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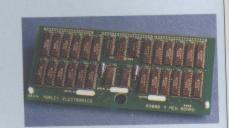
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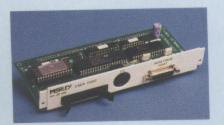
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The Morley Teletext Adapter is now available for the Archimedes. Advanced specifications, include digital tuning, screen dumps etc. Connects via the external podule socket or our £125 Analogue/User Port Existing users of our BBC Teletext Adapter can have the unit converted to an

Archimedes version for

LEADS & MISC. HARDWARE

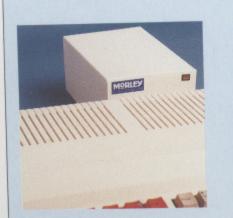
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 £420

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We are an Acorn dealer and service centre. If you would like to have a look at the A3000 or any other Acorn/ Morley product please feel free to call in and discuss your requirements with our staff.

If there is anything you require which isn't advertised, please ring for a competitive quote.

How To Order

BY POST: Enclose cheque made payable to MORLEY ELECTRONICS LTD.

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CARRIAGE: £1 on most orders. £3 on larger items. Hard Disks, Computers + Monitors £10 (carrier).

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The Micro User welcomes new program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cas-sette tape or disc. Please enclose a stamped, selfaddressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights

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!Maestro

Peter Davidson

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Pam Turnbull

Gail Blincow

Peter Babbage

This symbol indicates

that the feature contains at least one full length listing for you to key in on your micro.

All the major listings in this magazine are

accompanied by checksums to help you key them in correctly. For full details of how to use them see the article on page 72 of the February issue.

MICRO USER CLASSIFIEDS

The best bargains in the world of all Acorn micros come from fellow readers of The Micro User. Turn to Page 78 to find just what you're looking for - from cheap modems to complete computer systems.

SPECIALMI

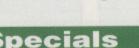
Keysound

HandelPF

Wibraphone Churching

!Rhapsody

Find out about the new utterly brilliant fun magazine for ALL Acorn machines - turn to Page 14



Lunar Eclipse Graphic guide to help out all those red Moon watchers.

Edit from the Desktop using Acorn's concurrent text editor.

packed into your BBC Micro.

How to use another 32K of memory

Ram Board



Newcomers

Software Scene

Our reviewers weigh up the latest games releases and give their verdicts.

Graphbox Presentation pictures made easy using Minerva's flexible package.

REGULARS: News 7 • Hac Man 38 • Mad Hatter 40 • D Page

ALMUSIC ISSUE

Music Overview
Four-page survey covering the primary music packages for Acorn machines

Music Product Guide
More than 50 packages for the BBC
Micro comprehensively described

Keysound
Superb voice designer for the
Archimedes series and BBC A3000



Use the Hybrid Music System to control a Yamaha Midi Expander

Sequences
Stunning classic and pop arrangements available for EMR products

Opus
Fascinating and educational composition package for the BBC Micro.

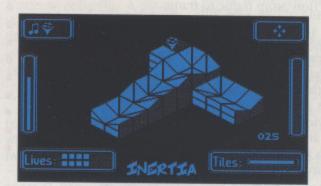
Welcome back electron user

AFTER seven successful years out on its own *Electron User* is back within *The Micro User*.

From this month all reviews and articles for the Electron will be covered along with those for the entire Acorn range of home micros.



Talisman



Inertia

Education

19 Update
Up-to-the-minute news of the BBC
Micro in the world of education.

We look at the latest software for the BBC Micro series in schools including:

PenDown Archimedes
 World Maps

27 !Wordchain
Try out an educational game that encourages correct spelling.

EMR Midi 4 interface card. EMR SMPTE card...... Let's Computel . Pattern Tiles PenDown.... Performer products featured this month's issue MAP90. EMR Sampler 8 card Ample Nucleus Programmer Guide. Ample Toolbox Perplexity... Picturebook Stereo A44b plus HighNote Master Class/G.I.G... Master-Rom.... Studio 24 Plus (Version 2) Archimedes Voice Generator First Word Plus. Play It Again Sam 14. Studio 24 Micro Editor for UMI-4M Swift Spreadsheet BBC Midi interface Mono A448 plus Adit Graphbox..... Handimusic 1... Helter Skelter... Castle Quest. 크로 Temple of Terror Hybrid Music System 64.65.67 Music 5000. Creations Sample Disc Library. Unix R260. Untrivia.... 105 106 33.34

Subscribe!

For the price of just one year's subscription just look at what you get: Twelve issues of the best magazine for the BBC Micro, Master series, Electron, Archimedes and BBC A3000, plus the monthly disc or tape containing all the listings, plus regular extras and public domain software

- See Page 83



What you'll find on this month's disc or tape:

 All the listings from this issue.

And exclusively for those readers with an Archimedes or BBC A300:

Full !Wordchain listing.

!Rhapsody music demo.

Plus PD applications.

Take out a subscription NOW by filling in the form on Page 100

THE MICRO USER

Education

In our special Education issue NEXT MONTH we cover word processors and IT policies in schools plus lots of useful learning aids for both your 8 and 32 bit Acorn micros. Not forgetting our regular features, plus the money-saving PD Section.

40 • D Page 55 • Problem Solved 75 • Body Building 79 • Letters 119

Available from FFFFFFFFFF for the Archimedes and A3000

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The Best Solution

Ovation provides a single solution to all of your desktop publishing and word processing needs. Combining the most useful and powerful features from DTP systems costing much more, you will find Ovation has just about everything you could want. Ask your dealer for a demonstration – you won't be disappointed.

Text Editing

Text may be typed in straight away just like a word processor, without the need for any complicated frames or styles. When a page is full, text will simply flow onto the next page. In addition you may add any number of frames to the page, each with its own 'story'. Frames may be linked together causing the 'story' to flow from frame to frame.

Adding Style

A 'style' is the font, size, justification, leading, indent etc. of a piece of text. Ovation allows any number of styles to be

defined, named and then applied to paragraphs at the press of a key. Styles may be re-defined at any time, and the changes will automatically flow through the entire document. In addition, local styles may be applied to any



highlighted block by simply selecting the font, size, style and format from the menus.

Frame Handling

Ovation has many advanced frame features, such as linked text frames with auto-flow, repel text, definable frame borders and a step-and-repeat facility. Unique on the Archimedes, is our parent/child system for frames and lines. This system allows you to copy and paste frames with embedded child frames and lines, as single items. This allows diagrams, forms, tables etc. to be copied or moved with ease.

The Instinctive DTP

Ovation is supplied with a tutorial and complete user guide, although you probably won't need to refer to it very often. Ovation makes full use of the RISC OS multi-tasking environment to provide a formidable array of features that are easy to learn and instinctive to use. A quick reference card is also included, which lists all the keyboard and mouse short cuts.

Other Features

- Multi-tasking/multi-documents
 No hardware protection
- Full WYSIWYG display with variable view
- Fast built-in spelling checker (requires 2Mb)
- Printer drivers for Epson, PostScript, LaserJet, and Integrex printers
- Import Draw and Sprite files. Features include scale, crop, fit-to-frame
- Master pages for each chapter
- Cut/copy/paste using clipboard
- Automatic headers and footers
- Supplied with 4 outline fonts (13 faces)
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- Stylesheets and customised start-up
- Definable frame borders
- Linkable text frames
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- Manual and auto hyphenation (requires 2Mb)
 And much, much more.....

Excellent Value

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Acorn's building a show village

ACORN Computers is to have a major presence at the next Computer Shopper Show to be held at Wembley Conference Centre from December 6 to 9.

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ller.

It is planned to incorporate a whole Acorn village into the show to give visitors a pre-Christmas view of the latest in the Acorn range.

"We are now convinced that Computer Shopper Show, which had such an overwhelming success when it was launched last November, represents the most appropriate event for the leisure and small business market in the important pre-Christmas selling period", said Acorn's marketing manager for home markets Simon Lovesey.

"Acorn is encouraging its supporting software and hardware developers, dealers and peripheral suppliers to join them at the show so that both they and the visitors to the show can benefit from the impressive promotion we are planning for all the Acorn products"

The inaugural Computer Shopper Show last year attracted 26,650 visitors throughout the three days. This year it moves to the new Cartoons come to computers

A NEW comic-style computer monthly aimed at beginners has been launched by Database Publications, publishers of The Micro User,

Let's Compute! scores a world first by teaching computing techniques through the medium of colourful strip cartoons and easy-to-understand, fully illustrated articles.

Designed primarily for children, it is also expected to attract many teenage and young adult readers looking for a hand-holding introduction to computers.

"Above all, it puts the emphasis on fun", said Derek Meakin, chairman of



Database Publications. "It's fun to read, fun to experiment with page after page of hints and tips, and fun to take part in the competitions with prizes galore".

Covering the full range of Acorn machines, Let's Compute! costs 99p. A preview copy is included with this issue of The Micro User – the on-sale date for the first Let's Compute! is July 16.

and larger venue at Wembley and has been extended to four days. It is expected to attract 40,000 visitors and 280 exhibitors

To avoid long queues, visitors are invited to pre-book their tickets by ringing 051-357 1736.

Admission is £5 for adults and £3.50 for children under 16 with £1 off for advance tickets. A pre-paid family ticket which includes two adults and two children costs £12.

The show will be open from 10am to 6pm Thursday and Friday, 9am to 6pm on Saturday and 10am to 5pm on Sunday.

The Computer Shopper Show is being organised by Blenheim Database Exhibitions.

Easy way with words

MINERVA (0392 437756) has entered the word processor market with EasiWord, a package designed to combine easy input with professional output.

Specially written for Archimedes machines and the BBC A3000, EasiWord allows letters, documents and reports to be easily produced in widths from 30 to 132 characters. They can then be shown in any size including large characters for children and extra large for those with poor sight.

A true Risc OS package, EasiWord will allow you to insert, copy, move or delete blocks of text by highlighting the area and to search and replace both globally or selectively. Text can be centred, justified, indented or merged.

By entering embedded commands or by simple menu selection, all these features can be combined with different typestyles.

Text, background and highlights can be in any colour from the palette, making it fun for children.

Documents can be previewed on screen, then printed out simply by dragging the save icon to the relevant printer driver.

Easiword costs £39.95.

BBC Micros aid quake victims

AS the young people of Leninakan piece together their lives after the earth-quake which devasted Soviet Armenia 18 months ago, 24 BBC Micros will be helping them with their computer studies.

Acorn Computers has stepped in to help the

Department of Education and Science equip the city's new Lord Byron School, built with £5 million of British aid and named after the poet who wrote of the country's beauty.

The school was opened by the Prime Minister during her recent visit to Leninaken, the country's second city which was virtually destroyed by the massive earthquake.

As its contribution to the British Government's disaster aid, Acorn provided the DES with 24 complete BBC A3000 systems plus other equipment at 50 per cent of the normal cost. The package includes manuals, 1Mb

upgrades, software, emulators, disc drives, and Midi expansions. The gratitude of the Armenian people was displayed during Mrs Thatcher's visit which produced the first case of "Maggie Mania" when thousands of residents clashed with the KGB to get a glimpse of her.

The Latest 2 Magazines

RISC User

The most popular magazine devoted solely to the Archimedes range of computers and the new



Risc User offers 10 magazines a year, which typically contain:

News on the world of Archimedes Reviews of the latest products Tutorial series for beginners Utilities, routines and advanced programming techniques Ready to run applications Hardware articles

Programs and articles on sound and graphics

Postbag for your letters and answers to your questions Hints and tips on programming Technical queries and expert answers

The programs published in each magazine, plus additional bonus items are also available on disc.

And here are some of the articles and series you missed in the last few months:

Mastering the Wimp – series on Wimp programming Beginning 'C' – series on the C language

Assembler Workshop – all about ARM Assembler
Under the Lid – hardware series
CD ROM for the Archimedes
Watchdog Anti-virus
Using Draw Files in Basic
Desktop File Loader
Review of Multi-sync Monitors
Scanners for the Arc
PSION and Z88 to Arc
Into the Arc – series for beginners

Arcade - latest games for the Arc

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With your subscription you will receive not only 10 magazines a year, but you will benefit from a professional organisation with 9 years of experience in software, hardware, computing publications and support.

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- Alarge range of other products, and a Retail catalogue mailed free to magazine subscribers.
- · Speedy mail-order service.

latest 2 issues Free

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 Trade-in service should you wish to upgrade your equipment.

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Workshop repairs by qualified staff.

BEEBUG offers 10 magazines a year packed with:

News from the BBC world Reviews and product surveys Ready to run applications Utilities and handy routines Tutorial articles and beginner's series

Workshop for the more advanced programmer

Games and games reviews
Postbag with answers to your
questions

Hints and tips on programming

The magazine programs, plus some bonus items are also available on disc.

These are some of the items published in the last few issues:

First Course – beginners series of articles

Practical Assembler – series for Assembly language programmers

512 Forum – a series for users of the PC emulator

Edikit – a library of useful routines for Basic programmers

BEEBUG Education Upgrading to an Archimedes ADFS Desktop

Music Programming in Ample Writing a compiler Using the ROM Filing System Curve Fitting

Games Reviews

I would like to subscribe to BEEBUG Magazi latest 2 issues Free	ine, and receive in addition the
I would like a joint BEEBUG and RISC Use latest 2 issues of each Free	er subscription, and receive the
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Card Expiry Date Signature	
Name	

French nickers nicked

SUSPENDED jail sentences and substantial damages have been handed out by the French courts following the piracy blow struck last year by UK firm GST Software Products.

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Suspecting its French distributor Wings Micro Electronics of selling counterfeit copies of two of its packages, GST called in the police. This resulted in the largest software raid ever carried out in France.

The two directors of Wings have now been tried in the Paris courts and both have been given suspended jail sentences. Damages have also been awarded to GST, the authors and exclusive European publishers of the products and to US companies Digital Research of Monterey and Timeworks Inc of Chicago, both of whom suffered infringement of their trademarks. Lawyers acting for Wings have announced appeals against the decision.

GST is now using Guillemot International as the French distributor of its products, which include Typografica and 1st Word Plus.

More Unix workstations

ACORN has launched a new range of Unix workstations based on the company's second generation Risc technology – Arm 3.

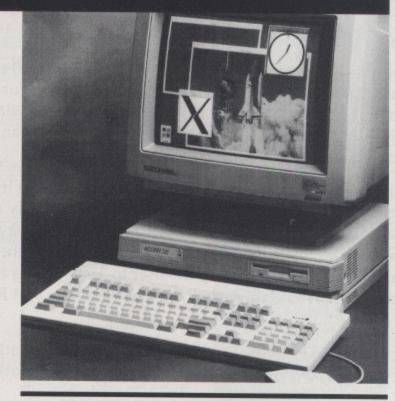
Unveiled at the Unix User Show in London, the new range targets the healthcare market and specialist technical markets such as image processing and computer-based training, as well as universities and polytechnics.

"The new products strengthen the position of the R140 within a growing family of compatible cost effective Unix solutions", said Mark O'Riordan, Acorn's sales and marketing director.

"In the fast moving Unix market we are committed to providing customers with upgradeable platforms compatible with emerging industry standards".

The R260 features 8Mb of memory upgradable to 16Mb and includes a fast access 100Mb internal hard disc. The R225 lacks the hard drive and starts with 4Mb of ram which can be increased to 8Mb. Both units can communicate using industry-standard Ethernet.

The R225 costs £3,000, while the R260 starts at £5,000.



Ears outside the walls

IN the minds of most computer users electronic eavesdropping is consigned to the pages of spy novels, but according to a Camberley-based company this form of intrusion is now a real threat to computer security.

As MP Michael Colvin's Computer Misuse Bill is expected to become anti-hacking law in the autumn, it is claimed that eavesdroppers are moving outdoors and increasingly directing their receivers at computer companies' buildings.

The subject has been given the codename Tempest in military circles and moves have already been made to combat it by placing a Tempest standard into NATO regulations governing electronic equipment.

Commslogic (0276 691222) says that similar precautions should be taken in the computer world.

"The security threat posed by computer hackers and conventional eavesdroppers is well known, but few companies are aware of the existence of this particular form of electronic eavesdropping which should keep those involved in industrial and private surveillance ahead of the pack for years to come", said Dave Perras of Commslogic.

It revolves around the electromagnetic transmissions from computers, VDUs, modems and telephone systems which can be detected by simple radio receiving equipment up to 100 metres or even in certain circumstances, 1km away.

Commslogic offers independent specialist advice on all aspects of data security with particular emphasis on passive electronic eavesdropping.

"This is an area of data security that is set to expand over the next few years", added Perras. "It appears that companies are unaware of the risk. Considerable sums of money have been spent by responsible companies on security measures so that they comply with the Data Protection Act but this is a medium for access which bypasses all other security measures".

Risc man's top post

A MAN whose computer development career at Acorn started with the BBC Micro and ended in the design of the award winning Arm Risc chip set has been appointed to the prestigious post of Professor of Computer Engineering at Manchester University.

It was here that the world's first practical computer was built in the late 1940s.

Steve Furber, 37, is one of Acorn's longest serving employees and is a leading member of its advanced research and development team. He joined Acorn after being awarded a PhD in aerodynamics at Cambridge. He has been involved in the company's leading edge development ever since.

"This highly valued university post was strongly contested and it is a tribute to Steve and indeed Acorn that it



should have been awarded to him", said Acorn's managing director Sam Wauchope.

"Manchester has a very good record for its research in computer science and is generally considered to be one of the leading UK universities in this field".

Wauchope has announced that Acorn hopes to set up collaborative arrangements between the company and the university group which Steve will be directing.

Upward curve

ACORN'S educational package The Learning Curve is beginning to attract inquiries from general business users.

Marketing manager for home markets, Simon Lovesey says there have been 8,000 inquiries generated by television commercials and national newspaper advertising. Of these, 30 per cent were interested predominantly for general business and personal use.

BEERICE

The Archimedes Specialist

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SPECIAL SUMMER PROMOTION

THE A3000 LEARNING CURVE

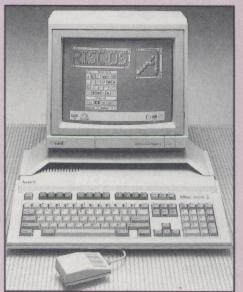
Acorn's new Learning Curve Package consists of an A3000 computer, First Word Plus V2 (the number one Word Processor package for the Arch), the PC Emulator, Genesis (A graphic based database system with a number of sample files). A parent's guide to the national curriculum and a demonstration video (VHS) is also included.

If you purchase an A3000 or Learning Curve from Beebug in addition to the backup service for which we are renowned, we will supply a free Beebug 1Mb RAM board. This board uses surface mount technology to achieve its remarkably small size of 256x46mm. A special feature of the Beebug upgrade is that it is expandable by the user to 3Mb (giving a total of 4Mb), unlike most other products. We believe that this is the best RAM board available for the A3000.

Learning Curve (no monitor)
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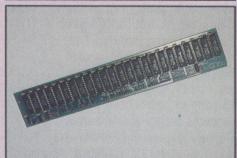
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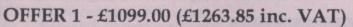
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OFFER 3 - £2099 (2413.85 inc. VAT)

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Please add £230 (inc. vat) for an Acorn colour monitor or £459.95 for a Taxan 775+ Colour Multi-Sync if required..

Please add £8.00 for postage & packaging per system.

Prices & specification subject to change without notice.

BEEBUG Ltd, 117 Hatfield Road, St Albans, Herts AL1 4JS Telephone: 0727 40303 (24 hours) Fax: 0727 60263

It's a music processor

AN innovative new Archimedes package packed with useful editing features promises to bring the convenience of a word processor to the task of music composition and score writing.

Rhapsody has been developed by a physics teacher from Wolverhampton Grammar School and should be available in September from Clare's Micro Supplies (0606 48511) for £49.95.

More than just a sequencer package, Rhapsody puts many editing functions at the user's disposal. It will copy sections of music, transpose them, move them up and down and, most importantly of all, it will print them out on either a dot matrix or laser printer.

Of particular interest to musicians will be its compatibility with Midi. Users can connect up a Midi keyboard, play in music then transcribe what they have played directly on to the staves.

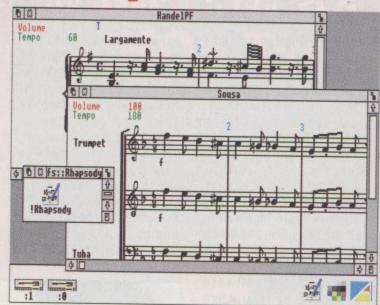
A keen cellist, the developer Mr. J. Linton is aiming his new product at four distinct market sectors. Because they will be able to print out their music and also hear it played back,

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GCSE pupils will be able to make use of the package to improve their composition skills. It will also be useful for teachers who want produce sets of parts.

Musicians will be able to type in the necessary accompaniment then use Rhapsody for practice and home users who are interested in music and computers will be able to combine their two hobbies.

"Rhapsody is not intended for the professional market, although there are plans to produce a professional version", said Mr. Linton.

"It is just a simple and easy to use program with features designed to produce acceptable performances and acceptable music to quite a professional standard.

"It has many features which are not in Maestro but it will load Maestro, files and change them into Rhapsody files".

Written in Basic but compiled with Silicon Vision's Risc Basic, it is fully Risc OS compatible.

Ballistix joins Sam

BILLED as the fastest, wackiest, toughest computer ball game yet, Ballistix will be the star offering on Play It Again Sam 14, the next in the successful series of BBC Micro compilations from Superior Software (0652 58585).

Ballistix features an amazing 60 different action screens. Likely to be teamed with it will be Predator, the computer game of the Schwarzenegger film which challenges players to take a crack commando unit into the South African jungle to rescue a bunch of trapped diplomats.

Other titles for Sam
14 are still uncertain,
but Superior boss
Steve Hanson is considering new game Star
Port from the author of
Quest, Tony Oakden.
It's a space version of
Tony's previous arcade
adventure, Camelot.

Another likely contender is Network from Peter Scott. It's a simi-



Prolific games guru Peter Scott

lar but bigger version of Peter's previous game, Pandemonium, which was a hit on Sam 13.

The Sam compilations cost £9.95 for BBC Micro cassette, £11.95 for BBC Micro disc and £14.95 for Master Compact.

More art on Archimedes

FLARE is a new art package for Archimedes machines which combines ease of use with a wide variety of features.

This latest offering from Silica Software Systems (0227 70279) installs itself on the icon bar. Clicking on this icon enters the package from where all drawing features are available. These vary from shape routines, advanced user defined brushes, area manipulation such as copying, scaling, lightening and darkening to a shadow brush, an undo facility

and the ability to mix colours, producing a range in excess of 32,000 shades.

All functions are available at a mouse click and there are no

All functions are available at a mouse click and there are no complex menu structures to be memorised or difficult key combinations.

Many of Flare's features were added after trials with an education authority in the South West. For individual users, the single copy price is £19.99. There is an educational discount of 25 per cent and a single site licence costs £45.

Silica has also released Desktop C, a front end for Acorn's version 3 ANSI C compiler. This multi-tasks from the desktop allowing users to set all the compiler options from a series of Wimp windows.

Supplied with it are a number of other utilities including a special sticky desktop program which copies files dragged on to it into an area of ram. It makes the use of C version 3 much easier on a single disc drive machines. Price, £14.99.

Passing round the teletext

TServ-Risc is a teletext server for Econet which runs as a multi-tasking application within the desktop environment of an Archimedes or BBC A3000. It allows teletext pages to be sent to BBC Micros and Archimedes machines elsewhere on a network and comes from XOB (030 784 364).

The server accepts requests from terminal software running on any Econet station, downloads the appropriate teletext pages from a Morley teletext adaptor connected to the host computer then transmits them to the requesting station.

Requests from many sta-

tions can be accepted simultaneously and these are dealt with quickly by means of an intelligent cueing system.

TServ-Risc is a full Risc-ware application so the computer running it can also be used for other well behaved applications at the same time. In particular, a given machine may be used both as a teletext server and with suitable additional software as a printer server and still have processing time to spare for additional tasks.

The software without a Morley teletext adaptor costs £87. Software and adaptor cost £205.

Archimedes is cancer aid

AN Archimedes is helping in the early diagnosis of an unusual form of cancer. At the Institute of Laryngology and Orology in London, the Acorn computer is teamed with Digit software to measure minute cell enlargements which are the early signs of verrucous carcinoma.

This innovative computer dianostic aid is the brainchild of Professor Leslie Michaels, a pathologist specialising in ear, nose and throat research.

"With this particular form of cancer, the cells look as though they are a benign condition", Professor Michaels told *The Micro User*. "We have now found that the cells enlarge with verrucous carcinoma.

"The Archimedes is very well set up to make the type of measurements we need to diagnose this".

Previously, Professor Michaels and his staff had to use an unwieldy process of photography and measurement of suspect cells in specimens sent for biopsy. Now they put the histological sections under a microscope and TV camera and feed the information directly into the Archimedes, which does the rest.

"Only today one of the pathologists on the project referred me to a case which on initial inspection he thought was benign – just a wart", added Professor Michaels. "I thought it had the hallmarks of this form of cancer and decided that we would run it through the Archimedes system. It turned out to be cancer".

Russian art goes on disc

HIDDEN Russian art treasures are to go on view for the first time thanks to British technology.

Anglia Television and Interactive Learning Productions of Newcastle University have collaborated to produce an interactive video disc record of pictures and sculptures from The Russian State Museum in Leningrad – many of which have never before been seen in the West.

Specialised software developed by Interactive Learning Productions is being teamed with Anglia's innovative Key Plus database technology to compile this photographic record of hundreds of Russian masterpieces.

Produced for use with Archimedes computers, the first demonstration discs will feature 1200 works of art, including 200 by the artist Malevich and will be ready by September.

Anglia's education officer
Peter Stibbons said: "The
Russian State Museum is
able to exhibit only about
one per cent of its vast collection and has not had a
complete photographic
record of the rest. We anticipate great interest from the
fine art market, galleries and
museums in the West.

"The interactive potential of the system also has exciting implications for educational institutions and we would hope to develop television and video uses as well".

Initial moves on this excit-

Productions.

"When we first started this project we were given the choice of absolutely any machine we wanted", said

ing project were made when

Dean of the Institute of

Mathematics Modelling in the

city of Leningrad, Kirill

Rozhdestvensky, visited this

country on an interactive

video fact finding mission.

One of his ports of call was

Learning

Interactive

Fred Grainger of ILP.
"Because of its power, versatility and graphics capabilities we chose the Archimedes.

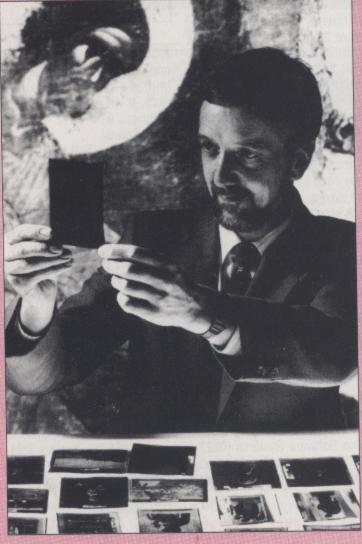
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We tried doing our work with other systems but because interactive video needs speed of access and very quick graphics, we decided the only one was Archimedes".

Marketing arrangements for the Russian art discs have not yet been finalised.



AS an increasing number of smaller software houses go to the wall, business is polarising to the big names in the game.

Typical is Virgin Mastertronic, well known to the Acorn
market for its Melbourne
House and Magnetic Scrolls
titles. It has restructured its
operation because of the
growth in its business. "It now
looks as though our turnover in
the financial year starting
August will exceed £100 million", said managing director
Nick Alexander. "This com-

Top moves at Mastertronic

pares with a figure of around £12 million only two years ago.

"Growing at this rate puts our management under significant pressure while being, none the less, highly stimulating, but it means that periodically we need to strengthen our senior and middle management".

Philip Ley has become gen-

eral marketing manager, Lesley Walker is now marketing manager, Sue Smith is credit and sales administration manager, Nigel Webb has been promoted to artwork and design manager and Catherine Spratt is now marketing coordinator.

"We will also shortly be announcing the appointment of an international director from outside the industry", added Alexander. "We believe these moves will greatly strengthen our marketing and sales management and we are especially pleased that all these positions have been taken by internal candidates, which is further evidence of what a strong group we have in the company".

A BAD debt of £130,000 owed by American company Keypunch, plus continued delays in its latest Elvira product have been blamed for the failure of well-known independent software house Tynesoft.

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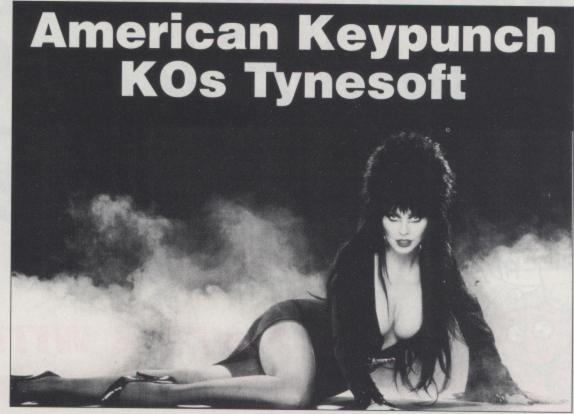
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discs ised. Time and cash ran out for the North East company and receivers have been called in. To add insult to injury, a fire in one of the firm's buildings has since damaged stock which was due to be sold off.

"I cannot raise anyone's hopes. There is absolutely no chance of money being available for unsecured creditors," said Ed Janes of accountants Price Waterhouse which has been appointed official receiver.

"The failure of Tynesoft was due to the combination of two principal problems. In the latter part of 1989 they entered into an agreement with American company Keypunch to produce versions of 10 games for them. For this they were owed £130,000 and they have not been paid one penny.

"The directors believe Keypunch is subject to some



form of administrative hold-up in the USA. While at some stage in the future they may receive some of the debt, that cannot be relied upon in the short term.

"This coincided with delays in the launch of their latest Elvira product, which slipped and slipped. It is now almost complete, but it came too late.

"A few days after I was appointed, a very small fire occured at the premises and some of the stock was damaged by smoke". No one from

Tynesoft was available for comment, but trade sources claim that its affiliate label Horrorsoft will still produce the highly successful Elvira products.

One of Tynesoft's latest hit titles for the BBC Micro was Circus Games.

Making an impression

TWO new versions of the foremost Archimedes DTP package Impression have been announced by Computer Concepts (0442 63933). Impression Junior is a simplified version of the current program and Impression Release 2 is an enhanced upgrade.

Many existing and potential users of Impression feel that it does too much, and this has led to the development of Impression Junior. It is aimed at users wanting enhanced word processing with the ability to create the occasional DTP document.

While certain areas such as styles and master pages have been simplified, Impression Junior looks and behaves like the original package and includes most of its features. New features have been added to extend the character mode word processing facilities.

It is a frame-based program which can use the outline font system plus Risc OS printer drivers, embed graphics at any position and link to other Risc OS applications. Still under

300k long, it can easily fit into 1Mb machines even with a spell checker loaded.

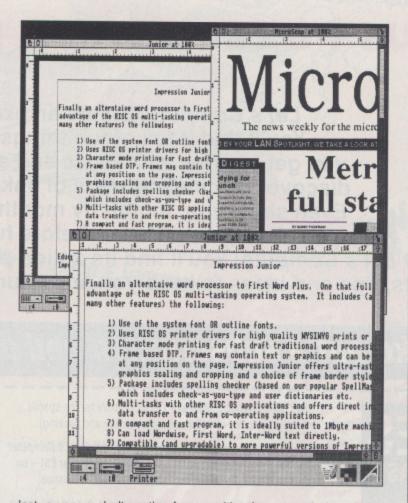
Impression Release 2 is the first major upgrade to the original package. It offers multiple frame selection, grouped frame operation, inside frame repel margins, loadable frame borders and enhanced print options.

For effects, a completely new main menu option allows any portion of text to be altered without having to define style. It is completely compatible with Release 1 and with Impression Junior and includes the new features of the latter.

Among other facilities are a show text flow option, quick graphics panning by mouse drag, rulers round the edge of the page and better template handling.

Said Charles Moir boss of Computer Concepts. "Impression has become the standard DTP program for the Archimedes and we are now stretching the range so that the Impression family covers all aspects of word processing.

"Impression Junior is, at



last, a very real alternative for First Word Plus, while Impression Release 2 extends the gap between other DTP programs, some not even released, and Impression".

Release 2 will cost £169.

with a free upgrade for existing users.

Impression Junior will cost £89.95. As *The Micro User* went to press, both were estimated to be six weeks away from release.

MICRO USER August 1990 13

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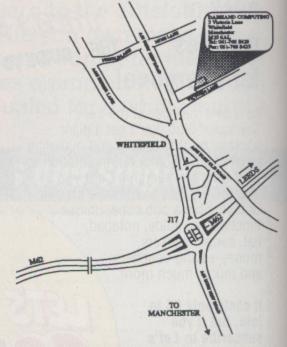
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This advert was produced in Impression and printed by Laser Direct which are products by Computer Concepts (see above for prices).

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Each young genius may have his or her own name on the icon bar,

it also appears on the title bar of the text window. So their own masterpieces can be filed and called up whenever they want. The teacher has total control, however, being able to specify certain menu options inactive (the only thing worse than a wandering mind is a wandering mouse).

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Giving mathematics child appeal

SEEKING a new approach to maths and the National Curriculum, Bill Bonham of Sherston Software (0666 840433) has come up with Connections, a package designed to make maths appealing to young children and to sustain their interest.

Written by Simon Hosler, Connections supports the maths demands of the National Curriculum to levels 1 and 2. It challenges children to alter the contents of various windows so that their connections are correct in line with various maths activities. These include addition, subtraction, money, halves, quarters, odds and evens, graphs and shapes.

Through a control menu, the teacher can select a wide choice of attainment targets at levels 1 and 2. Activities can be shown on screen or printed out as worksheets.

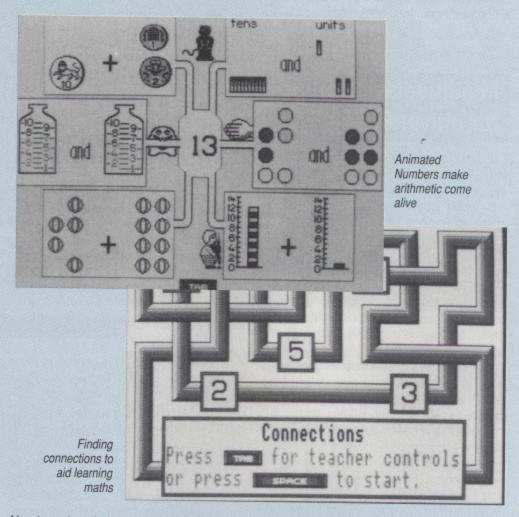
The package comes with start-up disc, copyable work disc, Concept Keyboard overlays, children's introductory and key cards, a quick guide and a teacher's manual. Until July 31, it costs £25.87. After that date, £28.75.

Also new from Sherston is Animated Numbers, a follow up to the company's successful Animated Alphabet. It brings numbers to life in three interconnected activities.

In Ladders, the children have to help Numberbod find the right number to match a set in a ladder maze. In the Pictures section, children have to type the right number to start an animated number story and Links provides practice for simple set work.

Designed to help children get to grips with simple number concepts, Animated

UPDATE



Numbers is relevant to level 1 of maths ATs 2,3 and 4. Fully compatible with the Concept Keyboard, it comes with both A3

and A4 full colour illustrated overlays and a teacher manual. Introductory price until July 31 is £17.25. After that date, £20.12.

Polytechnic lab uses Risc technology

STUDENTS in one of the largest computer science departments in the UK are being given their first taste of Acorn's Risc technology.

Local MP Bill Cash has opened a new computer laboratory at Staffordshire Polytechnic which has 8,000 students and a computer science department boasting more than 1,000 students and 80 staff.

Computers for the new facility have been donated by Acorn Computers and Crewebased Acorn dealer 3SL. Ten R140 workstations are networked together using standard Ethernet communications and give access to the department's mainframe computer. This allows students to work individually while also gaining valuable experience programming and operating networked systems.

"We are delighted with the new facility and we are very grateful to Acorn and 3SL for supporting the Polytechnic", said Dr Roy Newton, head of the computing department. "The machines are powerful and flexible for use across a wide range of computing applications. In particular, we will be using the R140s to teach students about new high-speed Risc computing architecture".

Opening the new laboratory, Bill Cash MP said: "Staffordshire Polytechnic has a first class and nationally recognised reputation in the field of computing and if Britain is to remain competitive in the increasingly high tech world, we must encourage this type of co-operation between industry and education".

Capital idea for small fingers

YOUNG children are taught to read and write in lower case – a fact not catered for by computer keyboards. SFA Computers (041-840 1477) has now designed a lower case keyboard overlay for use by small children.

It allows children to access all keys as

lower case avoiding the confusion of converting to capitals when starting to do computer work. The overlays are available for most makes of computer at prices starting from £12.63 with special discounts for bulk education orders.

Package keeps track of absentees

THE need to keep comprehensive pupil attendance and punctuality records often gives senior school staff the chore of repetitive reference to class registers. Now a computer program has been developed to do the job.

Mark Master from Chalksoft (0775 69518) has been developed over four years in a large comprehensive school. It allows staff to print out good or poor attendance lists, class and year lists and to produce attendance statistics.

Once the program is set up it's just a case of updating it each week from class registers. Mark Master will show percentage attendances by the week, name pupils with less than 80 per cent attendance, point to those who are the worst offenders for lateness and will also highlight those with good records.

The A3000 version costs £69 and versions for the Master and BBC B each cost £59 on either 40 or 80 track discs.

Multimedia packs for universities

DIGITHURST (0763 242955) has launched MAP90, a multimedia awareness project designed to help universities and other educational establishments develop multimedia applications and databases.

Aiming MAP90 at the scientific and medical fields, Digithurst is giving away 50 multimedia packages which include the MicroEye 1A video processing unit and a copy of the multimedia authoring software package PictureBook for use with Riscbased Archimedes machines. Each pack is worth more than £500.

MicroEye 1A captures video images and enables them to be processed under Risc OS. PictureBook is a hypercard-type multimedia package which allows text and images to be linked by association. It interfaces to expert system software which can be used to prioritise data and enable PictureBook to find its own links between data items.

"We are looking for establishments which can come up with bright ideas for the use of multimedia", said a spokesman for Digithurst.

The scheme will run until the end of the year. Application forms for eligible organisations are available from Digithurst Ltd, Newark Close, Royston, Herts, SG8 5HL.

Kiwi programmers are making good

WHILE most software houses look close to home for their programmers, Mike Matson of 4-Mation (0271 45566) has gone to the other side of the world. All his education packages are now written by a team of bright youngsters in New Zealand – most of whom he has never met.

Last year Mike decided to concentrate on the Archimedes market. He had previously written 8 bit programs himself but soon realised that the demands of the 32 bit market were more than he could cope with. While on a lecture tour in New Zealand he met 16 year-old Arc programmer Karl Ansley of Christchurch. After returning to the UK, he sent Karl an idea built around jigsaws. "I heard nothing more



Multimedia set to takeoff

for a couple of months and then through the post I received an excellent piece of programming", said Mike.

The program was Jigsaw which has already been added to 4-Mation's list of best sellers. Karl has since produce a junior version called Jiglet and another program called Snippet.

Through contacts in New Zealand, Mike has since taken on Dave Caughley of Wellington and Paul LeBeau of Christchurch. Both in their early twenties, they have produced Poster – the latest addition to the 4-Mation range and are now working on two new ideas.

"Last year I gave out some ideas to different people in this country, including local education authorities, and I got absolutely nothing", said Mike. "In comparison, the Kiwis have come up trumps every time".

Mike will meet up with his unknown programmers for the first time later this year when he returns to the Antipodes.

Micro art goes on show

FIVE educational programs specially produced by Topologika (0733 244682) are being featured in the largest art exhibition ever held for children. It is part of the cultural celebrations taking place in Glasgow.

At The McLellan Galleries until August 26, The Art Machine has been organised by Glasgow's museums and art galleries and is jointly sponsored by Acorn Computers, Central TV and Roland UK.

Acorn has donated 16 of its A3000 micros, 10 of which are fitted with concept keyboards. Young visitors to the exhibition are encouraged to take an active part rather than just looking. To promote this, Topologika has produced the five programs which have artistic themes combined with maths.

Pattern Tiles allows them to arrange patterns with four colour square tiles. Snowflake let them explore fractals, Cyclic Story is an environment program which challenges youngsters to create a cyclic story, Moving Squares lets them create their own motion pictures and Fractal Trees lets users design trees, then watch them grow.

The five A3000 packages with a 48 page book cost £19.95 if bought at the exhibition, but will go on general sale for £29.95.

Also new from Topologika is Astro, a desktop space exploration package with seven programs which allow children to seek out the wonders of our solar system. It costs £19.95 and is available for Archimedes machines and BBC Micros.

For the same formats, Untrivia is based around the trivia quiz idea. By using it, teachers can test their pupils' knowledge of maths and a future program will take in science subjects. The system disc costs £9.95 and quiz discs are £9.95 each.

Rounding off Topologika's latest releases is a new support disc for its best-selling maths adventure game Giant Killer. Price, £14.95.



The Commodore A500 Batman Pack must surely rank as one of the most popular computer packs ever! The pack features the Commodore Amiga 500 computer with mouse controller and TV modulator, plus four top software titles. The software includes: 'Batman The Movie' - Rid Gotham City of the cunning joker, in Ocean's top selling title based on the blockbuster Batman film; New Zealand Story - high quality conversion of the leading arcade game; Interceptor - Dogfight with two F-16's in this leading flight simulator; Deluxe Paint II - top quality Amiga graphics package which set the standard for others to follow. Return the coupon for further details.

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Which computer(s), if any, do you own?

A2000



Mightier than the software to the software to

OR the past year those junior schools that have bought an A3000 have been waiting for a word processor to go with it. So far promised are Folio, a package from Clares, and PenDown from Longman Logotron. The latter finally arrived, as a review copy at least, and looks as though it will fit the bill for many schools.

The 32 bit PenDown is not a re-write of the BBC Micro version but a completely new system. It is fully multi-tasking and when double-clicked from the directory viewer it loads in and sits happily on the icon bar

It appears to take very little space in the machine, so there will be room for a database to work alongside it.

You cannot edit more than one PenDown document on the screen at once in the way !Edit will, but you can load up more than one copy of PenDown if you really need to.

Clicking on the icon produces a blank page with a ruler and icons. However, the disc can be easily configured to come up with a blank sheet automatically, hiding any or all of the icons and menus, which immediately gives you a package that will grow with the child.

They could start with a large font and just the save option available, being introduced to the more complex options gradually as time goes by.

The caret looks as it does in all Archimedes software and can be moved around with the arrow keys or the mouse. Using a mouse to move around the text can seem awkward, but you and the chil-

Product: PenDown
Price: £39
Supplier: Longman Logotron, Dales
Brewery, Gwydir Street, Cambridge CB1
1BR.

dren will soon get used to it, especially if other mouse-driven software has been used before. You need the mouse anyway for large movements, using drag bars at the side of the screen to move through the document.

Clicking on the ruler icons gives access to a variety of functions which use the mouse and windows in the standard Risc OS form.

Several fonts are provided: Jumbo is a standard blocky infant style, Lineout and Relief give nice effects and Trinity can be used for normal typing.

All are anti-aliased - that is smoothed - and can be sized from unreadably tiny up

The search and replace window is quite sophisticated and includes the ability to search for whole words only

Converting
software to the
Archimedes is
quite a task.
Marshal Anderson
checks out the
success of the
new PenDown

to almost one letter per page. There was no problem getting the package to use other fonts like the ones on the applications disc. Just insert the disc, click on the disc icon and also on the font.

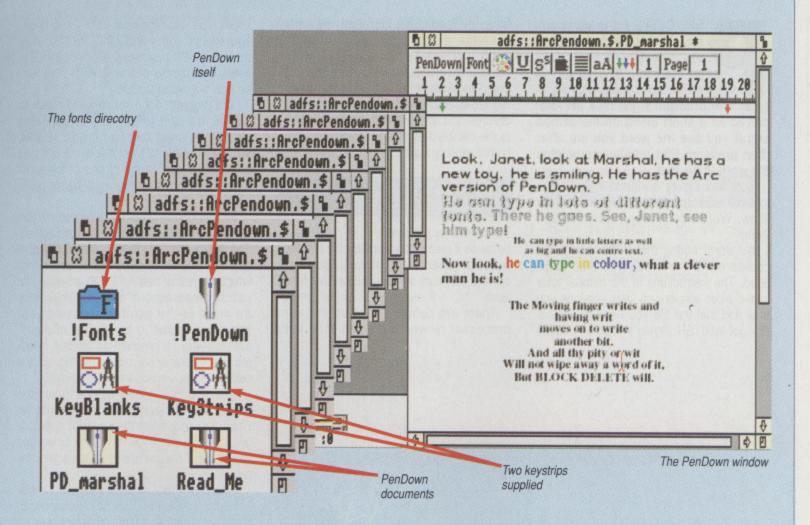
If you try this remember that the font file has to be on the disc containing your text – a little experimentation will get you there. As well as controlling the overall size of the font you can alter the height independently, which offers considerable variation.

The next icon accesses colour – 16 are available – for use with a colour printer. This is followed by underlining in three widths and at three heights plus sub and superscripts.

The formatting icon has the usual justification options and leading (pronouced *ledding*) gives control over the line spacing in 72nds of an inch, the standard print unit. There is also a case change option.

For all of the above you can act on the whole document, from the cursor line down or on marked text. Text is marked from the caret by holding down the right button and dragging the mouse to the end of the text you want. While it might seem like a lot of effort to mark and, say, separately colour all the letters in a single word, the mouse breezes through it.

The ruler can be set in centimetres, inches or picas (sixths of an inch) so you can tailor work to fit pages or displays with



pre-set sizes. Additional rulers can be brought into the text to affect the caret line or a marked block. While the current ruler settings are shown at the top of the screen the ruler position is not shown in the text.

I can't help feeling, that this is an error, as rulers can have surprising effects and you can loose track of them as you go back to text after a day or so.

You can also have a vertical ruler on which top and bottom margins can be set.

Taking the pointer into the text area and clicking the centre button produces another menu, from which you can save work as PenDown files or plain text by dragging in the approved manner. You also print here, though you will need a standard printer driver.

The page option gives overwrite or insert modes and page sizing. This allows setting the page width and length in millimetres and gives a range of standard sizes as well as choosing alternatives. The scale of the display can also be altered.

Edit gives access to word and line deletion and block manipulation. Blocks may be moved, deleted or cleared and the PenDown bin has been carried over from the earlier version.

Blocks may be deleted or copied to the bin where the text is saved for later use. This is a neat idea and one which junior school children readily understand.

The search and replace window is quite sophisticated and includes the ability to search for whole words only. This really is good because it stops the package coming up with words within words and allows you to use the automatic option, where all occurrences are replaced without refer-

ence to the user, with confidence.

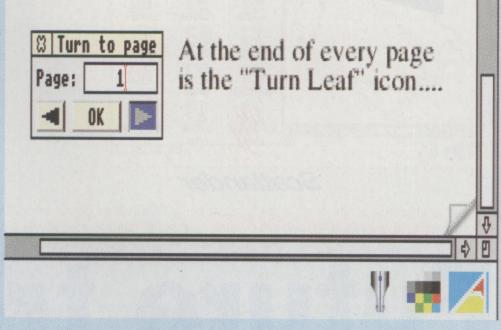
Many functions will operate from combination key presses or the function keys; the latter can also provide foreign characters.

Not every original PenDown function of has been carried over yet. Omitted from this version are the dictionary and planning functions which were so useful in earlier versions.

The manual is of the highest quality – even the pre-release version I was supplied with – and is full of helpful ideas on classroom use as well as clearly setting out the package's operation.

Summing up

PenDown works very well and can be thoroughly recommended to both junior and the lower end of secondary schools. It makes full use of the Arc environment but never gets too complicated because of the thoughtfully designed menus. The real test will come when it is held up, for price and facilities, against the other packages now under development.



There are three ways of changing page



REDICTYPE 3, the latest version of Scetlander's typing aid, monitors your key presses and tries to guess which word you are trying to type. The program's guesses are displayed as a short menu on the screen and if you see the word you are after then pressing that number completes the word in the text.

Scetlander have designed the package to work with specific word processors – View, Wordwise (Plus), Interword and Writer.

It's worth noting that Writer has to be copied on to the Predictype disc to be used. The instructions in the manual refer to the older version; on later versions you may find that the file you need to copy is RIX not WRITER. Trying to load an overlay

file with Predictype installed will cause problems.

It's uses are fairly plain: It will enable anyone who has trouble using the keyboard to move on with more speed, ranging from young children through older children and adults with learning difficulties to the disabled who can manipulate a keyboard but only slowly.

Viable tool

This final application is very exciting because it means that, at £35, the machine becomes a viable tool for many users without the addition of more expensive hardware.

There are options to set up the word processor to work with and then load

Predictype into sideways ram – the package will not work without this. As is usually the case with programs resident in sideways ram, some of the BBC B rom/ram boards will cause trouble.

The program does not seem to check to see if the ram is already in use and insisted on using rom four on my Master, so you will have to bear this in mind if you are using a rom image of one of the word processors or any other rom-based software.

Having chosen your word processor you select a word list from the Predictype disc. Those provided are Basics, which will give you 128 frequently used words and Long, which contains nearly 1,500 words. The package introduces is no discernible delay on most of the word processors, but Interword seems to be slightly affected. This is really no problem as anyone needing this package will not be typing quickly enough to be worried by slight delays.

At first sight it seems natural to use the largest word list available but this is not the case. You should set the word list appropriate for the user, thus removing unwanted words from the menus and speeding the process.

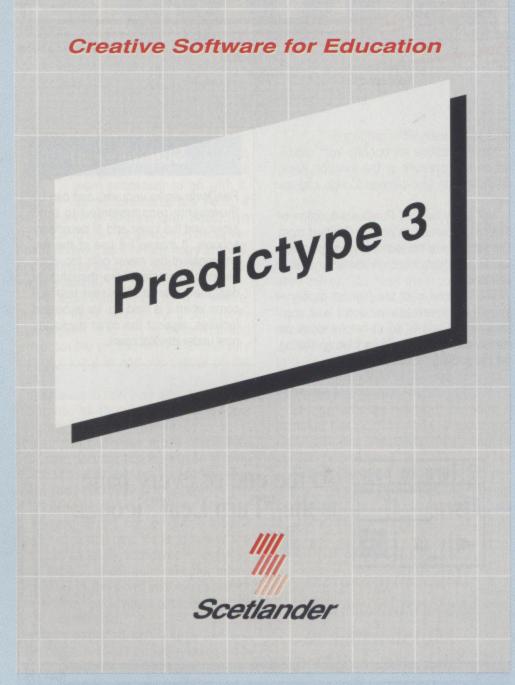
Another option allows you to set Predictype to learn. This has two aspects, the first is the frequency with which a word is used seems to raise its position in the menu shown. The second is where Predictype remembers new words and includes them in subsequent predictions. Thus the package tailors itself to the individual user.

Predictype will learn incorrect as well as correct spellings so the option to turn learning off will be important if you are using the package with people who have spelling problems!

One way round this is to edit the word list. This can be done by loading it into a word processor where you can change not

Product: Predictype 3
Price: £35
Supplier: Scetlander Ltd., 74 Victoria
Crescent Road, Glasgow G12 9JN
Tel: 041 357 1659

A package that
guesses what
you're typing?
Marshal Anderson
shows it has its uses



Future trends

An exciting package with applications at many levels

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only the words but also alter the expected frequency. This means that you could set up a vocabulary to be used with specific project work. You can also have Predictype learn all the words in an existing text file.

These features will let you build up a library of files for use in different circumstances and make the package very useful indeed.

Scetlander says you can use Predictype with most programs which need text to be typed in. Unfortunately this did not turn out to be the case. You can enable Predictype with *PREDICT but pressing Break disables it.

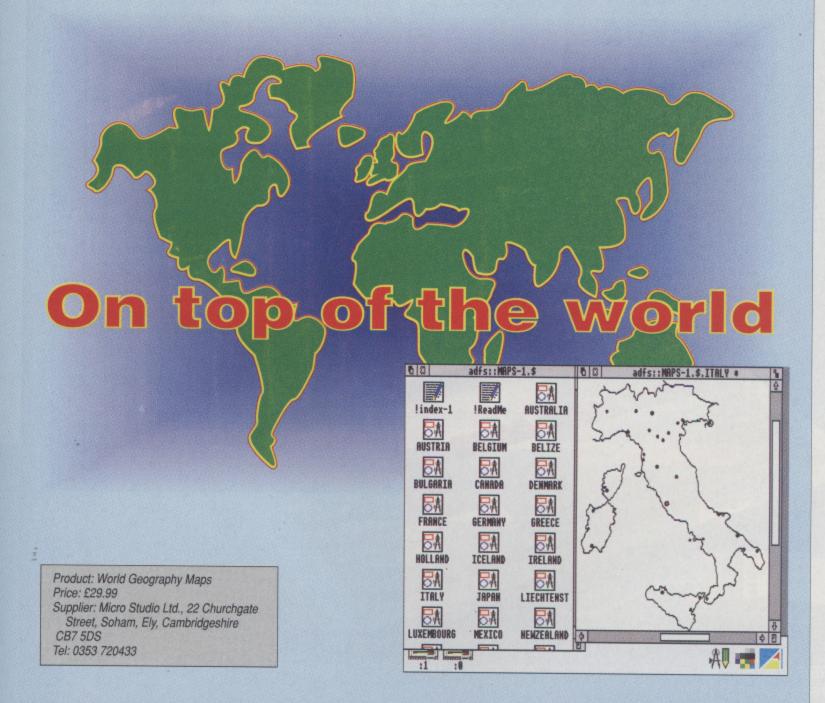
Getting around this with *EXEC !BOOT lets you try out various packages. The only adventure I found it worked well with was Giant Killer, while Worst Witch, L and Puff wouldn't cooperate.

It worked after a fashion with The Sorting Game and Branch, but the screen's of other packages like Our Facts and Logotron Logo were messed up.

It did work with Quest, and has a very practical application here presenting the unmemorable key words. It is compatible with simple text processors like the file creators in Tray and Teletype, perhaps expanding their use.

Summing up

This is an exciting package with applications at many levels. If you use any of the word processors covered it has to be a worthwhile investment.



ORLD Geography Maps from Micro Studio is the first really impressive set of !Draw files for the Archimedes or BBC A3000 in schools.

It is a set of outline maps of more than 100 countries along with their capitals, major towns and major bodies of water. They are saved as !Draw files and thus are easily imported into Impression, the Acorn Desktop Publisher, 4mations's Poster or any other package that accepts such files.

The only real problem with it is the map's large size, but you can soon reduce them using !Draw's scale function and then add anything you wish. Another nice thing

about using the scale facility is that you can give the impression of different projections.

With this package you will be able to produce excellent worksheets, illustrations for newspaper articles, OHPs and so on. No self respecting geography department should be without it.

Marshal Anderson

Tel: 0276 72046 Fax: 0276 51427

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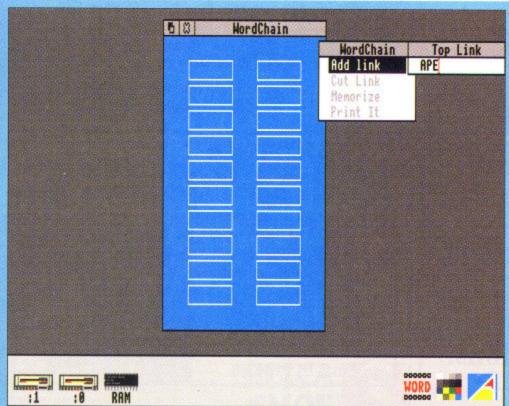
ORDCHAIN is a DeskTop application for the Archimedes which designs and prints versions of Lewis Carroll's famous Doublets word puzzles. The victim is given start and finish words and must change one into the other by the use of friendly link words.

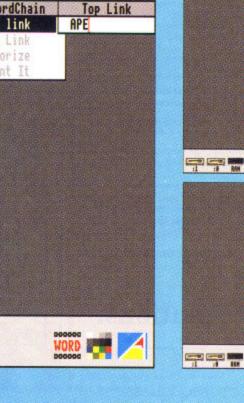
A friendly word is one that differs from another by only one letter. For example, words that are friendly with port include Sort, pArt, poSt and porE. To add to the elegance of the puzzle the word that starts the chain and the one that concludes it should have an association of some kind. such as LOVE to HATE. Here's a puzzle along with its solution created by Martin Hansen brings a 19th century word game to the most modern of micros

!WordChain which turns APE into MAN:

APE APT OPT OAT MAT MAN

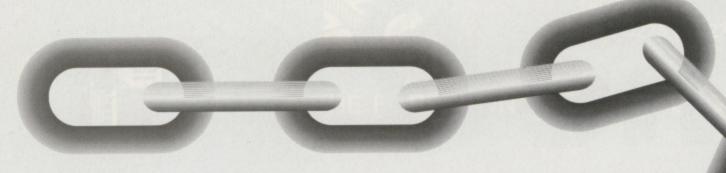
The program is on this month's disc that





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WORD THE PARTY



goes to subscribers to The Micro User. Load !Wordchain by double-clicking it, click the icon on the icon bar to bring up the window. Now let's create a new Doublet.

Move the mouse pointer over the !WordChain window and click on Menu. The main menu will appear on the right hand side of the window. This non-standard arrangement was used to prevent the menu from popping up on top of what you're looking at.

Move to the Add Link submenu and type in a three letter word - MOT perhaps. After pressing Return or clicking Select this word will appear at the top of the first vertical box. Click Menu again and move to the Add Link submenu.

The power of the program is now clear because all the words that MOT can be transformed into according to the rules will be listed.

The top entry is COT, which you may

select using the mouse. Follow the same procedure and add more links: CAT and then CAR. You can use the Print It option to obtain a hard copy and the puzzle half can be given to a friend for solution.

The other menu entry - Memorize simply transfers your current idea to the left hand column. This is simply a store in which promising ideas can be parked. Selecting Memorise a second time retrieves the design.

Clicking Menu on the icon on the iconbar calls up a second menu which contains Info, a restart option called New Chain and Quit.

The !WordChain database contains words of three, four and five letters in length. More can be added quite easily and will keep you out of mischief for quite some

The words need to be placed in DATA statements and separated by commas. The number of words to a line is unimportant and so too, within limitations, are line numbers. The boundaries are clearly marked by:

DATA "*****"

There are REMinders at the end of the !Runfmage program.

 Writing a DeskTop application is a most satisfying achievement. It demonstrates that the latest Acorn micro is very much an enthusiast's machine and even with modest effort is capable of being programmed to a high standard.

Due to its length the !WordCheain program cannot be reproduced here. Archimedes subscribers will find it on this month's Micro User disc.

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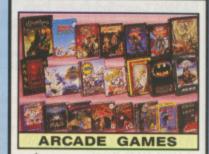
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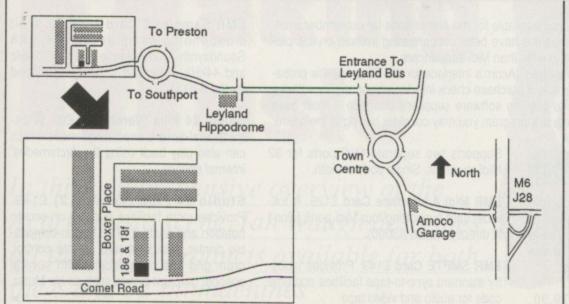
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On the BBC Micro

WHEN it first appeared the BBC Micro was acknowledged as having the best sound system of any home computer. Since then it has lost its leading position, but the quantity of dedicated hardware and software still continues to increase.

Hybrid Technology

THE Hybrid Music System is unique in the world of computer music. It is a self-contained system which is entirely driven from software running only on the BBC Micro.

One of its major features is its ability to store both voice sounds and music together conveniently as one file, something few other music systems can do. Partly because of this, its flexibility and its low price, the Hybrid Music System has become the de facto standard computer music system in education.

The basic unit is the Music 5000 which can produce 16 channels of sound. These are usually paired to give eight voices – eight-part multi-timbral in Midi-speak.

The system runs under a language called Ample (Advanced Music Production Language and Environment) housed in the Ample Nucleus rom and the software includes a number of easy-to-use front end modules to help you create music.

You can enter notes on the stave in traditional notation in the Stave Editor or in Notepad, a text-based music editor, using Ample's own MCL – Music Programming Language. There is also a computerised Mixing Desk which lets you adjust tempo, transposition and each voices' volume and pan position in the stereo image.

The Music 4000 keyboard lets you record music in real time and then edit it using Ample's programming facilities.

The Music 3000 adds another 16 channels of sound to the system, effectively giving you a 32-channel, 16-voice synthesiser.

The Music 2000 is a Midi interface which lets you apply Ample's powerful programming techniques to synthesisers, expanders and other Midi devices.

The Hybrid Music System is the most powerful, affordable music system running on any computer. It can be used at a very basic level – for example, to mix a prerecorded piece of music – as well as for highly sophisticated musical applications.

It can integrate music and graphics and produce computer-assisted compositions, teaching aids, sophisticated Midi instrument control programs and perform many other functions which can be accomplished by a computer language.

One of Hybrid's most recent releases is the Ample Toolbox, a collection of extensions to the Ample Nucleus and Studio 5000 software. It contains three new Ample modules plus two programs.

The modules include TEDIT, a fullscreen text editor which lets you scroll up and down and left and right through the text. It can hold several words – Ample program instructions – at the same time making it easy to merge and split word definitions

IEDIT is an image editor for creating Mode 7 graphic screens. It's quite sophisticated and rivals many dedicated teletext screen designers.

The Utils module includes a line editor which provides a command-driven method of entering words, plus eight extra system words. These include MERGE (self-explanatory), COMPILE (which reduces the size of a program and may make it unlistable), DECOMPILE (to make it listable again) and SPARESHOW and SPAREDELETE to help removed unused words.

The two programs include an Ample program recovery utility and SideMod which lets you store Ample modules in sideways

RAM. This is incredibly useful, especially if you use DFS and even more so if you only have one disc drive.

Hybrid's most recent release is the entry level Music 5000 Synthesiser Universal which uses the Music 5000 hardware with software which resides in sideways ram. It runs in conjunction with all correctly-written BBC Micro music programs and channels their sound to the Music 5000.

If you don't have an external amplifier, it will play the Music 5000 sounds through the internal speaker, which makes it a very cost-effective system, especially for education.

New releases include Soundspace and Soundscape, programs for the mentally and physically disadvantaged.

Hybrid also publishes around 20 albums of music (£4.95) created by HMS users. Panda Discs has more than a dozen Ample albums (£6.00) in its catalogue and there are a few independent music album publishers such as JB Software, which is the outlet for John Bartlett's excellent Jazz discs and Impressions album (£3.50).

Hybrid Technology Ltd, 273 The Science Park, Cambridge, CB4 4WE. Tel: 0223 420360.

Panda Discs, Four Seasons, Tinkers Lane, Brewood, Stafford, ST19 9DE.

JB Software, 20 Crawley Avenue, Wellingborough, Northants, NN8 3YH.

ElectroMusic Research

EMR was one of the first companies to develop Midi software for the BBC Micro. There are currently over a dozen programs in its catalogue falling under the generic heading of Miditrack. In most cases each piece of software and hardware can be used in conjunction with the rest.

Each program is purpose-written and

On the Archimedes

THE number of hardware Midi interfaces available for the Archimedes far outnumber available sequencer programs. Many companies have been concentrating instead on sample-based programs, which are far easier to write than Midi sequencers.

Not all software will run with all interfaces. Acorn's interface for the I/O podule is probably the least compatible. Before you make a purchase check interface compatibility with the software supplier. The safest bet is to buy the software supplier's interface – most have their own – but check compatibility with any program you may consider buying in the future.

ElectroMusic Research

EMR continues its policy of supporting Acorn products with a growing range of music software for the Archimedes. These come under the generic heading of the Arpeggio Music System and includes:

EMR Midi 2 Interface Card £79.90.

Supports two separate Midi ports for 32 Midi channels. Single podule width.

EMR Midi 4 Interface Card £129. A full-width card supporting four Midi ports (won't fit directly into an A3000).

EMR SMPTE Card £149. Provides industry standard sync-to-tape facilities and time code for audio and video tape

EMR Sampler 8 Card £126.50. 8-bit monophonic sampler for use with Soundsynth. Dual sample rates of 22kHz and 44kHz. A version is being developed for the A3000.

Studio 24 Plus (Version 1) £99. A 24-track real-time biased sequencer which can also play back using the Archimedes' internal sounds.

Studio 24 Plus (Version 2) £149. Provides extra facilities such as on-screen notation and printout to an Epson-compatible printer, Midi keyboard remote control, drum grid and compatibility with several optional graphics pages such as Vu-Music.

cannot be extended like Hybrid's Ample programs, however as dedicated software some people may find them easier to use.

Here's a run-down of the major items:

BBC Midi Interface £79.90. Connects to the BBC Micro's User Port and 1MHz bus. It has one Midi In and two Midi Out sockets plus sync facilities.

Performer £49.95. An eight-track real-time biased sequencer.

Pro-Performer £69.95. A 16-track real and step-time sequencer with software on rom.

Composer £29.95. A six-track step-time sequencer. Accepts input from the computer or a Midi keyboard.

Notator £29.95. Individual track notation for the Composer.

Vu-Music £14.95. Converts external Midi input to on-screen graphic displays. It's a stand-alone program which doesn't run with any of the sequencers.

Scorewriter £129.00. Two roms plus utility disc. Allows the construction and printout of scores. Two additional utility discs are available. Disc One (£19.95) converts music to Performer format. Disc Two (£39.95) prints out Performer tracks

Handimusic 1 £29.95. Composer for the handicapped which is controlled by a single switch.

Singad £99. Developed for education, the system monitors vocal input and gives visual feedback of the pitch.

Voice editors are also available for the following instruments: Yamaha DX7 and TX7 synthesisers; Yamaha FB-01 expander; Casio CZ101, CZ1000. CZ3000, CZ5000 and CZ1 synthesisers; Roland MT32. All editors are £29.95 each.

ElectroMusic Research, 14 Mount Close, Wickford, Essex, SS11 8HG. Tel: 0702 335747.

Umusic

UMUSIC's range of Midi programs for the BBC Micro were originally designed for the professional market, although they can be used by anyone.

There are two main packages which include both Midi interface and software and each has an optional Micro Editor which offers various edit facilities such as altering pitches, velocities and timings.

All software is in rom and the programs are therefore instantly available by entering *UMI. It takes the unusual but useful step of using shadow ram for note storage to compensate for the BBC Micro's limited memory, giving a very respectable 52k for music storage on machines that have the extra ram.

UMI is a pattern-based sequencer which lets you create up to 127 patterns of varying lengths and join them together to form a track. The system supports up to 16 tracks each of which can be routed to a different synthesiser.

The Stave Editor/Display rom – £120, but free to educational establishments – offers sophisticated note display and scorewriting facilities.

Umusic also has a range of system exclusive dumps which allow you to store synthesiser voice data on disc and save a fortune in ram packs.

Dumps are available for Yamaha's DX7, DX11, DX21 and DX100 (£30 each) and Roland's MKS70 (£40), MKS80 (£50), Juno 106 (£40), D50 (£50) and D110

(£50). Casio CZ dumps will be supplied

There is also a Universal Dump (£150) for synthesisers which do not require twoway communication.

UMI-3s £200.00
Micro Editor for 3s £96.00
UMI-4M £280.00
Micro Editor for 4M £120.00

A super version of the 4M is also available for £600 which supports Midi Time Code. All prices include p&p but exclude VAT.

Umusic Ltd, 17 Parkfields, London, SW15 6NH. Tel: 081 788 3729.



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In this comprehensive overview of the Acorn music scene, Ian Waugh describes all the major products available for both the 8 and 32 bit machines

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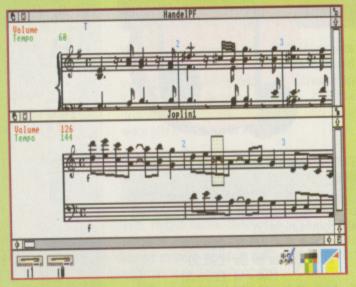
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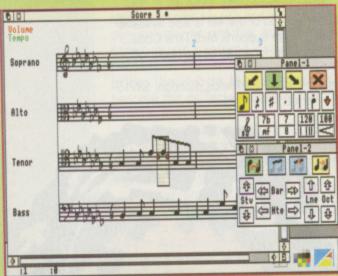
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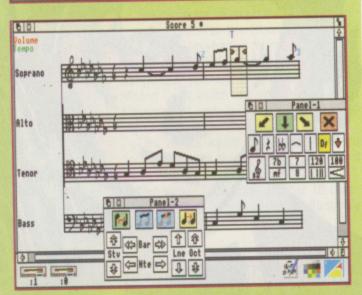
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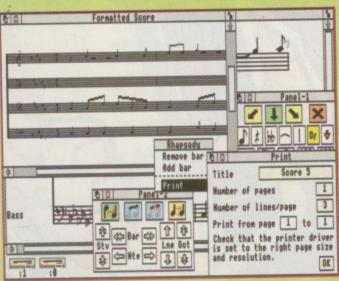
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Example pages from Rhapsody

It is also SMPTE-compatible when used with EMR's SMPTE card.

Soundsynth £49.95. Allows the creation of internal waveforms for use with EMR programs and Maestro.

Creations Sample Disc Library £6.95 each, all six for £49.95. A six-disc set containing a wide range of music and sound effects. Disc 1, 34 mixed sounds; Disc 2, 38 orchestral and acoustic instruments; Disc 3, 27 animal noises and human voices; Disc 4, 28 spectacular sound effects; Disc 5, 22 more spectacular sound effects; Disc 6, pop, Latin and orchestral percussion.

Handimusic 1 £29.95. For those with special needs. A melody can be created by tapping a single switch.

Scorewriter PMS £499. Produces fullscore notation printout using a text-based language. Requires an Arc word processor and Postscript laser printer.

Vu-Music £14.95. Produces graphic displays from incoming Midi data. A module is available to let it run from within Studio 24 Plus Version 2.

Rhythms Box £29.95. Stand-alone program which uses the Archimedes' internal sounds to create drum patterns on a grid. Can't transfer patterns to Studio 24.

Symphony £9.95. Demonstration disc containing a variety of music which can play back via Midi or with the Arc's internal sounds.

ElectroMusic Research, 14 Mount Close, Wickford, Essex, SS11 8HG. Tel: 0702 335747.

Clares Micro Supplies

Armadeus Software £79.95. Armadeus Sampler Board £149.95. Armadeus is sound sampler software which can be supplied with a sampler board as well. It runs under Risc OS and allows quite sophisticated manipulation of samples. It can read a wide variety of sample formats including those on Atari ST discs.

Editing facilities include zoom, telescope, append, overlay, reverse, echo and fade in and out. There are filter options to help produce clean samples and a resampling feature can reduce their size.

The software is compatible with Armadillo, Unilab and Wild Vision sampler boards as well as its own Armadeus board.

Rhapsody is Clares music composition and playback software. It allows you to compose in full manuscript notation — with few limitations — on up to 24 staves. Playback can be through the Archimedes or A3000 sound system or though a Midi instrument.

It will input Maestro music files and convert them to Rhapsody format. Its facilities far outstrip Maestro. Fully working versions of this program exist; it's due to be released in September.

There's a demo version on this months subscription disc for the Archimedes.

Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire, CW9 7DA, Tel: 0606 48511.

MJD Software

THE Archimedes Voice Generator (£59.95) is an excellent utility which lets you create sounds in standard Archimedes Relocatable Voice Modules which can be

Suppliers codes for Product Guide

- ACO Acornsoft, 645 The Technopark, Newmarket Road, Cambridge. Tel: 0223 214411.
- ADV The Advisory Unit, Microtechnology Education, Endymion Road, Hatfield, Hertfordshire, AL10 8AU. Tel: 07072 65443.
- AVP Computing, School Hill Centre, Chepstow, Gwent, NP6 5PH. Tel: 0291 625439.
- BBG Beebug Publications, Dolphin Place, Holywell Hill, St Albans, Herts, AL1 1EX. Tel: 0727 40303.
- CAM Cambridge Software House, Town Hall, St Ives, Huntingdon, Cambridgeshire, CB2 2RU. Tel: 0480 66805.
- CHA Chalksoft, PO Box 49, Spalding, Lincolnshire, PE11 1NZ. Tel: 0775
- COL Collins Educational, 8 Grafton Street, London, W1X 3LA. Tel: 071-493 7070.
- ESM esm, Abbeygate House, East Road, Cambridge, CB1 1DB. Tel: 0223 65445.
- ESP ESP, Holly Tree Cottage, Strelley Village,

- Nottingham, NG8 6PD. Tel: 0602 295019.
- FIS Fisher-Marriott Software, 3 Grove Road, Anstey, Warwickshire, CV7 9JD. Tel: 0203 616325.
- GAR Garland Computing, 35 Dean Hill, Plymouth, Devon, PL9 9AF. Tel: 0752 401287.
- GRE Greenweld Electronics Ltd, 443 Millbrook Road, Southampton, Hampshire, SO1 0HX. Tel: 0703 772501.
- HYB Hybrid Technology Ltd, 273 The Science Park, Cambridge, CB4 4WE. Tel: 0223
- IND ndependent Software, 26 Eason Drive, Abingdon, Oxfordshire. OX14 3YD. Tel: 0235 35035.
- TED Ted Kirk, 33 Humber Crescent, Sutton Leach, St. Helens, Merseyside, WA9 4HD. Tel: 0744 818761.
- LON: Longman Logotron Ltd, Dales Brewery, Gwydir Street, Cambridge, CB1 2LJ. Tel: 0223 323656.
- MED Microelectronics Education Development

used in a wide range of music programs. It is Risc OS compatible but not multi-tasking although it is mouse-driven.

Its functions are split into a number of different sections. The Realtime Synthesis Editor is used to create Relocatable Voice Modules containing up to eight voices from a combination of waveforms, amplitude and pitch envelopes.

The Interpolation Editor combines a number of waveforms, transforming one into another. The Harmonic Editor allows you to create sounds by selecting up to eight harmonic partials each with its own amplitude envelope. The Sample Editor is where you can manipulate and edit a sound sample.

MJD Software, 13 Burnham Way, West Ealing, London, W13 9YE. Tel: 081 567 4284.

Armadillo Systems

ARMADILLO specialise in samplers and has produced four models for the Archimedes.

Mono A448 plus Adit software £135.00 is a single width podule plus sampling/editing software. Sample rates range from 4.6kHz to 41kHz with band filters giving a bandwidth of 15kHz. The Adit software includes cut and paste edits, reverse, echo and mixing.

Stereo A448b plus HighNote software £165.00 is similar to the A448 but samples in stereo. The HighNote software is iconbased and consists of a number of modules which perform a range of functions including sampler/edit, disc and memory management, voice set up/Midi and an envelope module. Other modules are in development.

Unit (MEDU), Bishop Grossteste

College, Newport, Lincoln, LN1 3DY. Tel:

Lutterworth, Bramcote, Nuneaton, Warwickshire, CV11 6RB. Tel: 0455

Microvitec plc, Futures Way, Bolling

Road, Bradford, West Yorkshire, BD4

Mid-Sussex Music Software, 11 Bridle

Way, Pound Hill, Crawley, West Sussex, RH10 4HP. Tel: 0293 882130.

Music Education Centre, The University,

Musicality Software, Cheddington Road, Edmonton, London, N18 1LT. Tel: 081-

MUZZsoft, 69 Riley Road, Brighton, East Sussex, BN2 4AG. Tel: 0273 699768.

Note Perfect Software, 97 Valence

Road, Lewes, Sussex, BN7 1SJ. Tel:

London Road, Reading, Berkshire, RG1

MMU Micro Musical Ltd, 'Cedar Lodge',

7TU. Tel: 0274 390011/726500.

5AQ. Tel: 0734 875855

803 9449

0273 473135.

MUZ

0522 44713.

Stereo + Midi A448m plus HighNote £195.00. Similar to the A448b but including a Midi port with In, Out and Thru sockets. This allows sounds to be controlled by external Midi equipment.

A616 £1295. A 16-bit, rack-mount sampler which uses the HighNote software running on the Archimedes. It supports multi-timbral keyboard splits with eight-part polyphony and velocity sensitivity.

Spectre SFFT £60.00. This is a software package to compliment the A448 samplers. It performs Fast Fourier Transforms on samples. FFT splits a sample into its harmonic components and displays it in impressive 3-D graph form.

All prices exclude VAT.

Armadillo Systems Ltd., 17 Glaston Road, Uppingham, Rutland, Leicestershire, LE15 9PX. Tel: 0572 822499.

Acorn Computers

MAESTRO is the cheapest Archimedes music/Midi program available. It is free with Risc OS, and for a freebie is not at all bad. It lets you create music on the stave and play it back using the Arc's internal sounds.

If you have a Midi interface the program will detect it and offer you a Midi option in the Instruments menu to let you select the channels each voice will transmit on. It's an ideal - and cheap - way to take your first steps in Midi.

Product Guide

The following pages give a comprehensive product guide to 8 bit BBC Micro hardware and software.

Perfect Fourth Software, 11 Hempstead Lane, Potten End, Berkhampstead, Hertfordshire, HP4 2QJ, Tel: 0442 866311

Pitman Publishing Ltd, 128 Long Acre, London, WC2E 9AN. Tel: 071-379 7383.

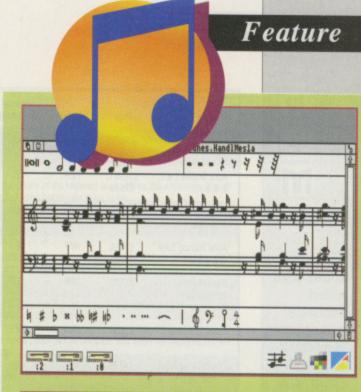
R.C.E.V.H. (Research Centre for the Education of the Visually Handicapped), School of Education, PO Box 363, Birmingham, B15 2TT. Tel 021-414 6733

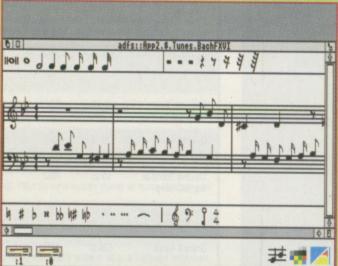
RESOURCE, Kingfisher School, Exeter RES Road, off Coventry Road, Doncaster, DN2 4PY. Tel: 0302 340331

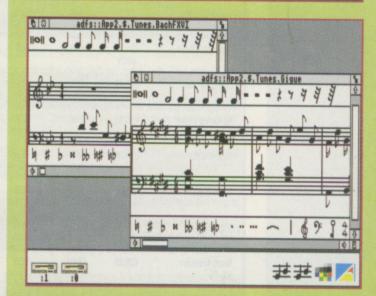
Sherston Software, 8 Court Street, Sherston, Malmesbury, Wiltshire, SN16 OLL. Tel: 0666 840433.

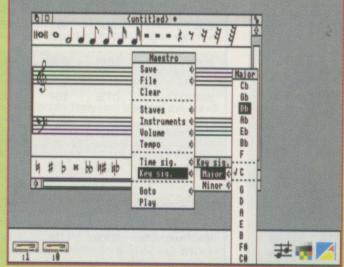
System Software Ltd., Fifth Floor, Sheaf House, Sheaf Street, Sheffield, S1 2BP. Tel: 0742 768682

Tobin Music Systems, The Malthouse, Knight Street, Sawbridgeworth, Hertfordshire, CM21 9AX. Tel: 0279 726625









Sample pages from Maestro

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MICRO USER August 1990 35

Feature







This table shows what music hardware and software is available for the BBC Micro, who supplies it, and how much it costs.

Program	Price ¹	Supplier	Universal compatibility ^a	Description
MPLE Compose	£26.45	ESP	YES	A version of the Compose program that works as an integral part of the Music 5000 Synthesiser/Music 4000 Keyboard system, taking advantage of its high quality sounds and allowing greater control over material created with Compose facilities. Requires Studio 5000 Software Pack.
ural Grades 1 & 2, , 4, 5.	£14.85 to £19.85	PER	YES	Help in graded aural examinations of the Associated Board. You must sing pitches and intervals which are played by the computer and selected at random. Can demonstrate correct method of beating time.
ural Tests Grades	£19.50	IND	YES	Helps students taking Associated Board exams to practise pitch, melody and rhythm memory, interval recognition, and beating time. Also provides computerised versions of the tests.
Aural Training Tutor , 2, 3 and 4	£24.50	AVP	YES	Provides graded aural exercises in specific skills. Can be used either as a controlled aural lesson or as individual support for GCSE and A level students.
Basic Music Composition	£11.95	тов	YES	Easy-to-use program that lets you compose melodies on the stave and play, store and print them. Provides a chordal accompaniment and the format ensures even beginners can produce musically pleasing compositions. Pieces can be used in a variety of classroom activities. Provides a fuller accompaniment when used with the Universal.
Chord Processor	£15.00	CAM	YES	Helps in composing chords sequences using predefined three-note chords, an optional drum-beat and settings for volume, tempo, beat, pitch, instrumental colour, tuning and chord pattern.
Chord Recognition	£17.50	AVP	YES	Tests your ability to identify major and minor chords by playing a chord and checking the answer entered on the computer keyboard. Offers three levels of difficulty and a volume control option.
Compose	£15.00	ESP	YES	Encourages musical invention, particularly in young children, through a combination of picture, sound and a simplified form of notation. Car use an optional Mildi Interface, the K1 (requires Mildi synthesiser), or Music 5000 Synthesiser Universal. Special Needs version uses Concep Keyboard (overlays supplied) or singleidual switch.
Compose Play	£20.70	ESP	YES.	Leads on from Compose by organising pictures representing short phrases to make a melody and harmony in up to three parts, plus a per cussion track. Can be operated by a variety of input devices, can use material from Compose and Rhythm Maker, and can use the optional Midi Interface K1 (requires Midi synthesiser) or Music 5000 Synthesiser Universal.
Compose Tune Files, Disc 1	£9.20	ESP	YES	Twenty sets of phrases for use with the Compose and Compose Play programs covering a wide variety of styles and activities.
Composer	£16.50	RES	YES	Music writing program that allows you to create tunes and present them in high quality score on screen and paper. Features include different key and time signatures, beamed notes, accidentals, repeats, and a wide range of sound control options.
Creative Sound on the BBC Micro	£9.95	ACO	YES	Book which investigates the range of musical applications to which the unexpanded BBC Micro can be put. Includes around 40 program from keyboard synthesisers to composing tools.
Exploring Music on the BBC Micro	£9.95	PIT	YES	Book of ideas for creating music through simple use of Basic covering a very wide range of styles and activities.
Grade 8 Aurals	£24.50	AVP	YES	Gives students practice in answering questions for the aural part of the Associated Board's examination. Includes melody singing, describing intervals, remembering rhythms, recognizing time signatures, chords and modulations.
Guitar Chords	£17.50	AVP	YES	Instantly see and hear any of 144 guitar chords of 12 types and tests your knowledge of how to finger them. The program can be used teacher demonstration or individual use.
History of Music	£24.50 each	AVP	YES	A series of eight discs giving a basic understanding of the repertoire and characteristics of the music of various eras from late Renaissance 20th century. Each contains information programs, a game and musical examples and analyses.
Jolly Jack Tar	£15.18	SHR	YES	Six easy-to-use games to help young children understand and learn about the musical concepts of rhythm and pitch. Can be a particula useful teaching aid for use with children learning to play instruments.
Keyboard Player	£19.95	CHA	YES	A computer-assisted learning course designed to introduce the beginner to the musical keyboard. Includes key identification, fingering teniques, five-finger exercises, adding rhythm and playing chords.
Logosounds	£13.80	ADV	YES	Extends the Logo computer language to allow users to explore sound patterns, such as scales and ostinati, program the computer to place tunes and chords and create their own sounds from the computer. Requires Logotron Logo rom.
Micro Maestro	£4.95	GRE	YES	Practice aid based on the same principles as Recorder Tutor but suitable for a wide range of instruments. Includes automatic compuscreen scores and professionally recorded backings for six contemporary pop classics.
Micro Music	£13.80	FIS	YES	Introduction to music notation and timing for complete beginners. Includes six games, four special sequences to teach the names of n pitches and values, and the option to play and print-out the user's own written tune.
Micro Musician ML-25	£28.65	MMU	YES	An aid for professional teaching of notation and music theory, allowing musical compositions in up to eight parts to be created, played (the parts only without extra equipment) and printed out in high-quality stave notation in a variety of formats on an Epson printer.
Microspecial Music	£25.30	COL	YES	Provides a medium for musical self-expression and creativity in composing tunes for MLD pupils of 14 to 16 years and younger more a pupils. Allows tunes to be built up on the stave, modified, played, printed out and saved to disc. Requires a concept keyboard.
Music	£N/A	MVT	YES	Uses the touchscreen to provide a menu-driven music synthesiser with an on-screen keyboard that can actually be played by lightly touch the screen. Supplied free with the Microvitec Touchtech 501 touch screen.
Musical Dictation 1	£19.00	MUS	YES	Aural training package which teaches how to take down simple tunes in notation. Includes 24 teaching and testing programs with exercic covering pitch, rhythm and pitch with rhythm. Suitable for all ages but requires elementary knowledge of notation.
Music LOGO	£17.25	LON	YES	Extension to Logotron Logo giving access to the computer's sound generating facilities through 51 music primitives controlling amplitud loudness, pitch and timing. Requires Logotron Logo rom.
Music Processor	£54.95	MID	YES	Prepares printed scores of up to eight staves using all basic music symbols plus double accidentals, double dots, four types of clef cho level or sloped beams and manual or automatic positioning. Requires Epson-compatible printer.
Music System	£20.00	SYS	NO	Comprehensive two-disc package which lets you create and print compositions using a stave editor, sound designer, keyboard, linker printer modules. Includes several example compositions.
Music Teacher	£17.50	AVP	YES	Six programs which make it fun to read and write music. Covers naming note pitches, identifying keyboard keys, key signatures, note valued and polyrhythms. Also includes a test for speed and accuracy of sight-reading.
Music Theory - Hints and Tests	£19.50	IND	YES	Suite of revision programs for theory of music exams aimed at Grade 5 but usable for Grades 2 to 7. Two discs cover keys, bars, rescales, terms, intervals, chords, cadences and transposition.
Music Theory Tutor 1, 2, 3 and 4	£17.50 each		YES	Series of discs covering a wide range of graded topics in music theory through tutorial sequences (with musical examples) and tests.

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Program	Price ¹	Supplier ^e	Universal compatibility ^a	Description
Music Tutor	£12.95	GAR	YES	Allows the writing of compositions using the computer keyboard as a music keyboard. Automatically places each note on the stave with correct pitch and duration. Notes can also be entered by typing the letter name and duration. Tunes may be easily edited, barred, stored printed on Epson-compatible printer.
Name-It	£6.00	MUZ	YES	Designed to help teachers familiarise younger pupils with the letter-name geography of the keyboard and reinforce this knowledge thro repetitive recognition. Includes an arcade-style game to encourage pupils to look upon learning the notes as fun.
Note Invaders	£14.95	CHA	YES	Package of music programs which introduces the stave and asks the user to give correct note names. Includes an arcade-type game ba on the classic Space Invaders which tests note-reading skills on a choice of treble or bass clefs.
Note Perfect	£9.95	NOT	YES	Plays scales and studies as practice for solo instrumentalists such as violinists, oboists, and trumpeters. Includes 200 exercises. Uses B Micro sound chip which is out of tune but with the Music 5000 Universal the pitch is correct.
Opus	£15.00	ADV	YES	A powerful, versatile and easy-to-use music composition program that allows you to create, combine, manipulate and edit musical ideas variety of ways. Its polyphonic graphic score format requires no knowledge of stave notation and the use of sequenceable "cards" provi control of structure and form.
Pazazz	£14.95	ESM	YES	A suite of comprehensive programs for creating miniature on-screen multi-media performances complete with stage set backgrounds, mated figures and musical soundtracks. Includes three example performances.
Patterns and Change	£FREE to education	MEC	YES	Programs to help young children to perceive patterns and change in music. Each deliberately simple program is designed for use as part musical activity. In some cases aural patterns are offered with visual patterns to provide a link with graphic scores.
Peter Beater's Musical Games	£14.95	SYS	NO	Pair of musical games designed for infants upwards. Melody Rainbow provides a simple way of entering and editing a tune note-by-note performance by the computer. Musical Jigsaws challenges the child's understanding of musical pitch using animated sequences.
Picture Music	£14.50	RES	YES	Allows tunes to be built up using packages of notes selected from the pentatonic scale. These are represented by pictures chosen for objects that might be seen during a train journey, the names of the notes or stave notation itself. Pieces may use melody, accompaniment rhythm lines, and be saved and printed.
Pitch Trainer	£12.50	MID	YES	Helps develop sight-reading of pitch and recognition of intervals through two types of test: Does the computer play right or wrong? and Na the interval.
Play What I Play	£7.95	TED	YES	Aural practice program for music pupils up to GCSE and Grade 5 suitable for a wide range of ability, attainment levels and ages. Challen and develops relative pitch perception, melodic memory and the ability to relate notes heard to notes visually presented on a glockens keyboard and stave.
Playbeeb	£7.95	MID	YES	Informal and fun introduction to the musical stave and keyboard for 3 to 7-year-olds. Plays favourite nursery rhymes or music, displaying notes on the stave and on a picture of the piano keyboard.
Reading Music 1	£25.00	MUS	YES	Eighteen programs in seven parts on four discs. Teaches music theory from basics such as rhythm and pitch up to key signatures, tonic ads, musical terms and signs.
Read-It!	€6.00	MUZ	YES	Designed to help teachers encourage pupils to become more fluent in reading music from stave notation on to a keyboard instrum Introduces F and C clefs, leger lines, key signatures, double-sharps and so on, using a fun-to-play arcade game against the clock.
Recorder Tutor	£7.95	GRE	YES	Turns the computer into a recorder practice aid, presenting exercises and music scores on screen. The computer automatically turns pages of the score as you play to its metronome or it plays its own performance of the melody. Includes printed scores and profession recorded backing tapes for 52 pieces.
Rhythm and Pitch	£17.50	CHA	YES	Programs to help people of all ages develop their ear for the basics of music composition using pitch and rhythm tests. They measure y response and adjust to an appropriate level of difficulty.
Rhythm Maker	£20.70	ESP	YES	Supports rhythmic invention from an elementary to very complex level by providing a time grid upon which you can create percussion patter which can be linked to make a complete composition. Work can be transferred to the Compose Play program. Can be operated by a var of input devices and can use the MIDI Interface K1 or Music 5000 Synthesiser Universal.
Rhythm Tutor	£12.50	MID	YES	Helps teach you to read rhythm by displaying up to four bars of rhythm on the screen in standard music notation (with quavers joined wh appropriate) and presenting two types of test: Is the computer right or wrong?, and Play it yourself, in which the computer marks your rakes on the score.
Recomposer	£12.50	MID	YES	Provides a way to experiment with melodies and harmonies. Starting from any one of twenty musical pieces displayed on the screen in up four staves, you may recompose by adjusting the pitches of any notes.
Soundscape	£33.35	HYB	YES	Composition software offering a wide range of high-quality sounds through a simple language of colour. Keyboard performances using the can be recorded, stored, and replayed. Intended to encourage listening, performing and composing in children from infants upwards, incling handicapped. Requires Music 5000 Synthesiser/Music 4000 Keyboard.
Soundspace	£33.35	НУВ	YES	An open-ended musical environment providing access to a wide range of sounds through the media of touch and movement plus convitional keyboard performance. Intended to encourage creativity in children from infants upwards, particularly the handicapped. Requires Mi 5000 Synthesiser and either Microvitec Touchtech 501 touchscreen, or joystick. Can use optional Music 4000 Keyboard.
Sounds Useful	£20.00	MED	YES	Three integrated programs intended to promote musical thought, exploration and activities: Synthesiser uses the computer as a musinstrument; Ostinato creates, repeats and modifies musical phrases and Sequencer builds compositions from Ostinato phrases with a var of transformations.
Studio 8	£16.50	BBG	YES	Allows compositions to be built up note by note using the computer as a music keyboard. Up to eight parts may be created and up to replayed at any one time using a variety of sound shapes.
Theory of Music Level 1	£13.50	TED	YES	Designed for use by an individual with minimal or no immediate supervision to prepare for a first Theory exam. Its two main parts deal with pitch and rhythmic notation and it includes a multiple-choice quiz on terms and signs.
Theory of Music Questions & Exercises, Grades 2 to 5	£13.50	TED	YES	Assists with learning the theory of music particularly for Associated Board examinations. Sets questions and checks answers on a wide very of topics from the writing of key signatures to the layout of root position chords on two staves.
foolbox	£39.10	HYB	YES	A set of programs adding extra facilities to the Hybrid Music System including a picture editor that lets you add graphic accompaniments computer compositions. Requires Studio 5000 Software Pack.
ouch 'n' Listen	£10.00	RCE	YES	An early introduction to the touchscreen or Concept keyboard for the very young or handicapped. It associates segments of a tune with different areas of the touchscreen, allowing the tune to be reconstructed by touching each area in turn. Includes 22 well known tunes.2
'All prices include	VAT but no	at n 0 n	Index to aver	pliers on previous page ³ Universal Compatibility refers to Hybrid's Music 5000 Synthesiser Universal











Power Pills

- Castle Quest hints and lotsa lives for disc versions
- Alerion level jump
- Terramex infinite lives
- Master sideways ram problems solved
- Perplexity bug fix for 5.25in disc version





ENTION arcade-adventures and probably the first examples of the genre that spring to mind are the two Superior Software giants Citadel and Exile – now available as a subscription offer. However, one such game that was in its time every bit as revolutionary as Exile is Micro Power's Castle Quest.

Its pioneering influence was such that many of the features we now take for granted, such as super-smooth sideways-scrolling, had never previously been seen in a BBC Micro game.

It is probably a tribute to the longevity of Castle Quest that although Tony Sothcott, its author, has long since moved on I still receive quite a few letters with hints, tips and requests for help.

The fact that it is one of the few major games that has never been re-released on any compilation, so that it has never received more than its initial burst of publicity, makes Castle Quest all the more remarkable.

When I compiled the summaries of my first three years columns, as featured in the April, May and June 1990 issues I noticed that in only one column in three and a half years had I featured any tips for Castle Quest, so here are some more hints for this intriguing game: I hope they make up for the delay.

In November 1989 I covered the steps necessary to obtain the sword and to cross the troll's bridge, so I will not go into these details again, except to say that the four little men are scared of fire.

You can swim in the moat for any length of time without drowning as long as you are wearing the aqualung. This is located in an area of the castle populated by red guards to the far right of your start point.

The aqualung is propped quite close to the wall in the top right-hand corner of the screen, so that it is not very easy to see unless you know what you are looking for.

The wizard seems to have confused a few readers, one of whom commented:

"But when I get to the wizard he refuses to let go of the wand". This is probably because, apart from the occasional brief appearance, the wizard plays no active part in the game. The wand is guarded by the witch, who lives quite a way to the left of the spiders' cave. The layout of the castle wraps around, and any point can be approached from either direction, so the witch can also be found to the bottom-right of the section of the castle where you find the aqualung.

However, although it is perfectly possible to approach her from either direction, as soon as you reach the bottom of the ladder by the gold coin you will be dead before you know what has hit you. So you must approach from the side of the spiders and lure her back into a narrow passage to the right of the pillars from which she cannot escape.

You kill her by throwing the water-filled bucket at her, an idea no doubt inspired by the famous sequence from The Wizard of Oz. Note that you must let her get as close as you dare, because she's extremely adept at dodging flying buckets.

I have frequently been asked if it is really necessary to get captured by the guards and go through the routine of escaping from the prison. The answer is an emphatic **yes** because the wizard's wand is located between two sections of brickwork from

which you can escape only by standing on the stool, which is located inside the prison

Once you have the wand, climb up the ladder past where you found the gold coin, swim the moat and get back to the point to the right of the troll's bridge where the wizard made one of his appearances.

Climb down a ladder to where you will meet two yellow guards. Defeat them then throw the wand at the right-hand wall. The brickwork will reveal the ruby, gold bar and gold coin, with the message:

TREASURE FOUND GAME OVER

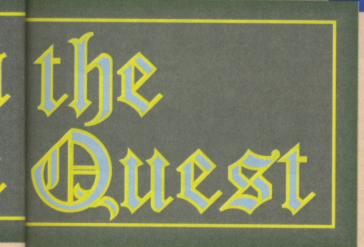
You'll be given a score of 110 points plus a time bonus, although I myself have invariably run out of time bonus by that stage.

Lastly, if any reader still cannot complete the game using the above hints, I hope the following infinite/extra lives routine will bridge the final gap. Incidentally, this routine also includes the Master-conversion routine that I originally featured in my June 1989 column, so it applies equally to owners of Master series machines. Happy hunting!

10 REM Castle Quest infinite/extra lives 20 REM for "Opus" and Master-compa tible disc versions 30 REM by Hac-Man 1990 40 REM (C) The Micro User 50 REM 60 IF PAGE=&2800 THEN GOTO 120 70 FOR IX=0 TO (TOP-PAGE) STEP 4 80 IX!&2800=IX!PAGE:NEXT 90 *KEYO PAGE=&2800|M END|M OLD|M RUNIFIM 100 VDU21:*FX138,0,128 110 END 120 L%=4:REM default number of liv es - can be 1-255 130 FOR 1%=0 TO 2 STEP 2:P%=&120:[OPT IX 140 LDA# cont MOD 256 : STA &1805 150 LDA# cont DIV 256 : STA &1806 160 JMP &FFF7 170 .cont 180 LDA# &A9 : STA &58ED : LDA# 1 : STA &58EE : \ infinite lives 190 LDA# L% : STA &5996 : \ no. of lives 200 JMP &4340

210]:NEXT 220 MODE 7 230 PRINT "Please insert Castle Qu est disc and hit any key...";: GX=G 240 PRINT: *LOAD !BOOT 250 IF INKEY(-256) < None> &A2 PROCconvert 260 !&E46=&A9012020:CALL &ED0 270 END 280 DEFPROCconvert 290 FOR IX=0 TO 2 STEP 2:PX=&E90:Q %=P%:[OPT I% 300 .data :]: Q%=P% 310 FOR J%=0 TO 31:K%=J%*640:P%=(2 *J%)+Q%:[OPT I% 320 EQUB K%DIV256 : EQUB K%AND255 330]: NEXT: [OPT 1% 340 .start LDX# &3F : .loop LDA &E 90,X 350 STA &C375,X : DEX : BPL loop : JMP &EOO 360]:NEXT 370 ?&FE34=&18:REM allow access to filing system ram

380 ENDPROC



Hac Man goes into troubleshooter mode and bags a bevy of game hints, tips and pokes

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Perplexity, or just perplexing

Steve Hanson of Superior recently brought to my attention a bug that appeared in the very first release of the company's excellent Perplexity, the closest that we Beeb owners are ever likely to get to Pacmania.

The problem is actually causes by a single character in one of the screens being incorrect, but the screens are so fiendishly designed that even this minor change makes it insoluble. Any Repton player who fell foul of the one-byte bug in the COLONEL screen of Repton's jaunt through the Orient will know that my description is no exaggeration.

The bug appears on screen 8 on which you have two pairs of keys - two facing one way and two facing the other, with a section of wall in between each pair. In fact the wall section should not be there.

Fortunately, Steve has a bug fix for the disc version of the game, which is as follows: First remove the write-protect tab from the disc, then type:

> *ACCESS D.PERP1 *LOAD D.PERP1 28552B=80 *SAVE D.PERP1 1100 +6F00 *ACCESS D.PERP1 L

Put the write-protect tab back on the disc and hey presto! You now have a perfect working copy of the game.

Memory problems

Many Master 128 owners will remember that in my March 1990 column I discussed how to modify the Master version of Elite so that it would use a bank of sideways ram other than bank 6, the default. This was to allow Elite to be run on a Master in which a rom had been fitted in the socket mapped over ram banks 6 and 7

David Hutchinson has sent me a mailbox message in response to this article, to say that he is having problems loading Elite on his Master, even with John Sparrow's

conversion routine featured in that column.

To quote David: "Since we changed a link in the computer to enable sideways ram we have been unable to load Elite. The planet logo appears, then the program announces 'Elite needs RAM in slot 6'. This is an empty rom socket".

In fact the Master is supplied as standard with all four ram banks enabled, so I suspect that by changing this link David has actually disabled the ram in banks 6 and 7

If he has changed both rom/ram links under the impression that he was enabling the sideways ram, then no value of bank in John Sparrow's program will work correctly.

David goes on to say that he has tried to run the enhanced versions of Stryker's Run present on both the original and Play It Again Sam 1 discs on his Master, but neither would load. As the enhanced Stryker's Run stores data in all four ram banks, this would seem to be a likely explanation.

David also cannot get his Sam 1 copy of Citadel to run on his Master. It loads all the way and displays the title page, but when you press the Action key to start it blanks the screen and displays the heading Main

Hall then locks up. In fact this is also a symptom of sideways ram being unavailable, but not banks 6 and 7 this time.

Citadel uses almost every spare byte of the micro's memory, and the version originally released by Superior in the pre-Master days used some very illegal techniques to squeeze just that little bit more out of the machine.

Consequently when programmer Chris Hart came to convert Citadel to run on the Master, there was simply not enough spare ram into which to put the routines necessary to do legally all the things that Michael Jakobsen, the author of Citadel, had done

Chris chose to store the extra code in sideways ram bank 5, so the only reason why Citadel would fail to load on the Master would be if ram banks 4 and 5 were dis-

Just to make sure that my guesses were correct, I tried running all three games with the different combinations of ram banks enabled and disabled: All three games behaved exactly as David had described them when both ram/rom links were set to disable sideways ram. I hope this clears up the problem.



32 bit power

Ben Hallifax of London has written to me with cheats for a couple of Archimedes games.

On Alerion, when the high-score table is being displayed on the screen, simply press any letter on the keyboard from A to O to start on the level corresponding to that letter.

On Terramex, wait until the game has finished loading, then before doing anything else, type:

SUBJECTTOCHANGE

exactly as shown, with no spaces. You now have infinite lives.

While on the subject of the Archimedes, I recently received a letter from a reader who said that I had been featuring a lot of pokes and tips for that machine in recent columns, and that he would like to see more for the 8-bit machines for which this magazine was originally launched.

I feel that it is necessary to try to cater for as wide a range of readers as possible. Indeed, I have tried quite hard over the years to cater for owners of the rather less well-established machines, such as the BBC B+ and the Master Compact.

Nevertheless, the vast majority of the material featured in this column comes from readers, whether as a request for help, a cheat routine or as general hints or tips.

Consequently, if my column is being read by Archimedes owners who have hints and tips that they wish to pass on to their fellow users, I can only feel that this must be good for the future of games-playing on the machine.





Sobering The Mad Hatter

plans to do a job and gets involved with some shady types saga

OAPY was left more or less paralytic in last month's episode of Dodgy Geezers and now it is time to bring Part One of this amusing frolic in the depths of criminaldom to its climax.

Abandoning Soapy, we leave the nightclub and head for the Amusement Arcade: W, D, D, E, SW, SW, SW, S and SE are the moves required.

Here you'll meet Mr. Video who will say that he can't stop now but that he'll call you later. Make your way to the park by going NW, N, SW and W then Wait until Saturday morning (Turn 120) when the library

Enter the library by going N and when the librarian asks if he can help you say Yes and when he asks what information you need reply Sewers to get the book

Now move S (with the book) and then Read book to obtain details of sewer entries. It's time to go E, NE, S, E, NE, NW, NE, N and NW to the pub. Gucci shoes may well be lurking as you make these moves, so don't dawdle until you arrive, when you will need to Wait until the pub opens in Turn 140).

As soon as you can, go W, W, NE into the Public Bar, and you'll hear the phone that you noticed earlier - ringing. Answer phone and you will be told to meet someone in the Snooker Hall - so go S, E, NE, W and W. When you arrive, Mr. Video will be waiting for you and he'll ask you if you are planning a job. Say yes and he will then tell you that there are others who are interested as well and they will meet you in the alley later.

Make your way E, E, SW and N to the police station, and note that it should now be Saturday afternoon (Turn 150). Read poster to get details about Mr. Video and then go S, SW and N to a service station.

Examine Station will reveal some tools, so enter Take cutters and go S twice to the pet shop.

There Examine food and then Take pills, so that you are now equipped to deal with the wire fence and the guard dog. Your final act should be Read poster to learn about

Next moves are N, NE, SE, S, and NE so that you can Take pickaxe and then continue SW, SW, SE and SW to the alley full of bottles, cartons and other rubbish. Enter T to check your number of turns and Wait until Turn 185, when the rest of the gang

Save here, just in case, and then choose the members of your gang by entering Say Soapy, Say Mr. Video, Say Tricks. These now join you, and you will be instructed to save your position and be told that the password for Part Two is VERT ETEP.

(Continued next month)



THERE are some 30 puzzles to be solved in Oxbridge and the first involves escaping from the tower by getting and making use of the key to the back door. Up twice from the opening location brings you to the ladder. Take it, go back down again then West and take the marmalade.

Go back east and Down three times now into the cellar and take the key. Drop the ladder here and climb it up out of the cellar, go West twice and take the (metal detector) mop. Move E then S and enter:

OPEN DOOR WITH KEY

and there you are, free at last. Moving S, W, and W takes you to the

Upwardly mobile at college

vicinity of the bees, which will sting you to death unless you distract them by dropping the marmalade. Once the bees are safely occupied you can collect the royal jelly and move to safety.

From the bees go NE, E, S, S, S, S and take the net before heading SW, S, SE to find and take the picklock. Now proceed E, catch the butterfy with the net, and continue NE, N, NW, W, NW, N, N, N, N, N, W to the Trophy Room. Drop the butterfly, net, jelly and key here and save: You should have six points.

If you now move E and N you come to

the front door which can be opened with the picklock.

Continue N, N, W, W, W, W and S to find and take the pole ready for some

Ordinary direction moves operate the punt, so the the full sequence is as follows: N, E, E, E, E, S, S, S, S, S, S, S, S, S, NE, S, E, SE, S, SW, N, N and N. Heeding the writing on the wall, SAY COURAGE to the pub troll to get the EXEAT hint and a tankard of beer.

Drinking the tankard enables something to drop to the ground - a coin - which you

Hatter's Helpline

I have just had a slap on the wrist from Oliver Bowman: I left something out when giving advice on how to leave the hospital safely in **Corruption**. I omitted to tell you to drop the stethescope as well as the clothes while lying on the bed.

This is how Oliver tackles the problem: Wait till the nurses go out of the ward, then LEAVE BED, TAKE PAPERS and go S, S, OPEN LOCKER, TAKE CLOTHES AND STETHESCOPE and go N then E.

WAIT till you hear the second set of footsteps, WAIT again then go W twice. TAKE BANDAGE, WEAR BANDAGE AROUND HEAD then LIE ON BED, DROP TIE, SHIRT, JACKET, TROUSERS AND STETHESCOPE.

After that it's just a question of hanging around till the nurse comes to put you in the ambulance, donning the suit and removing the bandage. When the ambulance stops at the traffic lights hop out and carry on sleuthing.

David Shepherdson has winged his way to the rescue of K. Williams who was stuck in **Temple of Terror**. The solution is a prehistoric Green one: Do NOT kill the Harpy. Then when you ride off into the wide blue yonder on the back of the eagle Pterodactyl and Harpy will dispute possession of the airspace and leave you in peace.

I've had a nice letter from Daniel Doran offering a complete solution to Superior's **Exile**. There's only one problem: I don't

really deal with arcade adventures, since my colleague Hac Man came on the scene.

I know it's a moot point, but when we divided up the work, we felt he was better qualified to handle that sort of thing. The only arcade game I deal with is **Elite** and that's as a consequence of my own interest and anjoyment.

can now take. Whatever you do remember to drop the tankard, since attempting to carry it out of the pub was in last month's list of fatal mistakes to avoid.

with

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SAY

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hing

you

Go S and W to where you can catch the crab safely – which is more than you can do from the punt – then continue N, E, S, S, S, E, NE, N, NW, N, W, NW, and N to the shovel. Take it and move four times North and then West to the Trophy Room.

Drop the picklock, pole, crab, coin and shovel and save once more. Your score is now doubled to 12 points.

(More next month)

Elite Scene

Remember R.J. Bevan's screen display problems with **Elite** which I mentioned in the March issue? Well, I've since heard from Ian Edwards – who has a tape copy of the game – and Ian had similar trouble.

He sent the tape back to Superior with an explanation and a SAE and got a fault-free replacement version. So it seems it really is a software and not a hardware problem.

A puzzled N. Thompson has a recent disc version, he's ELITE, and yet seems to be missing out on certain things. He regularly encounters the ships on the tape version plus Fer-de-Lances, Kraits and Shuttles – he's even encountered Transporters, but has had no sight of Asps, Anacondas, Boas and the like, and as for Thargoids – well, since the Second Mission, they've been nonexistent.

He also says that pressing CTRL+X while paused doesn't dump him into Witch Space. Admittedly this doesn't happen every time, but it all seems rather odd. Ships are randomly generated, so the odds against this sort of thing must be phenomenal.

His hardware includes Watford DFS 1.43 and their Transferom. Does any reader with both these and **Elite** have any helpful comment to make?

Dominic Muston – a Deadly Fugitive – has the Master version and says that he's come across a new ship. A cross between a Cobra and a Thargoid, the ship also released babies. Thinking the babies might be Alien Items, Dominic tried to scoop one up: Seriously depleted energy banks convinced him they weren't.

He tried launching a missile and was met with the ECM effect, but a second missile did

the trick. I checked the date of Dominic's letter and it wasn't April 1st.

A couple of readers have queries about different aspects of **Elite**: A. Whitworth wonders if there is any way of surviving Thargoid attacks other than destroying the Mother Ship.

Well there's always the energy bomb or escape capsule – but since he encountered them while still Harmless, the probable answer is that nothing will save him until he has sufficient credits to get a military laser.

Thargoids are big, mean and fast. Regular saving is the best anti-Thargoid device while

you lack combat experience.

Paul (Dangerous) Duffill did what I expect many players have done: He got news of the Second Mission, pressed his spacebar, and promptly forgot what planet he was told to go to.

Well, if you have qualified for the mission while in Galaxy Two and then move to Galaxy Three, you should emerge in the locality of Xeinis. It is after you've landed there – or somewhere safer – that you will be given instructions to go to Ceerdi.

So if Paul heads there, he should get cracking on the actual mission. Once he has completed it, he'll get a naval energy unit. An important tip here is to save his status with the naval unit, and keep the file separate. If he gets damaged in combat and loses the naval unit, then buys a replacement in a fit of absent-mindedness, he'll soon find he's back with an ordinary energy unit.

Paul asks if the extra goodies found on 16 bit versions of **Elite** – retro rockets, cloaking device and ID system are available to players on BBC versions. The short answer is *No*, but we do still seem to be discovering hidden depths in our own version, so there's no need to get jealous.

Paul's final comment sent me on a rather long – and expensive – voyage. He innocently asked if there was any substance to the rumour accessed by pressing f6 at Arredi in Galaxy 3.

It just so happened that the only saved Commander I had available to investigate was in Galaxy 4. So plodded around the universe at vast cost, struggled my way to Arredi making many bad-

dies bite the dust as I did so, and what did I find when I got there?

A message saying: Coming soon, Elite II. Since he has a BBC Master 128, and I have a 6502 2nd processor, that's exactly the version we have both been playing. The message was clearly a hangover from the first issue of **Elite**.

However, what this does remind us all is to press f6 once we have docked to see if the *Data on System* message has been altered. Who knows, there may be all sorts of interstellar graffiti left lying around by Messrs Bell and Braben.

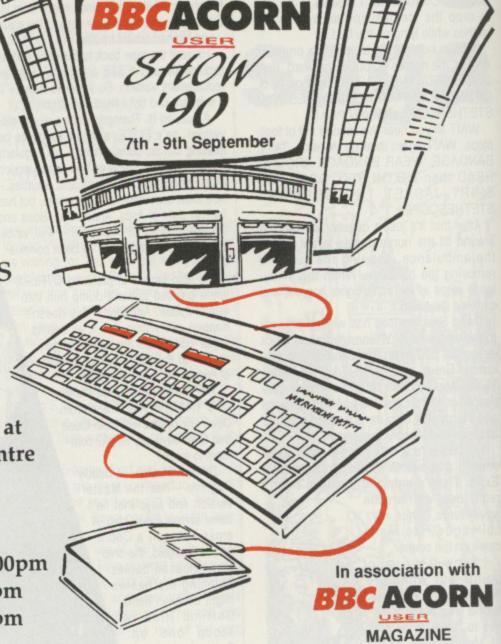
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REDICTING eclipses has pre-occupied man for thousands of years - and before the advent of modern mathematics and a realistic picture of how the solar system works, calculation was based on trends requiring recording data over very long periods. But now, with the help of your BBC Micro you can make the calculations in

There are two types of eclipses: Solar. when the Moon goes in front of the Sun, and Lunar which occurs when the Earth gets between the Sun and the Moon. Lunar eclipses are more common and these are predicted by the program given here. Such eclipses can only occur at the full moon, so we need only check around that time.

The Earth casts a shadow which is composed of two parts: A completely black section called the umbra and a partial shadow called the penumbra. From these two words you get the two types of Lunar Eclipse - umbral and penumbral. Only an umbral eclipse is worth watching - a penumbral isn't visible.

Type in the listing, ensure it's correct using the checksums, then save it. Because of the size of the program and the fact it uses Mode 1 it must be loaded at &1200 to run successfully. This only applies to Models B and B+ with PAGE set higher

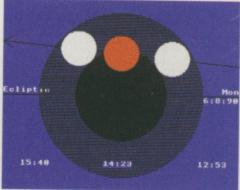
than &1200 - all other machines can just run it.

First you input the year - try 1990 first. The screen clears and you're presented with the Searching... message. After a few moments you are informed that one has been found and you can note down the details if you wish - the first one should be February 9, 1990 with the accompanying times 17:22, 19:06 and 20:41.

When you press a key the screen clears and a drawing representing three positions is given - the time the Moon enters the umbra, the time when it is at the centre and the time of leaving. For penumbral eclipses only one time is shown.

If the times shown - all of which are GMT - appear during our night the eclipse will be visible, clouds permitting. Ones that

Stuart Hatch discusses the best time to cast an eye on the sky



occur during midday can be seen from the Antipodes.

When a full lunar eclipse is in progress the Moon is still visible but it turns red. This effect is caused by light from the sun being reflected through the atmosphere and curved round to hit the Moon.

10 REM Lunar Eclipse Finder 20 REM by Stuart Hatch 30 REM (c) The Micro User

40 MODE7:VDU14:VDU23;8202;0;0;0;:FOR CX=0 TO 1:PRINTTAB(7,CX)CHR\$141CHR\$131"L unar Eclipse Finder":NEXT:DIM month\$(12) ,day\$(6):FOR C%=1 TO 12:READ month\$(C%): NEXT: FOR C%=0 TO 6: READ day\$(C%): NEXT

50 DATA January, February, March, April, May, June, July, August, Septémber, October, N ovember, December, Sun, Mon, Tue, Wed, Thu, Fri

60 REPEAT: PRINTTAB(11,8)"Which year? ":INPUTTAB(23,8)""Y%:YS=STR\$(Y%)

70 MODE1:PRINT''"Searching....";:M%= 1:D=1:PROC_days

80 REPEAT: PROC_FIND: UNTIL yZ=YX+1:*FX

90 MODE7:PRINT'''No more lunar eclip ses in ";Y\$''"<Q> to quit, any other key for more";:g%=GET OR 32:UNTIL g%=113

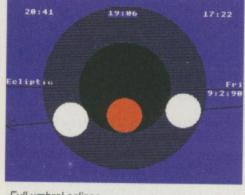
100 CLS: END

120 DEFPROC_days

130 m%=M%:y%=Y%



Penumbral eclipse



Full umbral eclipse

hr\$+":"+min\$+" GMT" e)/2*PI)*2*PI+angle+2*PI 360 =2*PI*(angle/(2*PI)-INT(angle/(2*P 140 IF m%=1 OR m%=2 THEN y%=y%-1:m%=m% 1))) +12 370 : 150 AX=yX DIV 100:BX=2-AX+AX DIV 4:CX= 380 DEFFN_Kepler(ANGLE) INT(y%*365.25):DD%=INT(30.6001*(m%+1)):D 390 kl=ANGLE:REPEAT:delta=kl-.016718*S AYS=BX+CX+DDX+D-723244 IN(kl)-ANGLE:correction=delta/(1-.016718 160 ENDPROC *COSkl):kl=kl-correction:UNTIL ABS(delta 170 :)<=.00000001 180 DEFPROC_FIND 780 : 400 =2*ATN(TAN(kl/2)*1.016860112) 190 PROC_SUN:PROC_MOON:difference=LAMB 410 : DASUN-LAMBDAMOON:check=ABS(difference):I 420 DEFFN_rtquad(tan) F check<PI/2 THEN PROC_date:DAYS=DAYS+15 430 IF y>=0 AND x>=0 THEN =tan :ENDPROC:ELSE PROC_FULL 440 IF x<0 THEN =tan+PI 200 DAYS=DAYS+30 450 IF y<0 AND x>0 THEN =tan+2*PI 210 ENDPROC 460 : 220 ';mid\$; 470 DEFPROC_date 230 DEFPROC_SUN 480 DAYSS=DAYS+2444238.5:A=INT((DAYSS+ 240 N=(DAYS/365.2422)*2*PI:N=FN_rt(N): 1.5)MOD7+.5):IZ=INT(DAYSS+.5):FZ=DAYSS+. M=N-.065674349:IF M<=0 THEN M=M+2*PI 5-INT(DAYSS+.5): IF IZ>2299160 THEN AZ=IN 840 : 250 E=FN_Kepler(M):LAMBDASUN=E+4.93223 T((12-1867216.25)/36524.25):ELSE AZ=1Z 7687:LAMBDASUN=FN_rt(LAMBDASUN) 490 BZ=IZ+1+AZ-INT(AZ/4):CZ=BZ+1524:DZ 860 *FX21 260 ENDPROC =INT((CZ-122.1)/365.25):EZ=INT(365.25*DZ):GZ=INT((CZ-EZ)/30.6001):dZ=CZ-EZ+FZ-IN 280 DEFPROC MOON T(30.6001*GZ):ddZ=INT(dZ):hrs=DAYS-INT(D 290 L=1.13403578+DAYS*.2299715042:L=FN AYS):hr=INT(24*hrs):min=INT(60*(24*hrs-h rt(l):Mm=l-.0019443683*DAYS-6.0978848:M m=FN_rt(Mm):EN=2.652035286-.00092422*DAY 500 1F GZ<13.5 THEN mZ=GZ-1:ELSE mZ=GZ S:EN=FN_rt(EN):Ev=.0222337493*SIN(2*(l-L GCOLO,3 AMBDASUN)-Mm):Ae=.0032428218*SIN(M):A3=. 510 IF m2>2.5 THEN yZ=DZ-4716:ELSE yZ= 0064577182*SIN(M):Mtickm=Mm+Ev-Ae-A3 DZ-4715 300 Ec=.1097567753*SIN(Mtickm):A4=.003 520 min\$=STR\$(min):IF LEN(min\$)<2 min\$ 7350046*SIN(2*Mtickm): Ltick=L+Ev+Ec-Ae+A 4:V=.0114895025*SIN(2*(ltick-LAMBDASUN)) ="0"+min\$ 530 hr\$=STR\$(hr):IF LEN(hr\$)<2 hr\$="0" :ldoubletick=ltick+V:ENtick=EN-.00279252 68*SIN(M):y=SIN(ldoubletick-ENtick)*.995 540 date\$=STR\$(ddZ):month\$=month\$(mZ): 970321:x=COS(ldoubletick-ENtick) year\$=STR\$(yZ) 310 tan=ATN(y/x):tan=FN_rtquad(tan):LA 550 digit\$=RIGHT\$(date\$,1):IF digit\$=" MBDAMOON=ENtick+tan:LAMBDAMOON=FN_rt(LAM 1" suffix\$="st" ELSEIF digit\$="2" suffix BDAMOON):BETAMOON=ASN(SIN(ldoubletick-EN S="nd" ELSEIF digit\$="3" suffix\$="rd" EL tick)*.089683442) SE suffix\$="th" 320 ENDPROC 560 IF LEFT\$(date\$,1)="1" AND LEN(date 330 : \$) <> 1 suffix \$= "th" 340 DEFFN_rt(angle) 570 ENDPROC 350 IF angle<0 THEN angle=INT(ABS(angl 580 : 590 DEFPROC_FULL ,1:COLOUR1 600 REPEAT: catchup=8.8837259E-3+1.0471 976E-3*COS(Mtickm): IF LAMBDASUN PI THEN difference=difference+PI ELSE difference =difference-PI 610 IF ABS(difference)>PI AND SGN(diff erence)=-1 THEN difference=2*PI+differen 300 = 6915 4 870 = E831 9 310 = 8532 B 590 = FC81 6 620 DAYS=DAYS+(difference/(24*catchup) 880 = 9015 2 600 = D981 1 320 = EDOF F):PROC_SUN:PROC_MOON:difference=LAMBDASU 610 = 8A70 E 890 = 2F67 6 330 = 9719 D N-LAMBDAMOON

0 0 10 = 20 = 0 0 30 = 40 = 0934 4900 = B324 7 340 = 0339 2620 = 841850 = 8A80 D 910 = FF08 60 = 19F3 5 630 = BA9A 9350 = 639D 1 920 = B98C 0 70 = 6A76 C 360 = 1198 8 640 = 3A13 E 370 = 9719 0 650 = 8002 4 930 = C7ED 3 80 = 4008 0940 = 8C4E 5 660 = C15E 380 = 2243 A 90 = 4F4A 1 950 = F695 5 670 = B10B 8 100 = 8215 5 390 = F01E 0 680 = EDOF 9 960 = 7E34 7 400 = 956B 5 110 = 9719 D 690 = 9719 970 = B5F5 8 410 = 9719 120 = 21E 0 700 = 5CE5 0 980 = FB9E 0 420 = 833A D 130 = F3ED710 = 2F27 A 990 = EDOF F 140 = F31F A 430 = 66DA F 1000 = 9719 E 440 = 630B E 720 = 2806 A150 = AC60 1010 = 1FE1 F 160 = EDOF 450 = 7281 B 730 = 3924 7 1020 = 2200 0 460 = 9719 740 = A5 170 = 9719 61030 = E087 6 750 = AAC2 F 180 = 20E9 0470 = 685 11040 = 30F8 8 760 = 53B2 8 190 = 7A52 2 480 = EE4F C 1050 = 2765 3 770 = EDOF 8 200 = CECO 490 = 6211 D 780 = 9719 7 1060 = 9719 F 500 = F614 A 210 = EDOF 8790 = 9148 2 1070 = C774 E 220 = 9719 D 510 = 3494 7 800 = 89C6 F 1080 = 1355 D 520 = 8BB3 6 230 = 6F291090 = E76C E 530 = 3569 1 810 = 7385 3 240 = AB6F 9250 = DF8B A 540 = 836B F 820 = 4B2 B 1100 = 5194 5 830 = EDOF F 1110 = A42F E 550 = 7E70 E 260 = EDOF 7 840 = 9719 1 1120 = 7A58 A 270 = 9719 4 560 = ADA9 31130 = 2083 E 850 = A707 6 570 = EDOF 3 280 = 1320 6 1140 = EDOF 3 580 = 9719 8 860 = B5F5 B 290 = 3EOB 8

740 CLS:CLG:VDU20:PRINT"Eclipse partic ulars are:"''TAB(5)"Date: ";date\$;suffix " ";month\$;" ";year\$''
750 PRINTTAB(5)"Eclipse begins: ";star ttime\$'TAB(5)"Mid-eclipse: "; midS; 'TA B(5)"Eclipse ends: ";endtime\$ 760 pen%=FALSE:PROC_diagram 770 ENDPROC 790 DEFPROC_pen 800 VDU7:mid=24*hrs:mid\$=hr\$+":"+min\$+ " GMT":CLS:CLG:VDU20 810 PRINT'''This is a penumbral eclip se:"'TAB(5)"Date: ";date\$;suffix\$;" ";m onth\$;" ";year\$''TAB(5)"Mid-eclipse: 820 pen%=TRUE:PROC_diagram 830 ENDPROC, 850 DEFPROC_diagram 870 PRINT''' Any key for the diagram"; :GX=GET:VDU19,2,4,0,0,0:COLOUR130:GCOLO, 880 CLS: MOVEO, 512: DRAW1280, 512 890 r=Su*factor:PROC_circle(640,512,r, 4):r=Sp*factor:PROC_circle(640,512,r,8): 900 VDU5:MOVEO,550:PRINT"Ecliptic":dat a\$=date\$+":"+STR\$mZ+":"+RIGHT\$(year\$,2): MOVE1279-(32*LENdata\$-3)/2+3,550:PRINTda y\$(A):MOVE1279-32*LENdata\$,500:PRINTdata 910 GCOLO,0: lh=(3.5*deltabeta+BETAMOON)*factor+512:MOVEO, lh:DRAW1280, (BETAMOON -3.5*deltabeta)*factor+512:MOVEO,lh:DRAW 50,(3.225*deltabeta+BETAMOON)*factor+542 :MOVEO, th:DRAW50, (BETAMOON+3.225*deltabe ta)*factor+482 920 GCOLO,3:r=thetam/2*factor 930 IF penX=FALSE PROC_circle(640-X1*f actor,(BETAMOON+starthrs*deltabeta)*fact or+512,r,4):PRINTTAB(33,15+12*SGN(BETAMO ON))LEFT\$(starttime\$,5) 940 IF pen% GCOLO,3:COLOUR3 ELSE GCOLO 950 y=BETAMOON*factor+512:PROC_circle(640,y,r,4):GCOLO,3:COLOUR3:PRINTTAB(17,1 5+12*SGN(BETAMOON))LEFT\$(mid\$,5) 960 IF pen%=FALSE PROC_circle(640-X2*f actor,(BETAMOON+endhrs*deltabeta)*factor +512,r,4):PRINTTAB(3,15+12*SGN(BETAMOON))LEFT\$(endtime\$,5) 970 *FX21 980 PRINTTAB(10,31 AND SGN(BETAMOON)=1)"Any key to continue...";:g%=GET:PRINTT AB(10,31 AND SGN(BETAMOON)=1)"Search res 630 UNTIL ABS(ABS(difference)-PI)<0.00 005:PROC_date 640 rhotick=.99698599/(1+.0549*COS(Mti umed..... 990 ENDPROC ckm+Ec)):pi=.016592845/rhotick 650 deltalambda=.009599311+.0010471975 1000 1010 DEFFN_DDtoDM(time) 5*COS(Mtickm):deltabeta=8.726646E-4*COS(1020 LOCAL hrs, hrs\$, mins, mins\$ (doubletick-ENtick) 660 Su=pi-.00471238898:Sp=pi+.00471238 1030 hrs=INT(time):hrs\$=STR\$(hrs):IF LE 898:thetam=.009042551/rhotick:rate=delta N(hrs\$)<2 hrs\$="0"+hrs\$ 1040 mins=INT((time-hrs)*60+.5):mins\$=\$ lambda-7.16783E-4:factor=1280/7/rate TR\$(mins): IF LEN(mins\$)<2 mins\$="0"+mins 670 IF ABS(.995970321*BETAMOON)<(theta m/2+Su) THEN PROC_um ELSEIF ABS(.9959703 1050 =hrs\$+":"+mins\$+" GMT" 21*BETAMOON) < (thetam/2+Sp) THEN PROC_pen 1060: 680 ENDPROC 1070 DEFPROC_circle(ox,oy,radius,U%):L0 690 : 700 DEFPROC_um 1080 MOVE ox-radius, oy: DRAW ox+radius, 710 VDU7:a=1+deltabeta^2/rate^2:b=2*BE oy: FOR y=0 TO radius STEP U% TAMOON*deltabeta/rate:H=(Su+thetam/2)*2: 1090 x=SQR((radius+y)*(radius-y)) c=BETAMOON^2-H 720 root=b^2-4*a*c:X2=(-b+SQR(root))/(1100 oxpx=ox+x:oxmx=ox-x:oypy=oy+y:oymy 2*a):X1=(-b-SQR(root))/(2*a):IF SGN(X2)= 1110 MOVE oxmx,oypy:DRAW oxpx,oypy -1 X=X1:X1=X2:X2=X 1120 MOVE oxmx,oymy:DRAW oxpx,oymy 730 starthrs=X1/rate:endhrs=X2/rate:mi 1130 NEXT d=24*hrs:starttime\$=FN_DDtoDM(mid+starth 1140 ENDPROC rs):endtime\$=FN_DDtoDM(mid+endhrs):mid\$=



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Music box

ONTROLLING the powerful sound capabilities of the Archimedes series or BBC A3000 is quite a task. But here's an easy way to turn your Archimedes into a polyphonic synthesiser and sound editor. It's called KeySound.

What you get with this program is the ability to design up to 12 sounds with volume and pitch control plus some special effects. You can load and save them individually or save a relocatable voice module containing any or all or the voices you've created, so you can then use them in other programs such as !Maestro.

To get going type in the listing – it's not multitasking – use the checksums to ensure you've made no typing errors and save it.

When you run the program there is a short delay while the machine code is assembled, some mathematical tables are calculated and the 12 default voices are compiled. You are then presented with the main display and are immediately in the editing mode.

Making music

Clicking on *Play* will clear the other options and display your synthesiser keyboard. Two sets of keys are used, laid out piano style. The on-screen keyboard shows white for the white notes and red for black ones. The line ZXCVB has the letter Z as middle C and the line QWERTY uses R as C one octave above middle C.

Up to eight notes will sound at any time; if a ninth note is pressed the oldest one is lost. Pressing several keys at the same

time won't always work as the negative inkey system can become confused.

You can step up and down octaves with the up and down cursor keys. Octave settings are -8, 0, 8. The change is instantaneous so you don't need to interrupt your playing. Function keys 1 to 12 will change voices and does it reasonably quickly too.

Pressing Escape returns you to edit mode. All cyan-coloured parts of the display are responsive to the mouse by dragging or clicking with Select. Generally, yellow is used for information and green for outline limits, while white indicates values that can be altered.

Clicking Select over any of the twelve listed voice names duplicates the function key action. This not only selects voices for playing but also for loading, saving and renaming. The default voices are given in Table I.

Clicking Adjust on a voice box toggles it between enabled or disabled. Disabled voices are not selectable when playing and will not be included when you save a sound module. You can't disable the currently selected voice.

An individual voice can be saved by selecting it as the current voice and clicking on Save. Or you can load a previously saved one using Load. Prompts are given and the file name is the displayed voice name. Saving and loading is to the currently selected voice.

Saving a voice stores all its parameters,

Bell HammondOrg Ethereal
Saw Vibraphone ChurchOrg
Harpsicord Flute Horn
PipeOrg BlockSynth Fantasy

Table I: The default voices

Terry Blunt turns
his 32 bit machine
into a powerful
eight channel
synthesiser

including the current octave. When loading a check is made for file validity. Pressing Return when prompted for a filename will save or load to the currently displayed name. Clicking on Rename changes the name of the current voice without altering any of its parameters.

The Module option prompts for a filename in the same way as save and load, and then creates a relocatable module of all the currently enabled voices. Therefore a library of 1 to 12 different voices can be assembled in one file. This can then be loaded and used in !Maestro or any other sound program.

Changing voices

Editing the current voice is done simply by moving the mouse to the appropriate part of the display and clicking or dragging on the cyan parts.

When dragging envelope shape markers some of the white envelope outlines may go outside their frames. This does no harm but may give unpredictable results. Similarly the harmonic content can be set too high, which is easily identified by sharply re-entrant spikes in the waveshape and a sudden harshening of the sound.

The timbre is altered by summing sine waves using the fundamental frequency; and its main harmonics f1-f9. Random noise is added with f0 to give wind-type sounds.

The amplitude envelope has three variable nodes, attack, decay and sustain, all of which can be changed vertically in amplitude and horizontally in time. Tremelo depth and speed modify the sustain phase only.

It isn't usually possible to get zero tremelo amplitude, due to the way the sustain is created in chunks, however setting a very fast tremelo time will tend to smooth out the steps. Careful selection of repeat time in conjunction with attack amplitude can be used to get almost continuous

smooth sound. The frequency envelope has a further three nodes, head, mid and tail. Head and tail can only be altered vertically by frequency deviation, whereas mid can be altered horizontally in time as well. Vibrato depth and speed only modify the tail phase.

How it works

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If you decide to play around with parts of the program it is important to remember that the exit routines in PROCtidy and PROCerror are essential. And the new sound tables, along with their handling code, are all in normal user ram and the system will crash most resoundingly if any attempt is made to overwrite this workspace.

The heart of the program is the machine code used to replace the normal 32 bit sound system. This is based largely on information and code examples in the Programmers Reference Manual.

For each voice a table is created of instantaneous voltages. This is then scanned to produce a continuous complex wave, the frequency (pitch) of which is determined by the scan speed.

Further tables are created to control the amplitude envelope of the wave produced by modifying the interpretation of the instantaneous values, and the pitch envelope is developed by varying the scan rate.

These tables are embedded in the code itself and although modules that don't use the official method of allocating workspace are frowned upon, this is acceptable as sound modules can't be used in rom form anyway.

Sine values are needed to re-calculate the harmonic content of a voice when it has been loaded or edited. Rather than obtain these directly, the array Sine%() is filled with a table of sine values in PROCinit. This makes for a dramatic increase in speed.

The array par%() is used to store all the parameters of all the twelve function key voices. Although making it a bit difficult to follow the program, using a single two dimensional array like this for all parameters gives a rapid response to change of function key number and makes saving and loading much easier. The array element order is shown in Table II.

Play control is done by each successive call to PROCkey stepping the channel number so that all eight channels are employed before a call kills off an already sounding voice.

Use of a long line of IFs on negative INKEYs is, unfortunately the only satisfactory way of getting polyphonic response. A CASE statement, for example, would only allow the first matching line to give it's key response.

Mouse control is fairly conventional.

Toggling between PROCmenu and
PROCedit improves response time, helps



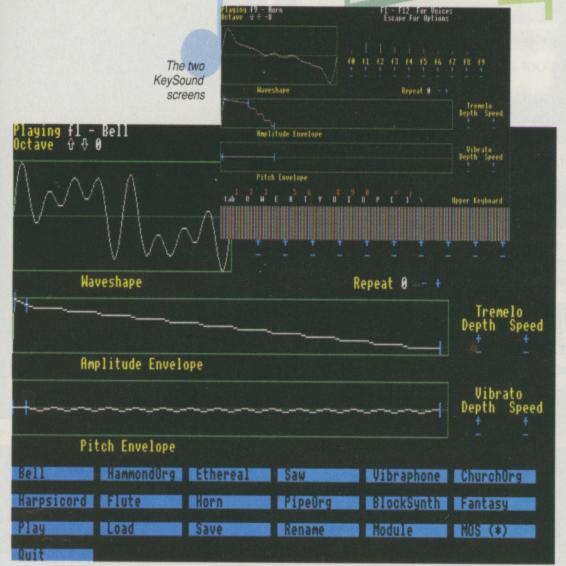
0 = harmonics	6 = head
1 = repeat	7 = mid
2 = attack	8 = tail
3 = decay	9 = vibrato
4 = sustain 5 = tremelo	10 = octave

Table II: The parameter order in par%()

to ensure that all parameters are updated as necessary, and eases the different types of calculation required for editing and menu selection.

The code for the module header is reassembled each time a module is to be saved. This is necessary as a different number of voices, may need to be saved each time. The code is such that it always produces the most compact module for the number of voices enabled.

The voices themselves have a fixed size, so with the excellent position-independent characteristics of ARM code, the required voices can be individually picked out of the main code and tacked on to the end of the module header without alteration.



```
10 REM > KeySound
   20 REM by Terry Blunt
   30 REM (c) The Micro User
   40 ON ERROR PROCEFFOR
   50 PROCinit
   60 PROCassemble
   70 PROCchannels
   80 MODE 12
   90 PROChour(FALSE)
  100 ON ERROR PROCEFFOR
  110 PROCdisplay
  120 PROCmenu
  130 PROCtidy
  140 END
  150 :
  170 DEF PROCERTOR
  180 VDU 4
  190 PRINT REPORTS " - Press
a key'
  200 IF GET
 210 IF NOT INKEY TRUE ENDPRO
 220 ON ERROR OFF
 230 *RMREINIT SoundDMA
 240 *RMREINIT SoundChannels
 250 *RMREINIT SoundScheduler
 260 *RMREINIT WaveSynth
 270 *RMREINIT StringLib
 280 *RMREINIT Percussion
 290 *FX 4
 300 *FX 12
 310 *FX 229
 320 END
             Turn to Page 110
```

Find out its limits. Look in the mirror.



Atari 1040 STE. With such an awesome machine, we're convinced the only limits you'll come across are your own.

Based on the incredibly successful 1040 STFM, the 1040 STE itself goes beyond the limits of its predecessor.

The 'E', by the way, stands for 'Enhanced'. But once you've discovered its amazing array of features, you may consider 'Enhanced' to be the understatement of the decade.

Perhaps the most outstanding feature of the 1040 STE is its graphics. Its palette contains over 4000 colours (all right, 4096 to be exact).

To ensure precise and realistic images, the STE features 'hardware scrolling', enabling smooth scrolling in any direction and split-screen effects. And, with the SM124 monitor, you'll get razor sharp black-out-of-white text that's as clear as the type on this page.

To complete the picture, it is able to 'phase-lock' its video output to an external video source, permitting direct linking to a Genlocking device.

The 1040 won't just have your eyes swivelling in their sockets. Your eardrums will also take a pounding from the 8-bit PCM stereo sound.

The new PCM (Pulse Coded Modulation) sound system's two chips allow the 1040 STE to replay high-quality sampled sounds, in stereo, without burdening the CPU. Or, for even more of an earblasting, just add a couple of RCA output jacks and power the sounds through your own stereo.

Of course we mustn't forget memory. One megabyte of RAM comes as standard. If that's not enough, the 1040 STE provides four SIMM sockets. Simply plug in some SIMM (Single Inline Memory Module) boards and boost the RAM up to four megabytes.

To help you handle all this technology, we've added even more: a Blitter chip, capable of shifting data at high speeds independent of the CPU, and a new version of TOS.

The TOS 1.6 (operating system) has an enhanced file selector with drive-change buttons, improved desktop with file move, MS-DOS compatible disk formatting, and better application installation and auto-booting facilities.

As you'd expect, there's a huge range of peripherals including hard disks, floppy disks, laser printers, colour monitors and even Megafile 44, Atari's unique 44-megabyte removable hard disk.

As well as all this hardware, there are hundreds of software programmes for the 1040 STE - we're even throwing in the ST-Series Productivity and Leisure bundles free.

The Productivity bundle features a database, spreadsheet, word processor and business graphics package, and there's S.T.A.C., FirST BASIC, Hyperpaint and Prince in the Leisure bundle.

If you're itching to get your hands on the controls, there are two 15-pin analogue controller ports (which accept paddles, lightguns and light-pens) and a 9 pin mouse port and joystick port.

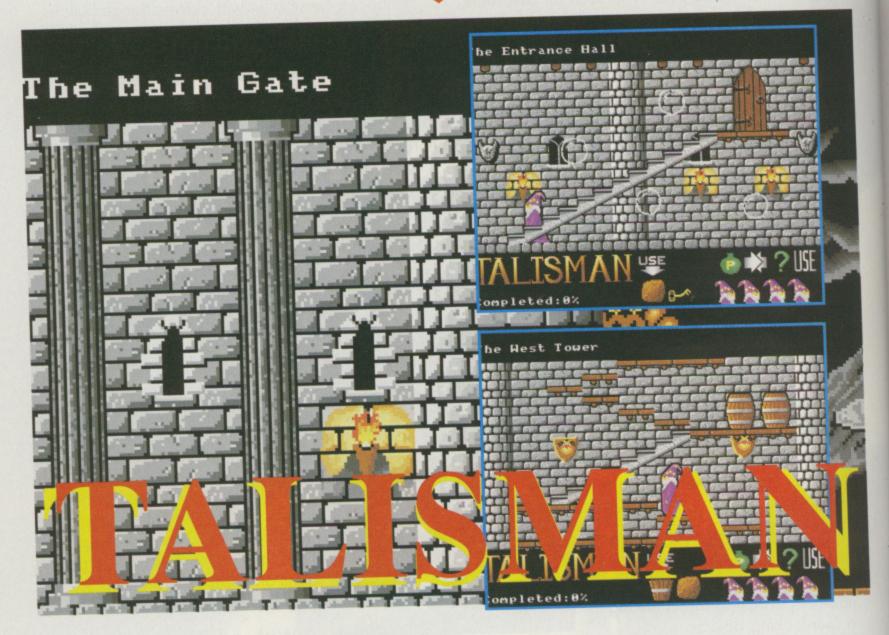
With adaptors, up to six people can use the 1040 at one time. Just in case it's too much for one person to handle.

At £499.99 it certainly won't be too much for one person to afford.

The ideal computer at the ideal price, you may think. We think so, too. But there remains only one potential problem: not whether you'll make impossible demands of the 1040, but whether the 1040 will make impossible demands of you.

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HILE the packaging pictures don't do justice to their counterparts on the screen, at least they're more accurate than the story line. The box asserts that the evil wizard Zaldremon is responsible for the terrible state of affairs which has befallen the land, but the storyline on the screen has the culprit as a Baron. Perhaps he's both.

The program requires 400k, so before you double-click the head of the good wizard be sure that you've got enough; alternatively pressing Shift+Break will do the trick.

The mystical looking menu screen has a scrolling message passing along the lower portion. Try not to fall asleep before it ends as there is some important information there – you could end up thoroughly frustrated, stuck in a small area of the adventure.

The tutorial gives game play details and the keys to use. What a pity that the mouse could not be used to control the

wizard's movements instead of the old A, Z, ', /, and spacebar – although you can redefine them.

The evil Baron has smashed the Talisman into six pieces and scattered them. Your task, as the remaining good wizard, is to recover them from around the kingdom, re-assembling them while fighting the forces of evil.

The screen backgrounds are beautiful, with castle walls of real stone, authentic-looking trees, flaming torches and fires – but why can't they scroll smoothly instead of flicking between screens?

The wizard's movements are unpredictable at times, although he makes a realistic ticking noise with his feet as he walks.

Talking of sound, the BBC A3000 has a wonderful system, but the wizard hardly knows it is there, producing only simple tones as he jumps or is attacked, and there's no background music to set the scene.

The ghouls, ghosts and monsters I came across were far better than just 8-bit derivatives and unlike the wizard, do justice to the machine – except for the bubbles which were little more than empty circles. There are bats, wasps, red beetles and all manner of unusual creatures out to sap your lifeblood.

Initially, I didn't achieve more than two per cent of the game, being sapped of my energy by the monsters time and time again, before I could explore much of the castle or surrounding forests.

The secret is to read the scrolling screen message – you have been warned.

Initially I found Talisman disappointing, but once the play opens up it's a fascinating and well-produced arcade adventure, with excellent scenery and pretty good sprites. As the next step up from Citadel it can't be beaten – at least, not yet.

Baz Racon

Sound	6
Graphics	9
Playability	8
Value for money	8
Overall	7

TALISMAN USE

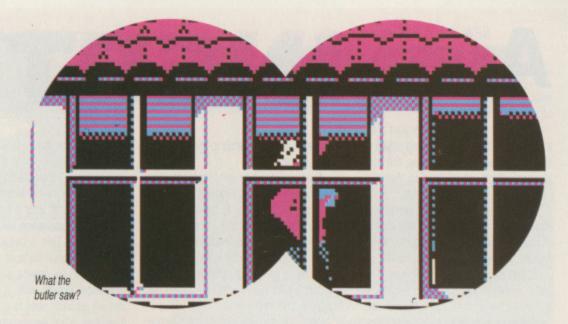
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Requirements: Archimedes or BBC A3000 and PC Emulator

T was 1987 when a superstar burst on the world. You may have missed his debut but the Archimedes' PC emulator gives you the ideal opportunity to make his acquaintance. Believe me when I say that Larry has become something of a legend. Born of the Reagan years and yuppie superiority, Larry Laffer is a phenomenon. Firstly picture the archetypal medallion



Man. Add even more fake tan and some large teeth, then subtract tact, subtlety and care for your fellow human beings. You now have our hero. Progressing from

man. And even more take tan and some large teeth, then subtract tact, subtlety and care for your fellow human beings. You now have our hero. Progressing from his first appearance in Leisure Suit Larry in the Land of the Lounge Lizards to his adventures in Looking for Love, he is now living on the island of Nontoonyt.

Is this game crude, is it chauvinistic? You bet, but most of all it is very funny. And as an adventure it is challenging, interesting, graphic and humorous. If you have already played Larry I and II, you don't need converting to its merits.

As with all Sierra games, the packaging is detailed and informative – not to mention important if you wish to succeed. First, though, you have to deal with the protection. This is not to check that you've got a pukka copy, but that you are of an age to play.

Well, how many of you know what the Andy Griffith show is? Get that one right from the over 18 range, and you can play at the Pretty Dirty Level. Easier to access is the 25+ age group. The questions are risqué, and correct/witty answers will allow you to play the Rather Risqué Level. If your sensibilities are not up to this, you can make informed guesses on a lower level, get a lot wrong and still play the game.

Larry's designer Al Lowe got his inspiration while on holiday in Mexico. "Some of the things that happened – the mad rush to the airline ticket counter, a really terrible plane ride, a resort so heavily landscaped we kept getting lost... they all found their way into the game".

Leisure Suit Larry III reverts in some way to the original's line in bad taste. Larry is basically the same sort of guy, his surroundings the same type of kitsch, and of course he is searching for the girl of his dreams, self-esteem and adventure.

Nontoonyt is a jungle island and holi-

day paradise. In the packaging there's a postcard to send to your nearest and dearest. The guide to the island is packed with hints and ideas for your holiday delectation.

You begin your adventure – as do all good holidaymakers – on Vista Point. The view will take your breath away. Fortunately for you, some visitor or holiday official has left binoculars which will allow you to search the island in further detail. In fact there are two pairs, both with educational views.

As a true tourist you shouldn't miss a visit to the sumptuous home of that pillar of society Larry Laffer. As you would expect, Mr. and Mrs. Laffer (yes, the Prince of Lounge Lizards did marry Princess Kalalau Laffer) live surrounded by the highest security – you should just look at the walls.

You won't get bored on the island, and with only one TV – and that in the middle of Walken Park – you'd better try some of the famous entertainments. If you can stand listening to Paul Paul at the Comedy Hut you may be rewarded, and the wood carving lessons on a Monday would be great if you had some of the famous granadilla wood.

What makes Larry III different is Patti. You can change role in mid-adventure and look at life and Larry with new eyes. Your female persona is looking for the one that got away, her perfect man. Larry is on the run from Patti, spies, mad scientists and the horror of another hour in Paul Paul's company.

The tongue-in-cheek stereotypes and

. tropical adventures



liberal sprinkling of wit could not have been brought off without an excellent user interface, nice animation, tricky problems, puzzles and a totally complex and improbable plot.

Go on... treat yourself!

Jo Giles

 Sound
 5

 Graphics (PC EGA)
 6

 Playability
 8

 Value for money
 10

 Overall
 7

Larry III: The opening screen



NEW idea in BBC Micro software? Well, not quite, there have been games like it in the past. Inertia, however, is vastly superior to earlier attempts on a similar theme.

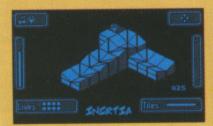
The aim is simple. You steer your craft, a kind of spinning top, through a series of three dimensional landscapes, the surfaces of which are covered in tiles and you must collect the shaded ones.

The problem is that this world has edges and it is all too easy to lose control of your vehicle and land up in the nether regions. This involves the loss of a life.

At first the task seems fairly easy: The paths are wide and simple to negotiate. But after a few screens problems crop up.

Shaded tiles need to be collected from very narrow passages with no walls to prevent a disaster occurring.

At other points ramps send your vehicle spinning into space with only a hope that it will make a soft landing. It is fortunate that you are equipped with first rate



NERTIA ... in a spin

brakes as well as controls to move you up, down, left and right.

These have to be used in tandem when diagonal movement is required. When you do have the misfortune to fall off the edge of the world you restart from the point where you last found a shaded tile.

When you feel you have mastered these basic problems other troubles will start to afflict you. Jump tiles throw the spinning top into the air.

With luck, you won't land on a direction square which reverses the operation of your control keys.

Ice is another hazard. This causes the craft to skid and it is essential to be heading in the correct direction before attempting to cross this slippery surface. Other



tiles make the brakes fail or the steering defective. Again, great care is needed before these are crossed. One other interesting idea is the transformation tile. This alters your craft from a light, fast mover into a slow, lumbering but more controllable device. This is certainly an aide to crossing awkward surfaces.

Inertia is an arcade adventure with a difference. Players without superb memories will probably need to produce a map if they hope to find every shaded tile.

You start the quest with three lives, but an extra one is gained for each tile collected. This can easily build up to the maximum of 12, but they are lost all too easily while trying to set a straight course along an ice floe. Each tile also gains you five



Price: £9.95 Supplier: The 4th Dimension, 1 Percy Street, Sheffield S3 8AU. Tel: 0742 700661 Requirements: All 8 bit BBC Micros

points while losing a life reduces your score by three.

The graphics are very good. Mode 4 has been chosen which limits the screen to two colours, but rapid scrolling means that the colours change frequently.

The craft can move swiftly - and it does so smoothly and without flicker.

The playing area is a window in the middle of the screen which is surrounded by neat status icons. Along the top of the



HELTER SKELTER

... bounce into action

Price: £9.95 (tape) £11.95 (disc)
Supplier: Audiogenic, Winchester House,
Canning Road, Weeldstone, harrow
HA3 7S.J.

Tel: 081-861 1166 Requirements: Electron, BBC, Master

N these days of ever increasing sophistication it is most refreshing to play a game as simple yet addictive as Audiogenic's Helter Skelter. The storyline goes like this: The world has been overrun by herds of comical looking monsters and your mission is to bounce the little blighters into oblivion. I choose the word bounce specifically, since you are a red rubber sphere of considerable size.

Ball control is achieved by means of three keys – left, right and bounce and your mastery of the bounce button will determine the outcome of the game.

Oddly enough the world that you are defending is constructed in platform game fashion – single screens, with several platforms floating in mid-air. Each is inhabited by one or more randomly moving monsters

just waiting to be bounced. Being an ace tactician, my first inclination was to ricochet around the screen as fast as possible, obliterating everything that I touched.

After I had doubled the indigenous monster population in five seconds I decided to adopt a more subtle approach – so I sat down and read the instructions.

The accompanying script indicated that the programmers had anticipated my sledgehammer approach by specifying the order in which the monsters must be despatched.

On all occasions, the next one to be blatted is highlighted by a large white arrow hovering above its head. Contact with any other beast induces instant binary fission, the result being two furry fiends scurrying around the screen instead of one.

Don't be put off by the fact that you can literally sprint through the first few screens, as this is a deliberate ploy to boost your confidence. Things soon begin to increase in both complexity and difficulty – don't forget that you have a total of 74 levels to complete before you reach the end! Helter



Opening screen

Skelter's monsters are not in any way harmful to the bouncing ball and the game's controlling factor is time.

A digital clock counts down the seconds as you race to obliterate the monster masses. Tension is heightened by a rapid ticking sound that starts at the 10 seconds marker.

Scoring is relatively simple. You receive 500 points for every monster you zap, a further 1,000 bonus for every second that remains on the clock, and a final skill



display you get an indication of sound status, which of the craft types is in use, whether the keys are normal or reversed and whether the pause option has been selected.

pin

Mode 4

screen

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At the bottom is the useful game information – lives left, score and tiles still to be found. The sides of the screen have the time indicators.

A tile must be found before the time runs out or a life is lost. Each time you do collect a shaded tile, the timer is reset. The sound is fairly basic - a few beeps when the craft hits a wall.

It can be turned off, although it's not particularly intrusive.

We have come to expect quality software from The Fourth Dimension and the company has not let us down with Inertia.

This is a first rate game with just the right mix of ingredients.

It requires close control and thought and has enough of a frustration factor to call for yet another go. Recommended.

Rog Frost



Sound	7
Graphics	8
Playability	9
Value for money	9
Overall	8

bonus which is halved every time you press the bounce button.

This final bonus encourages a player to adopt the most economical approach to completing a screen – this is also probably the quickest.

Variety is introduced by means of various tokens that appear at random throughout the game. Time limit permitting, you may be able to collect the letters E-X-T-R-A and be rewarded with an additional ball.

Alternatively there is a range of symbol tokens that can temporarily paralyse the monsters, interrupt the passage of time, or best of all, teleport you to the next level.

Sound is used sparingly: There is no title tune and the spot effects are simple, but this doesn't really detract from the game's appeal.

Helter Skelter strikes a good balance between graphic detail and colour use. On the animation front, the characters exhibit flicker-free and fluid movement, with the realistic response of the ball to the apparent gravitational effects being worthy of note.

If you become bored with playing your way through the same old levels time after time and you're not good enough to get any further, try pressing E while you're on the title screen.

Once the discrete message Edit mode has disappeared you will be faced with a blank screen – a canvas upon which you

can express the more devious side of your personality.

This built-in level designer allows you to create an infinite number of new screens, provided that you save them to disc or tape in groups of 40.

You are given total control over the size and location of all platforms, the number of monsters present, the starting position of your ball, the time allocation and the size of the low bounce bonus.

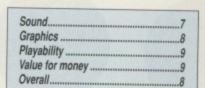
The only failing of this otherwise powerful editor is that you cannot edit a screen once you have committed it to memory. If you've used game editors in the past you will realise the magnitude of this omission.

There is no way that you will ever create a well balanced level at the first attempt – it will always be too easy, too difficult or just downright impossible!

I would rate Helter Skelter as one of the better platform games to have hit the market in recent years.

Simplicity is the keyword throughout: Simple controls, simple gameplay, simply fun!

Jon Revis



E-TYPE

... on the straight and narrow



Price: £9.95 (tape) £14.95 (5.25in disc) £15.95 (3.5in disc) Supplier: The Fourth Dimension, Dept. 4444, 1 Percy Street, Sheffield S3 8AU. Tel: 0742 700661

HO dared to say that the days of the good old BBC Micro were numbered?
Less than a year after the original release for the Archimedes series comes the 8-bit version of Gordon Keys' excellent E-Type racing game, proving that our trusty friend is capable of reproducing equally high class games.

If you are unfamiliar with the scenario here's a quick resumé: You and your passenger have been left in control of a gleaming Jaguar E-Type worth £70,000. All you have to do is complete the various tracks presented to reach the coveted first place in the Hall of Fame.

As you will have come to expect, a number of hazards are lying in wait for your every mistake. To begin with there are the other cars in the race – run into the back of them and your speed is reduced. Do it once too often and the game ends.

Other obstacles include boulders, trees, electricity pylons and roadside bushes – plus roadworks, of course. Colliding with them increases damage to your car until it finally falls to pieces.

Also beware oil spills which send you slipping around for a short – and possibly crucial – period.

The display shows a view of the track from behind your vehicle, with a car dashboard including a rev counter

and speedometer. Several different tracks are available, as are skill levels. Selection is simple – just press the appropriate toggle key.

Gameplay is very similar to the Archimedes version. The tracks appear to be identical and only a few features are missing.

Obviously the colour on this version is much inferior to that of the 32 bit version, although a good attempt has been made to compensate by using successful colour mixing techniques.

Missing features are the road cones, the time bonus messages and the automatic gearbox feature.

You may rightly question how the tracks can be completed if the time bonus messages have been removed. The truth is that they have been substituted slightly – the once-innocent policemen now have to be knocked down for you to qualify for your quota of extra time.

I missed the automatic gearbox at first – I always use it when playing the Archimedes version for simplicity's sake – but after a few attempts I learned to cope with manual gear changing.

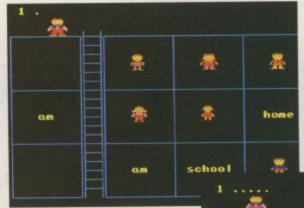
Anyone expecting a pure copy of the Archimedes version can forget it. Although the gameplay is very similar, the graphics are for obvious reasons of an inferior calibre, but by 8 bit micro standards are still very impressive.

I found E-Type enjoyable and addictive and recommend it to all racing game addicts.

Stephen Wade

Sound	6
Graphics	9
Playability	9
Value for money	9
Overall	8





Book

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Book

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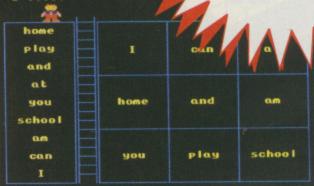
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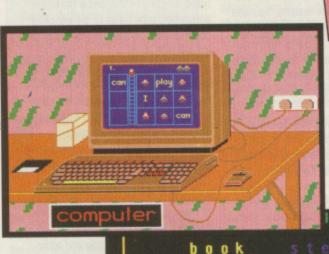
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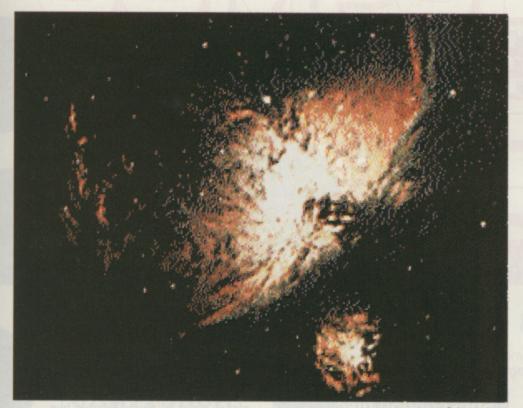
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Orion nebula

IGHT, it has come to my attention – from letters from you and the PD libraries themselves – that there is still confusion over what PD software actually is and what it isn't.

It's really very simple: PD software is only public domain – freely copiable by anyone to anyone – if, and only if, the author (or owner of the copyright) says it is.

For example, the programs published in this magazine are not PD – in fact you'll find that programs published in most, if not all, magazines are the same. They aren't PD because the owner of the copyright hasn't given up that ownership.

If you send me, or a PD Library, some software which bears a copyright message you'll get short shrift from me and them. So don't do it.

Also I'd get very suspicious of any software that has no copyright/public domain message at all. If it doesn't say it's public domain then don't treat it like public domain.

Certain bulletin boards distribute copyright material from magazines; this is naughty and they shouldn't do it. Luckily for them, most publishers within the BBC Micro market are fairly friendly and benevolent so aren't too bothered as long as no one is actually making money out of it.

However, there are some publishers of copyright material who are going to get very, very upset if they find out that their material is being pinched – which it is.

Someone sent me a PD disc that has film pictures and music copyright stuff on it – I also know that at least one other PD library is doing the same. This might seem fairly harmless, after all it's just one digitised

picture and some music to go with it. The music is good, so is the picture. But, and it's a really big but, film companies are huge bureaucracies and they don't take kindly to anyone stealing their material.

Trust me, the amount of paperwork required to get just one screen shot of, say, Star Trek into the magazine is amazing.

And any infringement that is discovered is dealt with using the full force of the law. Most film and music companies get very upset about people who steal their images or sounds – and they just love going to court, because there's no such thing as bad publicity.

'Nuff said.

Silly stuff

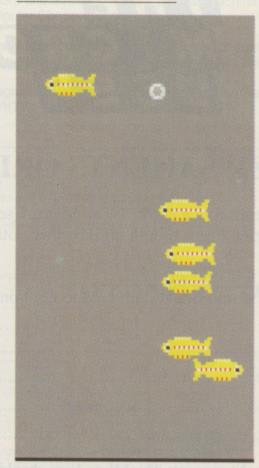
One of the most popular forms of PD software for the Archimedes are silly DeskTop accessories, !Wanda is a good example. When we first got a copy of that the editorial staff of *Amiga Computing* were absolutely riveted by it – the Amiga is a multi-tasking machine too, but they can't do what we can do.

I have heard of a DeskTop !Duck but I've yet to see it – I'll pass it on as soon as I get it. The only problem with these accessories is that you can usually only have one operating at a time.

The way they work is to create a big window covering the main screen, excluding the icon bar, behind all the other windows. Then they just move their silly icons around



Teri Paul presents further thoughts on the PD world







The Earth

in this window. Of course if there's more than one the latest will obscure any earlier ones.

There is a way of specifying a transparent window, unfortunately this is less than useless because the Wimp Manager still doesn't update what's behind it.

Perhaps the next release of Risc OS will improve this situation – I can think of many uses for properly transparent windows, not

just silly ones. Of course, the real solution would be some way of getting each of these silly accessories to use the same window. You'd need a central program that sets up the window, plus the accessories which – using the Risc OS message system – could add and modify icons in the window.

OK, that's enough hints one of you geniuses get cracking on it and I'll give a prize to what I consider the best version. Anyone sending a program with a GOTO gets the Teri Paul boot immediately!

Another quick hint to all silly accessory programmers – always use Wimp-PollIdle not Wimp-Poll. This ensures that your programs don't interfere with the foreground tasks that the user is working on.

Subscription disc

The monthly Risc OS disc, which I seem to have charge of now, is beginning to get a little bit tight for space – I had to leave off one of my brand new, never before heard on an Archimedes Amiga SoundTracker

modules, it's included this time. Once I get hold of David Pillings PD de-archiver I'll stick it on the disc and we'll be able to cram more on.

In fact, the !STracker module is rather appropriate considering the music theme of

this month's issue. You'll also find a demo copy of !Rhapsody, the new music composition program from Clares. As a demo it's very well protected – you can't load (it automati-

cally foads four files) and you can't save. You can edit and play the music through the built-in Archimedes sound system. If you've got a Midi output and a Midi instrument you can play the music through that too.

Mike Cook has given me a couple of discs of stuff. There's two screens from an astronomical bulletin board, these need to be loaded using !Translatr and look really good, as the pictures here show. He's also given me two applications which I've included, but if you don't understand them don't ask me!

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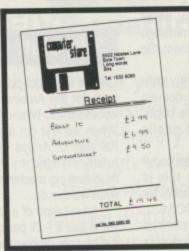
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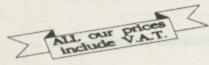
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Weighing Mike Cook explores the capabilities of a novel graph drawing package Product: Graphbox Price: £79.95 single user £799 network Mike Cook explores the capabilities of a novel graph drawing package



ith Graphbox from Minerva, you can present data in a wide variety of graphic styles, it's designed to be used on the Risc OS desktop and is fully compatable with it.

Supplier: Minerva Software,

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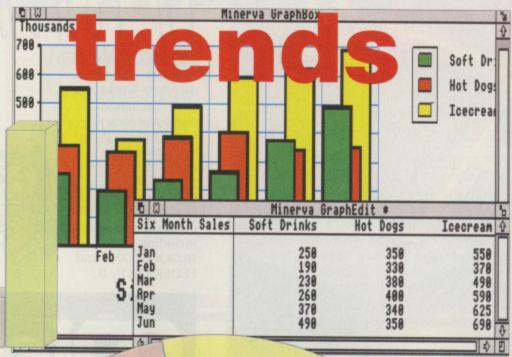
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The output is in the form of !Draw files. which means that you can use !Draw application to make adjustments or enhancements to your final graph. It also means that your graphs can be easily incorporated into other documents and desktop publishing packages.

Basically Graphbox consists of two separate applications, one that prepares the data and another which turns it into a graph. However you aren't confined to using the data preparer, as Graphbox will accept other forms of files, including Ascii ones, as its data input. So you could write a Basic program that outputs its data in the form of an Ascii file and then have Graphbox do all the fancy work and turn it into a graph.

GraphEdit is used to prepare the data: When run you are presented with a display showing two columns for data entry, although you can easily add more. Entering the numbers is a smooth operation, with the cursor moving from one column to the next every time you press Return.

When you reach the end of the available columns you are automatically placed at the start of the next row. Editing at any



Porting finished graphs is easy with Graphbox

place in the display can be achieved by pointing and double-clicking with the mouse. You can also move and copy whole columns. An options window lets you prespecify the type of graph you want to produce. The resultant data is in the form of text files, and are saved with the standard method of dragging icons.

Graphbox draws the graphs of which there are 20 different types to choose from (see adjoining table for the full list). Producing one simply involves dragging your data file into the Graphbox window, It is drawn - not exactly at lightning speed and legends, titles and axis labelling is performed. From here you can view your graph in any of the different formats, although some do not make a sensible job of displaying the data.

For example, the polar diagram of two different types of microphone sensitivity are fairly meaningless when plotted as a 3D

histogram, but that is only to be expected.

One useful feature is that the graph's axis can be linear, logarithmic or even your own function. This is very useful when plotting experimental results. By choosing the correct axis function you can get straight line graphs which are much easier to read, interpolate and extrapolate. When the graph is to your liking you can save it as a !Draw file.

The 36 page manual, with contents and index, provides a simple tutorial section as well as a reference section covering all the options and variations in the two programs. There are also screen shots of each graph type, along with an explanation of how the data is treated.

In addition to the programs there are data files containing data that illustrate all the major graph types. Plus a pullout overview from the middle of the manual doubles as a registration form.

Graph types available

- Scatter chart
- Scatter with error bars
- Line graph
- Line graph with error bars
- Bubble chart
- Polar scatter chart
- Polar line graph
- Stacked area chart
- Cumulative stacked area chart
- Bar chart
- 3D Bar chart
- Stacked bar chart
- Percentage bar chartHorizontal bar chart
- Horizontal 3D bar chart
- Horizontal stacked bar chart Horizontal percentage bar chart
- Surface chart
- Wire surface chart

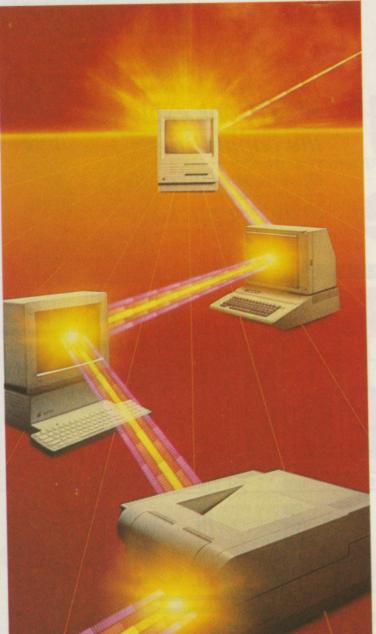
Summing up

All in all, a good package with a wide range of options, however I have a few minor quibbles. First of all the re-drawing speed can be slow, especially when there are a lot of data items. This is most irritating when it is redrawing "damage" done by the pop-up

Second, the applications do not install themselves on the icon bar. Instead you must have the window open all the time for

these applications to be in memory. Closing the window closes the application, requiring it to be reloaded from the disc.

Finally, while the single user price is reasonable if a bit on the high side, the network licence price is downright silly. This sort of costing only encourages piracy among network users, who probably would be willing to pay four or five times the unit price for a net-



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More Plus marks

HE official Acorn word processor, First Word Plus, has grown up and joined all the other good 32 bit products as a Risc OS multitasking package. And it's a great improvement. As such it now matches the behaviour expected of good software.

Once loaded it appears as a page icon on the bar. Documents already in existence can be loaded by dragging them on to the page icon or, more simply, by double clicking them from a directory viewer.

In fact, in true Risc OS style, if the filer has already seen First Word Plus then double clicking on a First Word Plus document will load the application on to the bar and open a window on the document. Figure I shows a standard test document in a DeskTop window.

If you have the original edition you can see that the bottom of the screen is no longer cluttered with reminders of the function keys and the character set.

However both these facilities can be shown, as the keypad - Figure II - from the

Ian Whitmore assesses the improvements in Acorn's own word processor

marked areas to be case changed. You can force all upper or all lower case, change case or force Title case selection with all leading characters only in upper case.

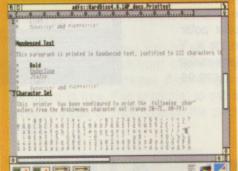
In similar manner to normal DeskTop use, function key 12 now offers access to the Command Line for * commands. This has meant that the allocation of function keys has changed a little, with F7 now being reformat. That takes a little getting used to.

Many of the control windows have been improved in layout. In particular, numeric input can usually be selected by increase and decrease icons as well as directly entering the value.

The spelling checker now has a 70,000 word dictionary and can be loaded and removed at will, again allowing control over the use of limited memory.

Perhaps the largest change is the move to Risc OS. File movement now fits the Risc OS format, most being possible simply by dragging icons. Printing is achieved by dragging a saved file on to the printer icon on the keypad.

The print window - Figure IV - gives the



| D | add s: for Dised. S. if does Ariettest Figure I: A document window BECOFFSHIJELHHOPERSTUOMET? (abadefghijklmappqrtuvusgt.ii.) lasata865e665jg1858a8688868693p lasata865e668jg185a846868693p lasata865e88a-xe-s/le-"()611)()e86 123456758a-xe-s/le-"()611)()e86 Figure IV:

Figure II: The keypad window

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iconbar icon menu and by using !1stChars an application supplied with First Word Plus, see Figure III. In fact I find it easier, as both are in moveable resizeable DeskTop windows that can also be placed behind other windows.

All the known bugs have been cured and access to all DeskTop modes makes the choice of screen memory against document size an easier one for those short of

I currently use mode 78 supplied by Computer Concepts with Impression on a multisync monitor and this gives an excellent result with First Word Plus.

New features include the ability to change between uppercase and lowercase using Control+V. An addition to the style menu allows single characters or block-

B () Left margin offset 800 800 sse between pages quality: ⊗Braft ◇MLB Cancel IX

The print dialogue

box

Product: 1st Word+ Price: £91.94 Supplier: Acorn Computers Ltd., Fulbourn Road, Cherry Hinton, Cambridge. CB1

Tel: 0223 245200

usual options, printer drivers being selected by dragging them on to the keypad. All previous printer drivers, dictionaries and so on are supported, although you may need to alter their filetype before they are recognised.

Figure III:

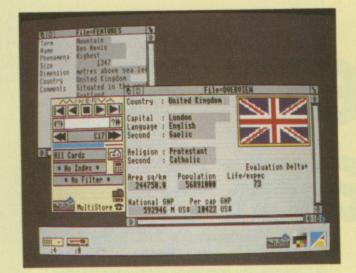
!1stChars

window

application

Summing up

Acorn should be congratulated on this new edition, although I have no doubt that others will still find fault. Whether or not current owners should upgrade is a more difficult decision, as the price is quite high. I think you have to look carefully at the benefits and make up your own mind.



MULTISTORE

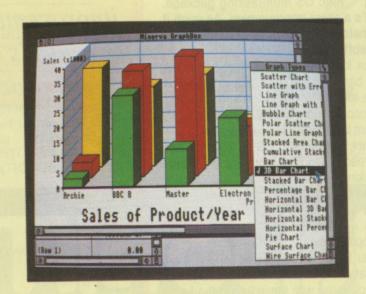
- THE DATABASE

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GRAPHBOX

- THE GRAPHICS

With twenty graph types and its multi-tasking capabilities GraphBox is one of the most flexible packages for the Archimedes. Enter data through Graph Edit or drag data in from any other legal multi-tasking software and produce a graph which can then be exported to a wordprocessor or DTP package. GraphBox gives you a professional graph in a matter of minutes, whether you require a simple scatter or a more complex polar chart. These features plus the ability to enter formulae on the X, Y or Z axis and save it to the Acorn Draw or Edit applications make GraphBox an impressive data presentation package. £79.95



ATELIER

- THE STATE OF THE ART

An art package in a class of its own, Atelier exploits the 256 colour capabilities of the Archimedes. Stunning graphics can be created easily and professionally. Atelier is multi-tasking which means your pictures or artwork can be exported to a DTP package by simply dragging them across. Comprehensive sprite editor, undo brush, patterns and definable brushes. Extremely smooth fill routines, ability to import digitised images and advanced features which allow you to wrap images onto any definable 3D shape coupled with the Sequencer to animate your images - only your imagination can hold you back.

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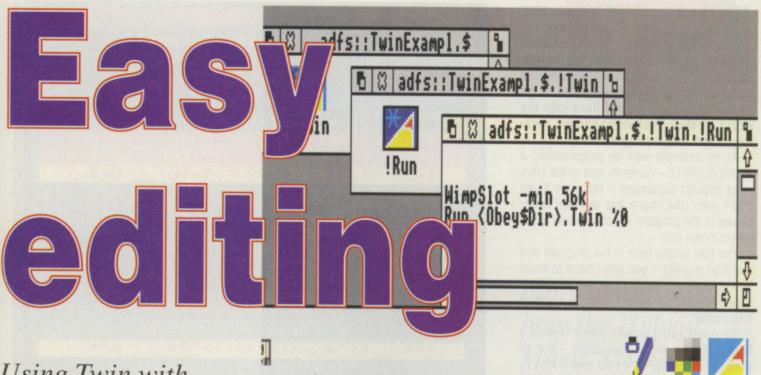
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Using Twin with
Risc OS is possible
- Andrew Cumming
shows how

N the distant past, when the only Archimedes' operating system was a beast named Arthur, Acorn released a text editor called Twin. With the advent of Risc OS this was partially replaced by the multi-tasking!Edit – but Twin still offers many advantages: The keyboard response is much faster, as are the very comprehensive search and replace operations.

Twin's concurrency allows you, for example, to type in a source file and pass it through a compiler without leaving Twin, and then to locate any errors produced in the original source code.

While !Edit runs in the multi-tasking DeskTop environment, and also allows a Task Window to be set up, Twin seems to offer a much more efficient environment for the programmer.

Though it cannot multi-task within the DeskTop, Twin can be integrated very effectively with it.

Firstly, create a new directory named !Twin. Inside this place the Twin program file, altering the load address as described in the panel. Note that to open the !Twin application directory you must hold down Shift while you double-click.

Using !Édit, create a new Obey file – using Create from the icon bar menu – and enter the following, saving it inside the !Twin directory as !Run:

WimpSlot -min 56k Run/<obey\$dir> .Twin %0

Twin will now be run by double-clicking on the !Twin icon.

With the above !Run file, Twin will run

with a minimum of 56k, and this leaves approximately 4k for text. The minimum amount of memory free for text can be

increased by altering the Next slot in the Task Manager window.

The !Twin run file

A maximum value can also be set. Twin will then take an amount of memory between these two extremes, depending on how much is free. For example, to set a maximum value of 100k, change the command to:

WimpSlot -min 56k -max 100k

To force a certain amount of memory make the maximum and minimum values the same:

WimpSlot -min 100k -max 100k

The %0 parameter after the Run command means that any parameter supplied will be passed to Twin. So from the command line, typing:

*!Twin filename

will run Twin and load the specified file.

You can achieve the same effect using !TinyDirs from Application Disc 2. Double-click !TinyDirs to load it then drag !Twin on to it. Now if you drag a file to be edited on to the !Twin icon on the icon bar Twin is run with the dragged file as its parameter.

To improve the speed here the !Twin application can be copied on to a ram disc first – 48k is all that is required.

Once in Twin, you can exit to the DeskTop by pressing Shift+f4 and pressing Return in response to the prompt.

If you loaded a file by dragging it on to the icon you can save it with the same pathname by pressing f3 and then Copy. The pathname will include the filing system and disc name and can be edited before saving the file. This avoids the need to remember long pathnames and you don't have type them out.

So there you have it – you're all set for easier editing and concurrent processing all from the DeskTop.

Altering Twin

Normally Twin loads at address &80000, which gives approximately 100k for text and 400k for concurrent applications such as a compiler. Which means that approximately 500k would be needed to run the program from the DeskTop.

If you are only going to edit text files and not run concurrent applications, or need less than 400k for the application you will be running, this is a waste of valuable memory, particularly on 1Mb machines.

Fortunately a utility called FileMove is supplied with Twin which can alter its load address. Before copying the Twin file into the !Twin directory, change its load address by typing:

*FileMove Twin 8000

This is also described in Appendix D in the manual. A load address of &8000 will give no memory at all for concurrent applications and is the lowest value that can be used while, for example, &10000 will give 32k.

The !Run file given in the main text and all further examples assume that a load address of &8000 has been set, which means no concurrent applications can be run. If you require some memory for other applications, simply add this figure to the figure given. For example, if a load address of &18000 had been set, the 56k in the !Run file would become 120k.

F you have the Hybrid Music 2000 unit you have access to the power and music connectivity of Midi. The Ample software environment protects you from the complex details, but sometimes you want to go deeper. Txed is an adventure into the world of Midi System Exclusive messages and Ample programming.

As an example we'll be programming a Yamaha TX81Z – currently one of the UK's most popular expanders – but even if you don't own one there are several techniques in the program which you can adapt

for your own use.

You can simply type in the program and use it as a utility – you don't have to know how it works – but please read this text carefully as it contains essential items of information.

To run Txed you will need Hybrid's Music 2000 – with Music 5000 – but all else is optional – even the TX81Z, although without it you won't be able to check that the program works properly.

Txed can be used to edit 90 of the TX81Z's Performance Memory which you use when playing multi-timbral compositions. It's based around two Control Panel

St	udio 5	000 Not een1" t	epad o make	ID 72 "Screen1	350 "	
tr	ying "	RETGATE	:" 		1.9.6	
%		Perfor	BasicR	The Real Property lies and the last lies and the	Ian Wa	ugh
%	Bank	Inst	Vol	Chan	Max	
%	I-D	No.		17=0mn	Note	s
%	1-5	1-32	0-99	1-16	0-8	
	4	20	70	1	1	TX1
	3	4	99	2	1	TX1
	2	18	89	3	4	TX1
	4	15	96	4	1	TX1
	5	5	99	5	0	TX1
	1	6	99	6	0	TX1
	2	7	99	7	0	TX1
	3	8	99	8	0	TX1
%	>^<	>^^<	>^^<	>^^<	>^<	
	FF Scr	eenSwap	0	FF Name		
%	NAME	(10 ch	ars)	"Manor B		
%						

Frequently modified TX81Z parameters

Command

screens so the Notepad module must be present or accessible from the M directory on your system disc.

Entering the program

Type in the listing shown – take care not to make any typing errors – and save it. There are only two words in which the spacing is important and they are *Screen1* and *Screen2*. In fact, the spacing is crucial, so enter these words in Notepad and make sure everything is spaced exactly as in the listing.

If you look at the accompanying screen shots you'll see that the panels are coloured. If you've tried to put colour codes into Notepad you'll know that you can't, at least not by normal means. But you can using #OUT which sends Ascii codes to the screen. This is where the Q word comes in.

Get Screen1 into Notepad, press f2 to enter panel mode – block cursor – site the cursor on the 1 in the second line from the top, press and release Shift and the screen should now be coloured.

This works because when you change a parameter – or simply activate it by pressing and releasing Shift – in panel mode, the program executes the line above the cursor, in this case containing Q.

Ignore any error messages at the bottom

of the screen and MAKE the word. Do the same with *Screen2*. You can now delete *Q* and *q* and save the program. You can alter *Q* to create coloured screens of your own. Note the use of control codes 9 and 10 to move around the screen.

Colour codes cannot be copied and if you SPOOL the screen words then EXEC them back again they will be lost, although you can save and load as normal.

Using the program

Type Txed to enter the program. The two screens operate in the same way as any Control Panel: You move around with the cursor keys and hold down Shift and use the cursor keys to alter parameters. Txed uses two types of panel controls – numeric for the parameters and switches.

for the parameters and switches.

The parameters are an integral part of the screens and you can save them by MAKEing them into words just as you make any word in Notepad. But by doing so you lose the original screen settings but you

can, of course, save everything by saving the complete program. Screen1 contains

the data you will most often wish to edit when creating Performances. *Screen2* contains settings you will probably not need to alter so often.

Here's a brief explanation of the functions, although they will be familiar to you if you've been creating Performances from the TX81Z's front panel.

BasicRcvCh is the Basic Receive Channel on which the TX81Z receives System Exclusive data and program changes. You probably set this to one and forget about it, but it's here to alter if you wish.

Txed will not let you set this to Omni as there is no reason for doing so

when using the program – although you could re-program this function.

For the TX81Z to receive any message the Basic Receive Channel must already match the one you are sending on. If your TX81Z

the one you are sending on. If your TX81Z doesn't respond to Txed, work through the channel numbers until you get a response.

The TX81Z very helpfully reflects all the edits you make with Txed in its LCD, so you can see at a glance whether or not it is receiving what you are sending. If it doesn't show it, it hasn't received it.

The next two lines are the parameter headings, and the numbers beneath them

S	tudio	5000 No	otepad		ID 72	350	
g	ot "Sc	reen2"	to mal	ke "S			
t	rying	"RETGAT	ΓΕ"				
%	TX817	Perfor	mance	Edito	or VO.	9 by	
1	MIDIL	Management of the Control of the Con	Basic				ıgh a
%	Lo	Hi	Dtune			LFO	
%	Note	Note	-7	-24	0=0ff	0=01	ff
%	0-127	0 -127	0	+24	3	0-3	TX2
	Ö	127	Ö	Ö	3	1	TX2
	0	127	0	0	3	1	TX2
	0	127	0	12	3	0	TX2
	0	127	0	0	3	1	TX2
	O	127	0	0	3	1	TX2
	0	127	0	0	3	1	TX2
%	>^^^<	>^^^<	>^<	>^^<	>^<	>^<	
OFF	Scree	nSwap					
%							



Ian Waugh shows how the Hybrid Music System can be used to control Midi peripherals

Less used TX81Z parameters

performance

indicate the range of values each can take. If you take a value outside the permitted range nothing should happen – but try to keep them in range. The line below shows the acceptable values.

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ScreenSwap is a toggle to swap between Screen1 and Screen2. It doesn't save the contents of a screen before swapping, so save if you don't want to lose it.

Name holds the name of the Performance – changing it requires just a little bit of care, so please read carefully: When the Name toggle is switched ON, the program transmits the name underneath – the one in between the quotes.

To change this name, site the cursor on the toggle, press f2 to enter Text Mode, press the down cursor, type the name between the quotes and press f2 again. To send the name switch the toggle ON.

Screen2 works in exactly the same way as Screen1. The Pan and LFO numbers correspond to the following settings:

Like most Ample programs, you can load and alter the words of Txed in the Editors. The screens, however, rely upon the position of the characters inside them for their function. If you alter the layout they will not work.

Running Txed with a music program

You've probably realised that if Txed is to run alongside a piece of music, the words in both programs must not clash. At the moment, Txed's words are a compromise between obscurity – so they won't clash with those of a music program – and meaningfulness.

To run an existing piece of music with Txed, create an Ascii file of the music program with SPOOL and then EXEC it into Txed – the utilities disc also contains a MERGE command. Next create a suitable mix word based on *mix9* supplied with the Music 2000 and alter the *RUN* word – and part words if required – to incorporate *mix9*.

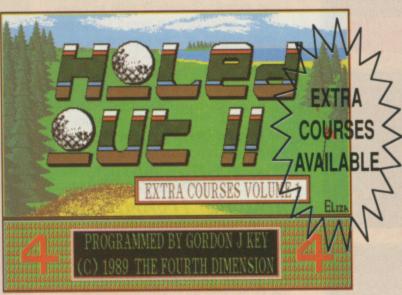
As Performance setups are saved with the program, it's easy to create separate Performance files which you can run before loading the music. If the music and Txed

Using Txed on the fly

Because of Ample's concurrency, you should be able to play a piece of music and edit the Performance parameters on your TX81Z at the same time. This is the ideal way of working as you can easily audition various combinations of sounds.

But with all this Midi data flying around it's possible that some will end up in the wrong place. If the TX81Z stops responding, enter command mode – press Tab – and start the program again by typing Txed.

MAKE the screen first if you wish, although this will stop the music. If the music starts producing funny sounds, try sending the Bank or Voice parameters again by moving to them, pressing and releasing Shift.



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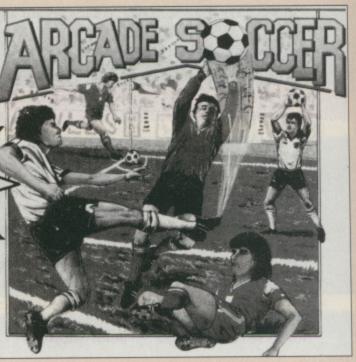


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>

can exist together you can store both music and Performance together.

To start you off, the parameters in the screens have been configured to produce a version of *To the Manor Born*, which is one of the demos supplied with the Hybrid Music System. Create an Ascii file of it and *EXEC it into Txed. The program listing already contains a suitable *mix9* definition, all you have to do is alter the last line of Manor's *RUN* word to:

"1234-9abcad"PLAY

As with other Control Panels, you can play it by pressing f1. This sends the contents of the entire screen to the TX81Z - all

except the Name. This is a particularly powerful feature of Txed - well, of Ample and the Control Panel, really - which makes it easy to create, save, recall an send Performance set-ups. So to set up your TX81Z ready to play To the Manor Born, type Txed to call up Screen1 then press f1. You will see the TX81Z's display reflect the parameters the program is sending. Select Screen2 and repeat the process. Then type RUN and the music will play. The performances created by Txed are sent to the TX81Z's buffer and you will not overwrite any existing Performance data in the instrument. In order to save a Performance permanently to the TX81Z's Performance Bank, follow the instructions on page 36 of your TX81Z manual.



Here's a whistle stop tour through the operational features of the program if you are interested in adapting some of the techniques for your own use.

When you alter a parameter in panel mode – block cursor – the program sends ALL the parameters on that line to the right of the screen. TX1 in Screen1 collects them – all five get sent no matter which one is altered.

Words xpos and ypos return the X and Y positions of the cursor so the program knows which voice – stored in vcno – and which parameter is being altered. This is why it's important that you don't alter the spacing in the Screens. The five values are stored in the variables in the second line of TX1 and tested using IF()IF statements and the test word to find out which one has been altered.

Then it's simply a matter of sending the new parameter to the synth. Simple is a relative term but let's see what happens if you alter the Maximum Note allocation of, say, voice one. The five parameters are zapped off to TX1 but the first thing the word does is to check ypos to see what voice is affected and

How it works

store it in *vcno*. Meanwhile, the five parameters are hanging around waiting for words which need numbers. They find them in the second line and all five are stored in variables. Our Maximum Note number is stored in variable *mv*.

Using xpos, the sixth line checks that the cursor is on the Maximum Note parameter and sends the value to m. This performs some offsets – to generate the number the TX81Z is expecting – and, in turn, calls pced which is named after the procedure used by the TX81Z to send Performance Edit Parameters.

The word pced first sends System Exclusive messages via yamsys which basically says this is a Yamaha instrument and here comes some system exclusive data on Basic Receive Channel 1. The blank MIDIOUT lines pick up the Max Note parameter data and send it. The routine ends by sending &F7, the code for end of System Exclusive message. You will notice that

some of the other parameters have a lot more work to do.

The most complex is probably *voxtx* which sends voice and bank information. The TX81Z has five banks of 32 voices which equals 160 voices – Yamaha's definition of a voice is different from Ample's, a TX81Z voice corresponds to an Ample instrument.

Midi only has provision to handle 128 Program Changes so the TX81Z uses a most significant bit to select bank five. In order to register this on the display you also have to send the voice number. Anyway, the program takes care of all that so what you send is it what you see.

Midi messages apart, look at *Txed*, key and *ScreenSwap* to see how you can duplicate key presses from within a program and how to GET words into an editor. For serious programming the Ample Nucleus Programmer Guide (£19.00 from Hybrid Technology) is essential.

Considering the functions it performs, the program is remarkably compact thanks to the Midi words built into the Music 2000 and the conciseness of the Ample language.

TX81Z Performance Editor: Be careful if you alter this as the spacing in Screen1 and Screen2 is crucial.

```
"TX1" [] "TX2" [] "brc" [] "bv" []
"cv" [] "dv" [] "fv" [] "h" []
                                  "key" []
           "init" [] "iv" []
"nv" []
           "p" []
                        "pced" [] "pv" []
"q" []
"t1" []
           "rc" []
                       "s" []
           "t2" []
                       "t3" []
                                  "t4" []
"test" [] "v" []
                       "vcno" [] "vv" []
"Name" [] "Q" []
"xc" [] "xd" []
                       "char" [] "[" []
                      "xf" []
                                  "xpos" []
"yamsys" [] "[v" [] "m" []
                                  "mix9" []
```

```
"Screen1" [] "Screen2" [] "TXED" []
"ypos" [] "voxsys" [] "voxtx"[]
"BasicRcvCh" [] "ScreenSwap" []
"BasicRcvCh" [brc
rc#? 1#+
brc
]
"Name" [IF(xpos 0 #> %This is not f1
IF( 10 #0UT %Cursor down
10 FOR( yamsys &10 MIDIOUT
count 99 #+ MIDIOUT
char MIDIOUT 9 #0UT %Cursor right
&F7 MIDIOUT
)FOR
130 key 130 key
```

```
) IF
) IF
) IF
]
"Q" [30q 37q 134q 157q
132q 10q 23F0R(9q)F0R
134q 157q 132q
3F0R(9q)F0R 132q
13q 9q 10q 129q 157q 131q
13q 9q 10q 129q 157q 131q
13q 9q 10q 131q 157q 129q
13q 9q 9F0R(10q)F0R 131q 157q 129q
13q 9q 10q 10q 134q
157q 132q 15F0R(9q)F0R
132q 157q 134q
```



```
"q" [#0UT
"Screen1" [Q% TX81Z Performance Editor
V0.9 by
  1 MIDILINE 1 BasicRcvCh% Ian Waugh
   Bank Inst Vol
                     Chan
                             Max
                     17=0mn
                             Notes
   I-D No.
                      1-16
                              0-8
         1-32
                0-99
    1-5
                                  TX1
                70
          20
                                   TX1
                        2
                 99
                                   TX1
          18
                 89
                        3
                                   TX1
          15
                 96
                 99
                                   TX1
           5
                               0
                                   TX1
                 99
                               0
                                   TX1
                 99
                 99
                               0
                                   TX1
                >^^< >^^<
   >^< >^^<
  OFF ScreenSwap OFF Name
   NAME (10 chars) "Manor Born"
"Screen2" [Q% TX812 Performance Editor
  1 MIDILINE 1 BasicRcvCh% Ian Waugh
              Dtune Shft Pan LFO
   Lo Hi
Note Note
                -7 -24 0=0ff 0=0ff
    0-127 0-127 +7
                     +24 0-3 0-3
                                0 TX2
          127
                                1 TX2
       0
          127
                 0
                       0
                                   TX2
           127
          127
                 0
                      12
                         3 0 TX2
                                1 TX2
                 0
                       0
          127
                       0
                                 1 TX2
           127
          127
                 0
                       0 3
                                1 TX2
                                   TX2
           127
    >** >** >** >** >**
  OFF ScreenSwap
 "ScreenSwap" [IF(xpos 3 #= IF( "
 ""Screen2""GET"$+
  )ELSE(" ""Screen1""GET"$+ )IF
 130 key
 142 key
 )IF
 "TX1" Lypos 4 #- vcno #! %Voice number
 1-8
 mv#! cv#! vv#! 1#- iv#! bv#! %Store
    %panel Nos. Note Offset for Voice No
 xpos 0 #= IF( %Send all if f1 is pressed
 mv#?m cv#?xc vv#?v voxtx )ELSE(
  xpos 33 #= IF( mv#?m )IF
  26 26 25 xpos test IF( cv#?xc )IF
  19 19 18 xpos test IF( vv#?v )IF
  12 11 5 xpos test IF( voxtx )IF
  )IF
  "TX2" Lypos 4#- vcno#! %SEE "TX1" for
  COMMENTS
  fv#! pv#! sv#! dv#! hv#! Lv#!
  xpos 0 #= IF( fv#?xf pv#?p sv#?s
               dv#?xd hv#?h lv#?l )ELSE(
   xpos 34 #= IF( fv#?xf )IF
```

```
xpos 28 #= IF( pv#?p )IF
22 23 24 xpos test IF( sv#?s )IF
17 17 18 xpos test IF( dv#?xd )IF
11 12 13 xpos test IF( hv#?h )IF
   6 7 xpos test IF( lv#?l )IF
)IF
"TXED" [" ""Screen1""GET"$+
"MAIN" $+ init
142 key %Cursor Down
13 key %Press Return
9 key %Press TAB
130 key %Press f2
Orc#! %Set Basic Receive Chan
1 VOICES MIDIV
"brc" Lyamsys
&10 MIDIOUT 123 MIDIOUT 1 MIDIOUT
1#- #11 rc#! MIDIOUT%New Basic Rcv Ch
                       %and store in rc
rc#? 15 #> IF(16rc#!)IF%If rc>15 then
%it's Omni mode so set to 16 to Transmit
rc#? 1 #<IF(Orc#!)IF%If rc<O then ditto
&F7 MIDIOUT
"by" [GVAR
"hy" [GVAR
"cv" [GVAR
 "dy" [GVAR
 "fv" [GVAR
 "iv" [GVAR
 "LV" [GVAR
  "mv" [GVAR
 "pv" [GVAR
  "rc" [GVAR
 "sv" [GVAR
 "t1" [GVAR
  "t2" [GVAR
  "t3" [GVAR
  "t4" [GVAR
  "vcno" [GVAR
  "vv" EGVAR
  "h" [vcno#? 12#* 7#- pced
  "char" [O 135 &FFF4 CODE #2 &FF AND
  "init" [ 1 15 &FFF4 CODE #2 #2
   'key" [#B12 138 &FFF4 CODE #2 #2
   "l" [vcno#? 12#* 8#- pced
```

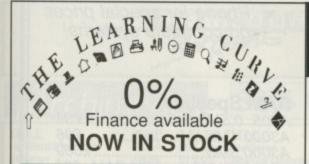
All program listings in this issue can be downloaded FREE on...

```
"m" [vcno#? 1#- 12#* pced
"p" [vcno#? 12#* 3#- pced
"s" [24#+ %Offset
vcno#? 12#* 5#- pced
"v" [vcno#? 12#* 4#- pced
"xc" [1#- %Offset
vcno#? 12#* 9#- pced
"xd" [7#+
vcno#? 12#* 6#- pced
"xf" [vcno#? 12#* 2#- pced
"mix9" [M5MIX 48,105=T
1 SHARE 2 VOICES MIDIV %synverb
 1 MIDILINE 1 MIDICHANNEL
2 SHARE 1 VOICES MIDIV %brassbow
 1 MIDILINE 2 MIDICHANNEL
3 SHARE 4 VOICES MIDIV Xelecorgan
 1 MIDILINE 3 MIDICHANNEL
4 SHARE 1 VOICES MIDIV %pedal
 1 MIDILINE 4 MIDICHANNEL
PNUM SHARE
 "pced" Lyamsys
 &10 MIDIOUT
     MIDIOUT
     MIDIOUT
 &F7 MIDIOUT
 "test" [t4#! t3#! t2#! t1#!%Store in
 variables
```

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```
t4#? t1#? #= IF(ON)ELSE(
t4#? t2#? #= IF(ON)ELSE(
  t4#? t3#? #= IF(ON)ELSE(
OFF) IF ) IF ) IF
"voxsys" [yamsys
&10 MIDIOUT
vcno#? 1#- 12#* 2#+ MIDIOUT
   MIDIOUT
&F7 MIDIOUT
"voxtx" [iv#? voxsys %Send voice to fix
            %'bug' Re Bank 5
yamsys &10 MIDIOUT
vcno#? 1#- 12#* 1#+ MIDIOUT %Parameter
                 %No. for Voice Offset
bv#? 5 #= IF(1)ELSE(0)IF %MSB for Bnk 5
MIDIOUT &F7 MIDIOUT %End Sys Ex
bv#? 1#- 32#* iv#? #+ %Calculate Voice
            %No. from Bank No. & Send
VOXSYS
 "xpos" [O 134 &FFF4 CODE #2 &FF AND
 "ypos" [0 134 &FFF4 CODE #2 #B12 &FF AND
 "yamsys" [&FO MIDIOUT &43 MIDIOUT
&10 rc#? #+ MIDIOUT
```



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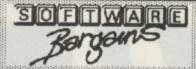
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T this year's Frankfurt
Music Fair I spotted French
and German companies
each with a library of Midi
song discs – music
recorded in Midi format ready to be
loaded into a sequencer and played
through your keyboard or expander. I
wondered if the idea would catch on in
the UK.

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It turns out that British company "Hands on" Midi Software have been following exactly the same path. In fact they've been treading it for two years. Director David Clackett explained that they wanted to get it right before going public.

Now they have around 65 pieces of music on disc in Midi format for a variety of computers including the Archimedes in EMR's Studio 24 format. If, or when, other programs come along – such as Pandora's Inspiration – the pieces will be made available in those formats, too.

The pieces were arranged specifically with Roland's CM (Computer Music) modules in mind, particularly the CM64. This costs around £789 and it's a combination of an MT32 expander and a U-110 sample playback module. It has virtually no front panel controls and is driven completely from a sequencer.

But if you don't have a CM64 you can still play the music using any Standard Midi-compatible instrument.

The track list in Studio 24 shows the instruments used and all you do is allocate those sounds on your equipment to the tracks' Midi channel numbers — or vice versa.

Half the fun lies in trying different sounds

– a chance to create your own orchestra.

You can, of course, play the music on
Studio 24 using the Archimedes' internal
sound. Plenty of scope for experimentation
here too

The only slight problem I encountered was rather clicky drum rolls. This, according to David Clackett, is due to Studio 24's low clock resolution.

Each disc holds a number of text files, the exact number depending upon the music it contains. These files hold general information about the pieces, lyrics if applicable, set-up instructions and a list of the Ian Waugh spins a pile of discs full of bright new sounds

structure of the song bar by bar.

There is also a list of the note allocations used by the pieces for the drum sounds. These conform to Roland equipment and you may have to reallocate some drum parts if you are using different instruments.

"Hands on" see the discs appealing to three markets – home users, the professionals and in education. The home user with little musical ability will still be able to play the pieces, examine them and experiment with the orchestration. The professional could use them on stage to recreate the sound of a complete orchestra.

Unlike backing tapes, the key of the pieces can be adjusted without altering the speed – and vice versa – and the performer can mute an instrument if he wants to play a part himself live. He could also introduce loops if he wanted to play an extended solo.

Educationally, the pieces offer a personal orchestra for instrumentalists to practise with. Ensembles could benefit, too, while on the technical side students can analyse the data with a view to improving their own programming skills. An insight into harmony and arranging may also be gained by

studying the pieces, and "Hands on" intends to produce a study course of harmony using Star Sequences.

In addition, Daton is producing a range of material for use with the Associated Board of the Royal Schools of Music which will interest all students studying this syllabus. In these arrangements, the student will have a "perfect" example of the examination pieces to examine, dissect and practise with – and a teacher who doesn't rap your knuckles when you get it wrong.

The arrangements are produced by an associated company, London Orchestrations, which is well-known to singers and musicians throughout the UK. It supplies professional band arrangements – exactly like the record – of music as diverse as chart hits and big band standards. There are more than 4,000 arrangements in its catalogue so Daton has plenty of material to draw on.

The other main man behind "Hands on" is London Orchestrations' major arranger, Dave Tanner. As musicians, both Clackett and Tanner have always been careful to observe the copyright laws and all their productions are fully registered with the copyright societies so all artists and composers get their due desserts.

The titles fall into five categories - Chart Hits, Big Band Standards, TV & Film Themes, Light Orchestral and Classical. You specify the pieces you want on the order form and "Hands on" put them on a disc for you.

Summing up

I had great fun with these programs and can thoroughly recommend them to anyone wishing to play conductor, arranger or orchestrator. You can even have fun just dabbling – you don't have to be a proper

musician. They have educational and entertainment value at all levels and at between £3.99 and £6.75 per tune they're excellent value for money. If you have Studio 24 you need at least one of these discs.

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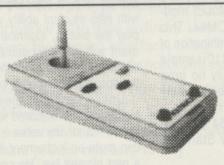
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I COPIED the joystick circuit for the BBC Micro from the Advanced Users Guide but it does not work. I've used $100k\Omega$ potentiometers. Should the top of the pots be connected to Vref or the 5v line? – Paul Bhatia, New Malden, Surrey.

The circuit in the Advanced Users Guide is correct. The top of the pots should be connected to the Vref input if you have full mechanical travel on your joystick, but if you only have limited travel connect it to the 5v line.

It could be that you have connected it to the 5v but the limited travel has been restricting the voltage to above the reference. In that case simply swap the two outer terminals on the pot.

You'll be able to get the necessary hardware from most big dealers.

Head-banger's relief

I HAVE just finished banging my head against the wall in a state of complete frustration after trying to solve a fault with my Swift Spreadsheet rom. The program

Topics on the agenda

- Copying data between different disc formats
- Putting in the correct joystick connections
- Making a Model B work like a Master
- Taking a micro overseas for good
- Using Chameleon with an Acorn monitor
- Getting in touch with the blanking inputs
- Banging against an intractable problem
- Shortening a lead to become Elite

seems to work perfectly in every respect until I try to load previously saved data – then I get the message *Bad character* and no data. I know the data has been saved because I can load it into the Mini Office Word Processor.

The rom has worked perfectly on two other BBC Bs, one with a QFS and the other with a standard Acorn DFS. My

machine has a Watford DDFS 1.53.

I am now at my wits end. Can you help?

- David Coveney, Staplehurst, Kent.

• The error message you are getting is not from the operating system or from your DFS, so it must come from the spreadsheet itself. It presumable means it has come across a character that isn't within the expected range, consequently it aborts the load sequence and ignores anything it has loaded so far.

What you need to know is whether this spurious character is being generated by the save or load process. One way to check this is to save some data from your friend's machine and then load it on yours. If it fails then it the load process must be at fault – but you should try saving on yours and then loading on another just to be sure.

This sounds like a minor hardware fault. It may be that you've developed a bad memory byte or that the disc controller chip is faulty. On the other hand it could be power surges demanded by the disc drive if this is powered from your micro or there's insufficient ooomph on the data bus driver.

Try changing the 74LS245 (IC14) for the ALS version of the same chip.

Keyboard crash

MY system comprises an issue 7 BBC Micro in a Solidisk metal case with separate keyboard connected by a short ribbon cable. The problem is this: All my rom-based and business software works perfectly, but whenever I try to hyperspace in Elite the machine locks up and only Break works

The same occurs on all my game discs, but only when the machine is hot. If I play from cold the games work for about an hour and a half and then the machine locks up.

I have replaced the Video ULA and the two VIAs. All the connectors and cables have been cleaned and all removable chips removed and replaced with no bent pins. – E. B. Locke, St. Johns, Surrey.

Your problem is the ribbon cable. Your normal programs run because they use the
operating system commands to access the keyboard and even when hot they can
obviously just about hang on and get the data.

But games usually by-pass these routines in order to increase speed and in doing so pass the limits of successful operation and simply fall over and die. You could try a cooling fan, but I suspect you may have to revert to a keyboard attached normally. The same problem can occur when using the Viglen three box console.

Disc copying dilemma

NO doubt countless people have asked you this before, but is it possible to copy data from Master Compact 3.5in discs to Model B 5.25in discs, and vice versa? – Joe Holmberg, Charlbury, Oxfordshire.

There are several possibililties, but all except one require connecting either a 5.25in disc drive to your Compact or a 3.5in drive to a Master.

The Compact Welcome disc should contain a DFS rom image. With this loaded and with a 5.25in drive connected you can load a file on ADFS, switch the drive and filing system, then save to DFS disc. The Master has both filing systems in rom so you can use the same procedure with a 3.5in disc connected. It is possible to load a file, physically unplug the 3.5in

drive and insert the 5.25in one. The final option is to connect the two machines via their serial ports. File data can be transferred with these two simple programs:

10 REM Transmit 30 *FX8 7 40 INPUT"File to send",f\$ 50 Z%=OPENIN f\$ 60 PRINT"Press a key ... "; 70 REPEAT UNTIL GET 80 REPEAT: *FX3,7 90 VDU BGET#Z%: *FX3,0 100 UNTIL EOF#Z% 110 CLOSE#Z%: END

10 REM Receive 20 *FX7 30 *FX8 7 40 INPUT"File to receive",f\$ 50 Z%=OPENOUT f\$ 60 PRINT"Press a key..."; 70 REPEAT UNTIL GET 80 REPEAT: * FX2,1 90 BPUT#Z%,GET:*FX2,2 100 UNTIL EOF#Z% 110 CLOSE#Z%: END

Colour Chameleon

RECENTLY I bought a medium resolution monitor labelled Acorn AKF12 which I believe is a Phillips 8833. The monitor has two inputs, the normal TTL RGB input and a Euroconnector.

The specification says 16 colours are available from the former and all from the latter. Does this mean it's analogue RGB?

I would like to use the monitor with your Chameleon board. Is it compatible? - T. Searle, Seaforth, Liverpool.

 The AKF12 is an analogue monitor and is completely compatible with the Chameleon as long as you feed it into the Euroconnector input, which is also known as a Scart socket.

Masterising a Beeb

I WOULD like to upgrade my Model B so that I can run the Master versions of Elite and Lancelot. What do I need? -Jonathan Beeston, Stoke-on-Trent.

 When considering this type of upgrade you have to look at the differences between the machines:

First there's the central processor itself. In the Model B this is a 6502, but in the Master it's a 65C02 with an extended instruction set - some games are re-written to use the extra instructions. These chips are quite cheap and a simple replacement will suffice in most machines except the very old ones.

Shadow screen is the next addition and plenty of commercial boards achieve this. In the Master you can independently switch between access and display on each of the two banks of screen ram, whereas on an expanded Model B you can only switch the display - Master Elite requires access switching. Sideways ram

Terminal troubles

I OWN a BBC B and a Sony Viewdata Terminal, KTX-1420UB. The manual for the terminal says that it can act as a monitor using the RGB Multi Input which is located on the side of the unit.

The pin description for this is:

Pin	Signal	Signal Level
1,2	+5v	500mA
4-17	Gnd	
19	+12v	200mA
20	Audio (R) input	726mV rms, 47kΩ
21-23	Gnd	
24	Audio (L) input	726mV rms, 47kΩ
25	Red input	Positive polarity, 0.7v, 75Ω , non sync.
26	Green input	Positive polarity, 0.7v, 75Ω , non sync.
27	Blue input	Positive polarity, 0.7v, 75Ω, non sync.
29	Blanking	Positive polarity, 1-3v, 75Ω terminated
30	Composite sync	1v, 75Ω terminated, negative.

What I'd like to know is how to connect this to my BBC Micro. Can I connect the outputs on my RGB socket directly to those on the terminal? Where can I get the 12v and

There's also a fault in the micro which occurs when I switch on: The speaker emits a noise like an untuned radio which eventually fades to a crackle and then goes completely. Although no other problems have appeared I'm worried that the machine will crash at some crucial moment. - Nic Rutterford, Ashurst Wood, West Sussex.

 You can certainly try direct connection – the voltages that your micro produces are higher than those specified, but they won't damage the terminal. The worst that could happen is that you would get poor quality.

Use pin 30 for the sync input and 24-26 for the RGB - and don't forget the ground.

The blanking input (pin 29) should be connected to pin 1.

The 12v and 5v pins are not inputs but power supply outputs from the monitor. If the monitor complains that the input signals are too high you'll have to "pad them down". This can be done using an 150Ω resistor in series with each connection (RGB and sync) and a 75 Ω resistor on each monitor input to ground.

As to your speaker problem, it sounds as though it is picking up the interference usually generated by the micro. This could be due to the proximity of a rom extension cable to the speaker leads.

However crackling indicates an intermittent fault, so make sure all the power leads are tight on their connectors - especially the single purple one on the left-hand side.

banks can be added easily and many games will detect and use them.

The Master has so-called private ram so that filing systems don't have to grab main memory for their workspace. This cannot be implemented easily on the Model B, and even if it was the software is not designed to recognise it.

The final step is the extended system commands available in the MOS. Some third party roms provide these to work in association with extra hardware to provide compatibility, but none can be 100 per cent successful.

As you can see, while it isn't an easy job a fair amount of compatibility can be

Master on the move

I WILL be moving to Canada this year and want to take my Master with me. What do I need to do to make the micro, printer, disc drive and TV - I don't have a monitor compatible? - Colin Trenchard, Shaftesbury, Dorset.

 The safest way to make the change is to use a step-up transformer to alter the Canadian mains from 110 volts to the 240 volts used by your equipment.

The main problem lies with your TV set. You can use the step-up transformer to drive it, but the line and frame frequencies are different in Canada and although you'll probably be able to get a mono picture you won't have colour.

A Canadian TV set uses NTSC to produce colour whereas we use PAL so you'll also only get mono if you try to use your micro with a Canadian TV.

I haven't tried it, but you could try converting your micro to NTSC by replacing the colour sub-carrier crystal X2, 17.73 MHz with a 14.31818MHz one.

Then you'd need to disconnect pin 12 from IC48 - this alternates the phase of the colour signal every line, which is the main difference between the systems. Finally, for best results you could reprogram the video controller IC2 (6845) to give you the exact line and frame frequencies required.

An alternate method that I wouldn't recommend is to check each item of equipment to see if the input transformer has a 110 volt tap. There is one on the Master and there may be one on the other equipment. However tampering with these could lead to disaster if you're not an expert.

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Curbing the curren

Mike Cook shows how to use mains electricity safely

HE raw power of mains electricity is normally kept well out of the way of computers. However there are occasions when it needs to be tamed. I had to do just that recently in connection with some other work, so I thought I'd share with you the tricks of how it's done - safely.

Many devices use mains electricity and are suitable for one of the two types of control - on/off and proportional. Whereas all devices are suitable candidates for on/off only a few are suitable for proportional, and these include electric heaters, motors and lights.

Devices unsuitable for proportional control include washing machines, TV sets and computers. You see, what is the point of only half turning on a TV set - unless you only want to half-watch a program!

I did cover on/off control way back in the September '83 Body Build article, so now I think it's high time I dealt with proportional

Conventionally, if we want to limit the power in a device we include a series resistor, and if it needs to be variable control, we use a variable resistor. For high power mains devices such as theatre lights this takes a physically big resistor which gets

I well remember the 3ft long dimmers I used in many old theatres and dance halls, the smell of cooking dust and grime generated by the heat.

You see, what a series resistor is doing is soaking up the extra power which is not being delivered into the device. However there is a better way to limit a device's power without wasting the energy and that is by using an SCR or, to give it its other name, a thyristor.

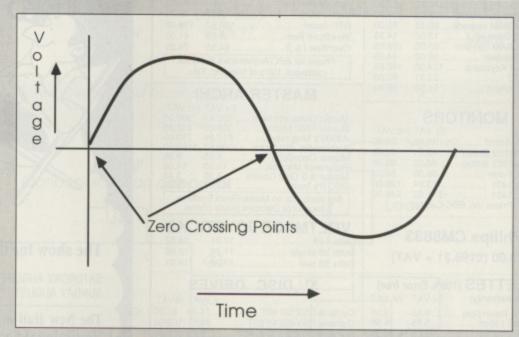
SCR stands for Silicon Controlled Rectifier and its name tells you what it does. Basically it is a rectifier, that means that it will pass current in only one direction, but it is controlled in the sense that it will not begin to pass current until it is given a small trigger pulse. This trigger pulse to the gate connection "turns on" the SCR and allows it to conduct.

Once conducting, the only way to turn it off is to reduce the voltage across it or current through it to a very small value. This value is so close to zero that it is not normally worth worrying about the difference.

Now you might think that an SCR is great for turning things on but not off. This is true when you are dealing with direct current (DC) but when you have alternating current (AC) the voltage drops to zero twice every cycle. Figure I shows a cycle of alternating current - for half the cycle it is positive and for the other half negative.

So if we use a single SCR it will only pass half the cycle and so run our load at only half power. This is because it is only on half the time, which gives a clue as to how we can proportionally control a device. If we restrict the time we apply the mains then we will also restrict the power to it.

What we need to do is to connect up our device or load with an SCR in series and generate a small trigger pulse every half cycle. This pulse will turn on the SCR and pass current into our load for the rest of the



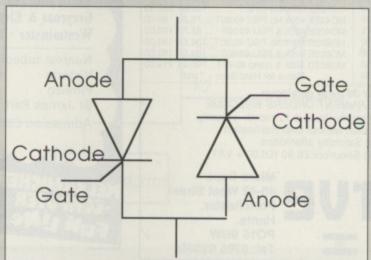


Figure I: A cycle of AC

Figure II: Current flow in both directions by using inverse parallel SCRs

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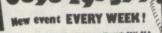
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half cycle. When the voltage reverses the SCR will be turned off until triggered again.

The secret of control is to delay the triggering pulse until part of the cycle has passed and only turn on the SCR for the remainder of the cycle. In this way, altering the pulse's delay alters the power in our load. As an SCR will conduct only in one direction, to be able to power our load on both halves of the cycle we need two SCRs connected in what is known as inverse parallel. This is shown in Figure II.

So to control the power in a device fully we simply need to control the timing of two small pulses. This is known as phase angle control because the time "into" a sine wave can be envisaged as an angle of rotation. Figure III shows the shaded part of the AC cycle is the only time power is applied to the device. As our delay gets shorter the power to the device is increased. Finally if the delay is zero the device is fully on.

We could generate this delay directly with our computer, but there are snags in doing it this way: For a start the pulses have to be synchronised with the mains frequency, and secondly it eats up a lot of computing time defining a precise delay 100 times a second.

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However it is such a common problem that there are many commercial phase angle control modules available. These have the advantage of fully isolating the control circuitry from the SCRs - needed in case of a failure in the SCRs resulting in high voltages appearing on the gate terminals. This could then get into your computer and blow every chip in sight.

Isolation is achieved either by the use of

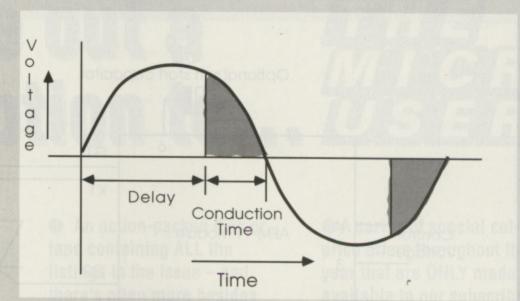


Figure III: Proportional control using phase angle switching

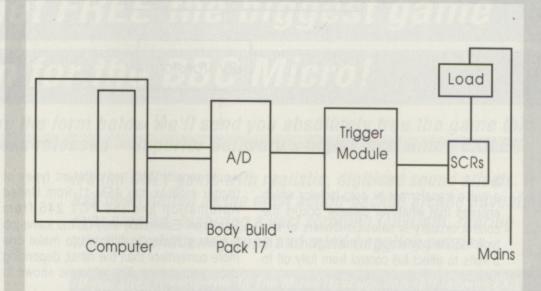


Figure IV: Block diagram of the control system

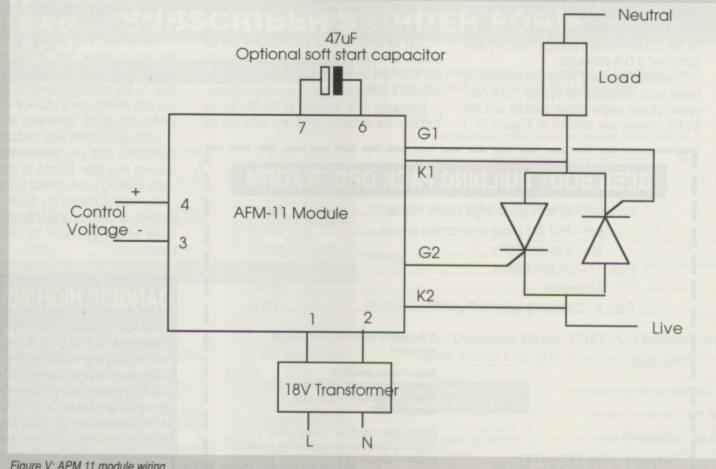
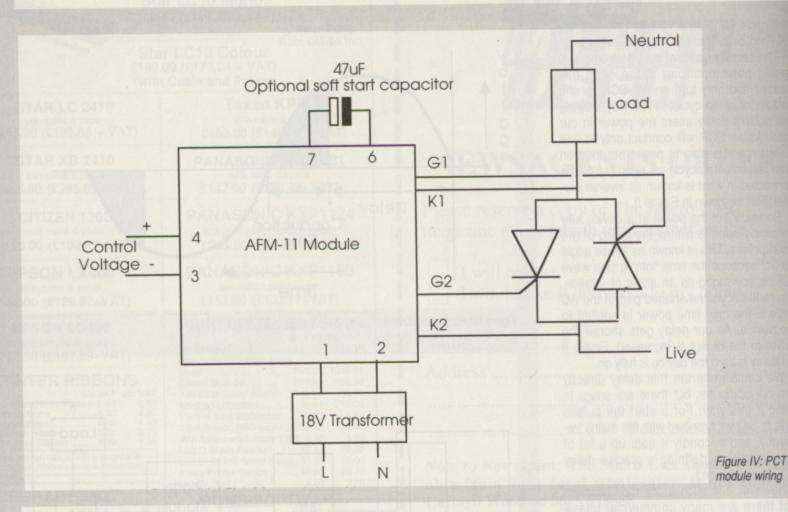


Figure V: APM 11 module wiring



a pulse transformer or opto-isolator which ensures that whatever disaster occurs the control circuitry is safe. Controllers of this type require something in the region of 0 to 5 volts to effect full control from fully off to fully on.

Fortunately we have a way of producing this voltage easily from our computer by using Body Building Pack No.17, the D/A converter. This was described in the October '84 *Micro User*, and is still available. More recently, from August 88 to May 89 the Experimenter's board (Pack 50) also contained a D/A converter.

Therefore we need three components to make up a proportional system, D/A converter, phase angle trigger module and the SCRs, these are shown in Figure IV. I

would recommend two different types of trigger module, the AFM-11 from United Automation and the PCT 245 from Semikron. Essentially they do the same job but are sufficiently different to make one more convenient than the other, depending upon your needs. The wiring is shown in Figures V and VI.

The PCT 245 has a built-in power supply transformer and provides optical isolation, but is more expensive. Connections to it are from push-on crimped spade connectors supplied.

The AFM-11 and its connections are by screw terminals. It requires an 18 volt supply from an external transformer for the module's power and pulse synchronisation.

However this module provides some extras – the range or span and zero can be

controlled using built-in 10 turn potentiome-

This means that you can adjust the module to the exact range of voltages of your control D/A. In addition there is an optional soft start input. By placing a capacitor here, say 50uF at 30 volts, you can restrict the maximum rate at which the power will change; this is like adding a delay.

Both modules are sealed units and will power SCRs with ratings from 1A to 1,000A so you are best getting the SCRs to suit your needs.

Remember that a device controlled in this way is never "off", in the conventional sense of the word, it is only powered down. Due to the leakage currents in the SCRs you can always get a shock if you touch the mains through an "otherwise off" SCR.

Leakage current also reduces the minimum load that you can switch. Anything drawing less than 100mA or dissipating 2.4 watts is going to be difficult to control.

Devices suitable for such control are heaters, floodlights and motors. In fact any-thing where you wish to turn down the power.

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Master ROM Cart	ridges Tw	in £8; Quad	£12
DFS Kit		 Rom Manager 	£18
• VIEW 3.0	£42	 DDFS Mk 2 Kit 	£42
 View Store 	£33	 View Sheet 	£34
Disc Doctor	£20	Over View	€60
Inter Word	€34	Inter BASE	£44
 Spellmaster 	239	Wordwise +	£34
		 Word Aid 	£18
Quest Mouse N	Mk 2 & Qu	est Paint	€54
AMY Mouse M	42 & Sun	prart	CEA

- Quest Mouse Min 2 a Quest Failt	LOA
AMX Mouse Mk3 & Superart	€54
• Quest Paint £29 • Conquest	€27
Wapping Editor £49	
Wapping Editor with Mouse	€69
QT-10 Quest Tracer Ball BBC/Master	£29
Solderless Sideways ROM Board	£32
User Port Splitter Unit	€20
 Sideways ROM ZIF Socket 	£16
B-32 Shadow RAM Card	£55
B-12 Sideways ROM Board	£33

- D OL OHAGON IDIN OUIG	~~
B-12 Sideways ROM Board	£33
32 Shadow RAM Expansion Card	£55
ROWRAM Card 32K	€44
● ROM/RAM Card 64K	€60
ROM/RAM Card 128K	299
Beeb Video Digitiser	299
Beeb Hand held Scanner	£125

DIEC DRIVES

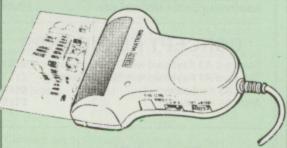
	DISC DRI	123	
• CLS400S	€69 ●	CS400S	£79
• CLD800S	£139 •	CD800S	£149
• CLS35	€62 •	CLD35	£109
	MONITO	RS	
Microvitec 143	31 £165;	1451	£205
Philips 7502	268:	CM8833	£199

• TAXAN 775+ £396:

	PRINTERS	3	
Panasonic KX-P10	81 £120;	KX-P1180	£129
Panasonic KX-P11	24 £205;	KX-P1624	£325
Panasonic KX-P44	20 £899;	KX-P4450	£1225
Integrex Colourjet	132 Printer		£475
Star LC10	£127;	LC10 Colou	r £165
Epson LX400	£127;	Epson LQ4	00£194

EIZO 8060H £379

Archi Mk II **Hand Scanner**



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system. The package includes the most comprehensive utility software available for the Archimedes, a high quality, ergonomically designed to fit the shape of your hand, (see drawing above) scanner, which is fitted with a warning LED that will indicate if the scanner is being moved too quickly for accurate results. Additional twin guide rollers ensure precise tracking over the image, to make the best use of the high resolution available with this sytem. The yellow/amber illumination of our Mk II scanner, enables you to achieve optimum accuracy. It is capable of scanning upto an amazing 400 DPI. The scanning area is 4" wide and the height is only limited by the maximu amount of memory available

On board ROM software supplied, is the most sophisticated Archimedes scanner software yet written.

AHS-4 Archi 300/400 Version £149 AHS-3 Archi A3000 Version £175

Z88 Portable Micro



Only: £195 (Carr £4)

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

 32K RAM Pack or 32K EPROM Pack 	218.00
 128K RAM Pack or 128K EPRON. Pack 	£45
512K RAM Pack	£175
Z88 Eprom Eraser Unit	£35
 Z88 Spellmaster for Pipedream 	£51
Z88 Carrying Case	63
Z88 Computing Book	29.95
AA Nicad Rechargeable Battery	£1.50
Battery Charger Compact & Fast	63
Z88 Serial Printer Cable	92
Z88 Parallel Printer Cable	£25
Z88 to Archi Link	£15
● Z88 to BBC Link £20 ● Z BASE	€56
● Z88 to PC Link II £30 ● Z TAPE	£42
● Z88 to Macintosh £52 ● Z TERM	£42
● Z88 Mains Adaptor £9 ● Z88 Modem	£149



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

By popular demand, we are now supplying refurbished and fully guaranteed BBC Micros with Disc Filing System (Please telephone for price &

ULTIMUM - Archimedes A3000 Podule Racking System

When Acorn originally designed the Archimedes micro, they released to all interested parties the specification of the expansion podule. This has now become the accepted standard for all manufacturers of Archi peripherals. The A300 & A400 both allowed expansion internally up to 2 or 4 podules. However, a newcomer to the affray has caused some upset. A3000 has only a single podule expansion slot, on the outside. There has been deliberation in the industry about a controversial "mini-podule" to be fitted to a special rack. This would entail a re-design of all the available podules onto a smaller board and understandably the manufacturers have rejected the idea completely. As always, Watford have come up with the only real solution to the A3000 expansion problem. The Ultimum Podule Racking System allows up to 3 full size standard A300/A400 series podules to be fitted to the computer. There is also allows up to 3 full size standard A300/A400 series podules to be fitted to the computer. There is also provision for a hard disc drive and podule. Ultimum has its own PSU. There is also an IEC mains output socket for a monitor. It mounts on top at the rear of the computer, and allows direct access to the floppy drive and reset button, rather than obstructing access as on other non standard systems.

Watch this space for launch details.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see £399(carr £7)

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control. FREE with every BBC Master purchased from us during July

ADD-ONs & ACCESSORIES

חשם טווט מ חטט	LOCOTHLO
Turbo 65C102 Add-on Module	£115
Econet Module for the Master	£47
Twin ROM Cartridge for Master	63
Quad ROM Cartridge for Maste	r £14
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref Manual	(No VAT) £17
64K Upgrade Kit for B+	£32
Acorn 1772 DFS Kit complete	£49
ECONET Upgrade Kit for BBC	
ALL ECONET UPGRADES AV	ailable
ARIES' IEEE Interface for BBC	B & Master £238
Morley Teletext Adaptor with A	TS Rom £99
Filestore E01S £899 F	ilestore E40s £749
Filestore E60S £949 E	colink £270

(Carr. £2 to £7 depending on the weight)

Continued $\rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow$

MONITORS



MICROVITEC 14"

 1431 – Standard resolution as used on th BBC television computer programme 1451 – Medium resolution, suitable for we 	£175
processing in mode 0	£219
Cub3000 Medium Res for A3000	£195
1455 – MS Medium resolution, ideal for Archimedes	£220
 1441 – High res, exceeds the capabilities BBC Micro 	of the £359
1431AP RGB + PAL and AUDIO	£199
1451AP RGB + PAL and AUDIO	£255
• 2030 CS 20" Med Res	£380
• 2040 CS 20" Hi Res	£675
Dust Cover for Microvitecs	€5.50
Touchtec 501 Touch Screen	£239

14" MULTISCAN COLOUR

 TAXAN 775 Plus – 0.28 Dot pitch Ultr 	a high
resolution, anti-static screen	£399
 TAXAN 770 LR Low Radiation, auto- 	
scanning Ultra High Res	£429
 TAXAN Multiscan 870 16" Monitor 	£575
 EIZO 8060H – For technical info. read 	d the
review in Micro User, Jan. '89	£389
 EIZO 9060SZ Low Radiation, Super I 	ligh
Resolution, Antistatic screen, multisca	an
monitor for a wide range of application	ns.
800 dots x 600 lines. Display for high	res VGA.
0.28 Dot pitch	£469
O'EO DOI PILO	

TAXAN Super Vision 3 – High Res 12" Colour Monitor/with green screen switch for wordprocessi

processing Special Offer £179 (While stocks last)

PHILIPS

BM7502	12"	Hi-res Green Monitor	€70
BM7522	12"	Hi-res Amber Monitor	£71
CM8833	14"	Med. Res Colour Monitor	£215

STAR BUY

PHILIPS 14" Medium Res, dark glass, attractively finished Colour Monitor . A pushbutton switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £189

 PHILIPS 14" Refurbished monitor, same as above at a special offer price (Offer valid while stocks last) Only £120

Dust Cover for Philips Monitors (Securicor carriage on Monitors £7)

SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the viewing angle.

for 12" Monitors £8 (carr. £2.50) for 14" Monitors £12 (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

SPARE LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	€7.50

CONCEPT KEYBOARDS

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

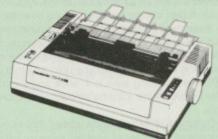
Roland Plotters

(Official Roland Appointed Distributor)

•	DPX 2500	£2495	• DXY 1100	€595
•	DXY 1200	£835	• DXY 1300	£1015

Panasonic KX-P1081

	12
Я	MONTHS
	FREE
	MAINTENANCE
	ON SITE



SALE OFFER only: £127

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every KX-P1081 printer purchased from us)

KX-P1180 Printer Offer

Panasonic KX-P1180 printer, Dump Out 3, Screen Dump ROM & a BBC printer lead.

Offer Price £136

Panasonic Printers

KX-P1124 24pin 80col, 192/63 CPS	£215
• KX-P1540 24pin 136col. 240/80 CPS	£415
KX-P1592 9pin 136col. 216/45 CPS	£275
• KX-P1595 9pin 136col. 288/61 CPS	£345
• KX-P1624 24pin 132col. 192/63 CPS	£349
• KX-P1695 9pin 132col. 330/86 CPS	£349
KX-P4420 NEW 8PPM Laser	
Launch Offer	€949

 Panasonic KX-P4450i LASER PRINTER Latest technology at Watford's special offer price

Spare Toner £29 Drum Unit £149 1MB RAM Upgrade 2MB RAM Upgrade	A4 Feeder Developer	£1,225 £55 £115 £299 £585
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Panasonic Accessories

Cut Sheet Feeders

KX-P1	124 (P36) £85 KX-P1180 (P37)	279
	BUFFERS	
P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16
	Sorial Interfaces	

Original Panasonic Ribbons

P17 P1081/1592

£12

Guaranteed to last 3 million characters

£32 P19 P1124/1180

LO
82
82
£10
& 1595
£9.95 each

INTEGREX COLOUR JET

Colour Jet 132 Printer	£515
Paper Roll	€6.50
 Screen Dump Software 	210
Colour Cartridge	£19.50
Black Cartridge	£11.25
100 A4 OHP transparencies	£55
8K Serial Interface Optional	£123

Citizen Printer Swift 24 £249

NEC PINWRITER P6/P7 Plus

NEC P6+ 80 columns		NEC P7+ 136 column	s £575
Colour Option		Serial Interface	£73
Cut Sheet Feeder NEC Ribbons for	£125	P6 £8; F	7 £9.50

Hewlett-Packard Printers

HP Desk Jet +	2549
HP Desk Jet Cartridge	£20
HP Desk Writer	£669
HP LaserJet Series IIP	£845
HP LaserJet Series III	£1235
HP Laserjet IID	£845
HP Paint Jet Colour	2699
HP Quiet Jet Plu's	£425
HP Scanjet Plus	£1199
HP Thinkjet	2269
Laserjet II TONER	£85
Series II 1 Meg RAM	£199
Series II 2 Meg RAM	£399
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Star Printers £129 XB24-10 r £160 XB24-15

£139

	J. C. C	11116010	
LC10 Printer	£129	XB24-10 r	£379
LC10 Mk II	£160	XB24-15	€499
LC10 Colour	2168	XB Colour Kit	£35
LC15	£259	LP8 II Laser	£1175
LC24-10	£199	LP8 IIT Laser	£1599
LC24-15	£325	Starscript	£1799
LP8 Laser	£1199		
	Cut She	et Feeder	
LC10/LC24-10	€65	LC15/LC24-15	£125

EPSON PRINTERS

XR24-10

£80 XB24-15

EX800	£429	LQ860 Colour	£535
EX1000	€564	LQ1050	€540
FX850	£315	LQ1060	€649
FX1050	£385	LQ2550+	6683
FX1060	€679	LX400	£129
GQ5000 Laser	€975	LX850	£179
LQ400	£198	SQ850	£515
LQ850	£439	SQ2550	2869
LQ550	£269		

CUT SHEET FEEDERS for

	0.100
EX800/FX800/850/LQ800/850	£130
FX1000/LQ1000/1050	£175
LQ2550	£390
LX400/800/850/LQ400/500/550	£69

TRACTOR FEED for

LQ800 £44; LQ850/FX850 £69; LQ1050/ FX1050 £85; LQ2500 £90; LQ2550 £90.

ACCESSORIES

EX800/1000 Colour Option	€45
EX800/1000 Colour Ribbon	£14
LQ2500 Colour Option	265
Multifont Card for LQ550/850/1050	£95

(Securicor Carriage on Printers £7)

EPSON PRINTER INTERFACES

All th	ese interf	aces fit inside the printer	
RS232	£32	RS232 + 2K Buffer	€52
IEEE 488	€40	RS232 + 8K Buffer	£79

DRINTER I FADS

PHINTER LEADS	
BBC Centronics 4' long	€5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	27
Archimedes Printer Lead 6'	26
Nimbus Centronics Lead	26
IBM Parallel Lead 6'	26
Double Ended 36 way Centronics Lead 4'	٤7
Double Ended 36 way Centronics Lead 6'	63
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.

9.50 1.25 £123

249 €575

€9.50 S

€549 €20 €669 €845 1235 £845 2699 £425

1199 £269 £85 £199 £399 £215 €449

€379 €499 £35 1175 1599 1799

£139

€535 €540 €649 6683 £129 £179 £515

€869

£130 £175 £390 269

€45 £14 265 295 7)

ES £79

£7 £6 62 £6 £7 29 P.O.A

Listing Paper (Perforated)

• 1,000 Sheets 9.5" x 11" Fanfold Paper	27
• 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
• 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£21
• 1,000 Sheets 15" x 11" Fanfold Paper	29
• 1,000 Sheets true A4 Fanfold Paper 70gms	£11
 2.000 Sheets true A4 Fanfold Paper 70oms 	621

Teleprinter Roll (Econo paper)

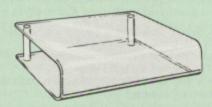
(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached)

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

PRINTER LABELS

(On continuous fanfold backing sheet)	
1,000 90 x 36mm (Single Row) £5.0	00
1,000 90 x 36mm (Twin Row) £4.9	90
1,000 90 x 49mm (Twin Row) £7.5	50
1,000 102 x 36mm (Twin Row) £6.2	25
Carriage on 1,000 Labels £1.00	

Perspex Printer Stand



Give you Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column	version
136 Column	version

£16 (carr £3) £20 (carr £4)

Professional Printer Stand



printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer func-tions is effectively halved. Its ergonomic design ensures

smooth paper flow and automatic refolding.

80 Column version £28 (carr. £3) 132 Column version £30 (carr. £4)

Printer Ribbons & Various Dust Covers

T	Dibbons	D
Type	Ribbons	Dust Covers
Brother HR15/20	£3.00	-
BBC Micro	-	£3.50
BBC Master	-	£4.00
Archimedes Micro pair	-	29.00
Citizen 120D	£3.95	€4.50
DMP2000	£3.75	€4.75
EX/LQ800	£4.50	£4.50
EX/LQ1000	€6.75	£5.00
RX/FX80/85/800/MX80	£3.25	5 5
FX/MX/RX100/1000	€5.00	_
Kaga/Taxan KP810/815	€4.90	£5.00
LQ500/550/800/850	€4.50	26.00
LQ1050/LQ2500	€7.00	-
LX80/86/800/850	£3.25	£4.50
M1009/GLP	23.80	£3.75
NEC P2200	26.00	£5.00
Panasonic KX1080/81	£3.50	£4.75
Panasonic KX-1124	00.83	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	€4.25	£5.00
Star LC24-10	€5.00	00.02
Olivetti Ink Jet		
Cartridges (set of 4)	29	

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

Universal Printer Sharers/Changer

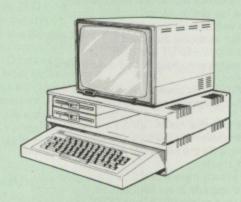
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables. cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£20	€22	£3
3 to 1	£27	£30	£3
5 to 1	£36	£39	€4

(Cables extra at £6 each. Please specify type required when ordering)

PLINTHS FOR BBC MICRO, **MASTER & PRINTERS**

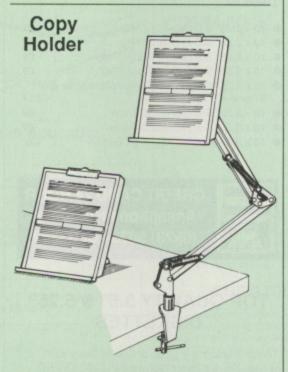


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige

BBC Beige.

Single BBC Plinth 420 x 310 x 105mm £13 Double BBC Plinth 420 x 310 x 210mm £24 420 x 310 x 105mm £12 Printer Plinth Single Master Plinth 490 x 310 x 105mm £14 Double Master Plinth 490 x 310 x 210mm £26 (Carr. Single plinth £2; double plinth £3)



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding you paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top £7 (carr. £3) Angle poise £12 (carr. £3)

Handy Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer.

Available in two configurations.

Compact AB Switch Centronics £19 Compact AB Switch RS232 £18 (Cables extra at £6 each)

MEGABUFFER 256



The Smallest 256K Printer Buffer Unit in the world 38mm x 130mm x 134mm.

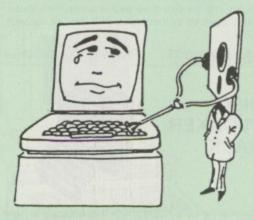
This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.

- Total compatibility with all software. Cheaper phone bills when using your Modems. Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
 Built in text unit for both the buffer & your printer.

Only £119 (carr £5)

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

(Only suitable for BBC B with 8271 DFS)



Now supplied with NEW RISC OS Version Software

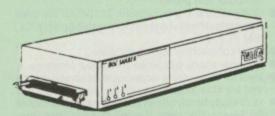
Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Offair televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £215

A Set of Colour Filters for colour image grabbing using a video camera £16

New Risc-OS Software Upgrade £39

DISC DRIVE SHARER



(Ideal for educational establishments)

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

Offer Price: £55 Price includes 3 Cables

DISC PLONKER RACK



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

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: £2

Acorn & Watford DFSs

Watford sophisticated DFS ROM	£16.00
Watford DFS Kit complete	£69.00
 We will exchange your existing ROM for 	
Watford's ultimate DFS ROM at only	£12.00
DFS Manual (comprehensive)	£6.95
Acorn DNFS ROM	£17.00
Acorn ADFS ROM only	£25.00
Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible Use ADFS on our DDFS board.
- Tube host Code No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation ensuring compatibility with almost all software
- compatibility with almost all software.

 New low profile small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes
- OSGBPB has been recoded, increasing still further the speed of file handling.

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

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only £39.00.

• SPECIAL PRICE £44.00
• DDFS Manual (No VAT) £6.95

 We will exchange your existing DFS Kit for our sophisticated DDFS for only

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

3M - DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

• 10 x 5.25" S/S D/D 40T (744)	£5
• 10 x 5.25" D/S D/D 40T (745)	£7
• 10 x 5.25" S/S D/D 80 Track (746)	83
10 x 5.25" D/S D/D 80 Track (747)	£9
• 10 x 5.25" 1.6M D/S D/D High Density fo	r IBM
XT and AT	£14
• 10 x 3.25" S/S D/D 40/80 Track	£9
 10 x 3.25" D/S D/D 40/80 Track 	£9
10 x 3.5" Double Sided High Density	£22



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

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

10 x M3 3.5" D/S D/D 80 Track	63
10 x M9 3.5" D/S High Density	£22
10 x M4 5.25" S/S D/D 40 Track	£5
• 10 x M5 5.25" D/S D/D 40 Track	£7
• 10 x M7 5.25" D/S D/D 80 Track	£9
• 10 x M8 5.25" D/S H/D Hi-Density	£13
M2 2" Double Sided	C2 oach

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of 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 3.5" & 5.25", please specify.

Price £4

ANTISTATIC LOCKABLE DISC STORAGE UNITS



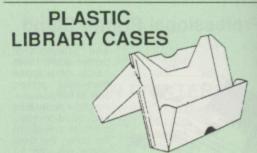
Gives double protection – Strong plastic case that affords real protection to your discs.

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 up to 50 5.25" discs
M85 – holds up to 95 5.25" discs
M25* – holds up to 25 3.5" discs
M50 – holds 50 3.5" discs
£4.95
£4.95
£4.95
£5.00

M50 - holds 50 3.5" discs
 M10 - holds 8 of No. 10 Data Cartridges
 *Not lockable



Holds up to 10 5.25" Discs.

Only £2.00

DUST COVERS (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	23.90

DISC ALBUMS

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

€4

Special BULK OFFER on 5.25" DISCS

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



BULK PACK DISCS in lots of 100

Туре	S-S 40T D-	S 40T	D-S 80T
Without Sleeves	230	£35	€40
Mith Clasues	622	020	042

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.

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95

15

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ves) £3.20 £3.25 £3.85 23.90

Stores dear

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240

€43

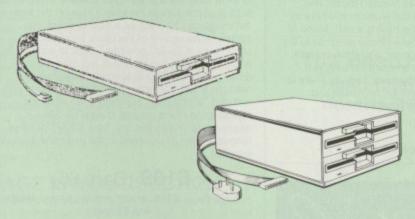
The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

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 UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC 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 £18. (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 a Watford plinth. (Turn to the 4th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Drives withou		ithout P.S.U. Drives with P.S.U.		P.S.U.
Capacity	Single	Twin	Single	Twin
400K (720K)	CLS400S £74		CS 400S £83	
800K (1,44M		CLD 800S £149		CD 800S £162

TWIN Disc Drive Case, complete with Power Supply & Cables £43
 Securicor carriage on Disc Drives £6 to £7

Suffix S = 40-80 Switchable

Prefix

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

CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.

Refurbished Disc Drives now available CLS400S £50 CLD800S £98 CS400S £59 CD800S £115

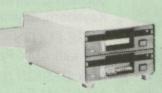
Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer



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

A Bargain at Only £119 (£7 carr) (Offer valid while stocks last)



3.5" DISC DRIVE OFFER

These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Drives to connect to BBC Micros own PSU

 CLS35 400K Unit 265

● CLD35 Twin 800K £119

Drives with built-in Power Supply Unit

 CS35 Single 400K £85 • CD35 Twin 800K £129

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).



WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

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

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

30 Megabyte BBC Hard Disc £395 (carr £7)



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 mains switch with neon OrvOff light indicator, and the two 40/80 track switches are mounted on the front

CDPM 800S for the BBC B & Master £175

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

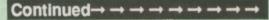
To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the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

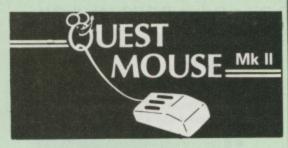
The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £165

(Securicar Carr. £7)

(The above drive units are 2 Megabytes unformatted)

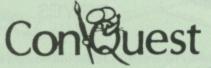




 Quest Mouse II & Quest Paint Quest Mouse II, Quest Paint, AMX 	£58
Stop Press & Pagefont	289
Quest Mouse II only	£29
Quest Paint Software only	£34
Quest Font Disc (22 Text Fonts)	£15
 Quest Mouse Mat (Red or Blue or Green please specify) 	£3
 Part Exchange your unreliable AMX Mouse for a Quest Mouse for only 	£22
(P.S. Quest Paint is not compatible with BBC Compact)	



Winner of the BBC Acorn User 1990 Award for the Best Art/ Graphics software



Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them. Some of the features are:

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

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).

(Not Compatible with BBC Compact)



for Archimedes Micro

RB2 Marconi

RB2 (AMX/Quest compatible)	€45
RB2 including Quest Paint	£75
RB2-A for Archimedes	€46

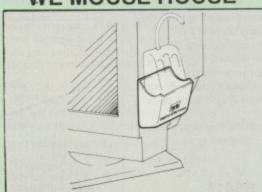
THE NEW Mk III AMX MOUSE

Inc. Super Art package
ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop	
publishing software. Works with	
Keyboard, Joystick or a mouse	£32
PAGE-FONTS - Over 20 Fonts for	
use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop	
(ROM)	€20

WE MOUSE HOUSE



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



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

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	239
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

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

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

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

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

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it. A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

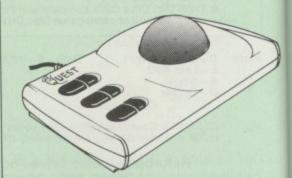
£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC & Master or Archimedes Micro.



QT-10 BBC/Master Version £32 QT-20 Archimedes Version £35





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Winner of the BBC Acorn User 1990 Award for the Best DTP/ Word Processor

The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-paste, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be — it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

cont./-

THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

Wapping Editor Software Pack Wapping Editor plus Mouse

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

£135

The Beeb HandScan Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware

Wapping Font Disc

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.

Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines

Supplied complete with instructions.

£12



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



€69

£89

Laser Direct

For Archimedes Micro

By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/ envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Launch Offer: £949

(For demonstration, call in at our retail shop)

NEW!

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed. Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

HEN

Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive,

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives)

Price: £39

(Please write in for technical literature)

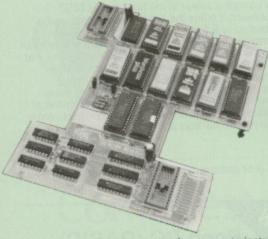
Continued $\rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow \rightarrow$

£32 £35

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay. computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Richard Overfield for interview, or write to us enclosing your CV.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

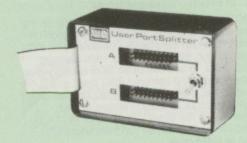
- Increase your BBCs capacity for ROMs from 4 to 16.
- No soldering required.
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instruc-

Price: Only £35 Battery Backup fitted £39 Battery Backup only £3 -16K Sideways RAM £8.50 (carriage £3)

 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

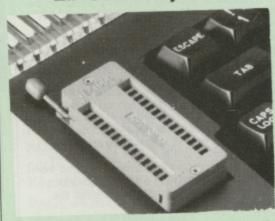
USER PORT SPLITTER UNIT



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 £22 (carr £2)

Sideways ROM **ZIF Socket System**



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 &
- 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, allow-ing you to store up to 12 ROMs, protecting them from mechanical and static damage. 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 professionals and Hobbyists
- BBC, B+ and Master compatible.

ONLY £18 (carr £3)

Low Profile CARTRIDGE SYSTEM

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

Complete System

£11

Spare Cartridges

£2.75

Spare Rack

£1.65

£3

ROM Cartridges for the BBC Master

Will accept the new larger Plggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

> Quad £14 Twin £9;

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM

Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
 Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: £29 (carr £2)

Optional Battery back-up fitted



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

HAM.
With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, 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 th printer buffer) or to load tape programs into a disc system. grams into a disc system.

grams into a disc system.

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

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

Price: £59 (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 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.

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

Aries B-12 25 Aries B-12C

ARIES B-488 **IEEE-488 INTERFACE UNIT**

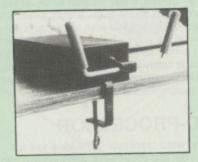
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment.
Using the B488, up to 15 devices may be connected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

£238 (Carr £3)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	€10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
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for the Archimedes	€24

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128

FRAM BCPL rgets Plus,

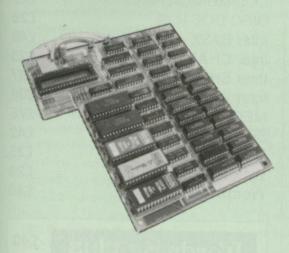
RAM stem pro-

RAM

T BBC 1B') ent.

15 11

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 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 Social Private required to lit the board.

NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)

Fully buffered for peace of mind.

Compatible with 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.

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 ROMSPELL, 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

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

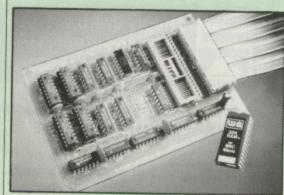
NTRODUCTORY PRICES:

÷	ROM/RAM card with 32k dynamic RAM £48 ROM/RAM card with 64k dynamic RAM £65 ROM/RAM card with a massive 128k dynamic
	(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:	
16k plug-in Static RAM kit	
 16k Dynamic RAM for Upgrade 	£13
Battery backup	6.3
 Read and Write protect switches Complete ROM-RAM board 	£2 each
All options installed	C115

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

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 PRO-GRAMS. 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, RS432 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. 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-inac-cessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

Acorn Speech Synthesizer package complete, for the **BBC B Microcomputer**

Special Offer

£18

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All this for only £21 (Disc)

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(When ordering please specify for which Micro & 40 or 80 track Disc)

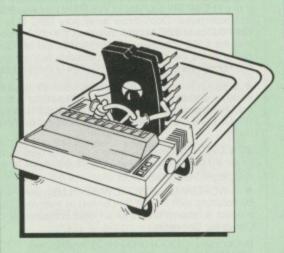


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VIEW PRINTER DRIVER ROM



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 at only 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, Hl80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

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

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable 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

Price: Only £33

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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-Rid

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 optionsChapter 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 test-segment area.
 BBC B, B+ and Master compatible.

Only £24

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

The Complete Mouse **User Guide to BBC Micro**

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

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THE COMPLETE BBC COMPUTER USER HANDBOOK

"Why has no-one written a book like this before? It's long overdue".

If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

GENERAL - Uses and abuses of computers.

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

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

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

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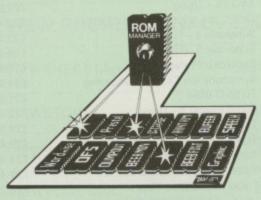
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ROM MANAGER

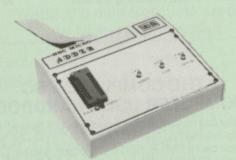


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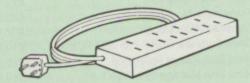
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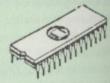
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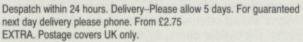
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More memory Rob Anderson finishes off his ram board by adding the

vital software interface

LAST month we took a look at the nuts and bolts of making a 32k memory board to connect to the 1MHz bus, along with a test routine to provide simple diagnostics to try and locate those inevitable dry solder joints.

ARDWARE is all very well, and owning a 32k ram board can be very nice, but without software it's just a pile of chips. So let's look at another program containing utilities which can be used to provide further tests and information that lets you write your own software.

Also – as promised – our monthly disc contains firmware residing in sideways ram to implement a silicon disc.

What makes a good test of ram? At first sight it would appear that simply reading and writing every location in the memory board would be enough - but, as usual, life is never that simple, and there are more subtle problems which often go unnoticed. For example, to test location &0001 we could execute this;

> ?&FCFF=0 :REM high byte ?&FD01=23 :REM write PRINT ?&FD01

If the result is 23 we may conclude that that location is OK. However, suppose writing to that location has corrupted some other locations in the ram? This could happen if the address lines are not connected properly, so a more searching test is to write to a number of locations and then re-read them while comparing them to an independent record of the original values.

This presents a problem, because reserving 32k of main memory in which to keep a record is impossible on a machine with only 32k in total.

One way round this is to use a known sequence of numbers generated from a mathematical function. As we don't have

to store them we can just recalculate from the start. A simple function would be to use incrementing values:

> ?&FCFF=0 FOR A%=0T0255 ?(&FD00+A%)=A%

This might not, however, detect an error such as D0 and A0 being connected the wrong way around, because the data lines and the low eight address lines are the same for each write.

A much better method is to use a function which generates pseudo random binary sequences - PRBSs. In fact, BBC Basic's RND function is ideal for this job because, once seeded with an initial value, it will generate the same sequence of random numbers every time. Program I uses this technique in

procedure prbs. To demonstrate this, type it in, ensure you've made no errors using the checksums, save and run it and select menu option three.

Note that this performs two sets of tests - after writing a value it immediately reads it back as a primary test, but the secondary loop is more important as it ensures locations have maintained their values while other areas of the ram board have been accessed.

In fact, the first loop is only a very basic test because when writing to Jim the computer has stored the value in both Jim and the ram board, so an immediate read back would result in the correct answer, even if the ram board were not connected. This is why it is important to cross page boundaries to ensure that the ram board is placing values in Jim and that they are not just left

Firmware support

So far we have discussed how easy it is to access paged memory from Basic or machine code, but to increase the useability of the memory board a chip has been written to provide a number of high level routines to create a simple silicon disc which has commands similar to the DFS, but which operate on paged ram.

The file RamDisc on this month's subscription disc may be loaded into any 8k bank of sideways ram, or alternatively blown on to an 8k eprom.

This firmware is not a filing system in its own right, so its commands may be mixed freely with those of the currently active filing system.

Commands supported by RamDisc are listed in Table I and are analogous to some of the DFS ones. Before files can be stored the paged ram must be formatted using *PFORMAT, after which *PSAVE can be used to save a specified area of main memory to paged ram. Using:

*PSAVE FRED 3000 3000

places one byte of main memory starting at &3000 into paged ram. It may be reloaded using *PLOAD FRED.

*PSAVE ABCDEFG 3000 7FFF

stores a 20k screen to paged ram.

*PSAVE ROB12

and saves the current Basic program.

All commands can be issued over the Tube, but the chip does not access Tube memory so Basic programs cannot be saved or loaded.

The chip only uses &B0 to &BF of main memory as scratch space, so it should not corrupt any applications, which cannot in turn accidentally corrupt the ram drive.

Paged ram is not affected by pressing Break, but anything in it will be lost when the machine is switched off unless you have an independent power supply.

Expansion

over from the last write. The only other major test is timing. Having got this far chances are the board is perfectly constructed - but there is nothing like a little machine code to stretch the board to its limits in terms of speed - use menu option two to write two blocks of data to the first two pages, and then use option one to print them out again. The two pages should contain the values 255 down to 0.

These routines have been included mainly as an example of how to access blocks of paged ram from machine code. To access a single byte of memory at a time the following sort of code could be used, first to write 12 to location &5678:

> LDA#&56:STA&FCFF \ high byte LDX#&78:LDA#12:STA&FDOO,X

and to read location &1234:

LDA#&12:STA&FCFF \ high byte LDX#&34:LDA&FDOO,X

What about the other menu options in program I? Option five performs a simple memory dump of any specified page in paged ram, and option seven is a PRBS test which will work with a 6502 2nd processor.

Note how this routine - procedure tubeprbs - uses osbyte calls to access I/O memory - Jim and Fred - and are essential if the ram board is to be used across the Tube. These calls, 146 to 149, are documented in the BBC Micro User Guide.

 That concludes our paged ram project, but hopefully enough information has been provided to fuel further development into the many untapped applications of paged memory. As a starter, how about implementing a pull-down menu system for graphics modes? The speed of access to paged ram would result in some very flash CAD systems.

Table II: Error messages

All error messages are preceded with PR to enable identification of the source of the error.

PR bad format	The paged ram is not forma	atted or it
	has been corrupted .	

	nas boon con apica.
PR no room	Paged ram is full. Using *PCOMPACT may provide more room.

PR file not found	The specified file cannot be found in the
	catalogue

	catalogue.				
PR illegal filename	Filename contains	too	many	or	illegal

	Gidiaciois.
PR missing filename	A filename parameter was expected.

parameter							
PR illegal address	Address	is	too	large	or	contains	illega

Tit megar address	characters.					1001110				
222	4									

parameter	All address parameter was expected.
PR file already exists	The specified filename already exists

sts	The specified filename already exists in
	the catalogue and cannot therefore be
	renamed or saved.

	C	ommands
Command Abbrev PCAT	iation P.	Description Lists files currently held in the paged ram. The catalogue can hold as many files as memory will permit. Information for each file is given like this: <filename> <start addr=""> <end addr=""> <exec addr=""> (BASIC)</exec></end></start></filename>
PFORMAT (<pr addr="">)</pr>	PFO.	Prepares paged ram to receive files. <pr addr=""> specifies the highest address above which the format will not operate, enabling a section of paged ram to be reserved for user applications. The lowest value for <pr addr=""> is &0018, but it defaults to &7FFF if omitted.</pr></pr>
PLOAD <filename> (<start addr="">)</start></filename>	PL.	Loads a file from paged ram to its load address in main memory unless otherwise specified using <start addr="">. When loading Basic programs to a different PAGE address from which they were saved, the new value of PAGE must be specified using <start addr="">.</start></start>
PSAVE <filename> (<start addr=""> <end addr=""> (<execution addr="">) (<reload addr="">))</reload></execution></end></start></filename>	PS.	Saves a file to paged ram from main memory. If no parameters are specified the file is treated as Basic and all relevant parameters – PAGE, TOP – are read from zero page. Unless otherwise specified the execution address defaults to zero and the reload address defaults to the start address.
PCOMPACT	*PCO	When a lot of file saving and deleting is carried out the catalogue can become cluttered with gaps of free space once occupied by files. This command can therefore be used to place all these free gaps into one block, thus providing more space in paged ram for programs.
PFREE	PF.	Displays the amount of free memory available for file storage. This value may increase after issuing *PCOMPACT. When a file is saved, don't forget that 16 bytes are required for the catalogue entry as well as the program itself.
PDELETE <filename></filename>	PD.	Marks <filename> as being deleted. This removes the file from the catalogue, although the contents will not be deleted until overwritten by another file.</filename>

PR.

PRENAME < source filename>

<destination filename>

PB

<F

iese commands can de used on	11011-10	illialled of reserved areas of formation payor rain.
BLOAD <pr addr="" start=""></pr>	PB.	Copies a block of memory from paged ram into
PR end addr> <start addr=""></start>		memory starting at <start addr="">. Among other thing:</start>
		command can be used to obtain paged ram catal

PR end addr> <start addr=""></start>	memory starting at <start addr="">. Among other things thing command can be used to obtain paged ram catalogue information for use in a Basic program.</start>				
SSAVE <start addr=""></start>	PBS. Copies a block of main memory into paged ram. If the				

Renames the specified source filename. There is no effect if

main

the destination filename already exists.

PBSAVE <start addr=""> <end addr=""> <pr addr="" start=""></pr></end></start>	PBS.	Copies a block of main memory into paged ram. If the ram has been formatted be careful not to corrupt it.
PCLEAR <pr addr="" start=""> <pr addr="" end=""> <byte></byte></pr></pr>	PCL.	Clears the specified area of paged ram with <byte>.</byte>

Addresses must be specified in hexadecimal. The paged ram maximum addressable range is &0000 to &FFFF- although the 32k version only formats up to a maximum of &7FFF. The address range for main memory is &0000 to &FFFF. The symbols <> imply parameters and () imply optional parameters.

Filenames are strings of alphanumerics up to 7 characters long beginning and ending with at least one space or enclosed in quotation marks. Case distinction is made with filenames, but not with commands or hexadecimal characters used in the addresses. All commands may be preceded with "R" to avoid command clashes with other roms.

Table III: Tecl	hnical Information.
	ormat conforms to the following protocol
0000-0004	Contains RFORM to identify a valid format.
0005-0004	Format high water mark (&7FFF by default).
0003-0000	File 1 type:
0007	No file exists, end of catalogue, in which case no catalogue information follows on
00	from here.
01	File deleted – space may be overwritten.
02	Basic
03	Data or machine code.
0008-0009	File 1 PR start address
0008-0009 000A-000B	File 1 length (-1) – zero implies a length of one byte.
	File 1 filename, seven characters, padded with zeros.
000C-0012	
0013-0014	File 1 start address.
0015-0016	File 1 execution address.
0017-0018	File 2 type and so on.
	The files themselves are stored from the top of paged ram downwards, so that the

are one byte long, with each catalogue entry taking up 16 bytes.)

last byte of the first program will be stored at &7FFF. For a 32k ram board, the

maximum number of files is (&7FFF-7) DIV (16+1) = 1927, which means all files

```
10 REM 32K ram board pseudo random bi
                                              230 PRINT; H%;"
                                                                  "; L%, R%;" ("FNch(R%
                                            );")",?(&FDOO+L%);" (";FNch(?(&FDOO+L%))
nary sequence test.
   20 REM by Rob Anderson
   30 REM (c) The Micro User
                                              240 IF?(&FD00+L%)<>R% PRINT"
   40 MODE128
                                             error%=TRUE ELSE PRINT
   50 a%=&0000B
   60 PRINT"32K RAM EXPANSION BOARD"
                                              260 IF error% PRINT"At least 1 error w
   70 PRINT"Random number generator seed
                                            as encountered."
ed with", RND(-1)
                                             270 END
                                                                                                   20 =
                                                                                                          0 0
                                                                                                                   220 = AOFE 0
  80 PRINT"Writing 5 pages to the board
                                             280:
                                                                                                          0 0
                                                                                                   30 =
                                                                                                                   230 = FOC6 6
                                               290 DEFFNch(num)
                                                                                                   40 = BCCC C
                                                                                                                   240 = 69CF
  90 error%=FALSE
                                               300 answer$="":source$=""
                                                                                                   50 = EFDO 6
                                                                                                                   250 = 8300
  100 FORH%=0T04
                                              310 source$=STR$(num)
                                                                                                   60 = C672 O
                                                                                                                   260 = BC3B
  110 2&FCFF=H%
                           :REM High byt
                                              320 oldbase%=10:newbase%=2
                                                                                                                   270 = FD2E
                                                                                                   70 = CEA5 2
                                              330 FORcounter%=LENsource$ TO 1 STEP -
                                                                                                   80 = 4385 6
                                                                                                                   280 = 9719 6
 120 PRINTH%
                                                                                                   90 = A716 2
                                                                                                                   290 = 5734
  130 FORL%=0T0255
                                              340 decimalnum%=decimalnum%+((ASC(MID$
                                                                                                  100 = BD69 F
                                                                                                                   300_= 5015
  140 ?(&FDOO+L%)=RND(256)-1
                                             (source$,counter%,1))-48) - (7*((ASC(MID
                                                                                                  110 = 2E10 B
                                                                                                                   310 = 1249 B
 150 NEXT,
                                            $(source$,counter%,1)))DIV 65)))*(oldbas
                                                                                                  120 = 2400 7
                                                                                                                   320 = 90BB A
 160 PRINT"FINISHED DUMP, re-reading va
                                            e%)^(LENsource$-counter%)
                                                                                                  130 = B485 B
                                                                                                                   330 = 5902 9
                                          350 NEXT
360 REPEAT answer$=STR$~(decimalnum% M
                                                                                                  140 = E4FA 7
                                                                                                                   340 = COC8 0
 170 PRINT"Seed set back to ",RND(-1)
                                                                                                  150 = 8300 C
                                                                                                                   350 = 2083 E
  180 FORHX=0 TO 4
                                            OD newbase%) + answer$ == ==
                                                                                                  160 = 3039 B
                                                                                                                   360 = E272 E
 190 28FCFF=H%
                                              370 decimalnum% = decimalnum% DIV newb
                                                                                                  170 = F203 2
                                                                                                                   370 = F450 5
 200 PRINT"Page, Low address, Value wri
                                                                                                  180 = E888 6
                                                                                                                   380 = CFCA 7
tten, Value
210 FORL%=OTO255
            Value received"
                                              380 UNTIL decimalnum% = 0
                                                                                                  190 = AD72 0
                                                                                                                   390 = 5E32 5
                                               390 =answer$
                                                                                                  200 = AD8A B
 220 R%=RND(256)-1
```

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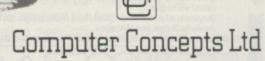
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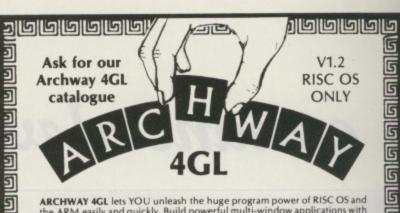
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Review



Ian Waugh
finds it's on
the cards
that Opus can
bring out the
maestro in you

Product: Opus Price: £15 (disc only) Supplier: The Advisory Unit, Endymion Road, Hatfield, Hertfordshire, AL10 8AU. Tel: 07072 65443

HE BBC Micro has run the gamut of music programs from C major to B minor and back again, and still they come. The majority are of the "You type music in and I'll play it back" variety. It's fun – and educational to a point. But recent trends in music software are towards programs which help you compose.

As composition is now a part of the music syllabus, and as many pupils – not to mention teachers – find it a difficult subject, any program which can assist and stimulate the compositional process is to be welcomed.

Oddly, there is no specific mention of Opus's use in education either within the program or in the manual. The only clue you get to its educational leanings, apart from its heritage, is a label on the disc which says: "For use only in the establishment for which it was sold." The disc, incidentally, is not protected and the manual tells you to make a backup copy before use. Full marks there.

To quote from the manual: "Opus will allow you to create your own tunes, to explore har-

mony and to make your own compositions. You don't need any previous musical experience and do not need to know how to read conventional music notation." In Opus, you write tune modules on *cards* and then link them together to produce a complete composition.

There are three sections: The main screen, the composition screen and the editing screen. Options are selected by moving an arrow around the screen to point to an option and pressing Return. The program is written in Basic and the pointer moves in steps rather than a smooth slide, but that isn't a serious problem.

You can move the pointer with the cursor keys and speed up movement by holding down Control. You can also use a joystick or a tracker ball, although I found keyboard control better. If you have a Master you can use the Concept Keyboard too – more evidence of its educational aims.

The editing screen is where the interesting work is carried out so we'll look at that first. In the centre of the screen is a large grid. Down the left is a list of 22 note names, the musical range of the program, and across are 32 boxes in which notes are entered; this can be reduced down to 24.

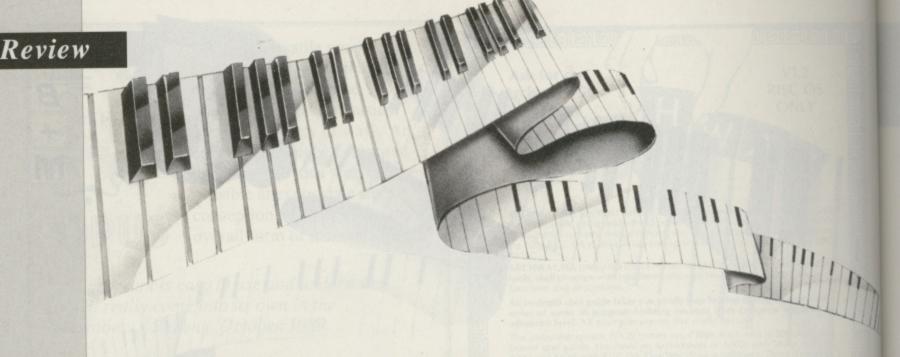
To enter a note you position the arrow in a box and press Return. The arrow steps to the next box ready for another note. Pressing Return on a box already containing a note will remove it.

The program makes use of the BBC Micro's three sound channels and you can flip from channel to channel to enter three-part music on a single card. A channel one note appears as a line at the bottom of a box, a channel two note sits in the middle and a channel three note is at the top. Using this form of note representation it's not easy to imagine what they will sound like when played together. Perhaps it would have been better to use varying colours for the different channels.

You select Play to hear a card. The program takes a second to compile the data, and then plays it. It would have been doubly useful, I feel, if the notes sounded as you entered them. It is difficult enough to compose a tune by ear, and having to test a card every time you enter a note or two in this way can be frustrating and, at times, counter-productive.

If notes of the same pitch occupy two or more consecutive grid boxes they sound as one long note. If you want to repeat the same pitch, therefore, you must separate the notes with a blank box. This may not be immediately apparent to a beginner.

The Reflect menu offers three types of note manipulation. Reverse switches the notes on a card so those near the beginning of the card now appear near the



end. Invert turns notes upside down and Shift is effectively a transposition function. You can elect to alter either just the current channel or the whole card.

These sorts of functions, used by composers for centuries, are easily implemented on a micro and offer a lot of potential for experimentation. A Copy function lets you copy one card to another – very useful – but a command to copy one channel's notes to another channel would have been handy too, especially when experimenting with the Reflect options.

More manipulations can be found under the Options menu. The first, Notes, lets you change the note list at the left of the grid. There are two fixed and one programmable list. The fixed lists are diatonic – a major scale – and chromatic semitones. The programmable scale defaults to pentatonic and a whole tone and quarter tone scale can be loaded from the disc.

A separate program on disc lets you define your own note lists. You can give each note a three-letter mnemonic. These need not have anything to do with music, call them sam, bob, joe – anything. You then enter a pitch number which the sound chip will use. Note lists can be saved and loaded independently of the notes on the cards, so you can create one note pattern and try it using several different scales.

Also in the Options menu are commands to alter pitch and volume and you can select one of six different envelope types either for the whole card or for each channel. You can't define your own envelopes – which I regard as something of a blessing in a program of this nature – but I

could have wished

for a few

better sounds. Two, Pizz and Pop, are fairly similar and Vibra produces a horrible, heavy vibrato. The ENVELOPE command is capable of producing subtle vibrato, too.

A glossary incorrectly defines an envelope as that which gives each musical instrument its characteristic timbre – the waveform or harmonic content of a sound does that. The envelope determines how the amplitude of a sound various over time. I know it was trying to be both simple and helpful at the once, but if we are going to define words let's be accurate.

You can create tunes on up to 12 cards and then you go to the composer screen to link them together. This screen houses a 10 x 6 grid with the numbers 1 to 12 beneath representing the cards. To enter a card on to the grid point to it and press Return. You can delete entries and move forwards and backwards through the sequence.

Tempo can adjusted from the main screen. It's not in the traditional beats per minute but instead increments the duration of the columns in a card in twentieths of a second – the sound chip's basic duration setting. It defaults to four and can range from two to ten.

The disc contains three demo files – a Bach three-part Invention, In Dulcio Jubilo and an original composition which demonstrates the reflection commands. And quite impressive they are, too, although I didn't care for the envelopes used in the Bach Invention, but if you wish they can be changed.

A printout of any screen – always very useful in the class-

room – is obtained by tapping Control+P. The manual is quite short at 20 pages but is to the point and contains lots of useful screen dumps.

The program is easy to understand and use, although it did prompt a couple of questions and a few niggles. It instantly brings to mind Andy Pierson's Compose. Both allow you to create tune modules on a grid and string them together to produce a complete song. Compose, however, is more flexible in several areas and contains several ready-made note sequences which allow even a complete musical novice to create pieces. It's more colourful and graphically appealing, too.

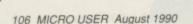
Opus has the advantage of allowing users to create three-part tunes and explore the harmonic relationship between notes. It is also, perhaps, initially easier to enter music on the grid, and the ability to define your own note lists opens the door for further exploration.

For a program which would obviously be at home in education it's a shame the manual contains no suggestions about its use in the classroom and within the music curriculum. I would also like to have seen more examples of user-defined note lists along with examples of more exotic harmonies.

For a practical and introductory exercise in composition, a teacher could construct a series of cards and pupils could be asked to put them together in the Composer screen and say why they chose that particular arrangement. Some demo files along these lines would have been helpful.

Summing up

It's good to see active music program developments are still taking place on the BBC Micro. While Opus isn't quite on the leading edge of compositional software development, this is a very interesting program and could be used quite effectively to assist in composition and the exploration of song construction and harmony.



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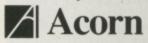
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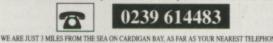
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From Page 47

340 DEF PROCinit

350 I%=PAGE+4 360 REPEAT 370 1%+=1 380 UNTIL 1%?-1=ASC">" 390 PRINT SIX 400 VoiceSize%=&500 410 VoiceMax%=12 420 DIM Module% &200, Code% V oiceSize%*VoiceMax%,Work% &40 430 DIM VoiceName%(VoiceMax%), VoiceEnable%(VoiceMax%) 440 DIM AmpEnv%(VoiceMax%),F reEnv%(VoiceMax%), WaveTable%(V oiceMax%) 450 DIM OldVoice%(VoiceMax%) ,OldChannel%(8) 460 DIM w%(VoiceMax%,255),pa r%(VoiceMax%,25),Sine%(255,9) 470 *POINTER 480 MOUSE OFF 490 PROChour (TRUE) 500 FOR 1%=0 TO 255 510 PROChour(I% DIV 25+1) 520 Sine%(I%,0)=(RND(1)-.5)* 16777216 530 FOR J%=1 TO 9 540 Sine%(I%,J%)=SIN(PI*I%*J %/128)*16777216 550 NEXT 560 NEXT 570 *KEY 0 580 *FX 4 1 590 *FX 229 1 600 *KEY 13 !! 610 ENDPROC 620 : 630 DEF PROCassemble 640 FOR v%=1 TO VoiceMax% 650 PROChour (10+v%) 660 VoiceEnable%(v%)=TRUE 670 FOR 1%=0 TO 2 STEP 2 680 P%=Code%+VoiceSize%*v%-V oiceSize% 690 COPT 1% 700 .VoiceBase 710 B Fill 720 B Fill 730 B GateOn 740 B GateOff 750 B Instance 760 LDMFD R13!, (PC) 770 LDMFD R13!, (PC) 780 EQUD VoiceName%(v%)-Voic eBase 790 ; .VoiceName%(v%) 810 = FNbytes(19) 820 ; 830 .LogAmpPtr 840 EQUD 0 850 .WaveBase 860 EQUD 0 870 .AmpEnvPtr 880 EQUD 0 890 .FreEnvPtr

Repeat 8 -+

Waveshape

Repeat 8 -+

Irenelo
Depth Speed

Pitch Envelope

Ball Harmondurg Ethercal Saw Wibraphone Churchurg

Herpstoord Filute Horn Pipourg Blooksunth Fantasy

Play Load Saw Rename Hodgle HUS (2)

980 .Instance 990 STMFD R13!, (RO-R4) 1000 ADR R1, VoiceBase 1010 MOV RO, #AmpEnv%(v%)-Voic eBase 1020 ADD RO, RO, R1 1030 STR RO, AmpEnvPtr 1040 MOV RO, #FreEnv%(v%)-Voic eBase 1050 ADD RO, RO, R1 1060 STR RO, FreEnvPtr 1070 MOV RO,#WaveTable%(v%)-V oiceBase 1080 ADD RO, RO, R1 1090 STR RO, WaveBase 1100 MOV RO,#0 1110 MOV R1,#0 1120 MOV R2,#0 1130 MOV R3,#0 1140 MOV R4,#0 1150 SWI "Sound_Configure" 1160 LDR RO, [R3, #12] 1170 STR RO, LogAmpPtr 1180 LDMFD R13!, (RO-R4, PC) 1190 1200 .GateOn 1210 LDMIA R9, (R1-R8) 1220 LDR R3, AmpEnvPtr 1230 LDR R5, WaveBase 1240 LDR R6, LogAmpPtr 1250 LDR R7, FreEnvPtr 1260 B FillGate 1270 ; 1280 .Fill 1290 LDMIA R9, {R1-R8} 1300 .FillGate 1310 LDRB RO,[R7],#1 1320 MOV RO, RO, ASL #24 1330 ADD R2, R2, R0, ASR #24 1340 AND R1,R1,#127 1350 LDRB RO,[R3],#1 1360 CMP RO,#255 1370 MOVEQ R4,#0 1380 CMPNE R4,#0 1390 MOVEQ RO,#2 1400 LDMEQFD R13!, (PC) 1410 ; 1420 SUBS R1,R1,R0 1430 MOVMI R1,#0 1440 LDRB R1, [R6, R1, LSL #1] 1450 MOV R1, R1, LSR #1 1460 RSB R1,R1,#127 1470 .FillLoop 1480 ADD R2,R2,R2,LSL #16 1490 LDRB RO, [R5, R2, LSR #24]

1500 SUBS RO, RO, R1, LSL #1

1520 STRB RO, [R12], R11

1510 MOVMI RO,#0

1560 MOVMI RO,#0 1570 STRB RO,[R12],R11 1580 ADD R2,R2,R2,LSL #16 1590 LDRB RO,[R5,R2,LSR #24] 1600 SUBS RO, RO, R1, LSL #1 1610 MOVMI RO,#0 1620 STRB RO,[R12],R11 1630 ADD R2,R2,R2,LSL #16 1640 LDRB RO, [R5, R2, LSR #24] 1650 SUBS RO, RO, R1, LSL #1 1660 MOVMI RO,#0 1670 STRB RO,[R12],R11 1680 CMP R12,R10 1690 BLT FillLoop 1700 .FillExit 1710 SUB R4, R4, #1 1720 STMIB R9, {R2-R8} 1730 MOV RO,#8 1740 LDMFD R13!, (PC) 1750 ; 1760 .GateOff 1770 MOV RO,#0 1780 .FlushLoop 1790 STRB RO,[R12],R11 1800 STRB RO, [R12], R11 1810 STRB RO, [R12], R11 1820 STRB RO, [R12], R11 1830 CMP R12, R10 1840 BLT FlushLoop 1850 MOV RO,#1 1860 LDMFD R13!, (PC) 1870 1880 NEXT **1890 NEXT** 1900 1910 FOR IX=0 TO 2 STEP 2 1920 P%=Work% 1930 [OPT 1% 1940 .Log 1950 SWI "Sound_SoundLog" 1960 SWI "Sound_LogScale" 1970 STRB RO, [R2, R1] 1980 MOV PC, R14 1990 .Type 2000 = FNbytes(7) 2010] 2020 NEXT 2030 ENDPROC 2040 : 2050 DEF FNbytes(n%) 2060 P%+=n% 2070 =1% 2080 : 2090 DEF PROCchannels

2100 RESTORE +0

1530 ADD R2,R2,R2,LSL #16 1540 LDRB R0,[R5,R2,LSR #24]

1550 SUBS RO, RO, R1, LSL #1

2110 FOR v%=1 TO VoiceMax% 2120 PROChour(22+v%*6) 2130 OSCLI"KEY "+STRS v%+CHR\$ (v%+199)+" 2140 READ as, bs 2150 \$VoiceName%(v%)="UserLib -"+LEFT\$(a\$+STRING\$(11,CHR\$0), 2160 FOR 1%=0 TO 25 2170 par%(v%, I%)=EVAL("%"+LEF T\$(b\$,2)) 2180 bs=MID\$(b\$,3) 2190 NEXT 2200 PROCfillwave(v%) 2210 PROChour(25+v%*6) 2220 PROCenvelope(v%) 2230 SYS "Sound_InstallVoice" Code%+v%*VoiceSize%-VoiceSize %,0 TO a%,OldVoice%(v%) 2240 NEXT 2250 Voice%=1 2260 FOR v%=1 TO 8 2270 SYS "Sound_AttachVoice", v%,0 TO z%,OldChannel%(v%) 2280 VOICE v%, \$VoiceName%(Voi ce%) 2290 NEXT 2300 VOICES 8 2310 ENDPROC 2320 DATA Bell,003A0000230028 002b00007F01700804FB0005000008 00080835 2330 DATA HammondOrg, 002F120D 1D001E0023000F77047F1015FE0705 00000c00110F05 2340 DATA Ethereal, 0161121106 080806090A0F6F077F1926FF000203 000200320835 2350 DATA Saw,00512E1C0000000 1000012690B7F2808FF0005000020 0140865 2360 DATA Vibraphone, 00470100 OF00010027000C7E016F041AF01706 02020202000435

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MicroLink

3020200000805
2380 DATA Harpsicord,0139100E
150E12100F11007C0170080AC20002
0300020000805
2390 DATA Flute,1356152903000
1000000106E077F160A9E050400020
200000835
2400 DATA Horn,062E2719151308
080200007C036E1E103B0002020002
00000705
2410 DATA PipeOrg,083C0014012
C011A0100126003683F37FA0503000
20200000705
2420 DATA BlockSynth,00170017
001600280129087A0170092AFF2303
00023602110B05

2370 DATA ChurchOrg, 077107180

000000006000F6F077F1932F800020

2430 DATA Fantasy,00330014180 0080016230A7C0454332CF52205004 01340110530 2440 : 2450 DEF PROCmenu 2460 Sel%=14

2470 REPEAT

2480 IF Sel%>12 THEN

900 EQUD 0

970 ;

910 .AmpEnv%(v%)

920 =FNbytes(255)

930 .FreEnv%(v%)

940 =FNbytes(255)

960 = FNbytes(255)

950 .WaveTable%(v%)

2490 OFF
2500 PROCmenu_bars
2510 MOUSE TO 560,48
2520 ENDIF
2530 MOUSE ON
2540 *FX 21 9
2550 REPEAT
2560 MOUSE x%,y%,b%
2570 IF y%>288 PROCedit
2580 x%=x% DIV 208
2590 IF x%>5 x%=5
2600 y%=3-(y%+16) DIV 64
2610 Sel%=x%+y%*6+1
2620 UNTIL b%=1 OR b%=4
2630 REPEAT
2640 MOUSE x%,x%,z%
2650 UNTIL z%=0
2660 *FX 21
2670 MOUSE OFF
2680 VDU 28.0.31.79.24
2680 VDU 28,0,31,79,24 2690 IF Sel%>12 CLS
2700 CASE Sel% OF
2710 UNEN 1 2 7 / F / 7 0 0 4
2710 WHEN 1,2,3,4,5,6,7,8,9,1
0,11,12:IF b%=1 THEN
2720 IF Sel%<>Voice% VoiceEna
ble%(Sel%)=VoiceEnable%(Sel%)
EOR TRUE
2730 PROCmenu_bars
2740 ELSE
2750 PROCvoice(Sel%)
2760 ENDIF
2770 UUSW 47-DDAC-1
2770 WHEN 13:PROCplay
2780 WHEN 14:PROCload
2790 WHEN 15:PROCsave
2800 WHEN 16:PROCrename
2810 WHEN 17:PROCmodule 2820 WHEN 18:PROCstar
2820 WHEN 18:PROCstar
2830 ENDCASE
2840 UNTIL SelX=19
2850 ENDPROC
2860 :
2870 DEF PROCtidy
2000 DEF PRUCTION
2880 FOR v%=1 TO VoiceMax%
2890 SYS "Sound_RemoveVoice",
0,0ldVoice%(v%)
2900 NEXT
2910 FOR v%=1 TO 8
2920 SYS "Sound_AttachVoice",
v%,OldChannel%(v%)
2930 NEXT
2940 VOICES 1
2950 *FX 4
2960 *FX 12
2970 *FX 229
2980 MOUSE OFF
2990 ON
3000 PRINT
3010 ENDPROC
3020 :
3030 DEF PROCmenu_bars
3040 VDU 28,0,31,79,24,12
3050 RESTORE+0
3060 FOR IX=0 TO VoiceMaxX-1
3070 IF VoiceEnable%(I%+1) TH
EN
3080 COLOUR O
3090 COLOUR 134
3100 ELSE
3110 COLOUR 7
7110 002001
Marine H Sell select 200
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,9)						
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3170	COL	OUR	134			
3180				0 6		
3190 3200				IZ P	100 6*	13.1%
DIV 6	*2+	-5)	SPC	12 5	TRING	\$(11,
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3240 3250				Load	,Save	Rena
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3260 3270	: DEF	PR	OCnl	av		
3280	V%=	1				
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Voice% 3300			%(Vc	ice	(,10)	OSCLI
"FX 12	"4	STR	\$ pa	r%(V	loice%	,10)
3310 3320			F+0			
3330	PRO	Cda	ta_p	rint	(7)	
3340	PRO	Cpr	ompt			
3350 3360						
3370	G%=	GET				
3380	IF	INK	EY-9	8:PR	Ockey	(0)
3400	IF	INK	EY-6	7:PR	OCkey	(8)
3410 3420					OCkey	
3430	IF IF				ROCkey	
3440	IF	INK	EY-8	34:PR	OCkey	(24)
3450 3460	IF IF				ROCkey	
3470	IF	INK	EY-8	6: PR	OCkey	(36)
3480 3490	IF IF	INK	EY-7	0:PR	ROCkey	(40)
3500	IE.	INK	EY-1	03:F	ROCKE	y(48)
3510	IF	INK	EY-8	7:PR	Ockey	(52)
3520 3530	IF IF				ROCkey	
3540	IF	INK	EY-1	105:F	ROCke	y(64)
3550 3560	IF IF				OCkey	
3570	IF				OCKey	
3580	IF	INK	EY-5	0:PR	Ockey	(32)
3590 3600	IF IF				Ockey	
3610	IF	INK	EY-3	5:PR	OCkey	(44)
3620 3630	IF IF				OCkey	
3640	IF	INK	EY-3	6: PR	Ockey	(56)
3650	IF	INK	EY-5	3:PR	OCkey	(60)
3660 3670	IF IF	INK	EY-5	4:PR	OCkey	(68)
3680	IF	INK	EY-2	2:PR	OCkey	(72)
3690 3700	IF IF	INK	EY-3	8:PR	OCkey OCkey	(76)
3710	IF	INK	EY-5	5:PR	Ockey	(84)
3720 3730	IF	INK	EY-4	0:PR	Ockey	(88)
3740	IF IF	INK	EY-5	7:PR	OCkey	(96)
3750	IF	INK	EY-9	4:PR	OCkey	(100)
3760 3770	IF IF				OCkey	
3780	IF				ROCke	
3790	TF	THE	EV	2.00	OCpit	ab/ 4
)						
2800	TE	TNV	EV.C	9.00	OCni+	ah/13

3800 IF INKEY-58:PROCpitch(1) rLib-"+LEFT\$(File\$+STRING\$(11,

3810	IF	6%	>1	99	A	ND	6	147	113	PRO	
Cvoice	(G)	-1	99):	PR	000					
3820							21				
3830 B(45,1					(4	4,1	1)	21	12	UIA	
3840	END	PR	00								
3850											
3860 d,64,2									(ey	boar	
3870					cy	DUC	11.0	,			
3880 5	DAT	A	4,	25	,1		2		3		
5 = FA	6			8		9		0			
3800	DAT	1	12	.2	9.	S	-)		6	
3900 3910 E R	1			,-	Ļ	1	,				
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	4										
3920 V B	DAT	A	10	,3	0,	" 7		X		C	
V B 3930		1/3	M		,			1	"		
3940		P	RO	Ce	di	t					
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3960											
3970 3980	MOU	SE	X	7.	YZ	. B)	Y				
3990	6%=	IN	KE	Y(0)						
4000											
4010							161	la	19		
4030	WHE	N	10	: W	av	e%:	FI	Ise	tw	ave	
4030 4040	WHE	N	9:	PR	00	set	re	ep			
4050 4060	WHE	N	7,	2,	5:	PR(JC S	et	ms.	P	
4070	WHE	N	4,	5,	6:	PR(C	set	fr	e	
4080	WHE	N	8:								
4090			SE								
4110			=0								
4120	END	IF									
4130								1.		-/11-	
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4220 ,File\$ 4230 4240 4250	Fil PRO Fil PRI	AL es Cn e% Fi	F = M am = 0 le	il ID e(PE %=	e% \$(SVO OIO	e Fil	to	1	oad"	
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```
CHR$0),11)
4420 PROCdisplay
4430 ENDIF
4440 CLOSE#File%
4450 ENDIF
4460 ENDPROC
4470 :
4480 DEF PROCsave
4490 LOCAL File%, File$
4500 File$=MID$($VoiceName%(V
oice%),9)
4510 PROCname("voice to save"
,File$)
4520 File%=OPENOUT File$
4530 IF File% THEN
4540 BPUT#File%, "Synth"
4550 FOR 1%=0 TO 25
4560 PRINT#File%,par%(Voice%,
1%)
4570 NEXT
4580 CLOSE#File%
4590 $VoiceName%(Voice%)="Use
rLib-"+LEFT$(File$+STRING$(11,
CHR$0),11)
4600 PROCdisplay
4610 ENDIF
4620 ENDPROC
4630 :
4640 DEF PROCrename
4650 LOCAL Name$
4660 Name$=MID$($VoiceName%(V
oice%),9)
4670 PROCname("new voice", Nam
4680 $VoiceName%(Voice%)="Use
rLib-"+LEFT$(Name$+STRING$(11,
CHR$0),11)
4690 PROCdisplay
4700 ENDPROC
4710 :
4720 DEF PROCmodule
4730 LOCAL VoiceTotal%, File%,
File$
4740 FOR v%=1 TO VoiceMax%
4750 IF VoiceEnable%(v%) Voic
eTotal%+=1
4760 NEXT
4770 FOR 1%=0 TO 2 STEP 2
4780 P%=Module%
4790 [ OPT 1%
4800 EQUD 0
4810 EQUD Initialise-Module%
4820 EQUD Finalise-Module%
4830 EQUD 0
4840 EQUD Title-Module%
4850 EQUD Help-Module%
4860 EQUD 0
4870 ;
4880 .Title
4890 EQUS "UserVoiceLib"
4900 EQUB 0
4910 ALIGN
4920 ;
4930 .Help
4940 EQUS "User Defined Sound
Voices"+MID$(TIME$,7,9)
4950 EQUB 0
4960 ALIGN
4970;
4980 .VoiceNumbers
```

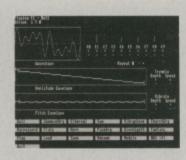
>	
5000	=FNbytes(VoiceTotal%-1)
5010	
5020	.Initialise
	STMFD R13!,(R14) ADR R2,VoiceCode
5050	ADR R3, VoiceNumbers
5060	
	FOR v%=1 TO VoiceMax% IF VoiceEnable%(v%) THEN
	EOPT IX
5100	MOV RO, R2
5110	MOV R1,#0
5130	SWI "Sound_InstallVoice" STRB R1,[R3],#1
	ADD R2,R2,#VoiceSize%
5150	
5160	ENDIF
	COPT IX
5190	LDMFD R13!, (R15)
5200	,
5220	.Finalise STMFD R13!,(R14)
5230	ADR R2, VoiceNumbers
	ADD R3,R2,#VoiceTotal%
	.FinLoop LDRB R1,[R2],#1
	SWI "Sound_RemoveVoice"
5280	CMP R3,R2
	BNE FinLoop
	LDMFD R13!, (R15) .VoiceCode
5320]
5330	NEXT
	File\$="SMOD" PROCname("module to save
",File	
5360	File%=OPENOUT File\$
	FOR IX=Module% TO VoiceC
ode-1	BPUT# File%,?I%
5390	NEXT
5400	FOR v%=1 TO VoiceMax%
	IF VoiceEnable%(v%) THEN FOR I%=0 TO VoiceSize%-1
	BPUT# File%,Code%?(I%+v%
*Voice	eSize%-VoiceSize%)
	NEXT ENDIF
5460	
5470	CLOSE# File%
	OSCLI "SETTYPE "+File\$+"
Modul 5490	ENDPROC
5500	
	DEF PROCstar
5530	LOCAL Input\$
	REPEAT
	INPUT'"*" Input\$
	OSCLI Input\$ PRINT "Press a key";
5580	InputS=GETS
5590	UNTIL Input\$<>"*"
	ENDPROC
5610 5620	DEF PROCdisplay
5630	VDU 28,0,23,79,0,12,5
5640	GCOLO,2
	RECTANGLE 0,680,512,256 RECTANGLE 0,488,1024,128
5670	RECTANGLE 0,298,1024,128
5680	MOVE 0,808:PLOT 49,512,0 MOVE 0,362:PLOT 49,1024,
5690	MOVE 0,362:PLOT 49,1024,

```
5700 FOR 1%=0 TO 9
5710 GCOLD, 3: MOVE 1%*64+560.7
96: PRINT"f":1%
5720 GCOLO,6:MOVE 1%*64+568,7
64: PRINT"+"
5730 PRINT CHR$8 CHR$10"-"
5740 NEXT
5750 PROCharmonic(7)
5760 MOVE 0,808
5770 FOR 1%=0 TO 255
5780 DRAW 1%*2, w%(Voice%, I%)+
808
5790 NEXT
5800 PROCamplitude(7)
5810 PROCfrequency(7)
5820 VDU 4:0FF
5830 RESTORE+0
 5840 PROCdata_print(6)
5850 COLOUR 7
5860 PROCpitch(0)
 5870 PRINT TAB(8,0)"f"; Voice%
  - " MID$($VoiceName%(Voice%
),9) TAB(8,1)CHR$139" " CHR$13
8 TAB(57,11);par%(Voice%,10)
5880 OSCLI"FX 11 "+STR$ par%(
Voice%,10)
 5890 IF par%(Voice%,10) OSCLI
"FX 12 "+STR$ par%(Voice%,10)
5900 ENDPROC
 5910 DATA 3,9
5920 DATA 0,0,Playing
5930 DATA 0,1,Octave,10,11,Wa
veshape,50,11,Repeat,68,13,Tre
 5940 DATA 66,14, Depth Speed,
10,17, Amplitude Envelope, 68,19
,Vibrato
 5950 DATA 66,20, Depth Speed,
10,23, Pitch Envelope
```

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```
5960 DATA 6,5
 5970 DATA 62,11,+,68,15,+
  +,68,21,+
5980 DATA 60,11,-,68,16,-
 -,68,22,-
5990:
6000 DEF PROCkey(T%)
6010 SOUND V%,-15,T%+par%(Voi
ce%,25),40:V%=V%MOD8+1
6020 ENDPROC
 6040 DEF PROCycice(n%)
 6050 IF VoiceEnable%(n%) THEN
 6060 IF Voice% >n%
 6070 Voice%=n%
 6080 FOR v%=1 TO 8
6090 VOICE v%,$VoiceName%(Voi
ce%)
6100 NEXT
 6110 PROCdisplay
 6120 ENDIF
 6130 ENDIF
 6140 ENDPROC
 6150 :
 6160 DEF PROCpitch(n%)
 6170 IF n%>0 THEN
 6180 IF par%(Voice%, 25) < 101 p
```



ar%(Voice%, 25)+=48

6200 IF n%<0 THEN

6190 ELSE

6210 IF par%(Voice%,25)>5 par %(Voice%,25)-=48 6220 ENDIF 6230 ENDIF 6240 PRINT TAB(12,1);par%(Voi ce%,25) DIV6-8" " 6250 REPEAT 6260 UNTIL NOT INKEY-42 AND N OT INKEY-58 6270 ENDPROC 6280 : 6290 DEF PROCflag 6300 LOCAL a% 6310 a%=X% DIV4 6320 IF Y%>636 THEN 6330 IF XX>512 AND YX>696 AND Y%<768 Flag%=10 ELSE IF X%>92 8 AND Y%<672 Flag%=9 6340 ELSE 6350 IF X%<1024 THEN 6360 IF Y%>488 AND Y%<620 THE 6370 IF a%-par%(Voice%,12)<pa r%(Voice%,14)-a% Flag%=1 ELSE IF a%-par%(Voice%,14)>par%(Voi ce%,16)-a% Flag%=3 ELSE Flag%= 6380 ELSE 6390 IF YX>296 AND YX<424 THE 6400 IF a%<par%(Voice%,21)-a% Flag%=4 ELSE IF a%-par%(Voice %,21)>par%(Voice%,16)-a% Flag% =6 ELSE Flag%=5 6410 ENDIF 6420 ENDIF 6430 ELSE 6440 IF X%>1036 THEN 6450 IF Y%>482 AND Y%<544 Fla g%=7 ELSE IF Y%>290 AND Y%<352 Flag%=8 6460 ENDIF 6470 ENDIF 6480 ENDIF 6490 ENDPROC 6500 : 6510 DEF FNsetwave 6520 PROCharmonic(0) 6530 N%=(X%-544)DIV64 6540 IF N%>9 N%=9 6550 IF Y%<732 AND par%(Voice %,N%)>O par%(Voice%,N%)=par%(V oice%,N%)-1 ELSE IF par%(Voice %,N%)<127 par%(Voice%,N%)=par% (Voice%, N%)+1 6560 *FX 21 6570 PROCharmonic(7) 6580 =TRUE 6590 : 6600 DEF PROCsetrep

6610 COLOUR 7

6620 IF XX<992 THEN

6630 IF par%(Voice%,10)>6 par

%(Voice%,10)-=1 ELSE par%(Voic

6640 ELSE 6650 IF par%(Voice%,10)<98 AN D par%(Voice%, 10) par%(Voice%, 10)+=1 ELSE par%(Voice%,10)=6 6660 ENDIF 6670 PRINT TAB(57,11);par%(Vo ice%,10)" 6680 PROCwait 6690 ENDPROC 6700 : 6710 DEF PROCsetamp 6720 PROCamplitude(0) 6730 PROCfrequency(0) 6740 IF Flag%=1 PROCsetbars(4 88,par%(Voice%,12),par%(Voice% ,11)) ELSE IF Flag%=2 PROCsetb ars(488,par%(Voice%,14),par%(V oice%,13)) ELSE PROCsetbars(48 8,par%(Voice%,16),par%(Voice%, 6750 IF par%(Voice%,16)<12 pa r%(Voice%,16)=12 6760 IF par%(Voice%,21)>par%(Voice%,16) par%(Voice%,21)=par %(Voice%, 16)-1 6770 IF par%(Voice%, 12)=0 par %(Voice%,12)=1 6780 IF par%(Voice%,14)<=par% (Voice%,12) par%(Voice%,14)=pa r%(Voice%,12)+1 ELSE IF par%(V oice%,14)>=par%(Voice%,16) par %(Voice%,14)=par%(Voice%,16)-1 6790 PROCfrequency(7) 6800 PROCamplitude(7) 6810 ENDPROC 6820 : 6830 DEF FNsettrem 6840 PROCamplitude(0) 6850 IF XX<1152 THEN 6860 IF Y%<508 THEN 6870 IF par%(Voice%,17)>0 par %(Voice%,17)-=1 6880 ELSE 6890 IF par%(Voice%,17)<100 p ar%(Voice%,17)+=1 6900 ENDIF 6910 ELSE 6920 IF Y%<508 THEN 6930 IF par%(Voice%,18)<40 pa r%(Voice%,18)+=1 6940 ELSE 6950 IF par%(Voice%,18)>2 par %(Voice%,18)-=1 6960 ENDIF 6970 ENDIF 6980 PROCamplitude(7) 6990 PROCwait 7000 =TRUE 7010 : 7020 DEF PROCsetfre 7030 LOCAL Null% 7040 IF XX<12 NullX=parX(Voic e%,16) 7050 PROCfrequency(0) 7060 IF Flag%=4 PROCsetbars(3 60, Null%, par%(Voice%, 19)) ELSE IF Flag%=5 PROCsetbars(360,pa r%(Voice%,21),par%(Voice%,20)) ELSE PROCsetbars(360, Null%, pa r%(Voice%,22)) 7070 IF par%(Voice%,21)<2 par %(Voice%,21)=2 ELSE IF par%(Vo ice%,21)>=par%(Voice%,16) par% (Voice%,21)=par%(Voice%,16)-1 7080 PROCfrequency(7) 7090 ENDPROC 7100:

0

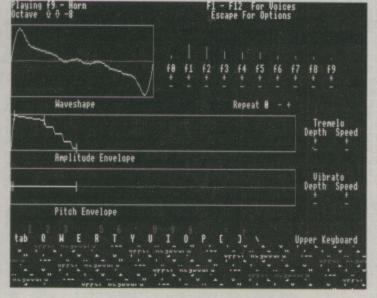
7110 DEF FNsetvib 7120 PROCfrequency(0) 7130 IF X%<1152 THEN 7140 IF Y%<316 THEN 7150 IF par%(Voice%,23)>0 par %(Voice%,23)-=1 7160 ELSE 7170 IF par%(Voice%,23)<100 p ar%(Voice%,23)+=1 7180 ENDIF 7190 ELSE 7200 IF Y%<316 THEN 7210 IF par%(Voice%,24)<36 pa r%(Voice%,24)+=1 7220 ELSE 7230 IF par%(Voice%,24)>2 par %(Voice%,24)-=1 7240 ENDIF 7250 ENDIF 7260 PROCfrequency(7) 7270 PROCwait 7280 =TRUE 7290 : 7300 DEF PROCsetbars(a%, RETUR N H%, RETURN V%) 7310 Env%=TRUE 7320 H%=X% DIV 4 7330 V%=Y%-a% 7340 IF a%=488 THEN 7350 IF VX>127 VX=127 ELSE IF V%<0 V%=0 7360 ELSE 7370 IF V%>64 V%=64 ELSE IF V %<-64 V%=-64 7380 ENDIF 7390 IF H%>255 H%=255 7400 ENDPROC 7410 7420 DEF PROCfillwave(Voice%) 7430 FOR B%=0 TO 255 7440 AX=0 7450 FOR J%=0 TO 9 7460 If par%(Voice%, J%) A%+=p ar%(Voice%,J%)*Sine%(B%,J%) 7470 NEXT 7480 w%(Voice%,B%)=A%>>24 7490 C%=WaveTable%(Voice%) 7500 CALL Log 7510 NEXT 7520 ENDPROC 7530 7540 DEF PROCenvelope(Voice%) 7550 M%=AmpEnv%(Voice%) 7560 level=0 7570 PROCamp_env(par%(Voice%, 11)/par%(Voice%,12),par%(Voice %,12)) 7580 PROCamp_env((par%(Voice% ,13)-par%(Voice%,11))/(par%(Vo ice%,14)-par%(Voice%,12)),par% (Voice%,14)-par%(Voice%,12)) 7590 S%=par%(Voice%,14)+par%(Voice%, 18) 7600 sus=(par%(Voice%,13)-par %(Voice%,15))/(par%(Voice%,16) -par%(Voice%,14))*4 7610 WHILE S%<par%(Voice%,16) 7620 PROCamp_env(-sus-par%(Vo ice%,17)/par%(Voice%,18),par%(Voice%, 18)) 7630 S%+=par%(Voice%,18) 7640 IF S%<par%(Voice%,16) PR OCamp_env(0,par%(Voice%,18)):S %+=par%(Voice%,18) 7650 IF \$%<par%(Voice%,16) PR OCamp_env(par%(Voice%,17)/par% (Voice%, 18), par%(Voice%, 18)):S %+=par%(Voice%,18)

7660 IF \$%<par%(Voice%,16) PR OCamp_env(0,par%(Voice%,18)):S %+=par%(Voice%,18) 7670 ENDWHILE 7680 IF MX-AmpEnvX(VoiceX)<25 6 ?M%=255 ELSE AmpEnv%(Voice%) ?255=255 7690 M%=FreEnv%(Voice%) 7700 PROCfre_env(par%(Voice%, 7710 PROCfre_env((par%(Voice% ,20)-par%(Voice%,19))/(par%(Vo ice%,21)-1),par%(Voice%,21)) 7720 S%=par%(Voice%,21)+par%(Voice%,24) 7730 sus=(par%(Voice%,20)-par %(Voice%,22))/(par%(Voice%,16) -par%(Voice%,21))*2 7740 WHILE S%<par%(Voice%,16) 7750 PROCfre_env(-sus-par%(Vo ice%,23)/par%(Voice%,24),par%(Voice%, 24)) 7760 S%+=par%(Voice%,24) 7770 IF S%<par%(Voice%,16) PR OCfre_env(par%(Voice%,23)/par% (Voice%,24),par%(Voice%,24)):S %+=par%(Voice%,24) 7780 ENDWHILE 7790 IF M%-FreEnv%(Voice%)>25 5 THEN 7800 M%?255=0 7810 ELSE 7820 WHILE MX-FreEnvX(VoiceX) <256 7830 ?M%=0 7840 M%+=1 7850 ENDWHILE 7860 ENDIF 7870 ENDPROC 7880 : 7890 DEF PROCamp_env(s,n%) 7900 FOR IX=1 TO nX 7910 level+=s 7920 IF level>127 ?M%=0 ELSE IF level<0 ?M%=127 ELSE ?M%=12 7-level 7930 MY+=1 7940 NEXT 7950 ENDPROC 7960 : 7970 DEF PROCfre_env(s%,n%) 7980 FOR 1%=1 TO n% 7990 ?M%=s% 8000 M%+=1 8010 NEXT 8020 ENDPROC 8030 :

1,0,par%(Voice%,I%) 8080 NEXT 8090 ENDPROC 8100 8110 DEF PROCamplitude(Col%) 8120 GCOLO, COLT: MOVE 0,488:PL OT 1,par%(Voice%,12)*4,par%(Vo ice%,11) 8130 PROCpeg 8140 PLOT 1,(par%(Voice%,14)-par%(Voice%,12))*4,(par%(Voice %,13)-par%(Voice%,11)) 8150 PROCpeg 8160 S%=par%(Voice%,14)+par%(Voice%, 18) 8170 sus=(par%(Voice%,13)-par %(Voice%,15))/(par%(Voice%,16) -par%(Voice%,14))*4 8180 WHILE S%<par%(Voice%,16) 8190 PLOT 1,par%(Voice%,18)*4 ,-sus*par%(Voice%,18)-par%(Voi 8200 S%+=par%(Voice%,18) 8210 IF \$%<par%(Voice%,16) PL OT 1,par%(Voice%,18)*4,0:5%+=p ar%(Voice%,18) 8220 IF S%<par%(Voice%,16) PL OT 1,par%(Voice%,18)*4,par%(Vo ice%,17):S%+=par%(Voice%,18) 8230 IF S%<par%(Voice%,16) PL OT 1,par%(Voice%,18)*4,0:5%+=p ar%(Voice%,18) 8240 ENDWHILE 8250 PLOT 1, (par%(Voice%, 16)-\$%+par%(Voice%,18))*4,0 8260 PROCpeg 8270 ENDPROC 8280 : 8290 DEF PROCfrequency(Col%) 8300 GCOLO, Col%: MOVE 0,360+pa r%(Voice%, 19) 8310 PROCpeg 8320 PLOT 1,par%(Voice%,21)*4 ,par%(Voice%,20)-par%(Voice%,1 8330 PROCpeg 8340 S%=par%(Voice%,21)+par%(Voice%, 24) 8350 sus=(par%(Voice%,20)-par %(Voice%,22))/(par%(Voice%,16) -par%(Voice%,21))*2 8360 WHILE S%<par%(Voice%,16) 8370 PLOT 1,par%(Voice%,24)*4



,-sus*par%(Voice%,24)-par%(Voi 8390 IF S%<par%(Voice%,16) PL OT 1,par%(Voice%,24)*4,par%(Vo ice%,23):S%+=par%(Voice%,24) 8400 ENDWHILE 8410 PLOT 1, (par%(Voice%, 16)-\$%+par%(Voice%,24))*4,0 8420 PROCpeg 8430 ENDPROC 8440 : 8450 DEF PROCpeg 8460 IF Col% GCOLO,6 ELSE GCO 8470 PLOT 0,0,16:PLOT 1,0,-32 :PLOT 1,2,0:PLOT 1,0,32:PLOT 1,-2,0:PLOT 0,0,-16 8480 GCOLO, Col% 8490 ENDPROC 8500 : 8510 DEF PROCprompt 8520 RESTORE+0 8530 PROCdata_print(7) 8540 ENDPROC 8550 DATA 7,1 8560 DATA 44,0,F1 - F12 For Voices, 45,1, Escape For Options 8580 DEF PROCname(Text\$, RETUR N Olds) 8590 LOCAL x%, Input\$ 8600 x%=17+LEN Text\$ 8610 ON 8620 REPEAT 8630 PRINT'"Enter name of " T ext\$ " > " Old\$; 8640 INPUT TAB(x%, VPOS) "" In puts 8650 UNTIL LEN Input\$<11 8660 IF Input\$>"" OldS=Input\$ 8670 ENDPROC 8680 : 8690 DEF PROCdata_print(Col%) 8700 REPEAT 8710 READ CX, JX 8720 COLOUR CX 8730 FOR 1%=0 TO J% 8740 READ X%, Y%, a\$ 8750 PRINT TAB(XX,YX)aS; 8760 NEXT 8770 UNTIL CX=ColX 8780 ENDPROC 8790 8800 DEF PROCwait 8810 LOCAL t% 8820 t%=TIME 8830 REPEAT UNTIL TIME-t%>10 8840 ENDPROC 8850 : 8860 DEF PROChour(p%) 8870 IF p%=FALSE SYS "Hourgla ss_Smash" ELSE IF p%=TRUE SYS "Hourglass_On" ELSE SYS "Hourg



lass_Percentage",p%

8880 ENDPROC



10
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PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

What is a Real Time Video Digitiser? There are quite a few different 'Digitisers' available for the es but very few can accurately claim to fit the above description. The requirements are that it must be able to 'grab' a single field of video information from a colour moving source, such as a video recorder, TV, or video camera, and then process the image and display it on the computer screen

The Pineapple Digitiser does just this, - and at a price which is less than some Digitisers which can only

HARDWARE

The hardware consists of a double width podule which fits inside a 300 or 400 series Archimedes, and comprises a PAL colour decoder, 256K memory and various control and interface circuitry. The PAL decoder converts the input signal from your TV or video recorder into separate red, green and blue signals. These are then converted into digital form and stored in the 256K ram in a format giving 512 pixels across the picture and 256 rows vertically. The video signal in the ram is constantly changing at the same rate as the incoming video picture until the podule receives a signal from the computer to 'freeze'. At this point the last picture in the ram is frozen and can be transfered to the computer screen in many different ways depending on which software commands are issued.

SOFTWARE

The software to drive the podule is supplied on disc in the form of a relocatable module. This provides a host of additional '* commands and SWI's which can be used even by inexperienced programmers to produce very impressive displays of live pictures or ones previously saved on disc. For non-programmers, ready written programs are provided to explore all the features of the Digitiser and produce 'Sprite' images which can be used in many other applications and 'Art' packages. The software is very easy to use and scaling routines are provided which allow you to manipulate the grabbed image by selecting any part of the picture (using a box drawn on screen controlled by the mouse) and placing it on any area of the screen, again using a box to select the position and size. This enables multi-picture images to be produced very rapidly using either live pictures or ones you have previously saved on disc. The 80 page handbook provides full details of how to implement the commands even for the

EDUCATION

The Digitiser has many uses in education. The software commands can show many of the effects typical of the digital storage of TV pictures which can help to explain the way in which TV works. It can also be used to produce powerful audio-visual displays tailored to your own requirements from images captured using video cameras etc. For younger children, programs can be created to help learning by giving high quality visual images of animals, birds, trees etc. built into a 'quiz' format. The possibilities here are endless. FUN & GAMES

As well as showing off to all your friends who don't have an Archimedes, what a great computer it is, you can use the Digitiser to produce images for all sorts of games and visual demonstrations. Games such as 'Guess the Celebrity or 'Guess the Advert' can be produced by even inexperienced programmers, simply by 'grabbing' all the necessary images from TV and saving to disc.

	SPECIE	

Pal coded video, .75 Volts - 2-5 Volts pk to pk

R, G, B & sync input
All inputs may be terminated by internal DIP switches

512 x 256 pixels Storage system

Standard version 4 bits Red, 4 bits Green, 4 bits Blue - 192KRam Extended version 5 bits Red, 6 bits Green, 5 bits Blue – 256K Ram The Digitiser harware allows the full screen area normally viewed to be

stored in the podule ram. Horizontal shift, Vertical shift and width can be

d internally if required.

The PAL decoder provides manual control of Brightness, Contrast on, combined with full auto saturation contr

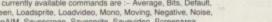
- Q What is the difference between the 12 bit and 16 bit version
- A The 12 bit version can produce very high quality pictures, those shown on this page were produced that way, but 16 bits can give even better results particularly in high resolution screen modes.

PAL Decoder

- A For those who have professional video cameras capable of producing R, G, B outputs, the R, G, B inputs can give significantly better results than the PAL inputs by avoiding the coding-decoding process. This removes some of the defects of the PAL system such as cross-colour, and also reduces noise.

Q -Will it work on the A3000?

- A Yes, you can show a real live moving TV picture on the computer screen. This means that if you are using a video camera or recorder as an input source then you don't need a separate monitor to frame up the picture
- A Yes, but you need an inexpensive adapter box which we can now supply
- A -No, the three controls are exactly the same as on a hormal TV set, Brightness, Contrast and Colour (Saturation). They may appear difficult to get at as they are at the back of the computer, but once set to your preference the brightness and colour should not require further adjustment, and the contrast (which is the easiest to get at) will only need adjusting if the video input source is changed.
- Q -Does it take a long time to Digitise a full screen colour image?
- A -Not really, a full screen image takes just 6 seconds on a standard 310, and reduced size images take proportionately shorter times.
- Q -What software commands are built into the module?
- A –The software is under continual development and updates will be made available under our usual updatin schemes (i.e) most updates are free), but the currently available commands are: Average, Bits, Default Digitise, Flip, Focus, Freeze, Image, Loadscreen, Loadsprite, Loadvideo, Mono, Moving, Negative, Noise Outline, Palette, Primary, Restorescreen, SaveAIM, Savescreen, Savesprite, Savevideo, Screenarea, Setvideo, Unfreeze, Videoarea.



This ever popular Rom based PCB designer is suitable for all BBC micros. It's fast high density 1:1 scale print routine allows prototype boards to be made directly from a printout, and a 2:1 scale print may also be used to produce professional quality boards. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' input routine and allows any component to be 'picked up' and moved around the board without having to re-specify component interconnection.

The full auto-route facilities are available even on a standard unexpanded

BBC PCB Designer

PCB Autoroute is remarkable. No similar software comes near the price.

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PRICE

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Some Digitiser Effects

- 'Pineapple has produced one of the 'ultimate' Computer Video Digitisers'
- -The Pineapple Colour Digitiser looks to be one of the most professional products yet to be seen

Acom User - April 90

Prices: Standard

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POSTAGE AND PACKING FREE

ADU is an invaluable utility for all ADFS users. It adds over 22 new *commands to the ADFS filing system as well as providing an extensive menu

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RB2/107	Atari ST	£49.83	Archimedes adapter to enable 101, 101+ to	work with
RB2/109	Amiga	£49.83	Australia	
RB2/110	Nimbus	£49.83	Archimedes	Σ19.9
DDDDDD	IDM DONTAT	000 66	Postago & Dacking on Tracker Balls	C4 70



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THE usefulness of the program Protect in the December 1989 issue of The Micro User depends upon the encoded file penetrability level. This is determined substantially by the length of the single Ascii byte sequence repeatedly applied along the length of the file and should be as long as is consistent with the ability to input it reliably each time.

For a single coding this length is equal to the length of the input coding string, and long strings are notoriously unreliable due to Case, Punctuation and so on.

With multiple encoding the equivalent (unlimited) length is equal to the lowest common multiple – LCM – of the lengths of the separate input strings.

For example, the maiden names of my paternal grandmother are SOPHIA, OPHELIA and OBENEY and are a potentially useful double or triple-encoding set:

SOPHIA then OBENEY has the same LCM as both SOPHIA or OBENEY at value six. Vastly superior is OPHE-LIA then OBENEY, which has an LCM of 7*6 – this is no different to triple input.

Evidently the best method is multiple encoding using names with lengths incompatible in factor terms, because this leads to the biggest LCM value.

It is essential to think laterally to find name sequences which are both easily remembered (usually some personal reference) and unlikely to be associated because of distance in either space or time.

It's also wise to hold several back-up encoded copies unless you are one of those rare people who never make a mistake.

A useful trick is to hold down Control while entering alphabetic characters only. This not only calls up Ascii numbers less than 32 but also shows nothing on the screen – see page 378 of the User Guide.

To take this matter further we must, regrettably, be more technical: Ascii tables – pages 490-491 in the User Guide – show the following:

Numbers greater than 127 (&7F) have their most significant bit (MSB) set to one and no equivalent character unless working in Teletext Mode 7.

Numbers less than 128

Lateral thoughts on super coding

£10 Prize letter

(&80) have an MSB of zero and can be subdivided into four groups identified by their left-most three bits only and we can conveniently define them as the LBTO, LBT1, LBT2 and LBT3 groups.

The table below shows the group identities resulting from EORing members of two groups and should be interpreted as meaning ONE member of LTB1 EORed with A member of LTB3 giving SOME member of LTB2. The 4 by 4 table is adequate to handle any thinking about Ascii-byte EORing.

 EOR
 ltb0
 lbt1
 ltb2
 ltb3

 ltb0
 ltb0
 ltb1
 ltb2
 ltb3

 ltb1
 ltb1
 ltb0
 ltb3
 ltb2

 ltb2
 ltb2
 ltb3
 ltb0
 ltb1

 ltb3
 ltb3
 ltb2
 ltb1
 lbt0

When cut down to a 2 by 2 table it tells us what happens to EORing two MSBs – a byte greater than 127 EORed with a byte less than 128 gives a byte greater than 127.

Fortunately MSB=1 bytes

are not too common in files, but they can assist decoding because they stick out like a sore thumb.

The most common ones are &FF giving a string length and a string following and &B0 to &B9 obtained by the Shift key combined with the red keys. It is for this reason that a long multiple-input code is strongly recommended.

When a long code is used, it can be comprised entirely of Itb0 bytes - using Control+alphabetic - because Itb0 EORed Itb0 gives Itb0 no matter how many times it is

The table shows that the group identity is unchanged by EORing with any ltb0. This discourages manual decoding via a hexadecimal printout because it looks easy due to the patterns – frustration rapidly intervenes.

In any case the additional problem of getting from the long ltb0 sequence back to the original names causes further

Win a tenner

WANT to write to The Micro User? The addess is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP.

Writers of the most interesting letters receive a £10 prize.

difficulty unless the LCM has very few factors. - R. H. W. Annenberg, Aylesbury, Bucks.

Checking out a micro mate

COMPUTERS are brilliant at playing chess and world championships are often held to decide which program is better than the rest. This frustrates me, as I am unable to beat any computer chess program

What I want to know is what happens when a program plays itself. Is the outcome always a draw, or does the computer which made the first move always win? If so, could you tell me this winning first move and hopefully my computer wil resign there and then.

– P. D. Welsby, Edinburgh.

• When two programs of similar ability or, even the same program running on different machines, are pitted against each other the outcome is never predictable.

A program has a set of opening gambits which it follows religiously until either their opponent fails to follow the sequence or it reaches the end of the sequence itself.

However the choice of gambit will be selected at random – as will the response. In addition once the program is out of

Simulator body blow

I HAVE an Acorn Electron and I recently bought the game Pro-Boxing Simulator, a new release from Code Masters.

When I loaded the program I found out that it was identical to By Fair Means or Foul by Superior Software. Please could you explain this coincidence. — David Milliken, Renfrew, Scotland.

 We made some inquiries and it seems that Code Masters now has the rights to sell this game on its own, while Superior is permitted to sell it on compilation.

the gambit sequence its decisions are based on the minimax theory.

The idea is to maximise the advantages of your position while minimising your opponent's. The program does this by analysing board positions and choosing one which gives it the best advantage.

However, sometimes it may find two moves that give it the same advantage. At this point it has two choices: It can choose one at random or analyse these particular moves further.

The number of moves ahead that a program analyses is called the depth - a program that could analyse every single possible board position from the start to the end of a potential game might give up after your first move - but how does it know what moves you'll make?

How well a program works depends on two things: How many moves ahead it looks and how good it is at figuring out the advantages of relative board positions. Obviously two different programs use alternate methods of calculating, so they will behave differently.

But, and this is true of all computer programs, if you know everything about the programs and how they behave and they don't contain any random elements it is theoretically possible to figure out what each move will be.

The trouble is that Chess is so complex - and the programs are so intricately designed - that there is no right first move.

Configuring smaller discs

ANYONE using an external 5.25in disc with the PC Emulator on the Archimedes may find that they can't read 360k PC discs, as the software expects them to be 720k.

You can alter the CON-FIG.SYS file on the MSdos boot disc either with EDLIN which is not very friendly - or the simpler, though equally unfriendly, COPY+CON. From the Dos prompt type:

A>COPY CONFIG.SYS+CON (Return) (Return)

DEVICE=DRIVER.SYS /D:2 /T:40 /S:2 /F:0 (Return)

Now press f6 and Return to save the data.

Reset the system with Control+Alt+Delete and you will see that logical drive D: is now recognised by the system - it's still the external drive, but this time set up to be 360k.

So to format a 360k disc, for example, just type FOR-MAT D:.

The great thing about this is that you get the best of both worlds with just the one, physical, drive, C: is 760k and D: is 360k.

For the technically minded the format of DRIVER.SYS is as follows:

/D:ddd /T:ttt /S:ss /H:hh /F:f

where ddd is the physical drive number (1 to 999), ttt is the number of tracks (1 to 999) 40 gives 360k and 80 gives 720k, ss is the number of sectors per track (1 to 99), hh is the number of heads with a default of 2, and f is the device type, 0 is 360k and 2 is 720k. - Kevin Morpeth, Robinson, Northumberland.

Tricky data for brill Brickie

THANK you very much for the excellent game Dickie Brickie from the March 1990 issue. The graphics were just superb, better than some of the rubbish I've forked out good money for in the past - and although the object is fairly simple, the game very addic-

As with all such wonderful games, there is the typing in beforehand - plenty of it, too and all that sprite data must have been a pain for somebody - but that's not my problem, because I get the subscription disc.

I can follow most Basic programs but this one had me baffled at first - that sprite data? What sort of commands were all that lot? And what about this?

220 START

I came to the conclusion that these lines were never actually executed, or even examined by Basic. I think the program just accesses the memory directly where they are stored for their information. Is this correct?

Also, why the incessant plugging of the L.E.A.s? Neither the author's name or initials are Lea (or L.E.A.), so

- Level one in the split second when the buildings are being built, the letters L.E.A. flash across the bottom.
- On level two, the second line on the optician's chart comprises these immortal let-
- They return on level three to fill the entire screen.

One last thing - I've found a tiny, tiny bug in it. I was on level 11 - yes, I was quite chuffed as well - when my last life was suddenly cut short by a rampant pair of scissors prophetic?

However, for some strange reason I re-materialised with lives at 0 and promptly died again. With lives then on -1, I continued to play up to level 15 and then back to 1 and up to 4 again. With a final score of 2,054,500 and lives at -32, I decided that it was never going to end, so I pressed Break.

I suspect that if a line somewhere in the middle reads something like:

xxx IF lives = 0 THEN PROC-GameOver

If this was changed to:

xxx IF lives <= 0 THEN PROC-GameOver

then on future occurrence the game would end immediately. - Tim Morley, Bolton, Lancs.

 Your assumptions about the sprite data for Dickie Brickie and Car Race in this issue are correct, the data is accessed directly and never executed.

What happens is that FNstart is called and this searches for the word START finally returning the memory address of the line after it. Note that it is vital that the line is typed in as:

220START

with no spaces before or after the word. Remember we always produce our listings using LISTO1 and WIDTH40, which means that if you type them in in Mode 7 using AUTO what you get on the screen will match exactly what's in the magazine.

The asterisk at the start of every line is there to make

Valuable source of memory

I AM responding to the letter from Ron Maitland in the June issue of The Micro User regarding the 12k Sideways Ram on the BBC B+. Before upgrading to a BBC A3000 at the beginning of the year I was the proud owner of a BBC B+ and must point out that the 12k is part of a full 32k which is mainly used for

In order to be able to load rom images larger than 12k in length Mr Maitland should consider buying the 64k upgrade for the B+, as supplied by Acorn. This is a small ram board that sits at a tangent to and on the right-hand side of the printed circuit board. This 64k is made up of four banks of 16k

ram for the following uses:

Each bank can have a rom image loaded and will then be treated as a rom. Contrary to what most dealers advise, a write protect switch can be added, I had one fitted with the minimum of fuss.

The 64k can be used for Basic programming using Basic128 - details are supplied with the upgrade. It can also be configured for use as a printer buffer (16, 32, 48, 64k) ram disc or a mixture of the two using such software as Beebug's Master-Rom - which I can recommend, having used it for over a year.

It is also possible to save areas of ram from PAGE to &7FFF to the sideways ram temporarily while you load, edit and run other programs. Details once again, are supplied.

I hope this information helps Mr Maitland. I found the upgrade (you are supplied with a sticker quoting 128k) to be invaluable. - M. Whiteman, Lewisham.

sure Basic ignores the line when you type it in – it thinks each of these lines is an operating system command.

The data read routine extracts the data in groups of three. The first character specifies the number of bytes – calculated by ASC"x"-32 – while the second two are the hex value of the byte. So the code:

!FF"00980

means set one byte of value &FF, followed by two bytes of &00 and ASC"9"-32 = 25 bytes of &80.

Registers for cursor effects

IN the March issue Dr. I. R. Shand asked how he could stop the cursor flashing, but keep it on the screen. I have discovered some CRTC commands which alter the cursor. The first one does what Dr. Shand asked for, the others might be useful:

VDU 23,0,10,12,0,0,0,0,0,0 VDU 23,0,10,1,0,0,0,0,0,0 VDU 23,0,10,22,0,0,0,0,0,0 VDU 23,0,10,72,0,0,0,0,0,0 VDU 23,0,10,82,0,0,0,0,0,0 VDU 23,0,10,112,0,0,0,0,0,0,0

These commands all alter the 6845 CRTC circuitry. They occur in the form:

VDU 23,0,B,A,0,0,0,0,0,0

This puts the value A into register B. You are warned not to try this sort of thing unless you know how to program the 6845.

Also, in the April issue you gave a routine to crash the system and erase memory on

any sort of Break. If you use:

*FX200,3

it will do the same . It definitely works on the BBC B, Master, and Master Compact. – D. Croft (age 11), Reigate, Surrey.

 There are two registers you can use to alter the cursor: Register 10 specifies the cursor start line and register 11 sets the cursor end line.

By using these you can change the thickness and position of the cursor – even have a thin line moving up and down instead of flashing.

The only problem lies in the fact that the values are different for Mode 7.

Underline routine for LaBelle

THE label creating program LaBelle in the November 1989 issue of The Micro User suggested adding a routine to switch underline on and off. So here it is:

Use Control+f0 to place a code which switches underline on and Control+f1 for off. The routine can be altered easily to recognise other codes and respond accordingly. The original program requires some slight modifications to allow for the new routine. Add the lines:

30 PROCa 2015 IF IX=144 OR IX=145 GOTO 2050

Then include the listing for PROCa.

Line 0 is a further idea in the lazy save theme that you've had recently.

I use this at the beginning of all my programs. On the

Master it puts TIME\$ after the first REM in the program. There must be at least 26 letters after it – make sure there is one in the first line.

All you have to do is put the name of your program in the inverted commas and type:

SA.FNS

If you're not using a Master, all you need is:

10DEFFNS="name"

I think this is the simplest and most effective method.

O DEFFNS: FORL 2 = PAGETOS FF+PAGE: IF?LX=244FORILX=L +2TO25+L%: ?iL%=ASCMIDS(TI ME\$, ILX-LX+1): NEXT:="LaBe lle"ELSENEXT: REM>Mon, 30 Oct 1989.11:38:32< 5010 DEFPROCa 5020 FORL=0T02:P%=&B00 5030 COPTL:SEI:LDA&22A:ST Ao+1:LDA&22B:STAo+2:LDA#y MOD256:STA&22A:LDA#y DIV 256:STA&22B:CLI:RTS 5040 .y:CPX#3:BEQ p 5050 .o:JMP&1111 5060 .p 5070 \DETECT AREA 5080 CMP#144:BEQunderline 5090 CMP#145:BEQstop unde rline 5100 \END 5110 JMP n 5120 \WORK AREA 5130 .stop-underline:LDA# 27: JSRn:LDA#O: JMPn 5140 .underline:LDA#27:JS Rn:LDA#45:JSRn:LDA#1:JMPn 5150 \SEND 5160 .n:JSRo:PHP:CLI:NOP: NOP: PLP: BCSn: RTS 51703:NEXT:CALL &BOO:ENDP

- C. J. Richardson, Hedon, Hull.

Italics from a jet printer

I HAVE owned an Acorn JP101 ink jet printer for many years but owing to lack of an instruction manual I haven't been able to access either the italic or bit-mapped modes. Even the manufacturers, Olivetti, haven't got a manual. Can you help? – Eric Keeley, Ramsgate, Kent.

• We don't have one either. Can any reader help?



IN regard to Dealing with decimals from the Letters pages of the May issue, there's a simple solution to Mr. Ellis' problem. To round a number N to 2 decimal places just use:

N = INT(N*100+0.5)/100

The problem with Mr Ellis' method is that the micro will often display a number such a 14.475 as 14.47499999. This does not seem to cause a problem with the arithmetic method above.

To produce columns of numbers with different formats we can use @% as often as necessary. Try:

10 MODE3
20 FOR I=1 TO 20
30 Z=RND(10000)/1000
40 X=INT(Z*100+0.5)/100
50 Y=INT(Z*10 + 0.5)/10
60 @X=&20207:PRINTTAB(5)
X;
70 @X=&20106:PRINTTAB(15)
Y;
80 @X=10:PRINTTAB(25)Z
90 NEXT
100 END

The semi-colons at the end of lines 60 and 70 keep the printing on the same line.

The display will be three columns of numbers, each right justified.

In the last column you will probably see several examples of numbers such as 16.4999999 or 15.45000001, slight errors caused by the conversion of decimal to binary and back again. — J. Jones, Kirk Michael, Isle of Man.

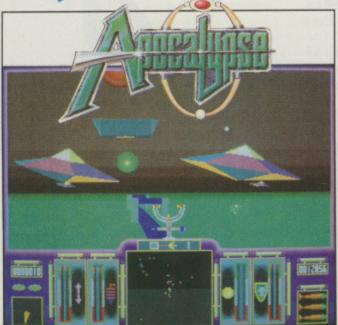
ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested. On the rare occasions when mistakes occur corrections are published as a matter of urgency.

Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.







APOCALYPSE

Apocalypse is designed purely for the Archimedes. Utilising the machine's colossal processing power combined with ingenious programming techniques, the author has created a masterpiece which could not have been produced on any other home computer. The author is of course Gordon Key who already has Holed Out and E-Type under his belt. Apocalypse is by far his best work to date. to date.

The game places you on the surfaces of varied futuristic hostile planets colonised by ruthless enemies. With your highly advanced craft you must find your way around the planets and systematically annihilate the enemy. Your ship, which can fly or move along the ground, is extremely fast and can even fight whilst hurtling backwards.

The graphics are truly unbelievable. The solid, shaded 3 dimensional buildings and objects are animated more quickly and smoothly than ever before. If you shoot at them they explode in a way that is terrifyingly real often catching fire before bursting into a ball of flames accompanied by devastating sound effects.

Initially Apocalypse is easy enough for a beginner to enjoy but as you progress your foes will become increasingly hostile and you will discover fascinating new objects. These can have strange properties and many may need to be destroyed. It will be up to you to discover how.

The Royal Guild of Spacing will monitor your progress as you play. Your performance will be assessed at appropriate times and you will need to impress them if you are to continue your adventure. Apocalypse is an amazing game. There's only one way to describe it....

RAW EXCITEMENT.

PRICE: A3000/Archimedes £29.95



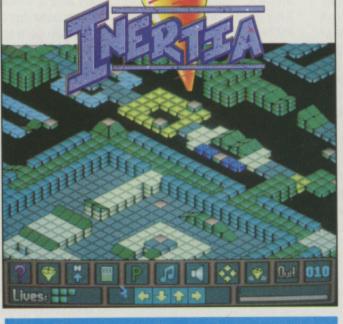


A3000/ARCHIMEDES





A3000/ARCHIMEDES



INERTIA

Inertia is a totally original game with a huge landscape just waiting to be explored. It is available for the Archimedes, BBC Micro and Acorn Electron. Scattered (or rather fiendishly placed) around the landscape are many special tiles which need to be collected. Your highly sensitive craft floats freely around the landscape and you must exert forces upon it to guide its speed and

You have a 3 dimensional viewpoint displaying a tiny fraction of the total playing area. There are walls, bridges, tunnels and ramps to negotiate and a host of mystery tiles with strange properties indeed. These include ice, jump and transformation tiles. There are even certain tiles which alternate the controls so that everything works in reverse.

This massive game has been very carefully put together and solving the puzzles within it will need lateral thought and a lot of dexterity.

The Archimedes version is considerably enhanced with digitised sound and music. It even features a full colour 3 dimensional map of the game which is a joy just to wander around. You'll certainly be amazed at the size of the game and the variety within it.

Inertia is a game for the determined. Each version makes full use of the ability of the computer so make sure you've got plenty of time to spare. Once you have started you won't be able to stop.

Electron User Golden Game May'90

BBC Micro and Acorn Electron versions available NOW. Enhanced Archimedes version available in June, 1990.

A3000/ Archimedes BBC B/Master 5 1/4" disc Compact 3 1/2" disc BBC/Electron Cassette

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As you progress you will discove many intriguing objects which cabehave very strangely. Many are documented such as woode panels, hour glasses, thorns portculli, mirrors etc.. But most as

PRICE: A3000 his





A3000/ARCHIMEDES

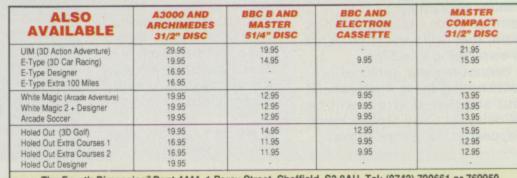
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The Fourth Dimension



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000000 NEWRIFE POWER: ####

NEVRYON

This fast arcade game is disc based only and boasts 100K of graphics and game code for the BBC and 2 discs of over 1.5 megabytes for the Archimedes. It is a fast sideways scrolling shoot'em up which features 8 levels of furious opponents and very varied and very detailed graphics.

You fly a spaceship which can attain immense firepower - more lasers, a ram, gun droids and highly destructive missiles which are released from the top & bottom of your ship, then ignite and shoot forwards.

Whilst the BBC version is superb, the Archimedes version has been considerably enhanced and is truly exceptional putting many arcade games to shame. Nevryon uses the machine's raw power to full effect and gameplay is

It comes on 2 discs and features 5 true levels of parallax scrolling, more than 50 objects on screen, over 1 megabyte of 256 colour graphics, digitised stereo sound and music etc. etc.. You control a different ship on each of the 4 scenarios and there are a seemingly infinite number of weapons to collect and use. End of level monsters are beautifully animated but are anything but friendly.

BBC Review: "Graphics are very colourful and hectic, with explosions, missiles and aliens all heading for your ship. Together with a scrolling landscape, complete with stars moving in the background, they combine to form an enjoyable and action packed game." Micronet, Feb'90.

BBC Micro version available **NOW**. Enhanced Archimedes version available in June, 1990.

PRICE: A3000/ Archimedes BBC B/Master 5 1/4" disc Compact 3 1/2" disc



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castle was ot. When you think your stuck, experiment and you'll discover properties you never knew existed. ices, to loot to destroy.

> The subtle blend of arcade ing and adventurous puzzles nake Man-At-Arms fiendishly ddictive. You must plunder each f the 4 castles which become creasingly "puzzling" as you rogress. Your overall objective is bill all foes with your mighty word and to plunder as much of he most valuable treasure as you

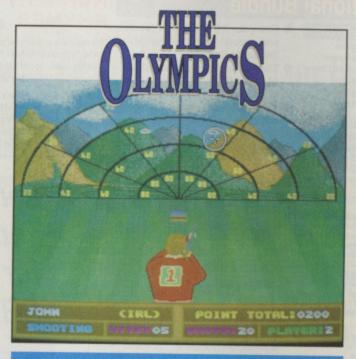
Man-At-Arms is a fascinating allenge with superb sound effects nd music. No attention to detail as been spared and you can be sure of many late nights for weeks

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It is comprised of 6 main events: Diving, Shooting, Javelin, Swimming, Canoeing and Pole Vault. Some of these have several "sub-events" to choose from - there are 2 Shooting events, 12 Swimming events and 3 Canoeing events. These events have been chosen for maximum variety and enjoyment. They will "extract" all sorts of abilities: manual dexterity, timing, memory, perserverance, adaptability and above all guts!

The menu systems are controlled entirely with the mouse. As such they are extremely easy and quick to use. All events can be practiced or competed in individually, or altogether for maximum Gold, Silver and Bronze medals. You can also play all 6 events as a sort of "hex-athlon" where points are awarded for each event - the player with the greatest number of points is deemed to be

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"Fury said to a mouse, That he met in the house, 'Let us both go to law: I will prosecute you. take no de-nial; We must have a trial:

For really this morn ing I've to do. Said the

mouse to the cur, Such a trial, dear Sir, with

or judge, would be wasting our breath.

Te: . Arthur. Bate . IS June. 1989

Jabberwocky

'Iwas brillig, and the slithy toves Did gyre and gimble in the wabe:

All mimsy were the borogoves. And the mome raths outgrabe.

"Beware the Jabberwock, my son! The jaws that bits, the claws that ca Beware the Jubjub bird, and shun The frumious Bandersnatch!"

(and so on, inte

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S - Dotronic Pictures, 3 discs. Samples from a Art Package (By DVS) which will allow anybody to

T - Digit Quarters, 2 discs. Quarter screen Colour Digitizations, 24 per disc, very good!

If you would like a copy of the current Skyfall catalogue then please send a SAE (A5 size), alternatively send a £1 coin/cheque and we will send you our demo disc and catalogue. The demo disc graphically illustrates most of our products, it includes Strackers.

Skyfall Public Domain, 93 Jayshaw Avenue, Birmingham, B43 5RX

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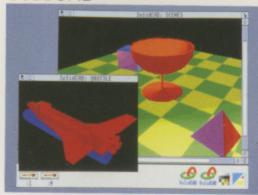
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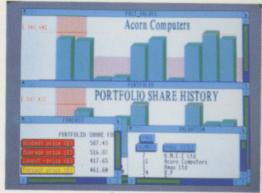
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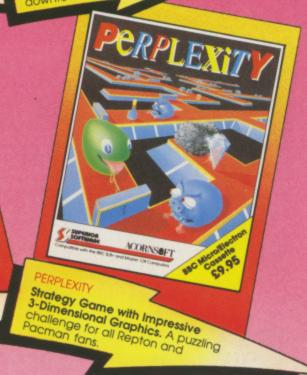
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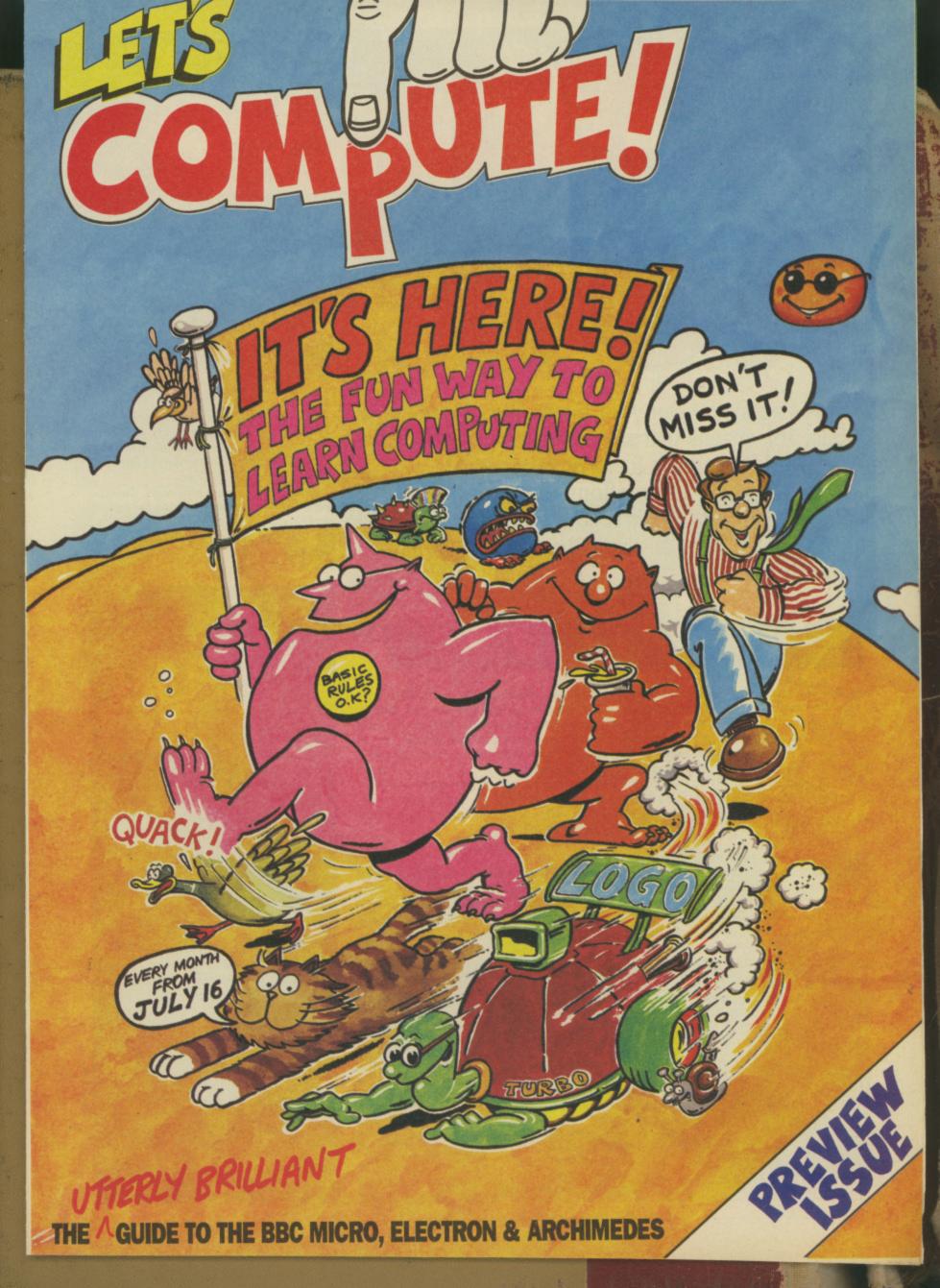
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When you switch on your micro it's in command mode. This means that any command you give it will be obeyed - providing it can understand it.

Here are some instructions you can try out for yourself. But remember to key each one in exactly as it's printed here, and don't press Return until you get to the end.

HATRINI

Whether you want to play a game like Yahtzee or just use your micro to act as an automatic dice thrower, this routine is just what you need.

It cycles numbers - each between one and six - on the screen and stops each one at random. All you have to do to throw again is press the spacebar.

So key it in now and chuck away those dice!

REP.REP.MO.O:FORs=1TORND(100):P.TAB(0,14):FORd= 1T05:P.RND(6);:N.,:U.GET=32:U.0

If you want to throw more or fewer than five dice all you have need do is change the number 5 in the routine to any figure you like. It's just as easy to give your dice more spots as well - change the number 6.

You may expect a routine that simulates dice

to give you different results each time you try just like when you throw real dice. But, although the one here uses random numbers, you'll find that if you enter it straight after switching on your micro the same five numbers will always

You can get more realistic results - different each time you use the routine even if your micro's only just been turned on - if you put the following at the start:

x=RND(-TIME)

You need to put a colon (:) to join it to the next part of the statement. Find out why the numbers are more random - and why a colon is needed as you learn more about your micro in Let's



If you think you can improve any of the routines on this page - or write others that produce strange effects on your screen - we'd love to hear from you.

If we like what you send we'll print it - and for each short routine we'll send you one of the exclusive Let's Compute! baseball caps. We also want to know what YOU want to see in Let's Compute! If it's a good suggestion it will also win you a baseball cap, so remember to give your name and address. If you're under 16 also give

Write to: Pete Davidson

Let's Compute! **Europa House Adlington Park** Macclesfield, SK10 4NP.



Have you ever typed your name on the keyboard only to be told - well almost anything - you want:

by your cheeky computer that it's a Syntax Error? Want to show it who's the boss? Just enter the following routine and you'll find you can type anything

CLS:REP.REP.c\$=GET\$:P.c\$::U.c\$=CHR\$13:VDU10:U.O

If you have a printer you can use your micro as a typewriter if you put this at the start of the routine:

Unfortunately, unless you're a perfect typist you'll quickly find one big snag. The Delete key doesn't work. Which means all your typing mistakes will be printed and you won't be able to do anything about it. So take care.

Meanwhile, here's a challenge: Can you make Delete work and still keep the routine short? If you can, send us your listing. You may even see your name in a future issue of Let's

Each key on your keyboard produces just one letter, or some other character, when it is pressed - but not the function keys



When you switch on your micro they appear to do nothing at all when you press them. But they're great for storing things you might want to key in time after time. You'll find you can make them print anything you like, from a single word to your complete address. Try this:

Now press f1 and PETE will appear on your screen (the word that is). Try it with your

screen if you press the key several times.

Try putting different words in all the keys

and you've made a simple game.
See how many guesses it takes your friends to find a hidden word.

So how can these keys help you with the short routines on this page? Just put, say. *KEY1 in front of any of them and the program's available at the press of a key. And there's another advantage of this method: If you make a mistake you can bring your text back and use the Copy key to correct it.

The function keys are labelled f0 to f9 (or F1 to F12 on the Archimedes series – the one labelled PRINT acts as F0). On BBC Micros and the Archimedes series they are separate red keys, while on the Electron you have to hold Caps Ik/Func as you press them.



















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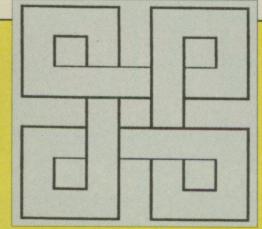
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IT'S KNOT Logo...



The knot created from the listing below

Month by month Let's Compute! will give you a step-by-step guide of Logo. To show the kind of diagrams you'll be able to create here's a knot designed by Martin Sann.

First you must run a Logo program. (If you haven't got one there's a version on the *Let's Compute!* Club members disc and tape – see how to join on the centre pages.)

Then key in the listing and type the following:

KNOT 50

Now watch the knot being drawn. The number (50 in the example) can be changed to make the knot bigger or smaller. Just try it!

If you already know how to program in Logo can you draw your own special kind of knot using the language? If you do so, send it to *Let's Compute!* Europa House, Adlington Park, Macclesfield SK10 4NP. There are prizes for every one we print!

TO KNOT :DIST HT REPEAT 4 [PATT :DIST 0 0] END

TO PATT :DIST :SIZE :ANG
MAKE "SIZE 3
MAKE "ANG D
SQUARE :DIST :SIZE :ANG
MAKE "GAP 1
LINK :DIST :GAP
JUMP1 :DIST
LINK :DIST :GAP
MAKE "SIZE 1
MAKE "SIZE 1
MAKE "ANG 180
SQUARE :DIST :SIZE :ANG

JUMP2 :DIST :GAP

TO SQUARE :DIST :SIZE :ANG
FD :DIST * 2
REPEAT 3 [LT 90 + :ANG FD :DIST * @L = :SIZE]
END

TO JUMP1 :DIST
PU LT 90 FD :DIST LT 90 PD
END

TO LINK :DIST :GAP FD :DIST * :GAP END

TO JUMP2 :DIST :GAP
PU FD :DIST
LINK :DIST :GAP
RT 90 PD
END

your own robot!

Here's YOUR chance to win a go-anywhere robot that knows logo inside out. It will do anything a Logo program asks it to, and much more besides.

Roamer is a close friend to Turtle, which can be found playing Logo in many schools. While it is just as versatile in and out of the classroom, Roamer is much more robust – and has a mind of its own.

Our prize pack costs £125*, but thanks to maker Valient Technology we have FIVE to give away in our easy-to-enter Wordsearch contest.

With your Roamer will come

face shapes so you can make him look as mean or as cute as you like. PLUS four colourful jackets for camouflage. PLUS a complete set of penholders and colour-

paper, program him by
pushing his control buttons, and off he'll go
on a drawing spree.
There'll be plenty
of other add-ons
you'll be able to

sticks. Put Roamer on a sheet of

you'll be able to buy for him, including one that lets you operate him by remote control from a BBC Micro.

'There are specially reduced prices for Roamer and its add-ons if they are used in education. Write to Let's Compute/ for details.



What you have to do:

Just find the six words in the wordsquare above and fill in the answers next to the clues on the entry form below. Then send it to arrive no later than July 31. Names of the five winners will be printed in Let's Compute!

If you want another clue – all the words you're looking for have something to do with computers, and they're all hidden somewhere in the wordsquare. Just winkle them out and put them in the right order.

	ON PERSONS	
	TDV	
$-\mathbf{n}$	184	 HCD/I
-		

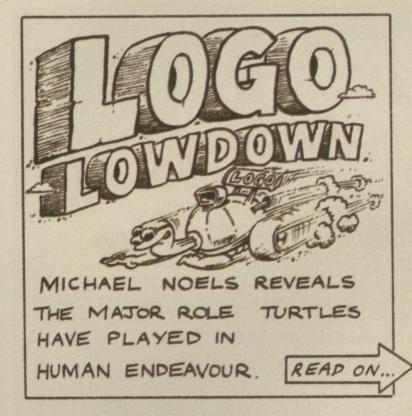
Clues

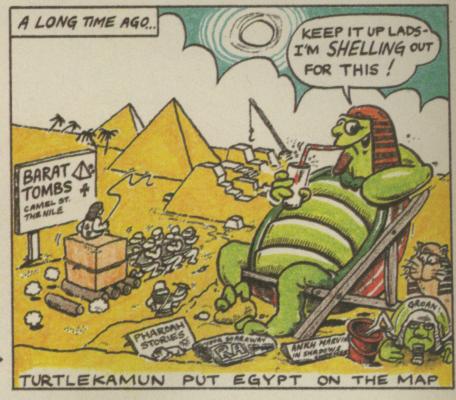
- He leapt out of his bath so they named a micro after him.......
- 3. A never-to-be-forgotten memory.
- 5. Something to watch on a computer.
- 6. You'll find characters here.

Your name

Address

SEND TO: Roamer, Let's Compute! Europa House, Adlington Park, Macclesfield SK10 4NP.













Look what's coming in...

COMPUTE!

Super add-ons!

Explore exciting ways of linking your micro to the outside world. This easy to follow step-by-step guide will show you how to make a lie detector, a burgler alarm, a game to challenge your pals and your own tame turtle. You'll even be able to control a train set from your micro!

All the parts you need for these and lots of other great gadgets will be available as inexpensive kits to save you shopping around. Using clever techniques devised for Let's Compute! most projects can be assembled without any need for soldering.

You'll discover how easy it is to make add-ons for your micro and amaze your friends with your home-built devices. And most important: You'll have great fun as you learn.

Create Prizes galore! Every month Let's Compute! will be giving away

Every month *Let's Compute!* will be giving away lots of goodies. Among the fantastic prizes we'll be offering in the first issue are:

A specially commissioned 3D illustration of your own turtle design, firawn, mounted and framed by our ace cartoonist.

Computer Critters: The latest craze from America. Fix arms, legs and a head on to your micro to turn it into a unique character.

 Special (and very costly) pens and printer ribbons to put your own pictures on your T shirts.

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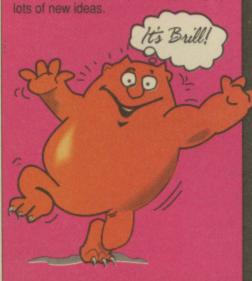
Discover Basic with Rom and Ram!

Rom loves playing games and eating. Ram is an expert computer programmer.

In Let's Compute! each month Ram will teach Rom more about Basic programming – and you're invited to tag along.

It's by far the most fun way to learn to program your micro.

Even if you already think you know Basic, you'll still find yourself picking up



Ever wanted to write your own game but just didn't know

where to start? Now's your big chance!

Month by month you'll be able to add yet another section to your mega-game, giving it your own personal touch as you go along.

You'll be able to design your own mazes, change the graphics. Even make your monsters walk through walls.

And each month you'll end up with a new, improved version of your very own game.

Lowdown on Logo!

Turtles are making headline news all over the world. Now we're going to tame the turtles to teach you Logo – the most popular educational language of all.

With characters like Turbo Turtle, Tyke Turtle, Myrtle Turtle and Tommy – from the Turtle Territorials – you can't help but enjoy learning this fascinating, graphical language.

Science without the smells!

Using programs specially writ-

ten for Let's Compute! you'll be

able to see what happens in real-life

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your experiments failing or blowing the

And there's much, much more!

Each month Let's Compute! will be packed with fun things for you to try. Learning about your micro has never been such a romp. With puzzles, games, hints, ideas, listings and lots of surprises

we've still got under wraps, each issue will be packed with plenty to keep both you and your micro occupied for a whole month.

will be simulated on your micro.

Science is an important part of the National Curriculum and Let's Compute! proves that it can be fun, too. You'll really enjoy learning science as you perform each month's experiment.

house up. All the difficult, dangerous - and smelly - bits





THE INDICATION TO THE INDICATI

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Use your micro to predict an eclipse

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