

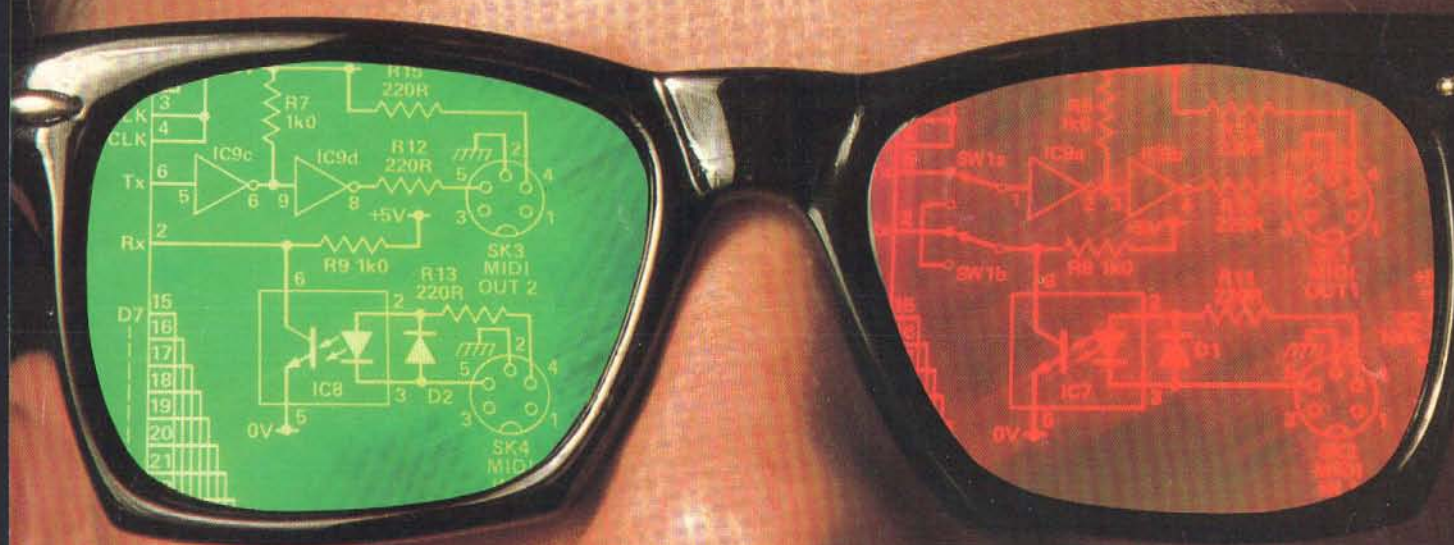
AN ARGUS SPECIALIST PUBLICATION

A&B

OCTOBER 1987
£1.50

COMPUTING

FOR BBC MICRO, BBC MASTER & ELECTRON



SIZZLING CIRCUITS
BBC MICRO IN ANALYSIS
AND DESIGN

INTERSPAN
—ELECTRONIC MAIL

**ARCHIMEDES
INSIDE:**
SOUND AND GRAPHICS
ARM ASSEMBLER
BASIC V

CRAZY RIDER

FREE ENHANCED BBC MASTER VERSION

- Extra Race Circuits
- Extra Graphics
- Extra Music
- Auto-Demo Mode
- Extra Game Features



A PROGRAMMING BREAKTHROUGH
The first Electron motor racing game to faithfully represent the bends and chicanes of major international racetracks.



Setting the Scene



Going round the bend at Misano (BBC MICRO VERSION)



Knocking off an opposing rider (BBC MICRO VERSION)



Clever Electron programming techniques (ACORN ELECTRON VERSION)

If you can't beat them, knock them off!

Howling round the bends at Le Mans at 150 m.p.h. is a daunting experience. You'll need nerves of steel and slick reflexes to finish in the Top 6 and qualify for the next race. If, at first, you can't make the grade you can always let off steam (and gain bonus points) by bumping into the other riders and knocking them off their bikes; listen for the terrified wail as the rider is sent flying to the ground.

Each race has 60 participants — and the further you get, the tougher the competition becomes. Bonus points are awarded for a good finishing position, and your "hit-count" shown at the top of the screen records the number of other riders you have sent tumbling from their steeds.

Seven top international racetracks are featured:-

- Le Mans (France)
- Anderstorp (Sweden)
- Paul Ricard (France)
- Brands Hatch (U.K.)
- Misano (Italy)
- Silverstone (U.K.)
- Nurburgring (W. Germany)

An enhanced version has been specially produced for owners of the BBC Master Series computers. Included free with all BBC Micro cassettes and discs, this version features several extra race circuits, a beautiful 6-minute musical soundtrack, and a host of extra game features — making full use of the Master's extra memory and capabilities.



BBC Micro Cassette..... **£9.95** Acorn Electron Cassette... **£9.95**
BBC Micro 5 1/4" Disc **£11.95** Acorn Electron 3 1/2" Disc. **£14.95**
BBC Master Compact 3 1/2" Disc **£14.95**

(Compatible with the BBC B, B+ and Master Series computers).

PRIZE COMPETITION

A superb MZ Simson sports moped (illustrated above) worth £500 is the first prize in our competition.

To enter the competition, you must finish in qualifying position on the first 21 racetracks, and note down the congratulatory messages you receive. Closing Date: 31st March, 1988.

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- All mail orders are despatched within 24 hours by first-class post.
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No.1, Leader of the pack!!!

Choice of 5 packs

Artroom **SAVE UP TO £12.90**

£30 5 1/4 inch Disc (ADFS ONLY) £34 3 1/2 inch Disc
With Digimouse add **£35**

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:

Machine
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 5 1/4 inch Disc

£34 3 1/2 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 NLQ 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

RAMROD



£50 5 1/4 inch disc £60 ROM £54 3 1/2 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

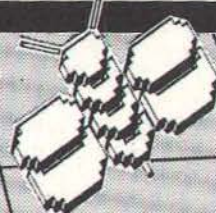
We are also making BROM+ available under this offer. Its main feature is the full scrolling BASIC editor which allows the user to edit a program as if dealing with text in a wordprocessor. There are many other features dedicated to making life easier for BASIC programmers.

'This is the best BASIC screen editor I have so far used.'

—MICRO USER August 85

For BROM+ add £25 on ROM,
£20 for 5.25 inch disc or £22 for 3.5 inch disc.

Suppliers of top
quality software
for the range of
Acorn Computers

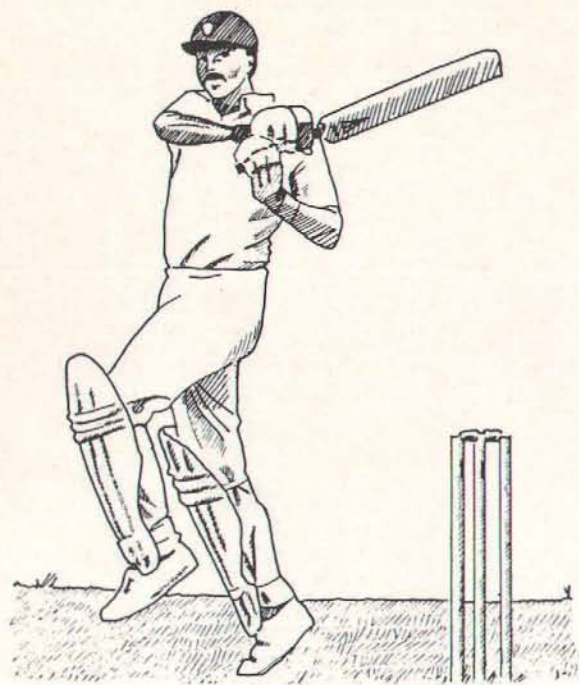


Clares

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Cheshire CW9 7DA Tel: 0606 48511



DON'T FORGET, YOU CAN ORDER WITH ACCESS CARD TOO!



SIX HITS FROM ASL

GRAHAM GOOCH'S TEST CRICKET

The best cricket simulation of all time comes at last to the BBC and Electron. Pick your own teams from squads of English and Australian test stars, then play in all-action arcade mode, or totally realistic simulation mode.

Graham Gooch's Test Cricket offers arcade-action, authentic scoring and averages, plus action replays. It's just the thing for a rainy day!

BBC/Electron cassette £9.95, BBC disk £11.95 (Master compatible)

OMEGA ORB

Peter Scott, whose diary appeared regularly in A & B Computing, has at last finished his masterpiece, *Omega Orb*. In his inimitable arcade adventure style, but with more puzzles and more challenges than ever before, *Omega Orb* finds BLIP, the bouncing Omega salesdroid on the planet Mynix. Can you find the twelve vital objects and save civilization as we know it?

BBC/Electron cassette £7.95, BBC disk £11.95 (Master compatible)

SPHERE OF DESTINY

Fast, thrilling action from maverick Gary Partis. Watch out for the deadly black holes as Bruce the bashful jetball careers along the intergalactic freeway in a seemingly never-ending search for his own true love.

If you're a Gary Partis fan you must add this one to your collection!

BBC/Electron cassette £7.95, BBC disk £11.95 (Master compatible).

PSYCASTRIA

Challenging arcade action from Gary Partis. Superfast smooth-scrolling action like you've never seen before in a classic shoot-em-up which shot to No.1 in the BBC charts.

BBC/Electron cassette £7.95, BBC disk £11.95 (Master compatible).

THUNDERSTRUCK 2

Subtitled *The MindMaster*. Even better than the first program in this classic mini-series from Peter Scott.

BBC/Electron cassette £7.95, BBC disk £11.95 (Master compatible).

SWIFT SPREADSHEET

A really powerful spreadsheet with pop up menus for simplicity, crammed into a single chip that fits inside your BBC. Only £29.95

COMING SOON.....

RANSACK by Peter Scott.....

IMPACT by Gary Partis.....

and introducing Dean Lester with ZIGGY.

WHERE TO BUY ASL PROGRAMS....

Not all shops sell software for BBC and Electron - but in those that do you'll invariably find most of our products. However, we also operate a fast and efficient mail order service. Send a cheque or Postal Order to our sales office at the address below, or phone 0734 303663 to order using your Access or Visa card.

Audiogenic Software Ltd.

Unit 12, Chiltern Enterprise Park, Station Road, Theale, Berkshire RG7 4AA

A&B COMPUTING

**Volume
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October
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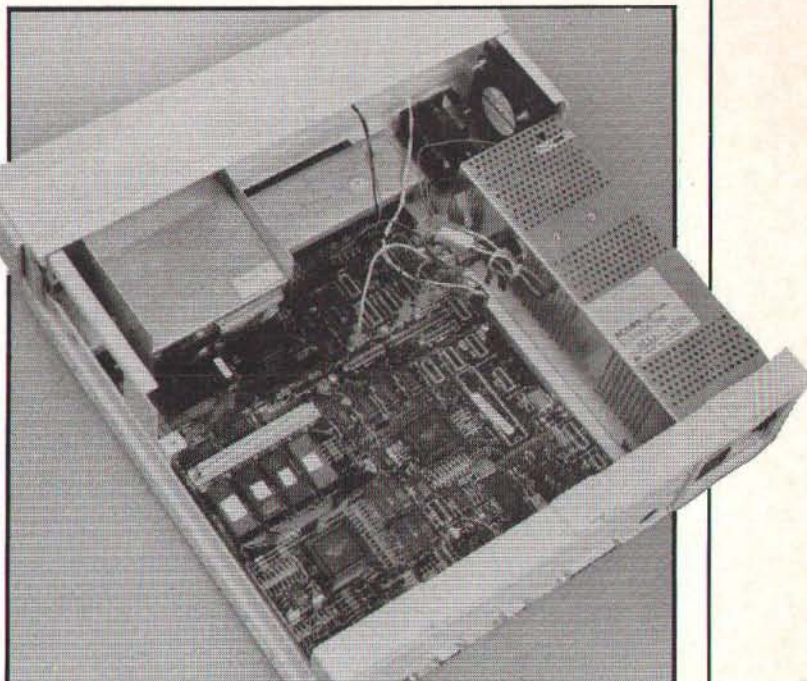
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Electronic mail brought to you as you sleep, via Interspan



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NEWS

Comeback — Acorn companies reply to our reviews and news items PCB improvements from Pineapple

Pineapple have responded to ideas for improvements to their PCB designer program. Customers can receive updates at no charge by sending in their old ROM.

New features are:

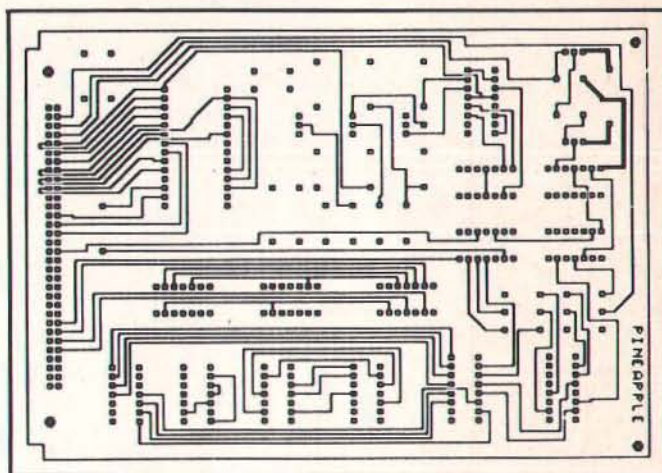
- double sized printouts are now possible
 - any rectangular area of the screen may be copied or deleted
 - during the track redrawing stage the component outline shapes may be superimposed on the screen as well as the Ascii component idents
 - the cursor can be returned to the centre
 - you can define the print area
- Pineapple may be coming back to us again in the near future with news of an auto-routing feature. Details on 01 599 1476

Master Replay from Vine Micros

Thanks for mentioning our Master products. We wish to confirm that our 'Master to B' conversion does in fact allow most of the BBC Model B tapes (which are otherwise incompatible with the Master) to be used and transferred to disc on the Master computer. It does not mean, as you implied, that this conversion allowed BBC Model B REPLAY owners to upgrade this utility to be Master compatible. I am afraid that this is a service which we are unable to offer.

Graphics Specials

Millipede Electronic Graphics have announced an addition to their range of graphics processor boards with the Prisma 3. The hardware comes with integral power supply, BBC control ROM, reference manual, demonstration disc and all cables. Price £3250+VAT. The Prisma 2 is still available at £2195+VAT. Also available are Prisma 2 user manuals, Prisma 3 reference manuals and an Hitachi HD63484 ACRTC (main graphics chip) user's manual.



New BBC Software

BBC Enterprises software have two forthcoming releases: Black Queen and Bismark.

Black Queen is a contract bridge game for beginners and club players with features such as bidding, playing, scoring, and the review of a deal just played. Users can construct deals from standard or 'classic' ones in newspapers or books, play them and store them.

Bismark — Death of a Battleship — is a naval strategy game. The player, as the British Navy, fights the computer or takes the role either of the British or German forces against another player. There are two different scenarios, historical and theoretical, built in. Both are available late '87 and the predicted price for each package is £14.95.

NTQ Extensions

Permanent Memory Systems have introduced various new combinations of their NTQ fonts. Epson MX80 III, Star 10X and Epson FX100 printers are supported by special versions and NTQ can now be used with the Interword and Master combination.

NTQ is usually a two 16K ROM combination but PMS have combined these into 32K ROMs for Master 128 and Compact. Extension fonts are

also available in this form. For sideways RAM owners, font library discs are available providing 14 fonts for £15.00. Specific fonts (minimum four) can be ordered at £1.50 each. Details on 03552 32796.

Music 87

Peartree have renamed their new software for the Music 500 as Music 87. The hardware and software combined costs £79.95. Software only is £39.95. Details on 0480 50595.

A&B Computing Binders

Binders for A&B are available from our Reader Services department, price £5.95 inclusive of post and packing for inland orders. You can order by post by applying to A&B Binders, Reader Services, 9 Hall Road, Marylands Wood Estate, Hemel Hempstead, Herts HP2 7BH. Credit card (VISA and ACCESS) orders can be placed on 0442 211882.

CONTINUES ►

Half a dozen steps to the right decision.

When you've seen one printer you really haven't seen them all. That's why, when you're trying to choose your first or your next, you really need all the help you can get. Here are a few steps to get you started.

1 Compatibility. You needn't worry about matching any of our six 9-pin printers with your present system. A simple slot-in interface means that any



Star printer can be used with virtually any terminal or PC set up. And, equally important, the software command sets are switchable.

2 Value. Getting more doesn't mean you have to pay more. All our printers are proof of that. Whatever your budget, the Star 9-pin printers start from just £248 for the NL-10 going up to £589 for the NR-15.

3 Simplicity. The Front Control Panel on all Star business printers gives you total control at the touch of a button. Selecting draft or Near Letter Quality printing, print pitch, margins and paperfeed control are sheer simplicity. No mess, no fuss and no more fiddly DIP



switches for all your usual daily needs. All our machines have semi-automatic single sheet feeding too. Simply drop your page into the top, press a lever,



and the printer advances it to the correct position ready for printing.

4 Performance. Star's 9-pin range has a choice of two paper widths, either 10" or 15" (80 col or 136 col) and three performance levels 120, 180 and 240 cps for draft quality listings, state-

ments and spread sheets. They also have very respectable Near Letter Quality speeds of 30, 45 and 60 cps for correspondence and more important documents. In either mode, Star's print clarity is envied by our competition.

5 Support. When you buy a Star

printer you buy superb back up too. We've a National three-level support system which operates through all our registered Star dealers backed by the

finest distributors in the country, so you're in good hands. Should you need any help at any time, our dealers will give you all the friendly, knowledgeable assistance you need.

6 If you still can't quite make up your mind, fill out this coupon. We'll send you our brochure so you can discover even more about the remarkable Star range of printers for business. We'll also tell you about our range of 24-Pin printers too. Or just call Belinda on 01-840 1829.

Name _____

Company _____

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Postcode _____

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THE
Star
PRINTERS FOR BUSINESS

Star Micronics U.K. Ltd. Craven House,
40 Uxbridge Road, Ealing, London W5 2BS.
Telephone: 01-840 1800.

A division of Star Micronics Co., Ltd., Japan.

System Gamma Star

Commands such as *SGpie and *SGbars are the key to Minerva System's latest programmable application, System Gamma. The graphics management system requires Master 128/Compact, B+ with GXR ROM or Model B with shadow RAM and GXR.

As with their database system, ROM-based commands can be used in combination with BASIC directly by the programmer/user or the power of the graphics can be accessed via ready-written, menu-driven programs.

Histogram, scatter, line or pie chart format can be used. More than one graph may be plotted on the same axis and charts may be overlaid if required. Each graph may be individually scaled and labels may be entered as required. Already created graphs can be saved to disc. A full-screen editor allows the graphs to be feely labeled with the different text styles available.

Various statistical analyses such as Line of Best Fit and Standard Deviaton, may be selected for use on data entered in various ways including from keyboard and from Card Index. A macro facility allows repetitive tasks to be assigned to single operations. Intended extensions will involve importing data from packages such as Viewstore and InterBase.

Write for A&B Computing

A&B is constantly on the lookout for original and well written articles and software for publication.

We are especially interested in short utilities and demonstrations of programming techniques. Graphics and music specialists may also appreciate the ability of A&B Computing to deliver their programs to a large and appreciative audience.

All submitted material must be in machine readable form. This applies both to programs (in any language) and to documentation, which should be prepared with a BBC Micro wordprocessor. 5¼" disc (DFS 40/80,ADFS large/small) equally acceptable. Please also include hardcopy and any suitable illustrations (or roughs), photographs and/or screen dumps.

It's sensible to give us a ring before going ahead with any major work.

All submissions will be acknowledged and material returned if not required. On acceptance the copyright in such works which will pass to Argus Specialist Publications Limited will be paid for at competitive rates. All work for consideration should be sent to the editor at Submissions, A&B Computing, London W1R 3AB.

Cover up

Kador have introduced Seal 'n Type covers for the BBC Model B/B+. The transparent plastic remains in place even during use, protecting against dust and spillage. Price £5.50. Kador are at PO Box 20, Ashford, Middx TW15 2QE.

C Release

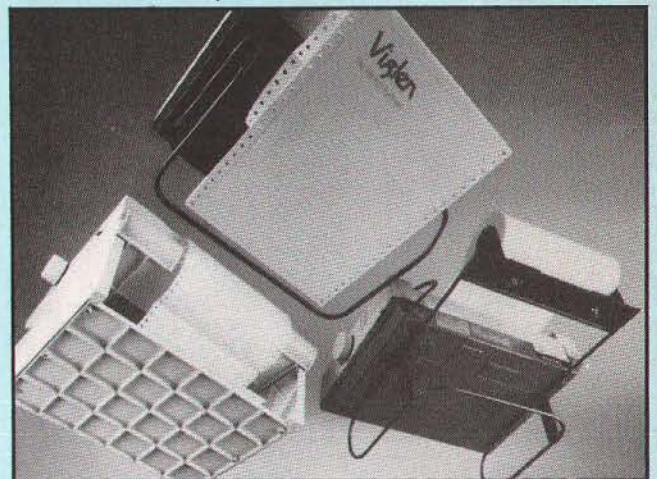
Following our brief news item last month, Brasscourt Ltd have given us some background to their version of the C language, which is now released. Entirely British owned, the product was developed in Britain and the USA over a nine month development cycle and Brasscourt believe it to be one of the largest software packages ever developed for the 65nn range of processors.

The BBC was chosen to write the compiler (using the assembler and editor which forms part of the package) rather than the Apple IIE to which it is now being converted. The compiler works with Model B or Master and the programs generated by the package will also run on the Model B, Master or any other 6502 computer. Details on 0249 655980.

Viglen Printer Stands

Printer stands for use with 80 or 136 column printers are now available from Viglen at prices ranging from £9.95 to £29.95.

The bottom of the range is has been designed for use with the Centronics GLP II with a larger version (incorporating a paper roll holder) for other 80 column printers. Details on 01 843 9903.



Genie Utilities

PMS are supporting their Genie system with a set of utilities on disc, price £9.95 inclusive.

From the Desk Diary you can print out week planners, calendars and selected periods. Diary dates can be spooled to a disc file for incorporation into a wordprocessed document.

Multiple pages can be printed from the Notepad and a wildcard search can be made on keywords in Notepad pages. Pages can be transferred to other software via an ASCII file.

The Address Book can print multiple address labels or all the information in the entries. The same data can be sent to a disc file. Genie can now import addresses from other databases, selectively if required. The Phone Book can also be printed or spooled.

Genie owners can order, quoting their serial number, from PMS, 38 Mount Cameron Drive, East Kilbride, G74 2ES.

Bibliography Update

The latest stage of Jim McHugh's **A&B Computing magazine bibliography** is now ready.

Part 3 covers **June 1986 to May 1987** inclusive and contains **1,572 references in 95K of data** and software. The data format and dedicated database management software is the same fast machine code.

The Bibliography is available on 40 and 80 track discs for DFS.

Previous purchasers can bring their bibliography up to date for **£5.00**.

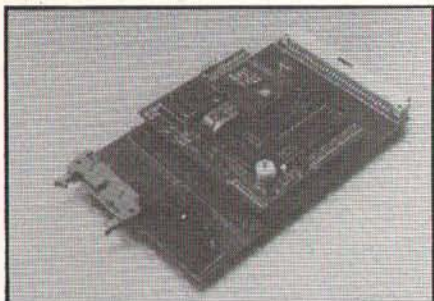
- Order product number DB55
- Buy the complete A&B bibliography in three parts for just £15.00
- Order product number DB40

CHIP SHOP

Euro Microbeeb

Following the introduction Cambridge Microprocessor Systems' Microbeeb — the BBC Micro, reduced to the size of a large matchbox — it appears to have grown a little. In order to fit the micro module onto a standard Eurocard, the system has been slightly expanded and named the Euro Microbeeb.

Designed for OEMs and companies working on bulk orders, this package holds many advantages over the standard BBC computer — you can program it in all of the usual languages, BBC BASIC, CMS' MULTI-BASIC, Pascal, FORTH and so on, but unlike a Beeb it will happily slot in with a Euroracking system making a huge saving in size. It also makes the Beeb more readily acceptable as an industrial computer.



On board the new unit is a full colour video controller, a ROM filing system, a serial filing system, four analogue input channels, three serial channels, a real time calendar clock and up to 64K of CMOS battery backed up RAM. The Euro carrier carries an RGB Video connector, a Centronics parallel printer port and a serial connector.

There's no secret about its size, CMS have been concentrating on surface mount techniques in a small multilayer board. Although the finished board looks like any other conventional board, there are three times as many surface mount components on the underside as there are conventional components on top.

Contact Cambridge Microprocessor Systems Ltd at Brookfield Business Centre, Twenty-pence Road, Cottenham, Cambridge, CB4 4PS. Tel 0954 51122

RAM on a card?

Personal memory cards are available for the BBC micro. These cards are about the size and thickness of a conventional credit card and can store computer information from 128K bits to 2 Mbits.

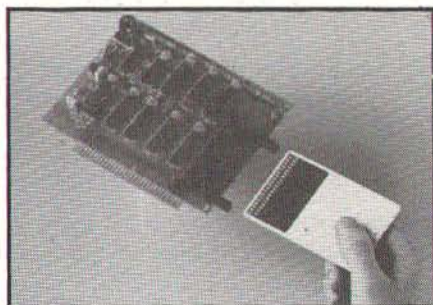
MIPS cards are available a range of different types, though they are all the same size and

Back again with all that's new in hardware

can all be connected to the BBC Micro or Master.

The MASK ROM card is the first type, enabling programs from 128K bits to 2 Mbits to be stored. This is ideal for mass producing games programs, and professional programs where high density ROMs would be unsuitable.

Another type is the EEP-ROM card, much like the common EPROM chip. This card is an



electrically erasable and programmable unit for the hobbyist and for small volumes. You can "blow" a card up to 10,000 times before it has to be replaced and is about 16 times faster to program than an EPROM because of a clever "Page write" operation, whereby complete blocks are sent to the chip for programming.

The last card available is the S-RAM card which will be able to store memory from 16K to 256K. Activated by a CMOS lithium battery, these are self contained units suitable for long term storage of programs.

Viglen are quick off the ball when it comes to MIPS accessories too, interfaces for the IBM PC, Commodore and Spectrum interfaces follow the BBC Micro's Read/Write adapter, although bulk copying can be achieved through gang copiers and IC card connectors.

**Contact Viglen, Unit 7, Trumpers way, Hanwell, London, W7 2AQ
Tel 01 843 9903**

Compact Companion

Probably one of the biggest gripes that Master Compact users have about their machines is their machine's inability to communicate to the outside world due to a lack of user interfaces.

Such interfaces are standard on the BBC Master series, yet Acorn, in their infinite wisdom, have only supplied an edge connector to the side of the Master Compact's keyboard unit. New from Mertec Computer Products is the Compact Companion, a small triangular box that makes use of this edge connector and restores most of the missing facilities, making the Master Compact a true alternative to the Master 128.

Once fitted, the Compact Companion offers a User Port, an Analogue (Joystick) Port, a 2MHz bus and an Acorn 1770 DFS. The connections are all standard Master 128 type connectors and the DFS may be configured to be the disc interface selected on turning on the machine. Not only that, but there is an interesting *CMENU command, enabling the user to have complete control over the interface software.

I am told that the fitting takes only two minutes using the two screws provided to bolt the interface firmly to the keyboard, what is impressive is its price, the unit costs £39.95 to you and me, and for schools and colleges, there's an educational discount available as well.

**Contact Mertec Computer Products, 33-36 Singleton Street, Swansea SA1 3QN
Tel (0792) 467 980**

Disc Caching for OS-9

More software support for the OS-9 Upgrade from Cumana is on the way from the Luton based Soft Centre enabling OS-9 to speed up read/write access times by as much as 100%.

OS-9 is no stranger to the pages of A&B Computing and was reviewed in January and June 87 by myself and Jon Vogler. The disc caching routines can be bought through any OS-9 licensee with a disc based system, whatever combination of hardware and software your OS-9 system has.

In operation, disc data is always read and written in complete tracks, rather than multiple accesses to smaller amounts of data. The cached data is held in memory buffers for as long as possible before being finally committed to disc.

**Contact Soft Centre, Software House, 36-38 John Street, Luton, LU1 2JE.
Tel (0592) 423425**

C O N T I N U E S ►

Colour Gone Wild

Newcastle Upon Tyne company Wild Vision have produced an intriguing device called the Hawk V8. It enables video images to be written directly to the video display memory of a BBC micro or Master.

With the Hawk V8, single frames may be grabbed or moving images analysed. The data capture and transfer is all managed by the Hawk box, leaving the BBC micro free to run whatever software is required.

What you need to make a complete system is a BBC B (or Master), the Hawk V8 unit and a video camera. The system comes complete with software in a 16K ROM to control the Hawk hardware and to perform various image processing and analysis tasks.

Software facilities include digital filtering, edge detection and image compression (for disc storage).

Contact Wild Vision, 6 Jesmond Road,
Newcastle Upon Tyne NE2 4PQ
Tel 091 281 8481

Speakeasy

West country based R&D Speech Technology have launched a new version of their Micro voice unit, specially adapted for the BBC Master. The Micro Voice unit provides a speech input facility and enables the BBC micro to react to words and simple sentences.

The basic Micro Voice features fourier analysis of the incoming sound and reacts to within half a second. The number of words stored by the user is limited by the the storage of your machine, but on the whole, every ten spoken words requires 1080 bytes of memory.

You can extend the Micro Voice system by adding an additional ROM allowing fifteen words or phrases to be stored in a template (whatever that may be!); another ROM increases the maximum to 20. The Micro Voice is a self contained package of hardware and software, and plugs into the User Port while a separate microphone and cartridge complete the package.

Contact R&D Speech Technology, Waterside
House, Ponsharden, Penryn,
Cornwall TR10 8AR

A Helping Hand

Micro Help computer services have released a set of four Help ROMs for the BBC micro. These ROMs can be fitted into a BBC B, B+ or Master 128 and they offer help on such diverse subjects as Wordwise Plus, BASIC programming and machine code.

For all of the ROMs the format is the same — they don't require any user memory, and they don't corrupt program space, so for the Programmers ROM and the Wordwise Plus ROM, you can call up the information stored in the 16K HELP chips without worrying about losing your program or document.

Micro Help also offer a comprehensive list of ROMs ranging from colours and screen memory Help commands, mathematical expressions, error handling, operating system

calls and graphics commands — just a few from a range of 47 ROMs. And if that isn't enough, you can have a custom ROM blown for you, holding all your own information. It need not hold information about the BBC computer, you could have telephone numbers readily available, or stock information or shop prices, addresses and codes, or even a timetable!

The ROMs can be plugged directly into your machine, or they are available in cartridge format and cost £19.95 each. Disc versions are available at £9.95 — three discs can be bought for the price of one ROM. The customizing service costs £24.95 for a 16K ROM and £10.95 for a disc version.

Contact Micro Help, PO Box 17, Newtown,
Powys SY16 1ZZ.
Tel 0686 27549

File transfer made easy

BAKsoft of Cambridge have released four disc packages for the B+, BBC Master and Master Compact, all of which enable files to be transferred from various computer systems over to BBC Micros. The four discs: DOScopy, TorchCopy, CPMcopy and CPMBeeb, are priced at £19.50 each run on any BBC Micro and can read and write to many formats.

DOScopy will read MS-DOS and PC-DOS files from all Apricot computers, the Atari ST range, RML Nimbus and all IBM and compatible machines.

CPMcopy reads and writes to many machines, the most popular being the Acorn Z80 format, Comemco, Epson PX-8 and QX10, Osborne Portable, RML 380Z and 480Z and the Tatung Einstein, amongst others.

Other formats can be added, but some machines, including IBM high density disc drives and the Amiga series, use hard sectorised discs which cannot be read by the BBC Micro.

The programs are menu driven and allow you to COPY, TYPE, RENAME and ERASE files, a useful facility is a hex dump. You can obtain a directory of the disc contents, and you can even format discs in some cases.

Contact BAKSoft, 20 Leys Avenue,
Cambridge CB4 2AW

Disc Drive Multiplexor

Technomatic have come up with a clever little device which enables more than one BBC Micro to use the same pair of disc drives. A cheap alternative to networking if you have less than four Beebs.

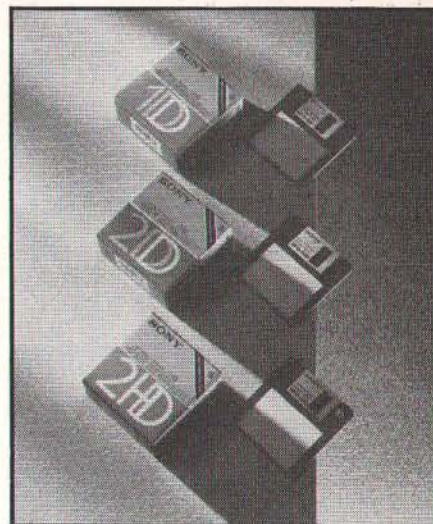
The Technomatic disc drive Multiplexor allows any combination of BBC Model Bs, Model B+s, and Masters. The only limitation is that you have to have only one filing system active at any one time — this means you can't have ADFS and DFS on the same disc of course, and you can't have one disc running GEM and another running a DFS application — but if you are planning on sharing up to four Beebs with two disc drives then contact Technomatic.

17 Burnley Road, London, NW10 1ED.
Tel 01 208 1177

Disc Dilemmas

Sony have decided to produce a new range of 2Mbyte 3.5 inch discs as these are currently in great demand, Sony tell me.

It seems that a world shortage was the inevitable result of computer manufacturers turning, almost overnight, to the more rugged and reliable 3.5 inch medium. Apple, Atari and Commodore now produce more 3.5 inch based computer systems than ever before, and sources inform me the new Acorn RISC computer will have at least one 3.5 inch drive.



For the present, this is good news for Electron Plus 3 and Master Compact users who are finding they are having to pay vastly inflated prices, just to support this medium — one local education authority has recommended the fitting of 5.25 inch drives to their Master Compacts to save money!

Sony's new range will only be available at selected dealers at first in their bid for world domination... I haven't the heart to tell them that IBM decided to produce their own brand of 3.5 inch discs over two months ago — expect a great price war boys and girls!

Quick Fix!

Has your computer or disc drive ever broken down? It's not a very nice feeling is it? One minute the centre of your computing universe is quite happily ticking away, and then *phut!* the system's broken down.

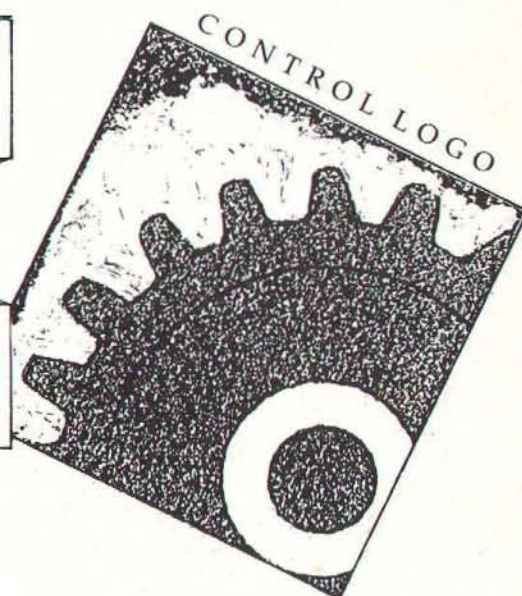
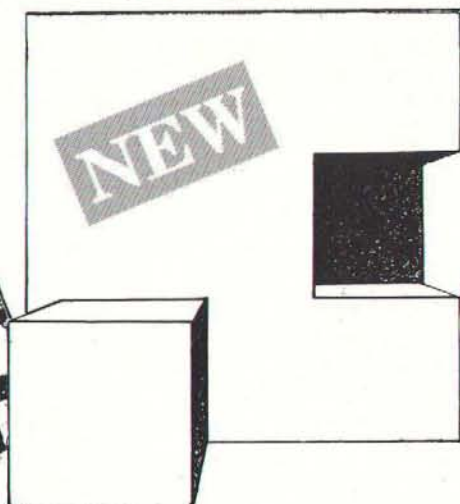
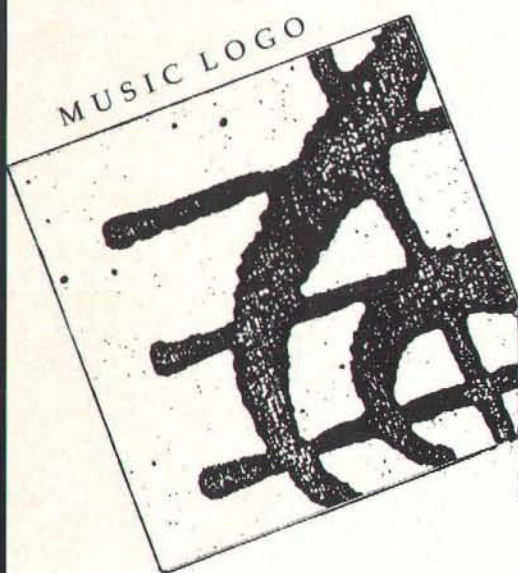
Naturally computer repair services are quite in demand. The onus is to get your machines up and running as soon as possible which is where Mancomp of Manchester specialize. Their repair rates for a blown out BBC start at £15, and if you can't wait for your old beeb, they normally have stocks of secondhand BBC micros, as well as disc drives and printers to sell you.

What's more, Mancomp offer a three month guarantee on all their repaired products, and if you bring your computer in for repair, they may even be able to offer a while you wait service.

Contact Mancomp, Printworks Lane,
Levenshulme, Manchester M19 3JP.
Tel 061 224 1888/9888

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C O U N T - O N - A B A C U S

The Archimedes Tapes

Mr Romarelli (Italy/Olivetti):
*Okay, we hadda da chow, now
 letsa getta da balla rolling.
 Whatta we gonna calla this
 gizmo?*

Mr Graphadopholus (Greece):
Let's call it Zorba!

(General groans from the whole
 meeting)

Romarelli: *Notta gain. Every
 new gizmo we get you wanna
 calla Zorba. Whena willa you
 admit that nobody willa taka us
 serious if we name it after
 Anthony Quinn. I veto. Next.*
 Mr Gomez (Mexico): *We want to
 call eet Zapata!*

Romarelli: *Why?*

Gomez: *Because eet a revo-
 lutionary machine.*

Romarelli: *Oh no. Whatta sorta
 image is that? All droopy mous-
 taches and bandoliers and shout-
 ing 'ariba'. I veto.*

Gomez: *What do you want to call
 eet then?*

Romarelli: *Ya gonna lova this.
 We wanna calla it Garibaldi!*

Gomez: *No, no, no, they already
 named a biscuit after him. I veto.*

(The heated debate went on far
 into the night with every nation's
 suggestion being swiftly rejected.
 By early morning desperation
 was creeping in).

Romarelli: *Alla righta, we beena
 through da famous footballers
 and da TV celebrities, what else
 can we try?*

Gomez: *What about philo-
 sopers?*

Stop press: A source close to
 Acorn has revealed exclusively
 to Abacus that actor Anthony
 Quinn has been offered a six-

figure fee to endorse a new
 computer planned for 1989.
 The name of the micro is still
 top secret.

Impress your friends by becoming totally fluent in Italian computer jargon in under five minutes.

Just follow these seven steps
 and you too could attend Olivetti
 board meetings without embar-
 rassment. Waving your arms
 about is optional but highly
 recommended.

(1) To start with — something
 easy: 'calcolatrice' (computer).
 (2) Add a nuance: 'bambino cal-
 colatrice' (microcomputer).

(3) Let's move on to adjectives:
 'stupendo graphico' (more than
 one screen colour).

(4) And something more tech-
 nical: 'immenso memoria'
 (fairly big memory).

(5) Now for a complete sentence:

'De formato disco molto
 rapido' (It's rather nifty in the
 formatting department).

(6) If, in conversation someone
 reaches step (5) ahead of you,
 blow them away with this: 'Mia
 bambino calcolatrice formato
 disco molto rapido indeedo!'
 adding (3) and (4) where appro-
 priate.

(7) Finally, name-dropping:
 'dela magnifico drollo guido's
 de Ghianda' (my very good
 friends at Acorn).

Congratulations, you have now
 mastered Olivettispeak.

ABACUS

— the column you can count on

**How does a computer end up with a name
 like Archimedes? Abacus reveals the true
 story — plus — your instant guide to fluent
 Olivettispeak.**

Romarelli: *Uh... Aristotle...
 Aristophanes...*

Gomez: *You forgot Archimedes.
 Romarelli: Archimedes. Now
 there's an idea.*

(General murmurs of agreement)
 Romarelli: *Can we live with the
 'eureka' jokes? And the jokes
 abouta running around witha no
 towel on while da bath spills
 over?*

(Shouts of 'Oui!', 'jah!', 'si!' and
 'no problem guv')

Romarelli: *Thenna we are alla
 greed.*

Graphadopholus: *Hold it. I'm
 not sure.*

Romarelli: *But hesa Greek.*

Graphadopholus: *Yes but it
 doesn't have quite the right ring
 to it.*

Romarelli: *Listen we wanna
 wrappa this up. Everyone elsa
 thinks itsa da right name.*

Whatta can we do to persuade
 you?

Graphadopholus: *Well there's
 justa one tiny thing you could
 do...*

Regrettably the tape ends here
 but at least it gives a genuine
 flavour of how big business deci-
 sions in the computer industry
 are made.

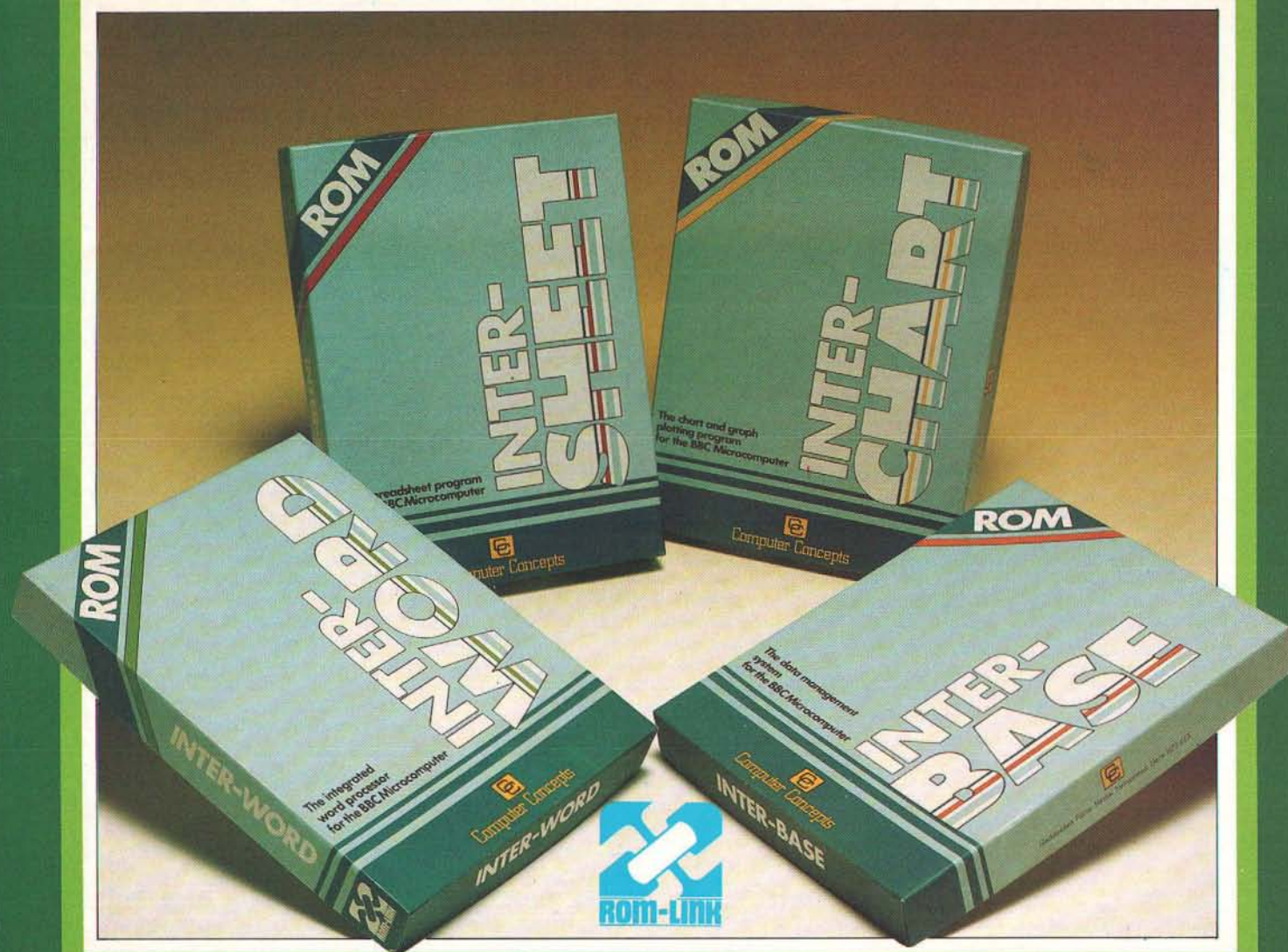
**Some people think that chris-
 tening a computer is just a
 matter of sitting around in the
 bath, waiting for that 'eureka
 moment' when the perfect
 name pops into your head.
 Unfortunately it's not quite as
 simple as that.**

**The naming of Archimedes
 was the subject of months of
 fierce negotiation between the
 national representatives of
 Acorn's empire. When no
 agreement was reached these
 minions were summoned from
 the four corners of the globe by
 Olivetti to an Extraordinary
 General Meeting held at a
 Pizzeria somewhere in Italy.**

**What follows are edited tran-
 scripts of tape recordings made
 secretly at the meeting. Only
 the names of the pizza toppings
 have been changed.**

THE COMPLETE SUITE

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INTER-CHART
INTER-WORD
INTER-BASE**

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Computer Concepts



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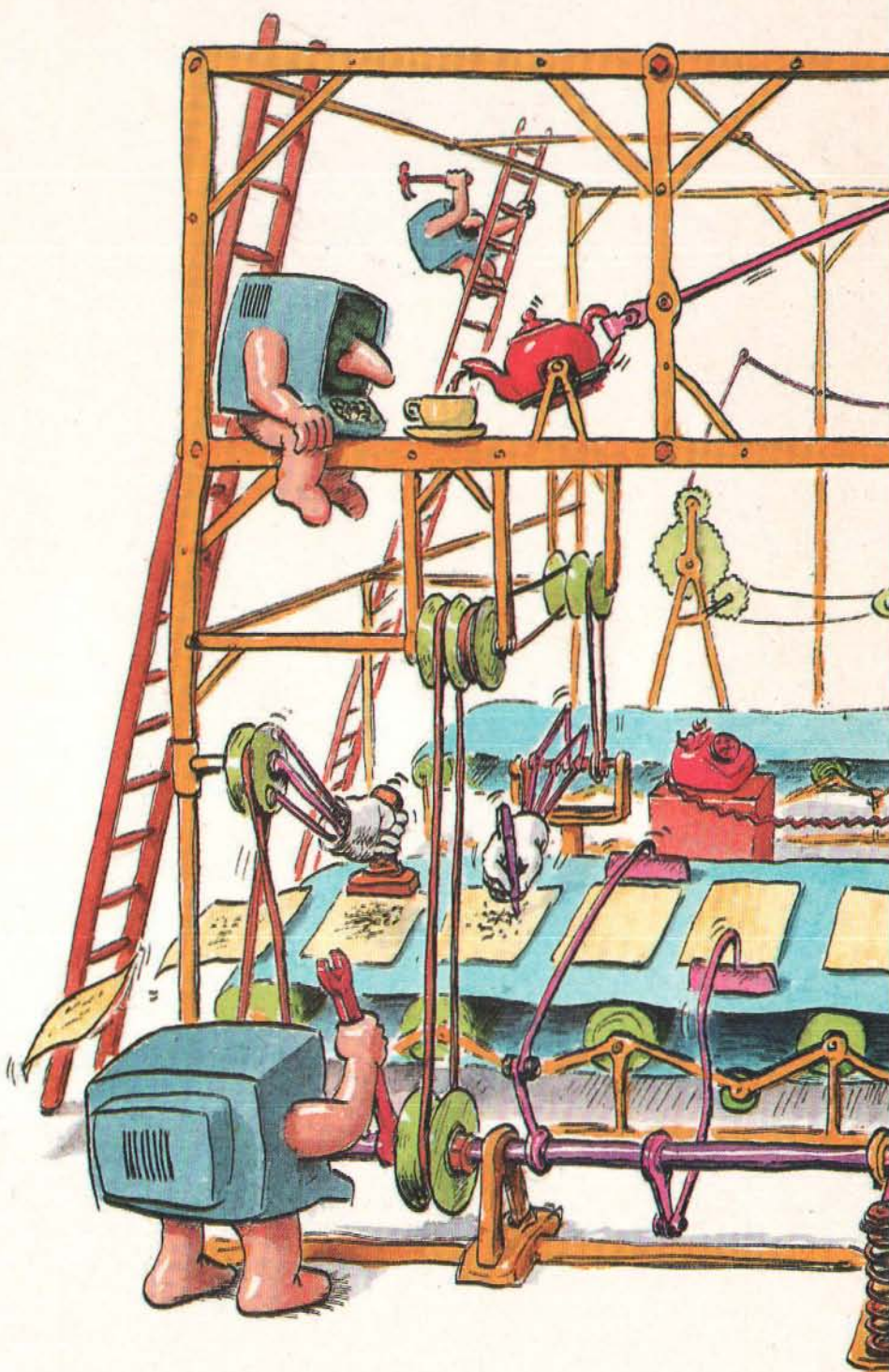
DOWN TO BUSINESS INTEGRATION

Down to Business

Separate office programs that will work together is what we've all been wanting ever since the Beeb appeared. Has true integration now become a possibility?

"Why can't I use them together?" has been asked by everyone who has run two different programs on a BBC Micro or any member of the BBC family of computers. While doing the accounts you want to analyse the trial balance using a spreadsheet. While word-processing correspondence you want to extract names and addresses from a database. To exploit auto-dialing software you want to pull telephone numbers from the database or transmit wordprocessed text files over the telephone wires. Not only would one computer rarely talk to another; neither would two or more software packages within a single computer communicate: even to incorporate tables of data in a word-processed report, use a graphics package to chart the information in a spreadsheet or display the statistics of a database.

Now, Glory be, this has changed! First, software houses ensured a common format for files; equipped packages to *spool* or *import* or *export*, *load* or *unload* data as a stream of ASCII characters. Small gains! Often the results proved unusable: files from one wordprocessor that sieze up another because it cannot digest text without *newline* characters, for example. So "switches" were added that gave a choice: yes or no to *newlines* with *carriage returns* and to *CRs* with *newlines* or that allowed the user to choose his *field separator* (the character that separates one database field, one spreadsheet cell or one word-processed text line from another): to replace a *carriage return* with a *bar* or a *tab* symbol.



DOWN TO BUSINESS INTEGRATION

However these were minor advances: a far cry from the Nirvana of full integration. Users wanted the ability to:

- Jump from one program to another without tedious key sequences and long delays.

- Take data with them when they made the jump.

- Select any part of the data to transfer, without loading the program that supplied it. Result: the biggest software boom in the past three years has been in packages which were either, themselves, an integrated set of office

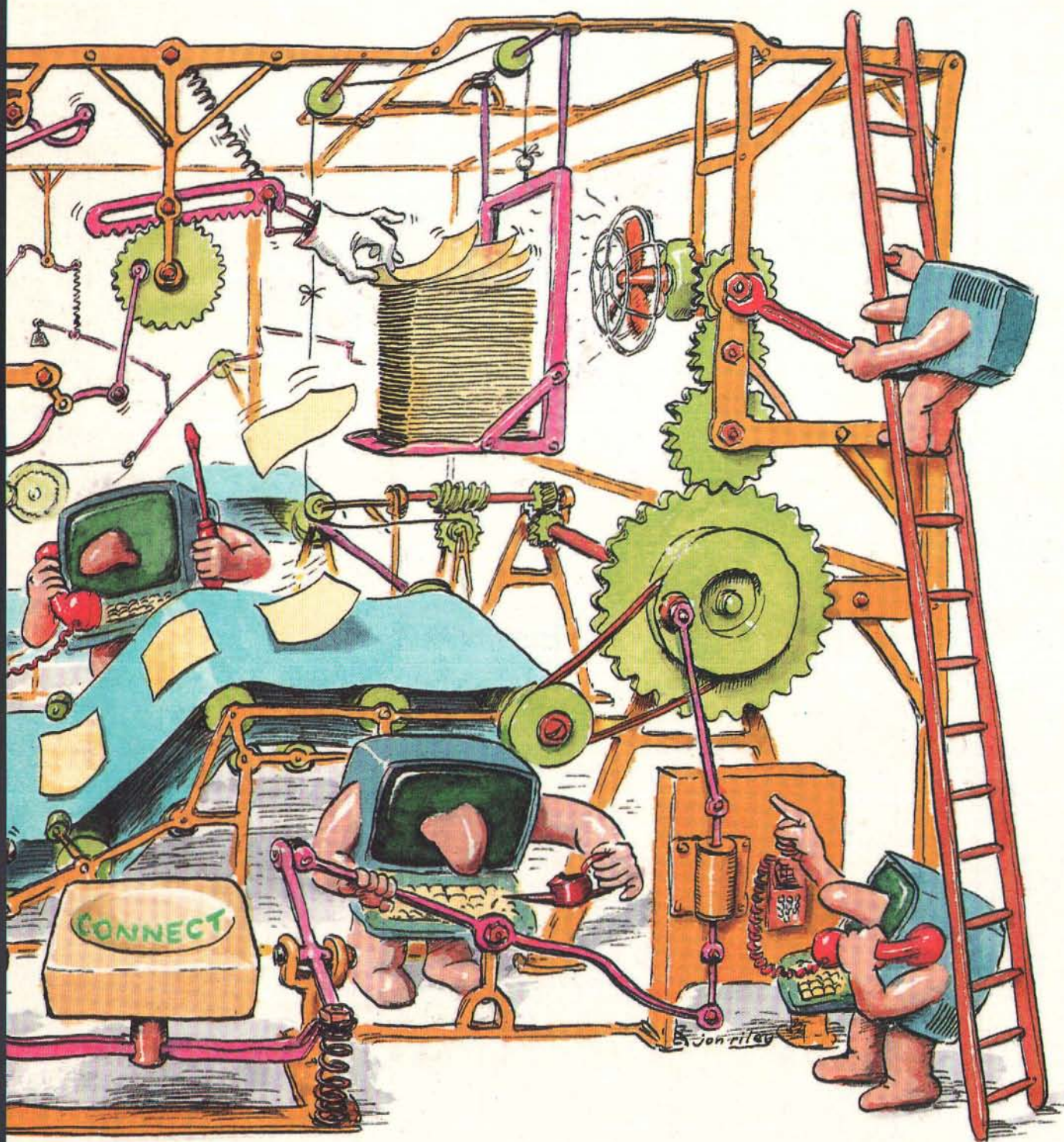
software or which created an environment in which separate software packages could be integrated. Different approaches were tried; all have benefits and limitations. It may be useful, for the business person seeking integration, to describe the various options:

- The minimum effort, exemplified by Acornsoft's *View*, *ViewSheet* and *ViewStore*, was to be content with common file formats, already described, plus standardised commands. If you use *Control-D* to delete one word forwards in the wordprocessor the same keystroke should delete one word

forwards in the database or spreadsheet. Apart from this, integration went little further than having similar colours on the cover of the handbook or the function-key title-strip!

- A far more imaginative approach was evolved by the writers of the highly successful *Lotus 123* and programs such as *Jazz* and *Symphony* which succeeded it, and now Acornsoft's *View Professional* (see *A&B Computing* September '87). All business

C O N T I N U E S ►



DOWN TO BUSINESS INTEGRATION

software was reduced to a spreadsheet. Make the cells a whole page wide and you are in a wordprocessor; treat the columns as separate fields and the rows as separate records and there is no difference between a spreadsheet and a database file. Then, isolate the separate functions in separate areas of the spreadsheet (remember a spreadsheet does not, really, have areas: only locations in the computer's memory) then traversing the spreadsheet (by a single keypress) feels like moving from one software package to another. Because it was quick to operate and simple to understand, many people overlooked the reduced power of each individual component, due to compromises necessary to make it compatible with the others.

- Other users, with a favourite program for each task: fastest word-processor, most flexible spread-sheet or easiest-to-understand database manager, wanted to integrate these chosen components. For them came the new generation of "graphic environment software". Programmes such as *Gem*, *MS-Windows* and *Epson's Taxi* purported to integrate any package, (that would run on the machine) within a "wimpish" operating environment. The main techniques were:

- Permitting two or more programs to run, simultaneously, in different windows of the screen.

- Providing mouse-driven operating commands, quick and easy to start new programs or examine files.

- Exploitation of the screen memory bit-map.

The latter is particularly interesting. BBC users have long lamented that scarce memory was reserved for driving a screen whose sole function was display. Why not also use this reservoir of carefully arranged binary bits as a means of transferring data from one program to another. Cut-and-paste techniques, often using an intermediate clipboard enable the user to select part of the screen map generated by, say, a database and load it into a word-processor. Of course problems arise between programs that treat the screen map differently: use a different text size or font, for example, and these environments have proved considerably less flexible than users originally hoped.

- The final technique is to hold the data in RAM: random-access memory. This was problematic for disc-based software, such as is used almost exclusively under *CP/M* or *MS-DOS*. As you load each new program from disc it over-writes everything currently in memory and existing programs had insufficient selectivity built in. Special suites of software, such as *PSION's Exchange* had to be written which would combine both the storage capacity of disc-based systems with the selective storage of data in memory. What a surprise then, to find the memory-scarce *Beeb* acting host to a suite of programs which achieves a high degree of integration by holding data purely in memory.

The Intersuite

Computer Concepts achieve this miracle by holding all the program code on chips. This gives double advantage: the user can switch between them instantaneously, with no disc accesses, and much of the RAM is available for the screen and the data. If you then off-load the screen's needs onto a "shadow RAM" board, you are left with quite a decent block of 24 kilobytes of memory to play with. Not sufficient for those who are writing encyclopaedias, doing the accounts for Harrods or putting all British Telecom's customers on a database, but just enough to get by in. Does it work? Will it do for your business? This article does not review the *Inter* suite: this has been done elsewhere in this magazine and a review of *Interbase*, the latest member of the suite appeared in *A&B Computing* September issue. Here I shall simply examine the *Inter* suite's suitability for business use and the effectiveness of its integration.

The *Inter* suite can integrate in two possible ways: by handling one another's disc files and by handling one another's data held in memory.

Integration through Disc Files

This entails an import/export process: each package must be able to export files in a format that can be read or imported by the others. The simplest example is *Interword's* option (main menu, option eight) to spool text. When *Interword* saves text onto disc it is in a slightly coded form which is understood by *Interword* but not, fully, by other programs. The spooling option churns out the text as an ASCII text file which can be read by almost any other software package. However special codes will have been omitted: for example if a text had markers in it, these would be missing from the spooled file.

Case Study

Newton Property Holdings is a one-person business that supplies furnished flats and bedsitting rooms. Some six different buildings contain over thirty units of accommodation, each containing one or more tenants. In these days of housing benefit for the unemployed, Rent Officers and Tribunals, planning applications and environmental health legislation, the occupation of landlord has become paper-ridden and a word-processor is a first essential. Most documents are largely standard and form letters, with boiler-plate paragraphs, all of comparatively short length, are efficiently handled by *Interword* with the standard paragraphs being called up, at print time, by colon commands embedded in the main text. By prefixing each boiler-plate paragraph with a distinctive string of characters all can be contained in a single package and identified using the *MOVEAFTER* and *GETTO* commands.

Tenants change frequently; so do rents and rates, telephone numbers and other details so all this information is held on a database. Newton tried various BBC databases, including *System Delta* and *Datagem*. He found the former unusable due to poor documentation. Although the latter was functional it would not integrate with other software. Initial trials with *Interbase*, using it solely as a card index, have already shown promise and the flexibility of the programming language offers the prospect of more sophisticated applications in future.

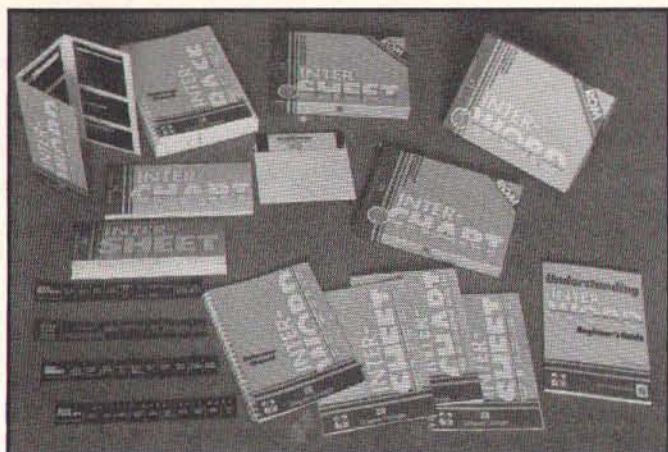
In property management, much accounting is repetitious: the same rents and rates being paid, by the same tenants, month after month. Conventional accounting packages are inefficient and demand that each item be entered every time so *Intersheet*,

has been used for the repetitive elements of the accounts; a single worksheet covering one property for a full year. Judicious use of the *copy area* command means that a month's book-keeping entries can be encompassed in a minute or two! Unfortunately there is no package that will handle the one-off book-keeping. How about it Computer Concepts?

New capital is required every time the business expands and the ability to impress your financier with a professionally produced proposal and feasibility study may be the difference between receiving a loan or being shown the door.

The ability to extract selected portions of the above mentioned spread-sheets, in order to construct convincing forward projection models, is augmented by attractive, see-it-at-a-glance, charts and graphs neatly labelled, within each proposal. Newton regrets that *Interchart* output cannot be incorporated within word-processed text and has to occupy a facing page but the overall effect, with full advantage taken of *Interword's* good control of bold-face, italics and enlarged print, has led to much appreciative comment from bank managers and other tycoons. Newton bought his BBC B when I bought mine. While I have moved on: to second processor, to hard disc, to *Unix*, to *Triple X* he has stuck, loyally, with his *Beeb*. His two complaints have been lack of an adequate database and of integration between software. If the *Inter* suite had not appeared, Newton would have been forced to replace the *Beeb* with an *MS-DOS* machine. Instead the money, time and effort involved can be devoted to the real business and the rugged *Beeb* has earned its keep many times over.

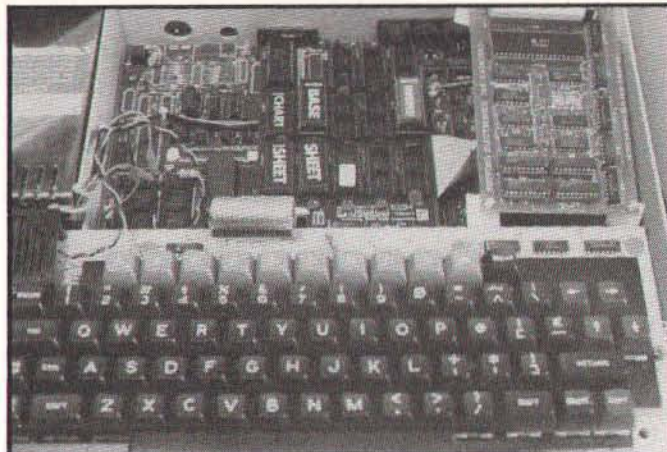
DOWN TO BUSINESS INTEGRATION



The integration Game

If you load a spooled *Interword* file into *Intersheet* it misbehaves: fills up one spreadsheet shell; then produces an error message. It will automatically arrange itself into specific cells (boxes) of the worksheet only if you specify which cell for each word or string of characters. To see how this is done run the process in reverse: export a worksheet from *Intersheet*, using main menu

option three, then import into any word processor (not necessarily sign followed, without a space, by the cell reference or box number such as "A6" or "M17". Then follow the contents of the first row of data, with a *tab* character between each box and a *return* character at the end of the row. Now take an ASCII text file, without control-codes but straight-forward, as spooled by your



The ROMs installed in a BBC B. A sideways RAM board is essential

wordprocessor, sign and a cell-reference at the start, intersperse it with suitable *tab* and *return* characters, ensure no cell entry is longer than the cell width you intend to use, and you can import it into *Intersheet*. *Intersheet* will export in either of two ways. Either the *contents* reflect any formulae entered such as:

sum (c6:c15)

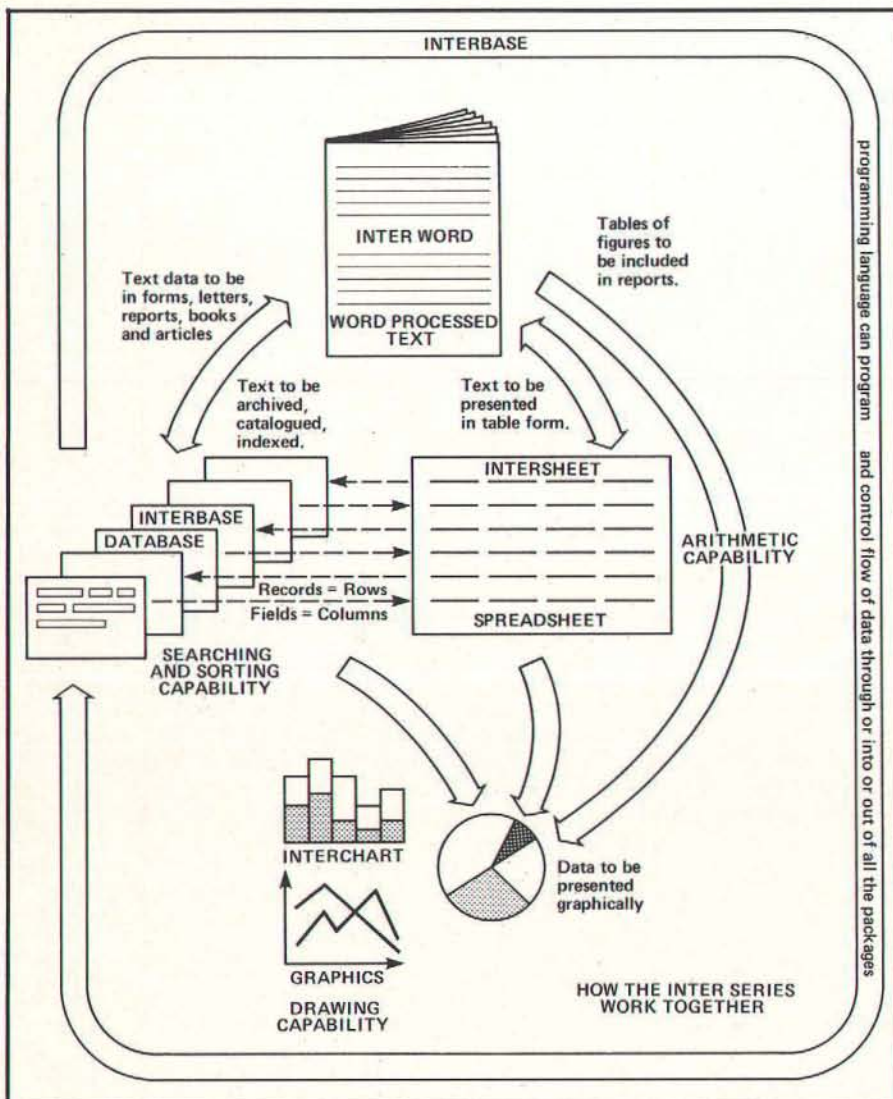
meaning that the cell should contain the total of the cells above it.

Or alternatively you can export the *results*, when the actual total figure itself would appear in that cell. Each *Inter* package has its own convention for files that it imports and exports. To work out that format, record the precise key presses to enter data at the keyboard. Thus, to enter data for an *Interchart* "scaled" graph, you enter pairs of x and y values, separated by a *return*, any number of times. The comma can be replaced by a *tab* character. *Interchart* however is a flexible program that allows the x axis to contain instead of numerical values, labels such as January, February, March for a chart of climate statistics or sales figures. As the absence of an x co-ordinate leaves the system guessing where to plot the next point, an automatic stepping function moves one step along the x axis every time a value is entered. When importing data from a file into *Interchart* it is therefore important to tell the graph if it is reading labels or data and, if the former, what sort of automatic stepping is to take place.

Finally *Interbase*. Part of my disappointment with *Interbase* was that there is no ready-made "report generator". It is left to the user to write, using the programming language and for many people (me, for instance) this will be impossible. *Interbase* comes with a disc of examples but these will only help those with the confidence to adapt them.

Swapping via Rom-link

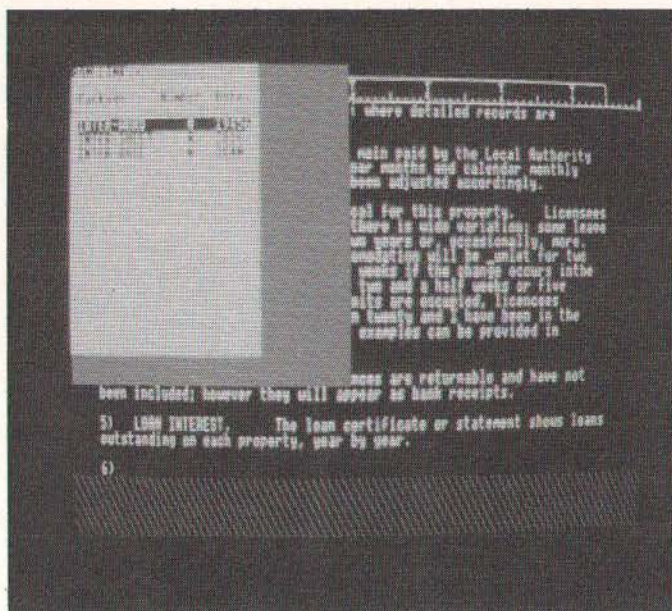
The glory of the *Inter* suite is that integration is possible in memory. Given the Beeb's acute memory shortage it is an incredible feat to



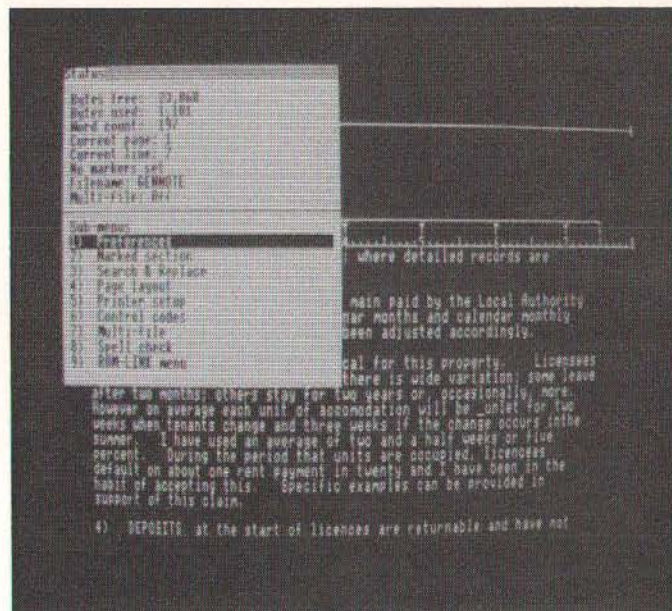
How the Inter series work together

CONTINUES ►

DOWN TO BUSINESS INTEGRATION



Interword: ROM-link menu shows which packages are active



Interword: pop-up menu

have created a system whereby four efficient packages can be resident while still accommodating, in theory, up to sixteen separate sets of data in different parts or the BBC memory. *Interbase* itself occupies no less than sixty-four kilobytes of memory: as much as the whole BBC memory put together! In practice it does not work out with a standard BBC B: you need, at minimum, a B+ or a shadow RAM board. Of course you will also need a ROM extension board to fit all five Inter chips (SHEET uses two), plus BBC BASIC and DFS into your BBC Micro at all. So do not contemplate using this suite seriously until you have bought these extra bits of hardware or you will experience only frustration and despair.

The technique is the same as *Wordwise* Plus: memory is split into separate "segments", each protected from being overwritten by the others. Each segment can lodge a "package", called by the name of the program that spawned it, followed by a number between zero and fifteen. You might have packages *Intersheet0*, *Intersheet1*, *Intersheet2*, *Interword0* and *Interchart0* all in memory at the same time. Only one of them is "active": the one that was last called with a BBC * command. However those which are not active can still be accessed: all or part of their data can be imported into other packages through the ROM-link process. This is elegantly simple: wherever BBC would have used a * command ROM-link uses a colon ":". This is followed by the address of the package that is required (which can be in abbreviated form "IS.4" or "IB.1", then another colon, then a command that says what you want to do with it: chosen from a battery of ROM-link commands which the sending program can manage. For example *Intersheet* offers five commands: four get different parts of the

spreadsheet: *GETBOX* will get the value of a single, specified box whereas *GETBOXES* gets the results of a range of them. *GETCONTENTS*, on the other hand, will get the formulae which drive the spreadsheet.

Because much of the power of *Intersheet* (as with any other spreadsheet) lies in its mathematical capabilities a final ROM-link command *TYPE* allows the mathematical function to be used in other packages. Thus it provides *Interword* with the on-screen arithmetic so much prized by business word-processors. A command such as:

:TYPE TAN (82) PLUS PI PLUS LOG (54.7) / TWENTY FIVE will insert the correct answer in the *Interword* text.

Interword has no less than seven colon commands. *GETTEXT* will import all the text from the package specified where as *GETMARKED* will only import the marked section. *GETTO* followed by a word will import all the text up to the specified word. Then there are three commands for moving around the package:

MOVETOP which moves to the very start of it, *MOVEAFTER* which moves the cursor to the character after a specified word and *MOVEFORWARD* followed by a number which moves the ROM-link pointer forward that number of characters. Finally *GETCHAR* followed by a number will import the specified number of characters from the package, starting from wherever the pointer has reached.

There are two ways in which you can import data into an *Interword* file via the ROM-link. Either you can give a colon command while you are in the menu and the data will be imported at the point where the text cursor is. Alternatively you can embed the ROM-link command in the text, just as, in *Wordwise* or *Interword* you embed various printer control instructions. The imported data does not appear until the file

is printed or previewed. However if you follow this latter course you must be sure that the called package is in memory whenever you print the text file in question.

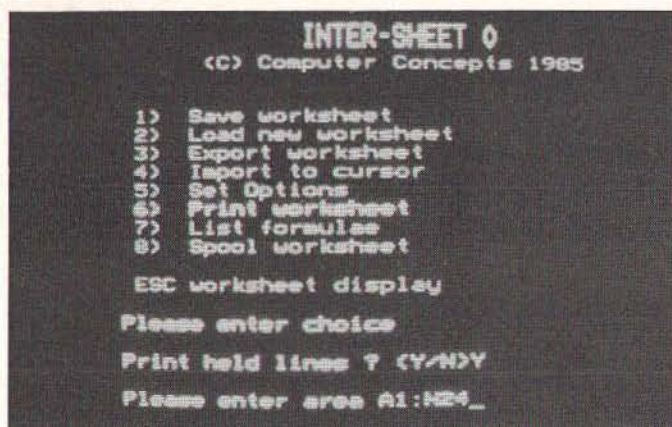
Interchart has no colon commands because it cannot export data to any of the other programs. If you had hoped to be able to include *Interchart* graphs and histograms in your reports, then forget it. You will have to print them separately. However *Interchart* can import data from *Intersheet*, *Interbase* or *Interword* provided the data is supplied to it in the form it requires.

The *Interbase* programming language can thus "drive" the whole suite. Here are a few of its many commands. *TEXT* will execute a specified text as a ROM-link command. *IMPORT* will obtain data from another package and *EXPORT* will send values, converted to ASCII strings, to any package that has called *Interbase*. Thus you can use it, although it is an *Interbase* command, to import information from *Intersheet* into *Interword*.

Finally there are a number of "utility" commands which can be used in any of the ROM-link packages. *CANCEL* removes the current package from memory while *KILL* removes all packages. *INFO* lists the current packages and their memory usage while *SAVEALL* saves all the current ROM-link packages into a single specified file. *LOADALL* loads them from that file on disk back into memory. So, if you are mail-merging an *Interbase* names-and-addresses file with an *Interword* text, and you had to interrupt to do your VAT return, you could use *SAVEALL* to stick them in a single file and, when the VAT-man was satisfied, *LOADALL* that file and resume your mail-merge with a minimum of effort.

The great joy of the ROM-link system is its speed: virtually instantaneous; no whirring of discs or swapping of floppies. Its

DOWN TO BUSINESS INTEGRATION



Intersheet: Main menu

drawback is that it is totally constrained by the BBC memory limitations. Although these may be relieved by the various enhancements nowadays available the *Inter* suite will not run with the Acorn, Torch or any other second-processor.

One criticism of the suite is that, to switch from one package to another, requires at least five keystrokes. I would like them included at the bottom of the main menu for each package. Many integrated suites have an enveloping main menu, the junction via which you pass to any package but, in practice, this may involve just as many keystrokes. The *Inter* suite allows use of the red function keys (with *shift* and *control*) and many users will write their own key scripts for switching packages.

Interbase

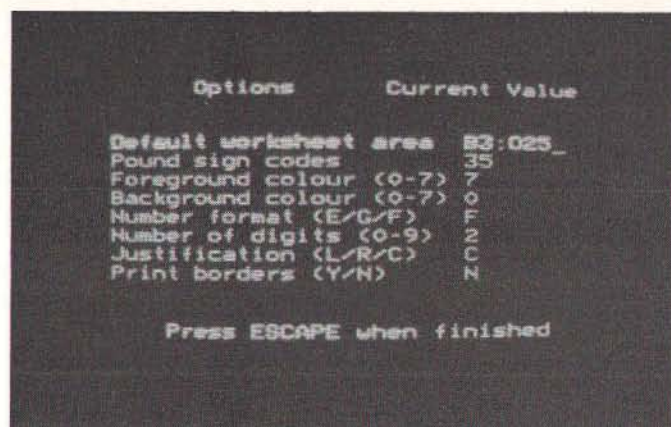
Interbase has just been launched on a single sixty-four-kilobyte ROM. It comprises four components: a card index database, a programming language, a text editor and a ROM-link to the other members of the suite.

The Card Index

This is totally conventional: menu driven

and simple to use. You create a database and state, in advance, how many fields you will require and how many bytes on the disc you want reserved. You then define fields, of any of five data types:

- a string
- an integer number which uses less storage space than
- a real number which can have decimal points
- a date format or a nice "multiple line" field: excellent for things like addresses or equipment specifications, where the data is on separate lines but constitutes a single field. From the menu you can index any or all fields, close the index temporarily, ask the index to only handle fields that satisfy a given condition and open and close database files. An option menu allows you to send control codes to your printer before or after printing, rebuild the database if you decide you do not like its structure but do not want to lose the data, alter the separator between fields, find information about how many records are in the database, how much space is left in the file and what is the state of the index and finally you can unhook an index so that it does not get tediously updated every time you add to, delete from or alter the database.



Intersheet: Options menu

Computer Concepts regard it less as a significant part of the product than as one example of the practical and conventional applications that can be written in the:

Interbase Programming Language

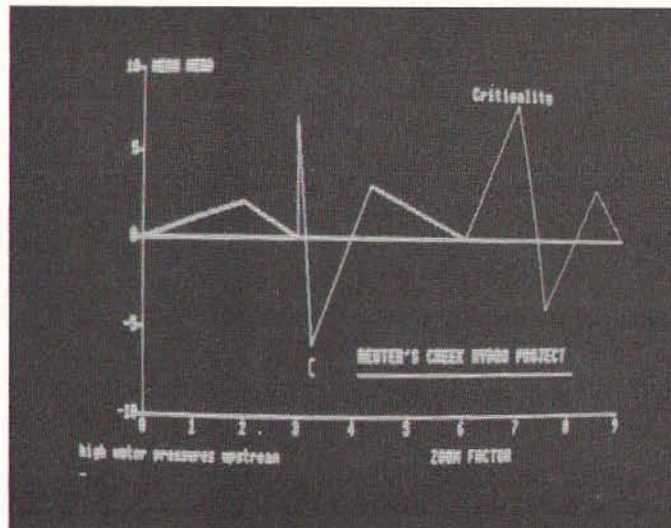
Computer Concepts were faced with a choice of four options:

1. To provide a fixed structure report generator and give it as many options as possible. This however would have left *Interbase* as no better than all the other inadequate databases that are available for the BBC Micro and was sensibly rejected.
2. To create their own programming language and force the user to learn it in order to write programs: the choice made for the *System Delta* database. Only a very small minority of professional programmers will ever manage to master the language, particularly if the documentation is poor.
3. To write a "fourth generation language" or
4. The choice taken by Computer Concepts, to use an existing, well known language and

C O N T I N U E S ►

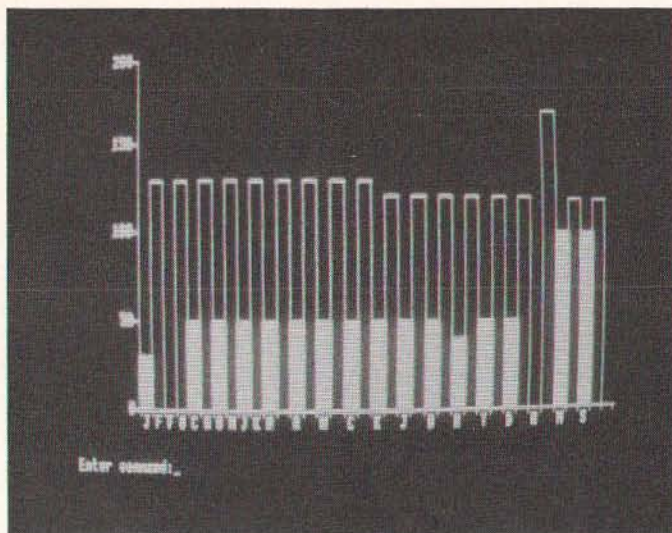
| NAME | SEP | WEEKS | MONTH | | | | | |
|---------------|--------|--------|-------|--|--|--|--|--|
| 21 Zondard | 50.00 | 120.72 | | | | | | |
| 41 Follingham | 50.00 | 120.72 | | | | | | |
| 51 Cary | 50.00 | 120.72 | | | | | | |
| 61 Oliver | 50.00 | 120.72 | | | | | | |
| 71 Joel | 50.00 | 120.72 | | | | | | |
| 81 Wiersma | 50.00 | 120.72 | | | | | | |
| 91 Rice | 50.00 | 120.72 | | | | | | |
| 101 Munday | 50.00 | 120.72 | | | | | | |
| 111 Chambers | 50.00 | 120.72 | | | | | | |
| 121 Kingston | 50.00 | 120.00 | | | | | | |
| 131 J. Smith | 50.00 | 120.00 | | | | | | |
| 141 Russell | 50.00 | 120.00 | | | | | | |
| 151 Rotella | 40.00 | 120.00 | | | | | | |
| 161 Taylor | 50.00 | 120.00 | | | | | | |
| 171 Davies | 50.00 | 120.00 | | | | | | |
| 181 Hodges+1 | 0.00 | 171.16 | | | | | | |
| 191 Marshall | 100.00 | 119.16 | | | | | | |
| 2019 Smith | 100.00 | 119.17 | | | | | | |

Intersheet in operation



Interchart: Line graph

DOWN TO BUSINESS INTEGRATION



Interchart: Histogram

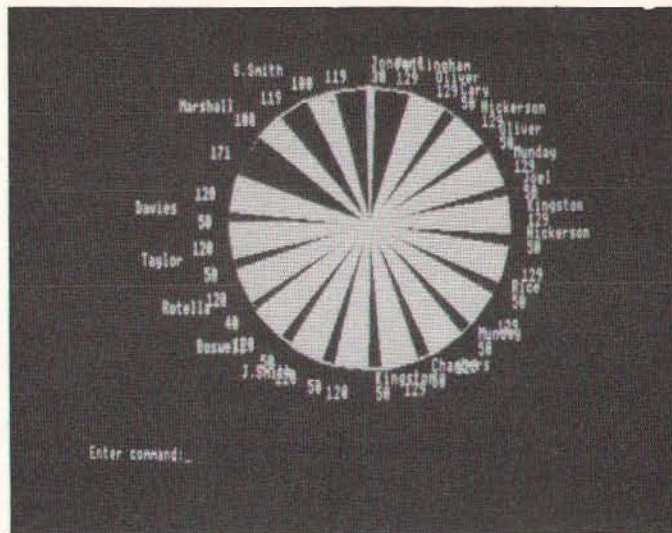
enhance it with a minimum of essential additional commands. Computer Concepts chose BBC BASIC and added features. They increased the size of variables from 255 characters to 32000. They improved the ability to chop up strings and handle separate parts of them so that, whereas in BBC BASIC you can only deal with the left or right or mid part of the string, *Interbase* will allow you to specify a character by its numbered position in the string. They provided facilities for converting upper-case to lower-case and for matching wild card choices. They did away with the line numbers and used labels for the procedures that make up the script. To the standard BBC BASIC control flow structures of *for..next* and *repeat .. until* they added three other functions: *while .. endwhile*, *case .. otherwise .. endcase* and *if .. then .. else*. With these tools, *Interbase* language is as powerful as anything that is going. Then in an attempt to make it easy to use they provided menus for the principle tasks of saving and loading programs, carrying out search and replace operations, printing and editing. To make life easier, the third component of *Interbase* is a program editor that uses very much the same syntax as *Interword* but is simpler and quicker of access when writing *Interbase* program scripts.

All in all an impressive package but it has one enormous disadvantage: it is "low level" which means that users, certainly most business users like myself, simply will not manage the time and effort needed to use it. What does "low level" mean? It is the difference between talking to a toddler and to an adult. To teach a toddler to eat you show it how to hold the spoon, how to use a fork, how to convey the food to the mouth and how to wipe the egg from its chin afterwards. With an adult such details can be encompassed in one command: "Eat" and the adult knows precisely what is required. Today's high level, fourth (and shortly fifth) generation languages, must be of the "Eat" variety to be acceptable to

business users who have neither the time nor the patience to learn the detailed commands used by *Interbase* for extracting the correct field from the correct record of the correct disc file and sending it to the correct part of the computer system.

Why did Computer Concepts not take the third option, of writing a high level or "fourth generation" language? Because of the BBC's limited memory. At the same time as reviewing the *Inter* suite I have been reviewing a package called *Sea-Change*: a "relational database" and "applications generator" that runs on my *Torch Triple X Unix* computer and uses a fourth generation approach. *Sea-Change* needs approximately one megabyte of random access memory and two megabytes of disc space and there you have it. With *Sea-Change* even I can write scripts that will handle half a dozen database files, all open simultaneously and joined together in complex ways, and extract the data in whatever way I want it: on a screen form, as a report or as a stream of information piped into another program. It may be possible to do this with *Interbase* but I would not like to take it on. However Computer Concepts have announced that various software houses are doing this and that ready-made applications packages, that will manipulate *Interbase* files, will be on the market shortly. They recommend that, if you need more than the bare card index and cannot cope with the language yourself, you wait until such "Third Party" software becomes available.

Interbase is a relational database; those clever enough to write the code can establish two or more completely separate files within a given database, with their indices (indexes), open at the same time and cross reference from one to another. Take our case study for example. There is one file with a separate record for each property unit, which defines its address, how many rooms it has, its rateable value and so. Quite a separate file contains, on a different record for each year, the rates levied by the Local and Water Authorities, with all their complexities of



Interchart: Pie chart

standing charges. Finally a third database file is used for each tenant: the rent they pay, which property they occupy, the terms of their tenancy and so on. All these files inter-relate. To calculate how much rates and water rates an individual tenant has to pay, tell *Interbase* what year it is and what rate the Local Authority levies and what property the tenants are living in. *Interbase* will then skim through all three files, extract the relevant data and carry out the arithmetic in accordance with formulae written into the programming scripts. What was a fifteen minute job becomes a fifteen second job: provided the files are kept up-to-date and the scripts are correct!

Assessment

The *Inter* suite takes the BBC as far, for office automation, as it is probably possible to go. It has the enormous benefits of speedy switching between programs, reliability, menu-driven ease of use, modest costs and excellent documentation. Its shortcoming is that none of its components has the power of equivalent packages on more powerful computers. However the shortcomings are remarkably few. Providing you are willing to keep your files fairly short, format titles and sub-headings yourself, live without automatic indexing and the production of tables of contents then *Interword* is a perfectly usable word-processor. Likewise, if you can put up with such irritations as inability to spread titles across several spreadsheet cells and bleeping forward reference warnings if you put totals in the first column instead of the last *Intersheet* can do all most spreadsheets do, on a small scale. *Interbase*'s programming language is far harder work than, say, *Informix* or *DBase III*, or even *DBase II*. However it costs £60 + VAT compared with between £400 and £900! *Interword* and *Intersheet* cost £49 + VAT (there is a discount for *Wordwise-Plus* owners) and *Interchart* is only £32 + VAT. For such prices they will satisfy a surprising range of your business computing needs. An essential kit for every Beeb!

NEW!

GENIE

Your wish is my command...

The Genie System only

£69.00 + VAT

(£79.35 inc. VAT plus £1 carriage)



GENIE can produce address labels, and pages of the diary notepad can be output to a printer.

In addition to these, stored in GENIE's memory are ASCII tables and lists of commonly used conversion factors eg metric to imperial units.

All the utilities in GENIE are MENU DRIVEN, making full use of cursor and function keys.

**Address Book - Desk Diary - Calculator - Calendar - Phone Book - Notepad.
Instantly - at any time - Magic??? No, just call GENIE!**

How often do you interrupt important work on your computer to use a calculator, look up your address book, consult your diary or make a note of something?

Have you ever wished for an invisible helper, just waiting there in the shadows, behind whatever program you are using, ready to appear, as if by magic, whenever needed?

GENIE - YOUR HELPER, HAS ARRIVED!

GENIE is a revolutionary new system which puts all your day-to-day information literally at your fingertips.

A single keystroke will call up GENIE, from WITHIN a wordprocessor, spreadsheet or other application software—no need to save your work—GENIE appears instantly on screen.

When finished, another keystroke makes GENIE vanish, immediately dropping you back to EXACTLY what you were doing, before you called GENIE.

GENIE is a totally self-contained system requiring no access to disk, it is present in your computer from the moment you switch on.

THE SOFTWARE

The GENIE System software—32K of machine code—has an original screen display, using high resolution windows with up to 7 colours on screen, AND 80 column text display. The screen colours are user selectable to give optimum clarity on any monitor.

GENIE provides; a 10 digit calculator with memory, a 100 year calendar, address book, desk diary, notepad and phone book. Information can be accessed by browsing, or by fast search techniques. The notepad is a mini-wordprocessor with word-wrap, and full cursor editing.

THE HARDWARE

GENIE 'lives' on a small circuit board only 3 inches square.

The GENIE System hardware uses a totally new memory paging technique, developed by PMS, which maps 32K of ROM and 64K of RAM into the address space of a single 16K sideways ROM.

The GENIE board is connected to the computer via a single header on 6 inches of ribbon cable. This header plugs into any ROM socket on the main BBC, MASTER or COMPACT board.

NO flying leads—NO soldering—NO modifications.



Permanent Memory Systems
38 MOUNT CAMERON DRIVE
EAST KILBRIDE G74 2ES, SCOTLAND

03552-32796 (24 Hour)



SPECIAL SHOW OFFERS

NTQ £29.95 new NTQ N32K Rom for Master £28.00 NTQ Font discs 15 fonts for £7.50 (1/2 price).
Money off, and free bundled software with E2P and B2P 2nd Processors.

PMS MULTI-FONT NTQ

Near Text Quality Typesetting Software

"Quite simply the best font software available for the BBC" - NTQ users say it - the reviewers agree -

If you want to produce quality worksheets, newsletters, OHP slides, menus, leaflets, concert programmes and tickets, exam papers, reports, invoices or just add style to your personal letters—NTQ's for you.

Use NTQ with VIEW, WORDWISE, INTERWORD, WORDPOWER* or BASIC on BBC, B, B+, MASTER, COMPACT and even ELECTRON with ANY EPSON compatible printer (MX and FX).

FONT LIBRARY CONTAINS OVER 35 HIGH QUALITY FONTS—standard typefaces + foreign languages + maths/science symbols + fancy styles.

Write or phone for leaflet and full list of fonts.

MIX FONTS, HEIGHTS, WIDTHS AND PITCHES IN ONE LINE OF TEXT—just like this:

**MULTI-HEIGHT
MULTI-FONT
BACKGROUNDS**
AóAÆÇèÀòòüöïè

**MULTI-WIDTH
MULTI-PITCH
INVERSE**
α±÷×√≡≠~≈~♪

Other features:

MICRO-JUSTIFICATION—right and left justified proportionally spaced text.

DRAFT mode—for a fast, rough copy for proof reading, but showing ALL NTQ features.

The basic NTQ system consists of a 2 ROM set—one ROM containing the NTQ driver software, and 3 fonts, the other containing a further 4 fonts. Any number of FONT EXTENSION ROMs can be added to the system, each one containing any 4 fonts of the user's choice selected from the FONT LIBRARY. Users can create their own fonts using the FONT DEFINER program supplied on the utilities disk. These fonts can be loaded into sideways RAM or burnt into ROM.

NTQ costs ONLY £34 (including VAT) plus £1 post and packing.

Please state disk size (5.25"/3.5") and printer type when ordering. For details of our Educational Site Licensing and Bulk Purchase agreements phone our Sales Office.

"Despite its power NTQ is a very easy package to use" (Educational Computing).

"The quality of text is quite outstanding" (TUBELINK).

*Also available: Power Font NTQ—a special version of NTQ for Ian Copestake's WORDPOWER word processor. This combines on-screen foreign/maths symbols with NTQ printout—a MUST for serious writers. (Phone 04867 4755 for info.).

A 6502 SECOND PROCESSOR AT AN AFFORDABLE PRICE!

PMS B2P-6502

THE SUB-£100 SECOND PROCESSOR

BANISH "Bad Mode" MESSAGES

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- ★ 44K in HiBASIC—from PMS

WIDEN WORD PROCESSING STORAGE

- ★ 30K VIEW 2—80 column display
- ★ 47K VIEW 3 and HiVIEW
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SWELL SPREAD SHEET SIZES

- ★ 30K VIEWSHEET—MODE 0
- ★ 44K ULTRACALC 2
- ★ 42K HiINTERSHEET

The B2P is fitted with a CMOS65C02 processor and works with both SINGLE and DOUBLE density DFS's. The "BOS" ROM, supplied with the B2P, contains the B2P Operating System + TUBE Toolkit—65C02 disassembler, B2P memory editor, memory shifters, printer buffer.

The B2P runs software obeying the ACORN TUBE protocols, this includes BASIC, the whole VIEW family, PASCAL, COMAL, LISP, BITSTIK etc...

The B2P is only 5.5" x 4" — external to the BBC — can be fitted internally if desired.

"I have no hesitation in giving it a firm thumbs up — high power at low cost." Acorn User (March 87)

YOU CAN ADD SECOND PROCESSOR POWER FOR ONLY

£99.95 (including VAT) + £2 carriage.

HiBASIC (disk or ROM) £5. HiWORDWISE PLUS £6.

ALSO AVAILABLE the E2P-6502 — ELECTRON version of the 6502 Second Processor — only £89 including VAT (Overseas orders no VAT required).



Permanent Memory Systems

38 MOUNT CAMERON DRIVE
EAST KILBRIDE G74 2ES
SCOTLAND

03552-32796 (24 Hour)

T H E A R C A D E

THE

ARCADE

Shock horror time! No brand new games this month from Gary Partis! What can The Arcade do? Well, how about awarding Game of the Month to a package that isn't strictly a game?

Welcome!

Ah, the Summer doldrums! Strangely, programmers are like the rest of us and prefer to spend those long Summer days loafing around the house, drinking beer and fine-tuning the tan.

So, very little new or explosive for us for a month or two. Companies are now looking hard at the imminent approach of the PCW Show (the spotlight for the year's supply of blockbusters) and I detail as much as I know of these plans in the *LOADing section.

Meanwhile, we have the next *Xor* project from Logotron, the first four budget games from ASL spin-off Top Ten, profiles of Arcade favourites Martin Edmondson and Nicholas Chamberlain, the new *Crazee Rider* from Superior and lots more.

Next month the column should be chock full of all sorts of goodies that lazy programmers didn't complete in time!

Game of the Month!

XOR for Schools
Logotron
Model B/Master
Disc £29.90
Graphics/sound 9

Playability 9
Originality 8
Options editor, designer
Lifespan 10
Overall 9

I hope you're all familiar with *XOR* - after all, we did supply you with a unique free demo on disc a few issues back. At the time we knew that Logotron had committed themselves to developing the game in much the same way as their suite of *Logo* programs has been expanded and, shortly, they released the *XOR Designer* package.

Now comes the ultimate *XOR* kit. Designed obviously for schools (this will be mail order only from Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ), it shows how, with imaginative development, a simple game can become a major piece of software with both entertainment and educational value.

The game is simple - a series of mazes have to be cleared within a fixed number of moves, whilst avoiding traps caused by the release of various icons that move in regular ways. Map icons can be found and there is a replay function that allows you to learn from your mistakes. I thought when it was first released that the game would be awful and I was prepared to say so - a nice surprise then to see that the free demo was not a poor program being cynically dumped but was instead using magazine publicity in a unique way.

The package consists of a number of familiar elements - inside a plain brown card envelope there are the two familiar packages of *XOR* game, *XOR* maze editor and icon designer but with the addition of six new introductory mazes, a maze planner (a photocopyable matrix that allows you to draw out your created mazes) and a very clear and well-designed A4 booklet of 24 pages.

There is nothing new here (apart from the new mazes and the planner) that will force you to dash your cheque off to Logotron if you already have the main elements but I am very

impressed with the whole package. It is well-designed both as a game and as back-up material - a very classy piece of software.

I'll leave it up to the education specialists to discuss how valuable this would be in a classroom - it seems to me, however, that pupils will return to this again and again from choice, which I don't think is true of many of the educational 'games' I have been unfortunate enough to see.

It gets my award as Game of the Month purely and simply because Logotron have put a lot of effort into the game and the package - that is as worthy of respect as any machine code blaster that I might personally prefer to play!

The Bug-Byte Compilation

Bug-Byte
Model B/Master
Disc £7.95
Overall 7

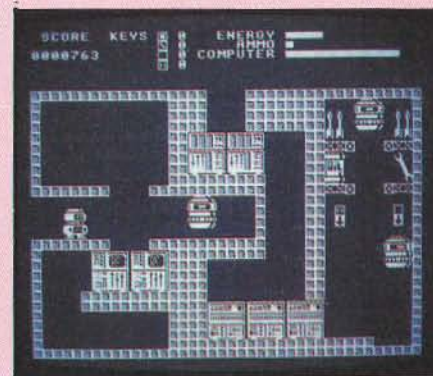
Nothing new here from Bug-Byte except a welcome step by them into the new and confused world of budget disc pricing policies! After last month's *Dunjunz* on disc, they've put together a selection of back catalogue material all originally selling for £1.99 on tape - save 1p and buy them on disc!

However, the collection is not strong as we've seen from earlier individual reviews. Both *Tennis* and *Skyhawk* from Margaret Stanger are poor even for budget games (note - anyone who thinks this column is ever biased should recall that Margaret is an A&B contributor whose articles are excellent but whose games are, er, not). *Star Force Seven* is an entirely predictable space strategy game but, thankfully, *Plan B* is excellent.

The game by Andrew Foord involves the search of a computer complex for ten keys allowing you to escape whilst destroying just about everything you see - lots of excellent large graphics and screen designs with puzzles



XOR, the final fling



Plan B - first among equals

T H E A R C A D E

and action enough to keep you thinking continually. If you're a fan of Peter Scott arcade adventures then you'll love this.

The package as a whole is weak, I'm afraid, but worth the price for the pleasure of getting *Plan B* on disc — for once a budget game that is considerably better than many full price offerings.

Crazee Rider

Superior Software/Acornsoft

Model B/B+/Master/Electron

Tape/disc £9.95/£11.95/£14.95

Graphics/sound 8

Playability 7

Originality 7

Options -

Lifespan 6

Overall 7

Kevin Edwards returns to Superior with a bang! This game is a bit of a curiosity for Beeb owners — we're the poor relations this time as the game was designed specifically to give Electron owners an excellent and fast motorbike game, after the very strong sales of the Electron version of *Overdrive*. Master owners get an enhanced version thrown in but Beeb owners just have the £500 sports moped prize to inspire them!

After an excellent loading screen you're faced with a screen split into three — at the top a map of the track (with your position marked) and current scores, in the middle the main view of track and other riders and, at the

bottom, a pair of handlebars with speed and race position. You're one of 60 riders on a choice of seven circuits (Master owners get more circuits, music, extra graphics, auto-demo mode and more — it's just *not* fair!) and the game is basically a race for the finish line. However, Kevin Edwards' usual vicious sense of humour is responsible for one imaginative difference between this and other racing games — part of the gameplay is bumping into other riders and knocking them to the ground! Nice touch, except when miscalculation leaves you standing as the pack of riders races past you instead.

There is nothing here that marks bold new steps into unknown programming areas — the

game is solidly put together but is not up to the usual high standard of Superior releases for the Beeb. The graphics are acceptable but are of *Grand Prix Construction Set* quality rather than *Revs*.

However, that is not really the point. The Electron version is what counts and here, I'm told, it does things at great speed to amaze Electron owners (cornering a strong technique point apparently). Perhaps Beeb owners should just be grateful that Superior's releasing policy does mean that games are planned across the range of machines and magnanimous in allowing Electron games players two Superior products in one month — *Crazee Rider* and the recoded *Stryker's Run* by Edmondson/Chamberlain.



Paper-Round, unreleased but not unloved

Programmer Profiles

We delve this month into the unblemished past of two of The Arcade's favourite programmers — Martin Edmondson and Nicholas Chamberlain. Perhaps it's because their first release *Ravenskull* had just been coded when I started this column and we therefore felt a natural affinity for fellow beginners or else that they saw the value of a good games column in the Beeb press for their future financial stability, but they have been meticulous in supplying me with early versions, maps and hints on their work.

Now they step forward and take the spotlight themselves, as well as providing a map and hints for the first two sectors of *Codename: DROID*.

As they always work together the background profile is of Martin, but much of it applies to them both.

"The first computer I ever laid hands on was a Commodore Pet in 1981 running a game called *Zooty's Invaders* (wow!). When everyone else seemed to be buying a Sinclair ZX81, I hung on for a while to see if anything better would arrive. It did, eventually, and I received a BBC Model A (+16K) for Christmas

1982 and Acornsoft's *Monsters* which I played virtually 24 hours a day, for weeks.

"During the next two months I wrote programs that performed ultra-useful tasks such as drawing boxes on the screen or playing the first few notes of 'We wish you a merry Christmas'!

"Not long after Nicholas got a BBC. This was great because it meant that I could swap games — everybody else I knew had VICs or Spectrums.

"At long last we decided to write a game. After several feeble efforts that never seemed to get past the 'Press Space to start' stage of production, we wrote an adventure. It was a disc based graphical adventure which was a daft idea to begin with as not many people had disc drives at the time. Despite this we still finished it but didn't bother offering it for publication.

"As soon as *Paperboy* appeared in the arcades, we decided to write a version for the BBC. With this game I think we pioneered '3D flicker-mation' but it looked quite nice. The



Crazee Rider — and all of a sudden Randy Mamola has 59 positions to make up!

C O N T I N U E S ►

T H E A R C A D E

game was shown to Superior who considered putting it on one of their compilations, but Kix beat us to it!

"Before we had really finished *Paper-Round* Nicholas showed me a four way scrolling routine which was VERY fast. This is where *Ravenskull* came from — use a Super Speed scroll to see it running at full tilt.

"As soon as this was finished we did *Codename: DROID*. Whilst writing this game we realised just how much more we could have crammed into *Ravenskull*. Can I just say at this moment to anyone about to copy the game in their twin deck hi-fi — STOP! — I quite possibly failed four 'A' levels to get that game finished! Have a heart!

"The next thing we wrote was *Stryker's Run* for the Electron, which proved very difficult. Our thanks to Kevin Edwards and Gary Partis for their advice on raising the speed of the game. This conversion took longer than we expected so sorry to any Elk owner who had difficulty getting a copy.

"For the future? Well, whether we write another BBC game will depend on the sales of *Codename: DROID*. The ST, Amiga and Archimedes all look inviting. *Zarch* on the Archimedes looks impressive running at about 15 frames per second — it's actually faster than the arcade game *I, Robot*.

"I now have a room devoted to computers, disc drives, printers and other things which I don't really need but look very impressive anyway!"

Thanks, Martin and now — the ever popular checklists —

Martin Edmondson

Age: 18.75

Games:

Paper-Round (unreleased)

Ravenskull (BBC, Elk)

Codename: DROID (BBC, Elk)

Stryker's Run (Elk conversion)

Interests: Very, very fast cars

Favourite games: Firetrack, Zalaga, Galaforce

Favourite food: Hamburgers

Favourite drink: Cherry Coke with a dash of meths!

TV: Blackadder, Only Fools & Horses, Just Good Friends, Ever Decreasing Circles

Film: Ruthless People

Novels: Wizwam & Martin Under the Sea; 68000 Programmer's Reference Guide and ROM Disassembly!

Hates: Cherry Coke without the meths! Also NUM, CND, NUT and IBM.

Nicholas Chamberlain

Age: 18

Games: As for Martin Edmondson

Interests: Tennis

Favourite Games: Revs, Aviator

Food: Hotdog and chips

Drink: Cider

TV: Moonlighting

Film: Nightmare on Elm Street

Hates: Cassettes, Micro Live and all other TV computer programmes.

Nicholas is too modest to send us a photo and to mention that it is his father who does the excellent title screens on their games.

Hints 'n' Tips

Codename: DROID

Our first hints for this game come courtesy of this month's Programmers in Profile. These are, of course, fairly general as the Superior competition is still running.

Sector One: the first guard at the stronghold entrance is easily dispensed with. Stand as far away as possible from him, jump and shoot.

Sector Two: there is a pressure pad activated trap in this sector. Shoot the next Volgan from the rope — there's a position where you can hit him but his shot passes over your head. When two ropes are side by side, it is quicker to jump from one to the other, rather than climbing one.

In this sector you will find the microfilm,

active even off the screen — you will hear it when it detonates.

You can destroy Volgans by tricking them into shooting each other — either stand between two that are running towards you and then jump out of the way as they fire, or stand to the right or left of both of them so that one shoots the other in the back.

Points are scored for shooting Volgans and for picking up equipment and objects. The score for the Volgans increases as you descend into the stronghold and they get harder to kill. At the end of the game you will be given a rating based on how close you came to completing your mission.

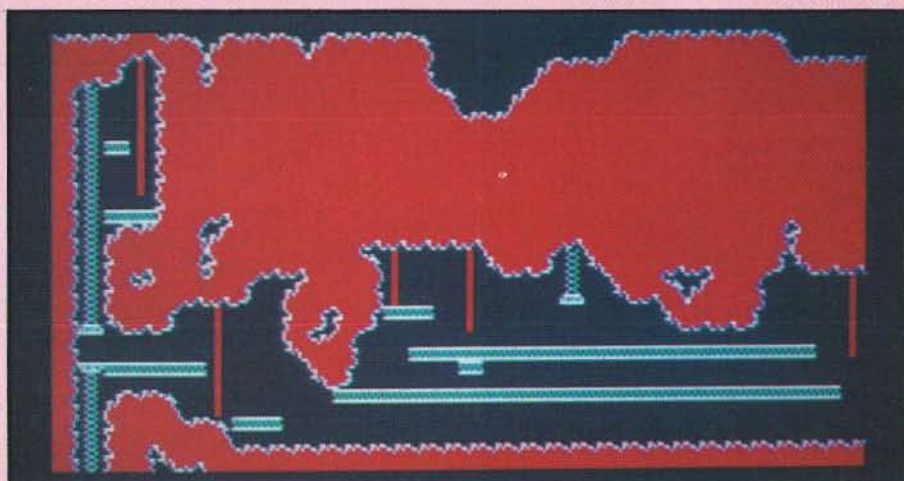
A quick listing for infinite lives for the game (disc version) comes from Andy Roberts of St Helens. Type it in, save it to another disc as 'DROID' and then RUN it.

10 REM Droid cheat

20 REM by Andy Roberts



Codename Droid — map one

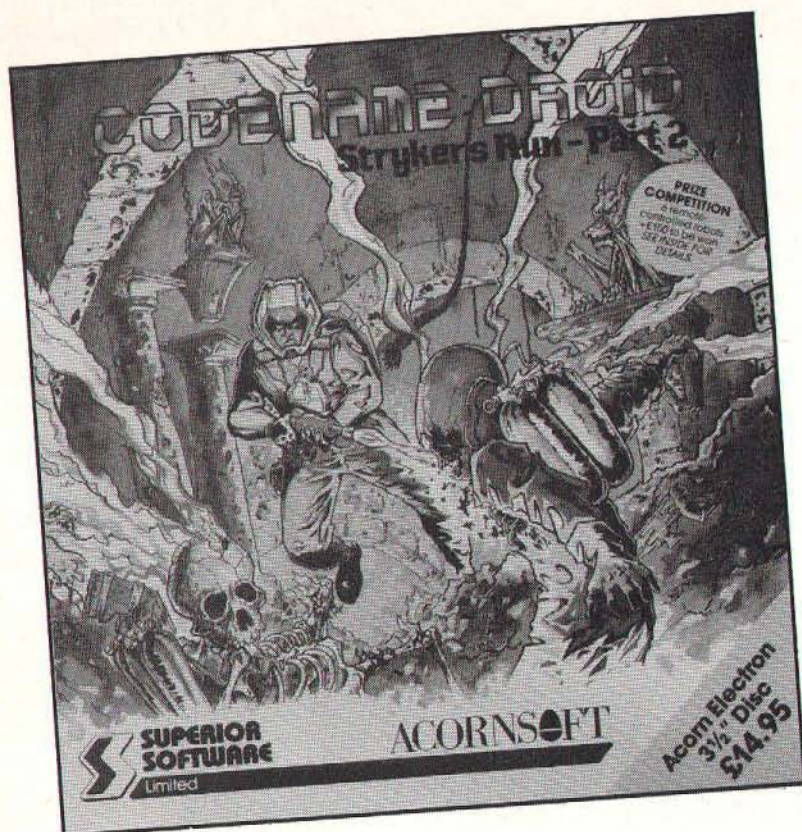


Codename Droid — map two

which can then be viewed via your wrist terminal. Z/X will scroll the map to show more information and will display the Volgan positions, but not their direction of movement.

General tips. To pick up equipment you must run into it — if you jump on it then you'll just stand on it, although you can use this to gain extra height. You can drop a mine on any flat surface but not on a slope. Take care not to run into your own mines! The mines remain

```
30 IF PAGE>&1100 THEN
PAGE=&1100:CH:"DROID"
40 MODE7:PRINT"Insert original disc and hit
Return";:FX15
50 REPEAT UNTIL GET=13
60 *INIT
70 ?&F9=0
80 MODE5:*LOAD STRYKER
90 ?&A99=&60
100 CALL&A00
110 !&3273=&2A7C4CEA
120 CALL&7700
```

Next month I'll be running a mega-cheat program by Mark Gidley that gives extra speed, infinite lives, infinite energy, infinite laser, infinite mines, infinite passcards and all maps without microfilm. Hardly worth playing the game!

Ricochets!

Just a quick note to welcome Mastertronic back into the BBC/Electron fold with some reissues on their new Ricochet label at £1.99.

So, if you missed the full price releases of Geoff Capes *Strong Man*, Eddie Kidd *Jump Challenge* and Gisburne's *Castle* (all originally Martech games) then here is your chance. Hopefully, more will follow.

Golf

Prism
Model B/Electron

Tape
Graphics/sound 6
Playability 6
Originality 7
Options one/two players
Lifespan 6

Overall 4.5 (B) > Here's a 1986 release that seems to have slipped past everybody - I found it in a pile of cheap tapes at the recent AU Show! A fairly basic golf simulation with options for nine or 18 hole rounds that draws holes fairly randomly but graphically adequately. Choose direction and strength of shot and, assuming you don't end up in the trees or a bunker, it is not too hard to find the hole.

Not as strong a game as CDS' *Birdie Barrage*, this is still a reasonable game — nothing offensive anyway. Might keep golf addicts quiet whilst awaiting Gary Partis' conversion of *Leader Board*.

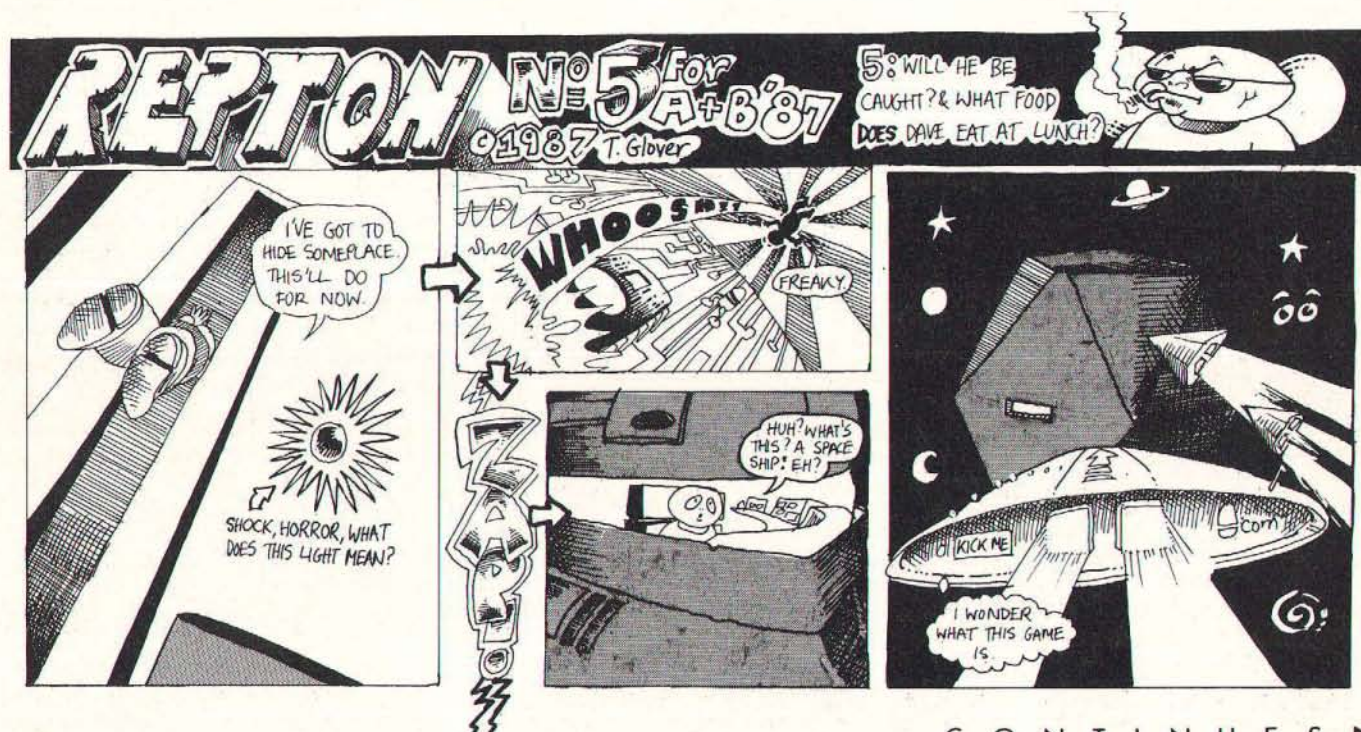
But what else has slipped out that we never see — if you have bought games that are never released, then please tell me. This column's intention is to review everything for you!

Panic!

Atlantis
Model B/Electron
Tape £1.99
Graphics/sound 6
Playability 4
Originality 4
Options pause
Lifespan 5
Overall 5

A bit unfair this — either the game is fatally bugged or I have something untraceable in my Beeb that this game dislikes!

Nothing more or less than an inferior copy of Acornsoft's old classic *Monsters*, you must dash up and down ladders digging holes and filling



CONTINUES ►

them in when the monsters fall in.

Trouble is — my copy doesn't allow you to dig any holes making the game a little difficult and pointless to play! Update next month if I manage to get a working copy from Atlantis.

The Times Computer Crosswords 1

Vector Services
Model B/Master/Compact/Electron
Tape/Disc £9.95/£12.95/£14.95

Graphics/sound 7
Playability 8
Originality 8
Options help
Lifespan 5
Overall 7

This package is the first result of seven years work by David Akenhead and his father Edmund, Times Crossword Editor from 1965-1983. It contains 60 crosswords that originally appeared in The Times in 1983 and is the start of a series that has *Times Computer Crosswords 2* and *Sun Computer Crosswords 1 and 2* due shortly.

This is obviously only going to appeal to addicts and, moreover, addicts who like a challenge. The graphics are clear and, after being asked to input a clue number, you are presented with the cryptic clue. A nice touch is then included — you can ask for extra clues or help if you can't answer immediately. Different scores are given depending on how much help you require.

The first help level merely points out what sort of clue it is — anagram, double meaning, literary reference, etc. Surprisingly, perhaps, at this level the crosswords are not as hard as you might imagine but, if stuck, the computer will give the answer if required.

I do like this package — a lot of thought has gone into it and, with subsequent releases, there is at last a product of real value for crossword addicts who wish to play on their computer. The price for 60 crosswords seems fair but I do wonder how often you'll return to a completed puzzle. I imagine this is mail order only as well — details from Vector Services, 13 Denington Road, Wellingborough, Northants.

What would be ideal, of course, is a crossword designer by the same authors. Perhaps one day?

Last of the Few?

Battle of Britain
Design People Software
Model B/B+/Master
Tape/Disc £9.95/£12.95
Graphics/sound 7
Playability 8
Originality 7
Options -
Lifespan 8
Overall 7

Another excellent simulation from Design People, following their successful *Sink the*

Bismark and *Tanks*. This time the action is set, obviously, in the Summer of 1940 and involves protecting Southern England from the ravages of the Luftwaffe.

Once again, war games purists will, no doubt, throw up their hands in horror but for computer games players interested in intelligent, well-designed simulations there is a lot here to keep you happy for a long time.

The screen shows the south coast, Channel and Northern France with RAF bases, radar installations and likely targets marked. Moving in five minute periods of action, the game allows you to detect the arrival of enemy forces (suitably inaccurate to reflect the reality of UK defences), scramble squadrons into the air and attempt to engage the enemy.

The computer does most of the hard work (you will only be told the result of successful aerial engagements, depending on how close your fighters are) and the skill of the game lies in a careful balancing of targets, fuel consumption and refitting time after missions. All controls are easy to use and the game is friendly enough not to require close study of the excellent instruction booklet, though this is recommended!

I can't vouch for the historical accuracy of the program but the simplicity of play (all on one screen, unlike the previous two simulations) means that it is a very enjoyable game. Full marks for simulations like this — an intelligent use of the computer that is never boring and doesn't require you to be a wargaming fanatic to enjoy playing. Its scores here really reflect the likely market though I do believe that many more of you would enjoy *Battle for Britain* than you might suspect.

Try something different this month — a change of pace is always welcome. As for me — I'm eager to see the next in the series!

Warehouse

Top Ten
Model B
Tape '1.99
Graphics/sound 7
Playability 8
Originality 7
Options quiet
Lifespan 7
Overall 7

First release from new budget software house Top Ten and an interesting beginning. Written by Philip Watts and Tim Bateman, the game resembles *Labyrinth* in its general playing style, although the graphics and plot are a lot more interesting.

Getting past the usual dire scenario, the game simply involves exploring a vast warehouse of rooms (get mapping!), shooting and avoiding nasties, whilst trying to find two objects each for six customers. Scrolls located around the game detail what each customer requires and some objects need to be found before parts of the game open up to you. Finally you must track down and kill the major baddie and then exit via a door. Nothing very unusual there, of course.

However, for a budget game this is

excellent value and a lot of fun to play. Nothing is outstanding but, equally, nothing is disappointing. One to search for, especially at the price.

And watch these two programmers — I have a feeling that they are just starting to flex their coding muscles!

Scott Overkill

Yoyo/Network/Pandemonium
Top Ten
Tape '1.99 each
Graphics/sound 8
Playability 8
Originality 5
Options -
Lifespan 6
Overall 7

No, nobody can accuse me of not liking Peter Scott's games — they've had enough space in this column for that. I enjoy his scheming mind with its penchant for puzzles, I love his large chunky graphics and I especially relish the humour that fills them.

However, this may just be too much of a good thing. Top Ten is a new software house formed by Martin Maynard (ex-ASL) and in his initial trawl for releases has bought up three early games from Peter (signed to ASL). They are all excellent, they could all sell quite comfortably at full price but they are so obviously early working versions of the ideas that led to a run of successful games for Audiogenic that the combined effect is that this reviewer is completely confused about which game he's been playing!

Hence this combined review. All the familiar Scott details are here — *Network*, for example, was originally going to be a sequel to *Hunkidory*, another early unreleased game that has just been offered at budget prices by Bug-Byte. The games are all fun, all well coded, all excellent value and all worth your attention.

Obviously no blame attaches to Peter for the block releases but, sadly, the effect is to create a Peter Scott overkill, which is a great shame for a programmer of his talent. Spread out over a year these would all have scored better marks — together they are just too similar to distinguish.

If you loved *Hunkidory* or *Last of the Free*, then you can buy these with confidence. However, if you like a little variety in your gameplay than you may find these are just too much of a good thing.

Preview Time

Not a lot to show you this month — although a pile of good things are due here about a week after the copy date for this issue. However, all the way from New Zealand comes a fun little machine code game by Juan Richardson that resembles the heady days of Micro Power's endless platform releases — *Kwangtung*. No doubt it means something in the Antipodes.

The game involves moving up and down ladders, avoiding monsters that look like animated gardening forks and jumping onto vegetables for points. Great fun!

The game was sent as a result of our offer back in April to try and help you place your masterpieces with our friends in the software business — *Kwangtung* has already been sent off with a suggestion that it might be suitable for a budget compilation currently being planned. I'll let you know what happens.

Meanwhile, that offer still stands — send in your software for my free evaluation and recommendation service.

Quick tips

To get an extra life in Peter Scott's *Omega Orb*, just enter 'GROVEL' at the computer!

To skip levels on *Arkanoid*, just press D,H,J and Delete keys simultaneously as soon as the ball starts to move on any screen.

Blast from the past — for infinite lives in *JCB Digger*, *LOAD main program then enter ?&3723=&EA and then CALL&5D00. Next month I'll try and find room for a program that tries to discover if anybody actually wants infinite lives for *JCB Digger*!

Recently available on Micronet, *Mr Shifter* is easily altered for level jumping or infinite lives. Alter LV% in line 490 to change level and remove L%=L%-1 in line 1190 for infinite lives.

Looking for infinite lives for *Firetrack*? Just use this mini-program:

10 *LOAD (main file) 1A00

20 ?&2233=&EA:&2234=&EA

30 *SAVE (main file) 1A00 7B12 479F 1B00.

For infinite lives in *W.A.R.* just load main game and enter ?&52BC=&A5.

Need help in the wild and fast *Plan B*? Load the main game, ?&3F01=50 and CALL&4CB3.

To edit robots in *Cholo* and for a solution to the game, you'll have to buy Issue 3 of 'Disc User' — our sister magazine that will now have a regular column of tips and hints for disc based software.

Around the World

Several people have sent in infinite life pokes for the latest *Repton*. Remember that these will not help you to win the competition — Superior have checking codes in their games.

Type in the following: PAGE=&900 (RET), *DIR D (RET), LOAD"REPTONI" (RET), 1 MODE5 (RET), 115 ?&311C=&EA (RET), 116 ?&311D=&EA (RET), RUN (RET).

Unlocking

Richard Koten of Harrow has sent in corrections for the unlocking program we ran back in January. For OS 1.2 and MOS 3.20 you should change the JMP address in line 60 to &DC93 and &E5FF respectively.

High scores

Iain Hotchkies is still continuing with the mania inducing job of compiling a master list of high scores for BBC games. There are far too many to print here, I'm afraid, but he is keen to receive new high scores so if you think you have reached an incredible figure on some game or other, then drop him a line at 1 Thoraby Close, The Woodlands, Belle Vue, Manchester M12 4NW.

Remember — you are on your honour as

an Arcade reader not to cheat! A sample to give you some idea of the competition is Stephen Gayler's almost unbelievable 29,329,420 for *Zalaga*.

Omega Orb

This issue's special map is Peter Scott's own copy of *Omega Orb*. Each place where you need an object is marked for you. Enjoy!

Quickies

After last month's look at Dean Lester's *Ziggy*, I've now seen a revised version thanks to ASL. Excellent stuff and worth watching for. So too is his earlier *Saracoid*, due on an ASL *Powerpack*; the game is an elegant, simple but classy shoot 'em up reminiscent of a combination of *Invaders* and *Centipede*, with a touch of *Galaforce* thrown in. I can't wait to play it!

*LOADing soon

●As mentioned before, lots of software companies are waiting for the PCW Show in September to reveal their plans to an eager and expectant world. However, some news and rumours were picked up by your reporter at the July AU Show and, no, I wasn't in the bar at all!

●Design People have now released three of the projected six war simulations they have planned. Next to emerge is *Island*, which will have segments into which you'll take the bonuses and losses from the previous segment. No plans for other machines but they may move into slightly different areas after those six games. When not releasing games the company prepares computer simulations for exhibition display.

●Peter Scott is thinking about *Omega Orb II*, but then he thinks about a lot of things!

●Next issue we will have previews of the two new Gary Partis games from ASL — *Impact* and *Leader Board*. Both are a couple of weeks away from completion.

●Tynesoft are being close-lipped about their future plans (still no further news on those American licenses) apart from *Winter Olympics II*, due in October. This is not just an update of their best-selling game but a completely new game (in pseudo 3D) timed for the 1988 Winter Olympics in Calgary next February. A competition is being planned with a prize trip to Calgary likely.

●Logotron are working on a secret new game for release at the start of next year with two provisional titles — *Magnets* or *Matter/Anti-matter*. There are also plans for an Archimedes *Xor*.

●Speaking of the Archimedes, the list of programmers working on games or expecting to buy the machine is growing daily. A preview of David Braben's *Zarch* (the extended version of the demo *Lander* supplied as part of the *Welcome* package) was shown by Superior at the AU Show to universal amazement — expect it about December time. Rumours abound that Jonathan Griffiths is working on another Superior game for the

machine as well as persistent stories that Orlando had one of the first machines that escaped from Acorn — there are rumours too that an Orlando version of *Tempest* exists, written for Superior but abandoned when they released an inferior version; add that to the Orlando gameography, if you like. We'll keep you informed.

●Apart from the update last issue, some more plans from Superior are reasonably certain — next release in September should be *Palace of Magic*, *'Haunted House'* (title uncertain) for Christmas, *'Nautilus'* (title uncertain) has been pushed back to 1988, *By Fair Means or Foul* has also been delayed till 1988, *Thrust II* is planned for the Autumn, *Compilation 4* of 1986 games is on the cards, a possible *Compilation 5* is suggested but not containing either Superior or Acornsoft material, more *Repton* screens are a good bet and the company is looking at major expansion in 1988. This is planned to make Superior a major software company across as wide a range of machines as you can imagine — "everything except the Jupiter Ace" as one of their programmers confided to me.

●Robico have sneak released an illustrated adventure *The Hunt*.

●Hot news is expected next issue from the combination of Steve Benfield (ex-Bug-Byte) and Julian Dunjunz Avis. A new software company? A new mega-game? Wait and see. One thing it won't be is a sequel to *Dunjunz*, which Avis now considers a juvenile extravagance. Incidentally the first 200 copies of the 40/80 convertible disc copies of *Dunjunz* were run from a corrupt master copy — if you have one, return it to Bug-Byte.

●A new games magazine debuts from Newsfield in September. Publishers of 'Crash' and 'Zzap', they claim that 'The Games Machine' will cover all machines. Beeb games players await that news with their usual scepticism.

●Still no news of CRL's *Cyborg*! This month's reason? My PR contact has been on holiday...

●Gremlin's *Star Clash* now put back to Christmas and Mirrorsoft's *Spitfire 40* now 'July/August'.

And Finally...

And finally we come to my usual plea for your help in putting this column together. This month The Arcade is a bit shorter than usual — partly because software releases in the Summer are traditionally slow and partly to let me get ahead for next month for once! Then the issue after (December issue) we should have a report of the year's release plans gathered at the PCW Show and delivered red-hot to the office just before I disappear to France for two weeks holiday on the canals, drinking wine, lazing about and not playing games for 14 days!

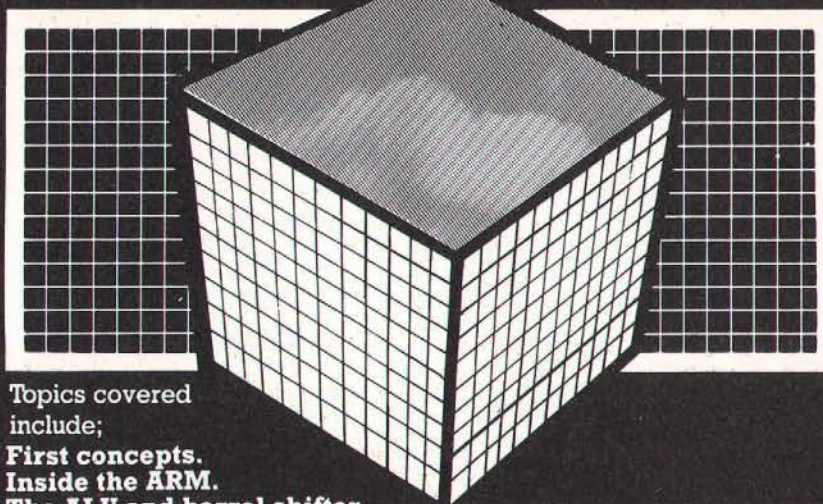
Meanwhile contact me as usual via Micronet mbx 919999020 or by post to: Dave Reeder, The Arcade, A&B Computing, ASP Ltd, 1 Golden Square, London W1R 3AB.

ARM

Assembly language programming

By Peter Cockerell

This book describes in detail all aspects of programming the new Acorn Risc chip (generally referred to as the ARM). This 32-bit chip, on average 4 times faster than a 68000, will form the basis of a new generation of machines. The book explains why the chip is so fast and how to take full advantage of its power.



Topics covered include;

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- **Instruction timings.**
- **The BBC BASIC assembler.**
- **Assembly programming principles.**
- **Data structures.**
- **Non-user modes.**
- **Undefined instructions.**
- **Interrupts and vectors.**

The book is completely up-to-date covering only the new 2 micron ARM, with appendices on the floating point and co-processor instructions and with numerous example programs. A truly comprehensive reference manual for anyone who intends to program in ARM assembly language, or for those who just want to find out why the Acorn RISC chip is so special.

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roundup

Archimedes Report

Gordon Taylor reviews
the peripherals and
software, as they arrive

BASIC V — Sound and Graphics

Clive Grace assesses
the new BASIC with
regard to those extra
special Archimedes
features

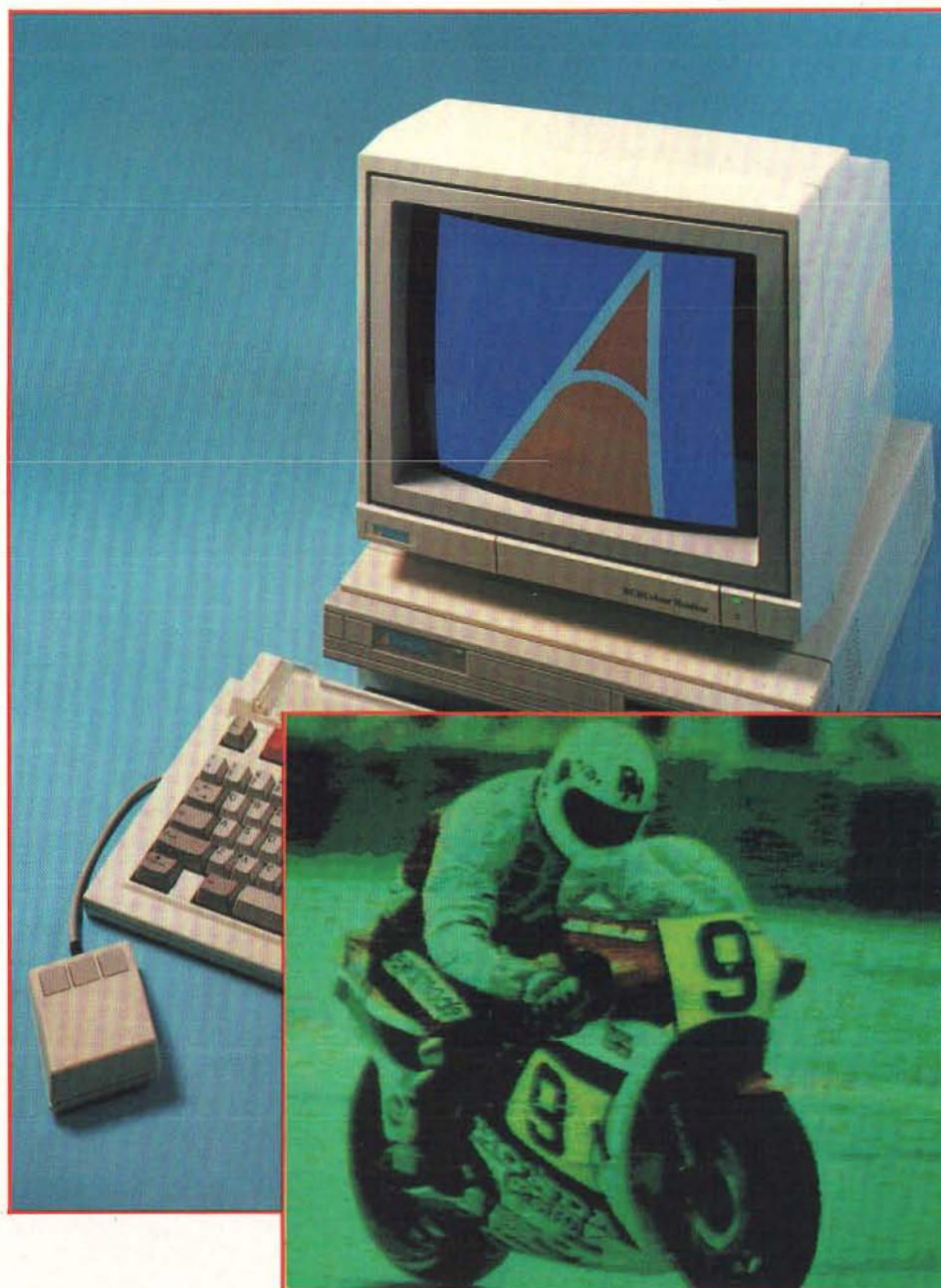
Every Picture Tells a Story

Screen shots which
show the way

We will tell you all you need to know about Archimedes . . .

graphics and sound
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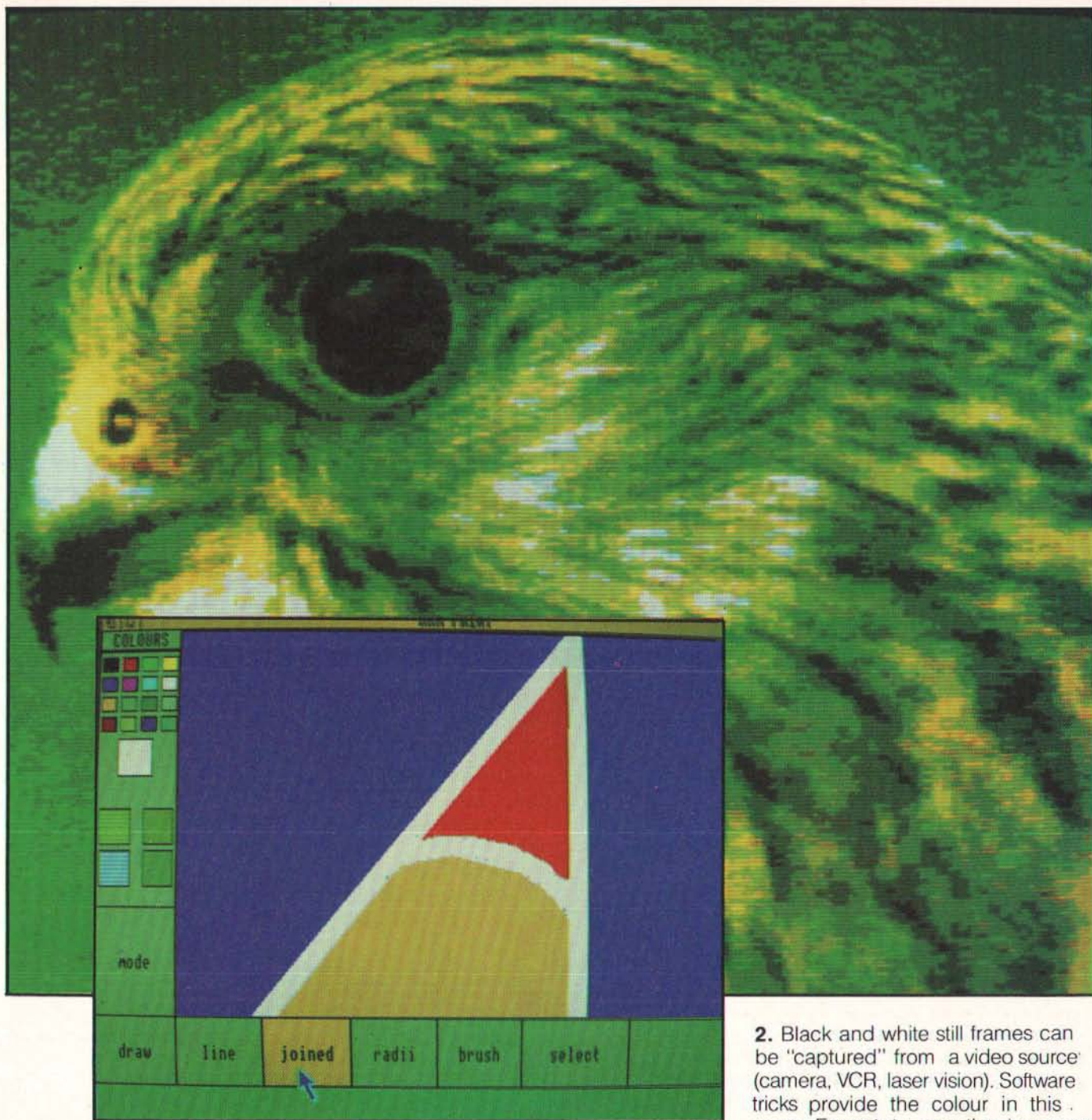
With a micro as
original and exciting
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going to need a
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in full. Archimedes
Computing in A&B is

dedicated to the 300
and 400 series RISC
based Acorn micros so
watch out for our
monthly coverage.

EVERY PICTURE TELLS A STORY



1. The high screen resolutions of the new Modes offer opportunities not only to computer artists, but also to anyone with a picture digitiser.

2. Black and white still frames can be "captured" from a video source (camera, VCR, laser vision). Software tricks provide the colour in this case. Expect to see the increased use of digitised graphics in commercial software as well as amateur slide shows.

| Colours | | | |
|---------------|-----|-------|------|
| Colour | Red | Green | Blue |
| Background | 0 | 0 | 0 |
| Inverse ruler | F | F | 0 |
| Page break | 0 | F | 0 |
| Codes | F | F | 0 |
| Inverse codes | 0 | 0 | F |
| Inverse break | F | 0 | F |
| Ruler | 0 | F | F |
| Menus | C | C | C |
| Page end | 5 | 5 | 5 |
| Normal text | F | F | F |
| Bold text | F | F | F |
| Underline | D | D | D |
| Inverse Under | 0 | 0 | 0 |
| Inverse Bold | 0 | 0 | 0 |
| Black text | 0 | 0 | 0 |
| Border | 0 | 0 | 0 |

he greatest would surely have been
mer imperial sorcerer to
d now earning lots of money selling
he assumed name of Paul Daniels.
a mile above Thorbia by a pillar
y because Athlan was the most
horbia and he liked showing
oharr had refused him planning
position of Magdioth, Rth'Rioharr
fact annoyed Rth'Rioharr, and he
Magdioth, because Athlan had never
e wife into a hippopotamus.

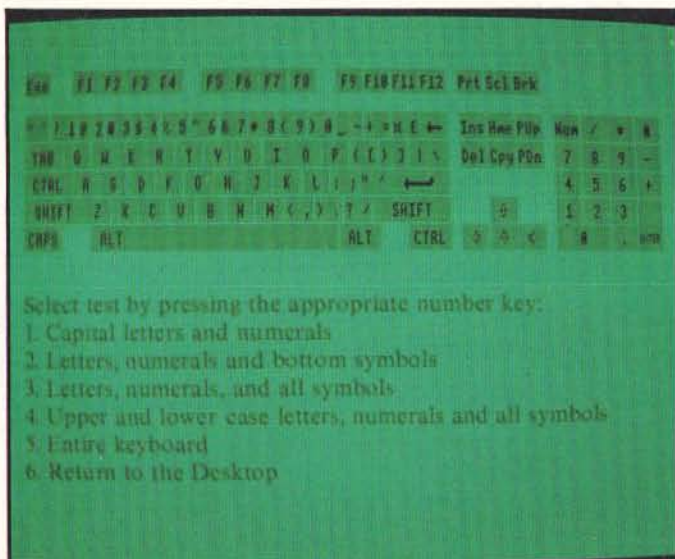
despatched agents to every part of
sorcerers and wizards they could
measure, for he had already tried

bribery, threats and even insults to coax Athlan down. After twenty
cycles, all the agents returned, and the sorcerers filled the Great
Hall of Rth'Rioharr's castle.

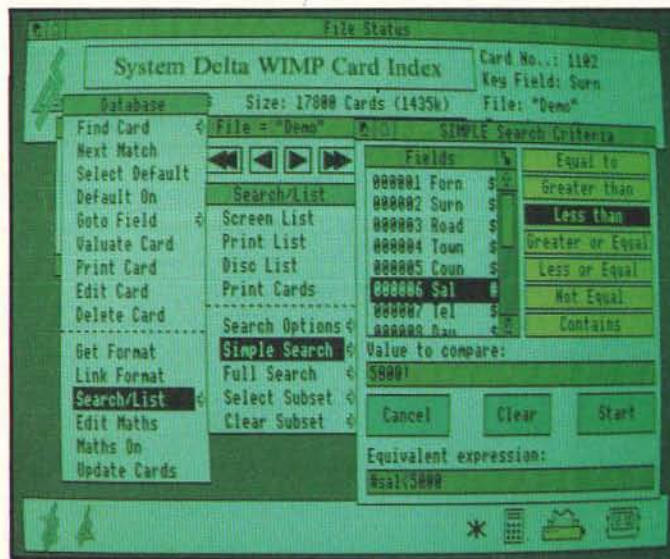
"Oh wise and cunning sorcerers, I h
enlist your help in the destruction
boomed Rth'Rioharr from his great t
rose slightly.

A voice rang out from the hall. "H

3. With Interword, Computer Concepts has taken the
opportunity to "Archimedeise" the software, adding colour
options and italics on screen. Running under the 6502
emulator, the Inter Series software has lost the ability to
interchange data between applications. Stop gap
software it may be but, with cheap upgrades available,
Computer Concepts have done their best to provide
stepping stones to new and powerful software specifically
written for Archimedes.



4. Future desk-top publishing software and enhanced
wordprocessors will use the excellent fonts displayed here
on the Acorn keyboard tutorial



5. What you can soon expect to see — Minerva's preview
screen from their forthcoming WIMP based database
management system

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RED KEYS

Archivists

Norwich Computer Services are to publish a monthly magazine in support of their new user group for the Archimedes. Each issue will cost £1.20 and the first is out in September.

To gain the full benefits of Archive membership a subscription for a year costs £10.00, for six months £6.50. The group is trying to organise special discounts and a technical hotline for its members. Details from Norwich Computer Services, 18 End Road, Norwich, NR4 7QY.

How about you?

So far in A&B Computing we've delivered Gordon Taylor's review in August; Aiming High in September — on software compatibility and the performance of high level languages; and this month's Archimedes report, bringing you information on peripheral compatibility and software upgrade policies. Clive Grace had a closer look at the ARM chip itself in

September and the new features of BASIC V this month. Plus a variety of Archimedes related news since launch. If you wish to complete your picture of Archimedes then back issues are available on 0442 48432.

Will you be buying an Archimedes after what you've seen and heard. Why not write and tell us what you think of the RISC machine and why (or why not) you will be buying one. Write to Archimedes in A&B, Number One Golden Square, London W1R 3AB.

Hail Archimedes users!

If you are already sitting in front of an Archimedes 305 or 310 then congratulations and how about sharing your experience with other readers of Archimedes Computing in A&B.

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know about programs that run and at least one that doesn't!

We would like to share your hints and tips, opinions and experiences. When we print them we will send you an A&B T-shirt to commemorate the event. And if it's a bit more than just an hors d'oeuvre, we'll discuss competitive rates of payment. So if you've yelled 'Eureka' recently while using Archimedes, write in to Archimedes in A&B, Number One Golden Square, London W1R 3AB.

Nickname

OK now, what have you christened Archimedes? There's Archway on Tubelink — who, incidentally, have produced Archie BASIC for the Model B and Master — and Norwich

Computer Services are starting up a user group called Archive...what do you think Archimedes Computing, the A in A&B, should nickname the machine. Your comments would be appreciated.

Minerva Range

Minerva have completed their list of Archimedes products based around the System Delta database management routines. Deltabase (£29.95), Reporter (£24.95) and System Delta Plus, which employs the WIMP environment, (£69.96) are joined by Personal Accountant - Sales Ledger, Stock Management, Purchase Ledger and Nominal Ledger at £64.95 each — and by specialist applications School Administrator, Timetabling, Video Rental, and Newsagent. A new Ances-

try application is to be announced.

SuperDelta will be available in 1988 priced £199.95 and the System Sigma programmable spreadsheet (price unknown) is due to appear at the end of this year.

Graphics applications for Archimedes will include GammaPlot and System GammaPlus.

There's one surprise amongst the list, a three dimensional animated maze game called Minotaur! Details on 0392 37756.

New Concepts

Number One BBC software house, Computer Concepts, have announced their intention to publish some major new applications for the Archimedes series. Already the 8 bit Interword, Intersheet, Interchart and Wordwise Plus have been transferred to the Archimedes via the 6502 emulator. These programs are available at 'upgrade prices' and offer little to justify the financial investment in new Archimedes hardware.

The new software announced includes a wordprocessor/desk-top publishing program, an integrated spreadsheet, a programmable graphics/CAD package and a free text database. The wordprocessor is likely to form the core of this set of programs with considerable data integration between them. Prices are uncertain but Computer Concepts do not wish to depart the sub £100 prices customers are used to. There will be no move towards 'PC prices'.

The wordprocessor will be available this autumn and demonstrated at the Personal Computer World Show. Both dot matrix and laser printers will be supported.

The first utility to arrive for the new computer will be Disc Doctor II, a completely new version of the popular BBC ROM, working under the Acorn WIMP system. Computer Concepts are keen to distribute software on ROM, which doesn't fit into the Archimedes system as neatly as into the 8 bit BBC world. ROMs of course can more easily protect the publishers software investment without inconvenience to the user. Information on Archimedes software can be obtained from Computer Concepts on 0442 63933.

BASIC V

The BBC BASIC interpreter has been with us for some time now and since its initial release, there have been many versions of this enduring programming language. The Cambridge workstation, the IBM PC, Nimbus, Atari ST and even the old Acorn Atom have their own versions of what is, more or less, a standard educational programming language.

So it will perhaps come as no surprise that we find BBC BASIC as an integral part of the Archimedes computers; indeed, the desktop software supplied with the initial pre-release Archimedes machines was a BBC BASIC program, like that on the Compact, (although it will be in ROM for the production versions).

The history of BBC BASIC has been an impressive one, and so have the tasks that it has been used for. Whereas most programmers rely on machine code on any other computer to gain the edge in speed and extra memory, BBC BASIC can often interpret the task adequately. Being capable of handling memory efficiently, BBC BASIC makes an excellent job control language, and with the extra speed due to an efficient operating system and a sensibly written set of math routines, it is perfectly capable of handling some pretty harsh scientific calculations.

The earliest version of BBC BASIC was BASIC I for the BBC Model B, but this was soon replaced by BASIC II. For the Master and Master Compact there were versions of BASIC III and IV with BASI28 and HIBASIC merely specialised super sets of the version II standard. There are also versions for the Z80 and 80186 and 32016 processors.

So the latest version of BBC BASIC for the Archimedes is called BBC BASIC V, it contains all of the BASIC IV improvements (such as the extended ON options, and the extra additions to the VDU statement), but in order to make the most of the Archimedes' amazing capabilities, quite a lot of extra commands have been added, especially in terms of improving speed and computational accuracy. BASIC V is the fastest version of the interpreter, and a great many of the enhancements have been to make the most of the 32 bit status of the Archimedes ARM processor.

The extensions

BBC BASIC finally supports the WHILE ENDWHILE loop structure, which is essentially the structure gleaned from all of the modern PASCAL compilers, whereby a check for the validity of a statement is made *before* any attempt at a loop is made.

The best way of describing WHILE ENDWHILE is to look at the REPEAT UNTIL

As BBC BASIC reaches version five, Clive Grace assesses its capabilities

syntax in BBC BASIC, but whereas with REPEAT UNTIL, one iteration of a loop has to be made until the check is made, WHILE ENDWHILE checks for the condition *before* the loop is made — I am amazed that this command was left out of the original specification.

WHILE ENDWHILE also supports a statement delimiter so that it is permissible to include a ":" or an ELSE statement. If the initial condition is FALSE, then the next ENDWHILE at the same level of nesting will be searched for, for example:

```
A=0:WHILE A<10:A=A+1:ENDWHILE
```

A fully structured CASE statement has been added to the list of commands, so that you can set up program lines thus:

```
CASE <expression> OF <return>
WHEN
<expression> ", <expression>
<statement delimiter>...
OTHERWISE...
ENDCASE
```

This is extremely useful if you are managing data lists and trees. If BBC BASIC is starting to look like PASCAL, don't worry, there are none of the annoying programming styles one has to adhere to, for instance the OTHERWISE is completely optional, so if it isn't present then no error message or fault will be generated.

```
CASE fred OF
WHEN 0:PRINT "Zero"
WHEN 1,2:PRINT "One or Two"
OTHERWISE PRINT "None of the
above"
ENDCASE
```

A fully block structured multiple line IF;THEN;ELSE;ENDIF structure has been implemented allowing nested block structures and ordinary single line IF statements to be included. Other single line statements such as ON ERROR do not become multi line when this is used on the end of the line which one

is on, so a little circumspection is needed when programming, but not much.

```
IF jim THEN
IF fred THEN
PRINT "Jim and Fred were true"
ELSE PRINT "Jim was true but Fred was
false"
ENDIF
ELSE
PRINT "Jim was false"
ENDIF
```

Parameter passing

More powerful parameter passing facilities have been added to the BASIC V language. The parameter passing method has been extended from its value only method, by prefixing a procedure with RETURN to give *value* and *result* parameter passing.

The value of the *actual* parameter is copied into the *formal* parameter which is used for the duration of the procedure or function. Once used the value of the function is then copied into the actual parameter on leaving the procedure or function. This also means that you can transfer between compatible data types so, for example, you can freely transfer between REAL and INTEGER data types, for example:

```
DEFPROCswapover(RETURN A,
RETURN B)
IF A<B SWAP A,B
ENDPROC
```

BASIC goes modular

BBC BASIC V allows programs to be loaded and checked for unknown procedures and functions so that libraries can be quickly built up and used without having to manually APPEND the necessary program files to your main BASIC program. Library manager programs are available for the BBC Model B, and some commercial packages have been available for some time, however as development tools, they have never really caught on.

BBC BASIC V has taken the "BCPL" and "C" like option to load either internal or virtual forms of procedures into memory used by BBC BASIC. Both ways have their own

individual uses and both will make programming a great deal easier in the initial stages of pre-logic coding.

The **LIBRARY** command loads an internal format BBC BASIC program into the interpreters heap where it will remain until the **CLEAR** statement has been used — much like a variable. The **INSTALL** command loads a procedure or a program directly into user memory above the stack thus changing the HIMEM positions likewise.

A companion command **LVAR** lists the first line of all of the libraries or the installed ones. This works on a stack basis whereby the first one listed is the last one searched. **LVAR** is also used to list variables and arrays, a task often set aside for programmers using utility ROMs for the BBC Micro.

Of course Acorn have decided to instigate a standard and suggest that the first line of the library (ie the first bit that will be displayed by the **LVAR** command) contains the full name of the library and should refer to a named procedure.

As BBC BASIC becomes more and more structured, so the reference to **GOTO** is becoming less and less popular; for instance, in a procedure library, any reference to a line number will attempt to go to the procedure and not the main program! **GOTO** has been included for historical reasons.

Acorn hope that individual software suppliers will make their procedures freely available to programmers and individual users should the need arise. Generally software companies may try to protect their procedures using control codes to eliminate listings and hang up the screen if they are listed; unfortunately such methods will not work with the procedure manager system in BBC BASIC V.

Interestingly, BASIC V is a good deal more protective about its memory contents than before. For instance, with BASIC II, the simple act of breaking out of a program is likely to corrupt the stack and mess up variable workspace. BASIC V is a good deal more careful as the interpreter lets control resume to the BASIC program after an error has occurred. BASIC V no longer forgets all references to **PROC** and **FOR** nesting, thus the structure **ON ERROR (LOCAL) PRINT "FRED"** is now supported.

Such freedom with errors and error trapping makes debugging a good deal simpler so that **LOCAL ERROR** can be used to make sure that fault detection (and the accurate location) of errors can be an easier task.

Array passing operations

For BBC BASIC, with its fast and efficient memory management capabilities, the passing of arrays has become quite a useful feature, but the problem was that a few "rules" had to be broken and sometimes the system variables had to be hunted down and poked with the right values. BASIC V can allocate local arrays using a free chunk of memory for

the duration of the function and once finished, it resets itself for something else. Local arrays are hard to interactively debug as they may be overwritten by program workspace.

Local arrays are of great use to those wanting to manipulate either a part of an array or a finished array without having to resort to advanced memory gymnastics, for instance:

```
DEF PROC(A(),A%(),AS())
PROC (FRED(),jim%(),harry$())
...
and
LOCAL A()
DIM A(10):RED a local array
...
```

An enhanced TRACE facility

BBC BASIC V has a vastly improved TRACE facility. On the Archimedes programs can be big, really big, and should an error occur which utilises some hectic procedure calls and a lot of branches, then it is wise to be able to see the flow of the program, not just in terms of line numbers, but also with procedures and also in steps.

Four commands have been added to BBC BASIC V enabling the user to trace the program flow whilst inside a particular procedure and **TRACE** in steps of lines, for instance, using **TRACE** in single step mode gives the number of procedure names in curly brackets instead of the usual square ones. The extra commands are:

```
TRACE PROC
TRACE STEP ON
TRACE STEP 1000
TRACE STEP PROC
```

BASIC Number accuracy has been improved upon quite a lot because the ARM is a more powerful processor than the 6502 in terms of word length and bit size. The command **PRINT STR\$.05** prints .05 instead of the totally ludicrous 5E-2.

New features

The Archimedes has some very powerful hardware facilities, and this is where BBC BASIC has been most obviously extended. The mouse is a standard input device included with Archimedes and thanks to BASIC V all of the driver routines can easily be used.

BBC BASIC has these drivers as standard, and the commands are very easy to use. They look similar to the AMX Super ROM commands available with the AMX Super Art Package, whilst there aren't any commands to fill the screen with the oh so trendy dappled "Macintosh Grey" for the desktop, the basic syntax of each of the mouse driver commands is almost identical. Using BBC BASIC V it is possible to get a mouse pointer on the screen and moving around within five minutes

of originally being face to face with an Archimedes.

By comparison, computers such as the Macintosh, the Amiga and the Atari ST are all ludicrously hard to program, the Amiga's treatment of the mouse as simply a joystick input is a simple one, but the routines still have to be written whereas the Macintosh requires custom written (or as is often the case custom ripped off) routines usually based on another popular package — no give me the Archimedes method any day!

The usual AMX commands **MOUSE ON/OFF** are used to turn the mouse reading routines on or off (these routines are in the operating system and are not part of BBC BASIC), naturally you have a number of pointers at your disposal, and the **ON** n command supports this.

The pointer is itself on a separate graphics plane so that if the pointer goes over a shape on the screen, it will not be overwritten (as is the case on the BBC B) and no XORing is required to achieve this, the pointer is in many ways like a sprite in that you can check for its position on the screen (like a grid) and you can also check for collisions (such as falling over a particular sprite or icon).

The **MOUSE RECTANGLE x,y,w,h** limits the mouse pointer movements to a selected rectangle on the screen. Other commands draw proper rectangles as well as fast rectangle fills (ideal for "drop" and "pull down" menus).

Graphically speaking BBC BASIC V is the most powerful version ever. The Archimedes can support up to 256 shades from the famous palette of 4096 colours. Not only has the complete GSX command set been introduced, but also circle fills and ellipse fills (as per the GXR command set).

Sound and music

From turning on at the power switch and the sonorous middle C "bong" of the initial power up beep, you can hear that the Archimedes is a very powerful computer as far as sound is concerned. The stereo sound is managed from BBC BASIC V quite well by building in a series of synchronizing commands that are usually used by programmers when using BBC Model Bs — its just that this time, the routines are built into the BASIC.

BASIC is an unusually poor language to write music with. The main problem is that BASIC is a linear language, whereas music is a language of concurrent operations, and I am afraid that even the best BASIC programs look very silly when compared to the concurrency associated with a real Music Composition Language, or music programming environment such as **AMPLE** or even **UMI**.

In order to make music programming easier than usual, some commands have been included in the BASIC command set, looking very much like **AMPLE Nucleus** at the "notepad", the commands, **BEAT**, **BEATS**,

C O N T I N U E S ►

VOICE, VOICES, STEREO, SOUND ON/OFF, and TEMPO are all very similar to AMPLE's notation.

BASIC V simply sets up a sequence of notes be they in any form such as data statements, binary image or even sampled sounds, and they can be set up to occur on a number of beats by using the BEATS <expression> command to set the sound beat counter.

BEAT returns the current beat number for a sound channel, whereas BEATS on its own returns the number of beats in a bar. VOICE <channel> <string> sets a particular voice playing on a channel and VOICES <expression> (in true AMPLE BCE style) sets the number of sound voices active.

General purpose commands

There are additional commands with less specialised ends in mind. For instance, APPEND joins a BASIC program to the end of another one, very much like *APPEND for the Master Compact's ADFS etc.

EDIT enters the BASIC editor. This editor is simply an alternative to the usual screen editor facilities available on all the other Acorn computers (including the Archimedes), but some users have voiced the opinion that using a BASIC interpreter tailor-made for a micro (as BBC BASIC V is) requires a BASIC editor to make the most of the Archimedes. This I

disagree with, but the facility is there should anyone want to use it.

A nice feature is an interactive HELP facility. By simply typing HELP, the BASIC interpreter will return a list of the available HELP options. By typing HELP <command> you have an immediate description about the command and more.

A simplified SAVE command has been introduced so that by simply typing SAVE, the BASIC interpreter will look at the first line of the program and use the contents of the initial REM statement. The name of the file must follow the usual ADFS conventions and the REM statement must be followed by a ">" symbol.

More line numbers

The maximum line number has been pushed up to 65279. For the BBC B series the highest previous line number could only be 32767. The higher number is to help deal with the longer BASIC programs that can be written with the extra memory. The internal memory format is still &0D and &FF at the end of the program, however most programmers have relied on BBC BASIC (II) to be able to overlook the &0D &FF boundary when joining programs together; but as BBC BASIC V supports a perfectly adequate APPEND facility, the page boundaries cannot and *must not* be breached, otherwise you will get a Bad Program error message suggesting corrupted memory.

An interesting feature that has been added to the BBC BASIC V list of helpful additions is the friendlier error message system (still readable using REPORT); should you RENUMBER a program and the program is very large, the BBC BASIC V interpreter may return **Line numbers larger than 65279 will be generated by this renumber** which is really useful!

Sorting things out

BBC BASIC has, at long last, a simple entry time syntax checker such as those found on nearly every other dialect of BASIC worth its salt. BBC BASIC V will now detect simple syntax errors such as mismatched round brackets, double quotes or attempts to refer to line numbers greater than 65297. Some minor lexical errors in BBC BASIC II upwards incorrectly analyses IF statements with a missing THEN when the next object is either PTR%, PAGE, TIME, HIMEM, or LOMEM, fortunately BBC BASIC V can interpret these errors correctly at run time.

I have deliberately kept away from ARM assembly language because of the complexities and hidden delights of the SWI call and the ARM instruction set, as well as new programming techniques that really require an article to themselves — needless to say that the BBC BASIC V also supports a full ARM Assembler and I will get onto programming the RISC processor next.

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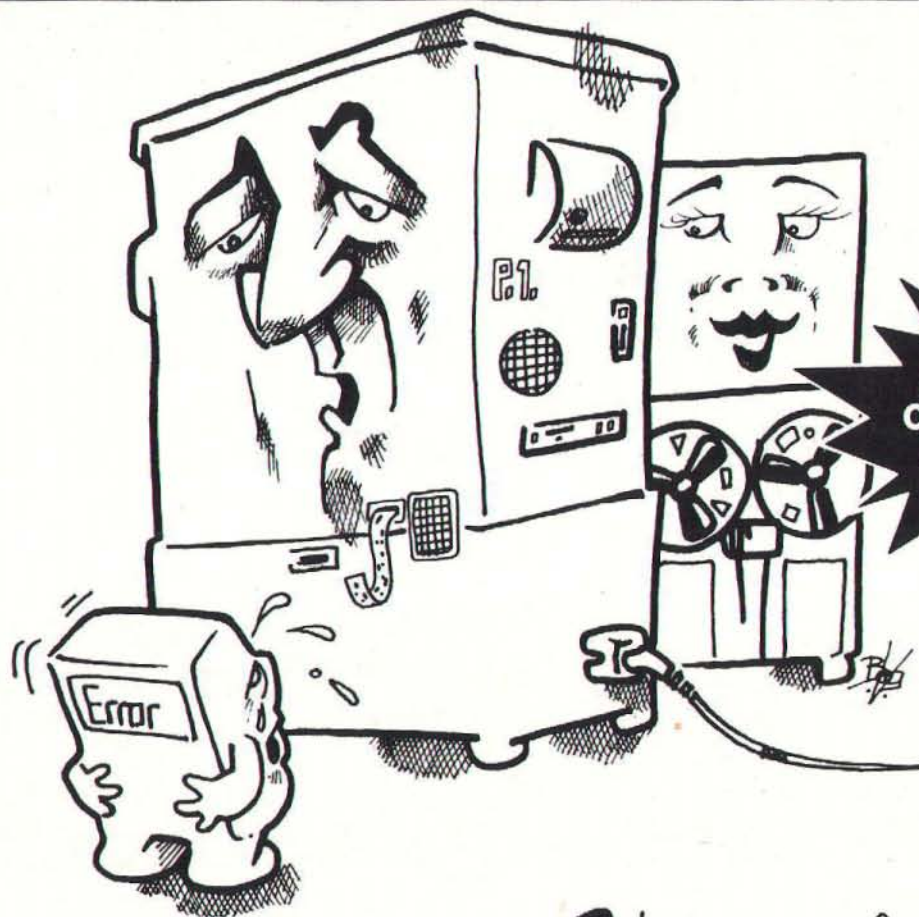
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ARCHIMEDES REPORT

Peripherals and software have started to appear

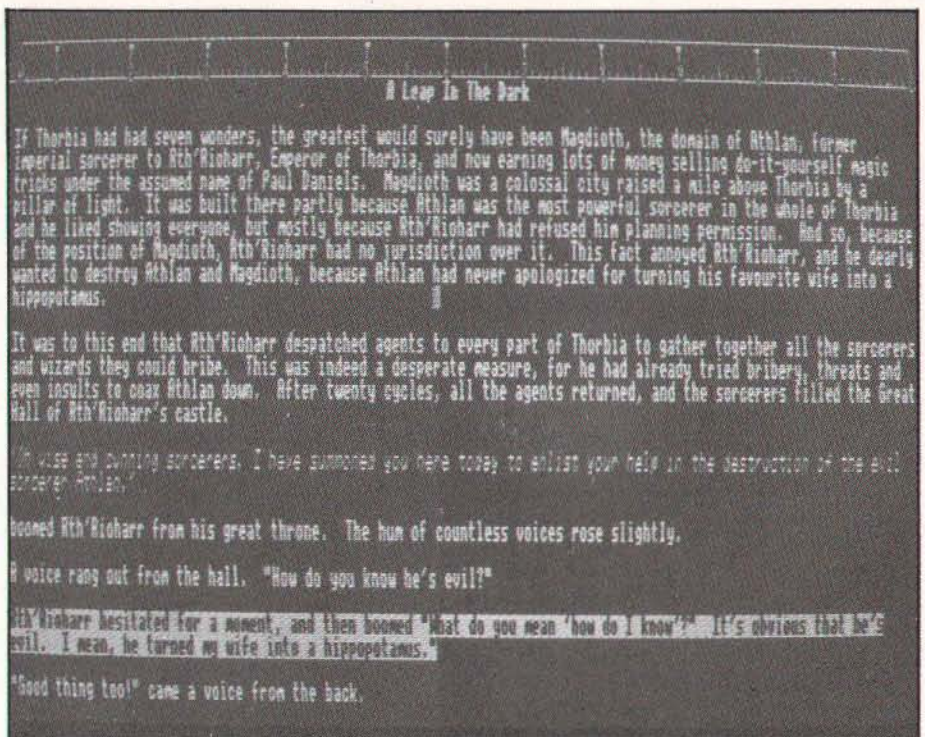
This — my third article on Acorn's new machine — is in the form of a report under several headings. As previously foreshadowed, I have investigated using an existing monitor with the A Series. Many of those considering purchase will also be interested in transferring programs and data via 5.25 inch discs, and in outputting to a plotter. I also give more information on the Operating System, Application Software, and Performance.

PERIPHERALS

Monitors

One option may be to use your existing monitor with the A Series. This is easy in the case of a monochrome monitor, since the new machine has a Composite Video output socket, albeit for a Phono plug, in place of the BNC Connector used on the Model B and Master 128. However, to enjoy the full benefits of the A Series, even with "serious" applications, a colour monitor is required. It should be capable of at least the 600 x 285 resolution of the monitor supplied by Acorn. This means a dot or slot pitch of about 0.42 mm for a 14 inch (diagonal) tube. The reason is the increased use which is likely to be made of higher resolution modes — both for text (up to 132 columns) and graphics (as in the Desktop). It may be possible to use an existing colour monitor, even though the A Series outputs RGB Linear (or analogue), in place of the RGB TTL (or digital) of the Model B and Master Series. The pinout at the computer is shown in Figure 1, and is the same as for the Professional Graphics Adaptor (PGA) of the IBM-PC. This was chosen as the obvious "standard" for Linear or Analogue displays, for which the correct leads should be readily available.

Some monitors with RGB TTL input already have provision for RGB Linear input (sometimes on a separate socket), while others may be capable of being converted internally. The JVC ECM 1302/G 12 monitor, badged Electrohome "High Resolution Data Display", and sold in the



UK by Opus, has a dot pitch of about 0.4 mm and a 13 inch tube, which gives a comparable resolution. It has provision for both TTL and Linear input, and the pinout at the monitor is the same for both inputs (See Figure 1). Once it is provided with the correct signal lead, the JVC monitor works well. Slight adjustment of "vertical hold" and "vertical height" was necessary in my case, and it may not be easy to achieve one compromise setting that suits both Model B/Master (TTL) and A Series (Linear) setups. While the specifications of the computer and this monitor do not match exactly, the difference in impedances tends to compensate for the difference in voltage levels. With the brightness control adjusted for best effect, the resulting picture is quite acceptable — especially for a low-cost solution.

Whereas the "standard" Acorn/Philips monitor weighs 12 kg, the JVC monitor weighs about 16 kg. However, the feet of the latter fit just within the width of the A Series casing — which puts them on the stiffest parts, at the edges, which are well able to carry the load.

Floppy disc drives

The A Series system logic supports up to four floppy disc drives, but the loading of the data lead has been designed for two — ie the two 3.5 inch drives that may be fitted internally. There are two power connectors, but if more power than usual is drawn, then (as with the Model B — and to a lesser degree — the Master 128), this could cause obscure problems, or limit the scope for other expansion. Indeed, because several aspects of the floppy disc system have been designed around the 3.5 inch drives, an external 5.25 inch drive has to be chosen and set up with care. Solidisk are offering a suitable 5.25 inch external drive as a second drive, complete with data and power leads, and powered by the system, for '110, inc VAT. The drive chosen takes only one watt more power than a 3.5 inch drive when seeking, and has certain simple modifications to ensure that it works correctly with the A Series. I can confirm the usefulness of such a drive, as it enabled me to copy over several benchmark and other programs and data files, as well as acting as a second drive.

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Plotter

The Linear Graphics' Plotmate plotters are very effective when used with a Model B or Master. (See A&B, 85/12, p 84). They also work well with the Acorn 32016 Cambridge series — both Co-Processor and Workstation. (See A&B, 86/12, p 96). This is because the plotters use the same "VDU" stream that is used to write to the screen, and at the full internal resolution of 1280 x 1024, on material of up to A4 or A3 size, depending on the model. This holds good also for the A Series. I confirmed this by outputting from Inter-Chart running under the 6502 Emulator, to a Plotmate A4SM (see Figures 3 and 5). When using a parallel connection, you simply enter *CO. IGNORE, as with the Master Series. However, with the A Series, *FX3,8 is needed to enable a printer or plotter. VDU 23,255 codes may then be entered to reset any plotting parameters from the defaults. Plotting from Inter-Chart is started by pressing fl Select (Screen) Mode, and responding with the same mode number, which causes the screen to be re-drawn, and "echoed" to the plotter. Afterwards, the plotter may be disabled with *FX3,0.

Connections

For the A Series, Acorn have adopted "industry-standard" (ie IBM-PC-type) connectors for the colour monitor, and also for the parallel and serial ports. In principle, a plotter (like a printer) can use either the parallel or the serial port. The former has the same connector and pinout as that on the IBM-PC, while the latter is the same as that on the IBM-PC AT. For the plots shown in Figs. 3 and 5, the Plotmate was connected via the parallel port, which does not allow

as long a lead as the serial port, but which is simpler to set up. However, Acorn have made a minor change in the implementation of the (Centronics) parallel printer port between the 8-bit machines and the A Series. For existing Plotmate plotters, the standard (IBM-PC-type) lead may be modified, but new plotters have been modified internally to work with both 8-bit and A Series machines, using corresponding standard leads.

SOFTWARE

Operating System

Free at last from the 64K address space limit of the 8-bit machines, it has been possible to provide an Operating System with virtually all the facilities that could reasonably be required, together with a generous amount of on-line help on the purpose of, and syntax for, each command. There is a great deal to be said about it, but that in the pre-production machines is not yet complete or finalised. There are 10 modules in the pre-production ROMs of 256K, but there are expected to be 24,

modules in the production ROMs of 512K. Hence it is appropriate only to touch on some highlights here — prior to a fuller treatment later.

Configuration

With the new machines offering so many choices, it is essential to be able to store your preferences in one form or another. One group of configuration options are assigned with *CONFIGURE, and held in non-volatile (CMOS) RAM. *CO. LANGUAGE may be set to "0" if you just want the Arthur system prompt — the star — at switch-on, or to 3, if you want to go straight into BASIC. *CO. DIR means that the ADFS behaves as on the Master, with the directory "cached". When the disc is changed, an attempt to load a file — even though it also checks the cached directories of other drives — may well return "Disc not present". Hence, to avoid this, it is necessary to enter *DIR :n or *MOUNT n (where n is the drive number). *DRIVE n may be used to set the drive number. Conversely, *CO. NODIR means that the ADFS behaves as the DFS, with the directory not cached, so an attempt to load a file will first catalogue the disc in the (currently selected) drive. To control the printer, you can set *CO. IGNORE to any ASCII character 0 — 255, or to none at all, (as for the Master). The usual choices are setting it from nothing to 10 (ie Line Feed) if the lines are double-spaced, or vice-versa if the printing is all on the same line.

Relocatable Modules

A Relocatable Module is the equivalent of a sideways ROM (or ROM image in RAM) in the 8-bit machines. It usually contains machine code (but can contain BASIC or text), with a suitable header to ensure that it is recognized by the Operating System, and appropriate workspace is allocated in RAM on switch-on or Reset. The Operating System ROMs contain many Relocatable Modules, and others may be loaded into RAM, just as ROM images can sometimes be loaded into sideways RAM in 8-bit machines — hence the similarity between *RMLoad for A series Relocatable Modules, and *SRLoad for Master Series sideways ROM images. However in the A Series, the Module code can be almost any size, and does not need to be (indeed cannot be)

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| Fig. 1 | A SERIES | VIDEO | PINOUTS |
|-------------|---------------------------|---------------|---------|
| Computer | Function | JVC 1302/G 12 | |
| Pin 1 | Red linear | DIN Pin 1 | |
| Pin 2 | Green linear | DIN Pin 2 | |
| Pin 3 | Blue linear | DIN Pin 3 | |
| Pin 4 | Composite sync (negative) | D pin 3 | |
| Pins 6 to 9 | Ground | DIN Pin 7 | |

Fig. 2

| | WORD | | PROCESSOR | | COMPARISON | |
|---------------|-----------|-----|----------------|--------|------------|----------|
| | Times | | in | | seconds | |
| Byte document | View | | Inter-Word | | | |
| 4000 words | Master | 128 | A Series | Master | 128 | A Series |
| Load | 4.4 | | 2.0 | 4.5 | | 3.5 |
| Save | 4.8 | | 2.0 | 4.8 | | 4.7 |
| Search | 3.2 | | 5.4 | 3.7 | | 7.4 |
| Scroll | 52.5 | | 43.0 | 16.0 | | 13.2 |
| "FILER" | View C.P. | | Inter-Word M-F | | | |
| 16,177 words | Master | 128 | A Series | Master | 128 | A Series |
| Forwards | 253 | | 73.5 | 59.1 | | 42.2 |
| Backwards | - | | - | 13.5 | | 11.0 |

"paged", like some of the latest sideways ROMs. (For example, Inter-Word, which contains 32K, appears as only 16K to the 8-bit machines). Much like sideways ROMs, Relocatable Modules may be listed with *MODULES. In addition, they return their own (now much more extensive) help messages, including a list of commands and their individual syntax, and of course, they respond to these "star" commands.

If you are at system level (the star prompt), ie without any application running, it is possible to RMLoad Relocatable Modules, and space will be found for them, until the RAM is full. If you want to RMLoad Modules from within an application (such as BBC BASIC), you can reserve space by setting the RMASize accordingly. Otherwise, you can leave ARM BASIC, and return to the system prompt, by typing QUIT (as for Microsoft BASIC).

For example, to load RAM BASIC from disc, you type *RMLoad RAM+Basic (or just *RAM+Basic). This is an instance where a module automatically "kills off" any other of the same name. Similarly, the 6502 Emulator is a Relocatable Module, and is loaded from disc with *65Arthur. As with a Model B or Master, you go straight into (6502) BASIC. To exit from 6502 BASIC to the 65Arthur of the 6502 Emulator, you have to enter *GO F800 — as for a "real" 6502 Second Processor. More often though, you will want to enter another application running under the Emulator, which you do with *<application> (eg *VIEW, or *SHEET etc). Alternatively, you can leave the 6502 Emulator, and return to the Arthur system prompt, with *QUIT.

Some Other Operating System features

A second group of "configuration" commands can be assigned with *SET. Several default assignments are included in various Relocatable Modules, and these may be changed and added to. Unlike those assigned with *CONFIGURE, these are not held in non-volatile (CMOS) RAM. However, the new assignments may be stored on disc, and loaded from an *EXEC file, which may be named !BOOT so that it is executed simply by pressing Shift-Break.

The command *SET ALIAS is similar to one in Unix (and also present in Panos — the Operating System used on the 32016 Cambridge Series). It may be used to assign aliases to commands, and command strings in LOAD+TYPE and RUN+TYPE, and allow *<filename> to invoke a command string including eg loading or entering the language, then loading the document "filename".

*SET may also be used to assign the File\$Path, the Run\$Path, and the PrinterType\$, and to reset various system parameters from their default or current values. These include the date and time, and the format to be used (eg Day, Month, Year etc.), and the Return Code (ie Carriage Return, Line Feed, or both). The time and date applied to a file is when originally saved (as distinct from when later copied). However, if required, a file can be stamped with the current time and date (from the battery-powered system clock) using *STAMP.

*SHOW shows all the current aliases and assignments, while *SHOW KEY* will reveal the contents of all user-defined function keys (as does *SHOW n on Master).

*ECHO <text> may be used to send eg VDU commands from the command (star) prompt (where previously this was only possible from within BASIC). For example, in the absence of a "green" switch (as fitted to the Philips monitors), the foreground colour may be set by entering eg *ECHO <19> <0> <2> < >.

Filing Systems

The A Series has a much-enhanced version of the ADFS, with formats of 640 and 800K for floppy discs — whether 3.5 or 5.25 inch. Figure 3 of the August article shows that on the new PCW "Store" benchmark, the ADFS is nearly four times as fast with the 800K as with the 640K format (which is retained for compatibility with the Master Series). Moreover, it is the fastest of those shown for floppy discs, and actually faster than some hard discs on this measure.

Whereas with the 640K format, ADFS permits up to 47 objects per directory (as before), with the 800K format it permits up to 77. With the old sector size of 1/4 K, the

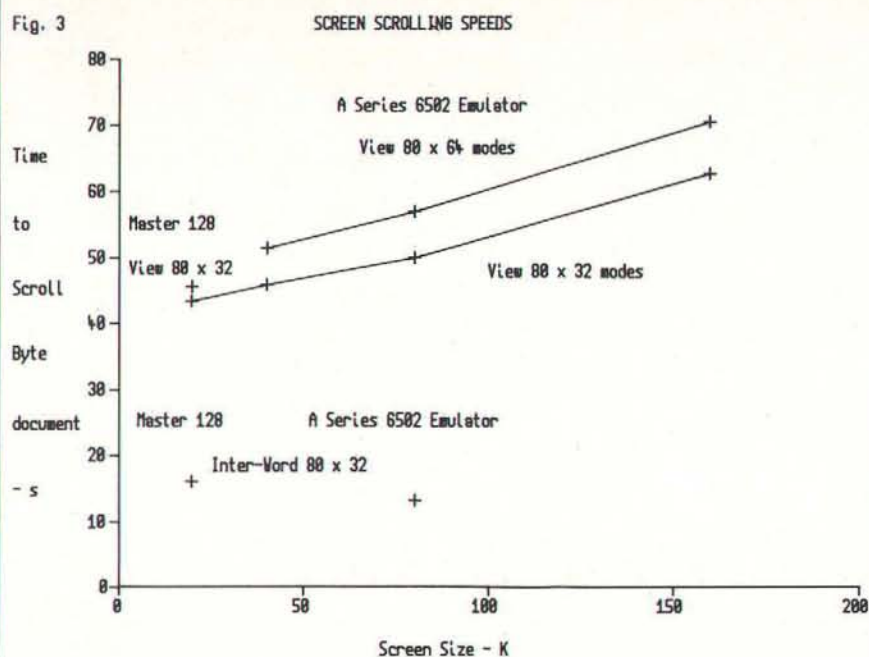
directory was 5 sectors = 1 1/4 K. Now with the new sector size of 1 K, the directory has been rounded up to 2 sectors = 2 K, which is 60 per cent larger/enough for 77 objects. By omitting the cycle number, the number of columns of objects displayed has been increased from four to five in 80-column screen modes, while the 132-column modes allow up to eight across. This allows a full directory, with header, to be displayed in only 15 or 20 lines.

The access attributes are stored in the top bit of the filename in the 640K format, but this is now needed to allow the use of characters above 127, such as may be required by non-English alphabets. The attributes have been "tidied up", while retaining compatibility with the 8-bit implementation of ADFS, and the "E" file attribute has been dropped.

*NameDisc allows a name to be applied to a disc, which is checked and recognized and used in commands. (This is distinct from Title, which applies to a directory, and cannot be checked or recognized — other than by the user). The disc name may be used in place of a drive number. This is similar to a feature of the Econet File Server.

The syntax of *COPY command is now *COPY filename1 filename2 (as for the *MOVE command of the Master, and *COPY under the DFS), whereas it was *COPY filename1 directory2 on the Model B/Master ADFS. *COPY has an option of R for Recurse, which allows the source object — ie disc, directory, or file (when specified with a multiple wildcard "**") — to be interpreted as the appropriate directory, every file in the directory (as in the Master "CopyFiles" utility), and also sub-directories and their contents too. Moreover, *COPY now works between differing filing systems (as in the Master *MOVE command). *COPY also has an option C for Confirm — to allow a selective copy when the source is specified with a wildcard, while *WIPE also allows a selective delete.

*BACKUP and *COPY have the option of Q for Quick, which uses the application workspace as a buffer. This is a great convenience when using a single drive. However, it has to be used with some caution, since it will overwrite other contents, such as data in the workspace of the current application, if issued from within it. Hence you should first save your data, and return to the system prompt, before using this option. *COMPACT is now issued alone — and does not need workspace to be specified, as did the version provided on the Master Series. There are specific star commands *SCREENSAVE and *SCREENLOAD for saving and loading graphics screens (actually the current graphics window). They avoid the need to know the addresses which define the extent of the current screen/window — as was necessary for the 8-bit machines. These are further examples of the greater user-friendliness that the A Series has made possible.



Assembler

Assembler is the mnemonic language in which machine code is written, before being compiled or "assembled". Just as earlier versions of BBC BASIC included an "in-line" Assembler for 6502 machine code, BBC BASIC V has an "in-line" Assembler for ARM code. Moreover the A Series is supplied as standard with both an ARM BASIC Editor, and a Debugger. The ARMBE is a full screen editor, and is documented in the User Guide. The debugger allows you to dis-assemble the contents of memory to ARM instructions, with mnemonics. You can also use it to edit memory contents, and to set "break points" in the code, to stop and display the contents of registers. It is documented in the Programmer's Reference Manual (which is not supplied as standard) — in the section on Assembly Language Programming. For the benefit of software houses who used the ARM Co-Processor and the ARM Development System (or A500), before the launch of the A Series, Acorn have also made available a manual on ARM Assembler. Much more recently, a book "ARM Assembly Language Programming", has been published by MTC for general sale at £12.95. The author, Peter Cockerell, works for Computer Concepts, who are very active in writing for the A Series, and MTC has the same address.

APPLICATION SOFTWARE

As before, the application software packages are mentioned only briefly, rather than reviewed fully. The purpose is to highlight comparisons with, and differences from,

their capabilities on earlier machines — 6502 applications on the Model B/Master Series, and (Big) BASIC and compiled language programs on the 32016 Cambridge Series. In the September article, I gave similar highlights on View, ViewSheet, and ViewStore, and Inter-Sheet and Inter-Chart, as 6502 applications that are already available, to run under the Emulator. I also mentioned that, from September, several languages will be available from Acornsoft which run under the 6502 Emulator, and several more (including "C", Pascal, and Fortran) will be available which run in full, "native" ARM mode. Indeed, the latter are already available in pre-release form, since they are likely to be of particular interest to those writing third-party software.

Inter-Word

In its original form, which runs on the Model B and Master Series, Inter-Word is a highly capable word processor by any standards, and certainly one of the fastest (see A & B, 86/8, p 56). These qualities were achieved by using 32K of code, which is "paged" to appear as only 16K to the computer, and by writing directly to the screen, which is not "Tube compatible". To enable Inter-Word to run on the A Series, under the 6502 Emulator, Computer Concepts have created a Relocatable Module, which sits outside the Emulator, and contains new screen drivers. Since the A Series Operating System offers 132-column screen modes, the code for the 53- and 106-column modes has been omitted, along with that for the ROM-link system, which is not practicable in a "Second Processor"-like environment. Although all the code has to be in one "plane", these omissions, and relocating it higher, has left

more space for the document than the 28.75K available in a Master Series machine.

While Inter-Word "A" still uses only the 8 x 8 "BFONT" characters (albeit with bold, italic and underline variations), the opportunity has been taken to enable highlighting these and other features with colours, by running in 16-colour modes (with 40, 80 or 132 columns, and 25 or 32 lines). Thus the Preferences Menu now has a single entry for screen colours, which leads to a full Colours Menu. This may also be accessed via Ctrl-I9 (formerly ROM-link), and allows each of 16 separate features to be assigned a different colour — itself chosen from the full A Series palette of 4096 colours. Moreover, the border — as the 17th feature — may have its own colour, which can be different again! These are all set in the usual way, with any of 16 different levels of Red, Green, and Blue, and are stored with the document. A set of default colours has been carefully chosen — to be colourful (but not garish) on a colour monitor, but usable (ie visible) on a monochrome monitor.

I entered the Byte 4000-word document, and measured the times taken to Load, Save, Search, and Scroll it (formatted to 80-columns, in 80-column mode). This last depends upon the key repeat period, which was set to 4 centi-seconds. (Scrolling can always be slowed, by increasing it, but not always speeded, by reducing it). The results are shown in Figure 2, together with those for Inter-Word on the Master 128, and also for View on both machines. These show that both Inter-Word and View are faster on the A Series in all but searching (which is still acceptable). This is purely a function of the effective processing speed of the 6502 Emulator. Documents in Inter-Word "A" reformatted immediately whenever the ruler was changed, even in the 132-column modes. However, the lines are limited to 120 characters, as usual. Inter-Word took only 15 s to scroll the same document when formatted to 120 columns and displayed in a 132-column mode (which takes 136K for the screen). View however took 52 s to scroll the Byte document, when formatted to 130 columns.

View, running under the 6502 Emulator, works in all the screen modes of the A Series. Figure 3 shows that the scroll time increases with the size of the screen, in K. Even so, it is still just less than that on the Master 128, in the same Mode (0). Likewise, the scroll time in Inter-Word, which also runs under the emulator, is just less than on the Master 128. However, the time is much shorter than for View, despite always using 16-colour modes.

To assess the handling of longer documents, I compared Inter-Word Multi-File and View Continuous Processing on "FILER" of 16,177 words (ie about 100K), again on both the A Series and the Master 128, using ADFS floppy discs. I measured

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Fig. 4

| Computer | FPU | A SERIES Compiled Integer Dhrystones per second | VS Language (Big) Sieve s for 10 | IBM PS/2 Benchmarks Floating Whetstones per second | MODELS Point Savage s for 2500 |
|---------------|-----|---|---|--|---|
| A Series | No | 4572 | 0.576 | 88,028 | 9.27 |
| IBM PS/2 - 50 | Yes | 1515 | 2.2 | 230,414 | 2.7 |
| Ratio A/-50 | | 3.0 x | 3.8 x | 0.38 x | 0.29 x |
| IBM PS/2 - 50 | No | 1526 | 2.2 | 21,834 | 47.5 |
| Ratio A/-50 | | 3.0 x | 3.8 x | 4.0 x | 4.6 x |
| IBM PS/2 - 30 | No | 668 | 4.9 | 9772 | 47.5 |
| Ratio A/-30 | | 6.8 x | 8.5 x | 9.5 x | 4.6 x |

IBM results from Byte, 87/7, p 221

the time taken to go from end to end, and had used the same document when comparing Mertec DataScribe (see A & B, 86/11, p 73). The results for the A Series benefitted considerably from the improved ADFS and the 800K format for the floppy discs. Inter-Word M-F was 1.4 times as fast when going forwards through the document, while View C.P. (which can go only forwards) was no less than 3.4 times as fast. What was a tedious process on the Model B and Master Series, is much more acceptable on the A Series, but still slower and less flexible than Inter-Word M-F.

Inter-Word "A" should be available in September, at the same price (£ 56.35, inc. VAT), for "new" purchasers. It will also be available at a special "upgrade" price of around £ 10 to owners of the 8-bit version, but this and whether on disc or ROM has yet to be decided. Computer Concepts have announced that they are working on "an extremely powerful comprehensive word processor, with many Desktop Publishing features". However, Inter-Word has been implemented well, and will satisfy many users, at a lower price.

DeltaBase

This is the first of three databases for the A Series to be produced by Minerva Systems. It is a more powerful version of the System Delta Card Index available on the Model B and Master Series, (and with which it is file-compatible), and is attractively priced at £29.95. I reviewed the System Delta Card Index — as one of four programmable databases — in A & B, 86/9, p 58. However, DeltaBase is one of the first applications to run on the A Series in "native" mode (as opposed to under the 6502 Emulator). The ROM which provides the extensions to BBC BASIC that are used by System Delta has been re-written in ARM machine code, as a Relocatable Module. This means that DeltaBase need not be limited by the 6502 Emulator. The parameters are the same, with up to 8160 records, of up to 255 fields, each of up to 200 characters, while the datafile still uses one fixed index for access, and you can create and store up to eight

subsets (and now also their inverses). However, the A Series enables the use of not just 40-column, but also 80- and 132-column modes. Moreover, the ARM processor and BBC BASIC V allow all the programs to run very much faster, while the new 800K disc format enables filing system operations on floppy discs also to be much faster. In addition, the much larger RAM allows many more (and sometimes all) records to be held in memory (ie "cached"). This gives very much shorter search times for second and subsequent searches of the datafile, whether via the index or sequential.

For comparison with the results I gave for the System Delta Card Index in the review of Inter-Base last month, I measured the times taken by DeltaBase for the same datafile, held on an 800K floppy disc. Indexed searching on the "Card Name" was reduced from 7.5 s to 5.4 s for the first search, and only to 1 s when cached. Sequential

searching on the contents of a field was reduced from 1 m 50 s to 1 m 47 s, but to only 18 s when cached. Sorting of the datafile on two fields, totalling eight characters, was reduced from 17 m to 2 m 47 s — ie by a factor of six.

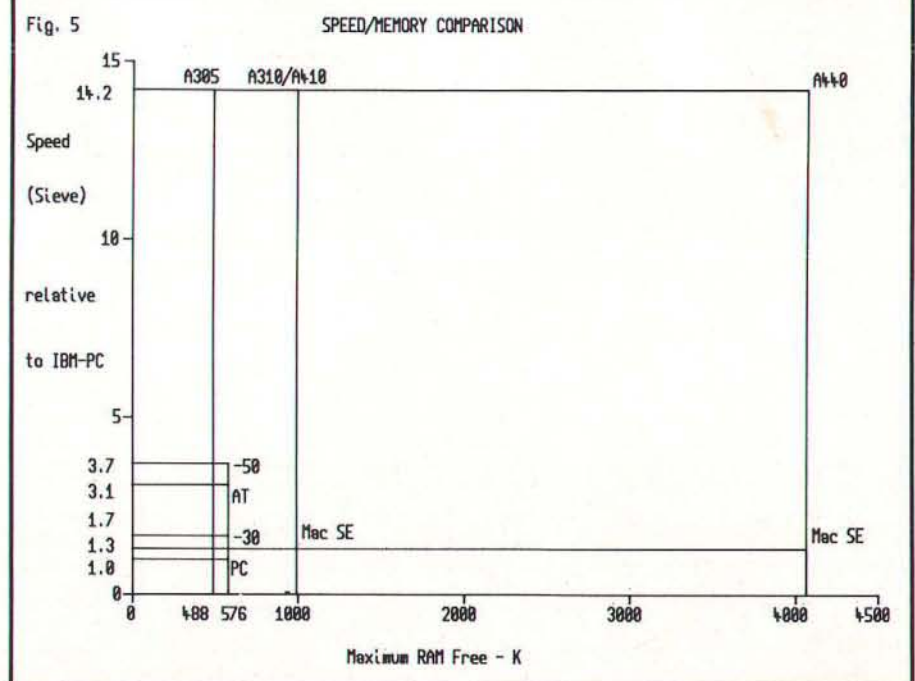
The Minerva databases are extendable by programming, as in System Delta on the 8-bit machines, and in the forthcoming System Delta Plus and Super Delta for the A Series. This allows the creation of custom systems, accessing multiple files if need be, and both programs and datafiles should transfer very easily from the 8-bit to the (32-bit) A Series machines.

PERFORMANCE

Speed

I included results for various benchmarks in interpreted BASIC in my article in the August issue of A & B, and results for the Dhrystone, (big) Sieve, Whetstone, and Savage benchmarks using compiled languages, in my article in the September issue. Since completing these articles, similar results for the new IBM-PS/2 Models 30 and 50 have been published (see Byte, 87/7, p 221). These are compared with those for the A Series in Figure 4. This shows that the A Series is almost five to ten times as fast as the Model 30 (the PC replacement). It will have a similar advantage over "clones" such as the Amstrad PC 1512 and 1640, since they use the same processor (8086) running at the same clock speed (8 MHz) as the Model 30. Moreover, it is three to four and a half times as fast as the Model 50 (the AT replacement) in standard form. Only when the Model 50 is fitted with a Floating Point Unit (ie an

Fig. 5



80287 Co-Processor) at extra cost, is the Model 50 faster on the floating point benchmarks. Even then, the A Series puts up a respectable performance, and the 400 Series will also have the option of a floating point co-processor.

However, processing speed is of little use without corresponding memory free for user programs and data, since actual throughput may be slowed by frequent disc accesses. Here the IBM-PC and AT, and the new PS/2 machines, are limited by MS-DOS to only 640K. Of this, some 64K is taken by MS-DOS itself, leaving only some 576K free to the user. Conversely, the A Series machines have no such Operating System limit, but — like the Mac SE — a hardware limit of 4096K. In the case of the A305, a minimum of 24K is taken for the screen, leaving 488K, while in the case of the A310/A410 and A440, this is 32K, leaving 992K and 4064K free respectively.

The speed and memory free for these machines is compared in Figure 5, where the measure of speed used is the (big) Sieve benchmark. This is usually written in "C", a compiled high-level language that is increasingly popular for writing application programs. The Sieve benchmark measures integer performance, but a comparison on the basis of floating point performance, such as the Savage benchmark, would show the A Series as having even greater advantage

(see Figure 3 in last month's article). The "mighty" 386 machines, such as the Compaq Deskpro 386, the RML VX 386, and the IBM PS/2-80, are not shown in the Figure because of their much higher prices. While they run the Sieve benchmark some 13.7 times as fast as the PC, this is still slower than any A Series machine, and they are still subject to the MS-DOS limit of some 576K free to the user.

Screen Handling

Also of great importance in applications such as word processors and spreadsheets is the speed of screen writing. Some impression may be gained from the new PCW "Textscrn" and "Grafsrn" benchmarks (see the August article), but these may be misleading — particularly in graphics modes. A better measure is the time to scroll the standard Byte document of 4000 words. Figure 3 shows that this is affected considerably by the number of colours that may be (but not necessarily are) displayed (ie by the number of bits per pixel), and by the horizontal and vertical resolution — all of which affect the amount of information on the screen. However, it also shows that for the A Series, even for applications running under the 6502 Emulator, and using multi-colour modes, the scroll time can be less than on the Master 128, and hence very acceptable.

Conclusions

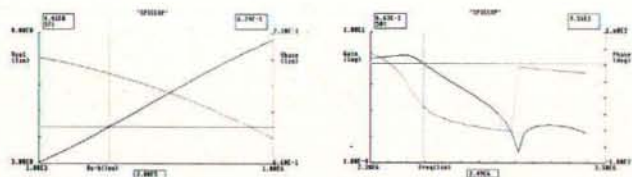
The utility of a computer system depends largely upon its peripherals. Thanks to Acorn's use of standard interfaces and IBM-PC-type connections on the A Series, the use of existing peripherals, such as monitors, external 5.25 inch floppy disc drives, and plotters, presents few problems. Moreover, a keyboard that is extremely close to the new IBM 101 Enhanced layout will help users to adapt quickly to the A Series. This and the availability of a 5.25 inch drive, together with the forthcoming MS-DOS Emulator, and then the 80186 Second Processor Module, will enable the transfer of data between ARM and MS-DOS applications and the running of the latter, when necessary.

Thanks to its heritage of 6502 software, there are already applications and languages to justify purchase of an A Series machine. In addition, languages of full workstation calibre, and the first ARM-based applications are beginning to appear. Even these early applications show that the A Series can already carry out many business tasks more effectively than any MS-DOS machine, thanks to its outstanding speed and the standard and optional memory capacities. Better still, the speed and precision of calculation, and the speed of screen handling promise even better performance in future applications.

Those Engineers' MITEYSPICE The unbeatable circuit simulator

for the BBC Micro is reviewed on PAGE 43 of this magazine. Miteyspice provides AC and DC simulation (the DC may be used to establish the operating point in a non-linear circuit at which a small-signal AC analysis may then be performed). Miteyspice incorporates numerous powerful features including 20 parameter Ebers Moll transistor models and comes with a 50 page manual full of useful hints including how to obtain illusive parameters from manufacturers' data.

Miteyspice is now in use in education and industry throughout the U.K. and with its SPICE compatible syntax, is fast becoming the teaching standard for analogue circuit simulation.



Please send for details of Miteyspice (£119 = VAT) and our other BBC and IBM PC Engineering Software. Enquiries for special applications projects (software/hardware/light engineering) are always welcome. We have VERY special terms for education.

Those Engineers Ltd

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MITEYSPICE

MITEYSPICE is a versatile and powerful circuit simulator supplied on disc by *Those Engineers*, who are consultants in circuit design, simulation software, mechanical and control engineering, as well as makers of light engineering prototypes.

'Miteyspice' incorporates MICROSPICE by D J McCabe and CURVES by Spencer Childs. 'Microspice' carries out DC, AC, parameter and noise analyses on analogue electronic circuits, and is based on the SPICE program written by the University of Southern California, as described by Dr Lawrence Nagel.

"SPICE" is a mnemonic for Simulation Program with Integrated Circuit Emphasis, and was written in Fortran. A more recent version, known as ECA-2, is used world-wide to design integrated circuits. 'Curves' is a separate program which plots the results obtained from 'Microspice'. The calculation and plotting programs occupy about 32K and 15K respectively. To have condensed an extensive mainframe program to run in the 28K available in a BBC Model B is quite a feat, even with the inevitable extensive use of overlays, yet the result is an extraordinarily comprehensive and flexible piece of software.

The use of specialist terminology in this review is unavoidable. To help those who have a general interest, but are not specialists, a glossary has been added. It contains most of the terms of which a simple outline is possible in the space available. Those who would like a brief outline of computer circuit analysis will find one in the review of Analyser (Number One Systems) in our March 1985 issue, pp 94-97.

'Miteyspice' is supplied on disc, and can (and should!) be suitably backed up. When booted, a simple text front panel displays the user's identity and asks for an alphanumeric password — if this is recognised the program is entered. Although the disc can be backed up without formality, the user's identity can be traced from unauthorised copies, so the onus is on original owners not to allow the password (or the disc) outside their supervision. 'Miteyspice' can be used with a single disc drive, but the circuit files will then have to be on the program disc. This is always risky, and a double drive is much to be preferred.

**The better part
of a mainframe
circuit analysis
suite can now
be crammed
into your Beeb.
You'll be
amazed at what
it can do!**

The program can cope with resistors, capacitors, inductors, current and voltage sources both DC and/or AC, voltage-controlled voltage sources and voltage-controlled current sources, bipolar transistors and integrated amplifiers. The latter are specified as voltage-controlled voltage sources, to which a single-pole, low-pass filter can be added as an option to simulate internally compensated operational amplifiers or simple filters. Diodes can be modelled as transistors with collector connected to base, transformers as the appropriate equivalent circuit, and field-effect transistors as voltage-controlled current sources.

The ins and outs of editing

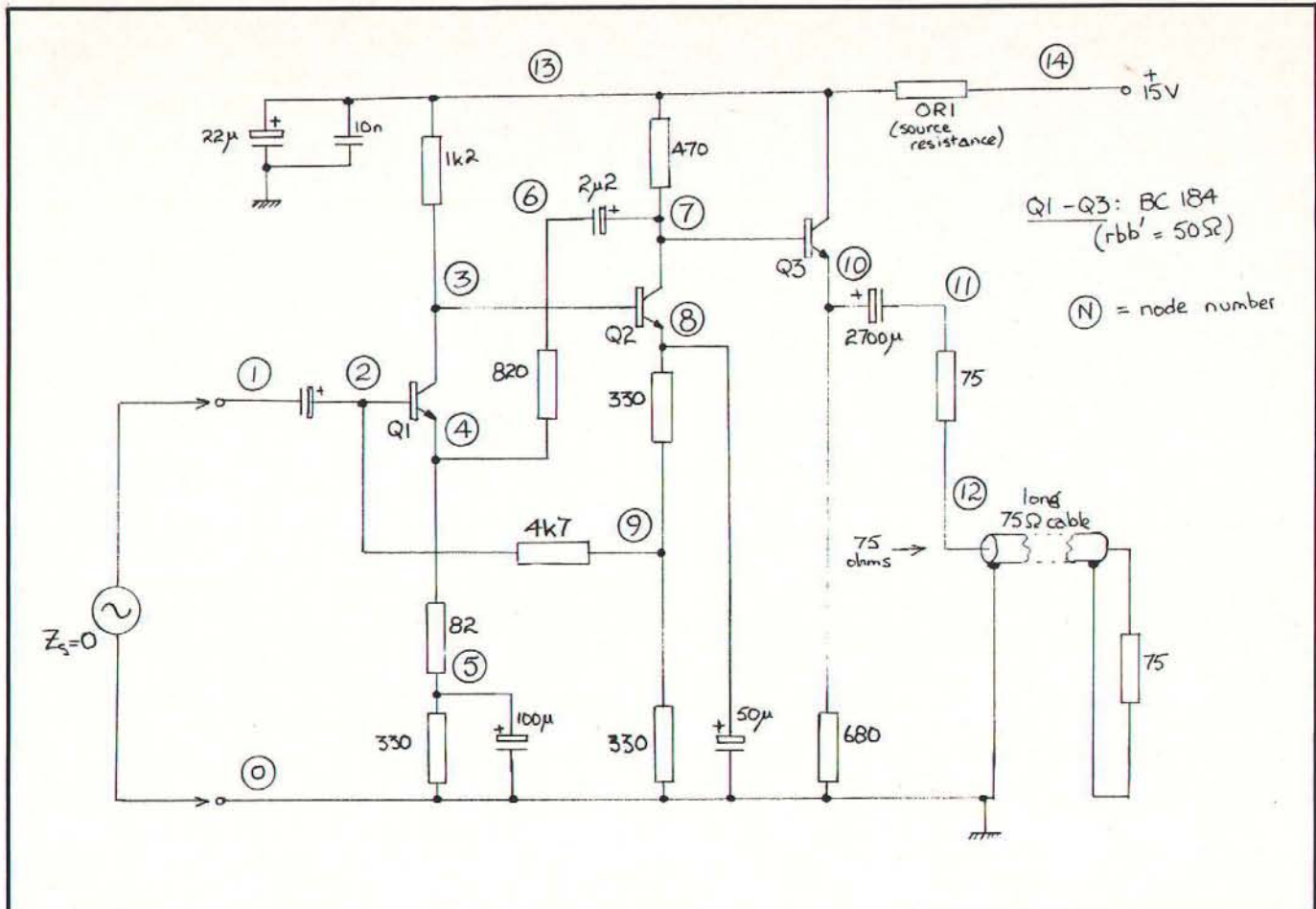
The analysis program comprises an editor and the analyser. The editor is used to compile the circuit data, and to specify the requirements of the analysis. The circuit nodes must be numbered, and one grounded node must be present as node 0. The remaining node numbers must not exceed 99, but need not be sequential, and input/output nodes do not require unique numbering. The size of circuit

which can be handled is decided by the number of nodes, to which must be added one extra node for each transistor with a non-zero extrinsic base resistor, plus the number of voltage-controlled sources (if any). The total must not exceed 25, or 45 with a second processor. The editor has its own simple commands and prompts.

When the program is booted the editor is entered automatically, and a colon prompt follows the line (end), indicating that no circuit has been defined. A GET command produces a lower-case "g" prompt. Components are then entered in turn, using an initial letter for type (eg R for resistor), followed by the node numbers and the value. Various delimiters can be used between entries on a line, but spaces seem tidiest. A BC184 is provided as a transistor model, and any unspecified parameters default to the Texas Instruments data sheet values for this device. Any or all parameters can be altered, and the resulting device can be given a new model name. Transistor models can be repeated anywhere in the circuit. There is no need to enter any paralleled transistors separately if, as would normally be expected, they are of the same type. Instead, an "area factor" can be included on the appropriate input line. Voltage or current sources can be either DC, AC or a superimposition of both, using only one input line per source.

Any one circuit parameter (eg a resistor value or transistor parameter), may be specified as an analysis variable, enabling the circuit performance to be determined over a selected range of the appropriate values. This is not merely useful — it is virtually essential when permissible component tolerances are being considered.

Following the circuit components, additional lines specify the kind of analysis required, using keywords. The following are available (the brackets have been added for clarity): (OP) calculates the DC operating conditions in the circuit and displays the voltages at all nodes. The nodes for any transistors are listed, together with details of their currents, voltages, resistances and capacitances, adjusted where necessary for actual working conditions.



Video amplifier mentioned in the text. Original transistors were BFY90 (Wilson & Gassemlow, New Electronics, 3 Feb 1987)

(SWEEP) produces a dc sweep analysis. The value to be swept is defined by terminating the relevant component line with the symbol P (SWEEP) is followed by the initial and final values to be used, and by either LIN, DEC or OCT and a number. LIN defines a linear sweep, the following number being the total number of points to be determined. DEC and OCT both give logarithmic sweeps, the former with the specified number of points per decade and the latter per octave. If (AT)(freq) is added to the (SWEEP) command, an additional AC analysis will be carried out at each point in the sweep, at a fixed analysis frequency specified by (freq).

(AC) gives an AC frequency response analysis, and the following parameters again specify linear or logarithmic sweeps. If any transistor is present, an initial operating point is calculated and displayed automatically, together with other data, as for (OP). (NOISE)(int)(var)(var) is used in conjunction with either (SWEEP)...(AT) or AC. It calculates and displays the equivalent spectral noise densities at the circuit input and output at each step in the sweep. It also produces a summary of the noise performance at intervals specified by (int), eg if (int) is 10, a summary will be given at every tenth point. This summary shows the contributions from each resistor in the circuit, and from the base resistance, base current and collector current in each transistor, as well as the total noise densities at input and output. Flicker noise in bipolar transistors is modelled

as excess base current noise, and noise due to the extrinsic base resistance is included if this resistance has been specified (its default value is zero). If used with an AC command, the integrated noise at the output over the total bandwidth of the sweep is also determined. (SSIG) stands for small-signal analysis, and is used in conjunction with (SWEEP) or (AC). This analysis assumes that the small-signal equivalent circuit for any transistor can be derived simply from its basic parameters and its collector current. The latter must be specified on the input line for each transistor. Full DC working conditions are not needed, so bias networks can be omitted, the supply nodes being connected to AC ground. Naturally the user must ensure that any supply or bias impedances which may affect the results are included in the circuit.

You only have to ask...

(PRINT) specifies which output voltages or currents are to be determined. Any number of columns of results can be asked for but, when there are more than three, lines will be split on the screen. Up to six columns per line can be handled by the printer, but not on screen, as implied in the manual. With more than six columns printer line feeds will occur, and the spooled output file will not be readable by the plotting program. However, it could be edited (eg in Inter-Word) to make it readable, and the result stored in a new file (see also plots

and printer dumps, below). (AC) and/or (DC) results can be specified, each followed by a list of the chosen nodes. Three variable formats are permitted in a DC analysis — the voltage at one node (with respect to ground), the differential voltage between any two nodes, and the current flowing through a voltage source connected between any two nodes. The voltage source may be of voltage-controlled type, but must be present, though it may be made zero to avoid disturbing operating points.

For an AC analysis there are various forms in which voltages and currents can be presented, namely the actual magnitude, log magnitude (dB reference input), phase (reference input), or real and/or imaginary components. Group delay is not available, partly because an accurate calculation, obtained by setting up and solving an additional matrix for every frequency, would slow up calculations, and partly because it is rarely of great importance in analogue circuits. Group delay is the rate of change of phase-shift with frequency, so a fair approximation can be made quite easily from two adjacent phase/frequency results.

(MODEL)(name)(type)(parameter)(value) specifies which model is to be used for one or more transistors. (name) can be an actual type number, or a code supplied by the user, (type) is NPN or PNP, and any number of

C O N T I N U E S ►

Transistors
=====

| | | | |
|-----|----------|----------|----------|
| nc | 3 | 13 | 7 |
| nb | 2 | 7 | 3 |
| ne | 4 | 10 | 8 |
| Ib | 2.07E-5 | 4.53E-5 | 3.44E-5 |
| Ic | 6.29E-3 | 1.39E-2 | 1.02E-2 |
| Vbe | 0.699 | 0.720 | 0.712 |
| Vce | 4.889 | 5.541 | 3.421 |
| gm | 2.43E-1 | 5.35E-1 | 3.94E-1 |
| Rpi | 1.25E3 | 5.71E2 | 7.52E2 |
| Rx | 5.00E1 | 5.00E1 | 5.00E1 |
| Ro | 1.13E4 | 5.15E3 | 6.79E3 |
| Cpi | 1.82E-10 | 3.72E-10 | 2.80E-10 |
| Cmu | 4.14E-12 | 3.94E-12 | 4.78E-12 |
| Ccs | 0.00E0 | 0.00E0 | 0.00E0 |
| fT | 2.08E8 | 2.27E8 | 2.20E8 |

| | | | |
|---------|--------|---------|--------|
| Freq. | VM12,0 | VDB12,0 | VP12,0 |
| 1E5 | 5.318 | 14.52 | -0.32 |
| 1.778E5 | 5.318 | 14.52 | -0.51 |
| 3.162E5 | 5.318 | 14.51 | -0.88 |
| 5.623E5 | | | |

Transistor operating conditions, and the art of the circuit performance data.

parameters may be specified by (value) statements, eg BF=200 RB=40 would specify a forward current gain of 200 and an extrinsic base resistance of 40 ohms. All values not specified in this line default to the BC184 values.

(TEMP)(value) calls for an analysis at (value) degrees Celsius. The temperature affects the change in collector current for a given change in base-emitter voltage, and hence other parameters.

(RFAC)(value) multiplies all resistor values in the circuit (except transistor base resistances) by the given factor ((value)).

(CFAC)(value) multiplies all circuit capacitances (except in transistors) by the given factor. Individual components can be left

unchanged by either RFAC or CFAC by using the expression (value)/RFAC as their value.

(NSUB)(node) changes the node assigned to the substrate in integrated circuit NPN transistors. The default is ground. PSUB does the same for IC PNP transistors. A hash is used to precede comments, which are then ignored by the analyser.

A most valuable enhancement is that any value, including those used in command lines, can be replaced by an expression. This may be any BASIC maths expression, and may contain the variable P, which takes the value of the swept parameter in a SWEEP analysis. A number of other special variables can also be used, such as Boltzmann's constant, unit electronic charge, default and actual

temperature, the Celsius-Kelvin conversion factor, KT/Q, PI, etc. There are two constraints — clearly a parameter can only be used in a SWEEP or SWEEP..AT analysis, and functions of the analysis frequency are only valid in AC analyses if they do not affect the DC operating point (and hence the parameters of any transistor present). This is because the DC working point is calculated only once, at the start. Therefore a warning is issued when a function is discovered in any analysis other than SWEEP or SWEEP..AT, and the user must ensure that the function is valid before proceeding.

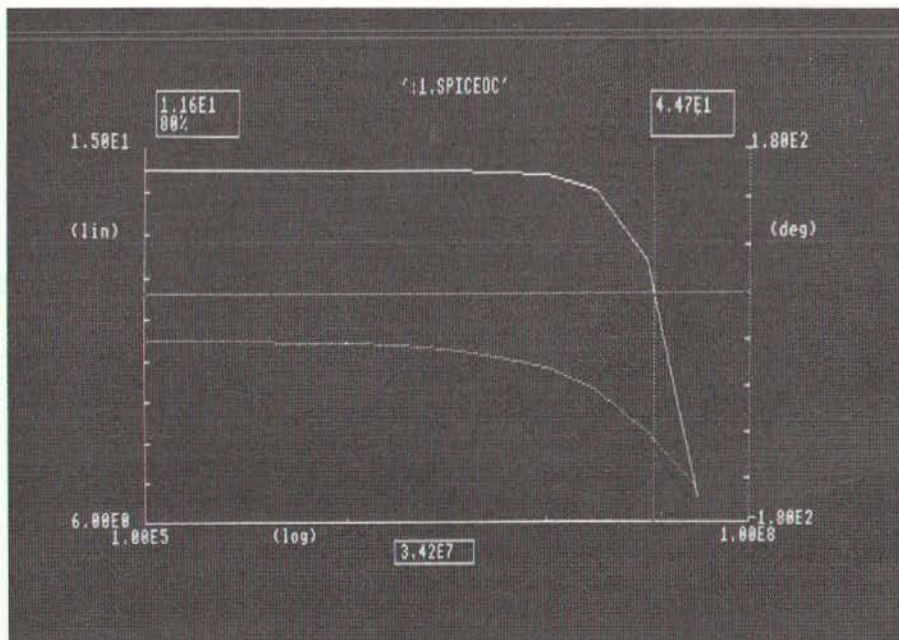
The circuit and analysis specification can be LISTED at any stage, and any line can be edited, using the normal BBC copy facility if required. Lines can be inserted, appended or deleted, and may be in any order. SAVE and LOAD save the new file to disc, or overwrite an existing file by a previously saved one, respectively. APPEND adds a file from disc without overwriting the current one, and HELP produces a list of the commands. Any safe "star" command can be issued from the editor, eg for file handling and cataloguing.

Certain checks are carried out on the input file by the editor, and any offending line is indicated by a row of "up-arrows". Comparison with the correct syntax generally makes the cause obvious. When satisfied with the file it makes sense to save it before issuing the GO command to start calculations. Four options are then offered — to print the results, to spool them to disc for subsequent graph plotting, to put the VDU into paged mode and to print up to 6 columns of results across the page. Paging is generally essential for examining the results unless they are to be printed.

After selecting the options, the file is passed to the analyser. Some further error checking is then carried out on the input file, any problems aborting the analysis. If the error is trappable, an error message will be issued, and control will return to the editor. If a BASIC error occurs, "BASIC error:" is displayed, followed by the normal BASIC error message. As long as the error is not fatal, the input file remains intact in either case. ESCAPE stops the current operation and returns control to the editor, with the first line of the input file displayed. Any results not already spooled to disc will be lost. The manual lists and explains internal error messages.

Calculated guesswork

There is insufficient space to investigate the analysis program in detail in this review. By way of a brief summary, the first step is to evaluate expressions, if any, the results of which will be required before much else can be done. The DC working conditions in the circuit are then found. If any transistor is present its working conditions involve non-linear functions, so iteration methods must be used, necessarily starting from assumed values which may differ substantially from the actual ones. This can take a significant time, and in some cases the circuit may not converge — that is, a mutually compatible set of values will never be found. 'Miteyspice' carries out 50 iterations before



Screen plot of the amplifier gain and phase shift versus frequency. The left-hand linear scale gives the gain in dB, the right-hand scale shows the phase. 3 boxes give exact read-outs at the dotted cursor positions.

CIRCUIT ANALYSIS

giving up, so nobody can say that it doesn't try! One of several cases in which problems may arise is that of circuits with positive feedback. The problem is not peculiar to 'Miteyspice' — it happens with all analysis programs. Depending on the particular application a designer may be able to use one of a number of "fiddles" to extract useful information. One example is the use of open-loop analysis, applied to a negative feedback amplifier to find out why it is such a good oscillator!

The next job is to calculate the transistor parameters that depend on working conditions, after which the analysis proper can start. As usual, this involves setting up and solving the circuit admittance matrix. Where a noise analysis has been requested, the sweep must stop at the appropriate points while the noise components are found, making use of the impedance and gain information calculated previously. Considering the sheer volume of data and the amount of arithmetic needed the whole job is quite remarkably fast, masses of results appearing in (typically) a few minutes. All results are given to four significant figures, with trailing zeros omitted.

The program seems to be well optimised for speed, which is further improved by using a second processor. By way of example a video amplifier having 22 components and 17 nodes (including extrinsic base resistors) was analysed for operating point, absolute gain, gain in dB and phase shift at 13 logarithmically spaced frequencies, with one full noise analysis. The time for this substantial computation (care to try it yourself with pencil and pocket calculator?), including printing and spooling the results, was 365.5 seconds with second processor and 515.9 seconds in the I/O processor only. The time taken is printed at the end of each program, which can be very useful.

Plotting and printing

Having completed the analysis and spooled the output data to disc, 'Curves' is entered to plot the results. The first column of results becomes the x-coordinates, and the second column becomes the normal y axis, designated y1. If there is a third column, it will be used to superimpose a second curve, using a y2 axis on the right of the graphs. A front panel menu offers linear or logarithmic scaling for the axes, and an extra option of +/- 180 degrees for y2. If the phase shift exceeds this range, numeric scaling will be used. Any filename can be loaded, the default being the name given by the analyser to the spooled file.

On selecting the plot option, the curves are almost instantly drawn in Mode 0. One label of up to five characters may be added to each axis if required. Two cursor lines at right angles are provided, traversing the full width and height of the graph, respectively, and these can be moved at one of three speeds by the cursor keys. By moving the cursors to intersect on any point of either curve, the exact x and y coordinates can be read accurately from boxes, of which there are three. In the case of y1 the value is also shown as a percentage of its maximum value. This system avoids the

```
R 13 3 1.2K
R 4 5 82
R 5 0 330
R 4 6 820
R 13 7 470
R 8 9 330
R 9 0 330
R 2 9 4.7K
R 10 0 680
R 13 14 0.1
R 11 12 75
R 12 0 75
Q 3 2 4 BC184
V 14 0 15
Q 13 7 10 BC184
Q 7 3 8 BC184
MODEL BC184 NPN RB=50
V 1 0 AC 1
OP
AC 100K 100MEG DEC 4
PRINT AC V(12,0) VDB(12,0) VP(12,0)
><end>
:GO

Options <P,S,V,W> ?P_
```

Part of the component list, and instruction to start analysis. The print option has been selected.

need for grid lines and visual interpolation, which are rarely satisfactory.

The completed graph can be dumped to a printer, for which a call to Computer Concepts' Printmaster ROM is used. Any other suitable ROM can be substituted by altering a program line, and a machine code dump could equally well be called after loading it at one of the usual locations.

Another plotting possibility for those suitably equipped is to load the circuit output file into Inter-Word, after which it can be edited into the format required to export it to Inter-Chart. This would allow up to 16 graphs to be superimposed, as well as the use of different colours, grid lines, varied scaling and flexible labelling. It would even be possible

to reorganise the data into bar-chart or pie-chart form, though these are far less obviously useful. The use of Inter-Word to edit output files for 'Curves' was mentioned above.

'Miteyspice' comes with a 49-page duplicated dot-matrix manual which covers all the necessary ground, and includes useful hints on the difficult job of extracting transistor parameters from manufacturers' data sheets. The information about specific areas tends to be scattered somewhat through the manual, and some rearrangement (or a good index) would be useful. Having said that, the user rapidly becomes accustomed to the various possibilities and their syntax, and only needs to refer to the manual occasionally.

'Miteyspice' is available from Those

C O N T I N U E S ►

```
fT          2.08E8    2.27E8    2.20E8

      Freq.      VM12,0    VDB12,0    VP12,0
      1E5        5.318     14.52     -0.32
1.778E5        5.318     14.52     -0.51
3.162E5        5.318     14.51     -0.88
5.623E5        5.317     14.51     -1.55
      1E6        5.317     14.51     -2.74
1.778E6        5.316     14.51     -4.87
3.162E6        5.312     14.5     -8.67
5.623E6        5.298     14.48    -15.46
      1E7        5.249     14.4     -27.68
1.778E7        5.043     14.05    -50.08
3.162E7        4.16      12.38    -90.35
5.623E7        2.152     6.656   -145.2
      1E8        0.7245    -2.8     164.8

run complete    251.5 secs

Edit Commands:  HELP GET GO LIST
f0(<+>) cr K LOAD SAVE APPEND

>C 13 0 10N
```

With the completion of the results, control returns to the editor. This is not the run quoted in the article, as shown by the run timing.


```

++ Microspice 1.4 ++
User: A & B COMPUTING

C 13 0 25U
C 13 0 10N
C 1 2 25U
C 5 0 100U
C 6 7 2.2U
C 8 0 50U
C 10 11 2700U
R 13 3 1.2K
R 4 5 82
R 5 0 330
R 4 6 820
R 13 7 470
R 8 9 330
R 9 0 330
R 2 9 4.7K
R 10 0 680
R 13 14 0.1
R 11 12 75
R 12 0 75
Q 3 2 4 BC184
V 14 0 15
Q 13 7 10 BC184
Q 7 3 8 BC184
MODEL BC184 NPN RB=50
V 1 0 AC 1
OP
AC 100K 100MEG DEC 4
PRINT AC V(12,0) VDB(12,0) VP(12,0)

Operating point:
=====
V 1= 0.0000 V 2= 3.2779 V 3= 7.4680
V 4= -2.5793 V 5= 2.0659 V 6= 2.5793
V 7= 10.1763 V 8= 6.7555 V 9= 3.3744
V10= 9.4562 V11= 0.0000 V12= 0.0000
V13= 14.9970 V14= 15.0000

Transistors
=====
nc      3      13      7
nb      2      7      3
ne      4      10     8
Ib      2.07E-5 4.53E-5 3.44E-5
Ic      6.29E-3 1.39E-2 1.02E-2
Vbe     0.699 0.720 0.712
Vce     4.889 5.541 3.421
gm      2.43E-1 5.35E-1 3.94E-1
Rpi     1.25E3 5.71E2 7.52E2
Rk      5.00E1 5.00E1 5.00E1
Ro      1.13E4 5.15E3 6.79E3
Cpi     1.82E-10 3.72E-10 2.80E-10
Cmu     4.14E-12 3.94E-12 4.78E-12
Ccs     0.00E0 0.00E0 0.00E0
fT      2.08E8 2.27E8 2.20E8

Freq.   VM12,0   VDB12,0   VP12,0
1E5     5.318    14.52    -0.31
1.778E5 5.318    14.52    -0.51
3.162E5 5.318    14.51    -0.88
5.623E5 5.317    14.51    -1.55
1E6     5.317    14.51    -2.74
1.778E6 5.316    14.51    -4.87
3.162E6 5.312    14.5     -8.67
5.623E6 5.298    14.48    -15.46
1E7     5.249    14.4     -27.68
1.778E7 5.043    14.05    -50.08
3.162E7 4.16    12.38    -90.35
5.623E7 2.152    6.656    -145.2
1E8     0.7245    -2.8     164.8

run complete 253.6 secs

```

Print out of the video amplifier circuit configuration, node and transistor operating data and results obtained.

Engineers, 106a Fortune Green Road, West Hampstead, London NW6 1DS (01-435 2771) at £119 + VAT.

There is a special offer, under which any educational establishment can purchase two copies in return for permission to use the program on any number of computers, leaving no excuse for piracy. Versions for use with Ethernet, or with an IBM PC, are also available.

Summary

In my experience 'Miteyspice' is, quite simply, unique. Its power and flexibility, which would be useful in a mainframe context, are amazing in a program scaled down to fit a micro with a very limited memory. The program has been applied to a number of circuits of both known and unknown performance, for which a mass

of data was easily and relatively quickly obtained. Where checks could be applied, the accuracy of the data was confirmed, and in no case could it be doubted. 'Miteyspice' is an invaluable design tool which leaves no excuse for the inadequacy and inefficiency of "design by soldering iron". It also has great potential in education, for lecture and practical preparation and as a potent teaching aid, not to mention settling staffroom arguments! It is not too complex for modest uses, yet it can tackle substantial jobs, so it is a "must" for any circuit design consultant or R&D lab with access to a BBC Micro. It is at its best with a 6502 second processor, which is now available at reasonable cost, but is no slaggard on a Model B. I wish I'd had something like this years ago!

GLOSSARY

Note: These explanations of technical terms are necessarily brief and non-rigorous.

Admittance matrix: The complete set of equations needed to describe a circuit, expressed mathematically as a two-dimensional array of the component admittances. It is solved routinely to obtain information about the circuit behaviour.

DC working conditions: The DC voltages and currents in a circuit under working conditions.

Decade: A frequency factor of 10, eg 100Hz is a decade below 1000Hz.

Decibel: A logarithmic voltage, current or power ratio. The gain of a circuit in decibels can be defined as $20 \cdot \text{LOG}(\text{Output voltage/Input voltage})$, or $20 \cdot \text{LOG}(\text{Output current/Input current})$ or $10 \cdot \text{LOG}(\text{Output power/Input power})$.

Extrinsic base resistance: The resistance between the base lead-out wire and the actual base junction of a transistor. It is not accessible for direct measurement, but can be found indirectly.

Frequency response: The manner in which the circuit gain (output/input) varies with frequency. The input and output may be currents (current gain) or voltages (voltage gain). Usually plotted as gain in decibels (vertical linear scale) against frequency (horizontal logarithmic scale).

Ground (or "earth"): Reference point of zero potential.

Log magnitude: See decibel

Low-pass filter: A circuit which allows low-frequency ac signals to pass unhindered, but progressively attenuates higher frequencies.

Node: A junction point between two or more circuit components.

Noise: An output which is not due to a corresponding input. Normally refers to voltages produced by random electron movements, which increase with rising temperature.

Octave: A factor of two in frequency (from musical notation). 440Hz is an octave above 220Hz and also an octave below 880Hz.

Parameters: (Name/value) The electrical properties of a component. Eg the principal parameter of a resistor is its resistance, measured in Ohms.

Single-pole: (Mathematical) The number of poles determines the sharpness with which a filter will cut off unwanted frequencies. Sharpness increases with the number of poles.

Tolerance: (i) The possible manufacturing spread in the value of a component around its nominal value — eg a resistor of 4700 Ohms $\pm 5\%$. (ii) The maximum range of a parameter that can be tolerated in the circuit in which it will be used.

Voltage-controlled current source: A source of current, the value of which is controlled by the voltage applied to a control terminal.

Voltage-controlled voltage source: A source of voltage, the value of which is controlled by the voltage applied to a control terminal.

PINEAPPLE SOFTWARE

Programs for the BBC model B, B+, Master and Master Compact with disc drive

DIAGRAM II

Diagram II represents a major breakthrough in the techniques used for drawing software on the BBC micro. It works on a completely different principle to other drawing software by storing the drawing information straight to disc as coded 8x8 pixel blocks.

This technique has three major advantages. First, the size of the diagram is only limited by the amount of space on disc. Second, there is no limit to the amount of information which can be stored on a given diagram as the information is stored on disc and not in computer memory. Third, the disc storage technique allows the smooth scrolling of the screen over the whole surface of the diagram.

For people not familiar with Diagram, the basic operation of the program is to first display any part of the diagram, either by quoting an index name or screen number. At this point you are free to scroll the diagram around the screen using either cursor keys, trackball or mouse. You may stop scrolling at any point and enter the edit mode which allows you to modify or add new information to the diagram. When you have finished making alterations, the new information is stored to disc and you are free to scroll elsewhere on the diagram stopping to edit at any time.

The edit features are now very comprehensive. Text may be typed straight from the keyboard, and if other fonts are stored as user defined characters then these fonts may be printed using the normal keyboard keys.

The print routines are now completely 'scaleable' with both the horizontal and vertical scales being totally variable in 1% steps between a size that will give 18 mode 0 screens on an A4 sheet and a size that would print just one pixel on a sheet. The routines are adaptable to most types of dot matrix printer and full advantage may be made of wide carriage printers. The printouts may be rotated through 90 deg. if required.

The new editing features make DIAGRAM II suitable for all types of serious drawing application including scale drawings, flow charts, architectural, family trees, and many other subjects as well as circuit and schematic diagrams. As an example of what Diagram II can do, this complete advertisement (with the exception of the PCB drawing) has been produced with the package.

SUMMARY of DIAGRAM II FEATURES

1. Works on any model BBC computer with either DFS or ADFS. (ADFS only if Shadow memory available).
2. Will automatically take advantage of shadow memory (any make) to provide more User Definable Characters, 880 with Shadow, 381 without Shadow.
3. Rapid horizontal and vertical line drawing routine with automatic joins for circuit diagrams.
4. Full rubber band line drawing and circle drawing modes.
5. Takes advantage of the Acorn GXR rom to provide drawing of arcs, sectors, chords, parallelograms, ellipses, and flood filling. Note this rom is already fitted to Master and Compact machines.
6. Pixel cursor drawing and deleting mode allows very fine detail to be added.
7. Defined areas of screen may be moved, copied, deleted or saved to disc.
8. On-screen indication of cursor position shows either the cursor position on the overall diagram or the distance from a preset point.
9. Keyboard keys may be predefined to print User Defined Characters, enabling new character sets to be stored as user defined characters and then printed straight to the screen using the keyboard keys.
10. Wordprocessor files may be loaded to the screen and automatically formatted into any shape screen area.
11. Index names may be set up to point to given areas of a large diagram, to enable rapid access to a given point on a diagram.
12. Fully compatible with Marconi trackball and most makes of mouse.
13. All Diagram 'Utilities' are included, enabling screen ident numbers and borders to be added, and any area of diagram to be moved or copied. The whole diagram may be displayed in reduced scale (either 444 or 888 format) on a single screen, and the size of the overall diagram may be increased or decreased.
14. Completely scaleable print routines allow any area of the diagram to be printed either horizontally or through 90 deg. in scales that may be varied in 1% steps allowing up to 18 mode 0 screens to be printed on an A4 sheet (still with readable text).
15. Complete with 40 page easy to understand handbook.



Diagram II consists of a set of disc files and a 16k Eprom. The disc supplied is formatted in 401 on side 0 and 801 on side 2. Please state if this is unsuitable for your system, or if you require a 3.5" Master Compact disc.

DIAGRAM II - £55.00 + vat

P & P free (except overseas)

N.B. Upgrades are available to existing Diagram owners. Please contact Pineapple if you have not received an upgrade letter.

PCB

Pineapple's now famous printed circuit board draughting 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 up to 500 component and 500 ASCII component descriptions may be stored for each PCB. There is no limit to the number of tracks that may be stored for a given PCB although the maximum board size is restricted to 8" x 5.6".

Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers and outlines entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 or 2:1 scale enabling direct contact printing to be used on resist covered copper clad board. The print routines are very fast taking typically 5 minutes for a 1:1 print of a 7" x 5" board. This program has too many superb features to describe adequately here, so please write or phone for more information and sample printouts.

PRICE £85.00 + vat

MARCONI TRACKERBALL

This high quality device comes in three versions. Version one is for the standard BBC micro and comes with the Icon Artmaster drawing package from Micro-Draw, and Trackerball Utilities which allow the trackerball to be used with other software.

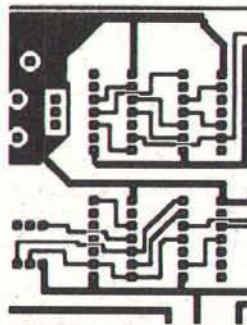
Version two is for the Master 128 computer and this comes with the Pointer Rom. This is a Rom which allows the Master to be configured for use with the Trackerball and has commands to enable the Trackerball to intercept the cursor key or joystick routines of other software. Commands are also available to reverse the axes of the trackerball and set the sensitivity. The three buttons may also be set up to produce any ASCII code.

Version three is simply the bare Trackerball which comes without software but is suitable for use with specially written software such as Diagram or Diagram II.

Trackerball adapters are also available which plug onto the end of the cable and convert the connections of the trackerball to be the same as a mouse. This enables the trackerball to drive all types of 'mouse' software.

| | |
|--|---------------|
| 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 & packing on Trackerballs | £ 1.75 |

All orders sent by return



A new addition to the PCB software is the PCB plotter driver program. This enables files produced by PCB to be used in conjunction with most types of plotter to produce plotted output rather than the normal dot-matrix printer output.

In this way plots may be produced directly onto film or even directly onto copper board with an etch resistant pen if a suitable plotter is available. The program is suitable for use with most makes of plotter including Hewlett Packard, Hitachi and Plotmate M. The program can also be configured to work with other plotters by entering suitable plotter instructions.

All the features of the printer driver are included, such as the automatic thinning down of tracks between roundels. Mirror image plots are also available.

PRICE £35.00 + vat

MITEYSPICE

Miteyspice is a very powerful AC & DC circuit analysis package with graphics suitable for use with any model BBC micro including those with 2nd processors.

As well as all the usual facilities available with this type of program, non-linear effects, small signal, noise measurements and sweeps may be performed. Component values may be swept, allowing component tolerances to be investigated as well as thermal performance etc. Comprehensive transistor modelling is incorporated using a 20 parameter Ebers Moll description. The program is supplied on disc with a very comprehensive 49 page manual.

PRICE £119.00 + vat

ADFS Utilities Rom - ADU

ADU is an invaluable utility for all ADFS users. It adds over 20 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 DFS 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 onto multiple floppies.

Additional commands include:- *ADU, *BACKUP, *CATALL, *CHANGE, *DFSDFS, *DIRALL, *DIRCOPY, *DIRDESTROY, *DIRNAME, *DISCEDIT, *DRIVE, *FILEFIND, *FORMAT, *KILLADU, *LOCK, *MENU, *PURGE, *PURBK, *UNLOCK, *VERIFY, *WFORMAT.

PRICE £29.00 + vat

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| 5¼ SS/DD | 48TPI | 5.95 | 8.95 | 12.75 | 16.00 | 18.75 | 36.95 |
| DS/DD | 48TPI | 6.95 | 9.95 | 13.95 | 16.95 | 19.95 | 37.95 |
| DS/QD | 96TPI | 7.95 | 10.95 | 14.95 | 17.95 | 21.95 | 39.95 |
| ★COL DS/QD | 96TPI | 8.95 | 14.95 | 21.95 | 28.95 | 35.95 | 63.95 |
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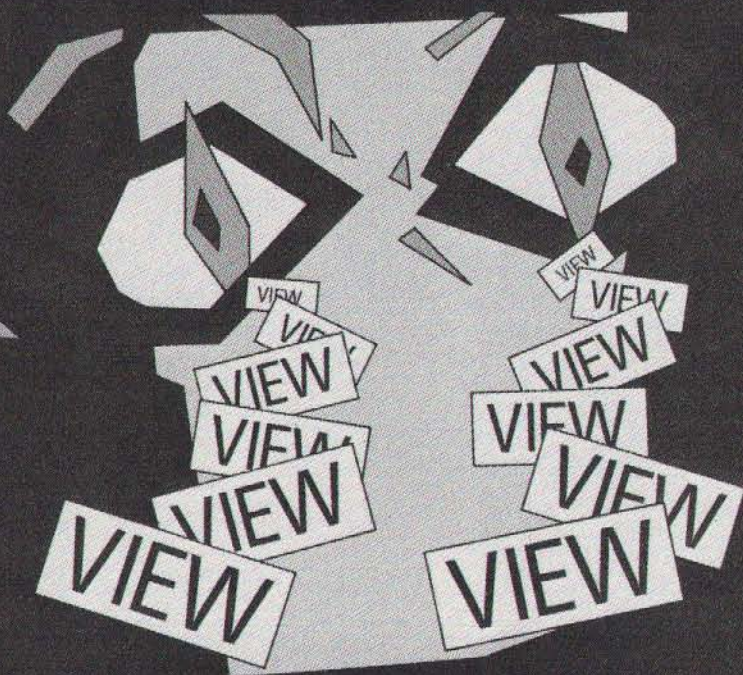
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H O M E O F F I C E

HOME OFFICE

A Dabhand Guide

VIEW

DABS
PRESS

**Panasonic
printer
performance
and a guide to
becoming a
dabhand with
View**

Wordwise Plus Plus

Ifel have licensed *Wordwise Plus* from Computer Concepts and added features of their own to create *Wordwise Plus II*. The price is £65.95 and a discount price of £39.95 is available to existing PRICE PLUS owners but not to existing *Wordwise Plus* owners. Details on 0752 787058. A full review of the product will appear in Plus Talk in the near future.

**Learning the easy way
— a Dabhand Guide to
View**

I assume there can be nothing nicer for a

writer on computer subjects to write about his or her wordprocessor. It must be like writing about an old friend. In Bruce Smith's *View, including Viewspell and Viewindex — a Dabhand Guide*, the most prolific of BBC Micro book writers tackles the popular Acornsoft wordprocessor and family. It's no battle making your way through this guide but a smooth readable ride as the voice of experience comes across.

The progress through setting up equipment, file handling, editing text, styles, layout and printing is predictable and perfect for the newcomer to View. But that's only the half of it. The book also provides a set of utilities, a substantial set of hints 'n' tips and a *View manager* system with 'pretty' front-end and extended file handling and information.

Viewspell and *Viewindex* get a fair crack of the whip with 20 pages which I found a very fruitful read as only an occasional user of these facilities.

The book displays considerable attention to detail and a concern to supply all the vital information for successfully using View in one handy volume. All the different versions of View are noted in relation to the main text. Further appendices include those vital printer codes for Epsoms and compatibles and a quick command guide. Appropriately there is a full index and detailed contents — very useful if you require a book for teaching View.

The production and layout of the book is worthy of note. Written in View on a BBC Micro and laser printed after editing in an Apple Macintosh wordprocessor, the resulting text is readable and clearly presented. There are graphic dumps, example screens from View and different fonts for listings and examples, an impressive example of desk top publishing.

An accompanying disc is available with the published utilities and further programs such as a printer driver generator. An all-round excellent value publication for the View user. Price £12.95

Programs disc (5½" DFS) £7.95, (3¼" ADFS) £9.95

Details from DABS (David Atherton/Bruce Smith) Press, 76 Gardner Road, Prestwich, Manchester, M25 7HU.

Faster printing

One printer that Jon Vogler couldn't include in his under £300 survey last month — because it wasn't yet available — was the new Panasonic KX-P1081. Panasonic responded by sending along their successor to the P1081, the P1082. Based on its predecessor, the P1082 boasts 160 characters per second draft speed and 32 cps

C O N T I N U E S ►

Near Letter Quality. A KX-P1083 with 240 cps draft and 48 cps NLQ is also now available with optional auto sheet feeder, very useful if you process large volumes of printout, such as mailshots, through your home office.

Having used this neat, lightweight printer for the last few weeks, I can declare myself very satisfied with its performance. Especially nice is the front panel switch selection for standard, NLQ and condensed print. Paper handling is very straightforward but why do printer ports have to be situated where they force the cable to do battle with the paper? The tractor feed design also means that you waste paper when you tear off at the perforations. A paper-out detector usually makes sure that you don't carry on printing long after the paper box is empty but it did mysteriously fail to work on one occasion. At no time did a label catch or paper crease or come loose from the tractor.

Though light, the hardware is sturdy enough, the buttons very responsive, the tractor easy to position, line and form feed quick and easy. Once I had removed it, I struggled a little to replace the transparent cover but the manual helped me sort it out. The printer ribbon is contained within a small typewriter-style cassette which clips into position. I much preferred this to the Epson FX and Taxan/Kaga ribbon cartridges where the ribbon stretches across the width of the roller.

Panasonic claim that a single ribbon prints successfully for about two million characters and an additional one million character print can be obtained by pressing a counter spring in the cassette hole. I found the print remaining dark long after I would have thrown away my Epson FX80 ribbon and was very impressed by the convenience of the cartridge.

Soft side

From a software point of view, the Panasonic's Epson compatibility makes it entirely suitable for the BBC Micro. It does not support reverse line feed which can cause problems with some font/design software. A&B Computing's Easyfont, for instance, uses reverse line feeds to draw a box and to print within it. Panasonic users have to print the box first and then manually reposition to print the font.

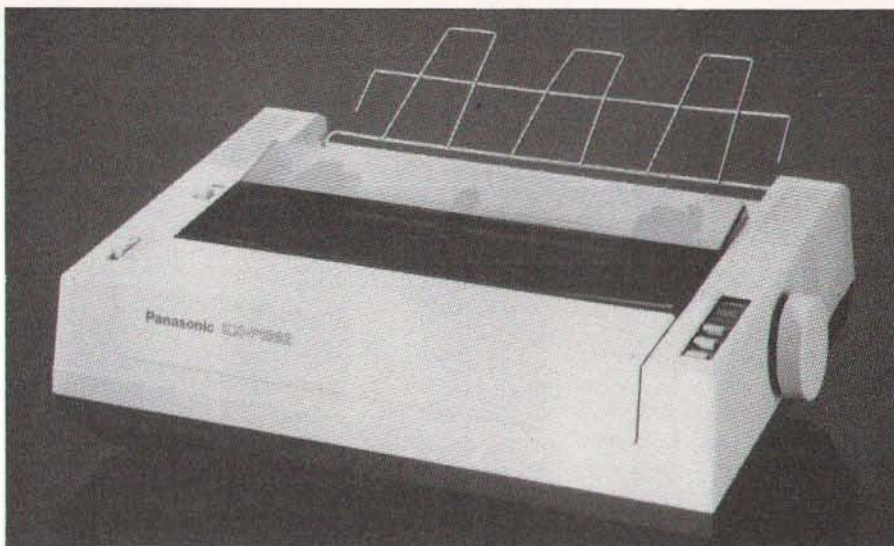
The manual is excellent on setting up and on DIP switch settings (easily accessible under a transparent plastic cover beneath where the print head travels). As per usual, the manual is not written with the BBC Micro in mind but both CJE and Viglen, well-known Acorn suppliers, stock the Panasonic range and supply suitable information. CJE have an extensive range of printer utility software. Recommended price for the P1082 is £245 but at a recent show it was discounted to well under £200 with cable included.

P1081

As well as examples from the P1082, I must thank Mr David Sayed, who tested the P1081 for us. His results, based on Jon Vogler's tests, were:

Print speed draft pica: 58.0 cps

Print speed NLQ: 15.4 cps



Conclusions

From a practical point of view the Panasonic KX-P1082 came through with flying colours, proving itself quick to print, compatible with the vast majority of character and graphics based software and causing no hiccups in the smooth running of my home office. I couldn't ask for more.

This is the Panasonic KX-P1081

This is pica mode

This is pica italics

This is pica bold-faced type

This is pica underline and

here are some descenders

yyyyy ppppp ggggg jjjjj

This is the Panasonic KX-P1081

This is elite mode

This is elite italics

This is elite bold-faced type

This is elite underline and

here are some descenders

yyyyy ppppp ggggg jjjjj

This is the Panasonic KX-P1081

This is NLQ mode

This is NLQ italics

This is NLQ bold-faced type

This is NLQ underline and

here are some descenders

yyyyy ppppp ggggg jjjjj

This is the Panasonic KX-P1081

This is pica mode

This is pica italics

This is pica bold-faced type

This is pica underline and

here are some descenders

yyyyy ppppp ggggg jjjjj

This is the Panasonic KX-P1081

This is elite mode

This is elite italics

This is elite bold-faced type

This is elite underline and

here are some descenders

yyyyy ppppp ggggg jjjjj

This is the Panasonic KX-P1081

This is NLQ mode

This is NLQ italics

This is NLQ bold-faced type

This is NLQ underline and

here are some descenders

yyyyy ppppp ggggg jjjjj

KX-P1081 — Down to Business style

- 1....ELITE MODE. (12 characters per inch)
- 2....EMPHASIZED MODE.
- 3....DOUBLE STRIKE. (Characters printed twice)
- 4....CONDENSED MODE. (17 characters per inch)
- 5....SUPERSCRIPT CHARACTERS
- 6....SUBSCRIPT CHARACTERS CONDENSED
- 7....SUBSCRIPT CHARACTERS
- 8....SUBSCRIPT CHARACTERS CONDENSED
- 9....ITALIC CHARACTER SET.

KX-P1081 — condensed mode

ABCDEFGHIJKLMNPOQRSTUVWXYZ.....abcdefghijklmnopqrstuvwxy NLQ Normal
ABCDEFGHIJKLMNPOQRSTUVWXYZ.....abcdefghijklmnopqrstuvwxy NLQ PROPORTIONAL.

NLQ on the KX-P1082

Elite text styles on the KX-P1082

MORLEY ELECTRONICS

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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.

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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).

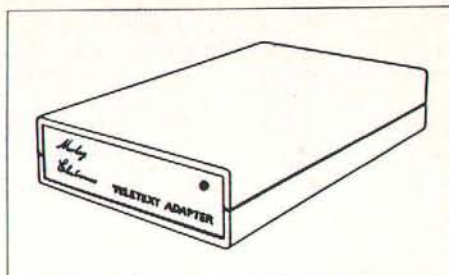
* Easy to follow comprehensive user guides.

* 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

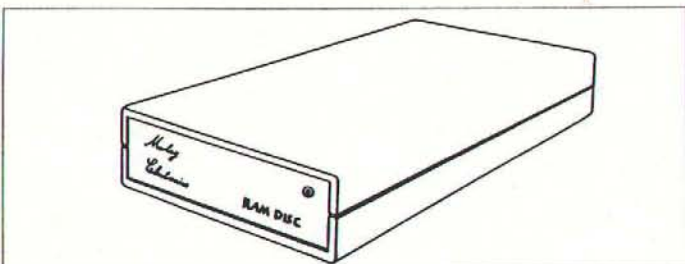


end user I would recommend the Morley unit."—(Acorn User, January, 1986).

"...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, battery backup and a comprehensive user guide.

FEATURES:

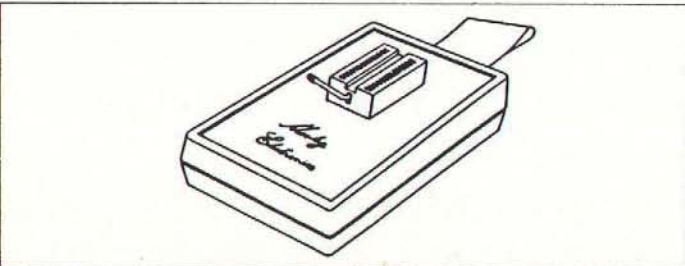
One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software

RAMDISC

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 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 its 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.

NEW PRODUCT

MORLEY MASTERBOARD "A"

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.

The new MORLEY MASTERBOARD "A" allows you to have up to 8 x 16K and 4 x 32K extra ROMS installed inside your MASTER and still leave 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 4 banks by using cartridges.

A staggering 32 ROM images installed and accessible at any time. User-friendly on-board software with a host of useful features.

To order please fill in and send order form to: **MORLEY ELECTRONICS, Unit 3, Maurice Road Industrial Estate, Wallsend, Tyne and Wear NE28 6BY.**

Adapter Software

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80 TRK ☐
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Qty. ☐ Morley Masterboard "AA"

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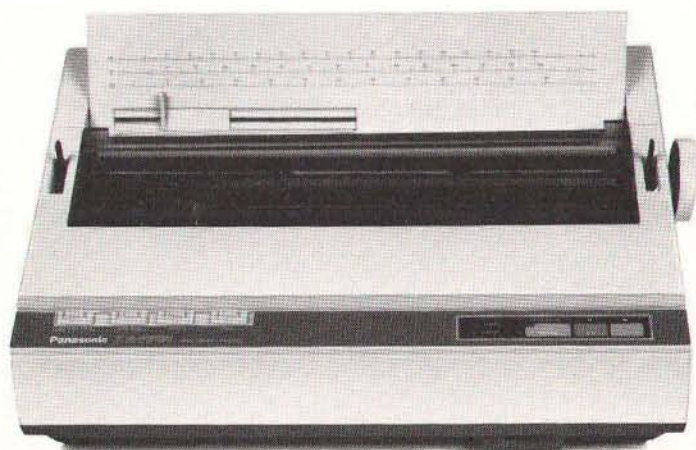
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3D CONSTRUCTION SET

With the two previously published programs of this *3D Construction Set*, three dimensional objects could be drawn on screen, complete with hidden line removal. With these programs, structures, usually buildings, are built up of stacks of different shapes, and each shape has to be defined separately.

This method works well enough, but, as large objects may exceed 200 individual shapes, a lot of time is needed to define them. Not all this work is absolutely necessary: if the structures built are symmetrical, one half of the structure is the mirror image of the other; apart from this, parts of the structure may be identical to other parts.

During the erection of a large cathedral, the idea soon presented itself of letting the computer do the boring bits of the work. It would be nice to have it produce duplicates and mirror images of the entire structure or parts of it. Additionally, a 'mover' program should be able to transfer a part of a structure to another structure.

The way designs are stored on disc lends itself well to the successful implementation of these requirements. Each stack of cubes consists of a limited number of separate shapes, each represented by two integers and one single-character string. All stacks are neatly ordered in rows and columns. Copying a stack is quite easy: first find the X and Y coordinates of the stack and calculate where in the random access disc file the data are stored. Read the required numbers from that place in the file. Now calculate where the numbers should be written to in the destination file, using the X and Y coordinates of that design.

Of course, these new X and Y coordinates need not be the same as in the original. Then write the numbers to that location, even if this involves overwriting the original contents. If you use the altered file in the drawing programs, you'll see that one stack of the destination design has now been supplanted by another.

Mirroring is a bit more difficult. The numbers making up a design can't be transferred as they are, but will have to be recoded. The coordinates of each shape may undergo rotations of 90, 180 or 270 degrees. If one stack is copied as a mirror image, this will do. But if part of a structure, consisting of more than one stack, is to be copied, it will not be sufficient to mirror the individual stacks; their order will have to be mirrored too, or the structure will lose its coherence. It may be necessary to mirror a part on the X axis, the

3D construction set for disk systems

Y axis, or both, so the program will have to cater for this. The one thing not implemented is changing the height of a stack; stacks are always copied in their entirety. But this in itself may cause difficulties: the stacks in the source file should not be higher than the maximum capacity of the new file. Otherwise, shapes will overflow, and the top of the original stack will be transferred to the next stack, instead of on top of it. In effect, steeple roofs might end up standing next to their decapitated bottom parts. The program prevents this by transferring only the number of shapes that fit in the new shape, and will warn the user beforehand that the stacks can't be copied in their entirety.

Input friendliness

After completing the program it proved to be very difficult to visualise what was going on if you had to move and mirror stacks only on the basis of a series of dull numbers representing the start and end coordinates of both the source and destination files. You may try it (I did), and end up with structures which have either strange empty gaps down their lengths, or partial duplications, or which consist of two unmirrored halves. Needless to say, none of these structures will help to establish your reputation as a gifted architect.

What this meant, of course, was that user friendly input routines had to be provided. The program will first ask for the names of the files concerned: a source file has to be available in advance, but the destination file can either be a new completely empty file, or any already existing file (with the exception of the source file). Indicating which areas should be copied now takes a bit of time, but the method used prevents mistakes: the area you wish to copy has to be outlined on a floor plan of the source, by moving a rectangle over it, whose size can be changed at will.

After you've outlined the area to be copied, an area of equal shape and size appears on a plan of the destination structure, and this

can in turn be moved around. Its shape and size can no longer be changed at this stage. After this is done, you have to indicate whether a mirror image should be made on the X axis, the Y axis, or both. This process can be repeated indefinitely. The only limitation is that it is impossible to use one and the same file as both source and destination, but this is not really a limitation: if you make a new destination file, and give it the same size and number of shapes as the source file, you can in effect treat it as a duplicate of the source file.

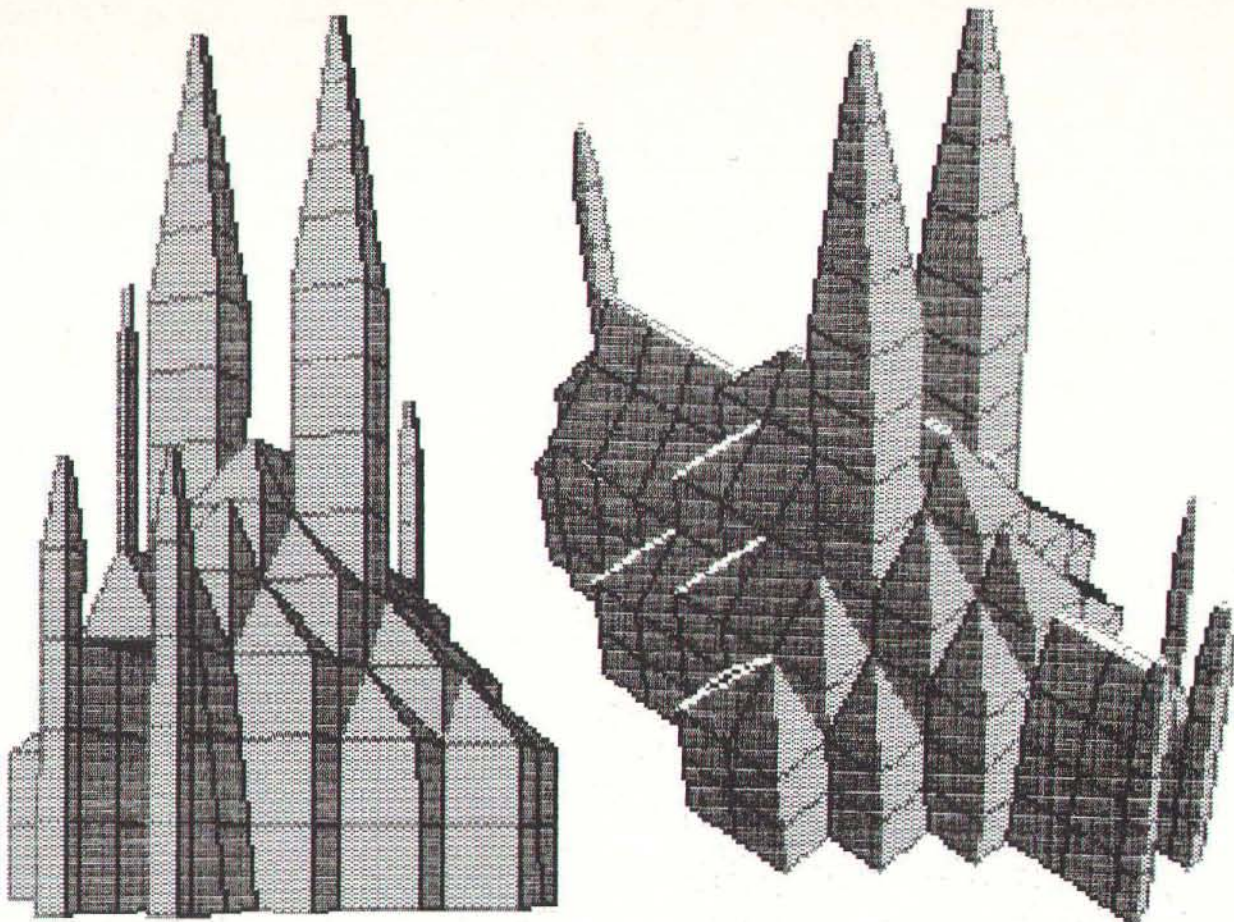
As you will see, the questions asked by the program are simple and logical, and should not require further explanations. Oddly, this program was definitely the easiest to write of the four *3D Construction Set* series of programs, especially regarding the mathematics, but it turned out to be the longest program.

Software Sale

All four programs are bundled on a disc of A&B's software sale. This disc contains the programs as they are printed in A&B, and improved and expanded versions as well, together with a menu program and several example files.

The improved versions include the facility to colour the surfaces of the cubes with regard to the direction they're facing: vertical surfaces will be either blue or cyan, depending on whether they are parallel with the X or the Y direction. Upwards-facing horizontal surfaces (flat roofs) are coloured white. Ideally, slanting surfaces should be lighter than the vertical surfaces if they face upwards, and darker when facing more downward. However, with only four colours to choose from, the choices are limited. Still, if they are used with these considerations, a more natural picture is produced, which greatly enhances the three-dimensional appearance of the subjects. With the use of dotted lines, the ground and sky can be drawn, giving a background to the drawing. The additions to the *PERSPEC* program pushed it firmly over the BBC's memory edge, so it could only be used in a compacted, unintelligible version. I've therefore decided not to print the additional lines here; on the *Software Sale* disc these versions run from the standard menu. The ability to deal with colours in this fashion, and the programming speed these programs require to work well, call for a newer generation of micro-computers; let's see if it is worth taking a RISC.

MODEL B/B + MASTER SERIES ELECTRON



```

10MODE4:*DIR A (6C2D)
20DIM c 7 (3A97)
30move=TRUE:new=FALSE (990D)
)
40PROCfiles (0972)
50CLS:PRINTTAB(9)"3D-Const
ruction Set: Mover" (E1B7)
60PROCwindow (DA17)
70CLS:PROCc("Please wait un
til") (4FF0)
80PROCc("the plans are draw
n.") (18BF)
90PROCdraw("L",nr1,rep1) (E
8C0)
100PROCdraw("R",nr2,rep2) (E
66B)
110REPEAT (091C)
120REPEAT (F206)
130PROCrectangle (6AD2)
140PROCcompare (430D)
150IF move THEN PROCposition
(55D1)
160UNTIL move (C221)
170PROCmove (9536)
180*FX15,0 (6235)
190CLS:PROCc("Moving is comp
leted.") (4BDA)
200PROCc("choose:");PROCc("A
gain Leave") (B37E)
210t=GET:IF t>91 t=t-32 (BB7
E)
220IF t<>76 GCOL4,128:VDU29,
4;4;:VDU24,xm1;ym1;xm2;ym2;:CL
G (E060)
230UNTIL t=76 (2899)
250CLOSE#file1:CLOSE#file2 (

```

```

17A3)
260*DIR $ (7F67)
261CHAIN"MENU" (7B7E)
330----- (C823)
340DEFPROCfiles:rec=13:B=620
:DIM c(7) (180C)
350PROCc("Would you like a c
atalogue (Y/N)?") (C876)
360PRINTTAB(17);:INPUT y$ (6
24E)
370CLS:IF y$="N"OR y$="n"THE
N 390 (A339)
380*CAT {877B)
390PROCc("Give name of sourc
e file:") (0160)
400PRINTTAB(17);:INPUT name1
$ (EB6F)
410file1=OPENUP name1$:INPUT
#file1,nr1,rep1 (0EC9)
420rcrd1=rep1*rec:line1=nr1*
rcrd1 (E839)
430PROCc("Do you wish to cre
ate") (D77C)
440PROCc("a new destination
file (Y/N)") (C3A3)
450PRINTTAB(17);:INPUT y$ (3
FD3)
460IF y$="N"OR y$="n"THEN ne
w=FALSE:PROCc("Existing file")
ELSE new=TRUE:PROCc("New file
") (68D2)
470PROCc("Name of destinatio
n file"):PRINTTAB(17);:INPUT n
ame2$ (A98E)
480IF NOT new file2=OPENUP n
ame2$:INPUT#file2,nr2,rep2 (63

```

```

E7)
490IF new PROCset (E5AA)
500rcrd2=rep2*rec:line2=nr2*
rcrd2 (A51B)
510ENDPROC (52C7)
520----- (D677)
530DEFPROCdraw(side$,nr,rep)
:E=B/nr (C8C8)
540IF side$="L" Xloc=4:Yloc=
4:flNr=1 ELSE Xloc=644:Yloc=4:
flNr=2 (3CB4)
550VDU29,Xloc;Yloc;:GCOL0,1
(E471)
560MOVE0,0:PLOT21,620,0:PLOT
21,620,620:PLOT21,0,620:PLOT21
,0,0 (E85F)
570VDU5:MOVE0,660:IF side$="
L"PRINT"Source: ";name1$ ELSE
PRINT"Destination: ";name2$ (D
F73)
580VDU4 (F7BE)
590IF new ENDPROC (1362)
610FOR Y=0TO nr-1:FOR X=0TO
nr-1 (676A)
620shape=0:hi=0 (974C)
630REPEAT:PROCread(flNr,Y,X,
shape) (49FC)
640IF c$="e" eject=TRUE:GOTO
680ELSE eject=FALSE (E355)
650FOR flr=1TO high%:hi=hi+1
(3DDD)

```

C O N T I N U E S ►

MODEL B/B + MASTER SERIES ELECTRON

```

660IF c$<>"b"PROCblock (0082
)
670NEXT:shape=shape+1 (8DEA)
680UNTIL eject OR shape=rep
(7577)
700NEXT:NEXT:VDU29,Xloc;Yloc
;:ENDPROC (8C8A)
710----- (03BD)
720DEFPROCc(c$) (E1AB)
730c$=STRING$((40-LEN(c$))/
2)," ")+c$ (F4E7)
740PRINT:PRINT c$:ENDPROC (E
821)
750----- (43F4)
760DEFPROCmove (67FB)
770*FX15,0 (17A8)
780PROCc("Mirror on X (Y/N)"
) (FF3F)
790PRINTTAB(17);:INPUT Y$:IF
Y$="Y"OR Y$="y" mirX=TRUE ELS
E mirX=FALSE (C19F)
800PROCc("Mirror on Y (Y/N)"
) (97C9)
810PRINTTAB(17);:INPUT Y$:IF
Y$="Y"OR Y$="y" mirY=TRUE ELS
E mirY=FALSE (8225)
820PROCc("Moving now...") (4
073)
830FOR Y=Yst1 TO Yend1 (A4E7
)
840FOR X=Xst1 TO Xend1 (4E2B
)
850FOR shape=0 TO repl-1 (31
40)
860PROCread(1,Y,X,shape) (C9
DB)
870PROCtransform(Y,X) (2E70)
880PROCwrite(Ydest,Xdest,sha
pe) (812E)
890NEXT:NEXT:NEXT (BFBF)
900ENDPROC (8B09)
910----- (73B7)
920DEFPROCtransform(Y,X) (44
94)
930Xdest=Xst2+X-Xst1:Ydest=Y
st2+Y-Yst1 (6231)
940IF NOT mirX AND NOT mirY
ENDPROC (8E55)
950P$=STR$(plan%):P$=STRING$
(8-LEN(P$),"0")+P$ (F860)
960FOR t=0 TO 7:c?t=VAL(MID$
(P$,t+1,1)) (F580)
970NEXT (500A)
980IF mirX Xdest=Xst2+Xend1-
X:temp=c70:c70=9-c?2:c?2=9-tem
p:temp=c74:c74=9-c?6:c?6=9-tem
p (454D)
990IF mirY Ydest=Yst2+Yend1-
Y:temp=c71:c71=9-c?3:c?3=9-tem
p:temp=c75:c75=9-c?7:c?7=9-tem
p (64E7)
1000P$="":FOR t=0TO7:P$=P$+ST
R$(c?t):NEXT (1CF9)
1010plan%=VAL(P$):ENDPROC (0C
32)
1020----- (377A)
1030DEFPROCwindow:VDU26 (2EAC
)
1040VDU28,0,10,39,1:COLOUR129
:COLOUR0:CLS (18F4)
1050VDU24,0,0;1279;670;:VDU29
,0,0;:ENDPROC (E95E)
1060----- (7733)
1070DEFPROCcompare (78F8)
1080*FX15,0 (8D61)
1090IF rep2<repl PROCc("WARNI
NG!"):PROCc("Only first "+STR$
(rep2)+" shapes"):PROCc("can b
e copied to "+name2$):G=GET (E
335)
1100IF Xend1-Xst1+1>nr2 move=
FALSE:PROCc("No room along x-a
xis"):G=GET (0AAL)
1110IF Yend1-Yst1+1>nr2 move=

```

```

FALSE:PROCc("No room along y-a
xis"):G=GET (C010)
1120ENDPROC (5D44)
1130----- (A9AF)
1140DEFPROCread(flNr,Y,X,shap
e) (B7E2)
1150IF flNr=1 THEN PTR#file1=
12+Y*line1+X*rcrd1+rec*shape:I
NPUT#file1,plan%,c$,high%:ENDP
ROC (172E)
1160PTR#file2=12+Y*line2+X*rc
rd2+rec*shape:INPUT#file2,plan
%,c$,high%:ENDPROC (A25E)
1170----- (E9E6)
1180DEFPROCwrite(Y,X,shape) (
All1)
1190PTR#file2=12+Y*line2+X*rc
rd2+rec*shape (7A18)
1200PRINT#file2,plan%,c$,high
% (0CBE)
1210ENDPROC (6186)
1220----- (9A96)
1230DEFPROCset:CLS (7756)
1240PROCc(" "+name1$+" has "
+STR$(nr1)+" blocks,") (DBC8)
1250PROCc("and "+STR$(repl)+"
shapes.") (4499)
1270REPEAT:PROCc(name2$+" : b
locks -even number- :"):PRINTT
AB(17);:INPUT nr2:UNTIL nr2>0
AND nr2 MOD2=0 (B9C6)
1280PROCc("Number of shapes :
"):PRINTTAB(17);:INPUT rep2 (6
0C7)
1290M%=0:c$="e":PROCc("Please
wait") (8706)
1300file2=OPENOUT name2$:PRIN
T#file2,nr2,rep2 (6A66)
1310FOR Y=nr2-1TO0STEP-1 (A43
1)
1320FOR X=0TO nr2-1 (5D2D)
1330FOR shape=0TO rep2-1 (A8D
D)
1340PRINT#file2,M%,c$,M% (6B7
1)
1350NEXT:NEXT:NEXT:ENDPROC (5
DE1)
1360----- (8C29)
1370DEFPROCblock (E134)
1380P$=STR$(plan%):P$=STRING$
(8-LEN(P$),"0")+P$ (885B)
1390FOR t=7TO0STEP-1:c(t)=VAL
(MID$(P$,t+1,1))/9:NEXT (1D2C)
1400h1=c(0)*E:h2=c(2)*E:h5=c(
4)*E:h6=c(6)*E (F7EB)
1410v1=c(1)*E:v2=c(3)*E:v3=c(
5)*E:v4=c(7)*E (54FE)
1420VDU29,Xloc+X*E;Yloc+Y*E;
(EB98)
1430MOVE h1,v1:DRAW h5,v3:DRA
W h6,v3:DRAW h6,v4:DRAW h5,v4:
DRAW h5,v3 (239A)
1440MOVE h1,v1:DRAW h2,v1:DRA
W h2,v2:DRAW h6,v4:MOVE h2,v1:
DRAW h6,v3 (866E)
1450MOVE h1,v2:DRAW h5,v4:MOV
E h1,v1:DRAW h1,v2:DRAW h2,v2
(BDB0)
1460ENDPROC (59A5)
1470----- (C48B)
1480DEFPROCposition:GCOL4,0 (
2E94)
1490E=B/nr2 (9EBE)
1500PROCwindow (CF28)
1510VDU29,644;4; (464B)
1520A%=0:B%=0:Z%=Xend1-Xst1+1
:N%=Yend1-Yst1+1 (FD9F)
1530REPEAT (16D5)
1540IF INKEY-58 B%=B%+1 (C5B4
)
1550IF INKEY-42 B%=B%-1 (E382
)
1560IF INKEY-26 A%=A%-1 (AC62
)

```

```

1570IF INKEY-122 A%=A%+1 (A86
4)
1580IF A%<0 A%=0 (3B52)
1590IF B%<0 B%=0 (88BD)
1600IF A%>nr2-Z% A%=A%-1 (C72
B)
1610IF B%>nr2-N% B%=B%-1 (C60
F)
1620PROCbox(E):PROCbox(E) (56
38)
1630UNTIL INKEY-74 (B52C)
1640Yst2=B%:Xst2=A% (0BE8)
1650GCOL4,128:VDU24,P%;Q%;P%+
R%;Q%+S%;:CLG (9CC2)
1660ENDPROC (1256)
1670----- (33CE)
1680DEFPROCrectangle:GCOL4,0:
*FX15,0 (DC6B)
1690PROCwindow:VDU29,4;4; (CA
0B)
1700E=B/nr1 (0C49)
1710CLS:PROCc("Use cursor key
s to move") (2A4E)
1720PROCc("Use < and > for ho
rizontal size") (5A71)
1730PROCc("Use L and ; for ve
rtical size") (5CF4)
1740PROCc("RETURN stops") (CB
92)
1750A%=0:B%=0:Z%=1:N%=1 (0D26
)
1760REPEAT (B8F6)
1770IF INKEY-58 B%=B%+1 (3C53
)
1780IF INKEY-42 B%=B%-1 (1E4F
)
1790IF INKEY-26 A%=A%-1 (300C
)
1800IF INKEY-122 A%=A%+1 (B94
6)
1810IF INKEY-104 Z%=Z%+1 (FC0
A)
1820IF INKEY-103 Z%=Z%-1 (C13
C)
1830IF INKEY-87 N%=N%-1 (C033
)
1840IF INKEY-88 N%=N%+1 (9640
)
1850IF A%<0 A%=0 (A3CB)
1860IF A%>nr1-1 A%=nr1-1 (015
E)
1870IF B%<0 B%=0 (97CF)
1880IF B%>nr1-1 B%=nr1-1 (B0B
7)
1890endH=A%+R%/E (6EA2)
1900endV=B%+S%/E (B3E3)
1910IF endH>nr1 Z%=Z%-1 (5661
)
1920IF endV>nr1 N%=N%-1 (45D7
)
1930IF Z%<1 Z%=1 (D624)
1940IF N%<1 N%=1 (6ACF)
1950PROCbox(E):PROCbox(E) (A5
7E)
1960UNTIL INKEY(-74)=-1 (0E20
)
1970Xst1=A%:Yst1=B%:Xend1=A%+
Z%-1:Yend1=B%+N%-1 (F4E0)
1980xm1=P%-4:ym1=Q%-4:xm2=P%+
R%+4:ym2=Q%+S%+4 (5B63)
1990GCOL4,128:VDU24,xm1;ym1;x
m2;ym2;:CLG (50BE)
2000ENDPROC (3974)
2010----- (8DB5)
2020DEFPROCbox(E) (E961)
2030P%=A%*E:Q%=B%*E:R%=E*Z%:S
%=E*N% (879D)
2040MOVE P%-4,Q%-4:DRAW P%-4,
Q%+S%+4:DRAW P%+R%+4,Q%+S%+4 (
E579)
2050DRAW P%+R%+4,Q%-4:DRAW P%
-4,Q%-4 (EFEE)
2051ENDPROC (08FA)
2060----- (B5DA)

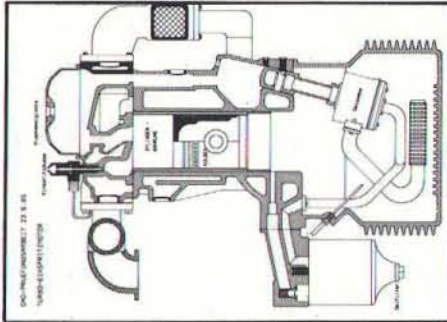
```


Every PLOTMATE picture tells a story



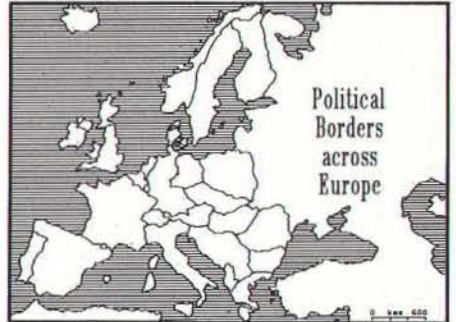
DOMESDAY

A typical bar chart from the Domesday database. Hard copy is obtainable via the Plotmate BBC Welcome disk.



CAD

Example from SUPERDRAFT running on the NIMBUS.



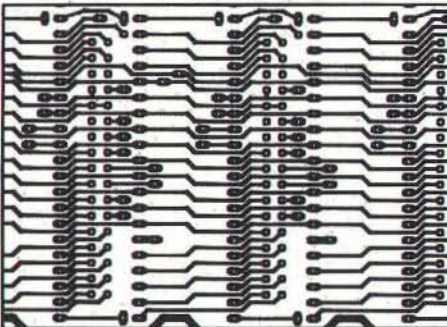
DIGITISING

Map of Europe digitised and edited using LINMAP software.



IMAGE SCANNING

Linscan screen file of 'MONA LISA' incorporated into AMX PAGEMAKER.



PCB DESIGN

Using LINTRACK, a Printed Circuit Board design package.



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CAD

Plotmate runs from many leading BBC packages including BITSTIK, AMX DESIGN, the REALTIME GRAPHICS SYSTEM and LOGOTRON LOGO. When the on-board graphics language range is extended, Plotmate 'M' models understand commands from HPGL 7475A/7470A industry standard languages enabling compatibility with a wide range of professional third party software including AUTOCAD, AUTOSKETCH, SUPERDRAFT, SCRIBE MODELLER and MICRODRAFT.

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GEM PAINT, XEROX VENTURA PUBLISHER, and GEM DESKTOP PUBLISHER can utilise image files created by Linscan (for IBM PCs and PC compatibles).

DOMESDAY

All Plotmate Welcome disks allow WRITE Files containing tabular data from the Domesday database to be reprocessed in pie, bar and line chart format on the BBC Master.

EDUCATIONAL DISCOUNTS

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A-LINE

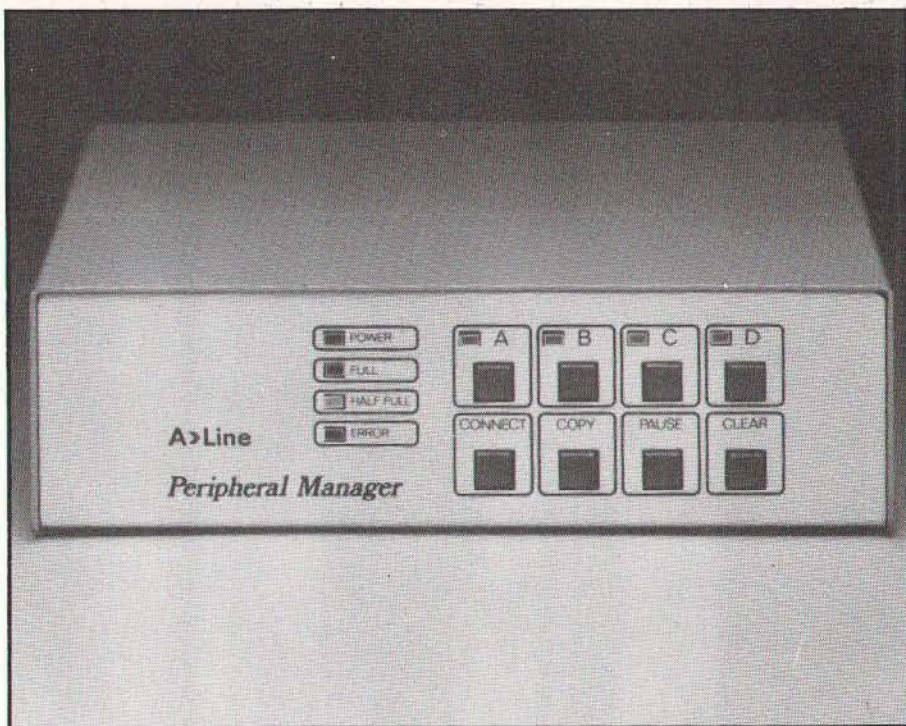
Sharing data between computers and peripherals in proximity needn't involve a full network. Read on

Data communications need not be restricted to hooking computers and modems up to telephone lines and remote computers; very often computers need to talk to each other in the same room, perhaps because there is the need to share information, or perhaps just to use common peripheral devices such as printers or modems, or even more expensive devices such as hard disc drive or laser printer.

Being the owner of a number of micros, (some of which are Beebs) I have often toyed with the idea of networking all my machines and expensive peripherals together; for instance, I am very often out and about with my portable computer, but when I get home, I need to transfer files across to the Beeb (which is used as a common data store). This can be time consuming as none of the computers have a common networking standard and so I have to resort to sending files down serial lines, which is both slow and cumbersome as the process normally involves having to plug and unplug various different cables to suit the different connectors.

Serially transmitting files can be very slow as most RS232 interfaces only come with about 2K worth of buffering, so if you have a machine communicating at 19200 baud, the computer will be slowed down to a speed of roughly 1200 baud simply because the buffer is filled up so quickly that data cannot be put through the system any faster, a sort of digital indigestion.

A number of companies have decided to produce printer buffers for the BBC Micro; Technomatic and Watford Electronics both produce various models for the BBC B and the IBM PC. Of course printer buffers come in a number of shapes and sizes but they are either



internal printer buffers fitted inside the printer, or as an external box connecting between the printer and the computer.

Whilst these buffers are all fairly useful as single user systems, they are incapable of properly supporting small multi user combinations comprising of anything more than a single computer. A common situation is a setup consisting of two computers and two printers. Most multi user systems require fast data interchanges — a wait of 60 seconds can be an eternity if there are other users clamouring for printer time, especially if you are using a high quality daisywheel printer.

Fortunately A-Line Dataspeed Devices have come up with an innovative new product. Called the *Peripheral Manager*, it does exactly what the title suggests, it manages your parallel and serial peripheral devices so that you can make the most of your computer time without having to endure idle time due to having too small a buffer on your printer or your computer.

Taking it all in

The *Peripheral Manager* is the answer to the computer user who requires not only a printer

sharer, but also a whacking great chunk of memory to store transmitted or received data. The *Peripheral Manager* can store up to 256K of text in its own memory in one go. Once in memory, it can be redirected to any other device connected to the *Peripheral Manager*, so it can be transferred to another computer easily enough by directing the data streams through a number of nodes named "A", "B", "C" and "D", which have push-button settings on the front of the panel, each with its own LED that lights up when it is activated.

Instead of using a combination of "X" or "T" switches, you can simply set up a communications network by sending a file from a computer into the *Peripheral Manager*. Once the file is in memory, you can redirect the flow of data by selecting any other "node" other than the one used to send the file, so you can send a file from your BBC Micro to an IBM PC and a laser printer or send it off to a modem or whatever you have hooked up to your *Peripheral Manager* at the time, no hold ups and no worries about connections or problems associated with getting the right RS232 transmission protocol.

The beauty of connecting the *Peripheral Manager* to your system is that you don't have

WAREHOUSE REVIEWS

to repeat certain operations. For instance, you don't have to print off a file ten times from the word processor, you can quite easily load the file into the Peripheral Manager and print off multiple copies from the data held in its own store; this frees your computer from having to repeat printing operations, and it can be used for multiple outputs to other nodes on the system. For this purpose, the Peripheral Manager has a button on the front face called "copy".

I have had a Peripheral Manager in my working environment for about three months now, and as far as high speed communications go, its performance has been faultless. The Peripheral Manager has also simplified the spaghetti junction of RS232 and printer connecting cables I have amassed as a result of linking up my computers to each other.

I installed the Peripheral Manager into a local school's Econet system consisting of a level two file server and twenty BBC Model Bs. Not only did its inclusion speed up data communications between stations and a rather tired and overworked Epson FX80, but the Peripheral Manager proved to be an ideal link to other "outer" devices that were considered to be impossible to share on the network, such as the school's two Research Machines 380Z computers that had been gathering dust.

After a week in the school network, the Peripheral Manager had proved its worth

twenty times over. The Peripheral Manager supporting the printers made Econet printer operations so much faster that I had to virtually prise the Peripheral Manager out of the Network Manager's hands when it came to retrieving the unit.

At Home and at work

The Peripheral Manager is not cheap at £395 excluding VAT and I imagine the price is enough to scare off a lot of small businesses, which is a shame as the combined cost of a Printer Buffer, a printer sharer, a T switch, a port expander and a protocol converter wouldn't leave much change from £600 — all of which is achieved in the Peripheral Manager.

In the home environment, the Peripheral Manager is most useful serving as a junction between three computers and one printer, or two computers and two printers. You can efficiently link your existing equipment together at a price considerably cheaper than setting up a new Econet system, and you have the advantage of being able to easily transfer data from one computer to another, without the extra worries about disc formats and transmission protocols.

For Econet, there are obviously the usual problems associated with connecting additional pieces of hardware to the network, but all in all, the Peripheral Manager can be used for

speeding up the printing or plotting of files from which all users can benefit.

After experimenting with the Peripheral Manager on a more simple three station Econet System, I discovered that it is possible to have the Peripheral Manager connected to the printer server, and two other ordinary stations, so you can have a more direct link to the buffer, perhaps for high speed data transfer between the printer stream and the main Econet Terminal.

The Peripheral Manager is easy to use and is well built. Although I haven't touched on the advantages of hooking up one of these devices to a modem, I am sure you can imagine how much time and money could be saved if you use your Beeb to access information databases where it is common to download a lot of data.

Factfile

The Peripheral Manager is compatible with any RS232 device and Centronics interface. There are currently two versions of the Peripheral Manager; the model PMC has four Centronics ports for use with lots of different printers, whereas the Model PMD has two RS232 ports and two Centronics ports, for more general applications. Both the PMC and PMD have 256K buffers and both cost £395 ex VAT.

For more information contact A > Line Dataspeed Devices Ltd, 3 Auburn Road, Blaby, Leicester, LE8 3DR. Telephone (0533) 778274.

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WAREHOUSE/AMX DESIGN CAD SOFTWARE

by DESIGN

Practical and educational Computer Aided Design software is in wide demand. Does the new AMX offering show potential?

Computer Aided Design (CAD) packages for the BBC Micro have done rather well for themselves of late — The BBC Micro has always been a powerful computer when it concerns computer graphics and, with the AMX mouse, there has always been scope for a friendly and easy to use program.

Of course CAD packages are not new for the BBC Micro; Technomatic were probably the first company to produce a major piece of CAD software for the BBC B, but this was heavily disc orientated and had limited options if you didn't happen to have shadow RAM or a 6502 second processor. Novacad (as it was called) could support a mouse as an input device, but this seems to be very much as an afterthought, and not central to the designing process.

Getting Started

AMX Design is a large package, having taken some ten months to design, plan and code. It can be mouse-driven and it runs on any 8 bit BBC Micro, including the Master series, and you don't even need a mouse, you can quite happily use a trackerball or a joystick, although to get the real flavour of the software, a mouse is preferable.

The complete AMX Design package consists of a 32K PALPROM chip, a library disc (more of which later) and an excellent manual. Now it is my belief that programs designed to work in a WIMP environment need little or no introduction beyond that of an initial overview, and I am pleased to say that AMX Design requires very little "manual bashing" — all of the icons clearly represent what they are supposed to do, and the overall "feel" of the package was very professional, very

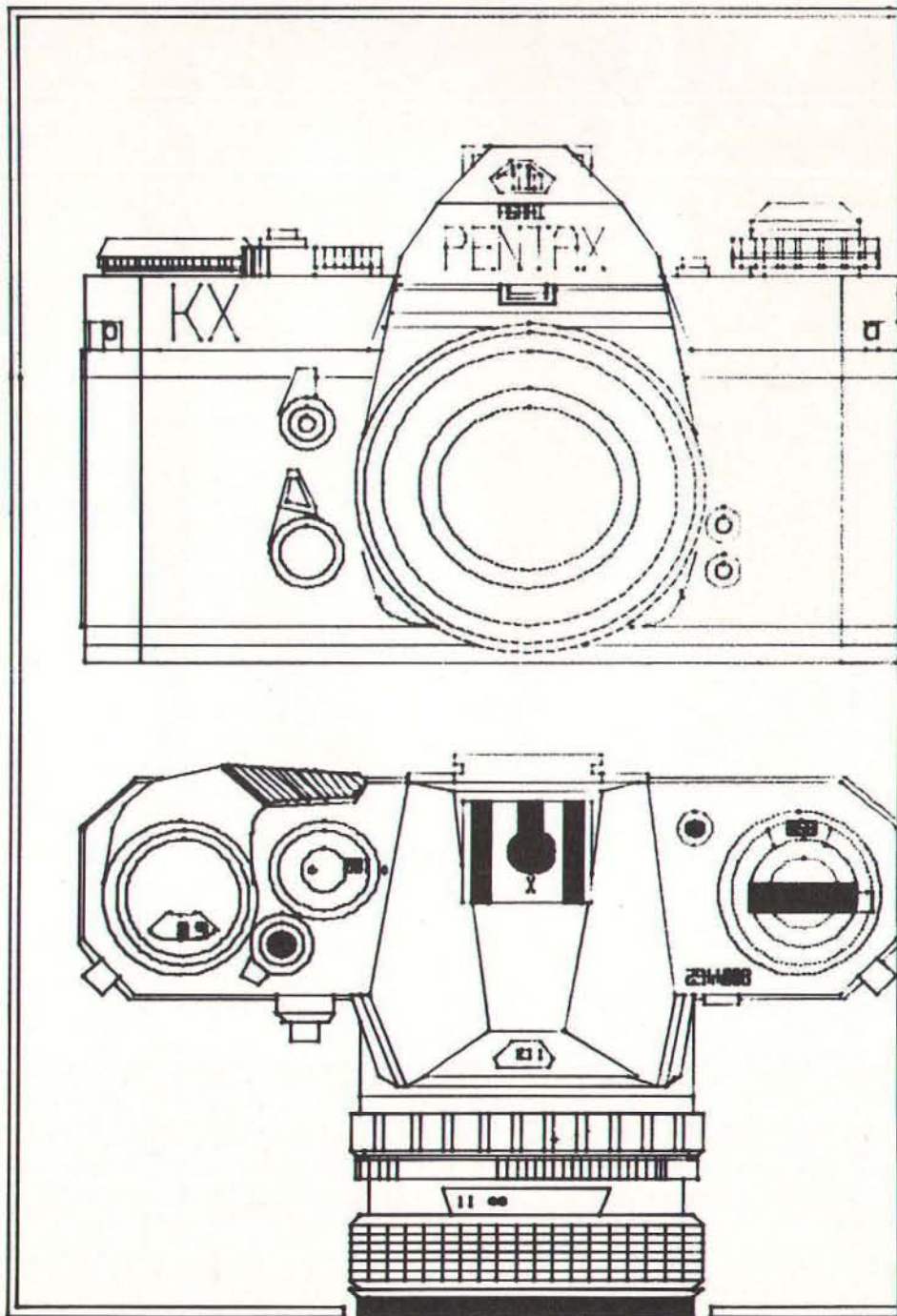
comfortable, and looking a little like some packages I have seen on the Mac.

Getting started with AMX Design couldn't be easier, all you do is type *Design and you're in! Of course there are other ways of getting into the system, and the one initially suggested in the manual is to use the libraries disc by

booting the setup program supplied.

From the main menu (see Figure One), you have three options open to you, you can either SETUP your disc for your own particular requirements, or you can DESIGN a drawing yourself or enter the plotter driver.

I found setting up the disc to be easy and



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free of hassles or annoying errors because of "rogue" ROMs or weird PAGE settings. AMX Design looked to be equally at home on a BBC Model B or a Master.

A Mode converter is included so that pages from *Super Art* and *Pagemaker* - (now called *Stop Press*), can be converted into AMX Design format. The converter can transfer standard graphics screens from Modes 0 to 5 with ease, so Novacad screens can be easily transferred by saving screen memory and then loading the screen into the converter. The conversion process is slow and laborious, simple designs taking less time complex ones.

The *configure* module is essentially AMX Design's way of allowing you to customize the software to your own requirements and tastes;

for instance, you can change the colours on the screen easily enough by sliding up and down on a "slider" control, which is an easy way of changing colours and similar features are found on other AMX packages including Extra Extra (for *Stop Press*) and MAX.

Other options include resetting the pointer speed (often set at maximum), as well as a sound and interlace control for TV and monitor users; if you should make a mess of the setup page, you can always press the "unhappy face" icon and all will be restored — a useful feature.

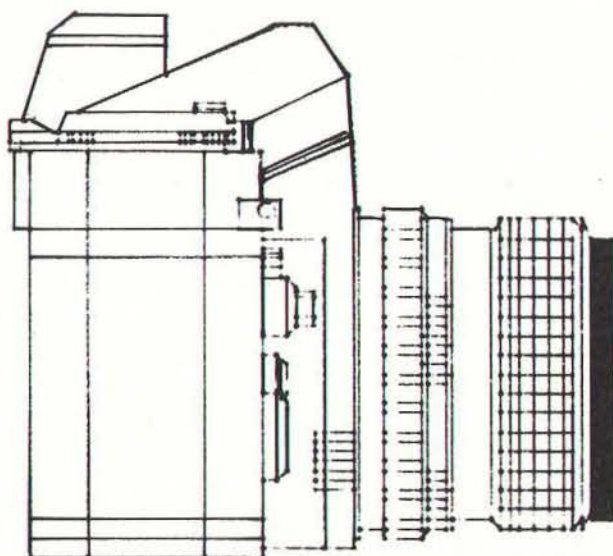
Designing

In the past few months I have seen the system

grow from a "semi complete" package (at last year's Acorn User show), to a massive 32K ROM system complete with all those Mac-like features people insist on when buying WIMP software.

The whole AMX Design ethos is simplicity without sacrificing power; for instance, to draw a circle or a curve, you merely click the relevant icon in the tool box and then point to where you want your curve or circle to be on the screen. There are no stupid parameters and no annoying numbers to type in; AMX Design will simply show you a flashing circle until you are ready to select it by pressing the SELECT button on the mouse.

C O N T I N U E S ►



PENTAX KX 35MM CAMERA
DRAWN USING AMX DESIGN
PLOTTED ON PLOTMATE A3M
BY LINEAR GRAPHICS LTD

TYPE. 35MM SLR WITH BUILT-IN THROUGH THE
-LENS LIGHT METER.

FILM. 35MM FILM. 24MM X 36MM

DIMENSIONS. 143MM X 91.4MM X 94MM

WEIGHT. 896G WITH 50MM F/1.4 LENS
631G WITH NO LENS

WITH

SHUTTER
SELF-TIMER
VIEWFINDER
MEMO HOLDER
EXPOSURE METER
EXPOSURE COUNTER
RATCHET TYPE FILM ADVANCE
LENS BAYONET-MOUNT

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WAREHOUSE/AMX DESIGN CAD SOFTWARE

The screen is (as usual) divided up into sections so that you have the pull down menus at the top of the screen and the tool box on the left hand side. Surrounding the window holding the design is a ruler for both the X scale and the Y-scale, which is very useful if you happen to want to draw from a grid.

The Tool Box

The basic drawing items such as lines, circles, ellipses, boxes and triangles are held in the tool box. You also enter text by clicking the text icon (a teutonic letter A no less!) and after selecting point size, you are free to move your text around the screen as if it were any other line shape or object.

At the bottom of the tool box is the virtual screen selector. AMX Design is able to draw onto a "canvas" which is four times larger than the BBC screen. By pressing this icon in any one of the four directions in which it points, you can move the "window" around to occupy any canvas position.

Along the top of the screen is the "pull down menu" bar, which is where most of the features of the system are held out of sight. In true Mac style, you simply move the pointer to the menu title and the options scroll down, once you have made your choice, you exit the menu either automatically (ie the software clears the menu for you) or by just pulling the pointer away from the list.

For AMX Design, when you pull a menu down (ie hold EXECUTE over the title bar), you must hold onto the mouse button until you have made your selection, occasionally you may come across a hazed menu or option, which simply means that the option is currently unavailable because another option is active at the time.

The options on the top bar are *Mouse*, *File*, *Edit*, *Zoom*, *Macro*, *Text Size*, *Line Style* and *Extensions*.

The *Mouse* menu holds miscellaneous items such as a listing of the *commands, a control panel, a simple calculator with addition, subtraction, multiplication and division, a print screen routine set up for Epson printers, and a "quit" option, returning the user to BASIC wherever possible.

The *File* menu handles loading and saving I/O operations; you can open and close files as well as create new titles as usual, but one nice feature is that the current filing system lists the suitable files on a selector screen with scroll arrows — easier for the user than having to look up a disc catalogue.

Interestingly, one of the features on the *File* menu is to Import a 3D Zicon file. 3D Zicon is a disc based 3D art package which is useful for taking ordinary pictures and adding a little depth — a sort of halfway house between a drawing package and a design package. I think the term *technical art* sums up 3D Zicon nicely.

The last option in the *File* menu is the Import option, which is a means of linking two AMX Design files together and is good for joining two different elevations as separate drawings, but on the same canvas.

The second menu is the *Edit* menu. This

contains options that enable you to edit the data in your file as well as being able to set up various data related options; you can draw onto a grid and set up variable widths and there is a "snap to grid" option included as well as an "invisible grid" — useful if you are drawing very angular objects, or objects in close-up using the Zoom facility.

If you have deleted an item on the screen, the drawing tends to look a little ragged, lines tend to get partially erased when erased lines overlap, and even the act of deleting a single line can leave the screen with a dot or two. This isn't any fault of AMX Design, as the BBC Micro has a very simple screen memory manager unit, so the screen could do with redrawing every now and then, just to get rid of the odd bit of stray garbage, or to fill in a line that was overlapping an erased object.

Page Levels

Common to many of the more expensive CAD packages is the concept of a page level; AMX Design works under a series of eight page layers which is, in effect, like drawing on eight different celluloid sheets. The lowest level (level 1) is generally used for basic reference points of a design such as the outline, and is useful for "structuring" a drawing.

Such layers are often drawn in different colours and, using the plotter driver, AMX Design is capable of producing high quality, colourful plotted output by attributing a separate colour to each level. As AMX Design operates in the two colour Mode 0, these colours are, of course, only available on the plotted output.

The deeper you go, the more information is presented on the screen and the secret of any good multiple level design is to structure your diagram so that you can quickly draw particular sections without having to wait for superfluous items to be drawn.

Zooming About

The *Zoom* option is a very powerful feature of AMX Design, and I was quite frankly astounded at the ease at which sections of a diagram could be magnified. After selecting an item, you are asked to box in an area of the drawing you want to Zoom into. The screen will clear and a magnified version of the screen will be drawn.

This is where a lot of designers start to get worried, because when a drawing is made at a low magnification, all the lines appear to join up, but at a higher magnification this is often not the case as AMX Design stores the points in memory more accurately than a human hand, so whenever a magnification is made, naturally any errors are likewise magnified!

The zoom facility does have its problems. For instance, sometimes there may be spurious lines appearing on the screen when working at a high zoom level, these lines are not stored as data, so the diagram won't be slowly corrupted by using this option. Unfortunately nothing can be done about this, but I am afraid this is a blot on AMX Design's previously

immaculate copybook.

Zooming out simply takes you back to the normal size of the design before you zoomed in.

The *previewer* option is a very special option enabling you to look at the four virtual screens in one go. Because it is possible to work on such a large "canvas", it would be useful to see the screen you are on in relation to the other three. Whilst this isn't particularly useful for looking at the detail in a design, it is invaluable if, for instance, you need to assess the overall impact of a large design — perhaps of a schematic diagram of a circuit board — or even something as mediocre as a family tree!

Macros

One thing that separates AMX Design from most of the other BBC orientated CAD packages (with the exception of NovaCAD and Bits tick) is the Macro facility.

A Macro is an area of the design screen that has been saved to disc, thus enabling multiple copies to be made at various sizes and at different layers. With AMX Design you can rotate macros in 90 degree steps by clicking the rotate icons. You can also rescale macros and you can expand a macro to double size (or to half its normal size).

Macros are not perfect, because although they are saved as data items on disc, they cannot be expanded in the zoom operation in the same way. For this reason a pixel compensation routine has been added to the Macro read routine which enables the macro to be expanded and any gaps where lines should have joined to be filled in. The only drawback of using the Macro read routine is that pixels will, in extreme cases, appear to be stretched.

The *Text* option does not display normal BBC characters as text, but rather a series of plotted lines of varying thickness forming letters. The overall effect is rather good, being legible from the very small point sizes to the very large, and it follows standard technical drawing lettering conventions as well. As I mentioned earlier, you can have various point sizes ranging from four point text to thirty two. Before selecting the point size, you can have a look at the text style as well as rotate letters and whole words through 90 degree steps, as in the macro options.

The *Line Style* menu has eight standard lines to choose from and one extra set aside for a user defined style. Although the dot dash line menu only works when used with the Master series computers, the BBC B and B+ have only a single dot dash pattern. By adding the Acornsoft Graphics Extension ROM, the Master's extended dot dash line facilities are available on any BBC Micro.

Although a simple feature such as line drawing may not seem important to many, the essence of a good technical drawing is based on the correct use of lines. There are line styles used to mark a centre line as well as a cross section line, not to mention dimensioning arrows, if you don't have the GXR, then I suggest you get one if you need to use conventional line drawing techniques.

WAREHOUSE/AMX DESIGN CAD SOFTWARE

For the Future

The last window along the top line is the *Extensions* window, which enables AMX Design users to upgrade their software when further additions arrive. By simply putting the extensions disc into the computer and selecting the *Install Extensions* option, you can include extra facilities that could not be squeezed into the design ROM. Remember AMX are partially dependant on your suggestions so, if you have any, why not send them into AMX, I'm sure they would be grateful!

Using AMX Design

When you think about it, a mouse is probably the most logical input device for a CAD package because it is accurate and designing with a mouse (be it on a Mac, a PC or a Beeb) is a very physical thing; designers can really start to make the most of the screen and the software with a mouse.

Just prior to receiving the AMX Design package, yours truly acquired an Amiga, and after almost a whole week of constant "playing" I went back to Beeb software — namely AMX Design, only to be bowled over by the speed and the facilities of the package. AMX clearly know what they are doing when

it comes to implementing mouse driven software, and you will have to buy a new machine and pay a lot more money for software that does better.

AMX Design is a very simple program to use by virtue of its friendly mouse driven environment, and whilst it is not as sophisticated as some of the more expensive packages available for other machines, AMX Design's simplicity does not limit your capabilities as a designer. Having used, and spoken to users of a great deal of professional CAD packages all the way from the BBC Micro up to a DEC VAX 11/780 workstation, I have found that very few of the "advanced" features such as perspective rotation, shearing, three dimensional construction (from a two dimensional image) and geometrical auto scaling are actually used.

AMX Design is suitable for just about any general purpose design operation. Using it to design printed circuit boards is perhaps stretching the system a little, but it is certainly good for schematic diagrams, high quality geometric and technical drawing, as well as home projects, including designing your own furniture.

The addition of a plotter is an important one as dot matrix printers can hardly produce output of a high enough quality. If you are serious about using the BBC Micro as a design workstation, I would recommend a good quality plotter such as the Plotmate A3M or

even the A4M. Plotmate printers are made to an exceptionally high standard — high enough for the department of education to recommend their purchase in secondary schools.

AMX Design fully supports the Plotmate range of plotters and the output is crisp and very clean. The plotters make full use of AMX Design's multiple layering facility, producing multi colour hard copy, and stopping when you need to change pens for a different colour.

All in all I found AMX Design very easy to use with the virtues of immediacy and simplicity. But don't be fooled by its appearance, AMX Design is a powerful CAD package capable of drawing complex designs. AMX have built themselves a reputation to live up to after the successful launch of Super Art and Pagemaker, and that reputation is further enhanced by Design.

Factfile

The AMX Design package consists of a 32K PalPROM, a disc and a manual. It will work with AMX mouse, Quest Mouse, Nidd Valley and Wigmore House mice and is compatible with the BBC B, the B+ and the Master series computers. Price is £69.99. Contact *Advanced Memory Systems Ltd*, 166-70 Wilderspool Causeway, Warrington WA4 6QA. Telephone (0925) 413501.

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PRESENTING PASCAL

Many programs use fixed arrays of variables or records for holding lists of similar items of data, but some programs require to grow and shrink their data structures as the quantity of data changes, inserting and deleting items as necessary; even to throw it away altogether and starting afresh. It is not much use adding records to the end of an array with one hand whilst leaving holes in the middle of it by removing data with the other. Among other things it confuses sorting algorithms; and blows up programs when the data area gets too big.

Pascal has an inbuilt capability in the form of the *pointer* to organize a variable data structure. The pointer is a simple variable type similar to an integer, with the difference that it does not contain data itself but has the address of a location which does. The "I haven't got it, it's on the shelf over there" syndrome.

The data in a dynamic structure is held on a kind of stack called a *heap* with new elements being added and old ones removed as required. As opposed to the normal stack, which starts in the middle of memory and goes down to the bottom, the heap generally starts above the program and grows upwards. In essence, when a new element of the data structure is added the required variable space is allocated on the heap and the memory address of the variable placed in the pointer.

A pointer is defined using the syntax

```
TYPE
  link = varbl;
VAR
  pnt : link;
```

and can be read as "Type **link** is a pointer to a variable of type **varbl**; **pnt** is a pointer of type **link** which may be used to access variables of type **varbl** which contain the actual data"; **varbl** may be of any Pascal type, including complex record structures. The caret indicates that **link** is defined as a type of pointer and not as an ordinary variable type. It is not in itself the variable. A pointer can only point to one type of variable; ie it is type checked as for all other Pascal variables.

A single pointer may point to any one of many variables (one at a time of course), providing only that the variables are all of the

A look at Pascal dynamic data structures

type specified in the pointer definition. Conversely any variable may have as many pointers to it as are required by the program.

New ones

New variables are created on the heap by the standard procedure *new* oddly enough. The procedure requires a pointer as a parameter, the correct amount of space for the new variable automatically being assigned on the heap by the program when it recognises the pointer type. In doing so the program also assigns the address of the variable into the pointer. Thus the code

```
new (pnt);
```

will create a new variable of type **varbl** with **pnt** holding its address. Note that this may not be literally true. The pointer holds only a version of the address which Pascal can recognise; it does not have to be the actual memory address.

The opposite of *new* is *dispose* which also takes a pointer as an argument thus

```
dispose (pnt);
```

This procedure is supposed to remove the variable pointed to by **pnt** and put the memory so released back into circulation for later allocation. Supposed being the operative word, as not all compilers do this; many just ignore the de-allocation. To be fair, it is tricky keeping tag on lots of small areas of memory, although moving the heap contents about to fill the gaps is one solution.

In many cases the programmer keeps account of unused dynamic variables, checking for empties which are free to be utilised and only creating a new one when there are no empties left.

On occasion it is necessary to indicate that

a pointer does not actually point to anything. This is accomplished by setting it to *nil* thus

```
pnt := nil;
```

If only one pointer points to a variable then switching that pointer to *nil* or, indeed, to point to any other variable will lose access to that variable for ever; there is no way to get to such a variable except by pointer.

The method of assigning one pointer to another is by means of the usual variable assignment structure

```
pnt1 := pnt2;
```

When it is necessary to move items of data the syntax

```
pnt1 := pnt2;
```

will do the job; the data in the variable pointed to by **pnt2** is copied into the variable pointed to by **pnt1**.

The egg case

When type **link** is used to point to a record a chicken/egg situation develops. Which does one define first, the pointer which points to a record or the record it points to? Pascal normally insists on defining the type before it is used; this is patently not completely possible in this case. Pascal permits pointers to be defined before the record to which they point. Thus a combination of this type would be defined as

```
TYPE
  link = recrd;
  recrd =
    RECORD
      next : link;
      data : integer;
    END;
```

This overcomes the problem neatly, and as will be seen later this type of definition is the most widely useful one as far as pointers are concerned.

There are few uses for a single variable with a single pointer to it, but there are many ways in which an array of such variables can be manipulated to make it worth while considering them. The uses include implementation of queues, single or double linked lists, and binary trees. These uses will be considered in the next part of the series.

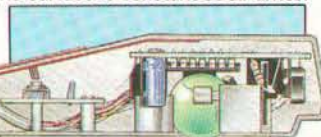
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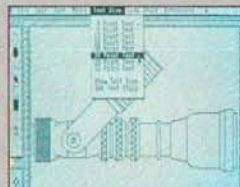
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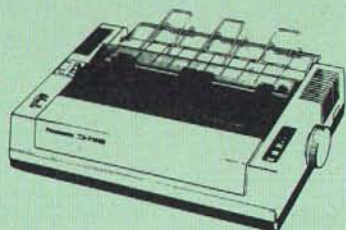
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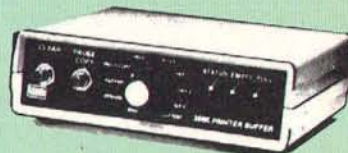
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Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

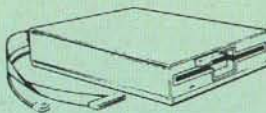
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only £30.00.

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your Existing DFS or DDFS for our 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

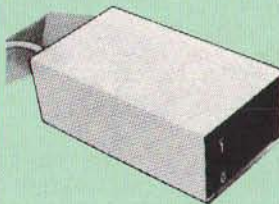
Type CLS400



- 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 **£125 (£6 carr)**
(Offer valid while stocks last)

3 1/2" TWIN 800K DISC DRIVE OFFER



These top quality 3 1/2" Disc Drives are attractively finished in BBC beige and are supplied complete with Cables. They run directly from the BBC B/Master's own PSU.

Special Offer £126

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 disc, 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 compatible with ADFS.)

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

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

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

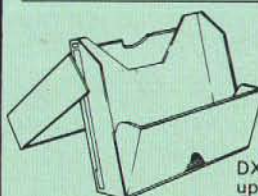
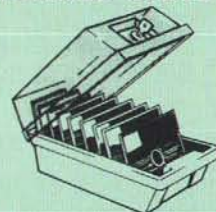
The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3 1/2" & 5 1/4", please specify.

£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 **£6.50**
- M85 – holds upto 95 5 1/4" discs **£8.00**
- M50 – holds 50 3 1/2" Discs **£7.50**



PLASTIC LIBRARY CASES

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

DX-08: This extremely handy unit holds upto 8 5/4" Disc while in use.
Only £2.00



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.

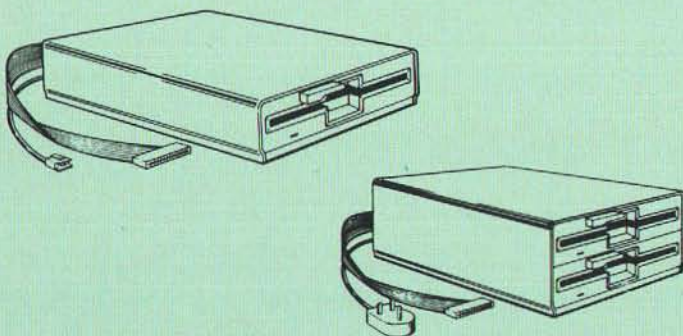
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.

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 plinth. (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 £90 | | CS 200 £102 | |
| 400K (720K) | CLS400S £92 | CLD 400 £175 | CS 400S £103 | CD400 £196 |
| 800K (1.44M) | | CLD 800S £179 | | CD 800S £198 |

● 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 | £9 |
| ● 10 x 5 1/4" D/S D/D 40 Track Diskettes | £11 |
| ● 10 x 5 1/4" S/S D/D 80 Track Diskettes | £13 |
| ● 10 x 5 1/4" D/S D/D 80 Track Diskettes | £13 |
| ● 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 | £18 |
| ● 10 x 3 1/2" D/D D/D 40/80 track Discs | £22 |

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 to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

| | |
|---|---------|
| ● 10 x M3 3 1/2" D/S D/D 80 Track Discs | £18 |
| ● 10 x M4 5 1/4" S/S D/D 40 Track Discs | £7 |
| ● 10 x M5 5 1/4" D/S D/D 40 Track Discs | £9 |
| ● 10 x M7 5 1/4" D/S D/D 80 Track Discs | £11 |
| ● 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 |

ACORN WINCHESTER DRIVES

Supplied complete with Level 3 Econet File Server software.

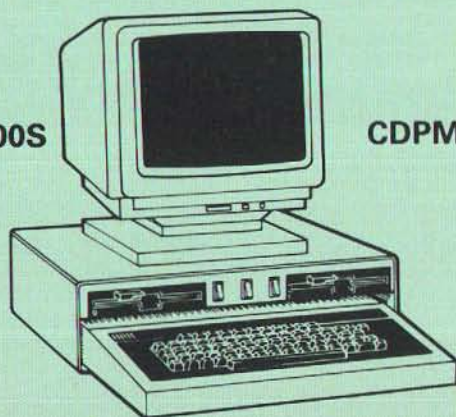
20 Megabytes £699; 30 Megabytes £1549

WATFORD's WINCHESTER DRIVES

- 10 Megabyte Unit with ADFS £399
- 20 Megabyte Unit with ADFS £499
- 40 Megabyte Unit with ADFS £999

CDP 800S

CDPM 800S



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.

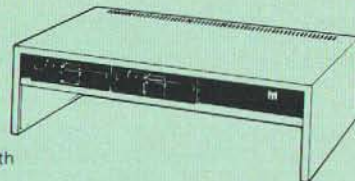
CDP 800S for BBC Micro £119

CDPM 800S for Master £205

(Securicor Carr. £7)

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 £250 Our Price: Only £189 (carr £7)

NOMINATED
FOR



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 is smooth and easy to use on most work surfaces. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that programs such as AMX Pagemaker etc, will work with it.

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".

QUEST MOUSE & QUEST PAINT £55
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT £85
QUEST MOUSE ONLY £29
QUEST PAINT SOFTWARE £32
QUEST FONT DISC £12
QUEST MAT £3

Part-exchange your old Mouse for a New QUEST MOUSE for only £23

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 24 text FONTS for use within Quest Mouse.
P.S. There is no need to worry about any of your existing AMX mouse software. The Quest Mouse is totally AMX compatible so it will work with any of the AMX range of software.

All prices in this advert are exclusive of VAT.

MARK II LIGHT PEN + PENPAL 2

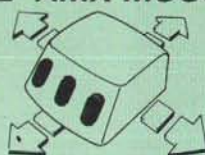
Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. Penpal II, Watford Electronics' sophisticated light pen software is also supplied free on cassette or disc (please specify). This is a highly sophisticated drawing package enabling you to gain the maximum benefit from your Light Pen. The software is used to edit Mode 2 full colour screens using lines, patterns and you own designs. Screens may be saved to cassette or disc.

Price Only £18



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

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £59 (carr £1.50)
(Please specify for BBC or Master Computer)

We are giving away, absolutely FREE, our popular Colour Art software package worth £15 with every AMX Mouse package purchased from us.

AMX MAT £3
AMX MOUSE ONLY £29
AMX DESK Package £19.00
AMX UTILITY Package £11.00
AMX SUPERART Package £39
AMX PAGE-MAKER Pack - A desk-top publishing software. It Works with keyboard, joystick and a mouse Only: £32

We are giving away, absolutely FREE, PAGE-FONTS, a disc containing over 20 fonts, with every purchase of AMX PAGE-MAKER from us.

PAGE-FONTS Over 20 fonts for use with
AMX PAGE-MAKER £9.50
EXTRA EXTRA £19
AMX DESIGN (ROM) £59
AMX 3D ZICON Disc £19
AMX Database Disc £19
AMX XAM Educational £19
AMX MAX A gem of desktop (ROM) £17

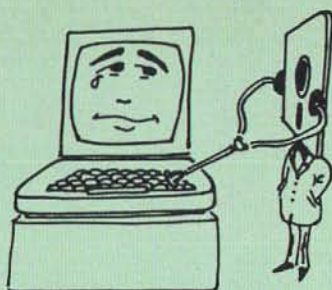
RB2 MARCONI TRACKER BALL

Complete with Software Disc £59
RB2 + Software Disc + Quest Paint £85

FLEET STREET EDITOR

Software pack £35
Admin Xtra Disc Utility £13
Walt Disney Disc Utility £13
Fonts N Graphics Disc Utility £13

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

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Cassette). 4 primary level maths programs **£9.95**
- Maths with a Story 2 (Cassette) 4 further maths programs **£9.95**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£19.95**
- 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 **£14.95**
- 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**
- MICROTكنولوجيا (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**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETXT SYSTEM **£6.90**
- PERIOD TABLE SOFTWARE **£20**
- USING YOUR COMPUTER (Cassette) 8-12 age **£24**

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 teletxt (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

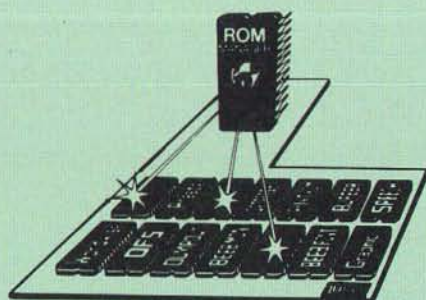


Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary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

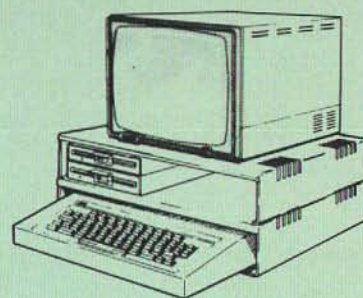


Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.

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

ONLY £20

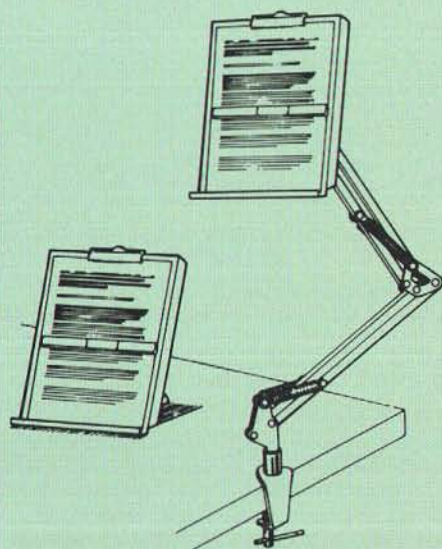
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



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

| | |
|----------------------|--------------------------|
| SINGLE BBC PLINTH | £11 (carr. £1.50) |
| DOUBLE BBC PLINTH | £20 (carr. £2.00) |
| PRINTER PLINTH | £10 (carr. £1.50) |
| SINGLE MASTER PLINTH | £14 (carr. £1.50) |
| DOUBLE MASTER PLINTH | £25 (carr. £2.00) |

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

**Amazing value at only
Desk Top £10 (carr. £2)**

Angle poise £14 (carr. £3)

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.

Price: **£80** (carr. £2)

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)

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

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.

- 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.

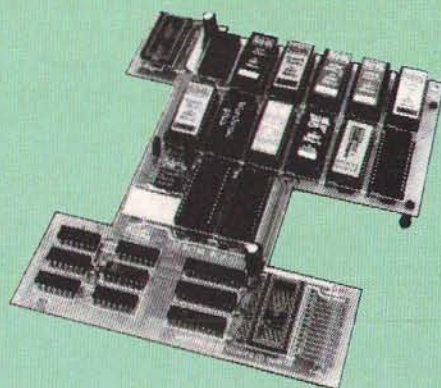
Only: **£24** (carr £2)

Optional extras

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

**All prices in this advert are
exclusive of VAT.**

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

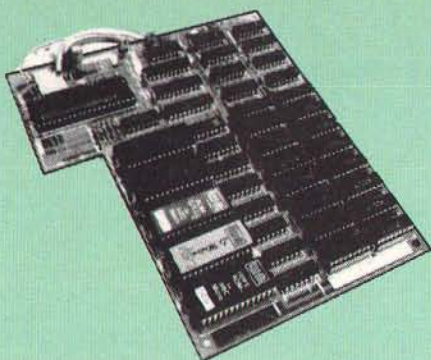
USER PORT SPLITTER UNIT



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 £15

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-SPILL, 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 £10 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.
 - BT Approval applied for.
- (When ordering, please specify the version required, (BBC or Master))

SPECIAL OFFER

Price: **£74**
(carr £3)

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

Nightingale Modem

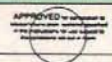
SPECIAL PRICE to our Customers

£82

(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

Nightingale Modem without software Only £75
COMMSTAR ROM package only £29
(P&P on modem £3.00)

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.

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: **£75** (Carr £3)
(Write in for full specification)

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 |

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

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 £47

Inter SHEET ONLY £37

INTER-CHART

ONLY: £26

Inter-WORD

Only: £39

INTERBASE £55

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1 £37

VIEW 3.0 ROM £54

VIEW PROFESSIONAL £79

HI-VIEW £36
(for use with 6502 2nd Processor)

VIEW Printer Driver Generator £9
Please specify Disc or Cassette)

VIEWSHEET (Acornsoft) £37

VIEWSTORE £37

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 £75

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
Adv. Rom Manager £13

MINI OFFICE II

Disc Version £14.50
ROM Version £48.00

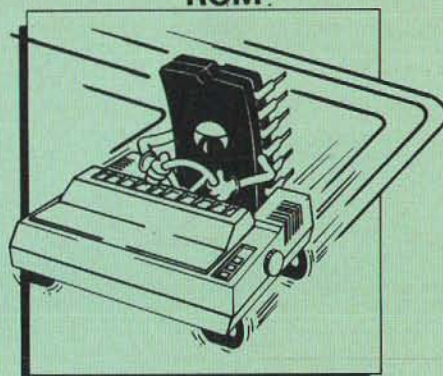
REPLICA 3

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, 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 KX1080, Mannesman Tally and compatibles.

Only: £25

(Write in for further details on all above ROMS)

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sophisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degradation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24**.

THE NLQ DESIGNER

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

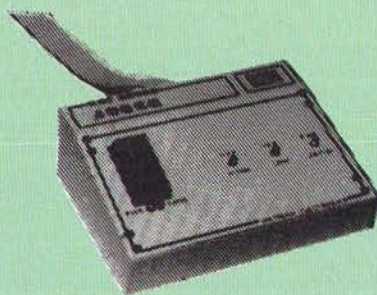
A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.

Supplied with disc containing over 25 example fonts. Please specify 40 or 80 track. 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

£25

ADDER



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).

£65 (£3 Carr)

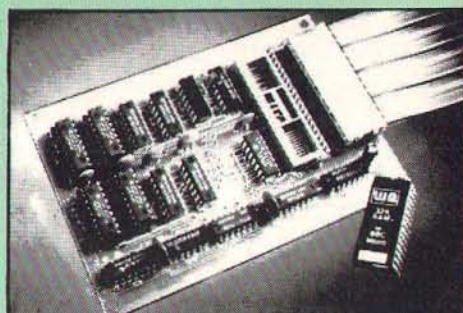
TEX EPROM ERASERS

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,ADVAL 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.

See next page for SPECIAL OFFER

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)

| | |
|--|--------|
| 30 Hour BASIC (BBC Micro) | £7.95 |
| 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 | £9.95 |
| 68000 Assembly Lang. Programming | £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 BASICROM User Guide | £9.95 |
| Advanced Programming Guide to BBC | £9.95 |
| Advanced Sideways RAM User Guide | £10 |
| Advanced User Guide for BBC | £10.95 |
| Advanced FORTH | £9.95 |
| Advanced Graphics with BBC | £9.95 |
| Assembly Language Programming on BBC Micro | £11.50 |
| Adventure into BBC BASIC | £6.95 |
| Applied Assembly Lang. for BBC | £9.95 |
| ARM Assem. Lang. Programming | £12.95 |
| Art of Microcomputer Graphics | £14.95 |
| Assembly Language Programming FOR the BBC Micro | £8.95 |
| Assembly Language Programming on the BBC & Electron | £8.95 |
| Basic ROM User Guide | £11.95 |
| BBC B Compendium | £5.95 |
| BBC BASIC for Beginners | £7.95 |
| BBC FORTH | £7.50 |
| BBC Hardware Projects | £8.95 |
| BBC Micro & the small Business | £5.75 |
| BBC Micro ROM Book | £10.95 |
| BBC Master 128 for High Flyer | £10.95 |
| BBC Micro Disc Companion | £8.95 |
| BBC Software Projects | £6.95 |
| BCPL User Guide | £14 |
| BCPL The Language & its Compiler | £7.95 |
| C for Beginners | £10.95 |
| C for Programmers | £9.95 |
| Complete FORTH | £6.95 |
| Computer Graphics & CAD fundamentals | £9.95 |
| CP-M - 86 User's Guide | £19.95 |
| 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 |
| Creative graphics on BBC Micro | £7.50 |
| Disc Drive Projects for Micros | £5.45 |
| DISC FILING SYSTEM (DFS) | |
| Operating Manual for BBC | £6.95 |
| DBASE Programming Language | £14.95 |
| Disc Programming Techniques | £9.95 |
| Exploring FORTH | £6.95 |
| FORTH on the BBC Micro | £7.50 |
| Functional FORTH for the BBC Micro | £5.95 |
| Guide to BBC ROMs | £9.95 |
| Graphics for Children | £6.95 |
| Graphs & Charts on BBC Micro | £7.50 |
| Hackers Handbook - New | £6.95 |
| Inside Information (Computers, Interfacing & Control of BBC Micro Communications & People) | £9.95 |
| Interfacing & Robotics on BBC | £15.95 |
| Introduction to COMAL | £9.50 |
| Introduction to LOGO | £6.95 |
| Introducing 'C' | £9.95 |
| Introducing LOGO | £5.95 |
| Introduction to FORTH | £8.95 |
| Introduction to PASCAL | £17.95 |
| ISO - PASCAL Reference Manual | £9.95 |
| LISP 2nd Edition | £14.95 |
| LISP, A Beginners Guide to | £10.95 |
| LISP on the BBC Micro | £7.50 |
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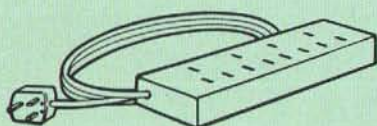
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MACHINE LANGUAGE ADE

SYSTEM's ADE Plus — the assembly language programmers dream?

ADE Plus is a complete machine code assembly package for the BBC and Master series of microcomputers. ADE plus consists of a Memory Management Unit (MMU), which includes a text editor, 65C00 series macro assembler, debugger, reference and tutorial guide, and utilities disc.

The ADE Plus package is available in a variety of formats depending upon your system configuration.

The MMU (incorporating the text editor) and 65C00 series macro assembler are sideways ROMs and are available either as EPROMs or on disk for loading into sideways RAM. The debugger is available in three versions on disc, one for use in main RAM, one for use in second processor RAM, and one for use in sideways RAM.

The disc system costs £42.00 +VAT (=£48.30), the EPROM system costs £46.00 +VAT (=£52.90), and the cartridge system (for use on the Master) costs £49.00 +VAT (=£56.35). Existing users of SYSTEM ADE can upgrade to any one of the above configurations for £27.00 +VAT (=£31.05), whilst upgrading from SYSTEM ASM costs £35.00 +VAT (=£40.25). Post and packing £1.25 per unit.

The "Reference and Tutorial Guide" comes in the form of approximately 120 A5 pages in a ring binder, with a sleeve containing the utilities disc. It is well worth investing a few

pence or so to put ring reinforcements on the manual.

The memory management unit

The memory management unit (MMU) is responsible for sensibly dividing up all of the available memory for use with the package. The MMU is entered with the command *ADE. The MMU has its own system clock which needs to be initialised when it is first used. On a networked machine this will be set to the network clock, or if used on a Master from the in-built real-time clock, otherwise the MMU will prompt for entry of the time and date.

Once initialised, the MMU will display details of how the machine's memory has been organised and the sideways banks that contain various modules of the ADE Plus system — see Figure 1. The available memory is organised into four areas, the input buffer, output buffer, printer buffer, and system workspace. The display will show the total amount of memory available for use with ADE Plus, how much memory is protected (see below), and how much memory is allocated to each of the buffers.

The printer buffer uses any sideways RAM in the machine. Should a sideways RAM bank contain a ROM image (such as the debugger), then the system will 'protect' that bank and not use it. The input buffer is an area of memory used for storing data being entered into the ADE Plus system, eg source code prior to being assembled. The output buffer is used to store data prior to being saved to the current filing system, eg assembled object code.

The MMUs prompt consists of the current time (as derived from the MMU system clock). From here, you can alter the size of the various buffers (in increments/decrements of one kilobyte units), alter the system flags (more of that later), assemble a program, enter the editor, or enter the debugger.

The editor

The editor can be entered from the MMU prompt by typing EDIT. The command can be preceded with an optional filename which is to be edited. The editor is described as a 'basic text editor'. It is however far from basic and has many special features.

The editor is similar in operation to that of the Acorn VIEW wordprocessor. The screen will either be in Mode 3 or Mode 7, depending upon how much memory is available (for use by the editor). The command screen shows details such as the current filename, amount of free memory (for use by the editor), whether insert mode is on or off, how many markers are set (if any) and the time.

The edit mode is entered by pressing the (ESCAPE) key. The same keys as used by VIEW are used to move the cursor around the text. The function keys are used to evoke the other editing features, eg insert/delete line, insert/delete character, join/split line, etc. One extremely useful feature is goto label which is evoked by pressing (F2). The editor will extract the label at the cursor position, and then search from the start of the text for the next occurrence(s) of this. This saves having to search manually for occurrences of a label. One other nice feature is the ability to jump to a specified line number — useful when correcting an erroneous line as reported during the assembly process.

The 65C00 series macro assembler

The assembler is used to assemble machine code from text files such as those prepared using the editor. The format of these files is standard, ie label, opcode, operand, comment. The assembler produces object code for use on the 65C00 series of microprocessors, ie 6502, 65C02, 65C12, and even supports the extra opcodes found on the Rockwell 65C00 series.

The assembler is summoned from the

ADE PLUS / SOFTWARE REVIEW

MMUprompt using the command **ASM object=source** where *source* is the filename containing the source code, and *object* is the name of the output file for the object code (ie the assembled code).

The assembler is a two-pass assembler. This means that the source code is scanned through twice before the object code is produced. The first pass is used to obtain values for the various labels and to check for (syntax) errors. The second pass is used to assemble the code, using the values of the labels as determined from the first pass.

After assembling a program, the time taken for assembly is displayed. This is given as a total time, with the time taken up by the Central Processing Unit (CPU) and the time taken up by the filing system (FS) also displayed.

The assembler is also a macro assembler. Macros are (usually) short pieces of commonly used sequences of instructions. The macros when specified are given a name. Then, when later on in the code you wish to use a macro, the macros name is placed in the opcode field. The operand field can contain optional parameters that are then passed onto the macro. When assembling code it is possible for these macros to be saved to the current filing system so that they can be used when assembling other programs.

The assembler has over 55 pseudo-ops. These are used during assembly to, for example, state the start address for assembly, insert data (like BASIC level II's Equate facility), define variables, etc. There are also pseudo-ops that are more like high-level language commands (particularly the conditional assembly directives) such as **WHILE...WEND**, **REPEAT...UNTIL**, **IF...ELSE...FI**, etc to produce quite complex object code with the minimum of fuss.

The linker

Linking is a facility normally found on mainframe computers. Linking enables programs to be written in small modules which are then 'compiled' to produce linker modules. These modules are then brought together using the linker to produce the executable program.

The advantage of linking is that it is far quicker to assemble a program by linking several linker modules and then to assemble one gigantic source file. This is due to the fact that the linker modules contain "semi-machine code", and so when the modules are linked together the assembly time is much faster.

Using the linker it is possible to produce program overlays, a task that is normally very time consuming and difficult.

The debugger

The debugger is based upon the **SYSTEM SPY** debugger. It uses Mode 7 to display a 64 byte block of memory, either in hexadecimal, ASCII, or disassembly, and shows details of the registers, program counter, and memory counter. The debugger can single step through code enabling mistakes to be found, and

```
SYSTEM ADE plus 1.0
Fri,08 May 1987
```

```
Available memory 136K : 48K protected
```

```
Input    28K
Output   14K
Printer  16K
```

```
Workspace 30K
```

```
Assembler options: NONE
Linker options   : NONE
```

```
ADE/Linker in slot 4
65C00 assembler in slot 5
Advanced editor not installed
Debugger in slot 6
```

```
00:14 =>
```

supports up to eight break points.

The debugger also offers memory shifting, verifying of two memory block, flood filling of a block of memory, and pattern finding.

The utilities disc

The utilities disc contains a number of useful programs for use with ADE Plus. The first of these, and probably the most useful, is "CONVERT". This is used to convert a BASIC program containing assembly language, into a text file for use with ADE Plus (after appropriate editing).

Other utilities are a symbolic disassembler and a filter program. The disc also contains examples of macro and linker library files.

The technical reference guide

The "Technical Reference Guide" is available separately from the ADE Plus package at a cost of £12.00 inclusive of P&P. The 42 page guide is in the form of A5 sheets that can be inserted into the back of the binder holding the "Reference and Tutorial Guide".

The ADE Plus system is written as a series of modules around a central core program, namely the MMU, which is used as a system manager. The 65C00 series macro assembler is an example of a module.

The theory behind this modular approach is that it would be possible to add other discreet modules to expand the system, such as a Z80 assembler. The technical guide will be of most use to those who wish to know how the MMU works and hence how to write other modules.

Details are given of the MMU variables, workspace, along with details of the **OSWORD** routines that are used to communicate with the MMU. There are details of the file structures for the linker and macro modules and libraries.

As part of this modular approach, the MMU will support an advanced editor and Z80 assembler, although these are not yet available. The technical guide gives details of how to patch **VIEW** version A1.4 so that it will appear to be the advanced editor.

Conclusions

ADE Plus is an extremely powerful piece of software. It works on all of the BBC and Master series of microcomputers and with all of the Acorn filing systems, ie DFS, ADFS, NFS, and ANFS. The ability to use *all* of the available memory within the computer is well appreciated. The speed of assembly has to be seen to be believed, it is so fast — even faster than BASIC's in-built assembler. A vast majority of the assembly time is taken up by the filing system.

The instruction manual was written for the user who is proficient in assembly language programming and as such is fairly heavy going. Anyhow, there are plenty of books on the market to explain how to use assembly languages. The technical guide is not necessary to operate the ADE Plus system and is not for the faint-hearted, it will be of most use for those wishing to write their own modules. The manuals were both typeset and clearly laid out, although not well structured.

There is not space to describe all of the facilities offered — there are just so many. If you are a serious assembly language programmer then you should seriously consider purchasing ADE Plus for it offers everything you could possibly need, and more. If you are going to buy your first assembler, then ADE Plus should still be considered, for although it is complex, once you have mastered how to use it, it will provide all the facilities that you will ever need in the future. One wonders if it would indeed be possible to take ADE Plus to its very limits.

All in all, a very professional piece of software that would be hard to beat. Then again, there was a time when it was thought that **SYSTEMS ASM** and **ADE** were the best and could never be improved upon...that is until ADE Plus.

Factfile

ADE Plus can be obtained from:
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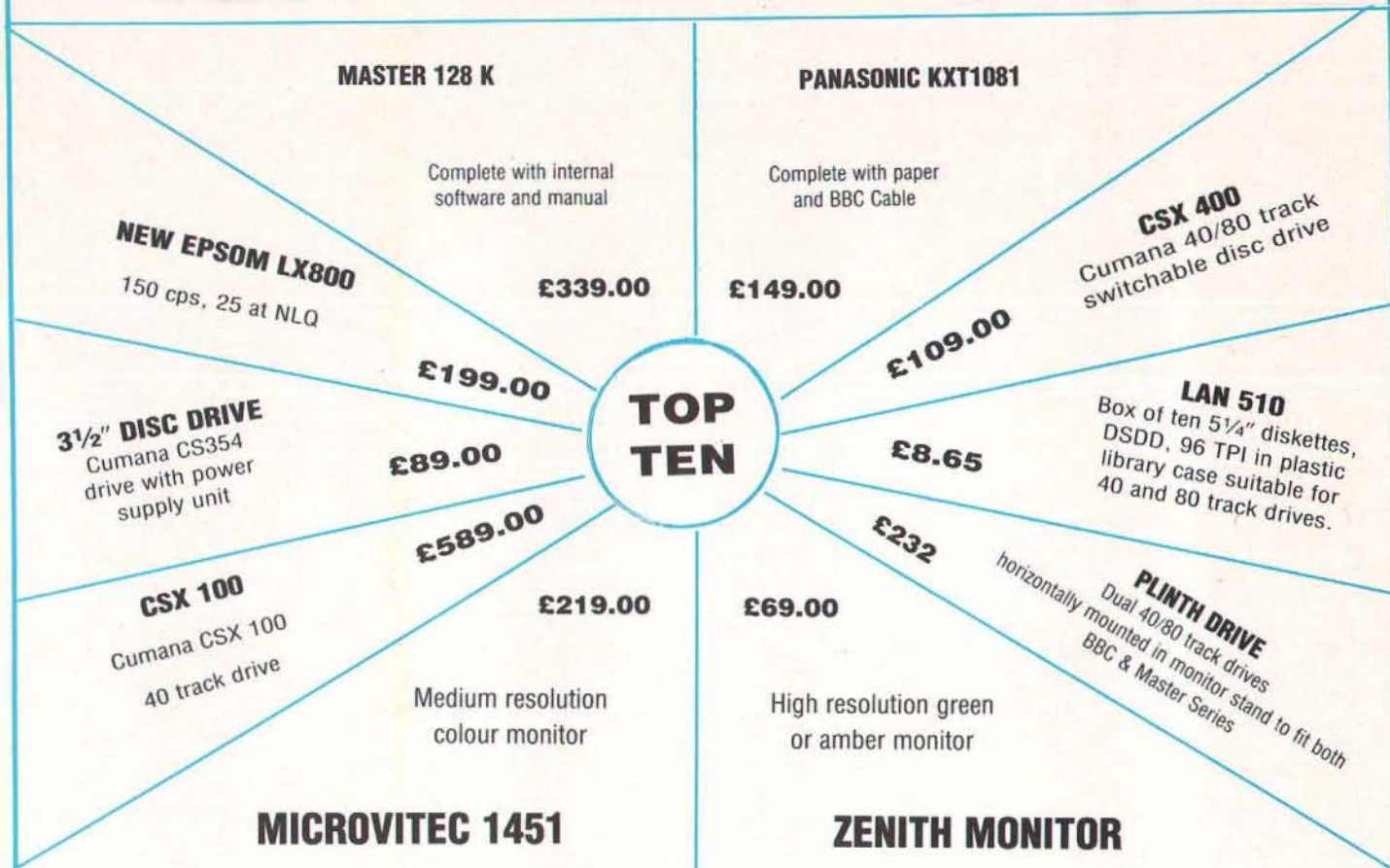


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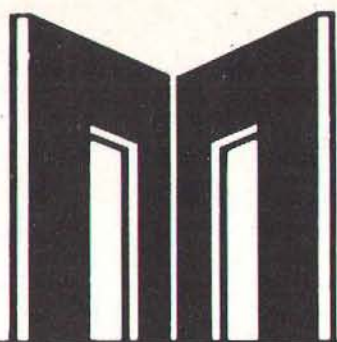
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At last a machine code development system that *really* does outperform ADE

ADE+

Features

- Runs on BBC B, B+, Master, Compact, ADFS, DFS, ANFS, NFS
- Full use of all available RAM
- Intelligent memory management unit (MMU)
- User switches on all main features
- Automatic search for macros on disc
- Assemble absolute or relocatable code
- Source program tokenised or full text
- REPEAT..UNTIL..WHILE..WEND etc. high level language constructs
- Macros nestable to any depth
- Excellent error diagnostics
- Linker
- Editor and symbolic disassembler provided

A comparison of three 65C12 assemblers

| Feature | ADE + | BBC Basic | MACROM |
|--------------------------|--------------|--------------|------------|
| Number of pseudo-ops | 64 | 4 | 36 |
| Use of all available RAM | Yes | No | No |
| Macros | Yes | No | Yes |
| Relocatable output | Yes | No | No |
| Linker with libraries | Yes | No | No |
| High level constructs | Yes | Yes | No |
| Number of error reports | 39+ warnings | 3+BASIC errs | 20 |
| 65C00 extended opcodes | All | 65C12 only | 65C12 only |
| Switch off 65C12 opcodes | Yes | No | No |
| ROM size | 32K | 16K | 16K |
| Disassembler | Yes | No | Yes |
| Label restrictions | No | Yes | Yes |

ADE+

Versions and prices

Recommended for Master Compact...
ADE+ MMU and 65C00 series assembler on disc (3.5" ADFS). 32K sideways RAM required.
£42.00 + vat

Recommended for BBC B, B+ ...
ADE+ MMU and 65C00 series assembler on 2 16K EPROMS with DFS 5.25" utilities disc.
£46.00 + vat

Recommended for Master 128, turbo...
ADE+ MMU and 65C00 series assembler on EPROM cartridge with 5.25" DFS utility disc.
£49.00 + vat

Upgrade
ADE to ADE+ (upgrade to either disc, EPROM or cartridge, you must send in ADE ROM chip)
£27.00 + vat

Upgrade
ASM to ADE+ (upgrade to either disc, EPROM or cartridge, you must send in ASM ROM chip)
£35.00 + vat
Please add £1.25 P&P per unit.

ADE+

The Ultimate Assembly Language Development Tool

ADE+ is a 65C00 series assembler system supporting all the mnemonics of the 65C12 used in the latest BBC microcomputers plus the additional 'Rockwell' instructions. ADE+ is fast, faster in fact than the in-built BASIC assembler and all rival products that we have tested. The assembler produces absolute code that can be 'RUN or linker modules that can be merged with the output from other programs using the ADE+ linker. ADE+ supports a powerful linker which drastically cuts assembly time; a feature normally only found on minis and mainframes. The linker will even link the output from compilers with your assembly language programs. Full library support for both the linker and the assembler is provided - fast searching for unknown instructions in a random access macro library. ADE+ is a modular system with many modules to add later; i.e. a mouse based editor & a Z80 cross assembler! A print spooling system uses sideways RAM as a print buffer to eliminate waiting time; your listing runs off as a background job! Use the print spooler from BASIC or your own programs. ADE+ uses ALL available memory. With a second processor attached the IO processor spare memory is used as a buffer to reduce the amount of disc access. All available memory is handled by ADE+'s intelligent memory management module. Use your own favourite editor or the one provided. Assemble from disc or memory. Full utilities including librarians, converter for BBC BASIC etc. ADE+ must be the bargain of 1986/7!

ADVENTURE ROUNDUP

I tried, I really did. I argued, I bullied, I flattered, but to no avail. Level 9 and the Austin Dynasty are adamant in their lack of future support for BBC adventurers. No new games for us, no readable disk copies for modern DFS users, no compilations, nothing.

The reasons are apparently technical as well as commercial, as Level 9's Pete Austin explained. They are moving on to a new super-sophisticated parser and puzzle system that simply will not fit into the Beeb's memory. They will, of course, produce their new games for the popular 128K home microcomputers.

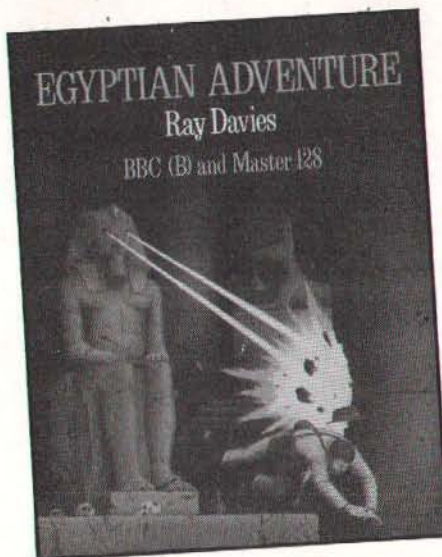
What about the 128K B Plus, Master and Compact, I asked in desperation? Not popular enough apparently, or their users are too 'serious', or pirate too much or whatever. I managed to achieve a grudging admission that it might be technically possible to implement their new system on the modern BBC range but the rest is a big blank wall. Our love of Level 9 remains sadly unrequited.

But now to the good news. The only other company (since early Acornsoft) to produce consistently outstanding adventure games for the BBC (and Electron), Robico, are continuing to support the machines. The reason that they have gone a bit quiet lately is that they have been tied up converting some of their best for the Atari: well, they have to live and Atari owners are entitled to some of life's pleasures, I suppose. Three of their very best games are, of course, the Rick Hanson Trilogy (*Rick Hanson*, *Project Thesius* and *Myorem*) which is now available in a compilation for BBC (all series) and Electron priced at £23.95 cassette or £25.95 disk and available from Robico Software at 3 Fairland Close, Llantrisant, Mid Glamorgan, CF7 8QH. If you are a recent Beeb owner or have been hibernating for the last couple of years then this is a bargain you should not resist. Robico tell me that 5,000 others have already succumbed.

I have no new Robico games to review this month, but several are promised shortly. *Blazing Star* — Rob O'Leary's answer to Mel Brooks' *Blazing Saddles* — is a cowboy spoof due shortly. Robico's first graphic adventure — *The Hunt* — *Search for Shauna* (written by Ian Muriss) is also imminent. I understand that this game will use a mixed Mode 4/5 screen to give a split screen presentation with four

coloured graphics and adequate memory for the text. Robico have also purchased the rights to Magus's *Village of Lost Souls* which will shortly be re-released having been rewritten to incorporate the new Robico Advanced Parser and made available also to Electron users. A sequel is also in preparation.

Keen BBC adventurers will, of course, have played most of the Level 9, Acornsoft and Robico games released to date, and will need something to keep them going. Nothing else around is quite in the same class but I do have some new games to discuss which might catch your fancy.



Egyptian Adventure

Duckworth
The Old Piano Factory
43 Gloucester Crescent
London NW1 7DY
Model B
Disk only £14.95

Your task in this adventure is to reach and penetrate the tomb of an ancient Egyptian Princess (cursed, of course), steal some treasure and make your getaway. Although the decision to use disk access has permitted lengthier text to be used, don't expect an enormous game in the Entar 7 mould. With

the help of my wife, daughter and the Duckworth clue sheet (extensively and unashamedly used) I managed to play through the entire game in a couple of extended sessions. I don't think that there are more than about 100 locations, although some have fairly extensive descriptions. By modern standards the parser is a limited two word affair, although this doesn't bother me too much. There are also far fewer, and less complex, puzzles than in a (memory only) Level 9 game and some are quite obscure. The game, however, gets better as it goes on and I really enjoyed the final section within the tomb itself.

I have commented before about the necessity and intricacy of Level 9's clue sheet, and *Egyptian Adventure* made me think some more about the use of this device. Duckworth's was designed to allow help with all significant problems in the game, with two levels of hint. I used it extensively because I wanted to get through the game quickly to meet the review deadline. However, I could have regulated my progress to be slower and more satisfactory if I were playing purely for pleasure. I did feel though that some of the puzzles were highly arbitrary and would lead most players to grind to a frustrated halt if the clue sheet were not available. Since one of the great difficulties of adventure game design is to make puzzles hard enough to prevent rapid progress, but not so obscure as to cause a permanent halt, the well designed clue sheet is really a very good idea. I understand that Robico are at last starting to issue them, if only for the practical reason that they sell too many games these days to deal with individual inquiries.

The Ultimate Prize/Pirates Peril

Heyley Software
24 Ley Hey Road
Marple
Stockport
SK6 6PQ
Model B
Disk only, £7.50 each

These two adventures are the first marketed games I have received for review that were

written with our own Adventurescape game writing system. This system uses disk access to enable writers to create far larger games than can be held in the computer's memory. The main limitations of the system are that it has a two word parser and a fixed table of condition-action lines for puzzle creation. Although allowing quite complex problems to be created, it is not, in principle, as flexible as the puzzle systems for the *The Quill* and *The Graphic Adventure Creator* — two systems which are, however, limited in memory size (see my review in *A&B*, September 1986).

Until now, the other games which I had seen written by authors with Adventurescape (those entered for the original competition) were of small size and contained, in many cases, bugs in the puzzle logic. By contrast Heyley's games are huge, using the maximum dimensions (250 locations, messages etc) and completely filling a 40 track disk each, even with 'squashed' text files. It was also necessary for the BASIC program which runs the game (ADVRUNF) to be compacted in order to provide enough dynamic memory space to run the games. The games are also remarkably free of both spelling and logical errors, and the authors (H & H Roberts) have evidently fully understood the puzzle writing system and exploited it to its limits.

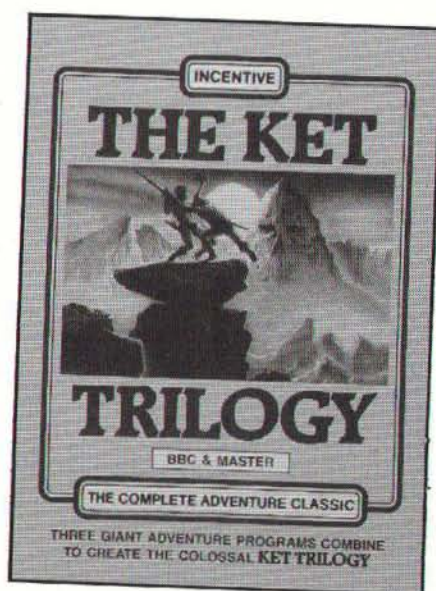
In the time available for the review, I have only been able to play one of the two games, *Pirate's Peril*, extensively which I in fact played right to its conclusion. This is a considerable compliment in itself, especially in view of the size and complexity of the game. Even when I am making progress, few games sustain my interest long enough to elicit that much investment of time. It's different for reviewers, you see. For one thing we have to meet deadlines, and there is always another program waiting to be seen. Also, we don't actually have to pay for the games, so there is no incentive to grind on through dull text with gritted teeth just to get our money's worth! A game which I go on playing long after I have seen enough for the review is, then, a happy exception. In the case of *Pirate's Peril*, I thoroughly enjoyed the game and only occasionally resorted to the cheating which is the system designer's privilege!

The game makes an excellent start by providing a really complex set of puzzles for you (the pirate) to escape from your starting location in prison. Thereafter you wander around a fairly small area until you are able to find yourself a skeleton crew (literally) to help you build a boat and make your escape. However, you have only really just started for you now get shipwrecked on to a huge island with all sorts of problems to solve. I particularly enjoyed the ogre's castle, but there were many other aspects to the play in this section.

Having played both *Pirate's Peril* and Duckworth's disk based *Egyptian Adventure* right through, I can make direct and objective comparisons. At £7.50, *Pirate's Peril* is nearly half the price and yet appears to be about

three times as large, not only in terms of locations and text but also in terms of the amount of play and puzzles to be solved. I also found the text to be wittier and more atmospheric and the puzzle quality to be better in spite of the limitations of the system. Each game uses a similar two word parser, so you can see for yourself which is by far the better value for money.

I would strongly recommend *Pirate's Peril* as an excellent buy. What I have seen of *The Ultimate Prize* (written earlier) I have found rather dull and repetitious by comparison, though I have probably not persisted long enough to make a fair judgement.



The Ket Trilogy

Incentive Software
2 Minerva House
Calleva Park
Aldermaston
Berkshire RG7 4QW
All BBC models and Electron
Tape only £9.95

The Ket Trilogy is a set of conventional text only games running in Mode 6. At the time of writing it is available on tape only, although I understand that a disk version is to be released shortly. At £9.95 for three games it looks good value for money, the multi-game format providing an alternative solution to the demand for larger games than the disk access used in games discussed earlier.

The three games can be played independently but form a logical sequence carrying the same story line through. The background is that the Lords of Ket have sent for you to put a stop to vicious attacks coming from beyond the mountains to the east, organised by Mad Monks and a beautiful High Priestess. You have little choice but to accept the mission as you will otherwise be executed for a murder you didn't commit. With me so far?

In the first game — *The Mountains of Ket* — you have to reach the far side of the mountains which involves finding the secret route to its entrance and then coping with the horrors inside. This takes you to the *Temple of Vran* — the second game — in which you have to destroy its evil occupants including the beautiful and evil priestess Delphia. The final game takes place in the inner sanctum of the Temple and involves a confrontation with the even eviller Vran Verusbel, leader of the Mad Monks.

Actually, I got most of this from the documentation because I have so far not completed the first game (I haven't stopped playing, just hit another deadline). I have got quite a long way with it though and can comment on the general style of the games. The parser is two word, and the descriptions on the brief side. Puzzles are of reasonable quality and I had quite a lot of fun finding ways to buy things in the village at the outset to set me on my way. The Ket games also involve combat which though popular with some is not my favourite style of game, because this always seems to bring in too much of a chance element and the fights can get boringly repetitious. The only reason that I have found it tolerable so far in Ket is that one can seem to get through most puzzles avoiding combat, and indeed it may be wise to do so.

For those of you who like to pick fights rather than avoid them, a brief description of the Ket style is in order. You start off with points for Prowess, Energy and Luck. On entering combat, the equivalent points for your opponent are also shown. Prowess points are fixed, but the ratio of yours to your adversary's determines your chance of making a hit. Energy is lost as blows are scored and a zero score results in premature demise for you or your opponent. Sources of nourishment to renew energy appear limited and time alone does not replenish. Luck points are used up by trying to dodge opponents' blows and do not seem to get replaced either. Fortunately, the author has provided for cowards as well as heroes and you are given opportunities to run away during combat!

Have you noticed that all adventure games are these days hyped as 'massive' or some such. The Ket Trilogy describes itself as 'colossal'. The only game that I have seen for the BBC which could justify such adjectives is Robico's disk based *Enthar 7*, after which *Pirate's Peril* above is probably as large as any in terms of text. The most massive games in terms of puzzles packed in are those of Level 9 in spite of their all in memory design. This said, The Ket Trilogy is significantly larger than normal, being three Electron sized games for a price often asked for just one. It's not the best game I have seen by a long way, but it is perfectly playable and can be safely recommended as good value for money. Incidentally, the first games written with Incentive's Graphic Adventure Creator are now beginning to appear on the market and I shall be looking at some of these in my next article.

ON LINE

News...News...News

TELECOM GOLD

New pricing structure for Telecom Gold

Telecom Gold have announced that as from August 1st their pricing system will be restructured. The old time-based charges are being replaced by a new system resembling the 'old' PSS charge rates, ie connection time plus data transmitted.

The connection charges have been reduced from 11.0 pence to 6.5 pence per minute for peak time (0800 — 1900 hrs) and from 3.5 pence to 2.0 pence per minute for off-peak time (all other times).

However, there is now an additional charge for the amount of data received and transmitted. In peak time the charge is 4 pence per 512 characters, and 1 pence per 512 characters off-peak.

The more astute readers of my column will probably have noticed that these new charges mean that Telecom Gold is now more expensive, with peak charges approximately tripling and off-peak charges doubling. It will be interesting to see if Telecom Gold's number of subscribers continues to rise at the current rate (approximately 100% per annum) after these charges have been announced. Nuff said?

Rumours are also emerging that Telecom Gold wishes to impose a £5 per mailbox per month standing fee, irrespective of what type of account the mailbox is under.

At the time of going to press I have been unable to ascertain how these charges will affect TTNS (The Times Network System) users, who at present only pay for their subscription. More updates will appear next month.

Welcome back Tubelink

Tubelink, the database for BBC Microcomputers (See A&B December 1986 pp14-15), is to return to Prestel after its three months absence.

Tubelink started out three years ago on the Viewfax database when Benjamin Riatti, Tubelink's Editor, wanted to start a 'small' user group for users of the 6502 second processor. Since then the database has grown in size along with the range of material it covers, becoming

Find out what's going on online in the number one BBC Micro communications column

Prestel page *800256 or by using the *TUBELINK keyword.

Dialup Personal upgraded

A number of enhancements have been made to DIALUP Personal, the communications package from PMS Communications. (See OnLine A&B May 1987 pp19-22).

The cable which is included in the package has been modified in order to support any modem on the market. "Due to the large number of enquiries from people with internal and non-standard modems we decided to

MNET Contributors (C) 800256a Op

Tubelink

Key for

- 11 Editorial
- 12 Reviews
- 13 Does it or Doesn't it?
- 14 Archway
- 15 Hints and Tips
- 16 Tubers' Links
- 17 Latest Processing
- 18 Tubelink Telesoftware
- 19 Special Offers

7 Write to Us 9 Tubelink Plus *

0 Micronet 800

very popular amongst Beeb users on Prestel.

Unfortunately for Tubelink, three months ago Viewfax decided to leave Prestel as an Information Provider (IP), leaving Tubelink out on a limb. Following on from negotiations between Tubelink and Micronet 800, Tubelink is now to return to Prestel under the Micronet 800 Contributors database.

With the changeover from Viewfax to Micronet, there have been a couple of changes to Tubelink. There is now a section specially for owners of the Archimedes (see A&B August 1987 pp12-21) called Archway. There is also the demise (sob!) of the MusicLink section for users of the Music 500/5000 synthesizer, which provided tunes to download and a regular letters column amongst other things.

We wish Tubelink a welcome return to Prestel and hope to see it going for at least another three years. Tubelink can be found on

remove the copy protection device, known as the dongle or little black box", comments Sue Froggatt, Product Manager. "The number of modems DIALUP is capable of supporting is now open ended. The modem list currently includes the Pace Series 4 2123S, Pace Linnet, Dacom 2123 AD, Tandata Tm 110, Tandata Tm 512, Miracle Technology WS4000 and WS3000, Communitel modem plus any Hayes compatible or manual dial modem."

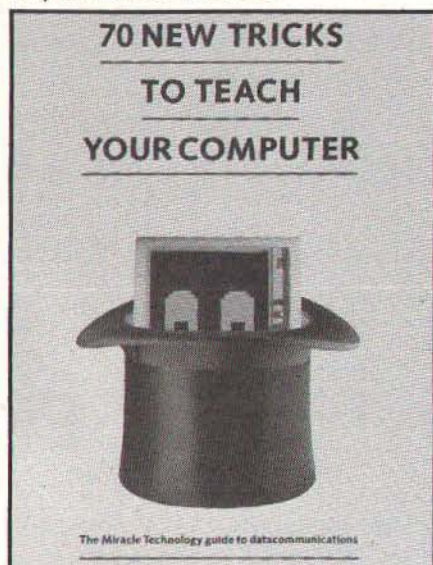
DIALUP Personal will shortly support VT100 terminal emulation to enable users to connect to the Open University and other large computer systems that use this protocol.

Sue points out "existing users can copy down the latest version of the software from DIALINK, a service provided for DIALUP users. This is another advantage of choosing the DIALUP package".

In addition the IBM version has been modified to allow split speeds, so it can be used

to access Viewdata services such as Prestel at 1200/75. Also, users can now choose to drive communications Port 1 or Port 2.

For further information contact:
Sue Froggatt, PMS Communications Ltd,
Norfolk House, Smallbrook Queensway,
Birmingham, B5 4LJ. Telephone 021-643 7688,
Telex 265871 MONREF G quoting reference
87:CQQ214, Prestel mailbox 216437688,
Telecom Gold mailbox 87:CQQ214, or
Easylink mailbox 19025180.



70 New Tricks to Teach Your Computer

Today a bewildering array of information awaits the uninitiated purchaser of computers and datacommunications equipment — information which is often confusing and full of jargon.

Miracle Technology (UK) Limited, well aware that most people buy modems and sometimes computers without needing to know how they actually work — except for those few really interested in binary codes and telephone signals — has come up with what they think is a solution.

To make life easier for people — and for their own dealers — Miracle has produced a small, easy to read booklet designed for people who want to get the best out of their modem called "70 New Tricks To Teach Your Computer".

The booklet is a learners guide to the complexities of datacommunications, and contains details of various online services, what they can offer, and the inevitable jargon and what it all means.

The new British Telecom Network

The new British Telecom Network (also known as VASSCOM) is now nearing completion.

Although behind schedule, the network should hopefully be completed by the time that this is published. The network is initially only connected to the Prestel computers, however "the Network will eventually provide users with a list of services that they can connect

to, offering not only videotext but scrolling services."

For Prestel users, the network offers two major advances, namely error correction, and higher access rates.

To take advantage of the error correction special software is required, and several software companies are upgrading their packages with this protocol included. For users of some 'intelligent' modems, the error correction software could be included within the modem (at a price).

The network also offers users a multitude of access rates, ie V21 (300/300), V23 (1200/75), V22 (1200/1200), and V22bis (2400/2400).

Indeed, Prestel at 2400/2400 has to be seen to be believed — the frames are transmitted so quickly and as for downloading software, the time taken is drastically reduced.

TELECOM GOLD

"Kompass Online"

Telecom Gold users can now access Kompass Online, an electronic business directory containing information on 110,000 UK companies, compiled from directories such as Kompass, Kellys, Directory of Directors, Dial Industry, British Exports and UK Trade Names.

Kompass Online provides Telecom Gold users with fast access to a wealth of information, which includes marketing and sales leads, product and service availability, and the contact names of agents or representatives. The information can be searched by company name, product, county or number of employees and is continually updated, with the last revision date displayed on each entry.

Kompass Online currently offers 45,000 product categories for researching new suppliers and the option to format mailing lists from accessed data. Mailing lists may be stored on a Telecom Gold textfile or a microcomputer for subsequent use at no extra cost.

Future plans include offering a larger range of information on an increased number of companies, including European and US companies, further search criteria, and a mailing list of 400,000 named managers and directors.

Kompass Online is a welcome addition to Telecom Gold's existing range of databases, complimenting the credit and financial information, export intelligence, and marketing data already available.

Dialcom Grows

Telecom Gold users can now communicate with their Italian contacts using the Dialcom electronic mail network. The Italian service was started in March 1987, under the name Mastermail by Teleo, a joint venture between SIP and Italcable.

The Finnish PTT plans to launch a public service in the Autumn and a full X.400 MHS (Message Handling Service) early in 1988.

Gold 400 (MHS)

Telecom Gold is expanding the range of facilities available to its customers with the introduction in July of the Gold 400 Message Handling Service (MHS).

Gold 400 will be capable of interconnecting different public and private electronic mail systems, and permitting messages to be sent between them and the telex and facsimile services.

Customers will be linked into it from the beginning of July, following the successful completion of engineering trials which began last October.

It is the first public service implementing the internationally agreed X.400 standard for message handling. This will permit users to exchange messages between different office automation systems available from a wide variety of suppliers.

The system and software for Gold 400 was supplied by Dialcom Inc., one of British Telecom's North American subsidiary companies. Through Dialcom, British Telecom is now able to supply X.400 message handling software to all Dialcom licencees, which operates in 17 countries.

Details of the new Gold 400 service were announced by Mr Clem Jones, Telecom Gold's General Manager: "Connecting customers to our Gold 400 service at the beginning of next month (July) is visible confirmation of British Telecom's commitment to Open Systems Interconnection, OSI. Gold 400 implements an OSI product which is covered by British Telecom's Open Network Architecture, ONA."

"ONA is the cornerstone of British Telecom's information technology strategy and it defines how international standards for OSI will be implemented in British Telecom's products and services. It will bring to users the twin benefits of flexible communications and suppliers independence which they have long been awaiting from OSI."

Mr Jones commented "I also believe that users will find our prices for Gold 400 both competitive and economic. We are blazing a trail for others to follow and I want to thank all those vendors of office automation services who have joined us in this pioneering venture."

To register as a corporate user of Gold 400 will cost £1,000, which includes the £300 subscription cost to telecom Gold itself. For existing Gold customers registration is £700.

Use of Gold 400 will be charged at a standard rate of 20 pence per 2048 characters transmitted between 0800 and 1900 hrs, or 15 pence per 2048 characters transmitted at all other times.

Use of Gold 400, as for corporate users of Telecom Gold itself, is subject to a minimum monthly bill of £100. (As ever, VAT is payable on Gold 400 charges.)

For the relatively small cost of subscribing to the MHS, users of office and public electronic mail will be able to gain access to a worldwide base offering greater productivity and increasing their returns on investment.

C O N T I N U E S ►

Companies avoid both the burden of having to change standards and being locked into any particular system.

British Telecom demonstrated message transfer in action back in March at an international computing exhibition in Germany.

The demonstration — at CeBIT '87 in Hanover — was part of a co-operative venture of 14 organisations designed to show an international audience the power of the X.400 Message handling Services agreed by the CCITT — The Comité Consultatif International Telegraphique et Telephonique (translation: The International Consultative Committee on Telephone and Telegraphs).

The 14 — all suppliers of message handling products and services — came together to prove that the X.400 series of protocols have moved from the laboratory to the world of commercial reality.

The group included two telecommunications administrations — British Telecom and the Deutsche Bundespost — plus twelve suppliers of electronic mail computers — Bull, Data general, Digital Equipment Company (DEC), Hewlett Packard, International Computer Limited (ICL), Nippon Telephone and Telegraph, Olivetti, Philips, Siemens, Sydney, and Xerox.

British Telecom also plans to introduce a series of X.400 products which will provide cost-effective access to Gold 400. The first of these is based on the T-Net 1000 personal computer Local Area Network (LAN).

For further information contact: Telecom Gold sales and administration on telephone 01-403 6777.

Dow Jones and BIS Infomat for Hotline users

Hotline, British Telecom's international business information service has announced that it is now able to offer the Dow Jones News/Retrieval service as part of its business database package. The new gateway, launched at the British Telecom centre in London on 8th June 1987, will enable Hotline subscribers to gain access to Dow Jones' vast news gathering resources, and business and financial information.

Dow Jones News/Retrieval provides authoritative and up-to-date news and information on business, finance, companies, industries and markets, as well as general information on sport, leisure, and travel. By using Dow Jones' Financial and Investment Information and Business and Economic News, Hotline users can make better informed decisions, identify trends, and pinpoint opportunities — all with the most current facts and news available.

Additionally, Hotline users can now access the BIS Infomat database, as part of the business database package.

Through the new database, Hotline subscribers can gain access to information covering all major industry sectors from agriculture to telecommunications.

Infomat provides wide-ranging business intelligence drawn from over six hundred

business newspapers and journals, in ten different languages. This information is presented as concise summaries which will alert Hotline subscribers to the essential commercial implications, together with quantification and statistics where appropriate.

Hotline users will be able to search Infomat by selecting relevant words and phrases, or by using Infomat's unique coding system and index words. An online database introduction, for which there are no online connect charges, provides information on how to search the database.

Infomat will be updated weekly, enabling users to keep abreast of the latest developments in their field.

For further information contact: Sales Enquiries, Hotline, Wellington House, 6-9 Upper St Martin's Lane, London, WC2H 9DL. Telephone 01-836 9625.

Microlink OnLine Directory

Subscribers to Microlink are now being offered an online directory of users. The directory means that subscribers now have 'the country's most sophisticated and comprehensive users list at their disposal'.

For the first time on a commercial database, companies and individuals can update their own entries, list their business and leisure activities and electronically search out others with similar interests.

Brand new, specially tailored software speeds the directory's search and locate procedure and reduces the time users spend on-line with their computers and modems.

The new search facility covers all areas of a directory name — names of companies and individuals, types of business and main activities, geographical location and personal details.

Users can quickly trace other Microlink subscribers in specific occupations, business sectors, and towns, or find out who shares their hobbies.

The major advantage for every user is the opportunity to keep their directory entry up to date by keying in new information themselves whenever a name or address changes.

For further information contact: Microlink, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

Tandata future

Tandata Holdings plc has revealed plans to expand into new areas of communications technology. Following several years of successful growth in its viewdata and modems operations, the company has announced the formation of two new divisions, Tandata Communications and Tandata Cable and Teletext.

"The new divisions formalise our expansion into new but complimentary areas of communications technology" explains Roy Pendleton, Tandata's managing director. "They take the place of Tandata Marketing — a name

which has done sterling service over the past half a dozen years. However, we feel the new division names better reflect our company's interests and the split will enable us to provide our customers with an even better service."

Tandata Communications will concentrate on all aspects of the company's successful viewdata and modems operations and Tandata Cable and Teletext will deal with the rapidly developing data broadcasting and cable technologies.

Tandata is also making a concerted bid to increase its penetration into the OEM market with a line powered modem module. This consists of an encapsulated single-in-line module attached to an interface card. The package provides a V23 modem, plus V21 as an option, powered by its own telephone line. It can be interfaced by either a TTL or RS232 connection to a terminal, making it suitable for a wide range of equipment and a variety of applications.

The modem normally operates at V23 (1200/75) full duplex, though the V23 protocol permits operation at 1200 both ways in half duplex mode. As an option, a V21 (300/300) full duplex facility can be added. The modem automatically senses whether a pulse or tone dial line is in use and both automatic dialling and answering can be carried out, using the module's range of commands. These commands are designed for ease of use, both during dialling and while in operation or, if preferred, the Hayes dial command can be used instead. Tandata Marketing Limited, Albert Road North, Malvern, Worcs, WR14 2TL. Telephone 0684-892421, Telex 337617, Prestel see page *799#, Telecom Gold (Dialcom) mailbox 81:TAN003.

International Communications — Iceland

Yet again I have received an electronic message from one of our overseas readers — this time from Reykjavik, Iceland.

Jon Cortez would like to know if there are any databases in Iceland that he can log on to.

If anyone can help you can either drop me a message (details at end of column) or contact Jon through his Dialcom (Telecom Gold) mailbox on 72:MAG11243.

The designer modem?!

Following on from my article on the new modems on the way from Dataphone (OnLine, A&B September 1987), Martin Paine, the managing director of Dataphone has confirmed that the basic modem will be called the Demon II modem. Interestingly, the enhanced modem will be called *The Designer Modem*. What will come next, the Designer Computer?

For further information contact: Dataphone Ltd, 22 Alfric Square, Woodstone, Peterborough, PE2 0JP. Telephone 0733-230240, Prestel Mailbox 722230240, Dialcom (Telecom Gold) mailbox 72:MAG95608.

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Gabriel Jacobs, Micro User, February 1987

I have often dreamed of a data handling program that requires less structure, so that the data can be typed in 'willy nilly' and then questions asked, leaving the computer to make sense of the data. *MicroCODIL* does just that. It is an excellent example of the type of application that our pupils should be exposed to.

Keith Chandler, Network User, March/April 1987

Another big advantage lies in the quality and quantity of the supplied [knowledge bases] which are interesting and useful in themselves as well as good illustrations of the flexible applications of the system. [compared with *micro-Prolog*] there is much to be said for *MicroCODIL* with its superior user interface, more flexible reasoning mechanisms and supplied programs - not to mention its lower price.

Jonathan Evans, A & B Computing, April 1987

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THE MODERN PEOPLE

OVERNIGHT SUCCESS

In the beginning...

InterSpan is a new concept in nationwide Electronic Mail. Kim Spence-Jones, the Managing Director of SJ Research, originally mentioned the InterSpan Electronic mail system at The Econet Conference held last October in Easthampstead Park, Bracknell (although it was originally referred to as *Streamline*). The aim was to provide a cheap and easy communication facility between Econet systems.

Since then, this dream has now become reality and InterSpan is now taking shape for its eventual launch due this September.

Throughout this article I shall look at InterSpan from the viewpoint of educational users. However business and home users needn't feel that InterSpan is not for them, for it will shortly be opened up for them to join.

At the current time of writing (mid July) the software is still in a provisional form, but should be finished by the time that this article is published.

Categorising InterSpan

InterSpan (or "Span" as it is referred to) is radically different from most other electronic mail systems in that its primary function is not to operate as an on-line system, and its main use is not to provide instant communications (although this will be one of the additional options available in the near future).

Before I get started, it is necessary to see how InterSpan stands in relation to electronic mail and electronic databases.

Wide area networking can be divided into two categories: Interactive and Store-And-Forward. The important distinction is whether both ends of a communication need to be on-line at the same time.

Telephone systems are "interactive" — both ends have to be on-line otherwise the conversation cannot take place. The mail service (or Snail Mail) is "Store-and-Forward" — the letter is sent to the post office who then deliver the letter to the recipient, who may, or may not be, in at the time. The letter is simply posted through their letter box.

For electronic messaging systems, the distinction is usually considered to be whether the message is stored en-route by any third party.

Telex is "interactive" because, although no

Join Dave Somers in a detailed look at the latest in Electronic Mail: InterSpan — a new nationwide overnight electronic messaging system

human intervention is required to receive the message, the recipients terminal must be switched on and available at the time the message is transmitted by the originator's terminal.

Electronic communication systems can then be further divided by the facilities that they offer, either information services or messaging facilities. Messaging systems can then be divided into those that store and collect message and those that store and forward messages. These classifications are shown in Figure 1.

InterSpan falls into the category of a store-and-forward messaging system.

Equipment required

To use InterSpan it is necessary to have a BBC Microcomputer with local storage, either DFS, ADFS, or Econet. The modems supported are the DTI modems, ie the Tandata Tm512E and the Dacom DSL2123, and the CommuniTel modems. An MS-DOS version is currently under development, and is expected to be available early next year.

How it works

The best way to describe how InterSpan works is probably to explain the daily procedure:

Using the SEND program

Because you do not interact with the InterSpan Distribution Node, all messages for sending are prepared off-line, using the SEND program.

When the SEND program is executed for the first time, you are prompted to enter the date and time, in ISO-standard format. (Time is available on Econet, even if you are not logged on.) If you have a Master, or are connected to Econet, then this time is automatically grabbed from your local Real Time Clock (RTC) or the fileserver as appropriate.

The display consists of three screens: the main screen, options screen, and the recipient screen.

In order to send a message to someone, their details have to be entered on the "recipient" screen.

The recipients address consists of several fields that are used to identify him/her: "Short Name" is a name by which they are commonly known.

Then come their personal details, their name, title (job description), and their user ID (for networked systems).

Finally, there are details of their address. The Organisation is the name of the company/establishment where their Client Node is based. A lot more friendly than those unfriendly mailbox numbers as found on other systems eh? Finally there is the Domain where their Organisation can be found. This is not normally used, and is for those who are on another X.400 messaging system (see below), eg Telecom Gold or Telex.

The delivery report level can be set so that you can be informed about what happens to your message. This is like the Acknowledgment facility as found on Telecom Gold/TTNS.

A further option to be introduced is "date activation" of messages. This is like the facility available on Telecom Gold/TTNS where you can specify a day (and time) when a message is to be sent.

After entering the personal details, they can be saved to disc for later retrieval. There are plans to introduce an "address book" system where you can scan through the addresses saved and automatically load them up. On network systems you will be able to access a shared "public" address book, as well as your own private one.

INTERSPAN ELECTRONIC MAIL

```

f0 Title f1 Screens f2 Send f3 Options
InterSpan
Send: Main Screen 87/07/16.23:19

f4 Recipients:
  "Short" Name Address Book Location
    KIM          Unsavd       Span
  *****

f5 Header: Preview of InterSpan
  Contents Type: Note

f7 Filename/Notepad:
  Just a quick note to let you know t →

f8 Private Ref:
  
```

The SEND program: Main Screen

Once the recipient's details have been completed, the main screen is entered.

The top of the screen shows the "Short Names" of the recipient to whom the message is to be delivered. Only five can be shown at a time, but this can be scrolled through to reveal the others. Due to the limitations of memory, only seven recipients can be catered for on a Model B. However, if using the software on a second- (or co-) processor, up to 13 recipients can be catered for. It is planned to allow up to 32,000 recipients in future versions, if you have a large enough disk to store them all!

The Header for the message can then be entered, followed by the contents type (or typed body indication) for the message. For

example, if sending a BASIC program, this would be toggled until it said BASIC. This is so that the recipient(s) can correctly decode and interpret the message. Finally, the filename of the message (or program) can be entered.

InterSpan doesn't care what the file to be transferred contains, so you can transfer any kind of file, unlike other electronic mail services.

It can be annoying to use a wordprocessor to prepare a short message, so you can specify the file type to be "Note". Thus, instead of entering a filename in the Filename/Notepad area, you can enter a short message, with basic text editing facilities available to use on a single line.

There is also an "Options" screen where

you can change the various options flags for message delivery.

The "Priority" option selects the priority of the message. There are three priorities, normal, express, and parcel. Selecting the express option will mean that the message will be transferred as quickly as possible to the recipient, and will probably cost more than the usual "normal" service. "Parcel" post is for non-urgent messages. These are only transferred when the load on the system is low, and will be cheaper than "normal" post.

The "Disclose Recipients" option allows you to select whether, in the case of multi-recipient messages, the recipients see who else has been sent the message or not. This is similar to the CC (Carbon Copy) and BCC (Blind Carbon Copy) options as found on Telecom Gold/TTNS.

The "Conversion Prohibition" option allows you to stop your message being transferred into other formats. This will only apply when sending messages to other domains.

The "Alternate Recipient" allows a message to be transferred to another recipient should the designated recipient be unable to receive the message. This facility is part of the X.400 specification and is not usually found on other systems.

The "Return Copy If Delivery Fails" option is self-explanatory.

In normal use, most of the information can be entered on the main screen. The other screens allow you to select the more unusual options. Once all of the details have been entered, and the various option flags have been correctly set, the message can then be "posted". The software prompts for you to enter your name. This is so that for multi-user centres, you can be easily identified as the sender of the message.

Once entered, the "Envelope" is then created and saved to disc, followed by the contents of your message. These are saved to the "OutTray" file, and are said to have been posted.

Putting the boot in

As mentioned earlier, InterSpan is radically different from other electronic mail systems, and come to that from electronic database systems.

Instead of having to telephone the computer at InterSpan to send and deliver your mail, the InterSpan computer telephones you — a case of *Don't Call Us, We'll Call You*.

Between the hours of midnight and six in the morning the InterSpan computer telephones you to begin the transfer. Any mail for sending is transmitted to the InterSpan DN (Distribution Node) and any mail for you is delivered and stored on your local disc (or network).

To prepare the computer for the overnight transfer, the InterSpan disc is booted up.

A modem driver for the DTI/CommuniTel is automatically loaded up, and the modem

```

f0 Title f1 Screens f2 Send f3 Options
InterSpan
Send: Options 87/07/07.00:00

1 Main
2 Options
3 Recipient

f4 Priority: Normal

f5 Options:
  Disclose List of recipients to the other recipients No
  Prohibit the conversion of the contents to other formats No
  Alternate Recipient(s) Allowed if delivery fails No
  Return a Copy of the Contents to you if delivery fails No

f8 Private Ref:
  
```

The SEND program: Options screen. Note the 'pop-down' menu at the top

C O N T I N U E S ►

INTERSPAN ELECTRONIC MAIL

initialised to the correct mode of operation for the transfer.

The software then transfers the outgoing mail from the "OutTray" file into "WKfile" — the work file. The programs are now said to be "in transit".

When the InterSpan "Distribution Node" (DN) calls your Organisation's Computer (the "Client Node" — CN), the outgoing envelopes, and their associated contents are transmitted to the DN, and any incoming envelopes and their contents are received and stored in your Work File. Any envelopes and messages that have been previously transmitted and correctly received at their destination Organisation, are deleted from the Work File to allow room for any incoming messages.

When the transfers have been completed, and the modem drops the line, the Work File is then sorted out. Any received envelopes and messages are then transferred into the InTray (logical eh?), and deleted from the Work File. The Work File is then tidied up, to allow for the next transfer.

Transmission and error checking

During the whole of the above overnight transfer, the packets of data are checked for errors (that are inherent when using the Telecommunications network).

The system is similar in operation to that used in Local Area Networks (LANs), with each packet of transmitted data having its CRC (Cyclic Redundancy Check) calculated and sent along with the packet. Should any errors have occurred, the CRC checksum for the packet won't agree with the original checksum sent with the packet, and the packet will be requested again.

System security

One of the inherent problems of sending information electronically, is that people will try and "hack" their way into the system. InterSpan can be considered secure in two ways:

I - because the InterSpan Distribution Node telephones the Client Nodes, to try to intercept messages will involve having to tap InterSpan's telephone lines. Even then, the data transmission (which can be encoded) will then have to be decoded.

2 - It is possible that someone might try and pretend to be the InterSpan Distribution Node and attempt to extract your mail. To circumvent this problem, whenever InterSpan calls, it sends a password to the client, and if this does not match the one expected, alarm bells sound. Just to be even more cunning, the passwords exchanged are *one-time passwords!* and are one-way encrypted, so that even if you know what the client is expecting, you cannot work out what to send. This means that each client node has a list of passwords to use, and after using each one, it is never used again. Obviously a fresh batch of passwords are transmitted when the old list is near to exhaustion.

Examining your InTray

Each morning, the InTray will contain any new envelopes and messages that have been received overnight. To examine the InTray, a SCAN/RX program is used.

The program scans through the InTray, displaying a list of the envelopes as it goes. Individual messages can then be read, saved to disc, or deleted. Using the software reminded me of using the Telecom Gold messaging system, the commands were almost identical.

The cost of it all

As I have mentioned above, the cost of InterSpan is extremely cheap. The exact pricing structure is shown below.

Educational establishments can join Interspan under a special educational package deal for £90.00, which covers registration, one year's subscription, and £40.00's worth of mail. Subscriptions for other users have not been finalised yet.

A unit of mail is defined as 512 bytes, items are rounded up to the nearest unit, and costs are as follows:

- Basic collection charge per message is currently 0.0 pence.
- Collection charge per unit is 0.5 pence.
- Delivery charge per unit is 0.5 pence per recipient site.
- Report charge per unit is 0.5 pence per recipient site.

Roughly speaking, this equates to the first Kilobyte of a message costing 3 pence to send, 2 pence for each Kilobyte thereafter.

For the more technical, the data is made up of two separate packets of data, which are charged separately.

One packet of data is the InterSpan envelope which contains a list of recipients, who you are (ie the originator's name), and various other bits and bytes (no pun intended) of delivery information. This packet is typically 250 bytes in length, and each additional recipient adds about 64 bytes to the packet.

The second packet contains the message data, and its length will obviously depend upon the length of the message.

Future facilities

As I write, a version is being written to operate under MSDOS, allowing the system to be utilised by RM Nimbus users. Following on from this, a version suitable for use with other modems will also be available, allowing InterSpan to be opened up to a larger base of potential subscribers.

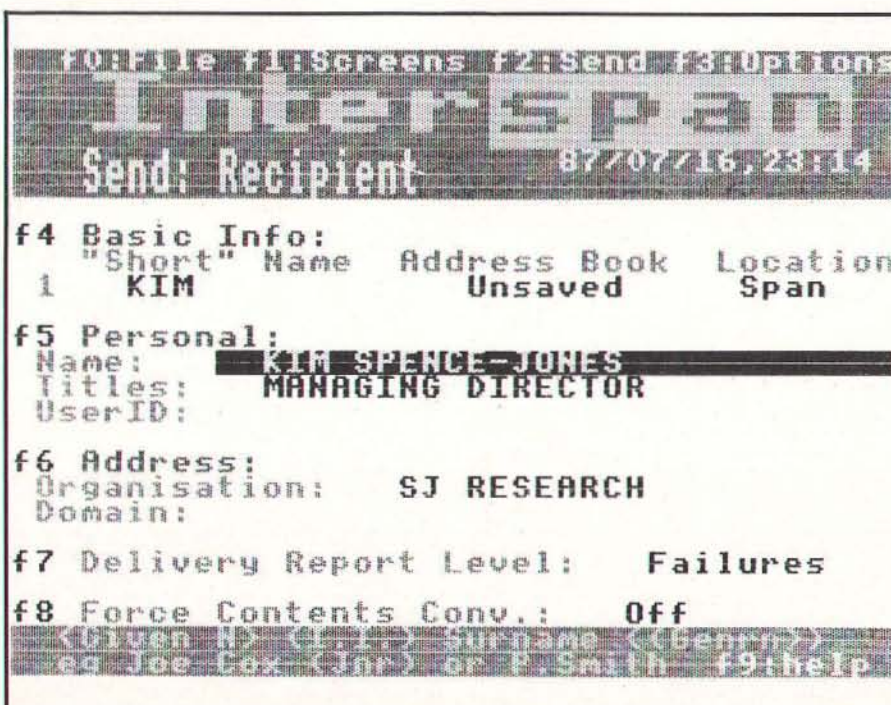
Next year there are plans to integrate the InterSpan service with local mail packages. This will result in a complete electronic mail service without distinction between internal and external mail. This will also allow for mail received through InterSpan to be automatically placed in a user's personal mail InTray, as opposed to being placed in a system InTray.

Value Added and Data Services (VADS)

An important part of any service is the Value Added and Data Services (VADS) that are available on it, and InterSpan will be no different.

There are currently plans for a regular news information service to be set up, available to all users.

Because the cost of transferring data through InterSpan is extremely cheap, the possibility of setting up a software database for users is being considered for the near future.



The SEND program: Recipient Screen

INTERSPAN ELECTRONIC MAIL

- | | | |
|---|--|---------------------------|
| 1 | Subj. New Interspan Directory From Andrew Gordon of SJ RESEARCH | 87/06/24,23:48 |
| 2 | Subj. This is an improved version of RX which transports Load/Execute add ... From Andrew Gordon of SJ RESEARCH | 87/06/27,00:55 |
| 3 | To Dave Somers Subj. Here is a better version of the new Rx prog. Compacting a file not ... From Kim of KIM HOME | 87/06/28,23:04 |
| 4 | To Dave Somers Subj. Reply to notes From Kim Spence-Jones of KIM HOME | 87/07/09,23:46 |
| 5 | To Dave Somers Subj. Returned Review, with thanks. From Kim Spence-Jones of SJ RESEARCH | 87/07/15,23:27 |
| 6 | To Dave Somers Subj. Please try this new version of MODEM2 From Andrew Gordon of SJ RESEARCH | 87/07/15,23:52 *NEW* |
| 7 | To Dave Somers Subj. This is a version of NEWRX From Arg of SJ RESEARCH | 87/07/16,00:09 *NEW* |

Scan, Read, SAve, Print, Delete, Q, H or *?

Scanning through your In Tray to see your messages

X.400 messaging

Another real advantage of using InterSpan (apart from its ease of use and cheapness) will come when it connects to the British Telecom X.400 Message Handling Service (MHS). This will allow InterSpan subscribers to transfer messages with users of other electronic mail systems.

With InterSpan's low cost, it could prove to be the cheapest way of connecting to the X.400 network.

And Finally

In this short preview of InterSpan, I have been able to only give a few details of how the service will be, for it is still very much in its infancy. However, those with the foresight should be able to see the tremendous potential that InterSpan could offer to potential subscribers. When InterSpan matures it should be an impressive system.

Using InterSpan is certainly an interesting experience. You soon get into the habit of plugging the modem in at night, otherwise 'phone calls at 3am soon force you into the habit! The other problem is that, should you forget to plug your 'phone back in when morning comes (especially should one oversleep), then anyone who 'phones will get an earful of carrier tones — sorry Sarah!

The cost of transferring data is extremely

cheap, especially as you don't have to pay for the telephone charges. With the recent increase in the price of Telecom Gold (see this month's *OnLine* column), InterSpan is certainly looking more attractive, and would suit users who have small budgets. Indeed, it is possible to have a self-imposed credit limit placed, so that you can't over-spend. However, even if you run out of money to pay to send messages, you can still receive messages because you pay nothing to receive them.

I'll be keeping a special eye on InterSpan and will let you know of future developments in my regular *OnLine* column.

Finally, I would like to thank Kim Spence-Jones at SJ Research for all his help during the preparation of this article.

For those of you who are lucky enough to join InterSpan, why don't you drop me a note? My organisation name is DAVE SOMERS.

As one of InterSpan's salesmen was overheard to say — "If in doubt, 'Span it!'"

Factfile

Further information can be obtained from: Peter Rycraft, Interspan Electronic Mail Limited, 108 Mill Road, Cambridge, CB1 2BD. Telephone 0223-316686/69927

Bibliography

Further information about the X.400

messaging system, and electronic systems in general can be gleaned from the following publications:

- Introduction to the CCITT X.400 Recommendations for electronic messaging. Published by IT Standards Units, Department of Trade and Industry. The booklet provides an overview of the types of services and facilities provided by apparatus conforming to the CCITT X.400 recommendations.

- TG 105 parts 1, 2, and 3: Recommendations for Message Handling systems. Published by IT Standards Unit, Department of Trade and Industry.

These three publications provide details of a more technical nature on the X.400 messaging system and its associated protocols.

- X.400 Multi-User Study. Published by IT Standards Unit, Department of Trade and Industry.

This publication provides a useful background summary of the commercial implementations (and the problems associated with them) for message handling. ● "Red Book", Volume VIII Fascicle VIII.7, Data Communications Networks Message Handling Systems Recommendations X.400 — X.430.

Published by the CCITT (can be obtained through the British Standards Institution). This can be considered the "Bible" for Messaging Service implementors. Not exactly bed-time reading — very heavy going.

ROM BOARD ROUNDUP

The sideways ROM system built into the heart of every Acorn computer's operating system is probably one of the most useful features of the BBC Micro, the B+ and the Master; you'll also find the same operating system at the heart of the Acorn Cambridge Workstation and the new 16 bit Communicator. Since the early days sideways ROMs have become bigger and bigger and we are seeing ROM based dictionaries (such as those found in Spellmaster) and if you can think of a software application worthwhile on the Beeb, then you've probably thought of another good reason to create a sideways ROM.

Truth of the matter is, that the sideways ROM is a clever device, it was an inspired thought on behalf of the original designers of the beeb and its operating system.

We now see 32K ROMs, the 128K chip will soon be with us in quantity, and I am looking forward to seeing the first 512K PROMS as well as the 1 Megabyte PROM. Think of it, four of these new generation of ROMs and you could have the software to support a full virtual memory system like VMS or CICS.

The problem is in addressing all that memory at one go. This is where the sideways ROM board comes in. You see the BBC operating system can only "page" 256K of ROMs in one go, so the ROM limit is not endless, although some companies have found solutions to that as well!

In a standard Acorn computer there is, however, only space for a few extra sockets. In the Master 128 there are three free sockets, in the Master compact, there is just one, and in the B+ there are four extra sockets. If you want to expand your machine, then you will have to go and install an expansion board.

Thinking about it, it is amazing that Acorn never manufactured their own ROM board, the chances are that many people would want to buy an Acorn product in favour of a third party board. But strange as it may seem, in the entire history of Acorn computers, the only internal boards that Acorn have ever produced is the BBC BASIC board for the ATOM, the 1770 disc interface and the 128K upgrade for the B+.

Over the past four years or so I have reviewed nearly every ROM board made for the BBC Micro and the B+, I have certainly

Clive Grace takes us through the history of the ROM board

seen every type of expansion board ever made. I have seen some very nice ROM boards come and go, but in the long run, only the boards offering the best facilities at the lowest price have ever got anywhere.

Four years later, I think it is high time to take a step back and look at the state of the ROM boards available for the beeb, what is available for the B+ and the new developments for the Master, to see what boards preclude the operation of other boards, and to see how sideways RAM dedicated boards — the dark horses of them all — match up to the new mega boards offering 400K of on line storage.

ATPL Sidewise

One of the very first boards for the BBC Model B was the "Sidewise" board from ATPL. Endorsed by Computer Concepts, the board has a wide user base and is very reliable, especially if you travel a lot with your Beeb. The Sidewise board does however pose some problems when it comes to fitting a shadow RAM board as the Sidewise board sits bang smack over the 6502 socket (which needs at least one centimetre free at each corner) which is commonly used for shadow RAM boards. If you get a Watford 32K shadow RAM board, you can fit this and the Sidewise system at the same time as the board is linked to the BBC Micro by means of a ribbon connector and does not clash with existing memory.

Watford Mk 1 Board through to the Solderless

Watford Electronics are the kings of the sideways ROM system. They have developed

the system in such a way as to render other boards obsolete. On average, they produce a new board every four months! And every time they specify what machine it is to be used for.

The first Watford board was the "Mk-01 Rom Board" which had a few buffering problems. Hot on the heels came the old classic, the Mk-02 which was not only fully buffered, but offered one bank of sideways RAM as well as a battery backup facility. This opened up a new area in sideways memory technology — the sideways RAM.

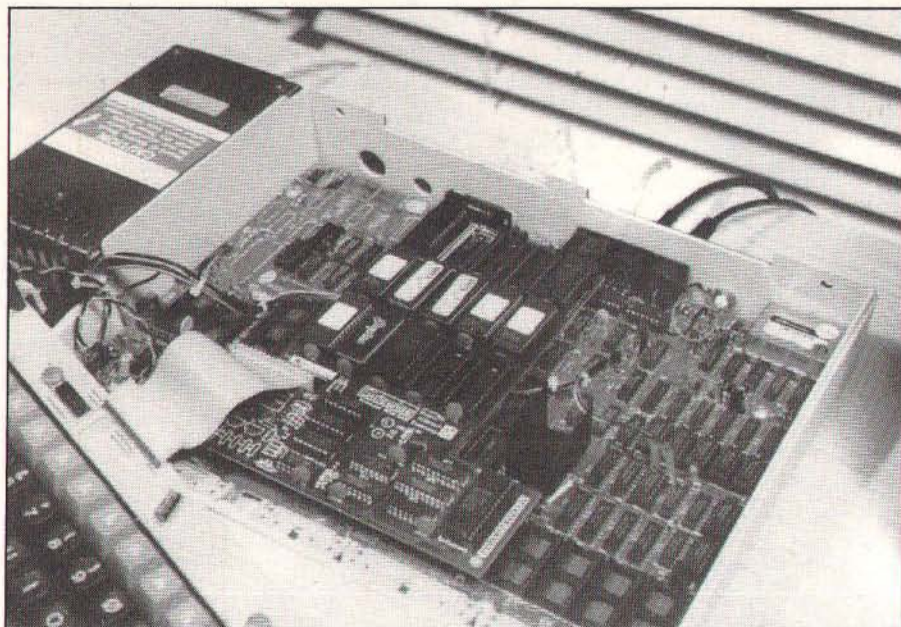
Battery backing up was a wise move, although this could cause problems if you had a ROM that hung up the machine, it also meant that you could write software as well as copy ROMs for your own use, safe in the knowledge that it would be there — ready for use when you next powered on.

When shadow RAM boards became really popular, users were looking for a board that accepted all extension boards, and required no soldering. This heralded the new "Mk-03", commonly known as the solderless board.

Using special chunky clips, the BBC Micro could now store the same amount of memory, and you could get away with fitting all sorts of firmware inside your machine. It also allowed the complete beginner to fit such a device, and needless to say, it was an overnight success.

Sideways RAMs

At this point, the sideways RAM board came on the scene. One of the first companies to develop this system was the then fledgeling company, Solidisk Technology. They developed systems that allowed people to copy the ROMs onto disc and then to load in whatever "image" they needed as and when it was necessary. This proved so popular that the original 16K SWR board, as it was called, was soon outdated and was replaced by the 32K SWR. For a time, Solidisk were undecided whether to release a 64K model or go the whole hog and make a complete 128K board. In the end Solidisk released a 64K board for a week or so, and then quickly phased it out when the 128K board became so popular that rumours were going about that somebody cannibalised Solidisk's Managing Director's own Beeb in order to supply a customer's 128K board.



Old faithful — ATPL internal board

Solidisk Technology were clever. They realised from the very early days that their board would only be a success if they continued to support the board with software. Solidisk went one step further — they supplied a ten volume collection of software including Word Processors, Spelling Checkers, Databases, good cheap and cheerful software, that no one could really complain about because it was free! About this time another board came out. This was the Watford Electronics 64K ROM RAM card. This offered a potential 128K of sideways RAM either upgradable from 32K in two jumps. The 64K model proved popular, but the 128K looked set to be mean competition. It was supplied with printer buffer software, a RAM disk, and optional battery backup. Prices have recently dropped and the two boards are still going strong.

The RAM disc was going to play a big part in the 128K ROM RAM card. It attempted to emulate a proper floppy disc drive. You could configure it to be any drive you wanted, but the best thing about it was that you could have a very fast means of temporarily storing data or programs in a battery backed up environment.

Now sideways RAM programs were becoming popular. Companies such as Clares were retailing ROM versions of their software on disc, at a slight discount and a huge saving in production costs. It also made sense as there was a shortage of 16K EPROMS for about three months which very nearly crippled some companies, famous for producing high quality ROMS.

The latest developments have started combining ROM and RAM technologies in order to make more use of the surface of the printed circuit board. For instance, Solidisk decided to combine a shadow RAM system, a 4 Mhz processor, and a four socket ROM board, in reality eight sockets, but divided amongst four 32K sockets all on the same board.

The Fourmeg board was the direct successor to the combined efforts of Solidisk's sideways RAM boards, and their unreleased "third processor", throw in shadow RAM and a little software to control the lot and you have one of the most compact boards ever plugged into a BBC Micro.

The B+

Shortly before the Fourmeg board, came the triumphant rise from the ashes of Acorn, a new streamlined company ready to battle with the likes of Clive Sinclair and the maverick genius of Amstrad's Alan Sugar. Acorn released two new machines in the B+ range.

The B+ was an attempt at getting all of the popular boards available for the BBC Micro, and cramming them onto a single PCB.

There was a 32K sideways ROM system, and shadow RAM, but still no *real* improvements in the sideways RAM area, until the second machine was released, the B+ 128. Instead of having a larger ROM board built into the Beeb Plus as many of us had expected, Acorn opted for a four bank system of sideways RAM chips. Collectively occupying sockets 0 1 and 12 and 13, it provided the blueprint for the Master sideways RAM system.

For the BBC Plus, there are surprisingly few boards, in fact, there are only two currently available, these are the "Sidewise Plus" board and the "Watford Electronics external box".

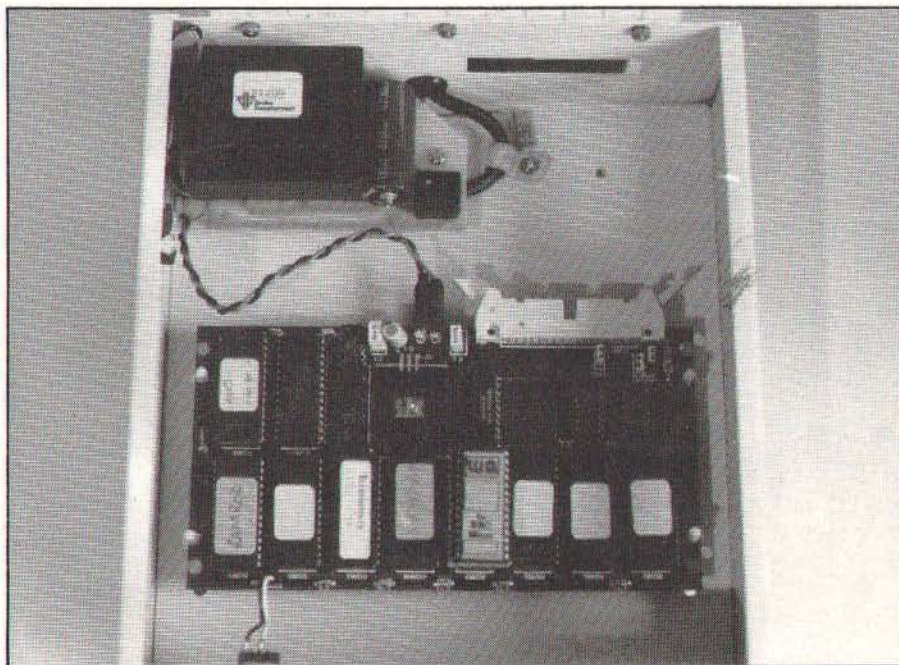
"Sidewise Plus" is essentially the successor to the old but eminently serviceable BBC B version; supporting a total of ten sockets it allowed four sockets more as a sideways RAM expansion (only by using the 128K upgrade from Acorn though), and at the time, it really made the most of the B+. Securely fitting into the sockets, it simply split the five 32K sockets into ten 16K ones. Because the 16K sideways ROM system seems more popular than the 32K chip sets, you can have twice as many ROMs in your machine at any one time, but you would have to split 32K ROMs if you ever wanted to use them.

Sidewise Plus was the first board available for the B+, and its very sturdy fittings and high quality connectors make it a wise choice if you want your expansions options to be internal. The other advantage is that it sits directly over a part of the board that isn't used unless you have an ECONET interface so none of the overheating problems prevalent with the earlier ROM/RAM boards and the early pre issue four BBC boards come to light.

Watford Electronics, always ones to take an idea a few steps further, and certainly not a company to stay out of the limelight for long,

C O N T I N U E S ►

B+ only — Watford's external box



ROM BOARD ROUNDUP

took the idea behind the B+'s 256K sideways ROM/RAM system and pushed the memory map way up to the 400K mark.

This was made possible by including a switch that enabled the user to select between two banks of ten sockets. Only ten could be active at any one time, and it meant that you couldn't use ROMs in one board at the same time as others, but it did mean that you could have over 400K of ROM in your BBC B+ memory map and you were at last able to fit ROMs that were mutually incompatible in the same memory map.

The Watford board consists of a ten socket board housed inside a metal cabinet with a hinged lid. This is supplied with an internal power supply, because the poor old BBC power supply would have a breakdown (quite literally) if it tried to power an extra bank of fully populated ROM sockets. The external option was so that the board could fit into a case for easy access, and you could chop and change whenever you liked, but your beeb does become a permanent fixture if you have this box.

The latest developments in sideways ROMs meant that the old BBC B (of which there is still a majority of users) could still use the latest 32K ROMs. The PALPROM as it is being dubbed is a 32K device that has an upper and lower "half". "Interword" is probably the first PALPROM ever to become commercially available. As there is a physical limit to what you can do in 16K of memory, the 32K

PALPROM solves this by switching in and out of top and bottom "halves" as and when each half is needed. This is made possible by clever use of a PAL device. This device has the advantage of making it next to impossible to copy the PROM, making it difficult for the every day user and computer enthusiast to pirate the ROMs.

Of course the big time pirates will be able to build boards for their own use, but already companies like Computer Concepts are reaping the benefits of this new technology, in that returns are very high, because more potential buyers are *having* to buy the software – after all, it is all too easy to ask for a copy of a ROM.

The Master

With the Master 128, things took a different turn. With the Master's built-in Mega ROM and the built-in four banks of sideways RAM, things seemed a little cramped in comparison to the open ended architecture of the BBC B and the B+. However, Pear Tree soon came on the market with a cartridge that accepted either four sockets of sideways ROM or sideways RAM. I confidently look forward to seeing internal ROM board options with battery backup for the Master. Also look out for "bundled" boards such as Computer Concept's idea of supplying all of the Inter Series on an Inter Office board, or even a second Mega ROM.

The early efforts have been doing well. Mini

Office II has all of the famous "Mini" software titles in four ROMs, and to top it all, it all occupies one sideways ROM socket care of a DIL connector – a nice move.

The Future

If anybody thinks that sideways ROM boards have gone as far as they can, then think again. 1987 was a year when software houses went "family" crazy. There is the entire VIEW range of ROMs (VIEW, Viewsheets, Viewstore, Viewspell, the View Printer Driver ROM) and more in the pipeline. There is of course the Inter Series (Word, Calc, Sheet, Spell) and of course AMX popped up and gave us all a surprise with Art and Super Art, the dual ROM – Pagemaker, Max and latest of all, AMX Design. So don't be surprised if the software switched 512K ROM/RAM board hops in on the scene just in time for 1988's yuletide festivities. Let's face it, we're all going to need it if we want to cram all these new ROMs in a single computer!

When buying a ROM board, always think about the future and try to ask yourself some questions like: *how many ROMs will I buy? Am I likely to move on to a BBC B+/Master etc? How many times will I need to access the board? Does it accept 32K ROMs? Will it take up too much space? But after all, do you really need a 100% faster beeb, or is it important to have a faster computer to impress your friends?*

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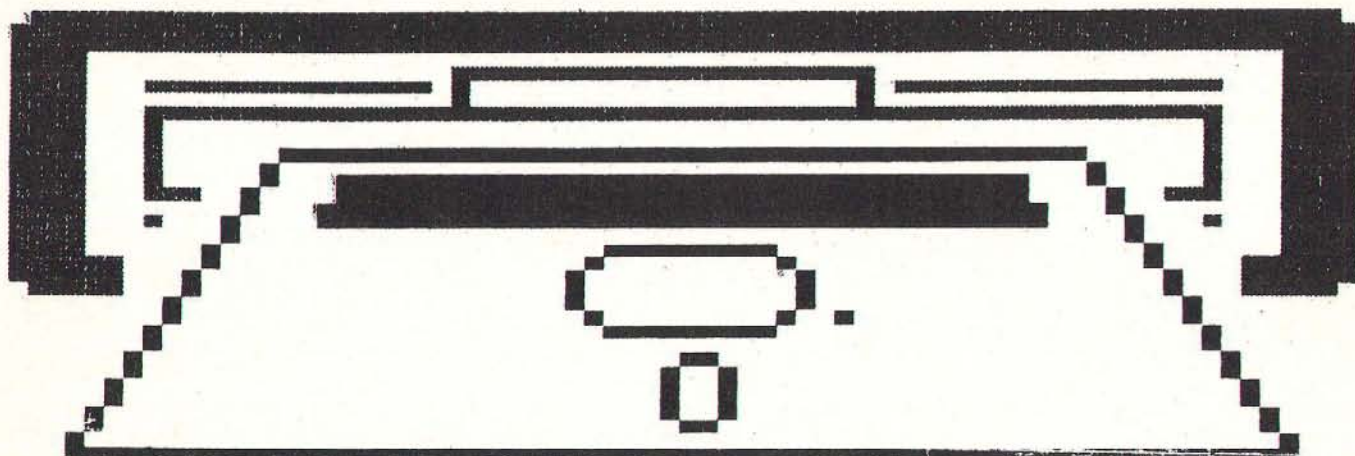
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Issue

EYE OF THE BEHOLDER

BBC Computers have sold heavily into universities and polytechnics over the past few years for use in a variety of ways: for wordprocessing and other 'business' type uses, as intelligent terminals to more powerful machines and as controllers of laboratory experiments. They have proved an especially popular choice in Psychology departments on account of the well structured and fast BBC BASIC, the good graphics, the excellent interfacing and, believe it or not, low price. Yes, the Beeb looks expensive in the home micro league, but its low cost competitors are generally useless as laboratory machines due to their very limited interfacing. If the Beeb is losing out in current purchasing policies it is to more powerful (and more expensive) machines such as the Atari ST and Apple Mac.

Some readers may be surprised to learn that many psychological experiments published in the academic journals are now run entirely by microcomputers such as the BBC. To take one example, consider a task called sentence verification. Numerous experiments have been reported in which people (or subjects as psychologists call them!) are shown a sentence together with a picture which it describes and are asked to decide as quickly as possible whether the sentence is true or false with respect to the picture. For example the sentence might be 'The circle is not above the square' and the accompanying picture of a square above a circle or vice versa. By varying the nature of the sentence and the picture and measuring the differing lengths of time that subjects take to react, psychologists are able to infer much about the way in which people comprehend the meaning of sentences.

Experiments

The way such experiments were originally run was as follows. A human experimenter would present the subject with verbal or written instructions and then present the sentences and pictures (drawn on index cards) for a limited period of time on a machine called a tachistoscope. A hard wired circuit prepared by a technician would allow the experimenter to press a key which both presented the picture and started an electronic timer. The subject would press one of two response keys (for 'true' and 'false') each of which would terminate the visual presentation and stop the timer but switch on a different coloured light to show the experimenter which had been pressed. The experimenter would record the response made, write down the time, reset the timer and change the card in the tachistoscope before presenting the next trial.

How much do you know about the way in which you see the world around you? Try these simple perceptual demonstrations and be prepared to be surprised

Nowadays, of course, the computer can do everything from presenting instructions on screen, to presenting the sentences and pictures, recording the response and times and saving all the data into a disc file at the end for later analysis. It can also be programmed to do things like randomising the order of conditions separately for each subject, which strengthens the degree of control in the design. From the researchers' point of view this automation of the experimentation brings many advantages. Once the program is written as many subjects as required can be run with it, often in parallel in a laboratory full of micros. Human error in the recording of data and possible biasing of the subjects' performance by the presence of the experimenter are eliminated. The subjects are also spared the waiting time while experimenters change cards and so on.

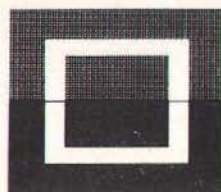
This article is the first in an occasional series in which I plan to publish some BASIC listings which run psychological experiments likely to be of interest to the general public. The program listed here was adapted from one written for use by first year undergraduate psychology students in their laboratory classes and is actually a set of demonstrations rather than experiments. It runs on all BBC series and Electron computers without modification. The program utilises graphics, colour and interactive programming to demonstrate a number of

phenomena concerning human visual perception. When the program is run, the user or subject is presented with a menu from which demonstrations may be selected in any order.

Colour perception

Three of the demonstrations (2,3 and 4) off the menu concern the perception of colour and naturally require a colour monitor or TV on which to run. The 'negative after image' (option 2) is the simplest from a psychological point of view, in that it reflects only the operation of the cells in the retina of the eye. The program presents a green square inside a red square against a black background for a period of one minute. To get the required effect you must fixate the centre of the display as steadily as possible. After a minute the display is replaced by a blank white screen. What you should see now is a so-called negative after image, that is a green square inside a red one. This occurs because the eye has red and green receptors which are 'wired' in opposing fashion. The red light both stimulates and fatigues the red cells whilst inhibiting the function of the green cells (and vice versa). On switching to a white screen, activity in the previously inhibited cells is temporarily increased while that in the fatigued cells is temporarily decreased. Hence, the opposite colour is seen in the after image.

Option 3 demonstrates an effect called colour contrast. Our perception of brightness and hue depend upon the background against which the colour is seen. When this option is taken a square white 'ring' is drawn across a square divided into blue and yellow sections. Nevertheless, the ring may appear fairly homogenous in colour. However, if the user presses the A key a line is drawn on the screen dividing the ring at the place where the background colour changes. Now, two effects may be observed. Firstly, the portion of the ring covering the darker, blue background should look brighter than that covering the yellow — an effect known as brightness contrast. This can be seen also in the black and white screen dump (Figure One). You may or may not experience a colour contrast, in which the ring takes on some apparent colour opposite to its background (blue for yellow or vice versa). The reason this may not work is that the ring should really be grey, but the BBC palette lacks this colour. Unfortunately, grey cannot be effectively simulated by a black and white dot pattern as the Mode 5 resolution is too crude. Note that the interactive options on this demonstration include permitting the



A — ADD LINE
R — REMOVE LINE
C — CHANGE COLOURS
<SPACE> TO CONTINUE

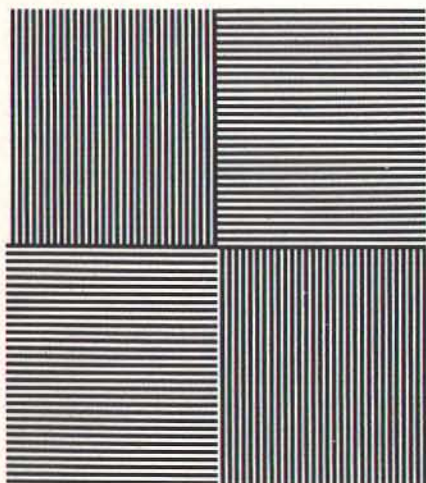
Figure 1

subject to alter the colour of either half of the square.

The final colour demonstration (option 4), called the McCollough effect was discovered relatively recently (in 1965) and is most interesting. This demonstration requires some patience on the part of the subject. After choosing this option there is a short pause, after which alternating screens of vertical red and horizontal green lines are shown for around five minutes during which time you must stare constantly at the screen. Then a black and white screen with a mixture of horizontal and vertical lines is shown. The McCollough after effect is then demonstrated by the impression of green colour in the vertical and red colour in the horizontal lines.

You may find the effect more evident when looking at a printed pattern (see Figure 2) than on the screen. Superficially, the effect may seem similar to that of the negative after image described earlier since the after effect is opposite in colour to that associated with the orientation of the lines in the inducing field. However, this effect is most certainly not due to activity in the retina. The reason we know this quite simply — and astonishingly — is that,

Figure 2



once induced, the after effect can be observed with the right sort of stimulus for weeks or even months afterwards. If you don't believe me then try it for yourself.

Most people report the McCollough after effect but a few do not. If you do not get the effect at first, try repeating the exposure to the red/green patterns. By the way, in spite of

the very long persistence of the effect, be assured that it will do you no harm and not effect your normal vision in any way.

Temporal and spatial effects

Option 1 on the menu demonstrates an effect first documented before the war and known as the phi phenomenon. The effect is that if two lights are flashed alternately at the right speed, then an illusion is created of one light moving back and forth. The phenomenon is nowadays exploited in some motorway signs. The demonstration provided by the program allows the subject to change the speed of alternation. If it is too fast then the two 'lights' (actually white squares) appear to be on all the time; if too slow then they visibly alternate. As with all psychological phenomena there are individual differences between people — in this case in the critical time required to produce an optimal phi effect.

Option 5 demonstrates some phenomena in the perception of size and distance and is pretty well self-explanatory since it uses a split graphics/text screen to guide the subject through a series of demonstrations. The end

Figure 3



point of the demonstration involves the use of a 'texture gradient', a concept introduced by a psychologist called Gibson. He pointed out that one does not need perspective cues to create an impression of depth. There are many types of texture gradients that do this also. For example, on a misty day, more distant objects will be shrouded in more haze. On a pebble beach, the apparent size of the pebbles will decrease with their distance from the observer, and so on. The gradient used in the program is shown in Figure 3 — it consists of decreasing distances between horizontal lines giving an impression of a flat landscape receding to an horizon. The three bars are of identical size, but the one at the top should appear larger. The illusion is created because if it were actually further away and projecting the same size angle onto the retina, then it would have to be an image of a larger object. The brain knows this and automatically compensates.

The final demonstration (Option 6) involves the well known Muller-Lyer illusion (Figure 4). The phenomenon is demonstrated dramatically by use of the interactive facilities of the micro, however. The subject is asked by repeated key presses to alter the bottom line until it appears equal in length to the top. Then the lines are redrawn without the fins. Most people then find that the lines are in fact most unequal, since the one which had the inward pointing fins is in fact clearly longer.

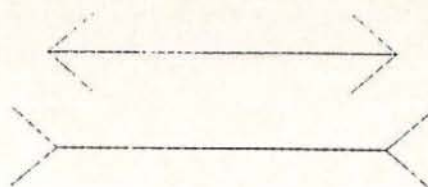


Figure 4

Programming techniques

One aspect of the graphical programming used is worthy of comment. The routine for the McCollough effect requires, if possible, to achieve instant switching between the two fields of vertical red and horizontal green lines. Redrawing the screen each time is much too slow even if a machine code routine is used. On the BBC Master series computers, of course, one could utilise the two screen maps available (in shadow and main RAM) to first draw each display and then switch as required by use of the appropriate *FX commands (see my recent article in A&B on Master graphics).

There is, however, an elegant Model B/Electron compatible solution that provides not fast but effectively instantaneous switching between fields. This requires a combination of the use of VDUI9 (logical colour changes) and GCOL3 (EOR plotting) in a four colour Mode (5) with only two actual colours visible at a time. PROCmcol (line 1570) first calls PROCgrid line 2400. The latter first switches the actual colour of all four logical colour numbers to 0 (black) so that the subsequent plotting is invisible to the user. It then plots a set of vertical lines in logical colour 1 and a set of horizontal lines in logical colour 2. Because the GCOL3 mode is used, the intersections of the two sets of lines are plotted in a third logical colour (3). On return to PROCmcol the two fields are presented in alternation by the use of VDUI9 for logical colour switching. To show the vertical lines, both colour 1 (vertical) and colour 3 (intersection) are switched to actual colour number 1 (red), whilst colour 2 is switched to 0 (black) to hide the horizontal lines. Similarly, to show the horizontal lines, colours 2 (horizontal) and 3 (intersection) are switched to 2 (green) whilst colour 1 is switched to 0. The reason that the switching is instantaneous is because no plotting is required. Both horizontal and vertical lines are already stored in the memory map; all that is needed is for the register of logical-actual colour relationships to be updated. This kind of technique has, of course, many other applications, for example in animation.

C O N T I N U E S ►

◆ LISTING 1 ◆

```

100N ERROR IF ERR=17 THEN R
UN ELSE MODE6:REPORT:PRINT" @
LINE ";ERL:END (66F5)
20REM (F210)
30REM PERCEPTUAL DEMONSTRATIONS (41AD)
40REM BY JONATHAN EVANS (B536)
50REM (9EF1)
60REM RUN ON ALL VERSIONS OF THE BBC (05DE)
70REM AND ELECTRON COMPUTER S (457E)
80REM (BB64)
90REPEAT (324A)
100MODE6:PROCmenu (8FB6)
110ON Q% GOTO 120,130,140,150,160,170,180 (CB15)
120MODE5:PROCphi:UNTIL FALSE (94AB)
130MODE5:PROCafter:UNTIL FALSE (AEE0)
140MODE5:PROCcontrast:UNTIL FALSE (B61D)
150MODE5:PROCmcol:UNTIL FALSE (42AC)
160MODE4:PROCspace:UNTIL FALSE (FC6C)
170MODE4:PROCmuly:UNTIL FALSE (87C3)
180UNTIL TRUE (1104)
190MODE6:END (B722)
200: (36F5)
210DEF PROCmenu (452A)
220CLS:PRINT (49E0)
240PRINT " PERCEPTUAL DEMONSTRATIONS" (224C)
250PRINT " =====
===== " (B6AB)
260PRINT " By Jonathan Evans" (753C)
270PRINT "This program demonstrates a number of "perceptual phenomena that are studied" "by psychologists. Please choose one" of the following options:" (3EEA)
280PRINT " 1. Illusory movement" (ED37)
290PRINT " 2. Negative after image" (09AF)
300PRINT " 3. Colour contrast" (2BCD)
310PRINT " 4. McCollough effect" (C899)
320PRINT " 5. Space perception" (9970)
330PRINT " 6. Muller-Lyer illusion" (3357)
340PRINT " 7. END" (3370)
350*FX15,1 (2343)
360REPEAT Q%=GET-48:UNTIL Q%>0 AND Q%<8 (293D)
370ENDPROC (2B43)
380: (B9C6)
390: (E0B6)
400DEF PROCphi (1809)
410VDU23;8202;0;0;0; (BACB)
420VDU23,255,255,255,255,255,255,255,255 (DB48)
430A=0;K=900 (7E80)
440CLS (0E29)
450PRINT TAB(0,26) " F -
FASTER" (BECC)
460PRINT TAB(0,28) " S -
SLOWER" (2BF1)

```

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470PRINT TAB(0,30) "<SPACE> -
ENDS" (09EB)
480REPEAT (CFA4)
490IF A=70 AND K>30 K=K-30 (DEB4)
500IF A=83 K=K+30 (34EB)
510A=0 (B42B)
520*FX15,1 (1B60)
530REPEAT (B22F)
540COLOUR3:VDU31,5,10,255,31,5,11,255 (34E6)
550COLOUR0:VDU31,15,10,255,31,15,11,255 (9A64)
560FOR I=1 TO K:NEXT I (1167)
570COLOUR0:VDU31,5,10,255,31,5,11,255 (D46D)
580COLOUR3:VDU31,15,10,255,31,15,11,255 (3C07)
590FOR I=1 TO K:NEXT I (B5BD)
600A=INKEY(0) (41E7)
610 UNTIL A=70 OR A=83 OR A=32 (19D5)
620VDU7 (ABDE)
630UNTIL A=32 (F7B2)
640ENDPROC (CB94)
650: (3AD2)
660DEF PROCpause(T) (5243)
670T1=TIME (C6ED)
680REPEAT UNTIL TIME-T1>T*10 (6C57)
690ENDPROC (E152)
700: (2214)
710DEF PROCafter (3807)
720VDU23;8202;0;0;0; (F757)
730REPEAT:A=0 (5609)
740VDU19,1,0;0;19,2,0;0; (89BE)
750X=400;Y=400;S1=400;S2=200 (B3FE)
760COLOUR128:CLS (044F)
770MOVEX,Y (786B)
780REM Plot squares using relative (EEF0)
790REM co-ordinates (9DAB)
800GCOLOR,1 (67A3)
810PLOT 65,0,S1 (8EDB)
820PLOT 81,S1,-S1 (A5AB)
830PLOT 81,0,S1 (9337)
840GCOLOR,2 (21B9)
850SD=(S2-S1)/2 (034C)
860PLOT 65,SD,SD (6052)
870PLOT 65,0,-S2 (5924)
880PLOT 81,-S2,S2 (5ACE)
890PLOT 81,0,-S2 (ED39)
900VDU19,1,1;0;19,2,2;0; (27BA)
910PROCpause(60) (336B)
920COLOUR131:CLS:COLOUR0 (795A)
930PROCpause(10) (D7D2)
940PRINT TAB(0,28) "<RETURN> to repeat"TAB(0,30) "<SPACE> to continue" (918D)
950REPEAT (3F39)
960*FX15,1 (A5D6)
970A=BET (F338)
980UNTIL A=32 OR A=13 (1B89)
990UNTIL A=32 (148B)
1000ENDPROC (6BD2)
1010: (D501)
1020DEF PROCcontrast (5BF1)
1030VDU19,1,4;0;S=300 (C6FA)
1040CLS (3223)
1050MOVE300,400 (CC25)
1060GCOLOR,1 (9731)
1070PLOT65,0,S:PLOT81,2*S,-S:PLOT81,0,S (5C2B)
1080MOVE300,700 (34B3)
1090GCOLOR,2 (5E7C)

```

```

1100PLOT65,0,S:PLOT81,2*S,-S:PLOT81,0,S (6F9D)
1110REM PLOT GREY RING (6A34)
1120GCOLOR,3 (44B0)
1130FOR Y%=900 TO 852 STEP-4 (BC08)
1140MOVE400,Y%:PLOT1,400,0 (BA0B)
1150NEXT Y% (10BF)
1160FOR Y%=848 TO 552 STEP-4 (6613)
1170MOVE400,Y%:PLOT1,48,0:MOVE800,Y%:PLOT1,-48,0 (F39C)
1180NEXT Y% (3A79)
1190FOR Y%=548 TO 500 STEP-4 (8F86)
1200MOVE400,Y%:PLOT1,400,0 (B6FD)
1210NEXT Y% (CB4B)
1220PRINT TAB(0,22) "A - ADD LINE"TAB(0,24) "R - REMOVE LINE"TAB(0,26) "C - CHANGE COLOURS"TAB(0,29) "<SPACE> TO CONTINUE" (ED3B)
1230*FX15,1 (6986)
1240REPEAT (7262)
1250A$=GET$ (CA0D)
1260UNTIL A$="A" OR A$="R" OR A$=" " OR A$="C" (88EC)
1270IF A$=" " THEN ENDPROC (3B7F)
1280IF A$="A" MOVE300,700:PLOT3,600,0:GOTO1230 (DA99)
1290IF A$="R" GOTO1040 (055F)
1300CLS:COLOUR3 (8C39)
1310PRINT "COLOUR NUMBERS:" (D0A0)
1320PRINT " 1.RED" " 2.GREEN" " 3.YELLOW" " 4.BLUE" " 5.MAGENTA" " 6.CYAN" (B7AA)
1330PRINT " (F91D)
1340REPEAT (33C5)
1350INPUT "TOP COLOUR";C1% (C091)
1360UNTIL C1%>0 AND C1%<7 (65DD)
1370REPEAT (C8DF)
1380INPUT "BOTTOM COLOUR";C2% (B6A4)
1390UNTIL C2%>0 AND C2%<7 (F14C)
1400VDU19,2,C1%;0;19,1,C2%;0; (EB29)
1410GOTO1040 (4F9B)
1420: (2E45)
1430DEF PROCvert(X1%,Y1%,L%) (2E5B)
1440Y2%=Y1%+L%;X2%=X1%+L% (9C2C)
1450FOR Y%=Y1% TO Y2% STEP 4 (AE92)
1460MOVE X1%,Y%:PLOT21,X2%,Y% (A32C)
1470NEXT Y% (B1CF)
1480ENDPROC (B18A)
1490: (4ED3)
1500DEF PROChoriz(X1%,Y1%,L%) (55DA)
1510Y2%=Y1%+L%-16:X2%=X1%+L% (4A04)
1520FOR Y%=Y1% TO Y2% STEP 16 (BBF1)
1530MOVEX1%,Y%:DRAWX2%,Y%:MOVEX1%,Y%+4:DRAWX2%,Y%+4 (9D0C)
1540NEXT Y% (C6FE)
1550ENDPROC (2E94)
1560: (6FF3)
1570DEF PROCmcol (928B)
1580VDU23;8202;0;0;0;:PROCgrid (6332)
1590T2=800:T3=30000 (B447)

```


PROGRAMS / VISUAL EXPERIMENTS

```

1600T1=TIME (7857)
1610REPEAT (7900)
1620VDU19,1,1,0;19,2,0;0;19,3
,1;0; (E58B)
1630T4=TIME (08DE)
1640REPEAT UNTIL TIME-T4>T2
(E656)
1650VDU19,1,0;0;19,2,2;0;19,3
,2;0; (B8AB)
1660T4=TIME (6FA6)
1670REPEAT UNTIL TIME-T4>T2 (
F358)
1680UNTIL TIME-T1>T3 (CC2C)
1690VDU20,12,19,1,0;0;:GCOL0,
1 (FC2D)
1700PROCchoriz(148,24,480) (26
42)
1710PROCvert(628,24,480) (9D0
F)
1720PROCvert(148,504,480) (C1
96)
1730PROCchoriz(628,504,480) (F
FCF)
1740VDU19,1,7;0; (D98D)
1750T4=TIME (1897)
1760REPEAT UNTIL TIME-T4>3000
(C836)
1770PRINT TAB(0,29)"<RETURN>
TO REPEAT""<SPACE> TO CONTINU
E" (07F9)
1780REPEAT (99B7)
1790*FX15,1 (8548)
1800A=GET (51C1)
1810UNTIL A=32 OR A=13 (66D7)
1820IF A=13 GOTO 1600 (3020)
1830ENDPROC (A6B4)
1840: (E85A)
1850DEF PROCspace (B796)
1860VDU24,0;0;1279;600;28,0,1
2,39,0 (287F)
1870REM CREATES GRAPHIC AND T
EXT WINDOWS (1300)
1880CLS:GCOL0,129:CLG:GCOL0,0
(68CC)
1890PRINT TAB(10)"SPACE PERCE
PTION" (6F5B)
1900PROCbars (A596)
1910PRINT""One's perception o
f size and distance""are inte
rrelated. It should be apparen
t""that the the three bars dr
awn below""are equal in size.
However, if " (29CB)
1920PRINT""perspective lines a
re added to give an""impressi
on of depth they look bigger""
as they get 'further away'." (
81AE)
1930PROCnewpage (1F33)
1940PRINT""The illusion is ca
used by the fact ""that the b
rain expects objects of the ""
same size to look smaller whe
n they ""are further away." (
5E72)
1950PRINT""Press <SPACE> to s
ee the effect" (2650)
1960*FX15,1 (FF5A)
1970REPEAT UNTIL GET=32 (BDD0
)
1980DATA 0,400,0,200,0,0,200,
0,400,0,600,0 (0421)
1990RESTORE 1980 (317B)
2000FOR I=1 TO 6 (6E59)
2010READ X,Y:MOVE X,Y:DRAW
1279,600 (E24B)
2020NEXT I (011E)
2030PROCnewpage (0798)
2040PRINT""Perspective lines
are a well known""method of p
roducing apparent depth""in a

```

```

two dimensional display. A mo
re""interesting method involv
es 'texture""gradients.'" (7F
8F)
2050PROCnewpage (B2DB)
2060PRINT""In a textured fie
ld the density of""objects in
creases proportionately with""
their distance from you. Prod
ucing""such a texture gradien
t in a two""dimensional displa
y can be done in a""number of
ways." (C6F4)
2070PROCnewpage (41DB)
2080PRINT""A simple method of
generating such a ""gradient
is by drawing horizontal line
s""at reducing intervals. Thi
s will now ""be demonstrated
.""Press <SPACE> to draw gra
dient":*fx15,1 (9AFB)
2090REPEAT UNTIL GET=32 (A110
)
2100CLG (3AE9)
2110Y%=0:YI%=120:REPEAT:YI%=.
83*YI%:Y%=Y%+YI% (8102)
2120MOVE0,Y%:DRAW 1279,Y% (3E
8B)
2130UNTIL Y%>500 (F5DE)
2140PROCnewpage (B602)
2150PRINT""If we now add the
bars, a similar ""size illusi
on should be observed to""tha
t created by the perspective l
ines." (8E13)
2160T1=TIME:REPEAT UNTIL TIME
-T1>500 (2A74)
2170PROCbars (1062)
2180PRINT""This is the end of
this section.""Press <SPACE
> to continue" (26BC)
2190*FX15,1 (08FB)
2200REPEAT UNTIL GET=32 (9F9B
)
2210ENDPROC (3320)
2220: (CAAC)
2230DEF PROCnewpage (D475)
2240PRINT""Press <SPACE> to c
ontinue" (96D5)
2250*FX15,1 (9EB1)
2260REPEAT UNTIL GET=32 (3D7E
)
2270CLS:PRINT TAB(10)"SPACE P
ERCEPTION" (B885)
2280ENDPROC (3F39)
2290: (AA3A)
2300DEF PROCbars (D449)
2310S1=100:S2=50 (862A)
2320FOR I=1 TO 3 (5A5B)
2330IF I=1 MOVE 24,24 (DA0A)
2340IF I=2 MOVE 500,250 (0F56
)
2350IF I=3 MOVE 976,476 (B11B
)
2360PLOT65,0,S1:PLOT81,S2,-S1
:PLOT81,0,S1 (6160)
2370NEXT I (EE9A)
2380ENDPROC (BAE1)
2390: (AE0F)
2400DEF PROCgrid (AB29)
2410VDU19,1,0;0;19,2,0;0;19,3
,0;0; (CD80)
2420GCOL3,1:PROCvert(148,24,9
60) (115D)
2430GCOL3,2:PROCchoriz(148,24,
960) (B49D)
2440ENDPROC (884D)
2450: (7C01)
2460DEFPROCmuly (5F6E)
2470 LOCAL L,K,XR:K=80 (CEA0)
2480 REPEAT (A575)

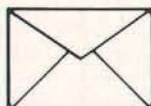
```

```

2490 GCOL 0,129: GCOL 0,0: CL
G (08DE)
2500 L=RND(80)+600 (8F39)
2510 XR=RND(1) (5AB6)
2520 REPEAT (BE0B)
2530 CLG (513E)
2540 VDU28,10,30,30,22:CLS (C
B4E)
2550 REM CREATES TEXT WINDOW
(E311)
2560 PRINT TAB(4,2)"BOTTOM LI
NE"" S SHORTENS"" L L
ENGTHENS"" E EQUALS" (7BFC
)
2570 Y1=800:Y2=600 (F890)
2580 PROCcentre(640):PROCline
(Y1) (C3A7)
2590 IF XR>.5 THEN PROCclfin(X
1,Y1):PROCcrfin(X2,Y1) ELSE PRO
Crfin(X1,Y1):PROCclfin(X2,Y1)
(B2A9)
2600 REM DRAWS UPPER ARROW (1
F7A)
2610 PROCcentre(L): PROCline(Y
2) (117D)
2620 IF XR>.5 THEN PROCcrfin(X
1,Y2):PROCclfin(X2,Y2) ELSE PRO
Clfin(X1,Y2): PROCcrfin(X2,Y2)
(29F1)
2630 REM DRAWS LOWER ARROW (6
065)
2640 *FX15,1 (48F0)
2650 A$=GET$ (0F4D)
2660 IF A$="L" THEN L=L+8: GO
TO 2700 (1DFE)
2670 IF A$="S" THEN L=L-8: GO
TO 2700 (B9F7)
2680 IF A$<>"E" GOTO 2650 (B8
38)
2690 CLG:TIME=0:REPEAT UNTIL
TIME>20 (D994)
2700 UNTIL A$="E" (03CD)
2710 CLG:CLS (81DA)
2720 PROCcentre(640):PROCline
(Y1) (41E0)
2730 PROCcentre(L):PROCline(Y
2) (982C)
2740 PRINT""THESE ARE YOUR LI
NES""WITHOUT THE FINS"" A
GAIN(Y/N)"; (D2EE)
2750 *FX15,1 (BC8F)
2760 REPEAT:D$=GET$:UNTIL D$=
"Y" OR D$="N" (6DE4)
2770 UNTIL D$="N" (0F7C)
2780 ENDPROC (1D07)
2790: (BEDB)
2800 DEF PROCcentre(L1) (F13F
)
2810 X1=(1280-L1)/2-1 (0AB5
)
2820 X2=X1+L1 (E30B)
2830 ENDPROC (F412)
2840: (140D)
2850 DEFPROCline(Y) (8BFC)
2860 MOVE X1,Y (25AD)
2870 DRAW X2,Y (48BD)
2880 ENDPROC (7B45)
2890: (83F8)
2900 DEF PROCclfin(X,Y) (9B22)
2910 MOVE X,Y (064A)
2920 DRAW X+K,Y+K (0452)
2930 MOVE X,Y (8504)
2940 DRAW X+K,Y-K (D629)
2950 ENDPROC (E45B)
2960: (A2DB)
2970 DEF PROCcrfin(X,Y) (ED75)
2980 MOVE X,Y (D121)
2990 DRAW X-K,Y+K (D5F4)
3000 MOVE X,Y (D3C7)
3010 DRAW X-K,Y-K (F08A)
3020 ENDPROC (6B99)

```


MAILSORT



Dear Editor

I am enclosing the modified lines to give a normal and mirrored printout from Touch of Class. And to avoid typing return after every entry. I have also added an option to rerun the program to allow a new design to be loaded. Also when using the continue option the grid is redrawn.

The second modification was to enable Touch of Class to run on my Z80 2nd Processor. Using BBC Basic under C/PM, but keeping the screen images in the DFS form accessible when not using the 2nd Processor.

I am also enclosing a label I produced for my home brew, to warn moderate drinker of its strength. The design was "grabbed" using the Retouch of Class screen digitising program.

It was then printed with a third modification of Touch of Class which prints three times on a line, to suite the small three across labels. It will not however permit a line or text, which have to be printed separately.

Yours faithfully,
J. Meekings
Watford.



DANGER 12% proof
Geordie Lager
Bottled 20.7.1986
Jerome B.H. Meekings



Thanks for your creative work with Touch of Class, Jerome, and all those others who have sent us original examples of Touch of Class printouts. Keep them coming because the best we publish each month will be rewarded with free software.

Explanation of modifications

To give a normal and mirrored printout.

line 830 calls the new procedure "PROCrevdraw"
lines 920 & 1000 sort out the spaces for text
lines 1420 & 1430 is the new procedure "PROCrevdraw". From the suggestion in the original article.

Explanation of modifications

To avoid typing return after every entry.

line 100,950,1060 changes to a print statement
line 110,960,1070 uses the new function "FNyn"
line 130 adds an extra repeat for the new "repeat until" loop
line 140 changes to a print statement and adds a new option to enable you to load a new design
lines 145 & 147 is the new "repeat until" loop and now accepts lower case as well
lines 150 to 170 now accept lower case as well upper case
line 155 will now redraw the grid before returning you to editing the design
line 165 is the new option to enable you to load a new design
lines 1040,1080 & 1100 changes to a print statement
lines 1050,1090 & 1110 uses the new function "FNnumber"
lines 1440 to 1490 is the new function "FNnumber" which only accepts a number between 0 and the input parameter number
lines 1510 to 1560 is the new function FNyn which only accepts Y or N in upper or lower case

Explanation of modifications

To enable Touch of class to run on the Z80 2nd Processor.

lines 170 & 640 change to my preferred mode and exit to CP/M
line 1170 loads a design from directory T on a DFS disc in drive 3
line 1180 saves a design on directory T on a DFS disc in drive 3
NB the screens will load without a problem even if used without the Z80.

Modification to Touch of class to give a normal and mirrored printout.

```
830 FOR RX=0TO119:VDU1,block?(line%*120+RX):NEXT:PROCrevdraw:ENDPROC
920 number%=INT((span%-1-120/dotchr%)-10)
1000 number2%=INT((span%-2-char%-120/dotchr%)-10)
1420 DEFPROCrevdraw:VDU1,27,1,bit%,1,120,1,0
1430 FORRX=119TO0STEP-1:VDU1,block?(line%*120+RX):NEXT:ENDPROC
```

Modification to Touch of class to avoid typing return after every entry.

```
100 PRINT"Do you wish to load a design (Y/N)?"
110 G$=FNyn:IF G$="Y" THEN PROCfile("L") ELSE PROCgrid
130 REPEAT:REPEAT:PROCdesign
140 INPUT"Print, save, continue, quit or rerun (P/S/C/Q/R)?"
145 menu$=GET$
147 UNTIL menu$="P"OR menu$="S"OR menu$="C"OR menu$="Q"OR menu$="R"OR menu$="X"
OR menu$="C"OR menu$="Q"OR menu$="Q"OR menu$="R"OR menu$="X"
150 IF menu$="P"OR menu$="P" THEN PROCfillblock:PROCedit:PROCoutput
155 IF menu$="C"OR menu$="C" THEN PROCgrid
160 IF menu$="S"OR menu$="S" THEN PROCfile("S")
165 IF menu$="R"OR menu$="R" THEN 100
170 UNTIL menu$="Q"OR menu$="Q":END
```



```

640 PRINT"AGAIN (Y/N)":G$=FNyn:IF G$="Y" THEN 650 ELSE END
950 PRINT"Do you want any text (Y/N) "
960 G$=FNyn:IF G$="N" THEN TXT%=10:GOTO1150
1040 PRINT"On what row do you want the text (0-5) "
1050 TXT%=FNnumber(5)
1060 PRINT"Do you want a line (Y/N) "
1070 G$=FNyn:IF G$="N"THEN RL%=7:ENDPROC
1080 PRINT"At which character row (0-5) "
1090 RL%=FNnumber(5)
1100 PRINT"At which dot row (0,3-7) "
1110 DT%=FNnumber(7)
1170 IFZ$="L"THEN $name="LOAD :3.T."+G$
1180 IFZ$="S"THEN $name="SAVE :3.T."+G$+" FFFF5800 FFFF79C0"
1440 DEF FNnumber(max%)
1450 REPEAT
1460 G=GET
1470 G=G-48
1480 UNTILG>=0 AND G<=max%
1490 =G
1510 DEF FNyn
1520 LOCAL G$
1530 REPEAT G$=GET$
1540 UNTIL G$="Y"OR G$="y"OR G$="N"OR G$="n"
1550 IF G$="Y"OR G$="y"THEN G$="Y"ELSE G$="N"
1560 =G$
    
```

Modification to Touch of class to run on the Z80 2nd Processor using BBC Basic under CP/M.

```

170 UNTIL menu$="Q "ORmenu$="q":MODE0:$BYE
640 PRINT"AGAIN (Y/N)":G$=FNyn:IF G$="Y" THEN 650 ELSE MODE0:$BYE
1170 IF Z$="L"THEN $name="LOAD :3.T."+G$
1180 IF Z$="S"THEN $name="SAVE :3.T."+G$+" FFFF5800 FFFF79C0"
    
```



Dear Editor,

Please find enclosed two examples of posters/handouts, as requested in your educational supplement of October. These posters have been put together with the aid of utility listings copied from various magazines, including A&B Computing. Therefore the only outlay was the initial cost of the magazines together with the running costs of the printer and computer.

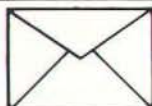
To produce the work I used a BBC 'B' incorporating a "Dumpout 3" printer Rom from Watford Electronics, in conjunction with an EPSON RX-80F/T printer.

Yours faithfully

M. P. English.



GEM Applications



Dear Sir

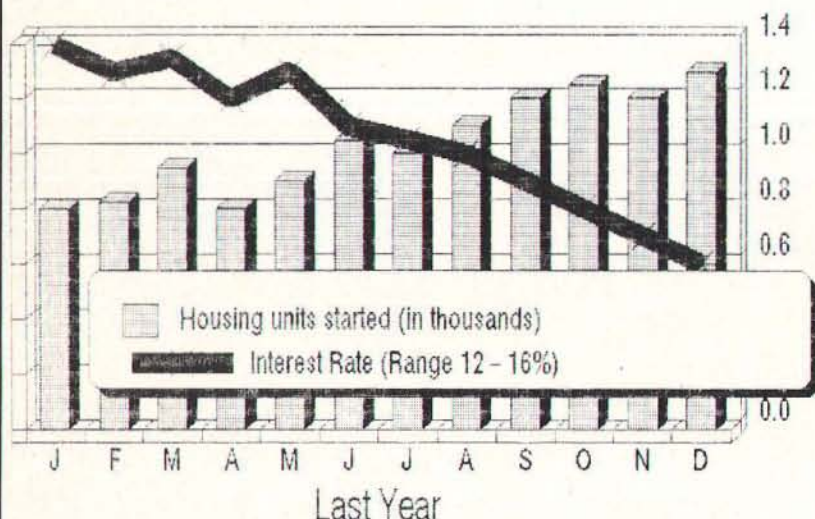
Find enclosed some examples of GEM in action on my Master 512. I have experimented with a number of GEM packages such as GEM Graph and GEM Write with great success. Have any other readers tested GEM software

and, if so, with what results?
Jim Rentall
York

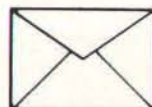
We were impressed by your examples, Jim. Have any other readers experience of GEM applications on the Master 512? Next month we'll feature an article on programming the 512 in the November Master supplement.

BOOM IN HOUSING

Fueled by lower interest rates?



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Dear Editor,

Re: Money Mangement Review — A&B Computing August 1986. I have just read your review of my Money Management programs in the August edition of A&B Computing and I would like to thank you for an objective (and often humorous) assessment of the package and to respond to a couple of the points you made.

In case there are thousands of Fulani tribesman looking for somewhere to record their petty cash expenditure, it is possible to use Money Management for this purpose. All

CONTINUES ►

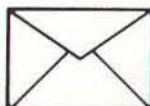
that is necessary is, on personalising the programs, set up one of the asset accounts as "Cash". Then whenever cash is drawn from a bank/building society account or from a credit card/loan account use the transfer facility to record this as a transfer from the appropriate account to the Cash account. Similarly, cash received directly can be recorded as receipts and cash expenditure can be recorded as payments against the cash account. The big problem is attempting to keep track of petty cash expenditure, especially when receipts are not given and for minor things like bus and train fares, so that reconciliation against "the pound in your pocket" (to coin a phrase) usually results in the need to make a "miscellaneous" posting in order to balance the figures!

My own experience is that 90% of my, and my wife's, cash expenditure can be attributed to everyday household items so I don't bother to try to analyse it further. We draw a regular weekly sum and this is posted to the "Household" account as "Cash drawn".

I'm glad you liked the standing order facility, I am quite pleased with it myself! One user asked for the facility to record standing order receipts and this is now possible by entering a negative amount, which I admit sounds rather contradictory.

I take your point about the difficulty in noticing the "red" entries on the budget report when using a monochrome monitor/TV. I did check this out on a mono portable that I own and thought the change of shade was reasonably discernable but to eliminate confusion negative balances are also preceded by the minus sign. Did you try printing the report? You will find there also that overspent balances are preceded by the minus sign.

Thanks again for your interesting review.
Yours sincerely,
E. John Ainsworth
Middlesex.



Dear Ms Owen

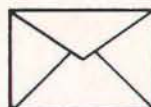
Just a comment about your review of Ibbotson's "Imagin-A". I bought this program six weeks ago and I agree with everything you say about it — it is an excellent piece of programming. There is, however, one thing that you did not say which seems to be to be extremely important.

Ibbotson's advertising blurb clearly states that the program is suitable for "most" dot matrix printers and the leaflet they send out if you contact them states clearly that it works with *Epson-compatible* printers. Well, I have a Canon PW1080A and it does NOT work correctly with this. The reason is that it, (in common with all the Epson's until the very latest series), will only produce 480 dots per line in graphics mode, whereas Imagin-A requires 620. This means that Imagin-A will not work correctly with the great majority of printers in use today by your readers and, specifically, will NOT work with what are

normally called "Epson-compatibles" — I do not think anyone would say that the Canon is not one. Furthermore I do not think the program will work with the earlier Epsos either.

Since the end product of all such programs is a printed sheet, I do think it is important that it is pointed out to your readers that Imagin-A may very well not work with their printer and that they should be extremely careful to check up on this before buying.

Yours sincerely,
J. G. Cunningham
Abingdon.



Dear Editor,

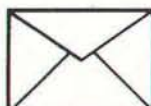
May I take this opportunity to thank your reviewer, Mr Dave Reeder, for his fair review of the product BEEB SUPPORT, in the September issue of A&B Computing.

I would like to correct one point and add what I feel to be an omission. Mr Reeder states: "... the ROM must be fitted in the highest priority." This is not strictly correct, the actual positioning of the ROM is non-critical, as is clearly stated in the manual, ie: "... in the highest priority socket after BASIC, and before any ROM that assumes total priority, ie: your DFS." For instance the ROM may be installed in socket three if the DFS is in socket zero, and the security facility would function normally.

With regards to the omission. The ROM is obviously a collection of general purpose routines, to facilitate easier use of some of the BBC's more complex functions, and was aimed not at the experienced or ardent user of the machine, but at the man in the street who may be new to computing. As such I feel the ROM offers a reasonably priced method of attaining an across the board suite of user friendly utilities.

I consider these points may be worthy of publication in A&B Computing.

Yours sincerely
C. J. Dawson
Author BEEB SUPPORT.



Dear Editor,

I am writing about two statements made in a recent issue of 'A&B Computing'.

The first on page 74 says "I cannot for the life of me see what is so difficult about this, that one should be persuaded either to buy expensive continuous processing ROMs or worse still to give up one's ease of editing for a system like Scribe."

I whole heartedly agree about the benefits of Wordwise Plus having used View, Logoscript and Easyscript, it occurs to me that unlike Wordwise Plus, most word processing programs are defined to be User Hostile rather than User Friendly. However I have not found the techniques described for handling long

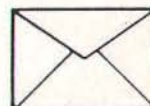
documents on Wordwise Plus as being satisfactory. In particular only being able to preview in 40 columns (unless the text is broken into very short files and that is a problem with the limited number of files per disc) it can be very difficult to check formatting. The need to preview all the files to get to the last one, unless the format commands are embedded at the start of all the files and each file starts on new page. The need to keep a list of all the file names at hand, for those reasons alone I purchased 'Norwich Computer Services' C P ROM. Now I am not faced with those problems and have a much easier time when writing long documents. While I will accept that long documents can be handled in the way described in the article I certainly do not feel that it matches the ease with which Wordwise Plus normally handles text and that the C P ROM improves on it greatly.

But thanks for the tip about VDUI4.

The second statement is the glib remark 'Assuming that the machine code routine CHECK has already been created' I am a computer user not a programmer, I can cope with BASIC, have succeeded in writing things like a simple database and understand what machine code and assembler is, but as to creating machine code routines, saving them from memory and running them I am completely confused. Please next time before you make a statement like that can we please have a description of how we create the machine code routine CHECK.

Having found Plus Talk I am now a regular purchaser of your magazine but hope I am not going to find that like a lot of other magazines you either think we have a memory map of the Beeb tattooed on the inside of our eyelids or that we are still struggling to get out of REPEAT UNTIL loops. I am somewhere in between.

Yours sincerely,
N. A. Tilston
West Midlands.



Dear Editor,

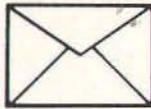
I refer to the letter in September's Mailsort from Colin Munro, who was having difficulty obtaining underlining and boldface with his Electron and MT printer.

Mr Monro might like to know about our WORDPOWER wordprocessor, which is available for the Electron and BBC. This program provides unlimited scope for printer effects, which can be turned on and off by including a single character in your text (e.g. U for underline).

WORDPOWER can be configured for any printer, and is supplied with default settings for Epson compatibles and the Juki daisywheel.

If Mr Monro would like to contact us we will gladly send him full details.

Yours faithfully,
Ian Copestake
Telephone: 048 67455.



Dear Editor,

Most writers of "flood-filling" routines for the BBC micro, be these included in graphics packages or published separately, seem unanimous in their belief that no-one should be allowed to re-flood a shape that has already been coloured, nor should they be able to "unflood" an area.

However I have several times found this restriction annoying, especially when writing programs for use by young children, who often need the opportunity to change their minds. This requirement to be able to change colours arose in particular recently, when writing a pattern-colouring program.

Rather than starting from scratch myself, I started searching for a filling routine which I might be able to modify, and was pleased to find Shingo Sugiura's articles in the December 1985 issue of A&B Computing. The Basic program near the beginning was quite adequate

for my purposes, and proved easy to modify. It is merely a question of temporarily re-defining the background colour. Here for other interested readers are my modifications. In PROCfil, Listing 1:

Remove line 1010

Add: 1035bcol%=7&35A :B%=POINT(IX%, IY%)

Alter line 1040 to read: 1040IF C%=B%
ENDPROC ELSE GCOL 0,C% :GCOL 0,128 +B%

Add: 1135GCOL 0,128+bcol%

In

PROCLine:

Alter line 1160 to read: 1160IF POINT(tx%,ty%) B% PROCscan:ENDPROC

I enclose a short program illustrating the use of this routine.

I have not attempted to modify any of the assembly language routines in the same article, but no doubt this could be done.

My thanks to the original author!

Yours sincerely,

Mary E. Clayton

Bedfordshire.

```

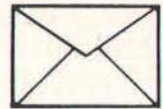
5REM flood fill by Mary E.
6Clayton (1B30)
7MODE 2 (9ABA)
820DIM ystack%(128),lstack%(
9128),rstack%(128),ws% 8 (9F94)
10FOR iZ=0 TO 12 (EE3F)
11 40READ kZ,xZ,yZ (ECA9)
12 50PLOT kZ,xZ,yZ (5FAB)
13 60NEXT iZ (145C)
14 70cZ=0 (D9C9)
15 80FOR iX=1 TO 3 (FD0B)
16 90RESTORE 310 (AFFA)
17 100FOR jY=0 TO 4 (D80B)
18 110READ xZ,yZ (2266)
19 120cZ=(cZ+1) MOD 7 (DDD4)
20 130GCOL 0,cZ (FD33)
21 140PROCfill(xZ,yZ,cZ) (D52A)
22 150NEXT jY (3A7D)
23 160NEXT iX (8663)
24 170END (A699)
25 180DATA 4,300,200 (102A)
26 190DATA 5,900,200 (1C39)
27 200DATA 5,900,800 (30DE)
28 210DATA 5,300,800 (7D6A)
29 220DATA 5,300,200 (C3E9)
30 230DATA 4,500,400 (F842)
31 240DATA 5,900,400 (2A94)
32 250DATA 4,700,400 (66CE)
33 260DATA 5,700,800 (6E89)
34 270DATA 4,700,600 (2E68)
35 280DATA 5,300,600 (F5F1)
36 290DATA 4,500,600 (3939)
37 300DATA 5,500,200 (96B6)
38 310DATA 400,400 (5976)
39 320DATA 500,700 (FD2E)
40 330DATA 800,600 (D1FF)
41 340DATA 700,300 (273D)
42 350DATA 600,500 (6524)
43 1000DEF PROCfill(IX%,IY%,CZ)
44 (C674)
45 1020M%=&FFFF:W%=2^((?&355 MOD
46 3)+1) (4340)
47 1030IX%=IX% AND (&10000-W%):I
48 Y%=IY%AND&FFFC (2587)
49 1035bcol%=?&35A :B%=POINT(IX%
50 ,IY%) (31D2)
51 1040IF CZ=B% ENDPROC ELSE GCOL
52 L 0,CZ :GCOL 0,128+B% (D789)
53 1050FZ=1:ZC=0 (78C2)
54 1060PROCline(IX%,IY%,0) (ABCD
55 )

```

```

1070REPEAT (0A36)
1080PROCunqueue (4E11)
1090REPEAT (2B77)
1100IF UX%<rx% PROCline(UX%,y
111Z+4,0) (6E5B)
1120IF DX%<rx% PROCline(DX%,y
113Z-4,1) (C6B8)
1140UNTIL DX%>=rx% AND UX%>=r
115x% (118A)
1160UNTIL FZ=(ZC+1)AND127 (43
11717)
1180GCOL 0,128+bcol% (965F)
1190ENDPROC (F8D5)
1200DEF PROCline(tx%,ty%,flag
121Z) (CBAD)
1220IF POINT(tx%,ty%)<>B% PRO
123Cscan:ENDPROC (1F0C)
1240PLOT 77,tx%,ty% (F232)
1250XZ=wsZ:YZ=wsZ DIV256 (3C3
126A)
1270AXZ=&D:CALL &FFF1 (CA9E)
1280PROCQueue(ty%,!wsZANDM%,(
129wsZ!4 ANDM%)+WZ) (1B9B)
1300PROCscan (473D)
1310ENDPROC (A36F)
1320DEF PROCscan (B8D5)
1330PLOT 92,tx%,ty% (A6AD)
1340RZ=(!&310 ANDM%)+WZ (65CA
135)
1360IF flagZ=0 UXZ=RZ ELSE DX
137Z=RZ (E391)
1380ENDPROC (C417)
1390DEF PROCQueue(ay%,lx%,rx%
140) (E766)
1410ZC=(ZC+1) AND 127 (4B7F)
1420ystack%(ZC)=ay% (E32C)
1430lstack%(ZC)=lx%:rstack%(Z
144C)=rx% (FF45)
1450ENDPROC (16B7)
1460DEF PROCunqueue (16BA)
1470yZ=ystack%(FZ) (613B)
1480rxZ=rstack%(FZ) (EEC7)
1490UXZ=lstack%(FZ):DXZ=lstac
150k%(FZ) (6912)
1510IF yZ=0 DXZ=rxZ ELSE IF y
152Z=1020 UXZ=rxZ (8409)
1530FZ=(FZ+1) AND 127 (D063)
1540ENDPROC (99E0)

```



Dear Editor,

Card Trick in the September 1986 issue of A&B is an interesting and amusing program. In trying it out on friends I was surprised at the number of times the oddities as mentioned in the text arose, particularly cases where there were three or even more answers.

There is of course one case where there are 10 valid answers! I have not yet attained this by playing the rules!

It is a sequence of the top cards as follows:—

Top card — any: followed by Ace, Two, Three, Four, Five, Six, Seven, Eight, Nine, Ten (or Court Card).

The attached modification to the printed program covers these with suitable comments on the screen.

I have maintained the original program as far as possible and the additions work as follows:—

As the card data is input it is stored in an array dimensioned in line 100.

Line 110 sets counter=0. Used for identifying valid solutions.

Line 211 puts Input in the arrays.

Line 301-309 reads the eleven cards, changes values of court cards to 10 on a temporary basis, checks whether a solution is present (line 304)

Line 306 allows the original program to handle cases of two solutions.

Line 310 calls PROCReveal (Original call at line 290 is deleted)

Line 311 replaces original END.

Line 1590 as original with the addition of ENDPROC.

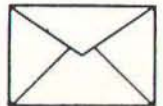
Lines 1595-1605 are "appropriate comments"

I hope these additions are of interest to your readers.

Yours faithfully,

E. Hobart

Suffolk.



Dear Editor,

Early in December I upgraded my old BBC 'B' Micro for the new BBC Master 128 and over the Christmas break explored the mysteries of ADFS. Deciding to transfer most of my DFS files to ADFS I looked through my collection of back issue magazines for some form of menu system — two appeared to be available, yours from the October issue of A&B Computing and the Beebug one from their August/September issue.

Although the Beebug program had a number of good touches — a clock and date display for instance — yours seemed to be the most comprehensive and I set about typing it in — helped by the excellent Checksum routine.

Once booted it worked a treat — what a marvellous program — my congratulations

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to all concerned.

As you have asked for suggestions for improvements, respectfully, here are a few:

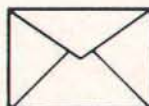
You mentioned in the first article that you hoped to include an improvement to enable Interword files to be downloaded and as I use this particular wordprocessor rather than View I feel that this would be an excellent enhancement.

Also, would it not be possible to include a routine to enable files to be DELETED from a disc say, with a single key press after being identified by cursor and then, maybe, a Y or N before delete.

One final suggestion — why not a mini menu to identify the various options available and the keys required to access them, this would save having to look-up the magazine for the lesser used options.

Once again — thanks for a superb program.

Yours sincerely,
K. M. Gamble
Milton Keynes.



Dear Editor,

Sometimes even an excellent magazine can get it wrong.

In the article on Page 60, "To Upgrade or Not?", it gave the impression that in ADFS, a 40 track disc can be formatted so that both sides are treated as one providing you have a double sided drive.

Regrettably, not so. I have a double sided 40 track drive and it doesn't work. It responds when verifying with "Verification error 10" whatever that might be.

In fact the Acorn Manual on Page J.9-I & J.10-I confirm this. Naturally, if there is a way of overcoming the problem I would be grateful from an economic point of view.

Thanks for an excellent publication.

Yours Sincerely,
Brian Hartley.

A: Right, no second side. Try a Flippy!



Dear Editor,

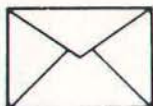
Jonathan Evans' random sequencing algorithm for integers (December) can be speeded up quite considerably in BASIC:

Delete lines 1090 and 1100, and substitute:
1090 IF X%(J%)=J% R%=RND(J%):
X%(J%)=X%(R%): X%(R%)=J%

In this implementation the Jth element is swapped (possibly with itself) only if it has not already been swapped. In BASIC 2 on a BBC B, the average timing is reduced to 5.72 secs (+/- 0.04) per 1000 integers, which is an improvement of about 28%.

Obviously, this improved algorithms works only for an array of ascending consecutive integers 1...N%, and is not suitable for FP numbers or string arrays!!

Yours sincerely,
A. M. Simpson
Perth, Scotland.



Dear Editor,

I found your Printer Inlay program, (A&B, June 1986) very useful. I have a Kaga Taxan, and as author Mike Harrison rightly points out, the printout drifts gently to the right (so much for Epson compatibility!)

After much trial and error and many hours studying Printer manuals, I found that an acceptable result can be obtained with the following two modifications to the original program:

1) Delete line 1810.

2) Amend line 1920 to read:

1910 DATA 27,94,1,2,0,255,128,255,128,-1

If anybody can explain to why the presence of the original code causes the drift, I for one, will be eternally grateful.

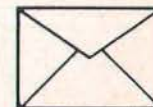
Yours faithfully,
Richard Grant
Newcastle Upon Tyne.

| A | B |
|--------|--------|
| SIDE A | SIDE B |
| 1) | 1) |
| 2) | 2) |
| 3) | 3) |
| 4) | 4) |
| 5) | 5) |
| 6) | 6) |
| 7) | 7) |
| 8) | 8) |
| 9) | 9) |
| 10) | 10) |
| 11) | 11) |
| 12) | 12) |

EDGE TITLE

(Note lack of continuity of centreline
with amended listing)

| | |
|-----|-----|
| 13) | 13) |
| 14) | 14) |
| 15) | 15) |



Dear Editor,

Would you please include our club in your next list of User Groups. We believe we are the only BBC User Group serving the Leeds area and would welcome new members.

Garforth BBC User Group is an organisation dedicated to helping and educating owners of the BBC and Electron Micro Computer. Meetings are held in the Welfare Hall, Garforth, on the first and third Tuesday of the month from 7.30 pm to 9.30 pm.

Yours faithfully,
D. G. Pell
Leeds.



Dear Editor,

I have been an avid user of VIEWSHEET for a number of years, mainly with DFS, and been extremely satisfied with the performance and the facilities provided particularly the access to array files.

I recently upgraded to a Master and was pleased to discover that VIEWSHEET was included with the package. I was also pleased to discover that ADFS was also standard on the Master and I could take advantage of the extremely versatile hierarchal directory system.

My pleasure subsided slightly when I discovered that I could not use my Spreadsheet data files (V.VII etc.) without having a copy of them as a sub-directory to the current-selected-directory.

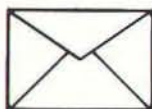
When using DFS all array files created were accessible from any directory within the 31 Files allowed. With ADFS however a "V" Directory has to be created in each CSD directory to enable accessibility from that directory. This can become a bit time consuming when creating or updating array

R E A D E R S L E T T E R S

files that are common to a number of Spreadsheet files in different directories not to mention the disc space being used up by repeating the same file numerous times.

Could any of your readers come up with a patch for VIEWSHEET/ADFS with the facility of creating array files in say the ROOT Directory or more logically in the LIBRARY, that could be accessed by any VIEWSHEET file in any directory. This would not only save time in making sure that all array files had been updated but would be a great saving in disc space.

Yours faithfully,
J. Reid
Tyne & Wear.



Dear Editor,

I am enclosing with this letter a text recovery program that I have written for the BBC Micro.

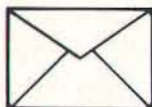
I wrote it originally to recover as much text as possible from Wordwise in the event of a crash, and have since found it useful for a number of situations where text can be lost. It is much less common for text to be lost in Wordwise Plus, but for the sake of completeness I have updated the program to deal with the different start point.

The program when run, generates and saves a short machine-code routine that resides in &C00. I have found this to be the safest place, usable with disk or tape. To recover text whilst in Wordwise or after transferring to another language it is only necessary to 'RUN the file. If you are working from tape change to a blank tape when you get the 'RECORD then RETURN' prompt.

The routine scans the working RAM area building a file consisting of all ASCII characters, Embedded command start and end codes, and TAB code. All other values are ignored so that a compact file is produced. The filename is fixed as "W.TEXT" which is so that the user will become accustomed to it and (hopefully) won't use that filename for anything else.

Apart from its location in memory, which can easily be altered by changing line 210, the program uses only Acorn supported code and I think the program is sufficiently annotated to require no further description.

Yours faithfully,
T. W. Blunt
Crowthorne, Berks.



Dear Editor,

I have thought of another way in which to use your excellent "Touch of Class" program; to make place setting names. They can be made very easily by printing an appropriate picture (i.e. Italian meal etc) at position 1 and printing the persons name after it as well as a line. You can then trim your 'creation' down to size and stick it on a bit of card. Simple eh!

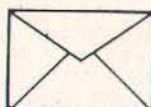
Yours faithfully,
David Hardy
Qatar.

```

10 REM Wordwise text recoverer
20 REM By Terry Blunt
30 REM 3 / 1 / 86
40 REM updated
50 REM 17 / 8 / 86
60
70 MODE 7
80 PRINT"" "To use this program RUN it and allow"" "it to save the assembled co
de to disc."
90 PRINT"" "When you wish to recover a piece of"" "corrupted text from WORDWISE
re-insert"" "the disc and type *RECOVER."
100 PRINT"" "A new file called 'TEXT' will be"" "produced which can be loaded in
the"" "normal way and final correcting and"" "deleting of unwanted text performed.
"
110 PRINT"" SPC10 "Press any key";
120 IF GET
130 PRINT"" SPC3 "Assemble for Wordwise Plus ? ";
140 IF (GET AND 95)=89 PRINT "Y":starthi=&1C ELSE PRINT "N":starthi=&1A
150 PRINT"" SPC13 "WORKING"
160
170 DIM otext &80
180
190 addlo=&70
200 addhi=&71
210 base=&C00
220 osnewl=&FFFE7
230 oswrch=&FFFE4
240 osfind=&FFFE4
250 osbput=&FFFD4
260 osc1i=&FFF7
270
280 FOR IX=0 TO 2 STEP 2
290 PX=base
300
310 [OPT IX
320 LDA #&80
330 LDX #text MOD 256
340 LDY #text DIV 256
350 JSR osfind \ Openout file "TEXT"
360 TAY
370 EOR #255 \ Set up start address
380 STA addlo \ cancelling Y offset
390 LDA #starthi
400 STA addhi
410 LDX #&5F \ Set number of 256 byte pages
420
430 .loop
440 LDA (addlo),Y \ Get character
450 CMP #&02 \ Embedded start (green)
460 BEQ put
470 CMP #&07 \ Embedded end (green)
480 BEQ put
490 CMP #&0D \ CR
500 BEQ put
510 CMP #&20 \ too low
520 BCC skip
530 CMP #&DD \ 'TAB' character
540 BEQ put
550 CMP #&7F \ too high
560 BCS skip
570
580 .put
590 JSR osbput \ send to file
600
610 .skip
620 INC addlo \ increment address
630 BNE loop
640 INC addhi \ increment page
650 DEX \ decrement page counter
660 BNE loop
670 TXA
680 JSR osfind \ close file
690
700 .print
710 LDA text,X
720 BEQ end
730 JSR oswrch
740 INX
750 BNE print
760
770 .end
780 JMP osnewl \ newline and exit
790
800 .text
810
820 ]
830 NEXT
840 $text="W.TEXT saved"+CHR$0
850
860 $ostext="*S. RECOVER "+STR$base+" "+STR$-(text+LEN$text)
870 XX=otext MOD 256
880 YX=otext DIV 256
890 CALL osc1i
900 PRINT' SPC9 "'RECOVER' saved"

```

C O N T I N U E S ►



Dear Editor,

No doubt I was a little foolish, but having spent too many hours getting to the bottom of this, I thought I'd pass on the answers.

The question was "How does one use data files in Pascal?" I am using the Acornsoft ISO Pascal — very good on the whole, though I'm not a Pascal expert.

The listings below show how to write one integer (5) to a file, and how to read the integer back from the file. Expanding the ideas to do useful work should be easy for anyone familiar with data files in Basic.

REWRITE is broadly equivalent to OpenOut.

RESET is broadly equivalent to OpenIn.

WRITE(DF,5) parallels PRINT\$DF,5.

READ(DF,C1) parallels INPUT\$DF,C1.

There seems to be no equivalent to Basic's CLOSE DF. It is possible to write to a file in one procedure and later read from it with another procedure, all in one program.

There is no provision for random access — all Pascal files are sequential.

Note: The identifier ("variable") which will be used for the file handle (DF in my examples (for Data File)) must be listed in the program header, and then defined after VAR. FILE OF INTEGER is allowed, also TEXT ("FILE OF ...") is implied in TEXT.) I suspect the principle can be extended, but I have not made tests. The actual name of the file on the disc will be TMP in the examples given.

I would appreciate help from any reader who can tell me how to "ask" the disc whether a file of a given name already exist on the disc, in Pascal.

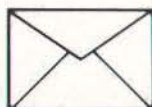
Yours,

T. K. Boyd

Petworth.

```
PROGRAM TKSEW(INPUT,OUTPUT,DF);
  VAR C1:CHAR;
      DF:FILE OF INTEGER;
BEGIN
  REWRITE(DF,'TMP');
  WRITE(DF,5)
END.
```

```
PROGRAM TKSRW(INPUT,OUTPUT,DF);
  VAR C1:INTEGER;
      DF:FILE OF INTEGER;
BEGIN
  RESET(DF,'TMP');
  READ(DF,C1);
  WRITELN(C1)
END.
```



Dear Editor,

In "Feedback", on page 20 of A&B Computing, January 1987, you state that "Viewspell is graced with an accurate dictionary". This is not true.

I checked a fairly common misspelled word and found that it gave as "correct" a spelling which is not even an accepted alternative.

Spelling is my specialist subject and I used to contribute articles on Spelling to the Scottish Educational Journal. I was an English Teacher and Educational Psychologist but am now retired.

Proof-readers seem to be in very short supply as I am sure you are well aware. Many handbooks and many articles in Magazines are very bad indeed. Beebug give a list of errors each month under "Points Arising" AFTER they have worried their readers. In the Electron User Aug 1984 a "Super Spell Listing" is given on page 45 which contains five gross spelling errors. It has never been corrected. This is an extreme example.

Your own magazine is reasonable and usually only contains the average number of errors. For example in the January edition, in the parts I read I came across the following:

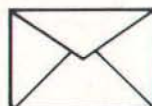
- p.13 line 23 aN instead of an
- p.16 line 10 it's instead of its
- p.34 line 45 practice for practise
- p.35 Centre Repton 3 for Repton 2
- p.62 Centre Column "I have BEEN expanded my Elctron system"
- p.78 3rd Column "... one can see A how the original board has been improved ON"
- p.79 line 2 a hankering from for "a hangover from"
- p.80 line 26 bracket in wrong place
- p.85 line 8 alot for a lot
- p.103 line 5 practice for practise (again)

Compiling a Spelling Dictionary is a more complicated matter than is generally realised. One difficulty is the large amount of alternative spellings. No two dictionaries are alike.

Yours faithfully,

P. J. Rooney

Strathclyde.



Dear Editor,

Many thanks for the free disc with the February issue. I cannot resist your invitation to pass comment.

This is an important (if obvious) step forward and full marks to A&B for taking it. Data transfer, ancient and modern, in the same publication, and most appropriate for a publication on Computing!

However... My own tangling with computers goes back to the fifties when they were used to do lengthy sums, and a Ferranti Pegasus if you could have afforded it would have nearly filled the average size semi. Thirty years later we have software on disc going out through the mass-circulation channels. But what does it contain? A game so highly protected that it causes my Challenger's disc drive head to bang itself against the chassis instead of loading.

Is this where the "Computer Revolution" has led? Micros are marvellous as well as being cheap, compact and reliable. They are super at sums, good at graphic art support, dazzling at data sorting and have taken the chore out

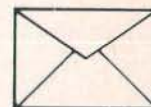
of writing through their word-processing programs.

Again all praise to you for this step forward, but please, please may we have the sights raised? You have shown it can be done. May we pause to think just what should be done with this marvellous facility. Even if Edison started by recording "Mary had a little Lamb", Caxton did not start by printing football pool coupons (for the 1477 equivalent). With discs now so cheap, surely a magazine dedicated to Education, with an excellent record in business application articles and some of the best magazine software available on disc and cassette, can now show us what really can be done?

Yours sincerely,

Joe Coutts

Dartford.



Dear Editor,

I am writing to you with regards to Mertec's Scribe.

While I have been extremely pleased with Scribe, and convinced, having produced an 80,000 word document using Scribe, that it certainly outperforms many of the other beeb wordprocessors I do have one reservation. Despite the replacement of my original Scribe chip, when using right justification and printer control codes, the printed lines are indented by whatever number of control codes are used. For instance, shadow printing on the Juki consists of "27 W" and 27 "&", and where I have inserted a shadow printed word(s) on a line, then the resulting printout is indented by 4 character spaces compared to lines without control codes. Mertec failed to provide a workable solution to this and I wondered if you might have any suggestions? (This letter was written on Wordwise+, which does not have this particular problem, although it is not (in my opinion) such a good wordprocessor.)

I would also be grateful if you could suggest a control code to stop the Juki 6100 from printing so that daisywheels may be changed in mid-document. Obviously one solution is to block the text in such a fashion that the text ends where daisywheel changes are required, but such a solution would be rather clumsy.

Yours faithfully,

Dr. P. A. Fowler

Aberdeen.

SOFT SALE

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Software is only available on the formats recorded in the tables. It is not available on cassette tape. All prices include VAT and postage and packing. Please make cheques/postal orders payable to Argus Specialist Publications Ltd and print your name and address clearly on the back of your cheque. Telephone orders are taken for Visa and Access. All software is sent first class. Prices include postage and packing for European destinations. Please include £1.00 postage and packing (airmail) for other overseas orders. Please allow 28 days for delivery.

PRODUCT CODE NUMBERS

| PROGRAM TITLE | BBC B/B+ | MSTR 128 | COMPACT | ELECTRON |
|---------------------|----------|----------|---------|----------|
| Global View | DB01 | DB16 | DB33 | DE06 |
| Graphics Pack 1 | DB03 | DB17 | DB37 | DE01 |
| Ikon Utilities | DB19 | | | |
| Musician | DB06 | | | |
| Venturescapes | DB48 | | | |
| Ed Compendium | DB47 | | | |
| Mode 7 Utilities | DB12 | | | |
| Adventurescape III | DB20 | DB28 | DB35 | |
| Combat Zone | DB21 | | DB32 | |
| Procyon | EB1 | | | |
| Easyword | DB22 | | | DE22 |
| Videobase | DB24 | | | |
| Delivery | DB25 | | | |
| Easy Font | DB26 | DB39 | DB44 | |
| ADFS Menu | DB27 | DB31 | | |
| Graphics pack 2 | DB28 | DB34 | DB38 | DE38 |
| Colour Ikon | DB36 | | | |
| A&B Bibliography | DB40 | | | |
| Statistics | DB41 | DB42 | DB43 | |
| Games Compendium I | DB45 | | DE45 | |
| Home Office | DB46 | | | |
| Graphics Constr Set | DB49 | DB50 | DB51 | |
| Compact 100 | | | DB52 | |

AVAILABILITY AND PRICE

| Name | Product | 40(small) | 80(large) | Price | Videobase | DB24 | yes | yes | £6.00 |
|------------------------|---------|------------|-----------|--------|---------------------------|------|-----|-----|--------|
| double disk | | | | | Delivery | DB25 | yes | yes | £7.50 |
| Global View | DB01 | yes | yes | £10.00 | Easy Font | DB26 | yes | yes | £10.00 |
| Electron +3 | DE06 | no | yes | £12.00 | ADFS | DB39 | no | yes | £12.00 |
| ADFS | DB16 | no | yes | £10.00 | Compact 3½ | DB44 | no | yes | |
| Compact 3½ | DB33 | no | yes | £12.00 | ADFS Menu | DB27 | yes | yes | £12.00 |
| Graphics Pack 1 | DB03 | yes | yes | £10.00 | Compact 3½ | DB31 | no | yes | £14.00 |
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| Compact 3½ | DB37 | no | yes | £12.00 | Compact 3½ | DB38 | no | yes | £12.00 |
| Ikon Utilities | DB19 | yes | yes | £6.00 | Electron +3 | DE38 | no | yes | £12.00 |
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| Venturescapes | DB48 | yes | yes | £10.00 | Statistics | DB41 | yes | yes | £10.00 |
| double disk | | | | | ADFS | DB42 | yes | yes | £10.00 |
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| Mode 7 Utilities | DB12 | yes | yes | £6.00 | double disk | | | | |
| double disk | | | | | Games Compendium I | DB45 | no | yes | £10.00 |
| Adventurescape III | DB20 | yes | yes | £15.00 | Electron +3 | DE45 | no | yes | £12.00 |
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| Combat Zone | DB21 | yes | yes | £6.00 | Graphics Construction Set | DB49 | yes | yes | £10.00 |
| Compact 3½ | DB32 | no | yes | £8.00 | ADFS | DB50 | no | yes | £10.00 |
| Procyon | EB1 | EPROM only | | £11.50 | Compact 3½ | DB51 | no | yes | £12.00 |
| Easyword | DB22 | yes | yes | £7.50 | double disk | | | | |
| Electron +3 | DE22 | no | yes | £9.50 | Compact 100 | DB52 | no | yes | £15.00 |

Global View Suite

This Global View package incorporates full global graphical displays of the seasons, day and night; alternative maps; continental drift; equidistance maps; a module to design your own world; model globes — section printouts with which to make your own model globes, of the earth today, 1 million years ago, or a planet of your own making!

With the Pangaea programs you can go back to a time when the world didn't look quite the same! You can run through the history of the earth's development up to the present day. Further background information and additional graphics (of fauna and wildlife) are displayed for each period. You can even go into a predictive sequence to see what the earth may look like to future astronauts lucky enough to look down upon its surface.

Our animation programs incorporate a DUMP key so that any of the screen windows can be saved to disk from any of the Global View suite of programs under a unique filename determined by the month/day/time parameters.

These displays are then retrieved from disk in sequence. Different screen windows can be animated up to the capacity of your disk drives. When using RAM disk, the effects are even more stunning.

HAM Radio enthusiasts who wish to update the on screen information at regular time intervals will find this upgrade invaluable.

As well as full on screen instructions, the package comes complete with necessary documentation. The whole suite is a uniquely educational and enjoyable package for the BBC Microcomputer, Model B, B+ or Master 128 (this version supplied on one ADFS disk). On two DFS disks for just £10.00.

A single disk Electron +3 version of the suite contains all the above but not the animation facilities, which the hardware does not support.

- BBC Model B/B+ disk £10.00
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- Master 128 ADFS disk £10.00
Order product number DB16
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Mode 7 Utilities

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The following Soft Sale products are all available for the Master 128 or Compact (for full details see the individual entries in the Soft Sale):

- Graphics Construction Set
- ADFS Menu
- Easy Font
- Combat Zone
- Global View Suite
- Adventurescape III
- Graphics Packs 1 and 2

The following DFS format disks are also compatible with the Master 128:

- Musician
 - Venturescapes
 - Games Compendium
 - Educational Compendium
 - Mode 7 Utilities
 - Home Office
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The A&B Computing Bibliography contains every reference relevant to the BBC Micro from every issue of A&B Computing since May 1983. The Bibliography is sold in parts, each containing an average of over 1,300 references.

The Bibliography contains information on all listings of games, educational and utility programs, including later corrections, updates and enhancements; reviews of hardware, firmware, peripherals, software and books; articles of specific and general interest, such as programming techniques for beginners and the experienced, writing adventure programs, computer implementation and applications etc. It even contains every news item and reader's letter; in fact, anything remotely related to the BBC Micro!

Unique Reference

Each reference has 5 components- the *title* of the reference; a *description* of contents, including keywords and the major areas covered; title of magazine; the *date* of publication and the *page* number. The references are stored in chronologically ordered sections, each chaining the next, and the user may specify the starting month and year.

Main Options

The Bibliography offers 3 options:

(1) View the whole Bibliography from May 1983 onwards. (2) View it from a specific section, missing out earlier ones. (3) A choice of a one or two-string search of the Bibliography.

For the *one-string search*, all the references containing the string will be presented, whether it is in upper-case, lower-case or a combination of both eg "PRINTER", "disc", "Graphics" or "UserRAM". It can also present references from one month (eg Nov'85).

For the *two-string search*, only references containing both strings are presented eg "LISTING" and "WORDWISE", "PRINTER" and "REVIEW".

This is obviously a most useful and versatile option with numerous possibilities for finding that reference that you knew was there somewhere, in some magazine or other; for example, it can find that hint or tip that solves your programming problem, or find all those reviews you need to read before making your final choice and spending your money on hardware or a peripheral!

You can find all references to a particular topic, such as robotics or interfacing. It is also ideal for cataloguing, cross-referencing and indexing your magazine collection according to subject, content, date etc.

Printer or Screen

The user can specify screen or hard copy. For *screen presentation*, references are displayed one at a time without *split* words and descriptions are left and right justified. When any key is pressed the screen clears and the next one is presented.

The printer hard copy can be global or selective for all three options and references are formatted for 40, 80 or 120 columns. For example, with global printing of *option 3*, all the sections are automatically searched and chained and only references containing the specified string(s) are printed; with selective printing, the user chooses whether each reference is to be dumped to the printer, after reading it on the screen.

The software is user-friendly. The constant on-screen information provides details of the option chosen, the strings being searched for, global/selective printing or

printer off, and the month currently being searched. The Bibliography is available for 40 or 80-track disc drives and it is updated regularly. It currently comprises two discs, A&B May '83 to April '85 and A&B May '85 to May '86.

Available From

The Bibliography is produced by Jim McHugh of Mc Hugh Enterprises and is available from A&B Computing Reader Services.

- BBC Model B/B+/Master 128 disc
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Graphics Construction Set

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Full instructions for both studios are supplied in an accompanying manual.

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Graphics Pack 2

Graphics Pack 2 is a single disk packed with graphics based programs published in A&B Computing during 1986. We think it represents superb value. Whatever your interest, Graphics Packs 1 and 2 should now offer you an opportunity to experiment with computer graphics.

Graphics Pack 2 for the Model B and B+ contains all the programs bar the Master Graphics set. The Master 128 and Compact versions both come in ADFS format, allowing us to pack a considerable number of example screens and extra programs onto the disk. All the programs are documented in an accompanying manual.

- Model B/B+ disk £10
Order product number DB29
- Master 128 with ADFS £10
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- Electron +3 disk £12
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This is range of attractive fonts supplied on one 80 track or two 40 track disk(s). There are eight fonts in all, choose from: Old English, Cloister, Tea Chest, Folio, Futura, Old Towne, Japanette and Corvinus.

The fonts are controlled from BASIC and example routines are given for each font.

- BBC Model B/B+ £10.00
Order product number DB26

- BBC Master 128 ADFS disk £10.00
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- Master Compact 3.5" disk £12.00
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Adventurescape III

Adventurescape is an adventure writing system for disk based BBC Microcomputers (all series). The system consists of a 'shell' program which will run any one of a number of different adventure games, and two utility programs which provide friendly menu-driven editors to allow people to create the data files for a game of their own design. The system is unique in treating all the content of the game as a database — including the

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- (iii) Locations are connected by pointers allowing one way exits, twisty passages, mazes etc to be constructed.
- (iv) Objects may be examined leading to messages which expand upon their usual description.
- (v) A very wide range of puzzles may be constructed using the unique puzzle generator of Adventurescape as will be explained in detail below.
- (vi) Players may SAVE and LOAD game positions under their own choice of filename as often as required.

What is more, this package includes no fewer than three sample games written with the system: Murder at the Abbey, Lost in Xanadu and Amnesia, in addition to the files of a short demo game 'Dungeon' whose construction is explained as a fully worked example in the manual. A utility for squashing text files once a game is complete is also provided. Text from Adventurescape can be exported to the Robico Midge Compression System.

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30th September 1987**

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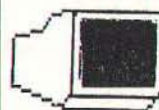
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COMPATIBLE WITH THE BBC B, B+, MASTER SERIES, AND ACORN ELECTRON

CODENAME: DROID

Stryker's Run - Part 2



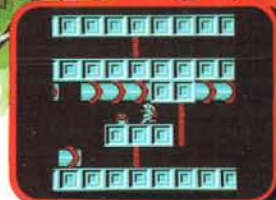
The Dramatic Loading Screen



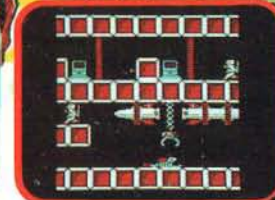
Climbing up a rope
(SURFACE DEFENCE)



Flying with a jet-pack
(ANCIENT SHRINE)



The elusive "Herbert" Droid
(CREW'S QUARTERS)



Crawling under a crane
(MISSILE FACTORY)

Commander John Stryker is back in CODENAME: DROID

Stryker's Run was one of our most successful releases of 1986. It stayed at the top of the BBC Micro software charts for six weeks and received several glowing reviews: "The graphics are stunning... This should be in every collection" enthused A & B Computing.

Now CODENAME: DROID presents a new challenge for Commander John Stryker. He has been commissioned by the Allied Nations to undertake another perilous mission in their continuing struggle against the warmongering Volgans.

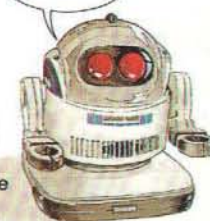
His task is to locate and seize the Volgans' latest weapon: a new spacecraft (codenamed the Z11) which is equipped with the revolutionary matter/anti-matter warp drive facility. Stryker must land on the mysterious planet Volga, penetrate the Volgans' underground defence systems, find the spacecraft and requisition it.

As Stryker descends below the planetary surface, he will pass through 4 different zones of Volgan activity:-

- The Surface Defence — an array of steel girders, ropes and chains lies coldly between the crusted white rock walls.
- The Ancient Shrine — a stone-walled temple bedecked with hideous gargoyles and rusting chandeliers.
- The Crew's Quarters — the Volgans' relaxation area: tables and chairs are arranged invitingly amongst the essential ventilation pipes.
- The Missile Factory — clinical pseudo-metallic walls surround the missiles, bombs, and computers of the evil Volgan race.

Your character in the game can jump, run, kneel, crawl, climb up and down ropes, fire his laser blaster and drop mines. He can also fly for short distances using his jet-pack, and access information via his wrist terminal computer.

HELLO



BBC Micro Cassette **£9.95** Acorn Electron Cassette ... **£9.95**
BBC Micro 5 1/4" Disc **£11.95** Acorn Electron 3 1/2" Disc. **£14.95**
BBC Master Compact 3 1/2" Disc **£14.95**

The screen pictures show the BBC Micro version of the game.
The graphics of the Acorn Electron version are identical.

Prize Competition

If you complete the entire CODENAME: DROID mission, you can enter our competition.

Prizes include 1 talking remote-controlled robot, 5 small remote-controlled robots, £150 in cash, and competition certificates.
Closing Date: 29th February, 1988.

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• All mail orders are despatched within 24 hours by first-class post.
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PALACE of MAGIC



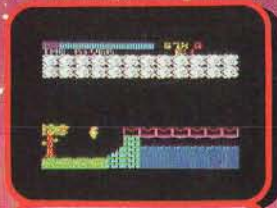
Leaping over deadly swords and spikes



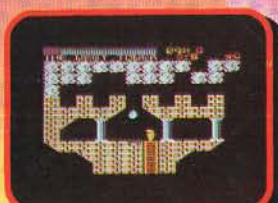
Climbing up the East Tower



Wandering through a patch of woodland



Approaching the meandering river



At the top of the West Tower



Exploring the passages



Greeting the Guardian of the Guards



Down in the dungeons



Over 100 Screens full of Challenging Puzzles and Awesome Foes

By practising acts of benevolence and goodwill, you have offended the evil wizard Caldeh. Summoning forth his satanic powers in order to extract retribution, he has cast two powerful spells upon you: (1) you have been reduced to the size of a dwarf; (2) Caldeh has banished you to one of his old homes, the "Palace of Magic".

The palace and its surrounding land is littered with magical objects and mysterious creatures. It is rumoured that there is also a hidden transporter — your only means of escape from this enchanted place.

After exploring the rooms of the palace, you should venture forth through the enclosing woodland: towards the ancient church and the eerie dungeons, or through the maze of secret passages, or over the river to the princess's house.

On your journeys, you will encounter many strange animals and people including rock monsters, gremlins, imps and guards. Some are good and some are evil. You will need to decide who you can trust to help you in this arduous quest.

| | | | |
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| BBC Micro Cassette..... | £9.95 | Acorn Electron Cassette..... | £9.95 |
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| BBC Master Compact 3½" Disc... | £14.95 | Acorn Electron 3½" Disc..... | £14.95 |

(Compatible with the BBC B, B+ and Master Series computers).

PRIZE COMPETITION

The first prize in our competition is a treasure chest containing over £200 worth of mystical and magical artefacts. 10 runners-up will each receive £5 and a signed certificate.

To enter the competition, you must complete the "Palace of Magic" adventure, and note down the congratulatory message you receive. Closing Date: 30th April, 1988.

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