A Database Publication

THE MICRO USER

Volume 8 Number 10 December 1990 £1.50

PIPE LOONACY

Plumb the depths of adventure strategy

KINETIC ART

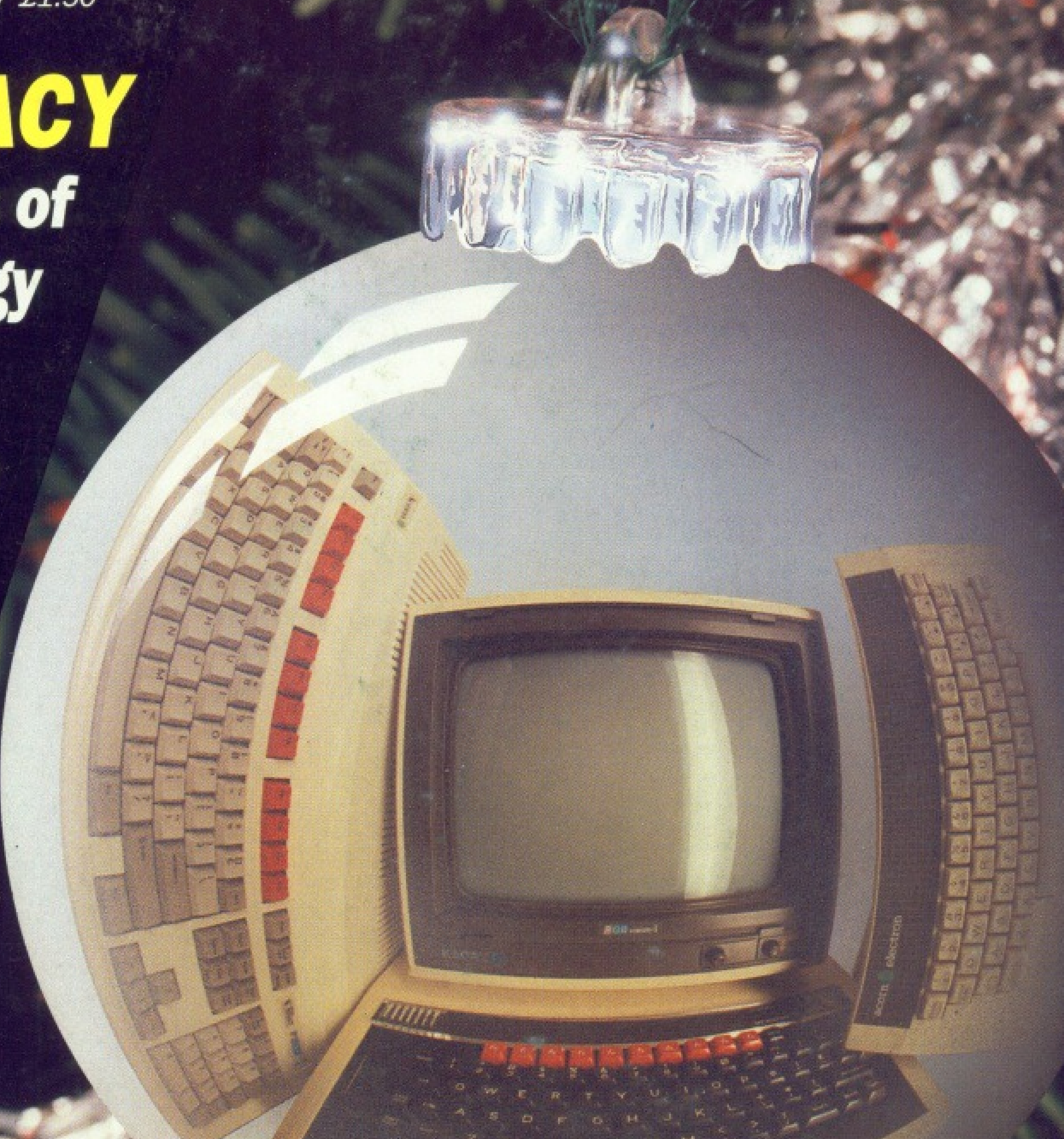
Make your micro trip the light fantastic

ADVENTURE

Excape from Exile with your life intact

GRAPHICS

Produce a great bouncing ball demo



REVIEWS

Modern Languages and Computers
World Map Study
Getting Ready for Maths
Place Value Activities
RiscType
...plus all the latest games

BOOST YOUR CHRISTMAS LIST

Public Domain Software for all

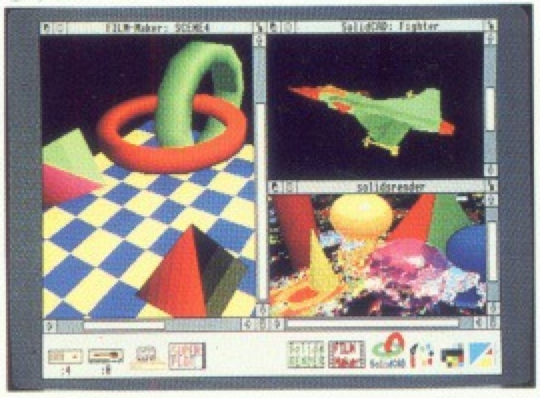
12
9 770265 404004

For ALL users of the BBC Micro, Master, Electron, Archimedes series and A3000

SILICON VISION

DESKTOP SOLUTIONS FOR THE ARCHIMEDES & BBC A3000

SOLIDTOOLS



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(RISC OS) New

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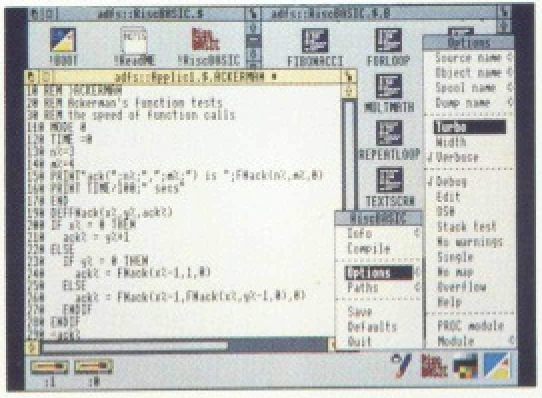
The most advanced Ray Tracing package for the Archimedes producing photo-realistic images of SolidCAD designs or FILM-Maker animations taking into account multiple light sources, reflections, shadows, transparencies, refractions and textures for the highest quality pictures from the leading 3D graphics experts renowned for technical excellence. The high-speed ray tracer uses sophisticated colour mixing techniques to provide the maximum range of colour shades plus anti-aliasing for smooth edges, motion blur effects, dynamic viewpoint, variable camera lens for wide angle and telephoto effects and multi-colour light sources driving the Archimedes display hardware to its limits for the best photo-realistic images within the laws of optical physics.

(RISC OS) New

RISCBASIC



The best BASIC V compiler money can buy. Here's what the reviewers say:

"If you are looking for THE compiler to go for, and are confused about which one deserves to win the very public battle that has been raging in the advertisements, well my preference is for RiscBASIC"
- RISC USER August 1989.

"In summary, BASIC V is the best version of BASIC produced and RiscBASIC provides the most compatible, fastest compiler for this language. This will be an invaluable addition to every serious BASIC programmer's toolkit. My congratulations to Silicon Vision" - Archive June 1989.

"very useful indeed for development work...produced significantly more efficient code" - Micro User July 1989.

"RiscBASIC wins the race...has the edge overall...more likely to provide the correct results" - BBC Acorn User Nov 1989.

"Still the only true BASIC V syntax compiler. If you want the best, buy Silicon Vision's complete answer"
- Micronet August 1989.

(RISC OS) New

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The complete Gerber driver for ARC-PCB and ARC-PCB Professional Printed Circuit Board design packages producing Gerber plotfiles for driving Electro-static Photo-plotters. These plotfiles may be sent directly to photoplotter bureaus on Archimedes ADFS or MSDOS disc formats to produce the highest quality PCB artwork for professional results.

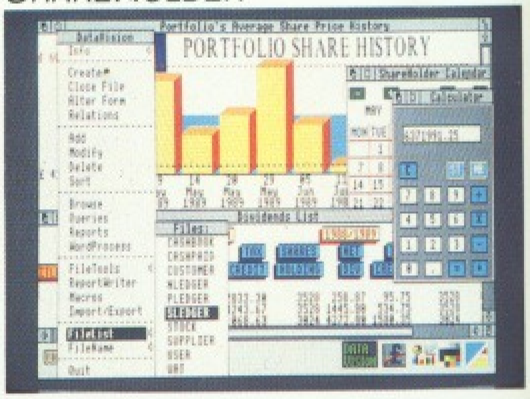
(RISC OS) New

SUPERPLOT

The complete plotter driver for SolidCAD, Realtime Solids Modeller and Gate-Array Design System supporting the industry standard HP-GL, Graphtec, Watanabe and Plotmate plotters.

(RISC OS) New

SHAREHOLDER



The complete share holder's management system providing all the facilities needed to automate your portfolio. Features include Company statistics, Share holdings, Transaction processing, Portfolio history, Forecasts, Dividends due, Share price updates plus built-in Calendar, Calculator and Hardcopy facilities for total integration.

(RISC OS) New

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A full featured true relational database management system which also includes word processing, label printing, reporting, & mail-merging facilities in one integrated environment for the Archimedes, bringing professional quality business software to the demanding user. The database manager is rich in features and includes facilities for the production of complex queries, detailed reports, browsing, sophisticated relational data entry, relational reporting, interactive & global editing, formula entry and validation. All this in an intuitive easy to use mouse driven environment.

(RISC OS) New

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(RISC OS) New

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(RISC OS) New

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THE MICRO USER

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Published by:
Database Publications Ltd,
Europa House, Adlington Park,
Macclesfield SK10 4NP.

ABC
30,212
July-December 1989
ISSN 0285-4040

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 cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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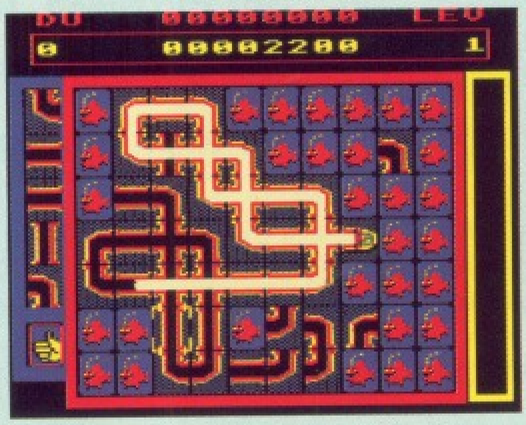
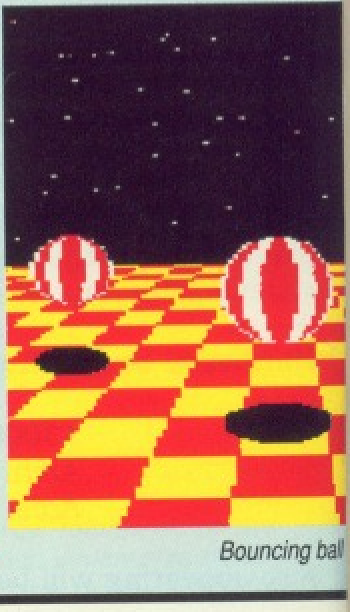
News trade distribution:
Comag Magazine Marketing
Tavistock Road, West Drayton
Middlesex UB7 7QE.
Tel: 0895 444 055.

Database Publications
is a division of
Europress Ltd

LEISURE SPECIAL



Pipe Loonacy



Bouncing ball

Type-it-in

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

Get it right ✓

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.

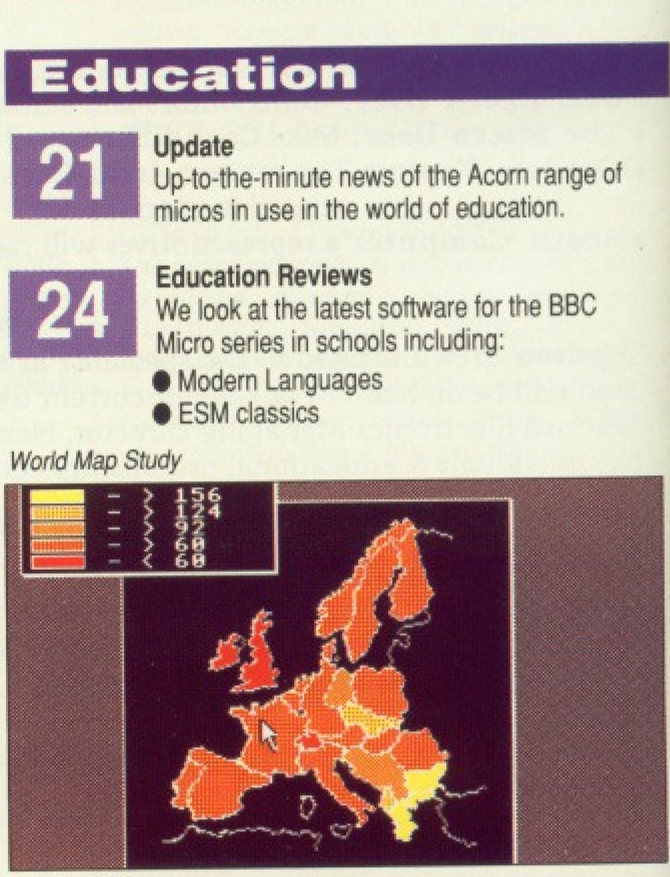
MICRO USER CLASSIFIEDS

The best bargains in the world of all Acorn micros come from fellow readers of The Micro User. Turn to Page 130 to find just what you're looking for – from cheap modems to complete computer systems.

Newcomers

Education

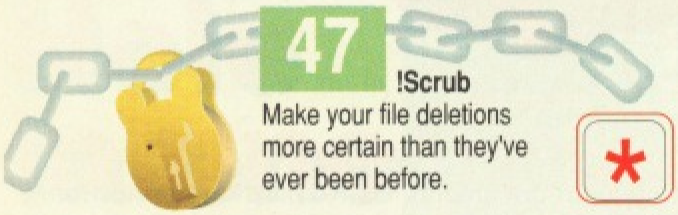
World Map Study



Specials

35 **Basic Saver**
Don't take the chance of losing your precious programs – use this automatic protection instead. *

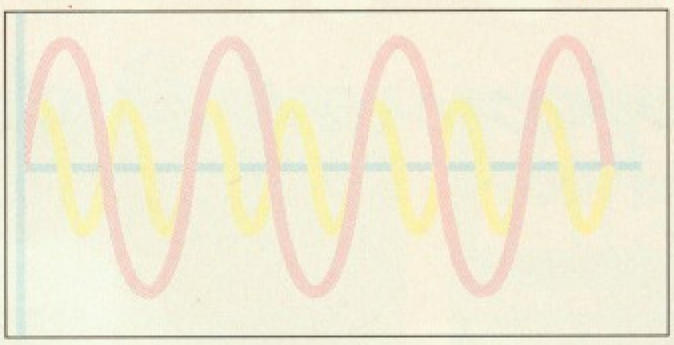
44 **Wordwise Database**
How to use a wordprocessor to build and maintain a complex database with ease.



47 **!Scrub**
Make your file deletions more certain than they've ever been before. *

64 **Routine Matters**
Another batch of fascinating utilities that you can include in your own programs. *

72 **Making Waves**
In the place where electronics and music meet discover interesting waves. *



78 **Supercharged Electron**
It is possible to speed up your Electron using just software – we reveal all. *

94 Our reviewers delve deep into the depths of the latest games releases.

Brixx!

Pon!

Memory Magic

Micro Golf

Play it again Sam 14

FREE Software

Subscribers to *The Micro User* will receive the following software on disc or tape wth this month's magazine:

- Pipe Looncy
- Exile Upgrade
- Wave Maker
- Routine Matters

In addition, those readers with a BBC A3000 or Archimedes series machine will also get:

- !SparkPlug
- !FileUtils
- !BIATetris
- And much more...

For new subscribers there's a special gift: A free binder to keep your copies of The Micro User.

Find out how to subscribe on Page 125.

Key to which micro articles are suitable for

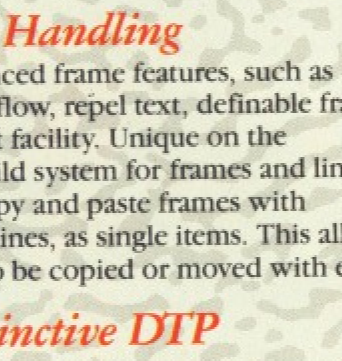
- Electron
- B BBC B
- + BBC B+
- Master 128
- Master Compact
- Archimedes series and BBC A3000

NEXT MONTH

THE MICRO USER

Out of the Cold

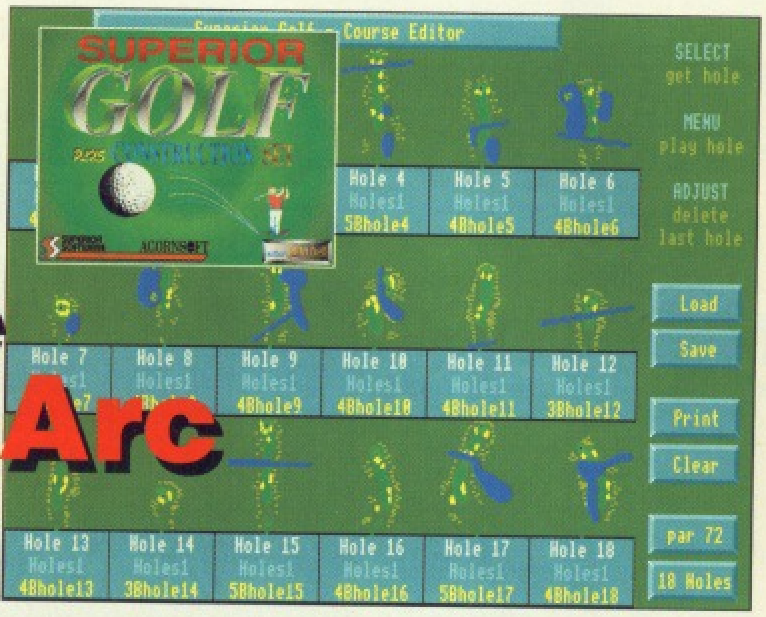
As the winter nights close in explore your imagination with the lighter side of computing. Not forgetting all our regular features plus our unique BBC Micro and A3000 money saving PD section.


Ovation: Introduction

Ovation: Introduction

News BEAT

Hole in one on an Arc



SUPERIOR Software (0652 58585) found a bonus factor to their Superior Golf Construction Set when Ian Robinson social secretary at Morecombe Golf Club wrote to them.

A keen golfer as well as avid Archimedes 310 owner, he recreated the Morecombe course on his micro and found that his handicap stayed the same, with the course playing the same way as the real thing. Intrigued, he took this one step further. Like any golf club, Morecombe's courses have to be changed from time to time, but this is an expensive and risky business, no one knowing how the course will play until it is completed.

By using Superior's construction set he was able to edit the course, playing the new design and working out the yardage and so on. He found some problems with the out of bounds hazard, but even the background scenes were incredibly apt for the Morecombe course.

With redesign and expansion on the cards for the Morecombe club, they could be the first golf club to use an innovative and cost effective way of developing their course.

Interest rates hit Acorn

ACORN'S net profit on normal trading for the first six months of this year was 50 per cent down on the comparable period in 1989 even though sales revenue remained the same. High interest rates were blamed.

Ordinary activities for the six months to June 30 produced a net profit of £42,000 (£80,000 in 1989) but this was knocked down to a net loss of £242,000 by the failure of Torus Group.

Acorn held a 25.3 per cent share of Torus and has had to write off its £242,000 investment.

Announcing the disappointing results, Acorn played up the fact that sales had not dropped dramatically. The first half of 1990 brought sales revenue of £22,074,000, just slightly lower than the £22,102,000 achieved for the same period last year.

Hefty interest charges lopped £319,000 off the operating profit of £361,000.

The latest figures show a dramatic fall compared with the first half of 1989 when the net profit was £2,049,000. This was helped by extraordinary income of £1.2 million from Olivetti and Networks OSN for sales and marketing rights.

For the first time, A3000 and Archimedes computers became the group's biggest selling products during this period. Almost 100,000 units have been sold since 1987.

Continuing research and development has produced new Acorn products this year and Acorn has also invested in its own trading operations in Australia and New Zealand.

"In a difficult economic climate, the board believes that tightly controlled overheads, the policy of delivering high quality products and the maintenance of investment in product development, sales channels and staff enable Acorn to face the future with confidence", said the company's head, Sam Wauchope.

Tiny talk

A PROGRESS report on Smalltalk 80 from Smalltalk Express (081-200 0220) came our way this month. Not only can education users obtain a 50 per cent discount on the £540 price, but a slightly curtailed version is available now which will work on an Archimedes with 2Mb and a hard drive.

In addition they also had news on the Active Book. Brainchild of Acorn founder Herman Hauser, the Active Book is a portable computer which will read your handwriting. It should be available early in 1991.

Using Acorn's Risc set, Smalltalk is the power behind the handwriting recognition software.

Still on the Smalltalk front comes news of an exciting development from ParcPlace Systems, US authors of Smalltalk 80.

They are working on a unified Smalltalk system which will work under any windowing environment, whether the Archimedes Risc OS, the Apple Macintosh, Windows 3 on the PC or XWindows on a Unix machine.

In theory you'd be able to write a program on any machine sure that it would work equally well under a different system – as long as it was written in Smalltalk.

There is a long way to go yet, and whether this will mean in reality simplified porting or just taking a disc from one machine to another remains to be seen.

CHRISTMAS OFFERS!

FREE

RISC User Magazine Disc

containing all the programs from RISC User December 1990, PLUS as usual, a selection of exciting BONUS items

when you subscribe to

RISC User

The most popular magazine devoted solely to the Archimedes range of computers and the A3000.

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

News on the world of Archimedes
Reviews of the latest products
Ready to run applications
Utilities, routines and advanced programming techniques
Programs and articles on sound and graphics
Series of articles for all spheres of interest:
'Into the Arc' – tutorial series for beginners
'Mastering the Wimp' – series on Wimp programming
'Under the Lid' – hardware series
'Assembler Workshop' – all about ARM Assembler
'Beginning 'C' – series on C language
'DTP/WP' – tips on using commercially available packages
'Arcade' – a round-up of the latest games for the Arc
Hints and tips
Postbag for your letters and answers to your questions
Technical queries and expert answers

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

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- Handy utilities and useful routines
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Reviews of new products, and comparative surveys
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- 'Workshop' for the more advanced programmer
- '512 Forum' for users of the Master 512
- 'Practical Assembler' for Assembly language programmers
- 'BEEBUG Education'

Informative articles:
- Upgrading to an Archimedes
- Writing a Compiler
- Using the ROM Filing System
- Thanks for the Memory Bas 128
- Music Programming in Ample

Hints and tips
Postbag for your letters and answers to your questions and lots more

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

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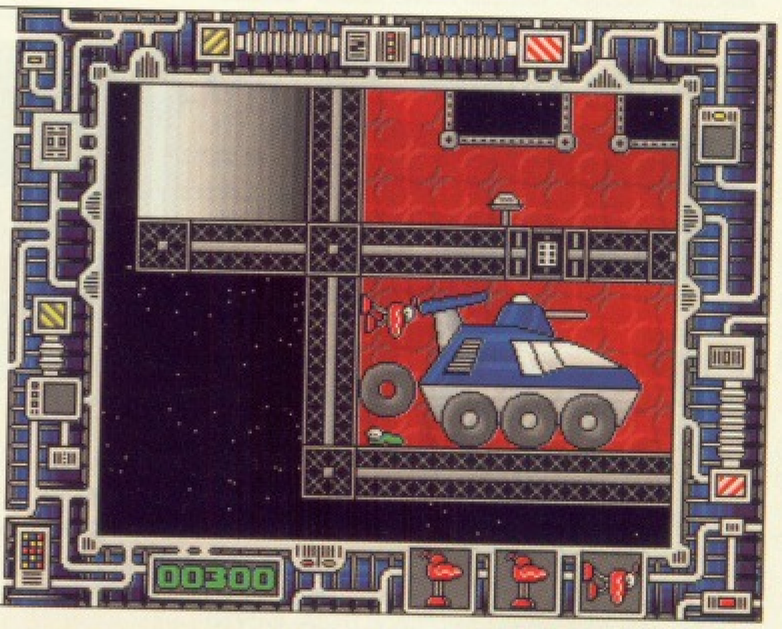
Pest control

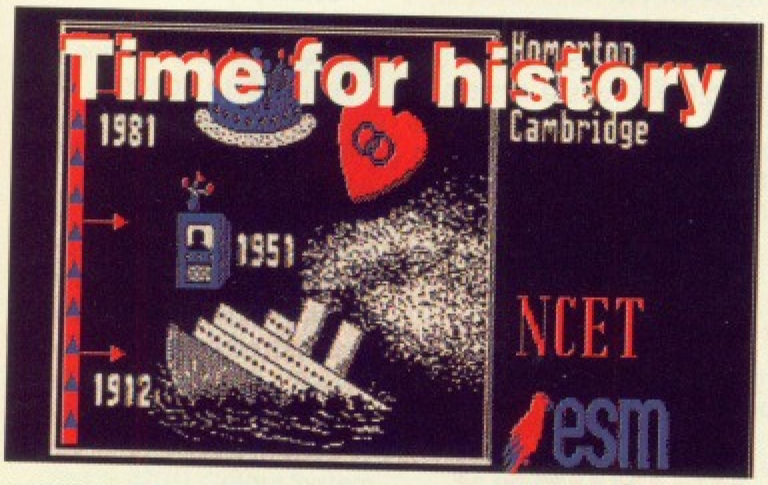
BEWARE all alien invaders, Minerva (0392 437756) have a cute secret weapon and they're not afraid to use.

BugHunter was so successful in cleansing the house and the Earth that when we are invaded by an alien life force there is no hesitation in sending him to thwart their evil plans.

BugHunter in Space will be available for Christmas, priced at £17.95. Good shooting.



Time for history



A UNIQUE history database has been developed by ESM (0223 65445). Time Traveller is usable by all ages and approaches the concept of time and chronology in an innovative way.

Traditionally this is a very difficult concept to put across, and ESM's approach was praised at the Historical Association's annual conference.

Available for the BBC Micro, Time Traveller allows pupils to record and interpret historical data which can then be printed as a visual timeline of specific events.

By studying and interpreting their chosen timelines, students will be able to gain a better understanding of chronology and such terms as years ago and consequence.

Children are encouraged to add the dates and events themselves into a simple time framework from 9999BC to AD2100. Entered in chronological order the information is then displayed in years, decades or centuries.

The National Curriculum requires that "pupils should ... employ appropriate chronological conventions by using timelines". Time Traveller aims to help in the understanding of the sequencing of events, making comparisons and examining cause and effect.

Also ideal in cross-curricular activities as it encourages pupils to build up a library of data on a whole variety of subjects.

Initially Time Traveller comes with a sample data disc, 100 Years of History 1891-1990, and the usual guides as well as guidance on use with the National Curriculum.

Schools video cost cut

INTERACTIVE video has been slow reaching schools because it cost too much, says Dr Colin Wormand of Eltec Computers. Now, in conjunction with the British Nuclear Forum, they have announced a claimed lowest price ever for a complete computer-driven interactive schools video system.

Costing £1,899 for orders placed before December 31, the system consists of a 2Mb BBC A3000, Philips Laservision 406 disc player, Allied Interactive genlock and a set of three double-sided science and maths discs.

The discs, aimed at the secondary school, were designed by the Interactive Learning Project at Newcastle University.

Covering the National Curriculum to GSCE level, they have been tested over the past year in 70 schools.

BNF stress that they have exercised no editorial control over the content of the discs, which cover energy, radiation, statistics and probability.

DTO update

HAVING reviewed Desktop Office from Minerva (0392 437756) last month it seems that some useful suggestions made by users have caused Minerva to update the software free of charge to all registered users.

Changes include visible page breaks in DTOWord, and the print sub-menu now offers the facility to to select, print or preview a selected block. Previewing is much more friendly as it stops at the end of each screen.

There are extensive additions to the spreadsheet, including a size increase, and there is a labels option in DTOChart as well as improvements to the DTOBase program. All in all if you haven't registered now may be the time to do so.

Authoring Arc

AS *The Micro User* went to press, Westland System Assessment (0935 24545) was poised for the major launch of a new authoring system based around the Archimedes.

Called Avanti, it is designed to produce training programs using text, video, audio and CD rom. An offshoot of Westland Helicopters, the company produces computer-based training packages.

It specialists in programs for aviation and military use, but the new system will lend itself to much wider markets.

Based on a Windows system, Avanti allows users to move easily between text and graphics and to go down to basic code with equal ease. It has already been tested on a number of flight training applications.

"The ease of use and scope of the system makes it ideal for any kind of training application", said a Westland spokesman.

Festive breaks

ELECTRON, BBC Micro and Archimedes owners can expect the Christmas offering from Superior Software (0652 58585) in the shops by the end of November.

Called Masterbreak, it is a combination of trivia quiz and snooker with more than 1,500 questions covering music, science and nature, geography, history, sport, passtimes and the arts.

Masterbreak throws up multiple choice questions in a snooker format. Players go for a red ball question and if they answer it correctly, they can go on to a colour. The Archimedes version has been written by Superior Golf author John Bell.

"The advantage of Masterbreak over games like Trivial Pursuit is that it can be played by one person", said Superior boss Steve Hanson.

"You can challenge yourself to achieve a break of 147 and because of the structure of the game, you can't cheat. It can also be played by up to four people and should be a popular package for Christmas".

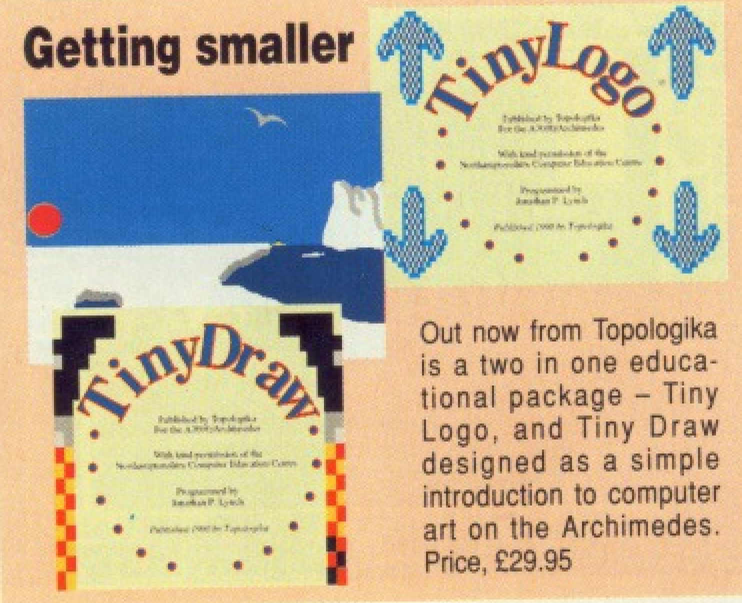
Electron and BBC Micro cassettes cost £9.95, discs £11.95, Master Compact £14.95 and Archimedes £19.95.

Fonts range extended

AS DTPing on the Archimedes gains in popularity outside the UK, The Electronic Font Foundry (0344 872923) have extended their range of typefaces.

Greek, Hebrew, Arabic and Cyrillic faces are under development, but for all Esperanto speakers out there the Latin 3 alphabet is already available in EFF Times, EvenWriter, Poster and Swiss.

Getting smaller



Out now from Topologika is a two in one educational package – Tiny Logo, and Tiny Draw designed as a simple introduction to computer art on the Archimedes. Price, £29.95

A540 into action

ALTHOUGH the A540 is just starting production, it is already making its impact. Derbyshire firm Computek (0457 865953) have launched a new graphics division offering design, layout and printing.

Using Computer Concepts' latest version of Impression II and Poster – to name just a couple – the Archimedes A540 and a HiRes Lazer Direct deliver the mono output, colour printing requiring a 8Mb colour PostScript printer.

Aiming to keep costs low, Computeck are offering their services to schools, businesses and anyone who needs full colour leaflets or information sheets.

This drastically cuts down on the costs a tradition printer would charge and does away with minimum runs of 1,500 for colour separation and print work. For instance 10 full colour A4 copies would only cost £18.95.

Rounding off the range

NEW from the disc duplicator are new additions to Circle Software's (0793 770021) Premier range.

Premier Junior has all the features of Premier 3 apart from the command language. For £49 you can own Junior, you can have a professional Archimedes word processor by adding this application to the base program for £74, while a combined word processor/database will cost £99.

In addition, Circle have also released two new applications which will work under both Premier 3 and Premier Junior. Letter Filer helps keep track of all incoming and outgoing letters for £15. For small businesses there is Stock Control.

£20 provides a system to keep track of stock levels as well as automatic re-ordering, producing stock value reports and so on. Look out for a full accounting package in the new year.

Adventures with a wimp

LAUNCHED to celebrate more than 10 years of Acorn home computers, The Wimp Game is one of a number of new offerings from The 4th Dimension (0742 700661).

A pointer driven graphic adventure, it's a multi-tasking game for Archimedes and A3000 machines which even allows users to run other programs as they play.

The aim is to work through various locations using the pointer to try out many objects and a magnifying glass to examine them.

The Wimp Game has no time limit, help, hints or score and no keys on the keyboard are used. Players progress from being the owner of an Acorn Atom to owning an Acorn R200 workstation. Price, £19.95.

Also new from The 4th Dimension is Powerband, the next project from E-Type author Gordon Key. A vector graphic 3D racing simulation, it puts users at the wheel of a Formula 1 car and is claimed to utilise routines almost twice as fast as Apocalypse.

Powerband features full racing circuits with hairpin bends, chicanes, roadside scenery and hazards. Unlike E-Type, it is more a pure simulation than a game and is aimed at the Christmas market. Price, £24.95.

Completing the new offerings are Superpool, a 3D pool simulation for Archimedes and A3000 computers and Break 147, a full 3D snooker game. Superpool includes tournaments, challenges and trickshots.

Players can even create and edit their own tables and have the options of either nine or 15 ball pool.

It includes a facility to record and save whole frames then replay them.

"A lot of people have asked us to include this feature so that they can keep their best performances", said Steve Botterill of The 4th Dimension.

"We've found a technique to do it without sacrificing other game features. It really is terrific being able to prove that you've cleared the table or made an unbelievable shot". Due out soon, Superpool costs £19.95.

Break 147 includes digitised sound effects, clever shots and the ability to view the table from any angle, even when the balls are moving. Price, £24.95.

Hacker defences

STORIES of computer fraud come and go, but this doesn't lessen the reality that £5 billion pounds a year is lost each year because of it. The destruction or corruption of data can cause financial loss and disruption to businesses large and smal.

Data and software protection, and the remedies available for dealing with offenders, is the topic of a new free guide produced by the City of London law firm Titmuss Sainer and Webb (071-583 5353).

Protection Against Hackers has 12 pages covering the practical and legal remedies for business, and explaining for software publishers the concepts of copy protection and a publishers rights.

Mystery tour

INTRIGUING morsel of news from Computereyes about their up and coming game, Square Route. Owner Andy Smith reports that it has 250 password protected levels, is easy to play, yet difficult to master.

Further, its concept is unique: "There is nothing like it", says Andy, promising a review copy very soon. Can't wait.

Colour taped

NEW for the Archimedes range is a PAL colour coder producing a high quality colour video signal which can be recorded on a video tape or fed into a colour monitor with a composite input.

It's especially significant for people who already use a video digitiser to produce audio visual displays, as they can now record their results on to VHS tapes.

Available from Pineapple Software (081-599 1476) for £69, it is quite small – 4.5in x 2.5in x 1in and sits behind the Archimedes plugged into the RGB socket. This provides a buffered RGB output which drives the Archimedes monitor as well as the coded video output.

You can also select 624 or 625 line compatibility for interlaced or non-interlaced screen modes. The sync pulses are completely regenerated by the coder to give the correct CCIR waveform with broad and equalising pulses.

The Archimedes Specialists
Competitive Pricing

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The Archimedes Specialists
Superb Service

Beebug Computers...Beebug Computers...Beebug Computers...Beebug Computers...Beebug Computers...Beebug Computers...Beebug Computers...Beebug Computers...Beebug Computers...Beebug Computers...

A3000

0255g	A3000 Entry System	599.00
0256g	A3000 Colour System	798.00
0209g	JetSet Pack + TV Modulator	649.95
0220g	Learning Curve Entry	699.00
0221g	Learning Curve Colour	898.00

Archimedes Computers

0260g	410/1 Entry System	1099.00
0261g	410/1 Colour System	1298.00
0262g	420/1 Entry System	1265.00
0264g	420/1 Colour System	1464.00
0197g	420/1 Learning Curve Entry	1299.00
0198g	420/1 Learn. Curve Colour	1498.00
0275g	440/1 Entry System	1699.00
0276g	440/1 Colour System	1898.00
0194g	540/1 Entry System	2995.00
0195g	540/1 Colour System	3194.00

The official Acorn Colour Monitor (AKF12) is supplied with all Acorn Colour Systems as we believe the quality is superior to other, cheaper monitors.

SPECIAL FREE OFFERS:
A free RISCOS extra's disc, plus:

A3000 & Learning Curve (Not JetSet)
Beebug's high quality 1Mb RAM Board

Archimedes 410/1
20 Mb Drive & RAM upgraded to 2Mb

Archimedes Learning Curve (420/1)
Drive changed to 40Mb, RAM expanded to 4Mb

Archimedes 440/1
A Taxan 775 monitor (Entry system) or a Star XB24-10 printer (Colour System)

Archimedes 540/1
Taxan 795 (or 775 if preferred) monitor (entry) or a Star XB24-10 Colour Printer (Colour system)

Memory Upgrades

0266f	0.5Mb RAM for A305 (Acorn) *	139.00
0222g	1Mb A310 Upgrade (CJE) *	287.65
0223g	3Mb A310 Upgrade (CJE) *	444.17
0278d	1Mb RAM upgrade for A400 *	60.00
0813g	Atomwide 8Mb RAM *	850.00
0225f	A540 4Mb RAM Card *	469.00

Dealer fit only - Free fitting by appointment

Hard Drives (ST506)

0268g	A310 20Mb (Acorn)	379.00
0120g	A400/1 20Mb (Beebug)	173.87
0121g	A400/1 40Mb (Beebug)	284.30
0122g	A400/1 53Mb (Beebug)	399.00

SCSI Hard Drives for A300/400

Supplied complete with controller card.

0140g	20Mb Internal	375.00
0141g	45Mb Internal	495.00
0142g	80Mb Internal	699.00
0145g	20Mb External	535.00
0146g	45Mb External	655.00
0147g	80Mb External	859.00

Archimedes Upgrades

0795d	A310 5.25" disc buffer (B'bug)	28.91
0267e	A310 Floppy drive (2nd) *	114.95
0784d	A410/1 5.25" disc buffer	28.91
0279e	A410/1 Floppy drive (2nd)	119.95
0134f	ARM 3 30Mhz (Beebug) *	399.00
0269d	Backplane 2-way (Acorn)	37.00
0768d	Backplane 4-way inc fan (Ifel)	55.00
0236b	MEMC 1A upgrade *	65.48
0817b	VIDC Enhancer (Atomwide)	29.95
0139b	VIDC Mode Expander (B'bug)*	29.95

Archimedes Add-Ons

0716b	Archimedes Dust Cover	7.43
0832b	Keyboard Extension Lead	6.91

Archimedes Expansion Cards

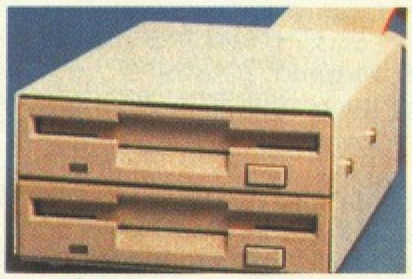
1950d	16 bit I/O card (Intell.Interf.)	199.00
0803d	A448A Mono sound sampler	135.00
0833d	A448B Stereo Sound Sampler	165.00
0834d	A448M Stereo + MIDI sampler	195.00
0265d	Floating Point Co-pro	559.95
0271d	I/O Podule (Acorn)	79.95
0272d	MIDI add-on to I/O podule	28.95
0273d	MIDI Podule (Acorn)	66.95
1948b	MIDI upgrade to Podule	15.00
0874g	Multipod Professional I/O	115.95
0158d	SCSI 16-bit card (Oak)	189.95
0870f	SCSI podule (Acorn)	279.95

Archimedes / A3000 General Add-Ons

0900b	PC Emulator (Acorn)	88.95
0794b	Spiral Keystrip Holder	2.56
1965g	Teletext Adaptor (Morley)	125.00

A3000 Memory Expansion

0133d	1Mb RAM Card (Beebug)	95.00
0130d	1Mb Upgradeable RAM card	105.00
0131f	3Mb RAM Card (Beebug)	249.00
0132f	1 to 3Mb Upgrade for 0130	155.00



A3000 External Disc Drives

1961g	External 3.5" drive (Morley)	125.00
0288g	External 5.25" drive (Morley)	169.00

NEW
Beebug's range of SCSI drives for the A3000

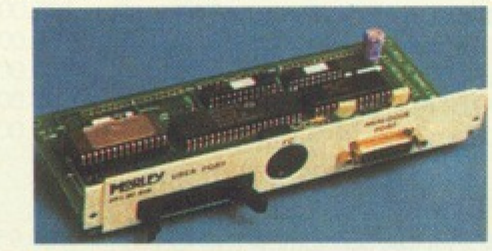
SCSI Hard Drives for A3000

Beebug drive. Supplied with internal controller card.

5200g	A3000 SCSI 20Mb	399.00
5201g	A3000 SCSI 45Mb	499.00
5202g	A3000 SCSI 80Mb	599.00
5203g	A3000 SCSI 180Mb 15.5ms	899.00

A3000 Add-Ons

0712b	A3000 Keyboard Dust Cover	4.30
0801e	Monitor Plinth (Acorn)	29.00
0896c	Podule case	14.96
0277a	Serial Chips *	19.00



A3000 Expansion Cards

0234d	BBC A/D + User Port (Morley)	69.00
0135d	Disc Drive Interface (B'bug)	34.74
0136f	Disc Interface with SCSI	136.91
0238d	MIDI + I/O Podule (Acorn)	49.00
0137c	SCSI upgrade for code 0135	120.44

Scanners & Video Digitisers

1964g	I-Scan (Irlam Instruments)	579.00
1960f	Scan Light Junior A3000	189.00
1963g	Scan Light II (CC)	380.74
1962f	Scan Light Junior (CC)	176.95
0731g	Scavenger A4	342.60
0732f	Scavenger A4 Sheet Feeder	146.96
0730f	Scavenger A6	149.00
0735f	Scavenger A6 for A3000	175.00
0733f	Scavenger A4 for A3000	408.65
0878e	Hawk V9 Colour Digitiser	334.95
1952e	Pineapple Colour Digisiter	273.87

Joysticks and Mices

0723c	Deltacat Joysticks	24.74
0742c	Joystick adaptor Arch (RTFM)	34.99
0743c	Joystick adaptor A3000 (RTFM)	37.99
0722b	Joystick Controller (Serial Port)	20.83
6603c	Deluxe Quickshot Joystick	10.43
0696a	Furry Mouse Cover	6.91
0685b	Mouse House	2.60
0789b	Mouse Mat (blue)	3.04
0788b	Mouse Mat (red)	3.04

JOYSTICK ADAPTORS
Connect an Amiga or Atari Joystick such as the Deluxe Quickshot to your Archimedes.

BEEBUG Ltd, 117 Hatfield Road, St Albans, Herts AL1 4JS
Telephone: (0727) 40303 Fax: (0727) 860263

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Wordprocessors

0899b	1st Word Plus Version II	72.00
1170b	Easiword (Minerva)	33.95
1975b	Premier 3 (Circle Software)	70.00
5462b	Premier 3 WP application	23.00
1088b	Protext 5.0 (Arnor)	130.39

Spreadsheets

0954b	Intersheet II (CC)	24.95
1084d	Logistix (Acorn)	89.00
1998b	Schema (Clares)	107.35
0931b	Sigmasheet (Minerva)	43.44

DeskTop Publishing

1089c	Desk Top Publisher (Acorn)	125.00
1113c	Impression II (CC)	158.00
1115b	Impression Junior (CC)	89.00
1077b	Tempest (Clares)	125.00
0108b	Ovation (Beebug)	99.00

Integrated Packages

5427b	Desktop Office (Minerva)	109.95
0901d	Pipedream 3 (Colton)	125.00

Databases

1913b	DataVision (Silicon Vision)	123.86
1992b	Flexifile (Minerva)	125.95
0987c	Flying Start II (Mitre)	84.95
1900b	Genesis (Software Solutions)	79.95
5460b	Carousel (for Genesis)	39.95
5448b	Genindex (for Genesis)	29.95
0910b	Knowledge Organiser (Clares)	45.00
0100b	Masterfile II (Beebug)	19.13
0989d	Multistore (Minerva)	199.95
5447b	Squirrel (Digital Services)	129.00
0921c	System Delta Plus vII (Minerva)	55.00

Accounting Packages

5458d	Business Accounts (Minerva)	379.95
0947b	Home Accounts (Minerva)	40.00
1159c	MicroTrader Accounts	199.00
1916c	MicroTrader Stock Control	75.00
1914d	Office Tools (Silicon Vision)	299.95
1917b	Share Holder (Silicon Vision)	161.09

Arcade Games

1930b	Apocalypse (4th Dimension)	24.75
0997b	Arcade Soccer	17.00
54450b	Ballarena	17.35
1931b	Battle Tank (Minerva)	12.35
5455b	Blowpipe (Eclipse)	17.35
1978b	Break 147 (4th Dimension)	20.65
1995b	Chock Away (4th Dimension)	20.62
1187b	Conquerer (Superior)	19.00
0952b	Corruption	20.61
1979b	Drop Ship (4th Dimension)	16.48
1070b	E-Type (4th Dimension)	16.48
1058b	E-Type Designer (4th Dim.)	14.00
0999b	E-Type Extra 100 miles (4thD)	14.00
1929b	Fireball 2 (CIS)	21.70
0944b	Fish	20.64
1980b	Guild of Thieves	20.65
0964b	Holed Out (4th Dimension)	16.48
0993b	Holed Out Designer (4thD)	16.48
0991b	Holed Out Extra 1 (4thD)	14.00
0992b	Holed Out Extra 2 (4thD)	14.00
1984b	Hostages (Superior)	17.35
1901b	Inertia (4thD)	17.35
1993b	Interdictor II (Clares)	27.95
1902b	Man at Arms (4th Dimension)	17.35
1987b	Manchester United	16.48
1903b	Nevryon (4th Dimension)	17.35
0946b	Pacmania	16.48
1999b	Pysankie (4th Dimension)	16.48
1994b	Real McCoy (4th Dimension)	24.75
1991b	Redshift (Minerva)	14.83
1122b	Repton 3 (Superior)	16.48
1933b	Rotor (Arcana)	20.70
5451b	Starch	13.00
0990b	Stranded	24.74
1986b	Superior Golf & Construction	16.48
5452b	Superpool (4th Dimension)	17.35
0998b	The Olympics (4th Dimension)	16.48
1981b	The Pawn	20.65
0963b	Thundermonks (Minerva)	12.35
0994b	U.I.M. (4th Dimension)	24.74
1109b	White Magic II+designer	16.48
5453b	Wimp Game (4th Dimension)	17.35
5456b	Worldscape (Eclipse)	17.35
1179b	Zarch (Superior)	16.48

Languages

0938c	ABC Basic Compiler (Dabs)	84.95
0897c	ABX Utils for ABC (Dabs)	44.00
1085d	ANSI C release 3 (Acorn)	128.95
0107c	ISO C Dev. System (Beebug)	77.39

Music & MIDI

1091b	Armadeus (Clares)	66.21
0904c	EMR Creations set (6 discs)	43.39
0948c	EMR Studio 24 Plus v2	164.35
1971b	EMR MicoStudio	68.70
0995d	!Inspiration (Pandora)	260.00
0239f	Pandora PMI-4 Midi Interface	179.95
1997b	Rhapsody (Clares)	41.36
5457b	Tracker (Serial Port)	41.95

Utilities

1946b	ARC-DFS (Dabs)	24.74
0102a	DFS Reader (Beebug)	9.06
0106b	Hard Disc Companion (B'bug)	33.91
5445b	Investigator II (Serial Port)	24.30
1990b	PC Access (Minerva)	33.91
0796b	Serial Link Disc (Beebug)	15.79
1908b	Star LC10 Colour Driver (Ace)	14.95

CAD

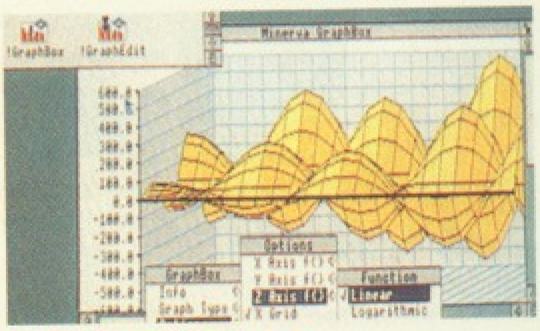
0911c	Autosketch II	75.00
0913c	PCB + autorouting	161.95
1909d	PCB Proffessional	310.95
0959d	P.D.T. (Oak)	349.95
1936c	WorraCAD (Oak)	73.95

Drawing / Painting

1103c	Artisan II (Clares)	54.95
0962b	Atelier (Minerva)	79.95
0937c	Pro-Artisan (Clares)	79.95

Graphics Manipulation

1976b	FontFX	10.00
1938c	Mogul (Ace)	19.00
19143b	Poster (4mation)	84.95
1078c	Render Bender (Clares)	58.00
1912c	Solids Render (Silicon Vision)	123.87



Presentation Graphics

0932c	GammaPlot (Minerva)	49.95
0912c	Graph Box inc Hotlink (Min.)	64.00
0908b	Presenter II inc Hotlink (Lindis)	46.95
5429c	Presenter Story (Lindis)	159.00

Outline Fonts

1920b	Font Starter Pack (Acorn)	40.95
1921b	Newhall Font Pack (Acorn)	40.95
1922b	Symbol Font Pack (Acorn)	40.95
0111b	Outline Font Pack 1 (Beebug)	47.39

Educational Software

1008c	Desk Top Stories (Resource)	32.95
0935b	Dread Dragon Droom	25.95
1193b	Fun School II (0-6 years)	16.48
1194b	Fun School II (6-8 years)	16.48
1195b	Fun School II (8+ years)	16.48
1150c	Jigsaw (4mation)	29.00

Books

There is no VAT to pay on books

1211b	Arch Assembly Language	12.95
1246b	Archimedes First Steps	9.95
1243c	Arch Operating System	14.95
1208b	Basic V : A Dabhand Guide	9.95
1245g	RISCOS Prog. Ref. Manual	79.00
1207c	30 Hour Basic	12.95

Communications

3110f	Amstrad SM2400 Modem	217.35
0779f	Linnet Modem	120.83
0101d	Hearsay comms Software	60.00

AMSTRAD SM2400
A high performance V22/V23 modem complete with Archimedes lead.
With Free Hearsay package (worth £69)

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Monitors

0189g	Acorn Colour Monitor	216.95
0530g	Microvitec 1431/MS	174.95
0531g	Microvitec 1451/MS	218.95
0527g	Microvitec CUB3000	192.95
0503g	Philips BM7502 (Green)	74.95
0504g	Philips CM8833	214.95
0537g	Philips CM8833 Mk II	214.95
0506g	Taxan 775 MultiSync	399.00
0511g	Taxan 795 Trinitron Multisync	499.95
0508g	Taxan Viking II/R140 (mono)	719.95

Three New Star Printers
The Star LC200, LC24-200 and LC24-200

Matrix Printers

0379g	Epson LQ400	206.95
0329g	Epson LQ550	277.95
0327g	Epson LQ860	539.95
0378g	Epson LX400	139.95
0322g	Epson LX850	209.95
0299g	Panasonic KX-P1081	124.95
0389g	Panasonic KX-P1124	239.95
0388g	Panasonic KX-P1180	129.95
0346g	Star FR10	309.95
0347g	Star FR15	399.95
0337g	Star LC24-10	195.00
0335g	Star LC10 (mono)	129.00
0343g	Star LC15	286.95
0338g	Star LC24-15	347.95
0436g	Star LC200	185.00
0404g	Star LC24-200 Mono	228.95
0402g	Star LC24-200 Colour	264.95
0339g	Star XB24-10	379.00
0340g	Star XB24-15	489.00

Matrix Printer Accessories

0357d	Epson S'feeder LX/LQ400	69.00
0349d	Epson S'feeder LQ550	76.95
0363e	Epson LQ Multifont card	95.00
0435d	Epson RS232 interace 0k	36.00
0434d	Epson RS232 interface 8k	79.00
0512d	Star S'feeder for LC24-10	55.00
0443e	Star S'feeder for LC10	64.95
0395d	Star S'feeder for XB/FR	89.95
0513b	Star 32k RAM for LC/XB/FR	55.00
0458c	Star Parral. to Serial convert.	55.00
0341d	Star XB/FR Colour Kit	35.00

Printer Ribbons

All ribbons are manufacturers originals.

0437a	Epson FX/LX800,FX/RX/MX80	4.95
0403b	Epson FX/RX/MX100,FX1000	6.42
0445a	LQ850/800,LQ500/550,LQ400	5.99
0413a	Epson LX80,LX86, LX400	3.95
0449a	Star LC10 Black	4.00
0450a	Star LC10 Colour	6.00
0467a	Star XB24-10/15 Black	6.95
0459a	Star XB24-10/15 Colour	12.50
0432a	Star LZ24 ribbon	8.00

Inkjet Printers

0430g	Canon BJ-10e (Black case)	299.95
0431g	Canon BJ-10e (White case)	289.95
0478g	Canon BJ130e	434.95
0399g	Integrex 132 Colourjet	515.00
0464g	HP DeskJet 500	427.05

Inket Accessories

0465a	Canon BJ10e Cartridge	17.99
0313c	BJ10e Auto Sheet Feeder	54.00
0314b	BJ10e NiCad Battery pack	39.99
0479b	Canon BJ130e Cartridge	12.65
0502d	BJ130e Pin Tractor	40.00
0493b	Deskjet Ink Cartridge	14.95
0492b	Deskjet+ FX80 Emulation	55.24
0409b	PJ1080/Integrex Black Cartr.	11.25
0410b	PJ1080/Integrex Colour Cartr.	19.50
0398b	Integrex Paper Roll	6.50

Laser Printers

0496g	Laser Direct (CC)	949.00
0497g	Laser Direct Hi-Res Card	350.00
0498g	Canon LPB-4 for above	825.00
0393g	Panasonic KX-P4450i	1321.60
0472g	Qume Publisher II	2207.83
0471g	Qume Super Series II	1156.48
0480g	Star LaserPrinter 8 II	1099.00
0481g	Star Laserprinter 8 DB	1535.00
0482g	Star LaserPrinter 8 DX	1789.00
0483g	Star StarScript	1575.00

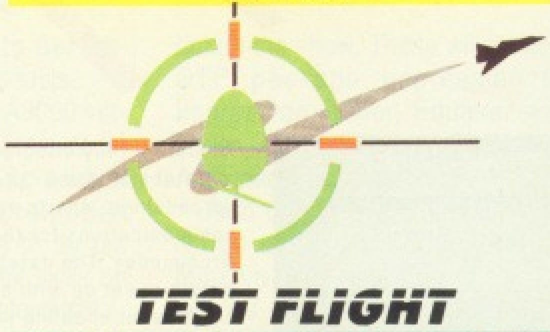
Laser Accessories

0474c	Qume CrystalPrint Toner	64.00
0370c	KX-P4450/i Toner Kit	27.78
0488c	StarLaser Toner Cartridge	90.48
0304d	Canon LPB-4 Toner	69.95

Beebug Christmas Open Day

Beebug, in conjunction with A&B magazine, is staging another of its popular open days at its modern premises in St Albans. A number of visiting companies, including Acorn will be demonstrating their latest products. You could even pick up a bargain for Chrismas!

Sunday 25th November, 1990
10am - 4pm



Why not visit our showroom and experience the Acorn Test Flight. You could win a trip on Concorde, a flying lesson weekend or a Helicopter lesson.

Beebug is an Acorn Premier Dealer and have been involved with Acorn products for over 8 years. We pride ourselves on our after sales service.

Phone (0727) 40303 for a free catalogue.

BEEBUG SHOWROOM

Our large modern showroom in St Albans has a wide range of Acorn related products on demonstration. Friendly, helpful staff will be pleased to discuss your requirements with you.

Opening Hours:
Monday-Saturday 9.00am - 5.30pm
Late night Thursday to 8.00pm

ORDERING INFORMATION

All prices exclude VAT. We accept Access Visa, Connect cards and cheques drawn on UK Banks. Orders from education and PLC's are most welcome. 80% of all orders are dispatched within 24 hours, but allow up to 28 days for goods which are out of stock. An acknoldgement of order is sent by return if goods are out of stock. All sales subject to our standard terms & conditions.

Product Code	**UK, BFPO & Channel Islands** *(P&P Prices include VAT).*
a	*£0.60*
b	*£1.50*
c	*£2.50*
d	*£3.50*
e	*£4.50*
f	*£5.50 Courier - mainland UK only*
g	*£8.00 Courier - mainland UK only*

£15.00 (24 hour courier - UK mainland only)

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Telephone: (0727) 40303 Fax: (0727) 860263

DESKTOP OFFICE

THE INTEGRATED SUITE FOR ARCHIMEDES

DATABASE

WORD - PROCESSOR

SPREADSHEET

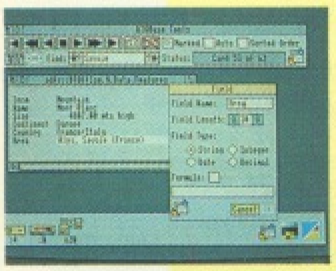
GRAPHS & CHARTS

COMMUNICATIONS

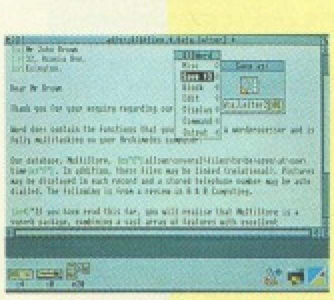
communications

DATABASE

£129-95 Incl. VAT

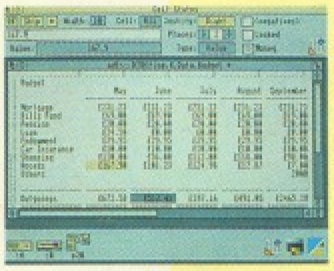


At last - a fully integrated suite of database, word - processor, spreadsheet, charts and communications for the Archimedes. The database is simple to set up with a flexible card layout enabling you to design cards to suit your data. Video style controls make it easy to browse through the records. With instant search on fields, sort routines and reports available, DTOBase gives flexibility whilst remaining simple to use.



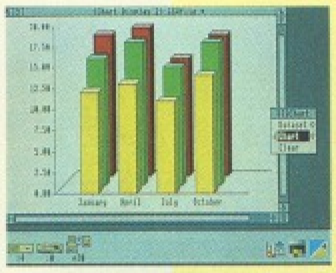
The word - processor, DTOWord is ideal for all types of correspondence, with the ability to change text to bold or condensed, indent, centre, justify etc. DTOWord makes every document look professional. Text can be any colour and even displayed in large characters on screen making this package ideal for young children or those with poor sight.

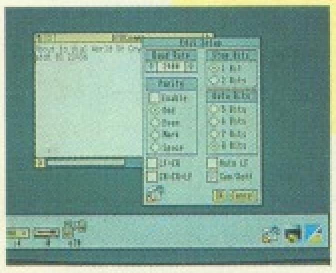
word - processor



DTOSheet is fast and powerful but designed for ease of use. Columns can be held for reference and cells locked to prevent accidental deletion. With colours available to highlight negatives or formulae DTOSheet gives all the features you would expect of a high class spreadsheet. Data can be exported directly into DTOChart allowing pie charts, 3D bar charts, etc to be produced in seconds. Sections of pie charts can be highlighted and the colours changed to your requirements.

SPREADSHEET

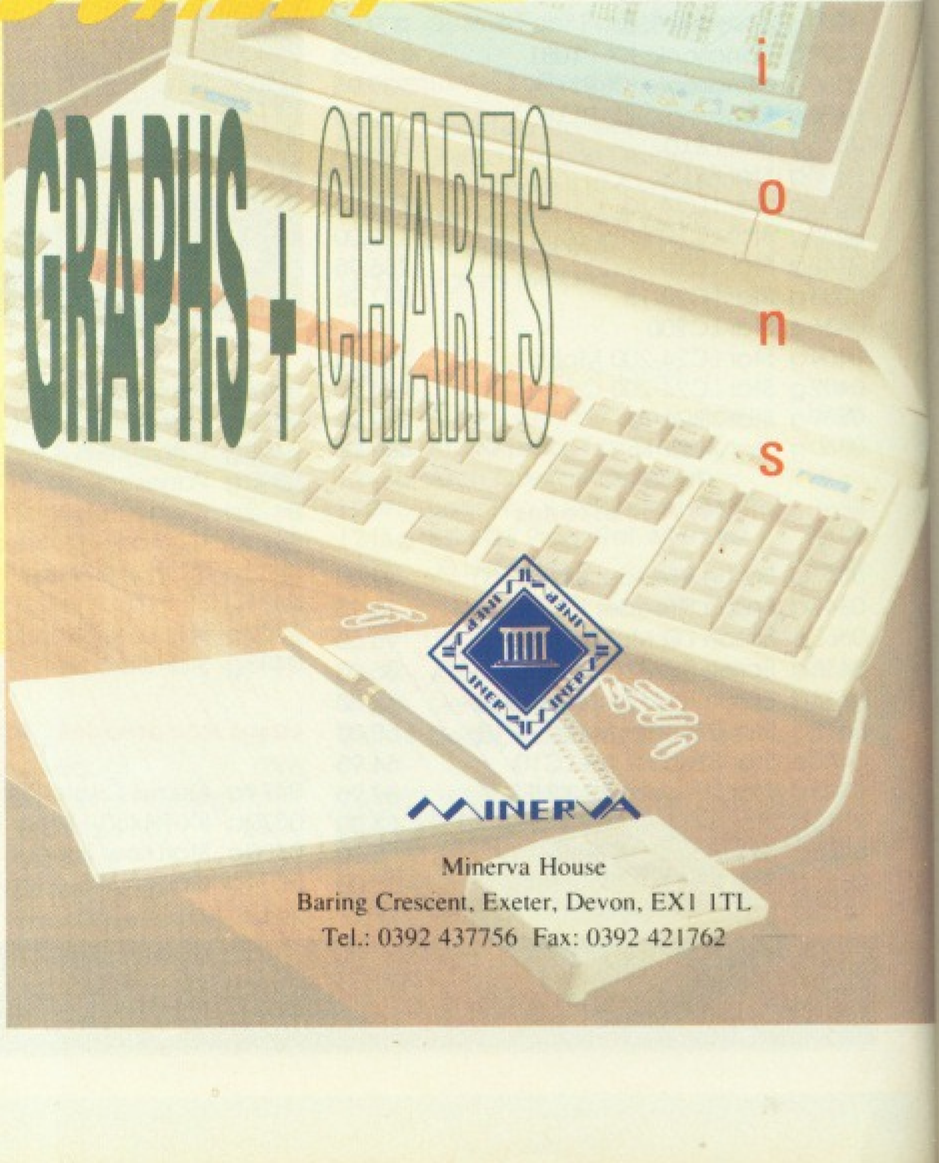




The final package in the suite is the communications program DTOComms. Multi - tasking, even on line, DTOComms supports ANSI and TV1925 emulations and is configurable for all baud rates and protocols. Text files can easily be transmitted and received.

DeskTop Office is a fully integrated, multi - tasking suite of programs for the Archimedes and A3000. Data can be transferred between the programs giving the ultimate in flexibility to produce graphs from your spreadsheet data or similar applications.

DeskTop Office is all you need for Education, Small Business or Home use.



MINERVA

Minerva House
Baring Crescent, Exeter, Devon, EX1 1TL
Tel.: 0392 437756 Fax: 0392 421762

EAS!WORD

word - processor

Easiword is simplicity in itself and ideal for everyday word-processing needs. Easiword has all the facilities of DTOWORD together with the extra facility of multiple documents.

£39-95 Incl. VAT

COMPUTER SHOPPER SHOW '90 UPDATE

Two million pound show bonanza

VISITORS can look forward to a bumper Christmas after they visit the Computer Shopper Show. Hundreds of Acorn market products at special show prices will mean lots of bargains.

A pre-show survey has revealed that special offers and discounts on hardware, software, add-ons and peripherals could top the £2 million mark this year.

The 26,658 visitors to last year's inaugural show at Alexandra Palace saved around £1 million on special offers. An exit poll of attendees showed that more than 95 per cent considered purchases there had resulted in substantial savings with reported figures ranging from £50 to £1,000.

This year the larger venue of Wembley Conference Centre will accommodate many more stands and with an extra day added, Shopper '90 is tipped to double that record.

Acorn will have a major presence at the show flanked by a strong contingent of their third party suppliers. In addition to their New Horizons conference which runs throughout the show, Acorn staff will be on hand to demonstrate their latest key products.

The Archimedes and A3000 versions of The Learning Curve package will be on show as part of Acorn's Test Flight promotion which allows customers to try out the bundles and test their skills on Clare's flight simulator Interdictor.

There are plans to house Interdictor in a specially built cockpit and to provide a top pilot against whom visitors can show their prowess. Those who test fly The Learning Curve can also enter a free competition with the chance to win flights on Concorde, helicopter and light plane flying lessons and Citizen Aerochron watches worth £250.

Demonstrations of a number of new Archimedes products from Computer Concepts will take place during the show. These will include DTP package Impression 2, Impression Junior, Equasor and Laser Direct, billed as the fastest Archimedes laser printer.

Also on hand to show off their range of new products will be Minerva Software. Top of the list will be multi-tasking relational database FlexiFile, PC Access which allows users to turn their Archimedes into a PC using MS Dos commands, and Desktop Office, an integrated suite including database, wordprocessor, spreadsheet, charts and communications modules.

As can be expected from the Acorn market, a wide range of educational software will be exhibited.

Covering primary, GCSE and A level courses, LCL Educational

➤

How to get there

READERS of *The Micro User* wanting to get their share of this Christmas bonanza will welcome the convenience of the Wembley venue. It is easily reached by public transport and car.

Buses serving Wembley Arena are numbers 83, 92 and 182 while the number 18 stops at The Triangle, a five minute walk away. The number 297 stops at Wembley Park Station and the 245 at Bridge Road.

By Underground, the Jubilee or Metropolitan (Stanmore) lines take you to Wembley Park and at peak times, Bakerloo can be taken to Wembley Central.

Regular trains run to Wembley Central from Euston or Broad Street and to Wembley Stadium from Marylebone. By car, Wembley is easily reached from the M25, M40, M4 or M1.

The Shopper Show runs from Thursday December 6 to Sunday December 9 at Wembley Conference Centre and will be open from 10am to 6pm on the Thursday and Friday; 9am to 6pm on Saturday and 10am to 5pm on Sunday

Admission is £5 for adults, £3.50 for children under 16 with £1 off for tickets booked in advance. Also available is a prepaid family ticket covering two adults and two children for £12.

● There is a voucher for reduced priced tickets on Page 43. Book in advance using the 24 hour credit card hotline. (051-357 1736)

Helping Hand

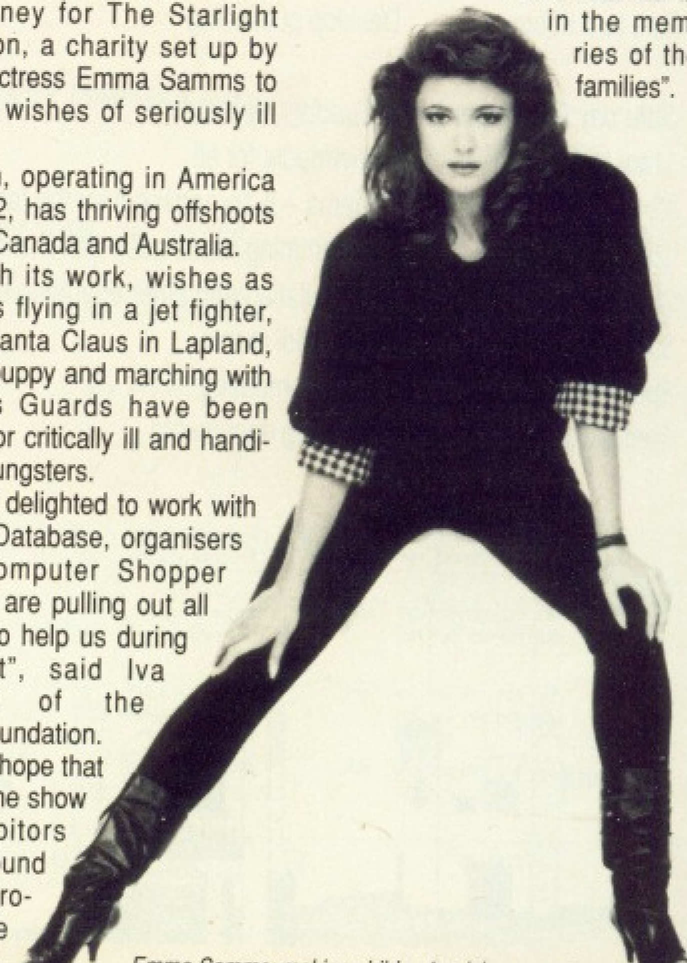
The Computer Shopper Show 1990 will be used as a vehicle to raise money for The Starlight Foundation, a charity set up by Dynasty actress Emma Samms to grant the wishes of seriously ill children.

Starligh, operating in America since 1982, has thriving offshoots in Britain, Canada and Australia.

Through its work, wishes as diverse as flying in a jet fighter, meeting Santa Claus in Lapland, owning a puppy and marching with the Scots Guards have been arranged for critically ill and handicapped youngsters.

"We are delighted to work with Blenheim Database, organisers of the Computer Shopper Show who are pulling out all the stops to help us during the event", said Iva Sheinbart of the Starlight Foundation.

"It is our hope that visitors to the show and exhibitors will rally round and help provide these unfortunate children with a moment of happiness that will live in the memories of their families".



Emma Samms: making children's wishes come true

COMPUTER SHOPPER SHOW'90 UPDATE

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Software will be demonstrating their series of 24 program packages and will use the show to launch the new version of Micro English.

This now includes Oral Communication ,which is a new part of the 1991 syllabus. Also on show will be the latest in the top-selling Fun School range from Database Software – Fun School 3.

Visitors will be treated to a wealth of new games software from The 4th Dimension. Ten new or recent Archimedes titles will be displayed.

A new computer dictionary for BBC Micros will be aimed at crossword fans by Akom. Alongside the new offering will be Akom's series of Times Computer crosswords.

The latest in the Dab Hand Guide series of books will be on offer from Dabs Press together with a number of games from the company's Alien Images label and a range of new 8 bit games will be given an airing by CDS Software.

This is just a flavour of the wealth of Acorn-specific products which will be offered at Shopper. A host of other hardware, software, peripherals and add-ons will be joined by many general computer goods to make the show a must for the pre-Christmas shopper.

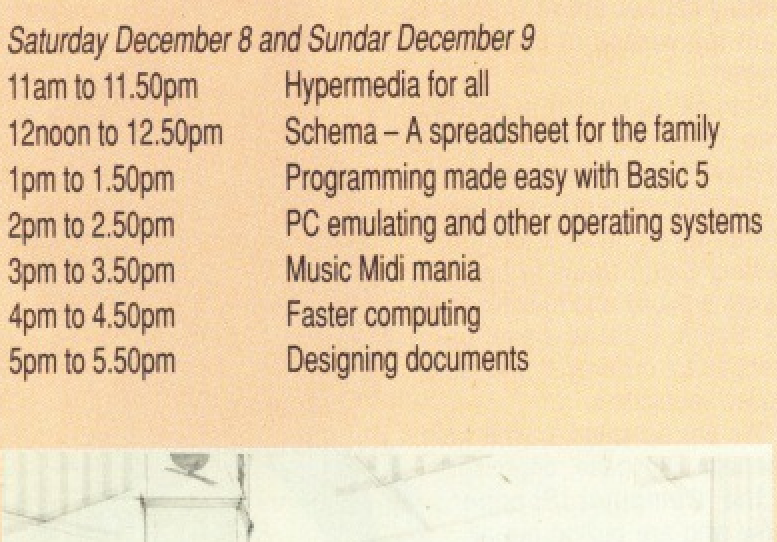
Acorn Conference Timetable

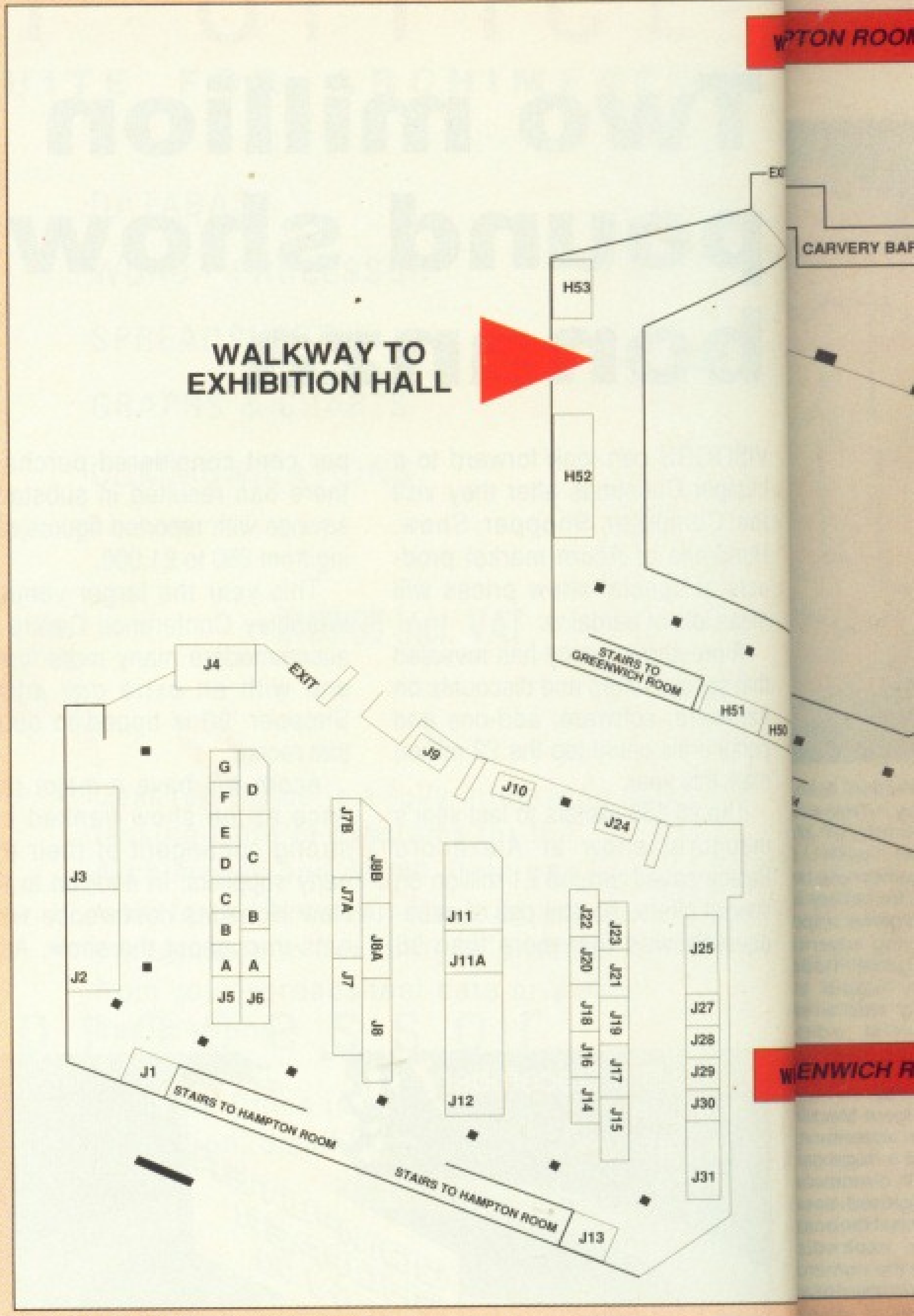
Thursday December 6 and Friday December 7

11am to 11.50am	CD Rom in education
12noon to 12.50pm	Schema – A spreadsheet for the family
1pm to 1.50pm	Image processing
2pm to 2.50pm	PC emulating and other operating systems
3am to 3.50pm	Music Midi mania
4pm to 4.50pm	Risc technology in the 1990s
5pm to 5.50pm	Desktop publishing

Saturday December 8 and Sundar December 9

11am to 11.50pm	Hypermedia for all
12noon to 12.50pm	Schema – A spreadsheet for the family
1pm to 1.50pm	Programming made easy with Basic 5
2pm to 2.50pm	PC emulating and other operating systems
3pm to 3.50pm	Music Midi mania
4pm to 4.50pm	Faster computing
5pm to 5.50pm	Designing documents





A to Z Computer Services	C11/C13
Ablac	D19
Acolyte	E13
Acorn	J12
ACSL	B18
Admincure	F8
Advanced Console Entertainment	H6
Advantage	G20/G21
Akom/LCL	A9
Aladdin Computers	A5
Alf Payne	E14/E16
Allied Dunbar	D19
Alphaprint	F24/F26
Amstrad/Amstrad User Club	D1
Anco Software	H37
Andrews & Cowan	H30
Andromeda	H34
AR Enterprises	A19
Arc Software (Atari UK)	H16
Arnor	C17
Aztez Products	H44
B & B Computers	G4
B Bytes	J6b
BCS	G16
Beebug and Risc User	J21
Beebug Ltd	J25/J26
Belgravia Data	B17
Bits 'n' Bytes	E19
Blackmore Electronics	C10
Blackstuff Ltd	A15
Cal–Abco	E3
Calderglen Computers	J11a
Cambridge International Software	J24
Care Electronics	C19
Caspell Computers	B5
City Desk	A25
C D S Software	A26
Chamber of Commerce	
Clockwork Software	G6
Composit Software	G23/G25
Compo Software	F21/F23
Compulynk	B4
Compumail/Compusys	E1
Computer Concepts	J7
Computer Disks & Ribbons Ltd	G5/G7/G9
Computer Express	C21
Computerlab	H7
Computer Lynx	H27
Computer Manuals	C16/C18
Computer Shopper Advice Centre	F1
Computing Plus	A3
Concita Micro Systems	J10
Condor Computers	G11
Confidential Computer Services	A21
Creative Technology	G15/G17
Dab Hand Computing	J11
Dabs Press	J6a
Database Publications	E9/E10/E11
Data Fern	D24/D26
Data Protection	E2
Dealer Technology	A17
Delta Leisure	F9
Dennis Publishing	D12/D14/D16
Department of Trade & Industry	
Diamond Computers	G1
Digiserve	D21
Digita International	B2
Dolan Electronics	A16
Dowling	E15/E17
DS Computer Supplies	E4
E C A	A28
Eclipse Computer Supplies	C8
E E C Ltd	E23
Electro Music Research	J9
Encyclopaedia Britannica	B19
European Peripheral Distribution	A6
Evesham Micros Centre	G18/G19
Finebuild	E21
First Stop Computer Supplies	A22/A24
Folio Shareware	G12/G13/G14

Fourth D
Frontier
Future P
Gasteine
G F A ...
Gemini S
Genesis
G P S ...
G S T S
Harpers
HiSoft ..
Hi–Tec
Hywin M
I B S ....
Impress
Jen Gro
J S C S
Kador...
Kaploc
Kuma C
Leax H
Leonar
Lindis
Logic S
London
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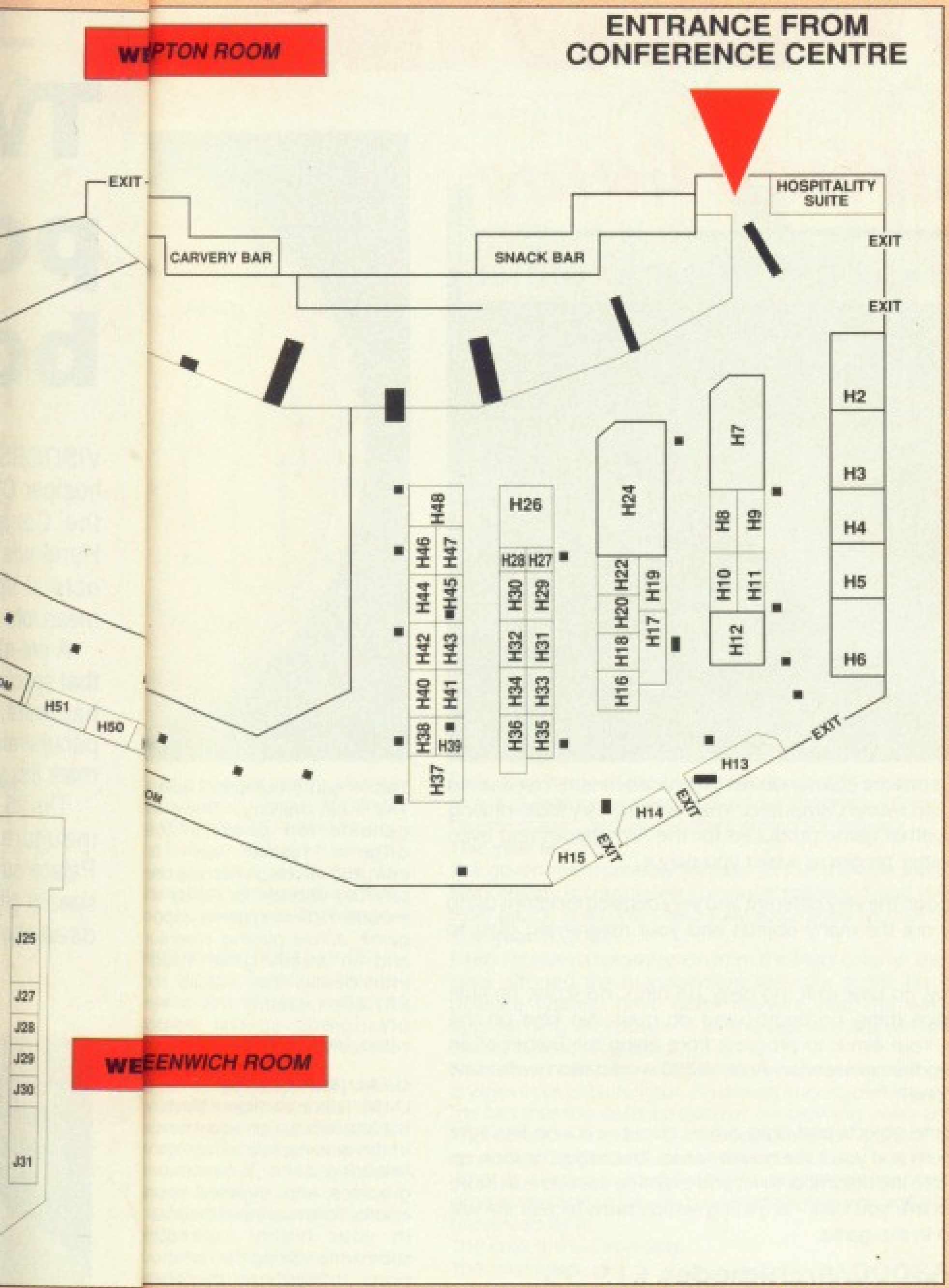
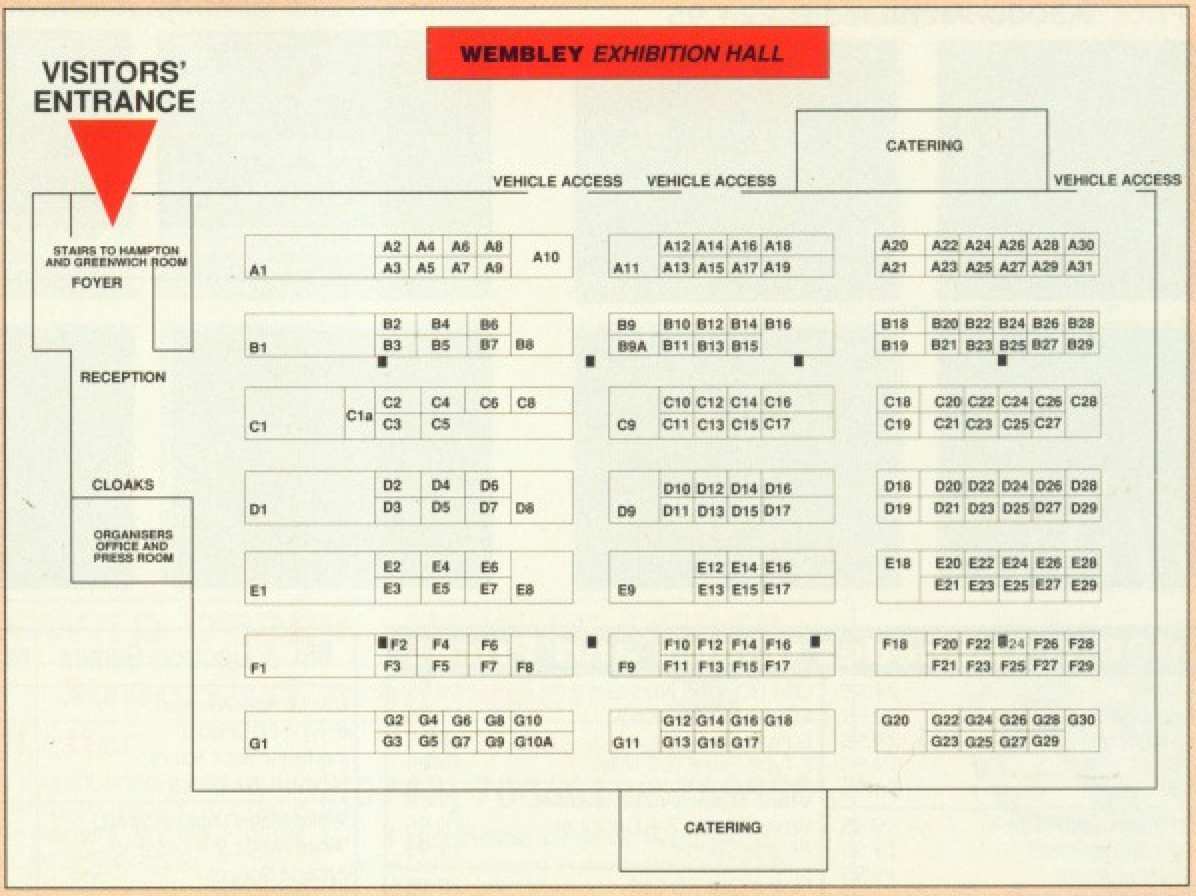
COMPUTER SHOPPER SHOW'90 UPDATE



.......F21/F23
..B4
..E1
..J7
....G5/G7/G9
..C21
..H7
..H27
......C16/C18
..F1
..A3
..J10
..G11
..A21
.....G15/G17
..J11
..J6a
..E9/E10/E11
.....D24/D26
..E2
..A17
..F9
D12/D14/D16
......
..G1
..D21
..B2
..A16
...E15/E17
..E4
..A28
..C8
..E23
..J9
..B19
..A6
....G18/G19
..E21
....A22/A24
12/G13/G14

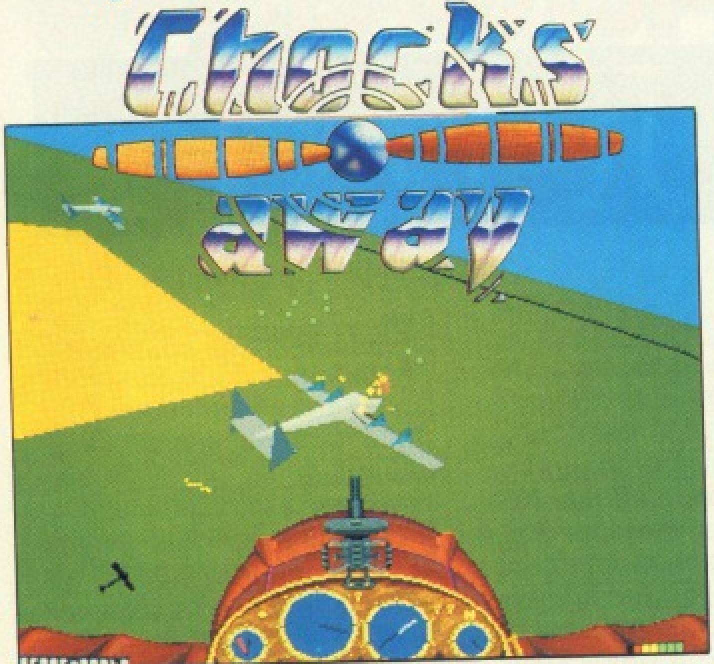
Fourth Dimension/Impact Software	J8
Frontier Software	E6
Future Publishing	A10
Gasteiner Technologies	C6
G F A	G29
Gemini Shareware	H2
Genesis	H28
G P S	C15
G S T Software	C5/C7/C8a
Harpers	C3
HiSoft	G30/G31
Hi–Tec Modems	A30
Hywin Media	C20/C22
I B S	B10
Impressions	H31
Jen Grove	B24/B26
J S C Systems	A27/A29
Kador	B28
Kaplocom Computers	B20/B22
Kuma Computers	G2
Leax Hardware	F2
Leonardo Systems	F25
Lindis International	J31
Logic Sales	A18
London Chamber of Commerce	
Mandarin	D8
Manor Court Supplies	G10a
Margin Maker	D3
MCD Software Ltd	B11/B13/B15
MD Office Supplies	A11
Media Change	G6
Media Direct	G4
Media Value	G3
Mediaware	E8
MFM	H15
Micro Anvika	G24/G26/G28
Micro Media Computer Supplies	E29
Micromart UK Ltd	F3
Microshack	F12/F13/F14/F15
Micro Smart	F18/F19
Microtec	H19
Microtext	B7
Microware	D27
Miles Better Software	E18
Mindscape	D10/D11
Minerva Systems	J16/J18
MMDI	H26
Moore Business Systems	F5/F7
Multiplex	C1a/C1b
Mutant Software	B14
Nada Concepts Ltd	D29
Nadi Systems	G22
Naga Trading	B12
Nasa Promotions	F28
Nhancer	D13/D15
Nintendo/San Serif	H24
Nortek Computers	B21/B23
Norphone Ltd	E25
Norwich Computer Services	J23
Oak Computers	J11
Ocean	H29
Office of Data Protection Registrar	E2
Olivetti	A1
OMD	D9
PC Independent User Group	D18
PC Serve	C2/C4
Pink Software	C9
Pinnacle Systems (SW) Ltd	C24/C26
PML	F29
Portobello	A7
PRES	J14
Print Rite	A23
Professional Solutions	D17
Proton Software	E26/E28
Public Dominator	E12
QD Enterprises/The Serial Port	J22
Ranger Computers	E27
Real Things	F11
Redka	A8
Riverdene PDL	G8
Rombo	F16
SCA Systems	B25/B27
SCS Computers	E5/E7
SDC	D2/D4/D6
SDL	B1/B3
Sega	C1
Senlec PD Library	G27
Siren Software	E24
SK Marketing	D5/D7
Sky Office Supplies	B16
Softcover International	C9
Softville	C28/C29
Software Selection	F4/F6
South West Software Library	B29
Sphere Micro	F27
Supertech Systems	B6
Supervision Electronic	A31
Technomatic	C23/C25
The Avenue Group	G6
Themis UK	J4
The Software Squad	C12/C14
Third Coast Technologies	B8
Thurston Techniques	J20
Tofware International	F20/F22
Topologica	J5a
Traderdesk	A20
Turbosoft	A12/A14
UK Home Computers	D23/D25
US Action	B9
Videk	A2/F17
Vine Micros	G10
Virgin Mastertronic	C1
VNU Publications	D20/D22
Weserve	F10
Westoning Ltd	A13
Westpoint Creative	E20/E22
Wight Scientific	A4
Wild Vision	J27
WTS Electronics	D28
XL Sales & Marketing	H33

Three halls – and nearly 300 stands


WEMBLEY EXHIBITION HALL
VISITORS' ENTRANCE
CATERING
VEHICLE ACCESS
VEHICLE ACCESS
VEHICLE ACCESS
STAIRS TO HAMPTON AND GREENWICH ROOM
FOYER
RECEPTION
CLOAKS
ORGANISERS OFFICE AND PRESS ROOM
A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15 A16 A17 A18 A19 A20 A21 A22 A23 A24 A25 A26 A27 A28 A29 A30 A31
B1 B2 B3 B4 B5 B6 B7 B8 B9 B9A B10 B11 B12 B13 B14 B15 B16 B18 B19 B20 B21 B22 B23 B24 B25 B26 B27 B28 B29
C1 C1a C2 C3 C4 C5 C6 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28
D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18 D19 D20 D21 D22 D23 D24 D25 D26 D27 D28 D29
E1 E2 E3 E4 E5 E6 E7 E8 E9 E12 E13 E14 E15 E16 E17 E18 E20 E21 E22 E23 E24 E25 E26 E27 E28 E29
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15 F16 F17 F18 F20 F21 F22 F23 F24 F25 F26 F27 F28 F29
G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 G10A G11 G12 G13 G14 G15 G16 G17 G18 G20 G22 G23 G24 G25 G26 G27 G28 G29 G30
CATERING

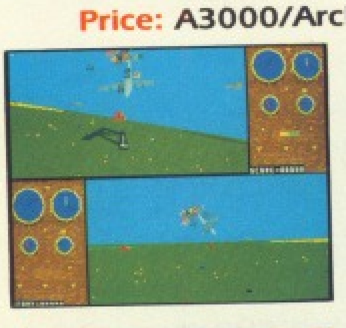
A3000
ARCHIMEDES
BBC B/MASTER
ELECTRON

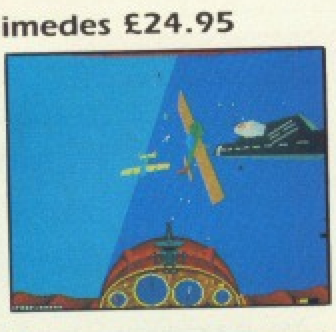
THE 4TH D

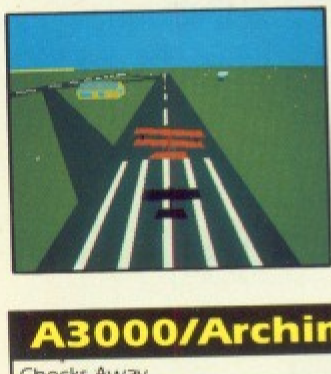


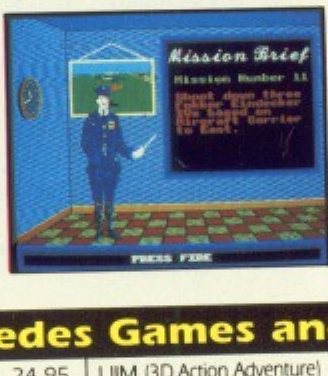
Chocks Away is flight simulation the way you've always wanted it. It has everything for the beginner and the expert:
- Beautiful solid 256 colour graphics and 'nerve shattering' digitised sound effects.
- You pilot a very easy to fly, yet highly manoeuvreable bi-plane - ideal for all ages and skill levels.
- Revolutionary 2 player option using split screen display. This allows 2 players to each fly their own planes simultaneously in practice or on missions.
- Full joystick, dual joysticks, mouse and keyboard control options.
- Amazing "Black Box Flight Recorder" included so that you can record your own flights and then save and replay them.
- Learn landing, loops, rolls and other stunts the easy way by watching the 90 minutes of totally absorbing pre-recorded training flights included with the game.
- Powerful 30mm cannon capable of very rapid fire and long range destruction.
- Easy to read instrument panel and simple controls so you can concentrate on developing your flying skills.
- Internal and external views of your plane can be selected at any time from front, rear, left and right.
- 3 very varied immense maps to explore - approximately 18000 km² in total (6000 km² per map).
- 20 fascinating and varied missions of increasing complexity are included to guarantee weeks or even months of enjoyment.
- Promotion system from Cadet status right through to Marshal of the RAF.
- Realistic take-off and landing from runways and aircraft carriers.
- Special 2 player dogfight feature where your only aim is to shoot down your human opponent.
- Superb range of targets and enemies including bombers, triplanes, powerful fighters, tanks, ships, control towers and anti-aircraft guns. Up to 7 aircraft can be in a single encounter.
- Beautiful scenery including bridges, churches, houses, rugby pitches, warehouses, lighthouses and trees.
- Permanent high-score table which is saved automatically to disc.

Price: **A3000/Archimedes £24.95**



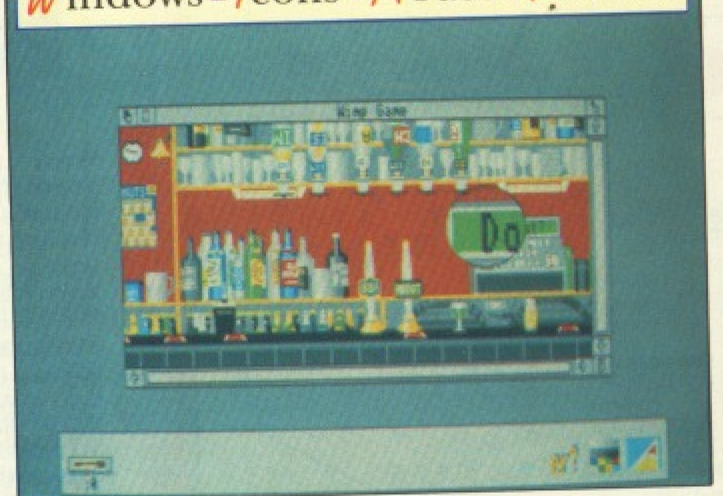






The Wimp Game

Windows - Icons - Mouse - Pointer



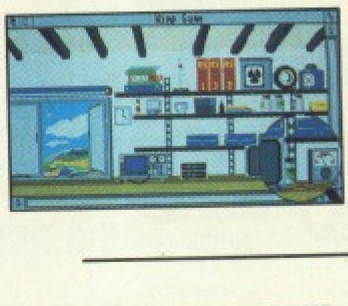
The Wimp Game is a brilliant pointer driven graphic adventure celebrating over 10 years of Acorn Home Computers. This revolutionary multi-tasking game is unlike any other game produced for the Archimedes and even allows you to run other programs whilst you play it.

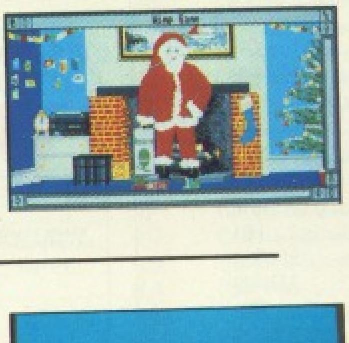
Work your way through the very different and very detailed locations using your pointer to try out the many objects and your magnifying glass to examine them.

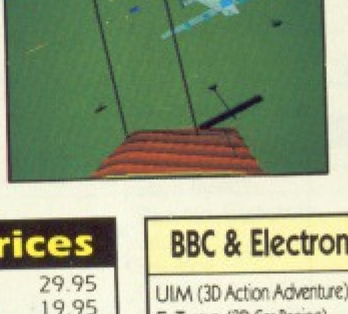
The Wimp Game has no time limit, no help, no hints, no score, no little green men, no space ships, no bombs and no guns. No keys on the keyboard are used. Your aim is to progress from being the owner of an Acorn Atom to being the owner of an Acorn R200 workstation - who said they'd already got one?

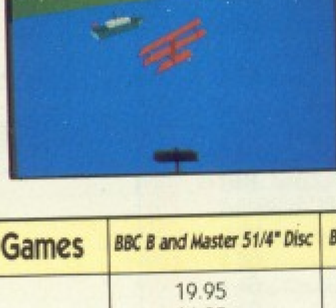
You can click on some objects and drag others about - click on the light switch in the first room and you'll see how it works. The 'adjust' button on the mouse will activate the magnifier to let you examine the scene in more detail. Be careful where you click - anything which hurts in real life will probably also do so in the game.

Price: **A3000/Archimedes £19.95**









This 4 game collection rea
The Real McCoy. These
genuine top games in
original format with
instructions. The games have
carefully selected for variety
include a thinking game, a sp
game, a role playing adven
and an arcade game. Bo
individually they would
£81.80p making this a
prestigious special ed
collection.

U.I.M. (RRP £29.95)
U.I.M. (Ultra Intelligent Mac
is a futuristic action adventu
in the oceans. It is a huge
featuring solid 3 dimens
graphics and digitised so
effects. You must travel the oc
in your highly expand
submarine visiting the nume
ports throughout the oc
networks. As well as ga
combat skills you'll need to
to trade in commodities, s
and currencies. There are
250 missions to complete b
you will find your goal - the U
- created to be almost a god

CADE SOCCE
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AZER (RRP
azer is a fa
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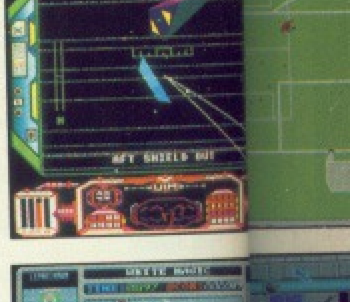
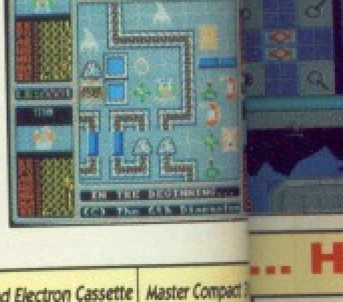
Price: **A300des £2**





A3000/Archimedes Games and Prices

Chocks Away	24.95
The Wimp Game	19.95
The Real McCoy	29.95
Dropship	19.95
Break 147	24.95
Nevryon (Pure Arcade Action)	19.95
Pysanki (Arcade Adventure)	19.95
Inertia (Isometric Action)	19.95
Apocalypse (3D Mega Game)	29.95
The Olympics (6 Events)	19.95
Man-At-Arms (Arcade Adventure)	19.95

UIM (3D Action Adventure)	29.95
E-Type (3D Car Racing)	19.95
E-Type Designer	16.95
E-Type Extra 100 Miles	16.95
White Magic (Arcade Adventure)	19.95
White Magic 2 + Designer	19.95
Arcade Soccer	19.95
Holed Out (3D Golf)	19.95
Holed Out Extra Courses 1	16.65
Holed Out Extra Courses 2	16.95
Holed Out Designer	19.95

All the above Archimedes games will work on the Archimedes A3000, 310 and 400 series

BBC & Electron Games	BBC B and Master 51/4" Disc	BBC and Electron Cassette	Master Compact
UIM (3D Action Adventure)	19.95	-	21.95
E-Type (3D Car Racing)	14.95	9.95	15.95
Inertia (Isometric Action)	12.95	9.95	13.95
Nevryon (Arcade Action)	14.95	-	15.95
White Magic (Arcade Adventure)	12.95	9.95	13.95
White Magic 2 + Designer	12.95	9.95	13.95
Arcade Soccer	12.95	9.95	13.95
Holed Out (3D Golf)	14.95	12.95	15.95
Holed Out Extra Courses 1	11.95	9.95	12.95
Holed Out Extra Courses 2	11.95	9.95	12.95

All the above BBC games are compatible with BBC B, B+ & Master Series Comp

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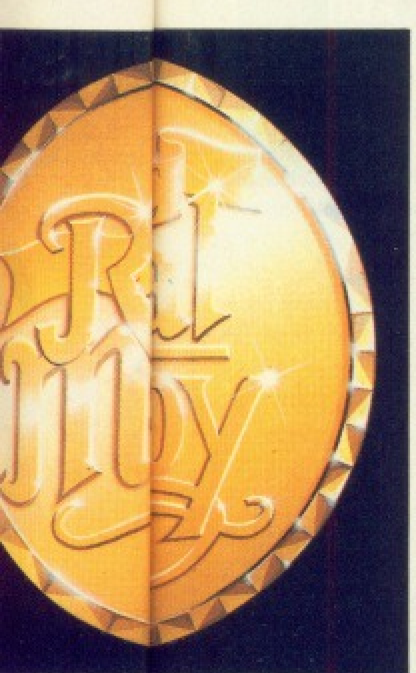

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CADE SOCCER (RRP £19.95)
cade Soccer really is WORLD
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st. Using an overhead view to
ke gameplay as exciting as
ssible it features everything that
u could want in a football game.

HITE MAGIC (RRP £19.95)
ite Magic is a unique arcade
venture in which you control 4
ried adventurers:- A
orechaun, Titan, Warrior and
chanter.
u can transform between all 4
aracters at will and use their
ch needed special abilities.
ite Magic is not a game for the
nt-hearted; it is a fast-action
me which requires fierce hand-
hand combat and frantic
apon fire.

AZER (RRP £11.95)
azer is a fast action arcade
e game with excellent music,
und effects and graphics. It has
incredibly detailed and varied
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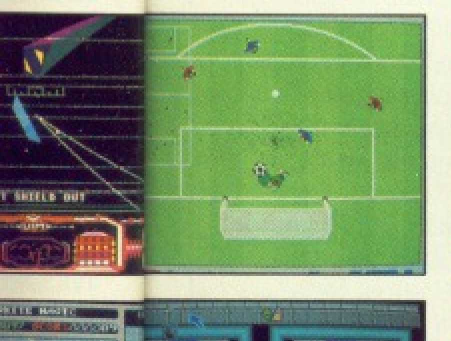
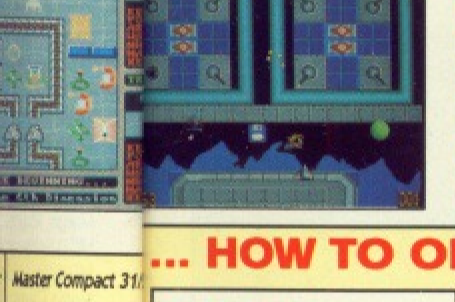
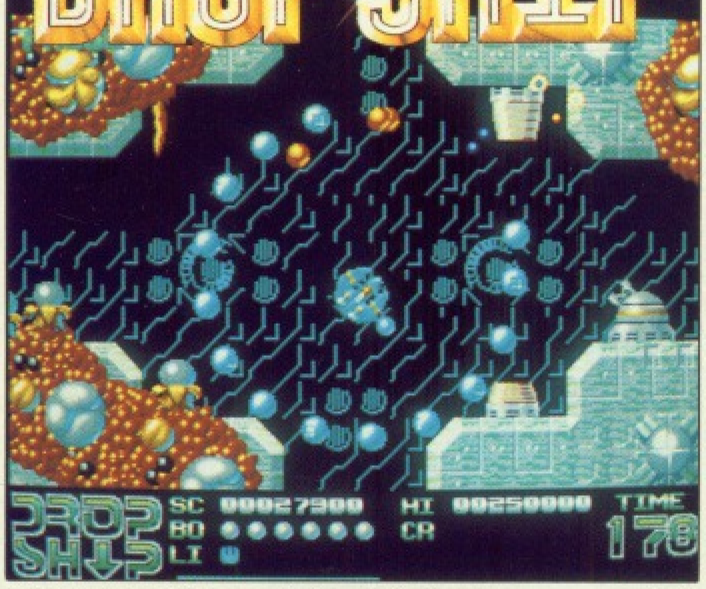
ddies you are ever likely to see.

ce: A3000 edes £29.95





DROP SHIP



Drop Ship is one of the smoothest and fastest arcade games you are likely to see. It features superb 256 colour graphics, 15 increasingly large and diverse stages and an excellent stereo soundtrack.

The year is 2020....

The government proudly announces that the new fast breeder farm on the Mars colony is completely computer managed and totally safe, defended from attack at all times by a fully-automated tactical defence system.

The year is 2030....

Earth receives a transmission from the Mars colony. The radiation seems to have affected the management software at the fast breeder farm. The defence systems have gone haywire and the whole farm is rapidly approaching meltdown. If all the reactors are not shut down the Mars colony will be wiped out....

Shut down can only be achieved by removing and collecting the power crystals from each reactor. An almost impossible task made even harder by the fact that the defence systems are blowing away anything that moves. The defences include gun emplacements, artificial gravity generators, sporers and hoards of deadly aliens.

What is needed is a craft which is supremely manoeuvrable, capable of great speed and possessing awesome firepower, and a pilot of extraordinary bravery to fly it.

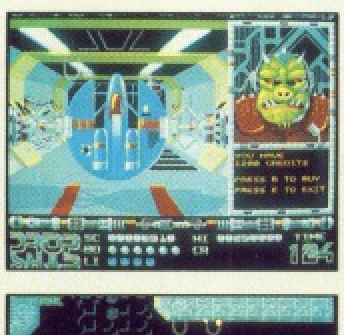
The craft is the Drop Ship.....

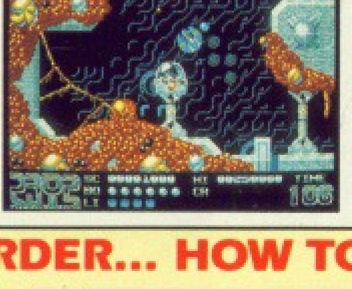
The pilot is You.....

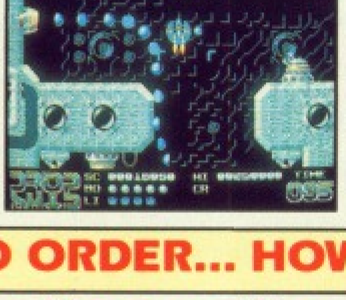
MORE GAME INFO

Frame rate: 50 frames per second
Maximum objects on screen: 150 per frame
The game features completely custom-written screen handling routines
No use whatsoever is made of the operating system routines
The ship movement in the game is accurate down to 0.0001 of a pixel

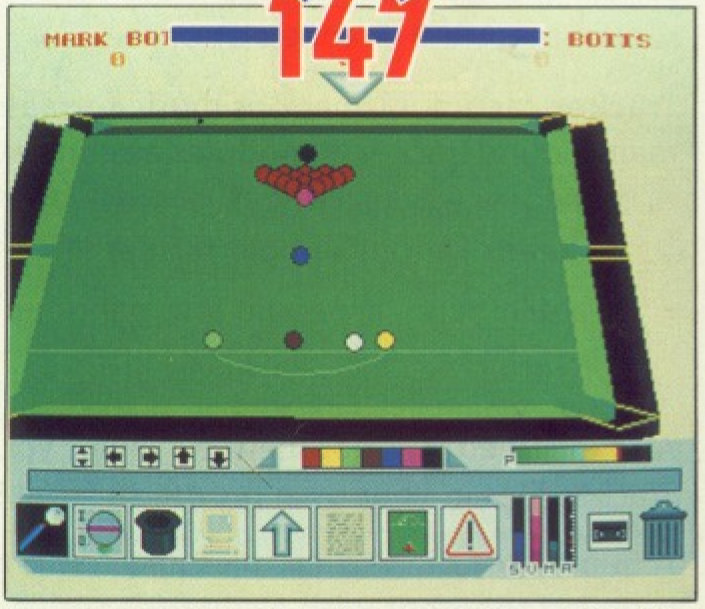
Price: **A3000/Archimedes £19.95**







BREAK 147



By any measure snooker is one the most popular sports in the world today. Break 147 has been precisely designed exclusively for the A3000 and Archimedes computers to be as close as is possible to the real game itself.

Break 147 is a full 3D snooker simulation with superb solid graphics and brilliant digitised sound effects, speech and music. The game is controlled exclusively with the mouse.

It features incredibly realistic interaction between the balls and precise control of the cue ball - topspin, backspin, stun, screw, drag, swerve and masse shots. You can view the table from ANY angle or distance even as the balls are moving.

All the rules are fully implemented and you can play matches (against friends or computer players), trick shots or just practice. You will not only be able to replay your last shot but you can also replay whole frames and move in and around the table as you watch it. Highest breaks are saved automatically to disc.

You can even create and edit your own tables so you can design your own trick shots or set up your preferred practice positions. A manual is supplied with each game which gives the fascinating history of snooker and all the rules and instructions required to play BREAK 147.

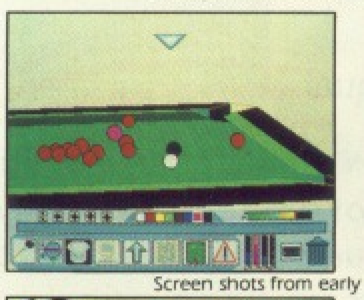
You will find that the game plays as if you were on a real snooker table with all the attendant features to take care of, but with a lot of the tedious parts - such as resetting the table, respotting the balls and scoring - maintained by your computer.

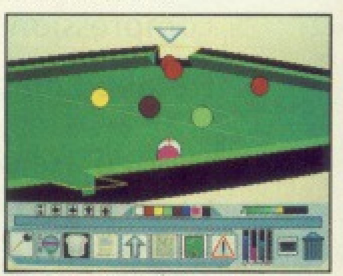
Win a Superb Engraved Trophy

This unique competition allows everyone who obtains a break of 100 or more to win a superb engraved snooker figurine on a solid marble base.

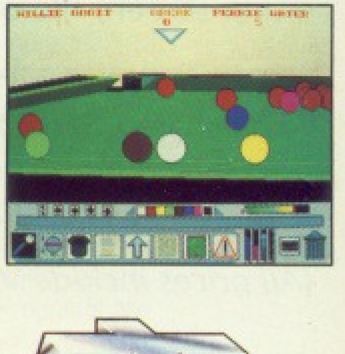
There's also a superb 16" trophy (to be engraved with the winners name) which will be awarded to the first entrant to achieve the maximum break of 147. Full details and entry coupon are included with the game.

Price: **A3000/Archimedes £24.95**
Anticipated Release Date: Mid November '90





Screen shots from early development version



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UPDATE

Wetlands conservation

BRITAIN'S ponds and wetlands are increasingly being sacrificed on the altar of urban development. Now, BBC Micros and Archimedes machines are being used to educate the next generation in the importance of preserving these vital environmental assets.

Mercury Educational Products (071-287 5060) and Granada Television have linked with The Wildfowl and Wetlands Trust to produce a key datafile supporting the nationawide Pondwatch survey co- ordinated by the Trust. The Key datafiles are used by schools in conjunction with ITV's schools programs and to date, 30,000 have been sold in this country.

This latest datafile inlcudes the results of the Pondwatch survey which started in 1989. More than 500 groups and individuals – a total of 2,500 people – have been involved in the survey throughout the UK. They have monitored local ponds and canals by "dipping" the water over a nine month period.

From this, they have recorded the location of the water source, its physical make-up, its age and its use by man plus the animal and plant life in and around the water.

The huge wealth of results has been entered into the ITV Schools Key datahandling package and a specially written mapping and graphics package has been created to enable schools to analyse and display the results on regional and national maps. A further package will also allow results of schools' own surveys to be displayed and compared with the nationwide results.

"Yuppie urban developments are increasingly draining the wetlands and marshes which are some of our most fertile areas", said Dominic Johnson of Mercury Educational Products. "These areas are micro-communities in their own right and it is vital to the environment that they be preserved. The best way to do that is by starting at the bottom level and educating the children who will be responsible for the environment in years to come."

Software for the Pondwatch Key Datafile is now almost complete. Some final readings will be added in the Spring and it will be available to schools by the end of March next year. Price, £12.

Working with Granada Television, Mercury Educational Products are also to produce a datafile on nitrate pollution in Britain's watercourses.

Pond dipping!

Computer Britannica

A MASSIVE project with scope to make the majority of human knowledge available through Archimedes computers has been undertaken by AVP Computing working in conjunction with Somerset Local Education Authority.

Called Freedom, it uses hypermedia to present teachers and students with powerful programs combining text, graphics, animation and sound.

"This is not just another computer program. It is a major carrier of information which in due course will provide ready made lessons and worksheets for the entire National Curriculum", said Robin Drewett of AVP. "You could view this as a computer version of The Encyclopaedia Britannica but it is even more than that. All human knowledge could be funnelled through this."

The initiative has started with science subjects which have had input from most of the heads of science in Somerset LEA and members of Somerset TVI plus AVP's own education writers. Five AVP programmers are working full-time to produce the first topics due out in January. They will cover Food Technology, Energy, Food and Fitness and Human Anatomy.

"These are just the tip of the iceberg", added Robin Drewett. "Freedom will be like opening the gates of the British Library but most important of all will be its ease of use. Within one minute of a new users seeing this program, we would expect them to be able to have a useful science lesson on their desks. It is absolutely straightforward.

"Freedom is also a tool and a servant to teachers, not the tyrannical slavemaster which is what computers are for a lot of teachers."

Lessons covering specific subjects, statements of attainment or any other criteria can be easily extracted from the programs then altered or adapted to suit individual needs. Any page of text or illustration can be easily printed out.

Freedom modules will cost £50 and will only be available from AVP (0291 625439). They will be provided on floppy disc but because of the large amount of material involved, future plans are to use CD rom.

English update

EDUCATION software house LCL (0491 579345) have announced updated versions of their Micro English and Reading Writing Course programs for BBC Micros plus new Master Compact and Archimedes versions of Micro English.

The latest version of Micro English includes a new section of four programs on Oral Communication which is now part of the GCSE English course. It also includes a new section on English Grammar.

The first English GCSE course for BBC Micros to contain a program on Oral Communication, Micro English includes two books, a voice tape and 24 programs. There are eight programs on writing, 12 on reading, including comprehension tests and four on Oral Communication.

Designed for pupils from eight years-old to GCSE level and for foreign students learning English, Micro English still costs £24. The Compact and Archimedes versions will be launched in December.

Rewritten to bring it in line with the National Curriculum, LCL's new Reading Writing Course also includes 24 programs, two books and a voice tape to teach reading and writing. It now covers attainment targets 1 to 5 and includes a table to show which programs are suitable for which attainment targets.

Colourful graphics and music are featured in the new package which covers the alphabet in both lower case and capital letters, writing and word recognition. Programs are also included to help students write amusing sentences, create poems and read books.

It is suitable for children from three years old, uses accepted teaching methods for dyslexics and is easily adapted to the needs of different pupils. The programs use three main teaching methods for reading – phonic, "look and say" and the multi-sensory phonetic and linguistic methods. Price, £24.

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Jet Set Pack	£649

*** NEW PRODUCT ***

JET SET PACK

A3000 with "monitor quality" adaptor eliminates the need to purchase a dedicated monitor. Comes with four games - Interdictor, Superior Golf, Trivial Pursuit and Euclid - as well as the usual A3000 bundled software. £649

No Monitor Needed! TV Modulator Included

ARCHIMEDES PERIPHERALS

Microvitec CUB3000	£189
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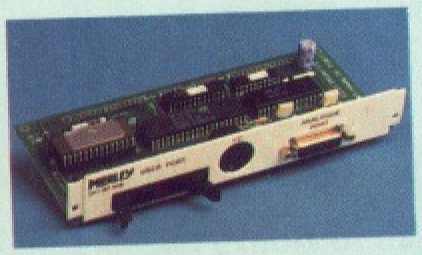
Philips 8833	£225
Mono Monitor	£73
Monitor Stand	£29
A3000 User Port & Midi	£49
Serial Upgrade	£19
Econet Upgrade	£49
Acorn Rom Podule	£56
300 2 Slot Backplane	£37
300 4 Slot Backplane	£59
300/400 I/O Podule	£79
300/400 Midi Podule	£65
300/400 3.5" Drive	£115

A3000 BBC ANALOGUE & USER PORT PODULE



Full specification BBC analogue and user port. The analogue port is accessible using ADVAL from BASIC5 with all BBC OSbyte calls supported.

£69

Interface software written by Acorn for maximum compatibility with the BBC.

TELETEXT

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 Analogue/User Port. £125

Existing users of our BBC Teletext Adapter can have the unit converted to an Archimedes version. £35

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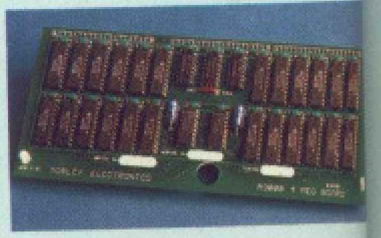
Unlike most other cards, our upgradeable card can be upgraded from 1MB to 3MB at a later date for maximum flexibility.



- Fully compatible with all Acorn software.
- A must for all serious Archimedes owners.
- Make full use of powerful RISC-OS packages.

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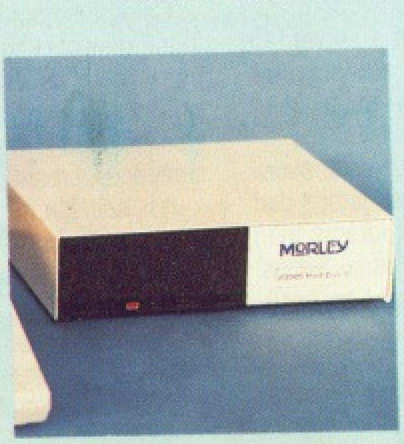

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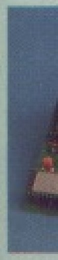

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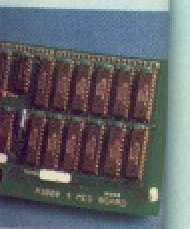

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This is a small selection of the software that we can supply at competitive prices. Please call for any item you require.

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M/B 8 BIT SOFTWARE

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Desfax	£17.40
Masterfax	£26.00
Mastercopy	£11.20

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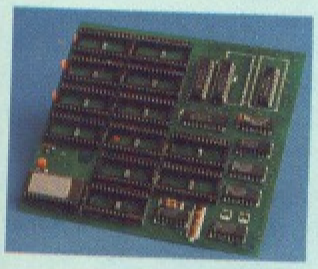

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With 2 cartridges and a ROM board, a staggering 32 ROM images installed and accessible at any time.

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Master control ROM which includes a clever file transfer program allowing files to be transferred between DFS and ADFS formats or vice-versa. £40

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Built-in features include:

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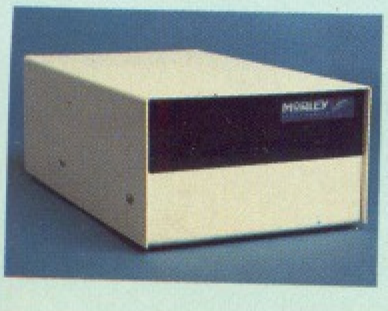
Don't be fooled by price, these units are among the fastest on the market.



Completely compatible with BBCs, B+s and Masters fitted with ADFS. Free utility disc incl: Format, Verify, Archive and Park.

20meg	£370
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Larger Drives	POA

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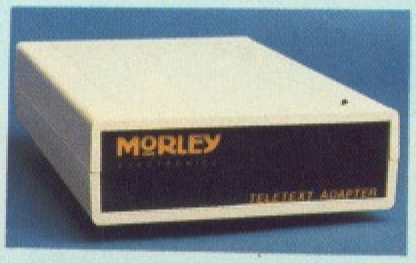

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BBC/Master	£104
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Archimedes	£125
Optional PSU	£9.50

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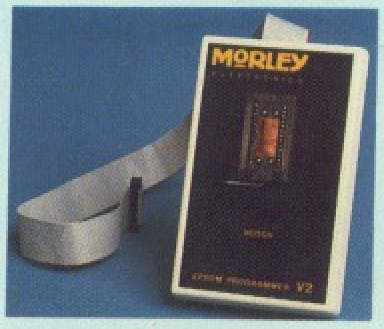

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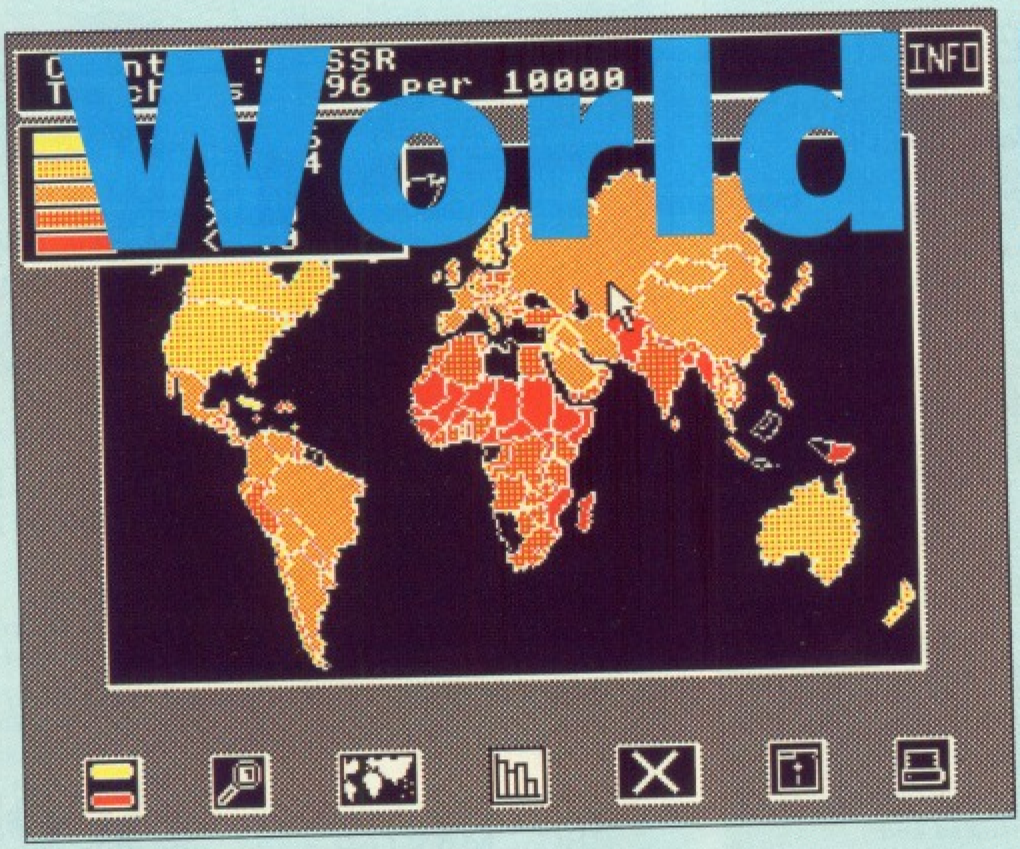
World Map



HIGH quality educational software for secondary schools is nowhere near as common as that for younger age groups, and the packages that do exist are predominently maths and science oriented.

But this new package will be of interest to all teachers of geography and the more general areas of humanities and social studies in the secondary school and in some applications at the top of the primary school.

The basic screen presents a map of the world in what looks like a Hammer Equal Area projection – though this information is

Reading modern languages

Brushing up his French and German, Marshal Anderson takes heart from a new book

INTEGRATING computers into the modern language side of the curriculum isn't easy, but now there's a book to help you. Taking the form of a report on a project in five Hertfordshire schools where computers were introduced into the modern language curriculum, it starts by explaining what equipment and software was used, where it van be obtained, and irs cost.

Straight away you know you are reading about real school situations and leave behind the thought *"That's all very well, but what do I actually DO"* that so many more theoretical books generate.

The setting out of the report cannot be faulted. It states clearly the initial considerations, including access to machines and the use of trolleys. It then goes through the planning stage, considering the uses and misuses of the machine and the obstacles that have to be overcome.

All the programs used are described and evaluated in detail as are the more exotic uses of the machine like Audio Enhanced Computer Assisted Learning and remote access to the French Teletel database.

Sections like *Is it worth it?* get to grips with the reality of the situation, and the overall conclusions are enthusiastic but qualified. The section on wordprocessing with Pen Friend is particularly useful.

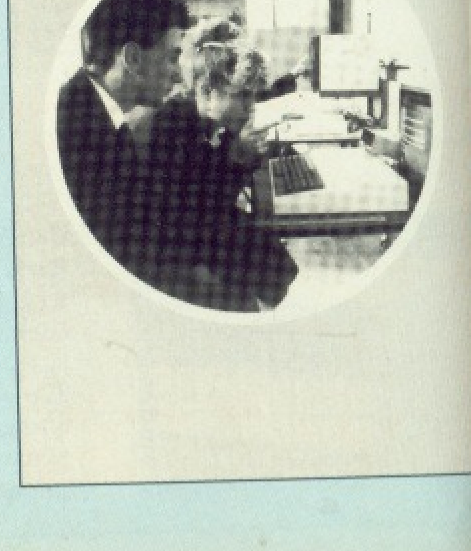
Appendices are provided on all aspects of using the machine from switching on to accessing Teletel, so teachers with no previous experience of computers can confidently tackle the activities described.

There are examples of students' work and the support materials the teachers produced, while the text is broken up with comments from students and staff. Overall the book is friendly and refreshingly self-critical – it's about real teachers in real classrooms with real students and real problems.

Summing up

This is just the sort of thing you need if you are going through the same process and want to avoid the pitfalls others have already discovered.

Product: Modern Languages and the Computer
Price: £3.00
Supplier: Advisory Unit for Microtechnology in Education, Endymion Road, Hatfield, Herts AL10 8AU.
Tel: 0707 265443



Modern Languages and The Computer

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p Study

Marshall Anderson travels from Aberdeen to Zanzibar with the help of this new release

Product: World Map Study
Price: £30.00
Supplier: ESM, Abbeygate House, East Road, Cambridge CB1 1DB.
Tel: 0223 65445

not provided – and a series of icons. Move a pointer around the map and select the country you are interested in by clicking with the spacebar.

You are dealing with a wimp-style environment the program will let you use an AMX mouse if you have the relevant chip installed. As an aside here I think it's worth having a little moan about the fact that the program does not have its own mouse driver. This would have made it more flexible in schools with machines spread about but few with the relevant chips.

Even without the mouse, the environment is very friendly. The pointer moves smoothly and accurately and can be speeded up by holding down Shift. Selecting small countries can be difficult, so there is an enlarge icon which will give you a map of just one continent – you switch back by selecting the World icon.

Once you have chosen your country you can see a selection of relevant statistics. These have been carefully chosen to provide a range of social and economic indicators that allow comparison of the state of one country with another.

To start with there is the expected area, population and GNP per capita information that is always needed.

Then comes military spending as a proportion of GNP and the proportion of the population employed in the military. To balance this we have the proportion of doctors and teachers. All these figures are per thousand, and already we can begin to compare and contrast the outlook and priorities of different nations.

Figures on urban population naturally indicate urbanisation, and child population will be some indication of human resources and future demography.

The health data is short and to the point. There are two figures for infant mortality – for 1960 and 1981which give a dynamic view of a country's ability to care for its population. To fill out the health picture there are figures on life expectancy and access to clean water.

Finally, separate male and female literacy figures give indications, not only of the extent of education, but of the society's attitude to gender. The care with which this data has been chosen is central to the package's success – it manages to cover the maximum of factors with the computer-imposed minimum of file space.

Choose the graph icon and you see what these figures mean in terms of different countries.

Information may be displayed in three forms. The first is to use shading on a map of the world or any given continent using two or five steps generating two or five levels of shading. You can use this for comparing countries from the point of view of one field – try plotting GNP per capita on the world map and you will straight away have the basis for lively discussion.

Bar charts can be selected in a similar way, using data for one continent or the world. But the use of scattergraphs really gets things going as your students get to grips with connections between GNP and life expectancy, or find out which poor countries are spending valuable resources on arms.

Each of the graph options will allow the computer to construct the scale or let you do it. The only niggle here is that scales must always start with zero, which restricts your ability to examine one part of a graph closely.

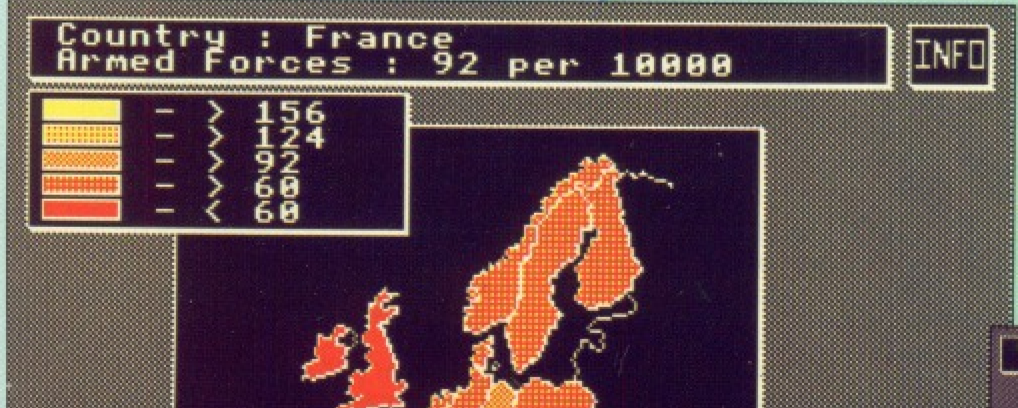
The manual is quite straightforward about the reliability of the data and provides an editor which will get you over the problem of information becoming out of data.

You can change the name of a country and its capital as well as updating any of the fields. You can't change its borders, but this would be asking too much of the software. So you'll have to find more creative ways of dealing with the unification of Germany, for instance.

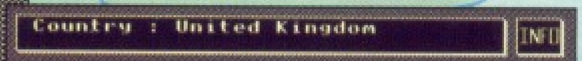
The lack of a network version will cause problems in some schools, but special deals on multiple copies are available from ESM.

Summing up

This package explores aspects of world geography in an interesting and creative way. Introducing students to the power of databases covers several Attainment Targets in technology and, I hope, geography when it appears.



Country : France
Armed Forces : 92 per 10000



Country : United Kingdom

Vouchers **worth £235** redeemable at the Computer Shopper Show

New horizons

December 6-9
Wembley Conference Centre
London

A CONFERENCE SPONSORED BY ACORN
(in association with the Computer Shopper Show)

Acorn is to hold a major four day end-user conference running alongside this year's Computer Shopper Show.

It has been designed to bring computer users bang up to date with technology and what the company's renowned research and development team has achieved of late. Attendees will also be provided with a fascinating glimpse into the future of computing.

The conference will allow end-users to –

- **See all the latest Acorn innovations being exhaustively put through their paces.**
- **Hear from the experts who developed them, all acknowledged world experts in their fields.**
- **Gain an insight into the current projects on which Acorn is working to ensure it will remain in the vanguard of technology.**

No matter where your particular interest in computing lies, the conference will provide you with a unique opportunity to learn more.

For the timetable offers something for everyone. The conference itself is divided into two distinct seminar programmes - one running on the Thursday and Friday, the other on Saturday and Sunday.

Drop into a seminar of your choice – or attend them all – and you'll be given discount vouchers redeemable against purchases out on the exhibition floor.

There you will find up to 280 stands, including the massive Acorn Village, where the company will be flanked by all its leading third party suppliers.

Here then is YOUR chance to be not only entertained and informed but also to purchase computer Christmas presents at unbeatable prices. And it's all thanks to Acorn.

But don't leave it too late. Conference tickets are limited and will be allocated on a first come, first served basis.

Ensure your seat by completing and returning your application form TODAY.

Timetable of events

THURSDAY AND FRIDAY

11.00 - 11.50 am
CD ROM IN EDUCATION
Speaker - *A spokesman for Next Technology.*

VOUCHER WORTH £50 for a Next Technology CD Rom Drive

12 NOON - 12.50 pm
SCHEMA - A SPREADSHEET FOR THE FAMILY
Speaker - *David Clare.*
He has worked in the computer industry for more than nine years and is best known as the head of one of Acorn's longest standing third party software houses, Clares.

VOUCHER WORTH £30 for Schema

1.00 - 1.50 pm
IMAGE PROCESSING
Speaker - *Malcolm College.*

VOUCHER WORTH £40 for Wild Visions V9 Digitiser

2.00 - 2.50 pm
PC EMULATING AND OTHER OPERATING SYSTEMS
Speaker - *Ian Lynch.*
An expert on a variety of operating systems including IBM's PS2, MS dos, Unix and Risc OS, he is the curriculum development director for the City Technology Colleges Trust. In this role, he is responsible for supporting and developing curriculum innovation within colleges throughout the country

VOUCHER WORTH £30 for Acorn PC Emulator

3.00 - 3.50 pm
MUSIC-MIDI-MANIA
Speaker - *Mike Beecher.*
A graduate of the Royal College of Music, he is the managing director of ElectroMusic Research.

VOUCHER WORTH £30 for EMR Studio 24

4.00 - 4.50 pm
RISC TECHNOLOGY IN THE 1990's
Speaker - *Mike Muller*
A key memberof the Acorn Risc development team.

VOUCHER WORTH £25 for Programmers Ref. Manuals

5.00 - 5.50 pm
DESKTOP PUBLISHING
Speakers - *Martin Chappell and James Lynn.*
Martin Chappell is the Art Editor of Car Magazine, the largest publication of its type in the UK.

James Lynn is one of the chief designers and programmers on the Impression development team at Computer Concepts.

VOUCHER WORTH £30 for Impression 2

SATURDAY AND SUNDAY

11.00 - 11.50 am
HYPERMEDIA FOR ALL
Speaker - *David Tee.*
The author of two of the original programs on the first welcome tape for the BBC Micro, he is the man behind the Genesis project.

VOUCHER WORTH £20 for Genesis

12.00 noon - 12.50 pm
SCHEMA - A SPREADSHEET FOR THE FAMILY
(See details as for Thursday and Friday)

1.00 - 1.50 pm
PROGRAMMING MADE EASY WITH BASIC 5
(Including Dabs Compiler)
Speaker - *David Atherton.*
A co-founder of Dabs Press, he is well known as a regular contributor to leading computer titles.

VOUCHER WORTH £30 for a Dabs Press ABC Compiler

2.00 - 2.50 pm
PC EMULATING AND OTHER OPERATING SYSTEMS
(See details for Thursday and Friday)

3.00 - 3.50 pm
MUSIC-MIDI-MANIA
(See details for Thursday and Friday)

4.00 - 4.50 pm
FASTER COMPUTING - ***all the expansion options for the Archimedes***
Speaker - *Alex Van Someren.*
The technical director of Aleph 1, producers of the first commercially available ARM 3 upgrade, he will demonstrate the full potential of the Archimedes and discuss future possible enhancements.

VOUCHER WORTH £50 for Arm 3 upgrade

5.00 - 5.50 pm
DESIGNING DOCUMENTS WITH THE HELP OF A COMPUTER
Speaker - *James Lynn.*
A leading light in desktop publishing technology, he is a chief designer and programmer at Computer Concepts.

VOUCHER WORTH £30 for Impression 2

Getting to the conference

Getting to Wembley Conference Centre is easy. All roads leading to the site are well signposted and the Centre is well served by buses and the tube (Jubilee & Metropolitan lines).

Conference registratio

Complete the registration form below. Sessions a priced at £7.50 each on Thursday and Friday and each on Saturday and Sunday. Or buy a "Rover ti and attend all sessions - £30 per ticket for Thurs Friday - £15 per ticket for Saturday or Sunday.

Entrance to the Computer Shopper Show at the d £5 for adults and £3.50 for under 16's, but for Ac conference delegates only we are offering a redu rate at £3 per adult and £2 per child. "Rover ticke holders get in free!

Tick the boxes to indicate which sessions you wi attending:-
Please register me for the following sessions @ £7.50 each.

Thursday/Friday 6 & 7 December

☐ CD Rom in Education
☐ Schema - A spreadsheet for the family
☐ Image processing
☐ PC emulating
☐ Music-Midi-Mania
☐ Risc technology in the 90s
☐ Desktop Publishing

Please register me for the following sessions @ £5 each.

Saturday/Sunday 8 & 9 December

☐ Hypermedia for all
☐ Schema - A spreadsheet for the family
☐ Programming made easy with Basic 5
☐ PC emulating
☐ Music-Midi-Mania
☐ Faster computing
☐ Designing documents with the help of a comp

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......Adult tickets @ £3 } only valid for Acorn
......Child tickets @ £3 } Conference delegate

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1. To provide the best possible service & assistance to users.
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3. Provide tested products with special attention to quality of design, components & production.
4. "Only to cash cheques & credit card receipts when we know we can supply the goods ordered."

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The only fully compatible Electron disc upgrade running Acorns own filing system. Complete package of ADFS interface + 3.5" d/s drive + documentational welcome disc + free 3.5" Superior game disc.

£129 ex VAT £148.35 inc VAT

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The Advanced Plus 1, the main expansion for the Electron as designed by Acorn, gives Analogue Joystick Port, Parallel Centronics Printer Port + two cartridge ports – needed for disc upgrades such as AP3 & AP4 + free View OR Viewsheet (please state which title required)

£50 ex VAT £57.50 inc VAT

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A fully buffered 6 ROM expansion module for the Acorn +1 or API.

£33 ex VAT – £37.95 inc VAT

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Upgrade Service for the original Acorn Plus 1 to Advance Plus 1 & AP6

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ADVANCED DISC TOOLKIT

(01)/M/B/E/C **£30 ex VAT £34.50 inc VAT**

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An Acorn approved cartridge containing a card with special 'zero' profile sockets.

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AP34 interface: Get the best of both filing systems

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3.5" ADFS £9.99 ex VAT each volume; £11.49 inc VAT
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Cumana 5.25" dbl/sided 40/80 track, switchable, inc psu	**£113.00**	**£129.95**
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AP5+ Music 5000	£152.17	£175.00
AP7+3.5" ADFS E00	£49.52	£56.95
AP7+5.25" ADFS E00	£48.65	£55.95
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AP4+CS400	£147.78	£169.95
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ACCESSORIES

ELECTRON POWER SWITCH
£3.96 ex VAT; £4.55 inc VAT (E)

AP3 2nd DRIVE LEAD
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Panasonic KX-P1081 Printer Ribbon
£5.50 ex VAT; £6.32 inc VAT

ELECTRON ADVANCED USER GUIDE

Further reading and information for the Electron user	**£3.95**
ADFS Guide Manual	**£5.00**

(E)

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3.5" ADFS £6.95 ex VAT per Disc; £7.99 inc VAT per Disc (E)

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Panasonic Matrix with NLQ

Including Ribbon Cable and Courier delivery

£139 ex VAT; £159.85 inc VAT (MBE+1)

MUSIC 5000

£99.00 ex VAT; £113.85 inc VAT
1 MHz Bus (E+1)

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A new 1MHz Bus low cost Cartridge – £19.99 ex VAT; £22.99 + VAT (E+1)

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3.5" in plastic library box – ideal for Plus 3 users	**£19.95**
5.25" 10 dble/sided dble/dens	**£12.99**
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Games on disc (4 titles)	**£7.99 each title**

ADFS VERSION 1.1

Suitable for existing Plus 3 or A.P.4 users

£14.95 ex VAT; £17.19 inc VAT

ADFS E00

For Electron users with either Plus 3 or A.P.4 and 32k of S/W RAM i.e. ABR

3.5" ADFS (manual avail, sep.)
£14.95 ex VAT; £17.19 inc VAT

5.25" ADFS (manual avail, sep.) **£14.00 ex VAT £16.10 inc VAT**

5.25" DFS (2 Discs+ADFS manual) **£19.00 ex VAT; £21.85 INC VAT**

AP4 MOD

This converts an AP3 to an AP34 (ie. DFSEOO) supplied as a two chip set, full documentation and fitting instructions.

£21.74 ex VAT, £25.00 inc VAT

All items on this page are available mail order only. Prices include UK delivery & VAT (subject to availability). Please send or phone your order to

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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 Archimedes 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 handle static images.

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 inexperienced programmer.

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

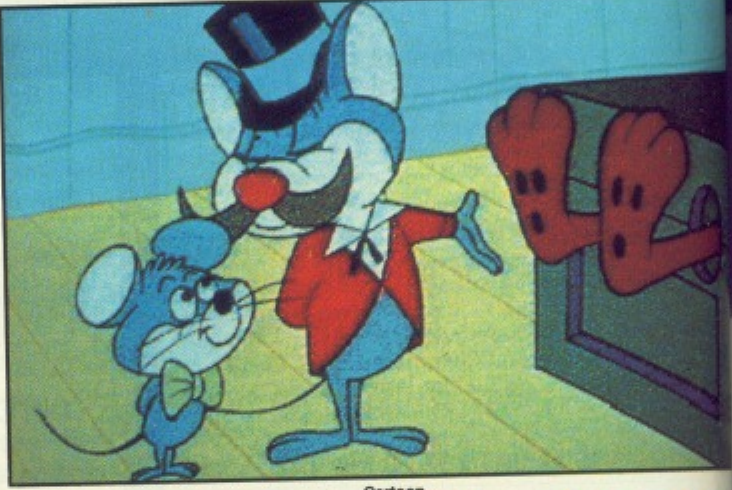
As well as showing off to all your friends who don't have an Archimedes, what a great computer it is, you can use the Digitiser to produce images for all sorts of games and visual demonstrations. Games such as 'Guess the Celebrity' or 'Guess the Advert' can be produced by even inexperienced programmers, simply by 'grabbing' all the necessary images from TV and saving to disc.

SPECIFICATION

Video Inputs	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.
Resolution	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
Picture Area	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 adjusted internally if required.
PAL Decoder	The PAL decoder provides manual control of Brightness, Contrast and Saturation, combined with full auto saturation control.

STOP PRESS! STOP PRESS! STOP PRESS! STOP PRESS! STOP PRESS! STOP PRESS!

Many new software applications are now supplied with the Digitiser including an excellent new icon based front end providing easy access to all the existing Digitiser features plus many new ones!


Cartoon

A Multi Picture Image

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 on the Archimedes'-

Acorn User - April 90

Digitiser Prices

Standard	**£285.00**
Extended	**£315.00**
A3000 Adapter Box	**£65.00**

POSTAGE AND PACKING FREE

NEW! NEW! NEW! NEW! NEW! PAL COLOUR CODER

A new hardware product now available from Pineapple is a high quality colour coder unit. This unit produces a full coded video signal from the Archimedes computer which enables you to feed the output of the computer into a video recorder or second colour TV monitor.

FEATURES:

1. External to computer - no podule slots required
2. Sync regeneration to provide correct broad pulse and equalising pulse wfm
3. Switch selectable to 624 or 625 line operation - for interlaced or non-interlaced screen modes
4. Plugs into RGB computer socket and provides buffered output to feed Archimedes monitior + coded signal output
5. Adaptable for use with other computers or RGB and Sync signal sources.

PRICE £69.00 + VAT. P&P FREE

NEW LOW PRICES!

BBC PCB Designer

NEW LOW PRICES!

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' imput 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 Model B.

'PCB Autoroute is remarkable. No similar software comes near the price.'

Acorn User- Aug 88

PRICES	
Manual track routing	**£55.00**
Auto track routing	**£85.00**
Plotter Driver	**£35.00**

P&P FREE

STILL AVAILABLE AT NEW DISCOUNTED PRICE! DIAGRAM II £25.00!

ADFS Utilities Rom

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 facility with over 35 sub commands covering such areas as repeated disc compaction, saving and loading Rom images, auto booting of files, and many more. Transferring of files from DFS to ADFS is also made very easy

ADU .... £29.00 **P&P FREE**

Marconi Tracker Balls

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RB2/107 Atari ST	£45.00
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S's range of add-ons offers tremendous advantages. The system can grow with your pocket, it offers security rength but most importantly it offers choice." (AU Feb.90)

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A3K1

Probably the best ***monitor plinth*** available for the A3000 & the basis of a modular system.

A3K2

When you are ready to expand the A3000 this ***system housing*** is added, allowing upto 2 floppy drives and a hard drive to be added.

A3K3

If you are adding an expansion card (podule) to an A3000, such as a hard disc card, then you will need this ***podule case*** to connect & protect the card.

A3K6

If extra floppy drives are to be connected then you will require a ***disc buffer.*** This one supports upto 3 additional drives and incorporates software control for physical to logical drive mapping & 40/80 stepping which could prove essential when using discs in 65Host or PC emulator. A key feature is the built in expansion for further cards to be added internally; also see A3K12. NB some cheaper products may only provide a connection for an additional drive without buffering.

A3K7

A ***20 mb hard disc*** drive ready to fit in A3K2, including the hard disc card and all cabling. We are not aware of any other hard disc upgrade that is treated as an internal upgrade (consult your Acorn dealer or call PRES for details)

A3K8

31/2" disc drive & mounting brackets for A3K2

A3K9

53/4" disc drive & mounting brackets for A3K2

A3K12

A ROM & disc upgrade for A3K6 provides –
1) a desktop ***DFS filer*** that allows DFS files to be dragged to ADFS viewers or straight into applications such as Edit or Pipedream.
2) BBC ***1770 DFS*** for use in ***65 Host.*** Automatic Icon and loader which can allow BBC DFS discs to have **<SHIFT BREAK>** operation.
"effectively turns your A3000 into a model B" Acorn User Sept '90

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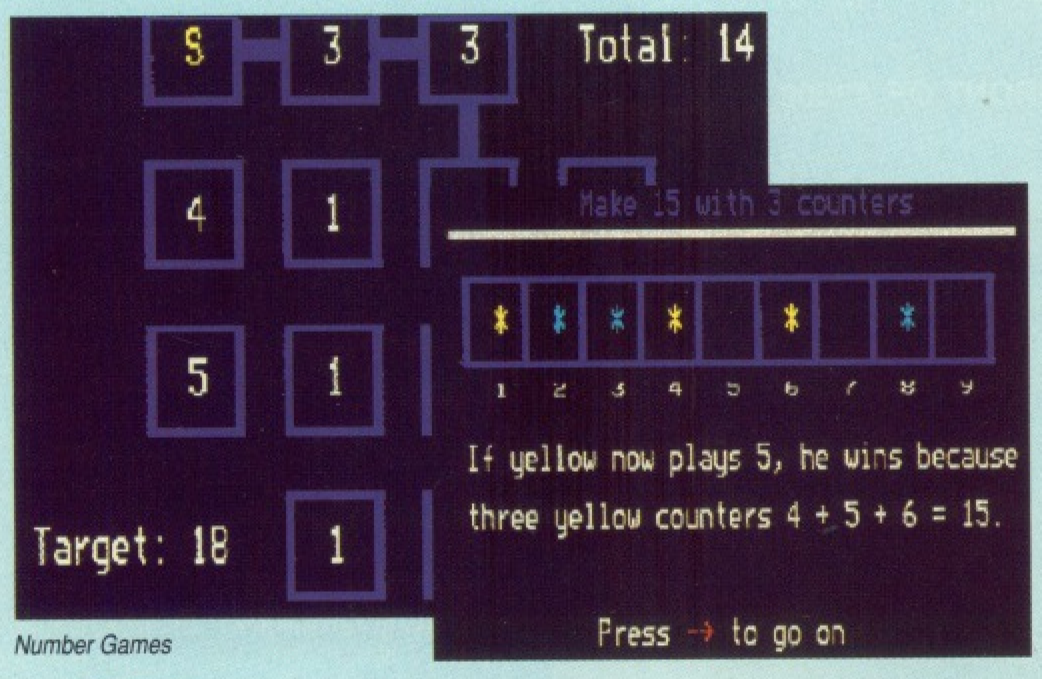


Total: 14

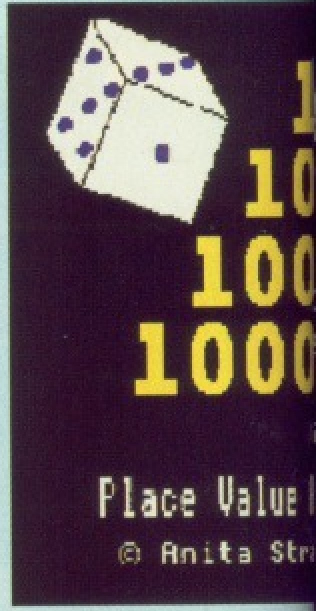
Target: 18

Make 15 with 3 counters

If yellow now plays 5, he wins because three yellow counters 4 + 5 + 6 = 15.

Press → to go on

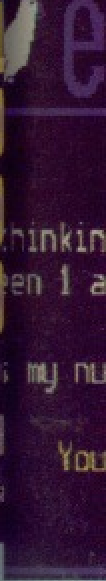
Number Games



Place Value

© Anita Str

Place Value



One, two, t

Product: Getting Ready, Place Value and Number Games
Price: £18.50 each
Supplier: ESM, Abbeygate House, East Road, Cambridge CB1 1DB.
Price: 0223 65445

NUMBER in the National Curriculum is well catered for, but there is always room for more. So here's a collection of Anita Straker's maths programs published by ESM in three separate packs: Getting Ready for Maths, Place Value Activities and Number Games.

Described by ESM as "a new series of maths programs.....designed to sit in with the needs of the Maths National Curriculum" most, if not all, were written some years ago. Although occasionally updated, they will still be familiar to some teachers and children.

Their age is not a problem – the programs are well thought out, mathematically sound, and offer experiences at different levels within the National Curriculum. Their age is apparent in the extensive use of simple graphics and jingles.

There is some advantage in keeping things simple. All of the menus and key presses are consistent and this helps pupils to learn how to use the programs quickly and easily, but simplicity in graphics often detracts from their value.

I am not too sure that today's pupils will view them in quite the same way, especially if they have experience of some of Sherston Software's usually dramatic offerings.

Getting Ready for Maths explores some basic concepts. The six programs include games and puzzles based on matching, sequencing, investigating patterns and recognising numerals.

They are a useful addition to the Reception and Year 1 teacher's collection, and children working in groups of two or three will find them interesting and enjoyable.

Cubes is a simple program concerned with patterns. Children are encouraged to look carefully at eight cubes of various colours before using the spacebar and Return to match the sequence on a line below. At more difficult levels the cubes are presented in piles of two or three.

Beads 1 uses the same keys and methods of working as Cubes, but this time shapes – triangles, diamonds, hexagons and circles – as well as colours must be matched. Again, there are differing levels of difficulty within the program.

Instead of asking for a pattern to be copied, **Beads 2** asks the children to continue one. It is fairly simple at the easiest of the three levels, but at the hardest the pattern can prove quite difficult. Careful working is essential.

Interesting and valuable work based on this program can be done away from the computer. Children using beads and card can simply mimic the program, but to extend their experiences, seeds, for example, may be glued on to paper to continue patterns set by the children themselves.

Some of the patterns I have seen when working with Year 1 classes are testimony to the way in which the computer and uncomplicated programs such as Beads 2 can make some children to work at a much higher level than may have been anticipated.

Matching and **Number Snap** are based on matching. In the first, which has two levels of difficulty, the child is presented with a number of shapes at the top of the screen. Pressing the spacebar puts a matching number of shapes at the bottom – at the easier level each shape has a guide line at the bottom.

The second of the two displays a number of simple pictures with three large numbers. The spacebar and Return key allow the child to choose the appropriate numeral to match the number of pictures. Unfortunately, the pictures are very simple and the motivation is not high, despite Podd making a guest appearance.

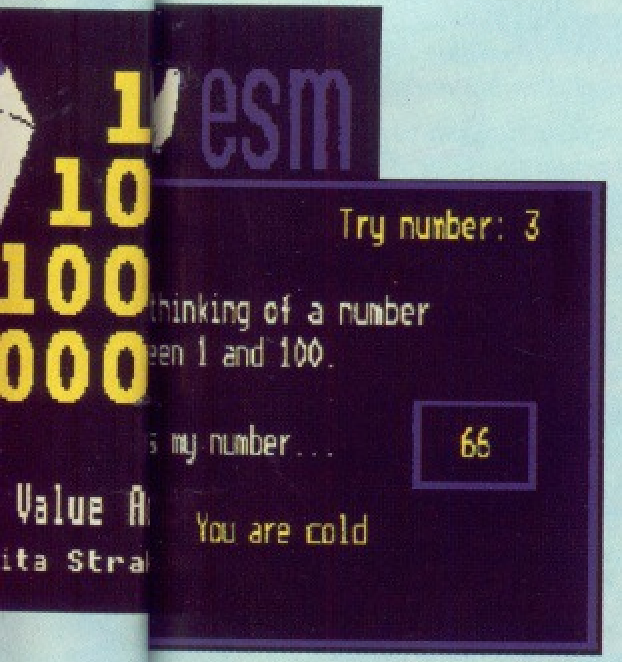
For children who have a grasp of numbers to nine, **Line Up** lets two children practise their knowledge. A 6x4 grid is shown onscreen and the trick is to be the first to fill a column of four.

Between one and nine spots are shown on what is loosely described as a rolling die. The number displayed can be used as it is or as the result of adding two numbers, for example, a seven is rolled and is the result of three and four. By choosing the number or pair carefully players can fill the numbered squares on the grid to get a completed column.

Place Value, the second pack, contains seven games and puzzles at levels two, three and four of the National Curriculum. Six of the programs support the concept of place value, but the seventh, **Shape Hunt**, involves the search for a square and is described as "a little light relief".

The first four programs are variations on a theme and use the rolling die again. Depending on the game, points are awarded if the larger numbers form number sentences or sums and include the less than and greater than signs.

The programs achieve their goal but the instructions and scoring are difficult for young children to understand even if they



esm

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Value A
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Try number: 3

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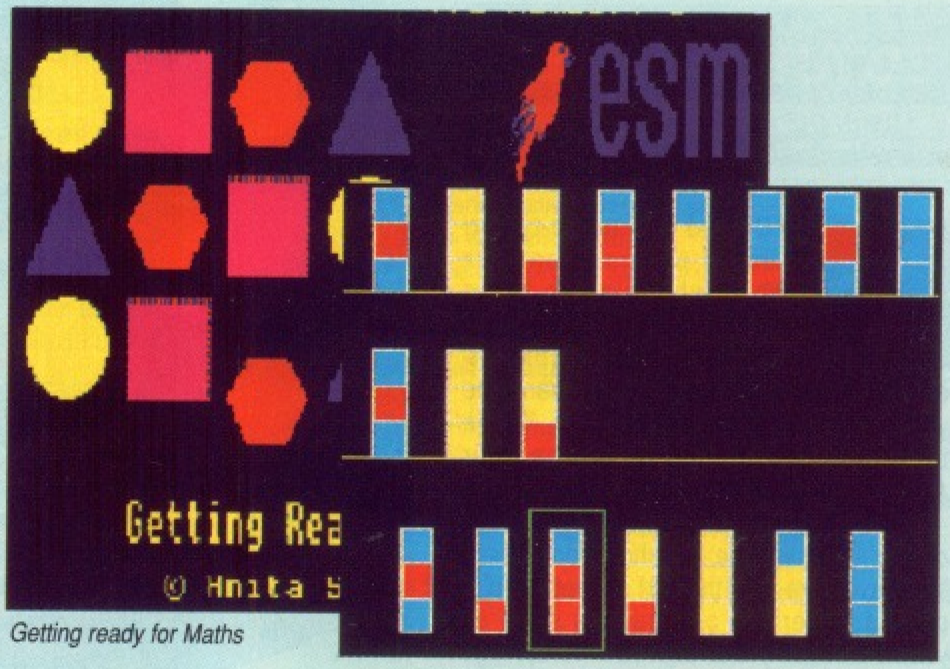
s my number...

66

You are cold



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Getting Rea

© Anita S

Getting ready for Maths

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have a good grasp of place value. Using the programs with an adult is best and probability is an unexpected bonus!

The concept of probability was neglected by many published maths schemes until recently, when the National Curriculum gave it the status it deserves.

A child with an understanding of probability will have an advantage when deciding where to place the numbers shown on the die, and it would be possible to use the programs to reinforce the concept with those who are relatively new to it.

Find Me is a guess the number game. In all the three versions the computer selects a number between 0 and 100. The differences between the games lie in the clues which the computer gives. In the simplest game clues are of the too big or too small variety while the hardest asks for you to decide before you start, how hot 'hot' should be and when 'cold' should become "freezing'.

Another game with three levels of difficulty is **Counting Words**. A number is displayed in words and you must enter the equivalent in figures. Different levels offer larger numbers.

If mistakes are made you are taken through the process digit by digit.

The object of **Shape Hunt** is to find a large blue square within a grid by colouring it in square by square. Described as a diversion, it is just that, but a useful one for all that. If a child really understands what it is that makes a square a square then success will be quick. If that understanding is not there using the program may help it develop.

Finally **Number Games** is pitched higher. Aimed at Maths Attainment Targets 1, 3 and 5 at levels between 3 and 5, it contains eight programs.

Chains is a puzzle which asks you to

Frank Jukes assesses ESM's relaunch of some classics

add numbers together in a chain to match a given target number. Producing some interesting problems it isn't always possible to match the target number.

Counters, Make 37 and **Make 57** are strategy games for two players. The objective is to reach a given total by selecting numbers from an on-screen grid. The games are quite simple and would be useful for providing addition practice, but I'm not so sure that time devoted to these programs would be well spent.

Spot the Pattern is better. A random series of seven numbers between 0 and 100 is displayed with all but two replaced by stars. You must find the other five, one point deducted from a starting score of 20 for every wrong guess. Three levels of difficulty cater for a wide range of ability.

For children who understand such terms as square, cube, triangle, more than and less than when applied to numbers **Ask Me** provides an alternative approach to the **Find Me** games of the **Place Value** pack.

Similarly simple, it provides a lot of motivation to look for a quick and elegant solution using the attributes of the different terms. Children enjoy playing it.

Play Train is excellent, but like others in the series it suffers from poor graphics. The problem is to fill a train's carriages with a given number of passengers. Passengers only come in two groups, so trial and error is the way to solve this one. A strategy can be developed and applied though.

The last game is **Sliders**. It is suggested as one for two teams, and I would recommend teams of only two children. There is simply not enough to do to involve more, especially when it is possible for the second player or team to win every time once a relatively simple trick has been learned.

Summing up

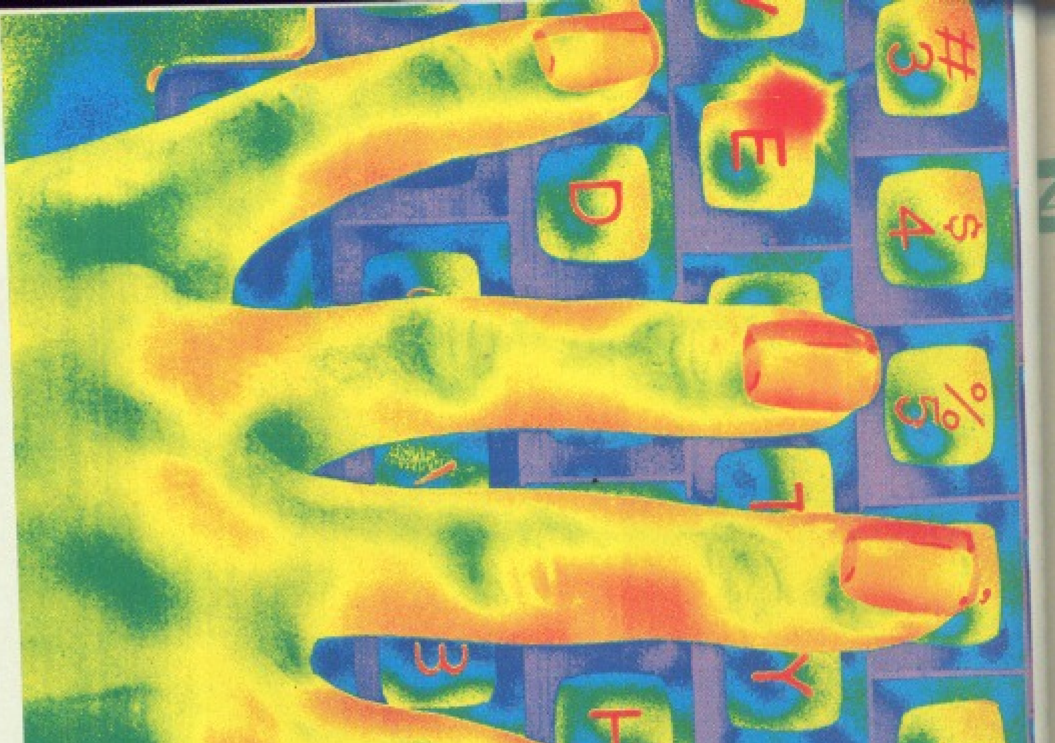
Most of the programs in the three packages are repetitive, but anyone tempted to dismiss them as "drill and practice" would be wrong. With a little imagination, and advice from the simple and clear 10 page manual, they can be used to provide useful mathematical challenges.

Young children can practise new skills and apply them in new situations in a fun and non-threatening environment. They can also experience situations where there are opportunities for problem solving and logical thinking, as well as strategic planning which may quickly be tested and modified if it is not successful.

Taken as a whole, the three packs are a useful and mathematically sound resource, but the programs are showing their age and are not cheap.

Finally, I am concerned that ESM should attempt to link what is essentially a collection of existing materials to the National Curriculum by simply including a reference to it in the title and by brief references to attainment targets in the manual.

Like many other recently published materials, the programs were not specially written for the National Curriculum and any links are simply implied. Unfortunately, as the practice spreads it brings no credit to anyone, and is in a sense misleading.



Qwerty mad

Rog Frost tries out his typing skills

Product: Risc Type
Price: £19.95
Supplier: CIS. 8 Herbrand Street, London WC1N 1HZ.
Tel: 071-833 4023

RISC Type is a touch-typing tutorial program, and for those who wish to learn this skill, it's extremely useful to have a kindly computer which recognises errors and can give you a speed typing rate as well. These tasks can now be carried out on your Archimedes, courtesy of this software.

The basic idea is simple. A small section of text – just one line – is shown on screen. You have to re-type the text so that it is displayed under the original. As soon as you've finished you are given a percentage rating for accuracy, told how many words you can type each minute and receive a simple message.

The words per minute rating is somewhat misleading. I have achieved speeds of over 220 words per minute by the simple trick of making each and every word just one letter long. A better measure would have been to have worked on average words of five letters.You are, in fact, bound to end with no mistakes on the screen. This is because the program will not display the wrong letters that you type.

You'll know, though, when you do err since the computer offers you a low pitched raspberry noise rather than the bell which signals success.

If you hear any of these fruity asides you have to finish the task and try it again. And you keep repeating the same line until you get it right, at which point you are offered the next line of the lesson to work on.

Options allow any feature to be turned on or off – including the sound effects – and an extra metronome sound can be added to help inculcate a good typing rhythm. All of the messages that tell you how good or bad you are can be removed.

A printer can be selected and the printout shows precisely what you typed, including mistakes, along with the correct line of text. A large on-screen display of the keyboard can be removed if you don't require it. All the options can be saved to disc.

Complete with a set of lessons which start with the home keys and take you right through the keyboard, RiscType's ideas are sound and I am assured by a typing teacher that everything is correct.

Everything, that is, apart from spelling mistakes and errors in grammar. I feel cheated when I spell things correctly only to get a raspberry. This problem of lesson accuracy permeates the whole package, which includes ideas for learning poems or French vocabulary.

This should not be a major worry since lessons are only !Edit files, so it's easy to create your own or correct the ones there.

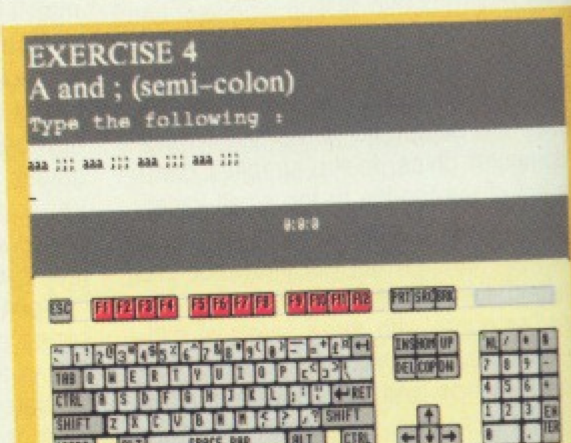
If you follow the instructions in the handbook, though, your new lessons won't work. This is because the required layout of the lesson is not described properly in the book – I had to study the structure of one already on the disc.

It's a pity to have to make these fairly basic criticisms. After all, it would have taken very little effort for the writers or publishers to have dealt with these problems.

Perhaps they'll be put right on the all-action version two which is promised soon. I hope so because they spoil what is otherwise a very good program.

Summing up

RiscType is a nice package to use, and is a good way to improve your keyboard skills. However its use will be limited until CIS sort out some of the problems of accuracy which exist.

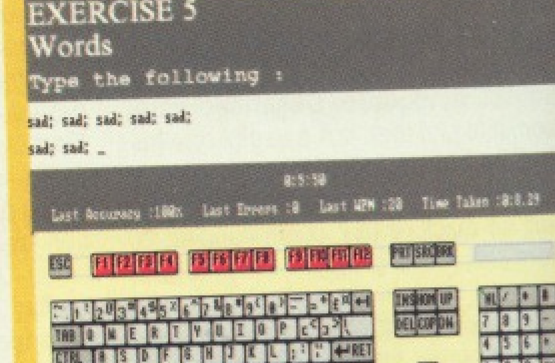


EXERCISE 4
A and ; (semi-colon)
Type the following :

```
aaa ;;; aaa ;;; aaa ;;; aaa ;;;
_
0:0:0
```

ESC
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12
PRT SCR BRK
TAB CTRL SHIFT CAPS ALT SPACE BAR RET
INS HOM UP DEL COP DN

Getting started



EXERCISE 5
Words
Type the following :

```
sad; sad; sad; sad; sad;
sad; sad; _
0:5:30
Last Accuracy :100%   Last Errors :0   Last WPM :20   Time Taken :0:0.29
```

ESC
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12
PRT SCR BRK
TAB CTRL SHIFT CAPS ALT SPACE BAR RET
INS HOM UP DEL COP DN

Further along in the lesson

Presenting PROTEXT 5.0

Five years to the month after Protext version 1 was launched Arnor are pleased to present version 5, an enormous leap forward in both ease of use and performance.

Protext 5.0 introduces a completely integrated system of pull down menus and dialogue boxes. The menus are among the many operations that may now be carried out with either the mouse or the keyboard. Protext really does give you the best of both worlds.

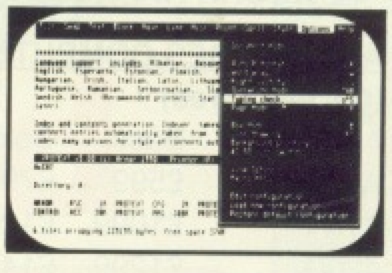
Protext 5.0 handles printer fonts flexibly and accurately. You can make full use of any number of proportional printer fonts, mix them freely within any line, centre them in headers, use automatically formatted footnotes. And Protext correctly formats your text as you type it, no matter how many font changes you use, showing you line and page breaks exactly as they will be printed.

Protext 5.0 is still the fastest word processor around. Even though we have made all these major improvements we have taken great care to ensure that text editing is as fast as ever. The menus work smoothly and quickly even with high resolution displays. But of course, you can use Protext's efficient set of commands and keys just as before and 5.0 remains compatible with all earlier versions from 1.0 onwards.

Protext 5.0 is a worthy successor to version 4, which was described as "the best word processor at any price", "the best text processor on the Amiga" and "the most powerful word processor on the Atari ST" (AUI, ST/Amiga Format, ST User).

Protext 5.0 heralds a new era of multi-lingual European software, in time for 1992 and the opening up of Eastern Europe. Protext may be used in at least 27 different languages and has 10 different national keyboard layouts built in (plus the capability to define your own symbols and keyboard layouts).

The Features



☆ **New fast & easy to use pull down menu system** with dialogue boxes and alerts; file selector; mouse dragging to set blocks. Menus complement existing commands and keyboard shortcuts, do not replace them. Menus may be used with mouse or keyboard. Amiga version follows Intuition guidelines.

☆ **Enhanced printing capabilities** supports multiple proportional fonts; mixing of different font sizes on the same line; proportional formatting whilst editing; side margin, headers and footers independent of main text font. Tabs, decimal tabs and centre tabs. Extensive range of printer drivers supplied.

☆ **Multiple file editing** - up to 36 files may be open; split screen editing.

☆ **Graphics mode support** on PC allows use in virtually any text or graphics mode including 132 column or 75 line VGA modes; user defined characters and on-screen bold, italics and underlining now on all versions; use of 13 different accents on any character.

☆ **Language support includes** Albanian, Basque, Czech, Danish, Dutch, English, Esperanto, Estonian, Flemish, Finnish, French, German, Hungarian, Irish, Italian, Latin, Lithuanian, Norwegian, Polish, Portuguese, Rumanian, Serbocroatian, Slovak, Spanish, Slovene, Swedish, Welsh. (Note: some printers do not support all languages).

☆ **Index and contents** generation. Indexer takes marked words or phrases; contents entries automatically taken from titles wrapped in control codes; many options for style of contents output.

☆ **Spelling checker** features completely new 110,000+ word Collins dictionary with very fast phonetic lookup. Anagrams and find word pattern. Foreign language dictionaries (German, Swedish available now, others to follow).

☆ **Many other enhancements** including multi-line footnotes and endnotes; automatic timed save; add column or row of figures; indent tabs; find word at cursor; 40 column mode support; sentence operations; inter- paragraph space; much improved expression evaluator; self incrementing variables; Roman numerals; newspaper-style column printing; file sorting utility with special options for names and addresses; revised manual plus new tutorial guide.

☆ **And don't forget Protext still includes** background printing; box manipulation; macro recording; exec files; headers and footers; find and replace; mail merging; undelete; file conversion utility; configuration program; auto reformatting; on screen help; time and date; typewriter mode; line drawing; disc utilities.

Prices

Protext 5.0 may be purchased from any good computer shop or directly from Arnor. Upgrades from earlier versions are only available from Arnor and the original discs should be returned with your order.

	PC	Amiga	ST/TT	Archimedes
Protext 5.0	£149.95	£149.95	£149.95	£149.95
Upgrade from v4.2	£60	£60	£60	N/A
from earlier versions	£75	£75	£75	N/A
Protext 4.2	£99.95	£99.95	£99.95	N/A
Prodata 1.1	£79.95	£79.95	£79.95	due 1991 Q1

Notes:

Protext 5.0 requires at least 640K of memory on all machines
Protext 4.2 requires at least 512K of memory on all machines
Prodata requires 1MB of memory on the Amiga

ARNOR

Arnor Ltd (MU), 611 Lincoln Road, Peterborough, PE1 3HA. Tel: 0733 68909 (24 hr), Fax: 0733 67299

Your four minute friend

Zak Kipling's utility makes sure you're never again left with a dead screen and hours of work down the drain

SURELY it's happened to you: You've just written a masterpiece, you're just about to save it when someone trips over the mains lead. Or perhaps you *COMPACT the disc first and corrupt the memory.

With this cunning program you can put a stop to this fraught state of affairs for good because it saves your program to disc automatically every four minutes.

Type in the listing and save it as SaveSrc. Correct any typing errors with the checksums and run it. This creates the machine code. Now you just copy the line that's printed at the end in order to save it.

To start up type *AutoSav, and begin writing your program. The first line must be:

```
REM > Filename
```

Spaces are irrelevent and may be put wherever you want. Quotes are not necessary, but a double quote before the filename is permitted, and must be used if the filename begins with a space or is null.

A quote mark at the end of the filename will be treated as part of the filename, except in ADFS, where it will be ignored. The right-pointing arrow, or greater than symbol, is compulsory. These lines are all correct:

```
REM > Prog1
REM>GAME
REM >$.convert
REM> "
```

The last one is a double quote mark followed by one space. But these are not on:

```
REM Program
REM >
```

The program is not saved but no error is generated.

```
REM>"Editor"
```

This is allowed under ADFS but for the DFS the name would be *EDITOR"*.

```
REM > main"
```

Also allowed under the ADFS, but for the DFS the name would be *main"*. If the format is wrong – or this line is not at the beginning – the program will not be saved. If the filename is invalid, or there is not enough room on the disc, an error will occur when there's an attempt to save the program.

You can set the time inverval between each save in seconds using the *LINE command, for example:

```
*LINE 60
*LINE 120
*LINE 210
*LINE
```

The first three set the interval to one, two and three and a half minutes, while the last one resets the value to the default of four minutes and also re-enables the AutoSav program.

*CODE has two functions: On its own, it saves the program immediately and re-enables the AutoSav program. Used like this:

```
*CODE 1
```

it disables auto-saving.

The program itself uses memory from &900 to &AFF, so don't use sound envelopes 5 to 16, RS423, or cassete files – since this is mainly used when writing the program it shouldn't be a problem.

The AutoSav program should be added to your boot file as a simple *AutoSav command so that it's set up automatically with the rest of your initialisation routines.

● *So there you have it. A useful routine to protect your valuable programs from accidental loss.*

➤

How it works

The program intercepts the event and user vectors and sets the interval timer for four minutes – the default time between saves – and enables the interval timer crossing zero event.

If the user vector is called, it first checks for *CODE, and if it isn't *CODE, for *LINE, and if it's not that either just exits. If it was *CODE the program looks at the X register, which is *CODE's first parameter.

If X is 1 the interval timer event is disabled which stops the program running. Otherwise the accumulator is set to five – the number for the interval timer crossing zero event – and the event routine called.

If *LINE has been issued the interrupts are disabled to prevent saving while the interval between saves is being altered.

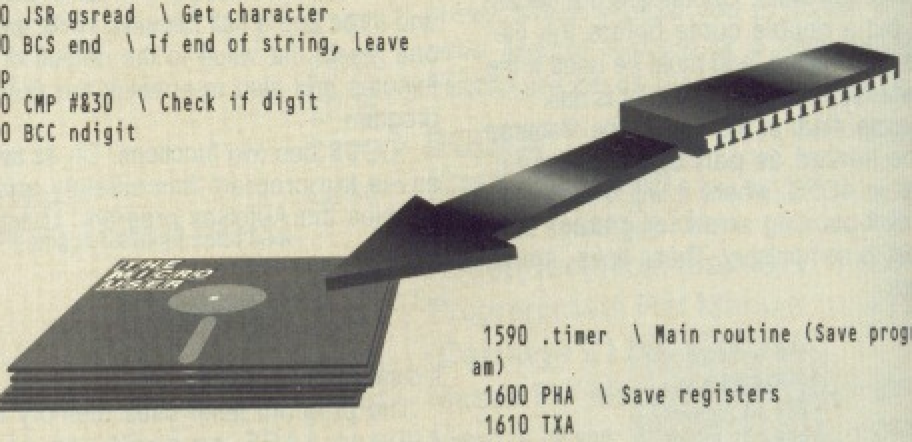
The value following *LINE is read using the GSInit and GSRead routines. The actual conversion from decimal to binary involves multiplying the previous value by ten then adding the new digit.

If the event vector is called, the event number in the accumulator is checked to see if it is the timer event. If not, the program exits. Otherwise the timer is reset, and event five enabled if it has been turned off, and the first two bytes of the program in memory checked to see if they conform to the format character &0D followed by character &00. If not then it's not a Basic program and the routine exits.

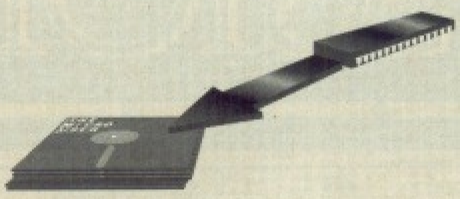
If it is Basic the first line is examined for a REM token – value &F4 – an assembler comment, \\, and a greater-than sign, >. The assembler comment is permitted because you may be using overlays to assemble large machine code programs.

The filename is extracted – if there is one – the necessary save parameters set up and finally the program is stored to disc.

```
   10 REM > SaveSrc
   20 REM by Zak Kipling
   30 REM (c) The Micro User
   40 top=&12
   50 page=&18
   60 block=&70
   70 addr=&70
   80 userv=&200
   90 eventv=&220
  100 temp=&AF7
  110 interval=&AF9
  120 timebuf=&AFB
  130 gsinit=&FFC2
  140 gsread=&FFC5
  150 osfile=&FFDD
  160 osword=&FFF1
  170 osbyte=&FFF4
  180 REM Work out entry point for BASIC in use
  190 V%=?(&8000+?&8007+7) AND &0F
  200 IF V%=1 THEN entry=&1F
  210 IF V%=2 THEN entry=&23
  220 IF V%=4 THEN entry=&2B
  230 IF V%<1 OR V%=3 OR V%>4 THEN entry=&00
  240 FOR I%=0 TO 2 STEP 2
  250 P%=&900
  260 [OPT I%
  270 .init  \ Initialise
  280   \ Check if user and event vectors already set
  290 LDA eventv+1
  300 CMP #event DIV &100
  310 BNE setvecs
  320 LDA eventv
  330 CMP #event AND &FF
  340 BEQ init_time
  350 .setvecs  \ If not, set them
  360 LDA eventv  \ Save event vector
  370 STA oldvec
  380 LDA eventv+1
  390 STA oldvec+1
  400 LDA #event AND &FF  \ Set event vector
  410 STA eventv
  420 LDA #event DIV &100
  430 STA eventv+1
  440 LDA userv  \ Save user vector
  450 STA oldusr
  460 LDA userv+1
  470 STA oldusr+1
  480 LDA #user AND &FF  \ Set user vector
  490 STA userv
  500 LDA #user DIV &100
  510 STA userv+1
  520 .init_time  \ Set time interval
  530 LDA #&C0
  540 STA interval
  550 LDA #&5D
  560 STA interval+1
  570 .donevecs
  580   \ Load time into interval timer
  590 SEC
  600 LDA #&00  \ Byte 0 (Least Significant Byte)
  610 SBC interval
  620 STA timebuf
  630 LDA #&00  \ Byte 1
  640 SBC interval+1
  650 STA timebuf+1
  660 LDA #&FF
  670 STA timebuf+2  \ Byte 2
  680 STA timebuf+3  \ Byte 3
  690 STA timebuf+4  \ Byte 4 (Most Significant Byte)
  700 LDA #&04  \ Set timer
  710 LDY #timebuf DIV &100
  720 LDX #timebuf AND &FF
  730 JSR osword
  740 LDA #&0E  \ Enable event
  750 LDX #&05  \ Interval timer crossing zero
  760 JMP osbyte
  770 .user  \ User vector code
  780 CMP #&00  \ Check for *CODE (Save program now/Turn program off)
  790 BNE ncode
  800 CPX #&01  \ Check if first parameter 1
  810 BNE not_off  \ If not, emulate timer event
  820 LDA #&0D  \ Disable event
  830 LDX #&05  \ Timer event
  840 JMP osbyte
  850 .not_off \ Emulate timer event
  860 LDA #&05  \ If *CODE, act as for timer event
  870 JMP event
  880 .ncode
  890 CMP #&01  \ Check for *LINE
  900 BEQ line
  910 JMP (oldusr)  \ If not, exit
  920 .line  \ Code for *LINE (Set time interval and enable interrupt)
  930 SEI  \ Prevent timer event whilst altering time
  940 LDA #&00  \ Set to zero
  950 STA interval
  960 STA interval+1
  970 STX &F2  \ Load command line position into &F2/3, for GSREAD
  980 STY &F3
  990 LDY #&00  \ Set offset to zero
 1000 CLC  \ String ends with space, CR, or second quote mark
 1010 JSR gsinit
 1020 BNE string  \ If string present, jump to decoding loop
 1030 JMP init_time  \ Otherwise, re_initialise to 4 minutes
 1040 .string  \ Decoding loop
 1050 JSR gsread  \ Get character
 1060 BCS end  \ If end of string, leave loop
 1070 CMP #&30  \ Check if digit
 1080 BCC ndigit
 1090 CMP #&3A
 1100 BCC digit
 1110 .ndigit  \ If not digit:
 1120 LDA #&0D  \ Disable event
 1130 LDX #&05  \ Timer event
 1140 JSR osbyte
 1150 CLI  \ Enable interrupts to prevent lock-up
 1160 BRK  \ Generate error
 1170 EQUB &00  \ Error number
 1180 EQUS "Bad digit"  \ Message
 1190 EQUB &00  \ Message terminator
 1200 .digit  \ If it was a digit:
 1210 AND #&0F  \ Convert ASCII code to number
 1220 CLC  \ Add digit on to number as Least Significant Digit
 1230 ADC interval
 1240 STA interval
 1250 LDA #&00
 1260 ADC interval+1
 1270 STA interval+1
 1280 JSR tentimes  \ Multiply by ten
 1290 JMP string  \ Continue loop
 1300 .end  \ Leave loop
 1310 JSR tentimes  \ Multiply by ten again to get centiseconds
 1320 CLI  \ Enable interrupts now alterations done
 1330 JMP donevecs  \ Load into timer
 1340 .tentimes  \ x10 subroutine (based on long multiplication):
 1350 ASL interval  \ Multiply by two
 1360 ROL interval+1
 1370 LDA interval  \ Make copy of this number
 1380 STA temp
 1390 LDA interval+1
 1400 STA temp+1
 1410 ASL temp  \ Multiply copy by 2 (now original x4)
 1420 ROL temp+1
 1430 ASL temp  \ Multiply copy by 2 (x8)
 1440 ROL temp+1
 1450 CLC  \ Add (original x 8) to (original x 2) to get (original x 10)
 1460 LDA temp
 1470 ADC interval
 1480 STA interval
 1490 LDA temp+1
 1500 ADC interval+1
 1510 STA interval+1
 1520 RTS
 1530 .event  \ Event vector code
 1540 PHP
 1550 CMP #&05  \ Check if timer event
 1560 BEQ timer  \ If it is, then go to main routine
 1570 PLP
 1580 JMP (oldvec)  \ Otherwise exit
```



```
 1590 .timer  \ Main routine (Save program)
 1600 PHA  \ Save registers
 1610 TXA
 1620 PHA
 1630 TYA
 1640 PHA
 1650 JSR donevecs  \ Reload interval timer
 1660 LDA page  \ Get PAGE and store in pointer
 1670 STA addr+1
 1680 LDA #&00
 1690 STA addr
 1700 TAY  \ Offset zero
 1710 LDA (addr),Y  \ Check if first byt
e carraige return
 1720 CMP #&0D
 1730 BNE exit  \ If not, bad program, s
o exit
 1740 INY  \ Next byte (Line number MSB)
 1750 LDA (addr),Y
 1760 BMI exit  \ If bit 7 set then empt
y program, so exit
 1770 LDY #&04  \ First byte of actual p
rogram line
 1780 JSR strip  \ Skip spaces
 1790 LDA (addr),Y  \ Get byte
 1800 CMP #&F4  \ Check for REM token
 1810 BEQ comment  \ If it is, examine r
est of line
 1820 CMP #&5C  \ check if assembler com
ment '\'
 1830 BNE exit  \ If not, then exit
 1840 .comment  \ Examine rest of line a
nd check format
 1850 INY  \ Get next non-space characte
r
 1860 JSR strip
 1870 LDA (addr),Y
 1880 CMP #&3E  \ Check if '>'
 1890 BNE exit  \ If not, bad format, so
 exit
 1900 INY  \ Next non-space character
 1910 JSR strip
 1920 LDA (addr),Y
 1930 CMP #&0D  \ Check for CR (End of l
ine)
 1940 BEQ exit  \ If not then no filenam
e, so exit
 1950 CMP #&22  \ Check for <">
 1960 BNE nquote
 1970 INY  \ Increment pointer to skip q
uote
 1980 .nquote
 1990 TYA  \ Add offset to base pointer,
 so it points to the filename for OSFILE
 2000 CLC
 2010 ADC addr
 2020 STA addr
 2030 BCC ncarry
 2040 INC addr+1
 2050 .ncarry
 2060   \ Set up rest of OSFILE paramete
r block
 2070 LDA page  \ Load address (Byte 1)
PAGE
 2080 STA block+3
 2090 LDX #&00  \ Load address (Byte 0/L
SB)
 2100 STX block+2
 2110 STA block+11  \ Start address (Byt
e 1) same as load address
 2120 STX block+10  \ Start address (Byt
e 0/LSB)
 2130 LDA #entry  \ Execution address (B
yte 0/LSB) BASIC rom entry point
 2140 STA block+6
 2150 LDA #&80  \ Execution address (Byt
e 1)
 2160 STA block+7
 2170 LDA top  \ End address (Byte 0/LSB
) TOP
 2180 STA block+14
 2190 LDA top+1  \ End address (Byte 1)
 2200 STA block+15
 2210 LDA #&FF  \ Machine hi-order addre
ss for bytes 2/3 of addresses:
 2220 STA block+4  \ Load address (Byte
2)
 2230 STA block+5  \ Load address (Byte
3/MSB)
 2240 STA block+8  \ Execution address (
Byte 2)
```



```
 2250 STA block+9  \ Execution address (
Byte 3/MSB)
 2260 STA block+12  \ Start address (Byt
e 2)
 2270 STA block+13  \ Start address (Byt
e 3/MSB)
 2280 STA block+16  \ End address (Byte
2)
 2290 STA block+17  \ End address (Byte
3/MSB)
 2300 LDY #block DIV &100
 2310 LDX #block AND &FF
 2320 LDA #&00  \ Save file
 2330 JSR osfile
 2340 .exit
 2350 PLA  \ Retrieve registers
 2360 TAY
 2370 PLA
 2380 TAX
 2390 PLA
 2400 PLP
 2410 RTS
 2420 .strip  \ Space skipping subroutin
e
 2430 LDA (addr),Y  \ Get character
 2440 CMP #&20  \ Check if space
 2450 BNE stripped  \ If not, leave subr
outine
 2460 INY  \ Next byte
 2470 JMP strip  \ Continue loop
 2480 .stripped  \ Leave subroutine
 2490 RTS
 2500 .oldvec BRK:BRK  Dummy
 2510 .oldusr BRK:BRK  Dummy
 2520 ]
 2530 NEXT
 2540 PRINT" *SAVE AutoSav FFFF0900+"+ST
R$~(P%-&900)
```

Get it right ✓

```
  10 =    0 0 |  520 = BD8D 3 | 1030 = E7FA 5 | 1540 = 805E 4 | 2050 = 6C40 1
  20 =    0 0 |  530 = 2A71 B | 1040 = 51DE 8 | 1550 = 794C 5 | 2060 =    0 1
  30 =    0 0 |  540 = 6992 D | 1050 = 9EB7 A | 1560 = D3E0 3 | 2070 = 2556 3
  40 = C386 6 |  550 = B69D F | 1060 =  42A 6 | 1570 = 4C9A 9 | 2080 = 63A6 E
  50 = B653 B |  560 = EE27 C | 1070 =  960 A | 1580 = 90F7 6 | 2090 = 180B B
  60 = 743D 4 |  570 = 8F67 5 | 1080 = FAC0 0 | 1590 = FEF9 5 | 2100 = E2A5 8
  70 = 3353 1 |  580 =    0 5 | 1090 = E1B4 3 | 1600 = F674 F | 2110 = 489A A
  80 = D7D7 D |  590 = 8D00 3 | 1100 = 3C58 6 | 1610 = 5DFD 3 | 2120 = 5027 B
  90 = 1927 F |  600 = 7CB6 3 | 1110 = 28EC A | 1620 = 824E 3 | 2130 = 9D96 3
 100 = 18BE 5 |  610 = 13D1 B | 1120 = 787E 2 | 1630 = 6ECC 4 | 2140 = 3303 5
 110 = EC70 9 |  620 = 6C92 1 | 1130 = F3FB 2 | 1640 = 824E F | 2150 = F975 0
 120 = A4DA 4 |  630 = 7CB6 A | 1140 = 8E7E A | 1650 = 3F34 5 | 2160 = 2322 2
 130 =   E6 D |  640 = 7112 E | 1150 = 7FAC F | 1660 = 2556 2 | 2170 = A0C1 3
 140 = 3209 E |  650 = 11D2 8 | 1160 =  260 5 | 1670 = 4B39 D | 2180 = EA70 E
 150 = BC36 7 |  660 = CBD5 0 | 1170 = 524A 2 | 1680 = 777B 5 | 2190 = 9CDB 6
 160 = 4EF9 8 |  670 = A0A9 3 | 1180 = 6533 E | 1690 = FEB2 A | 2200 = FA51 A
 170 = 7966 7 |  680 = 9799 1 | 1190 = 524A 5 | 1700 = 66C7 3 | 2210 = 2BED A
 180 =    0 7 |  690 = 1209 6 | 1200 = 77CC D | 1710 = 72B9 F | 2220 = 2C41 C
 190 = EB74 E |  700 = A076 0 | 1210 =  CCE E | 1720 = E442 6 | 2230 = 1B71 F
 200 = 1AC3 B |  710 = CCEB 6 | 1220 = B86D D | 1730 = DFFD E | 2240 = 5920 B
 210 = AE07 5 |  720 = 3E87 9 | 1230 = D39F A | 1740 = 9709 A | 2250 = 6E10 0
 220 = 4FDA 4 |  730 = 62D8 D | 1240 = 6992 F | 1750 = FCBA 5 | 2260 = 11CA 4
 230 = 4BF8 E |  740 = 4F4E 6 | 1250 = 777B 9 | 1760 = E30E 0 | 2270 = 26FA 4
 240 = A418 2 |  750 = F3FB 3 | 1260 = CE4C 3 | 1770 = 8318 1 | 2280 = CD0A C
 250 = C92F 2 |  760 = 2151 B | 1270 = EE27 3 | 1780 = B671 3 | 2290 = FA3A 1
 260 = E106 3 |  770 = D8CC 2 | 1280 = 3113 C | 1790 = 72B9 9 | 2300 = 3FA4 6
 270 = 1119 9 |  780 = 92BC 4 | 1290 = 6B72 3 | 1800 = 2B90 6 | 2310 = 48D4 F
 280 =    0 9 |  790 = 38F1 F | 1300 = 1187 8 | 1810 = DD44 3 | 2320 = 7CB6 E
 290 = 5060 8 |  800 = B69B 7 | 1310 = 3113 D | 1820 = AFA1 4 | 2330 = 8D36 6
 300 = 8BCD C |  810 = CF2F 0 | 1320 = 7FAC 6 | 1830 = DFFD 6 | 2340 = DC83 7
 310 = 2D75 1 |  820 = 787E 6 | 1330 = AB5B A | 1840 = 2EE6 D | 2350 = 3C85 A
 320 = FA8C A |  830 = F3FB B | 1340 = 5421 6 | 1850 = 9709 9 | 2360 = 772F 7
 330 = 7E98 E |  840 = 2151 B | 1350 = DFF9 3 | 1860 =  EB1 B | 2370 = 4E8A A
 340 = BD20 B |  850 = EC3E A | 1360 = 5204 9 | 1870 = FCBA 7 | 2380 = 670E 2
 350 = 95E3 C |  860 = 9746 B | 1370 = 7BE3 B | 1880 = 3A98 0 | 2390 = 4E8A 3
 360 = 8E8A 2 |  870 = F6A0 2 | 1380 = F4BA C | 1890 = DFFD 8 | 2400 = 4C9A C
 370 = 4103 F |  880 = ED66 A | 1390 = A509 D | 1900 = 9709 F | 2410 = 9843 2
 380 = 5060 2 |  890 = A58C C | 1400 = 25FA 6 | 1910 =  EB1 E | 2420 = F38B 8
 390 = F2F0 A |  900 = E781 2 | 1410 = 56C3 4 | 1920 = FCBA B | 2430 = 72B9 C
 400 = 1605 1 |  910 = FADB 4 | 1420 = 4B9E 6 | 1930 = 9674 F | 2440 = 7FD4 0
 410 = 6B55 8 |  920 = 10B2 E | 1430 = 56C3 9 | 1940 = E99F 8 | 2450 = 5CA3 C
 420 = 27A4 B |  930 = 8881 3 | 1440 = 4B9E 5 | 1950 = 11B4 9 | 2460 = 9709 9
 430 = 21EE 7 |  940 = 7CB6 3 | 1450 = B86D D | 1960 = 893E F | 2470 = DD74 8
 440 =  CA1 3 |  950 = 6992 E | 1460 = 27B7 2 | 1970 = 9709 1 | 2480 = DFA4 7
 450 = B396 1 |  960 = EE27 5 | 1470 = D39F 3 | 1980 = 85E6 2 | 2490 = 9843 E
 460 = D24B 6 |  970 = AC2D 6 | 1480 = 6992 E | 1990 = 1261 8 | 2500 = 30D6 1
 470 = 544F B |  980 = 5B1C 8 | 1490 = B423 1 | 2000 = 74FB C | 2510 = C7C7 B
 480 =  217 1 |  990 = 5FD8 4 | 1500 = CE4C D | 2010 = F09B 8 | 2520 = 8B58 B
 490 = 5266 1 | 1000 = B86D 5 | 1510 = EE27 B | 2020 = FEB2 F | 2530 = 2C83 3
 500 = 709A 9 | 1010 = 2CEF 9 | 1520 = 9843 B | 2030 = BE60 1 | 2540 = F47F 8
 510 = 98D3 8 | 1020 = 5EC6 B | 1530 =   F6 F | 2040 = 78AE D |
```

IMPRESSION II

Impression release 2 is the first major upgrade to the leading DTP package for the Archimedes. It makes the preparation of documents, from the simplest letters to the most complex and intricate designs, easier than it has ever been before. It is the only program designed to be used as a word processor, to handle long documents while at the same time offering the most powerful page layout facilities.

Where word processing and DTP meet

As word processors grow more powerful year by year, Desk-Top-Publishing programs are becoming more like word processors, so that both types of product are evolving in the same direction. However few computers have either the power or a flexible enough operating system to allow the successful integration of the two approaches.

Impression on the Archimedes has successfully combined the best features of word processors and desk-top-publishing programs to create the logical result of that evolution. A word processor that can handle the most complex DTP, and a DTP program that can process words like no other - we call it a document processor.

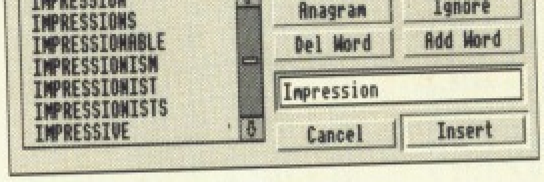
When other computers catch up with the Archimedes, all word processors will be like Impression. Why buy two programs when Impression can handle all your documentation requirements ?

Word processing

To be a successful word processor, a program has to be easy to use, include, amongst other things, real time spell checking, a powerful set of editing tools and the ability to handle documents from the simplest letter to complete books. What's more it has to be fast and responsive in use, something that lets down nearly all DTP programs.

Spelling checker

Spelling checkers have become a necessary tool in reducing errors in documents, not necessarily because they can catch spelling mistakes, but because they can also spot typing errors. The spelling checker supplied with Impression is based on the successful SpellMaster product, enhanced and fully integrated into Impression. It offers check-as-you-type, a 60,000 word main dictionary, up to 8 user extension dictionaries (which can automatically save themselves to disc) and two intelligent guess modes to help identify the correct word (one lists words that sound like the misspelt word, the other lists words based on the most common typing errors). It will even solve crossword and anagram puzzles.



IMPRESSION
IMPRESSIONS
IMPRESSIONABLE
IMPRESSIONISM
IMPRESSIONIST
IMPRESSIONISTS
IMPRESSIVE

Impression

The spelling checker dialogue

Long documents

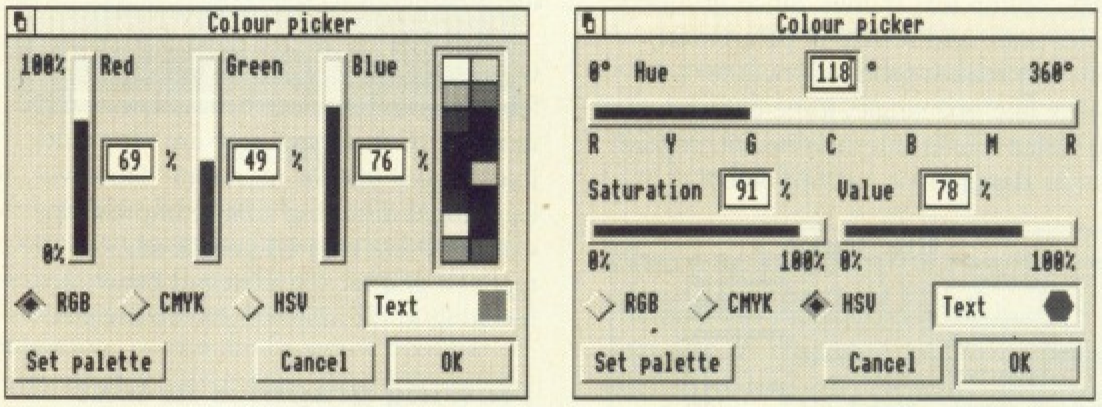
Impression supports many features to aid the creation of long documents. By employing automatic disc slaving, it can handle documents of practically any size, even on 1Mbyte Archimedes. In fact, the memory available in the machine is no longer the limiting factor. Impression has already been used to produce books and manuals consisting of hundreds of pages, sometimes many megabytes long.

It also supports automatic index and contents compilation, again an enormous time saver. Impression 2 also has the ability to keep headings attached to the following paragraph, so eliminating 'widow' lines at the bottom of pages or columns. This improves the appearance of all documents, short or long.
As you might expect, automatic page and chapter numbering is supported along with the most flexible header and footer system around. These may be any number of lines at any position on the page, and even incorporate graphics. A new feature in Impression 2 allows headers and footers, or any frame, to repeat over a whole document or any specific range of pages.

Styles

Impression's unique style system can be a time saver for all types of word processing and DTP use. The appearance of headings, titles, quotes or any region of text can be made to appear in any combination of a vast range of stylistic effects. Each combination of effects can be given a name and applied to any required region of text with one key press. Styles save time because the combination of effects can be applied in one go rather than individually applying each effect, each time it is required.
Styles are retro-active - any edit or alteration performed to a style will affect all occurrences of that style in the text. For example, if all quotes in a document are set to be italicised, and you want to change them to be bold, this involves just a single style edit.

The Impression style system is unique in two ways; firstly in the number of options available - text can be any size (even as large as the page), any line spacing, any font, any colour (background or foreground). Text may be set to have a strikethrough line or be single or double underlined. Tabs can be leadered (it automatically puts dots between tabs). Paragraphs can have an



Red 69 %

Green 49 %

Blue 76 %

Hue 118 °

Saturation 91 %

Value 78 %

The RGB colour selector (left) has a pre-selection of 16 colours, but allows any colour to be defined. Three alternative colour models are available, such as HSV shown on the right, which allows new colours to be selected in a more intuitive manner. These colour selectors can be used to set the colour of just about anything in Impression - text background and foreground, line and frame colours etc.

automatic ruling line placed after them (of any thickness and colour) etc etc.

Secondly, Impression styles can be applied to any region of text, from a single character to an entire document. They can also overlap, so that one style can be used in a paragraph while another is used for a few words in that paragraph. The above quote example is not possible on other DTP systems since they cannot apply a style to anything less than a paragraph.

Master pages

Impression master pages are a powerful tool that provides control over the appearance of a whole document. Master pages control the size, layout and structure of all pages in a document. If you want all pages to be based on three columns on A4 paper with a graphic in the corner, then the master page can be set to create all pages in this fashion automatically. However, master pages are really powerful because, like styles, they are retro-active. Any change made to a master page will be reflected throughout a document. So, if you decide to have two columns rather than three, or perhaps arrange the page landscape rather than portrait, this can be achieved by one master page change.

Impression supports any number of master pages (the pages can be any size) and can allow the page size to be changed *after* the document has been created.

Desk Top Publishing

All text and graphics are contained within rectangular frames. When using Impression as a word processor, these frames are created automatically on each new page, as the text flows from page to page. For desk-top-publishing work, the ability to place any frame at any position on the page gives absolute and total freedom of page design. Impression supports those features found in all good DTP programs such as the use of any font, any size. Frames of any size may be placed at any position on the page, and may be set to be transparent or opaque (any colour). By using the Acorn anti-aliased font system, it presents the ultimate in WYSIWYG displays. And since the scale of the page can be altered from 1% to 900% of actual size, it is possible to examine the page in enormous detail so that text of 1pt can be edited, or at smaller scales, complete page spreads can be viewed. Impression even allows more than one window, at different scales, on any document.

Impression also includes two essentials needed for any high quality, professional publishing, hyphenation and text grid-lock. The latter ensures that lines of text align across columns. Examine most quality newspapers or magazines and you will see that, even when pictures or different size headings are used, the main body text remains aligned across columns.

Hyphenation is of course used in virtually all printed material. This advert, magazines, books and all newspapers use hyphenation to improve the look and readability of text, especially when arranged in columns. Impression will hyphenate automatically if required, using a combination of exception dictionary and algorithmic hyphenation.

Users can add their own hyphenation points either manually in the text (using soft hyphens) or to words in the hyphenation exception dictionary.

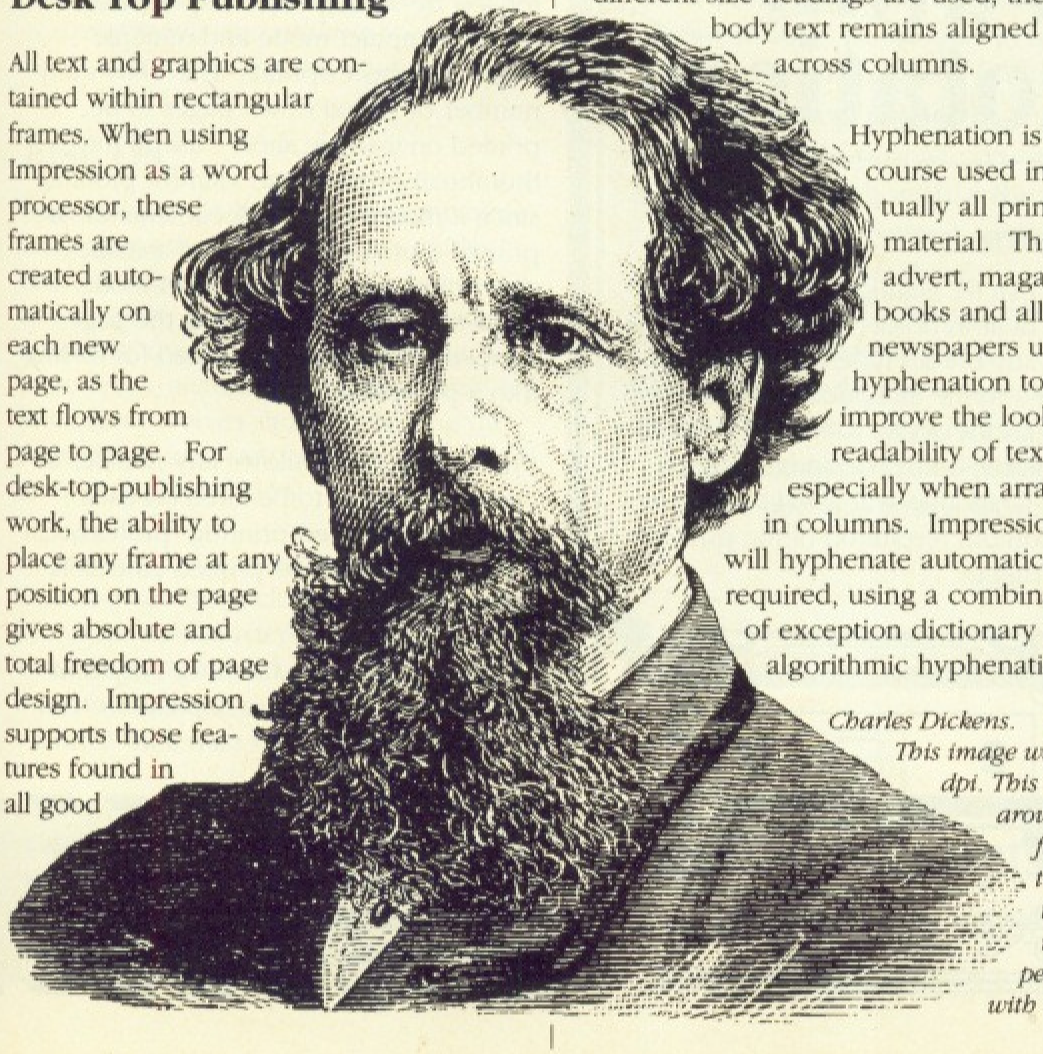
Frames

Since frames are a key part of Impression, a great deal of time has been spent ensuring that all possible frame manipulation tools are provided in a fashion that is convenient and simple to understand. Text frames can be connected to other text frames so that text will flow from frame to frame, in any desired order. (This can be displayed graphically, along with the number of words not fitting within a frame.) Any frame can be re-sized at will, and each frame can have independent repel margins. (Text can be made to repel around another frame, and the repel distance from any side of the frame can be controlled.) Text contained within a frame can also be inset from the frame edge by any amount.

Multiple frame operations

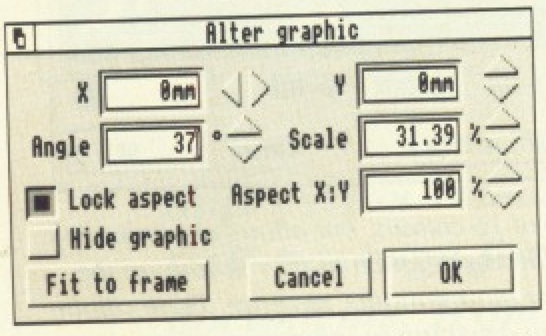
Any set of frames on a page can be temporarily selected together (multiple frame selection). In this mode the frames can be moved together as a group, and they can be copied to other pages or other documents. If one is re-sized, all others will change size by the same amount. (Imagine you want to make three columns slightly narrower - by selecting all three columns and changing the width of one, they will all change by the same amount.)

In addition frames can be permanently grouped, so captions can be permanently



Charles Dickens.
This image was scanned using the Scan-Light Junior scanner at 400 dpi. This sprite was re-touched using !Paint and a mask drawn around the head. Although Impression cannot automatically flow around irregular shapes, by placing a collection of transparent, but repelling, frames around the drawing, the text can be made to repel around any desired shape. By using the group frame facility, the repelling frames can be permanently tied to the drawing, so that the whole image with its repelling frames can be moved and scaled as one.

attached to graphics. This also allows multi-column text frames. Since grouped frames scale and re-size in proportion, three text frames grouped together act exactly like one single, three-column, text frame which can then be cut, copied, moved, dragged etc. as one object.



X 0mm

Y 0mm

Angle 37 °

Scale 31.39 %

☑ Lock aspect

Aspect X:Y 100 %

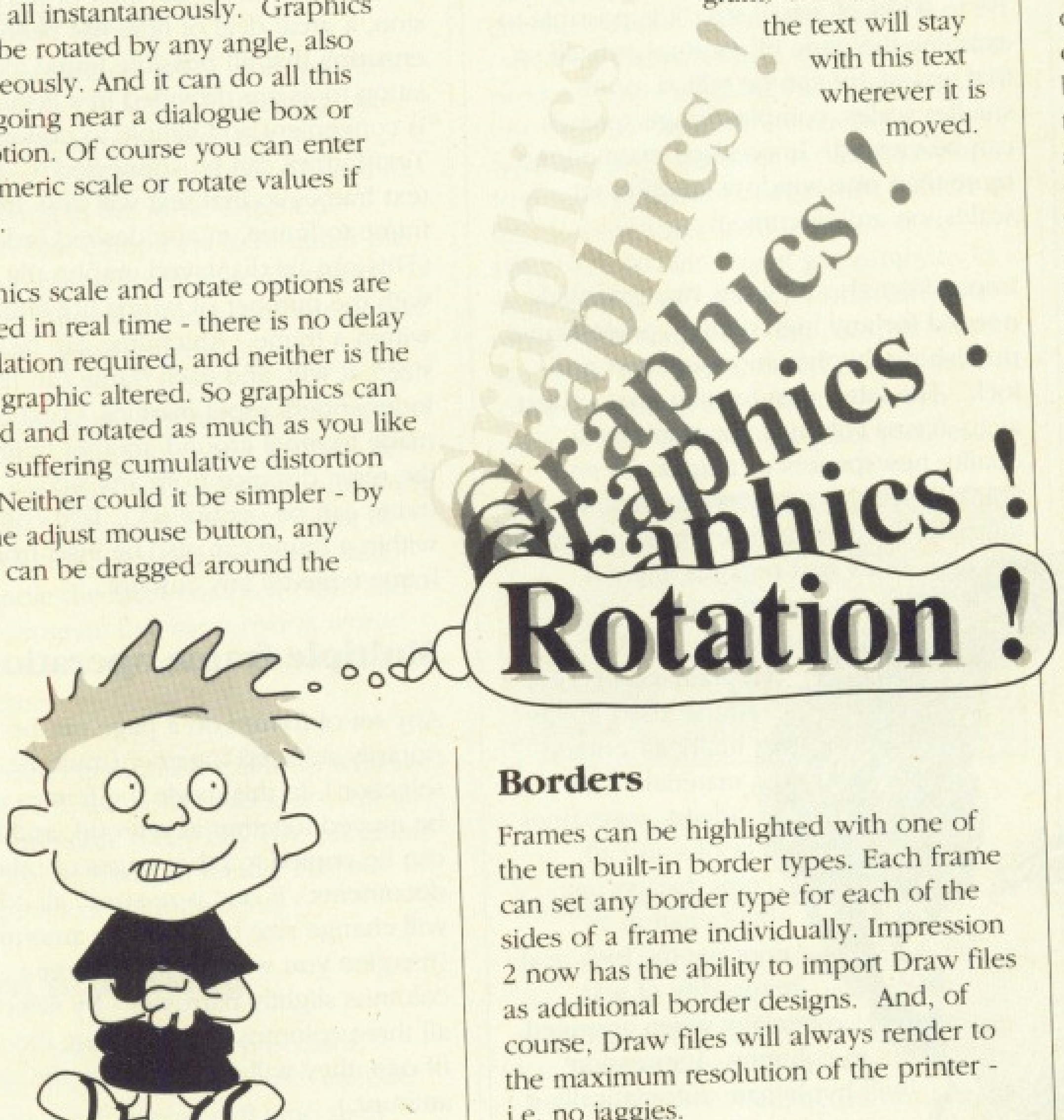
☐ Hide graphic

The Alter graphic dialogue allows precise numeric values to be entered.

Graphics

Either line art graphics (for example from !Draw) or bit-image graphics such as sprites, scanned or digitised images, can be placed in a frame. The graphics can be scaled, stretched, cropped as required, all instantaneously. Graphics can also be rotated by any angle, also instantaneously. And it can do all this without going near a dialogue box or menu option. Of course you can enter exact numeric scale or rotate values if required.

All graphics scale and rotate options are performed in real time - there is no delay or calculation required, and neither is the original graphic altered. So graphics can be scaled and rotated as much as you like without suffering cumulative distortion effects. Neither could it be simpler - by using the adjust mouse button, any graphic can be dragged around the centre of the frame, interactively. Speed tests indicate that rotation of sprite graphics is over 500 times faster than !Paint.



Although Impression cannot directly rotate text, it is supplied with a utility program that will convert lines of text into an outline graphic file. This can be dropped onto a frame where it can be freely rotated; ideal for headlines or any text that needs to stand out.

Grey level dithering is another unique feature of Impression. Normally a maximum of 16 shades of grey are reproducible on Archimedes monitors. However, by using a dithering ability, Impression can represent over 60 grey levels, for all types of graphic - sprites and Draw files, resulting in far more on screen images.

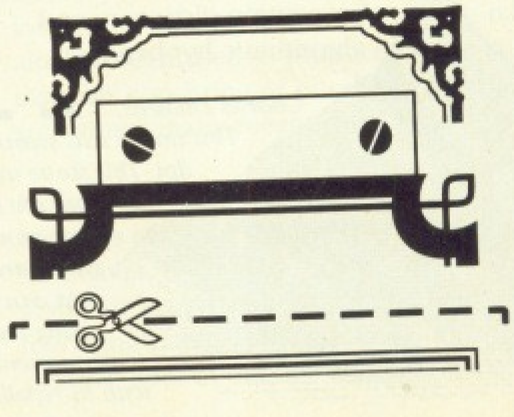
Flowing graphics in text

$$x_i = \sum_{k=1}^{n} t + m + \frac{A - Bc}{c + d} - y$$

Any document more than a few pages long, that contains graphics, usually requires the graphics to be tied to a particular part of the text. Impression can embed any graphic into the text, even as part of a line if required. For example, the above equation (from our Equasor program) embedded into the text will stay with this text wherever it is moved.

Borders

Frames can be highlighted with one of the ten built-in border types. Each frame can set any border type for each of the sides of a frame individually. Impression 2 now has the ability to import Draw files as additional border designs. And, of course, Draw files will always render to the maximum resolution of the printer - i.e. no jaggies.



Some examples of some of the frame borders possible from Impression. You can also design your own with !Draw.

Printing

Impression has always had a very wide range of printing options. Impression 2 takes this even further by supporting two completely different modes of operation - draft printing and RISC OS printing.

Word processors typically use the built in character set of the printer - this is fast and ideal for text only documents. DTP programs, on the other hand, use the RISC OS printer drivers that can deliver an exact representation of the page, including all fonts and graphics, to the maximum resolution of the printer. Unfortunately RISC OS printing can typically take 5 or more minutes per page on most dot-matrix printers. (PostScript or direct drive laser printers are the exception to this rule.)

Impression 2 supports both modes. Draft mode allows any document to be printed using the built-in character set of the printer, matching the closest fonts available in the printer to those used on screen. This can be used for obtaining a quick text draft of any document - even complex DTP layouts. If Impression is being used as a text only word processor, this mode is fast and accurate while still allowing full control over printer attributes such as bold, italic, underlining etc. This mode even allows multi-column text, multi-line headers and footers etc and so means that Impression is now a truly effective alternative to traditional character mode word processors such as First Word Plus.

RISC OS printing in Impression allows the page to be scaled by any amount or rotated by 90 degrees. Unique features are its pamphlet mode and multiple pages per sheet options. This allows any number of scaled down pages to be printed on a single sheet - useful for thumbnail printing and vital for proofing since it means that A4 documents can be printed 2 up, as A5 pages on a single sheet of paper. The pamphlet mode takes this further by printing the pages correctly rotated and arranged for folding into a pamphlet.

Impression 2 also allows any number of copies of a page to be fitted on each sheet and reflected printing (professional typeset pages can be printed emulsion side down.)

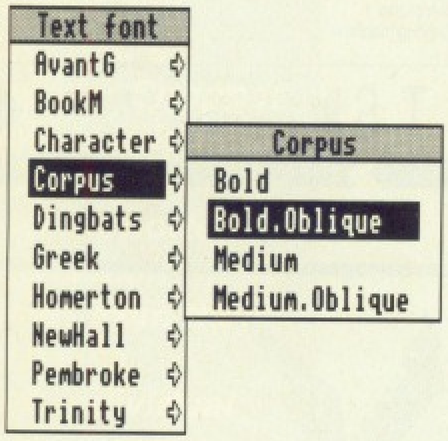
Needless to say, this document was created, arranged, edited and typeset entirely with Impression 2 on a 2Mbyte Archimedes. Line-art originated from

Word substitution

Another unique Impression feature is word substitution or abbreviation expansion - as you type. Any commonly used word or phrase can be assigned any abbreviation and added to a dictionary. When the abbreviation is subsequently entered, it is automatically changed to the fully expanded word or phrase.

Ease of use

Much of the design effort for Impression has gone into the user interface. The program has the minimum of menu options (only 6 main menu items), so new users are not overwhelmed by dozens of menus. Full use is made of dialogue boxes which can remain on screen while editing continues. For example the 'Alter graphic' dialogue, illustrated opposite, will remain on screen and dynamically indicate any alterations performed to the graphic with the mouse. The result is that, although Impression is more powerful than any alternative, it is actually simpler to learn and easier to use.



Fonts are listed by family so reducing the size of menu and making it easier to select any required weight.

RISC OS

Impression is totally RISC OS compatible and follows the Acorn RISC OS guidelines. It integrates with other programs and supports in-memory transfer with co-operating applications. For example importing a picture from !Paint, !Draw or ScanLight involves simply dropping the appropriate icon onto a blank frame in an Impression window.

Impression can access the full RISC OS character set that includes a complete set of European characters. European versions (with translated manuals, menus etc) are available.

!Draw. The scanned image was obtained using Scan-Light Junior. Proofs were produced on a LaserDirect printer (90 seconds for all 4 pages).

The IMPRESSION family

Impression 2 is part of a family of products that includes Impression Junior, a low cost, less capable, yet fully compatible version of Impression. The family therefore covers the broadest possible spread of requirements. All versions can be upgraded to more powerful versions - Junior to Impression 2 for the difference in price, Impression release 1 owners can obtain a free upgrade to release 2. All Impression owners get a regular newsletter, upgrades to future versions and the support of the largest, and oldest, software house in the Acorn market.

Unique Impression points

We could list dozens of features but the following is a list of some of the more important features that we believe set Impression apart from any other word processor or DTP program.

The Impression style system
Graphics rotate
Graphics grey-level dither
Group and multiple frame operations
The spelling checker
Built-in hyphenation
Documents larger than memory
Supremely fast and responsive
Index and contents compilation
Draft and RISC OS quality printing
18 quality outline fonts included
Retro-active master pages
Word substitution as you type
Graphics flowing within the text
The range of printing options
The ease of use
The shortest learning curve
Impression Junior
The history and experience of the Impression developers and the sheer number of man-years of effort put into this product.

Computer Concepts Ltd
Gaddesden Place, Hemel Hempstead,
Herts. HP2 6EX
Tel 0442 63933 Fax 0442 231632

Educational discounts

A range of educational discounts, site licences and network licences are available for both Impression release 2 and Impression Junior. Contact Computer Concepts for details.

The package

The package includes: A 300 page manual with reference, introduction, tutorial section and index; the acclaimed 'DTP at a glance' introduction to desk top publishing; five discs including Impression and installation program, a selection of extra utilities (such as the previously mentioned text to Draw converter and a utility that provides over a dozen new screen modes for both normal and multi-sync monitors), a selection of clip-art and example graphics, printer drivers (licensed from Acorn) for a wide range of dot matrix, laser and ink jet printers. 18 quality outline fonts. (12 licenced from Acorn). It also includes 8 non outline, character mode fonts.

Impression is compatible with all (the every growing number of) RISC OS outline fonts and can access all weights of all fonts. The following shows some of the (over 200) symbols from the Dingbats font included as part of the set.

Money back guarantee

Your guarantee of satisfaction is that when purchased direct from Computer Concepts, Impression 2 is offered with a full 'no quibble' money back guarantee.

£169.00 +VAT (£194.25)

TECHSOFT

CAD AND CAD / CAM SOFTWARE FOR THE ARCHIMEDES / A3000

DESIGNER intro

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DESIGNER INTRO is a powerful, yet easy to use 2D draughting system, based on its big brother DESIGNER (ARCHIMEDES). It is ideal for the production of high quality, accurate drawings, particularly when linked to a plotter. It makes light work of all the difficult areas of CAD, such as true blending arcs and tangents, simple deletion of part lines and arcs, automatic hatching, etc. Further features include ellipses, dimensioning, text, move, rotate, mirror image, alter size, pan, zoom, etc. DESIGNER INTRO is an ideal introduction to CAD. In fact it will easily cope with all of most peoples draughting requirements.

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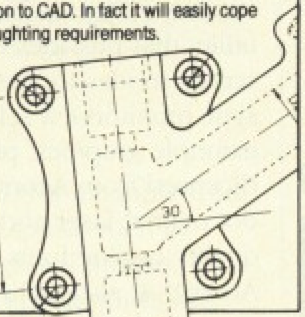
Overseas **£95**



DESIGNER (ARCHIMEDES)

MORE THAN JUST DRAUGHTING

DESIGNER (ARCHIMEDES) offers a range of features that go well beyond just draughting. As well as a wide range of draughting options, it also provides some of the most comprehensive text (including font/symbol design), drawing manipulation and editing capabilities available. Additionally, a 3D effects option allows "3D" extrusions in a variety of projections, and wire frame solids of revolution, to be created for quick and simple visualisation. The graphic design capability of DESIGNER (ARCHIMEDES) easily encompasses such diverse activities as engineeering/architectural drawing, poster design, logo or sign design, dress design, cartography, etc. As well as supporting a vast range of plotters, DESIGNER (ARCHIMEDES) also has specific outputs for such devices as the ROLAND CAMM 1 vinyl cutter and the CAMM 2 engraver/miller (both available from TechSoft).

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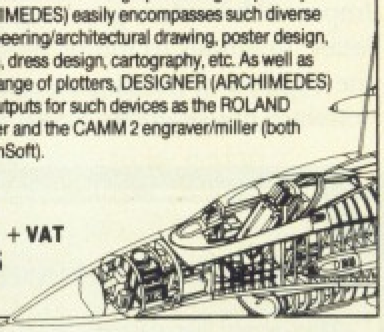

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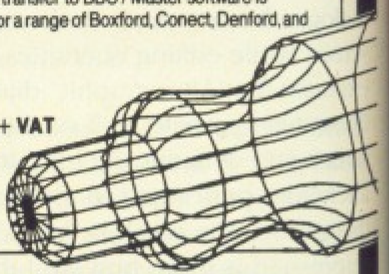

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Full information is detailed in our Product Guide available on request.

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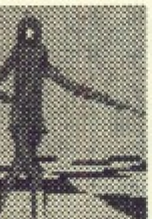
Ace Computing

RISC OS Euclid is the best multi-tasking 3D graphics and animation system for the Archimedes. It works like a 3D version of Draw, and now forms the centrepiece for a number of related products allowing the creation of complex animation sequences with the minimum of effort.



Mogul makes full use of **Euclid**'s unique hierarchical data structure to generate films of 3D objects with articulated motion and simultaneous camera motion.

Tween produces films from Draw files. It uses techniques similar to **Mogul** and generates a film by calculating intermediate frames from a set of key positions.

Splice allows you to edit films produced by **Mogul** or **Tween**. You can even produce hand-drawn cartoons by converting sprites from any source.

Support is provided for import and export of Sprites and Drawfiles. Films can be played by the **Projector** which comes free with **Euclid, Mogul, Splice and Tween**. Films and Euclid files can be used with Genesis.

Such is the enthusiasm for **Euclid** there is now a user group called **Elements** which provides a quarterly disk containing hints, tips, animations and user pictures like the ones in this advertisement.

Euclid £70 **Mogul** £20 **Splice** £30
Tween £30 **ArcLight** £50
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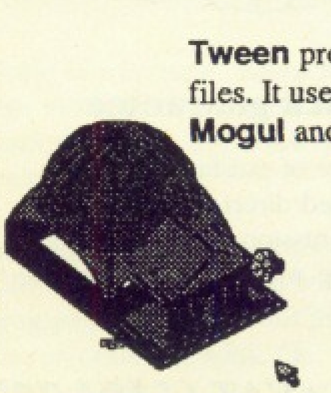
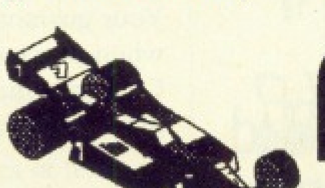
All prices include VAT and P&P.





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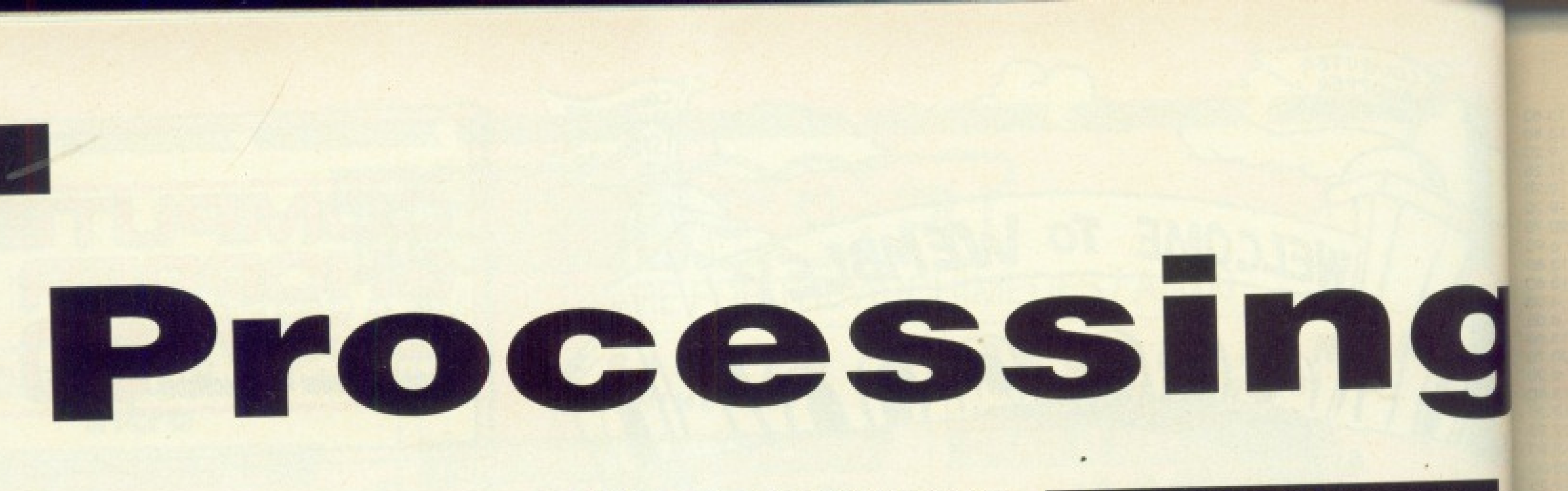


Processing

Christopher Waldock provides many useful routines to help manipulate Wordwise Plus database records

LAST month we looked at the structure of the database records and a program called ROUTINE to ease the work of making changes to records and printing individual ones out. Now let's consider some special programs for more specialised actions.

The function keys are automatically set up to load special programs available in !Boot. They may be placed in any segment by pressing together Shift-Ctrl-Fkey, and will wipe out any program already in the selected segment. Of course, you can also use the menu to load the programs by name. The panel describes each in turn.

BiSortD If the Find option in Routine has been used to make entries there should be no need to sort the files in this way – Find is no use unless the files are already in order.

But if sorting is needed, BiSortD is available – the **D** denotes that records are read from disc while being sorted. **Bi** indicates a binary search is used you jump halfway into the sorted records and test to see if the sorted record lies before or after the one found.

If it passes the first test, jump back half the length of the previous jump. If it passes the second test jump forward the same amount. Repeat the operation until both tests fail. End the search and insert the new record in the current position.

You may wonder at the temporary use of three dummy records at the start and end of the file. The sorting code is optimised for speed, but as a result is liable to jump over the end of the records. The dummy records force the search back into the file.

A simpler sort would involve going through the sorted list until the record found is *greater than* the new record. This works faster when sorting only a few records.

CoSortD Uses a similar process to sort records into groups according to the members' sex, paid-up status and age. Whereas BiSortD uses the surname+forename, CoSortD uses the code field and date of birth field.

The program includes a *display* after each new record is inserted. You may, like me, wish to see the program at work and you will find you save very little time by taking this facility out.

Analyze Should be run after using CoSortD and gives, in segment one, totals for each age and sex grouping, and separate figures for those who have not paid their subscription. After Analyze you may want to run SelList to get a list of names grouped by age, for instance.

SelList This lists selected fields. If you want to list selected records only, use a program like Include or SelDel to make a file of those records first.

Using this program you can decide which fields, or lines, will be included in a list of records. For instance, you may want a telephone list with names, town and phone number.

The output is to segment one, producing a file that may be given a heading and saved for later viewing or printed out. As each record is copied to segment one it is deleted from Text so you don't run out of space.

If you select Text and enter *:type segment 1* in menu mode the output will be copied into text for processing. You could then do a global replacement of commas by tab characters (|T) to get columns lined

Data protection

The law lays down rules about what information may be kept about people in computer processed form. There is a basic requirement that any data user must register with the Data Protection Registrar. This does not apply if all you keep on file are names and addresses, or the most basic accounting records, or the most basic wages data. If you go beyond the essential data, or the essential uses, you may be required to register.

Under certain conditions the records of a club or other voluntary association may be exempt. The safest thing to do is to indicate on the membership application the kind of data to be recorded and its proposed use, and probably to make consent a condition of membership.

If you are starting a computerised record with more than simple names and addresses, bear in mind the following:

- Members should have a chance to object to their data being on the register – no objection counts as assent.
- You also need consent to disclose data to anyone outside the club, for example for insurance or travel arrangements.
- Data must only be used for the purposes for which it was gathered.
- Members do not have a legal right to see their personal entry, but it seems provocative to deny them this. Since errors and changes occur, it makes sense for them to have a chance to check each year.
- The file must only include members – so lapsed members must be removed.
- The data must be accurate and kept up to date.
- Care must be taken to guard against unauthorised access or accidental loss.

Within these limits, there seems to be no restriction on the kind of data that may be recorded if it is strictly necessary for the purposes of the club – and members approve. The rules are more detailed for cases where registration is thought to be necessary: What we have looked at here is by no means a complete statement of the law.

Is your system safe?

Apart from the Act's requirements, there is a heavy investment in time in entering data and you would not wish to lose it.

- A minimum safety requirement is probably to keep your discs locked up. If you have a fireproof container, so much the better. Can backup copies of data and programs be kept by another club officer? Even paper records need such care.
- You are, of course, following the basic

g data

rules to avoid damage to your discs – don't finger them, keep them away from heat and sunlight, and don't put them on the monitor or, most important, near the phone.

- Keep your disc drives clean – you can get kits for this.
- Keep major backup discs locked with a security tab. If a working disc becomes faulty make a copy from the backup – perhaps on another machine – and use that, rather than the backup disc itself.
- If all discs fail to load, don't panic – an expert may still be able to get back all or most of your data.
- Use a voltage stabiliser if your power supply is unreliable.
- Have a reliable system for backups.

Making backups

Failure to back up work can cost you hours in re-entry. It is best to make copies at regular intervals during the day to reduce the risk. How many minutes of work are you prepared to lose? Some way of marking source material so you know which file it is entered in will also help if re-entry is needed.

We use two ways of backup for my wife's club. Firstly with each major session of alteration the data file is saved with a new date in the name: A180290 or M180290 are examples.

We have the file split in two for reasons of size. The result is that we always have the previous file or files to go back to if all the latest fail. I would aim to *WIPE away any greatgrandfather files.

Secondly, each data file is saved three times, at least once to a different disc. I often back up on to the reverse of a disc, but you can't do that with an ADFS system. Disc storage is now cheaper than the equivalent in paper copies and time is money.

Thirdly, if you want to check a data file has saved correctly – and provided there are no control codes embedded in it – *TYPE "filename" in menu mode and the file should be screened without interfering with what is in memory. If a file is not too long you can also reload it into a segment as a check.

If you are backing up a whole disc – which is probably rarely needed if you back up individual files regularly – be sure to lock it first by covering the write-protect notch. It's all too easy to get the drive specifications the wrong way round.

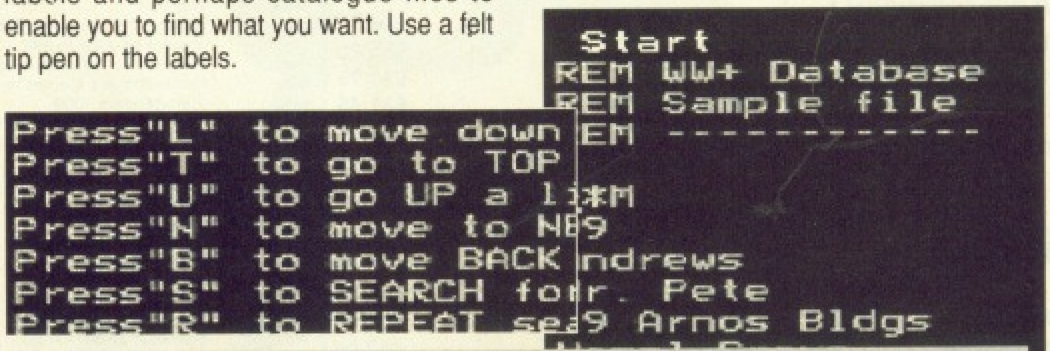
If you are going to change a disc extensively, as by compacting, work on a backup, not the original. Alternatively you can use *COPY 0 1 *.* from one disc to a newly-formatted one. I feel this is safer than compacting and the new disc will have no waste space. Only reformat the original disc when you know, by using them, that your copied files are OK.

It may seem elementary, but it's worth a reminder that unlabelled discs all look alike. When data is held on disc is very important to be well organised with meaningful labels and perhaps catalogue files to enable you to find what you want. Use a felt tip pen on the labels.

The programs

Due to the number and length of these programs they cannot be included in the magazine but most are available on this month's subscription disc. The programs are held in one file and will need to be split up.

The programs will run but it is best first to convert them to an equivalent uncommented and compressed version using Compres, as described in the last article. They will then not only take up less memory but run faster. Both versions should be kept on separate discs.



```
 Start
REM WW+ Database
REM Sample file
 EM -----------

 *M

 9
 ndrews
 r. Pete
 9 Arnos Bldgs
```

```
Press"L" to move down
Press"T" to go to TOP
Press"U" to go UP a li
Press"N" to move to NE
Press"B" to move BACK
Press"S" to SEARCH fo
Press"R" to REPEAT se
```

up. Though you can program for immediate printout of a list from the records, this gives less control of what you are printing than producing a list in memory first.

Include

To operate this program, files are loaded to Text – from within the program – and searched for records to be extracted. Using wildcards, **>/#** will extract all unpaid subscribers, or **>#F** will extract all women, paid or not.

The extracted records are marked top and bottom as extracts – you would not usually want them saved back under the original file name.

GlobDel

This routine deletes coded records. It's a powerful option which may be used, for instance, to eliminate all members not paid up, say code **>/#**. It works on a file you have already entered into text.

If you aren't too happy about using this, you can try the main Routine program command S(eek) followed by the code and R(epeat) thereafter, while using D(elete) on each example found. If you know the members well, you may spot an error in coding in this way if one has occurred.

GlobDel may be faster than the opposite program INCLUDE. Obviously you can get the same effect by including men, or excluding women. Unlike INCLUDE, it does not provide any warning about saving the resultant file.

Stats

This can be used to provide statistics of members. The documented program is self-explanatory. The most interesting part of the code is probably the right justification of the figures.

If you wish, you can add printout to the display, or type the statistics at the end of the record file.

Count

This is an example of a piece of code that can be cobbled together simply in a couple of minutes to count the number of records.

Registr

Perhaps the most interesting program – it is used to make an attendance register.

Integri

Checks the database's integrity, stopping if the mark **>** is missing. If it reaches the end of the text all is well.

To explain, most of the utilities – including Routine – look for the **>** sign at the start of each record in order to work. This is added automatically by the subroutine ADD in the main program.

But if you make additions or changes by hand you may forget to put it in. After altering records, load this program into a segment and run it before you save the updated text.

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Deleted files can usually be brought to light by clever prying eyes. But not if you use Stuart Tyrell's super scrubber

Secure as Fort Knox

EVERYBODY knows that if you want to prevent someone from reading the data in a particular file all you have to do is delete it from disc. Then it's gone – completely safe from prying eyes. Correct? Unfortunately not.

If only things were that simple. Format a completely fresh disc then, from Basic, enter this program:

```
10 PRINT "This is an example"
20 PRINT "(Your name here)"
```

Save this as TEST with:

```
SAVE "TEST"
```

Now delete the file you have just saved by entering:

```
*WIPE TEST
```

Take the disc out of the drive and turn the computer off for 10 seconds. Clearly, the program is no longer in the memory and you have just wiped it from disc.

Turn the micro back on, re-enter Basic, put the disc back in the drive and type in the following commands

```
*CREATE PROGRAM 1000
LOAD "PROGRAM"
LIST
```

Recognise it? Your – erased – confidential data is not as secure as you thought.

The solution

But all is not lost – or rather, all *can* be lost. The program presented here provides a way of securely deleting your files so they cannot be inspected with the use of a disc editor, the method above, or even by highly sophisticated equipment.

Type the program in, ensure it is correct using the checksums, and type RUN. A module called Scrubmod will be saved to disc. You can load it with:

```
*Scrubmod
```

or by double-clicking on the file from the DeskTop. The module adds a new command:

```
*Scrub
```

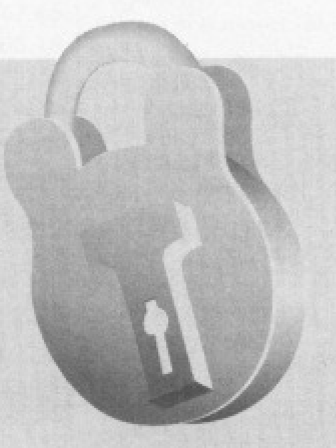
which will securely delete the file mentioned by first writing over it seven times with zeroes before finally deleting its entry from the catalogue.

The file is overwritten seven times because although another file may be saved over the top of it, magnetic traces of the original data remain on the disc and the file may still be read using specialised equipment. Saving over the file seven times is sufficient to reduce the traces of the old file to such a level that they are undetectable.

● **One word of warning: Although the module may be very useful for deleting confidential documents and business files, there is no way in which your data may be recovered after it has been scrubbed, so don't destroy files which you need.**

```
10 REM >ScrubSrce
20 REM By Stuart Tyrrell
30 REM (c) The Micro User
40 MODE 0
50 PROCassemble
60 PROCsave
70 END
80 :
90 DEFPROCassemble
100 DIM mc 2048
110 Help$="FileScrub"+CHR$9+"1.00
("+MID$(TIME$,5,11)+")"
120 FOR pass=4 TO 6 STEP 2
```

➤



➤

```
130 P%=0:O%=mc
140 [OPT pass
150    DCD 0
160    DCD 0
170    DCD 0
180    DCD 0
190    DCD title
200    DCD help
210    DCD commands
220 .title
230    FNs("FileScrubUtility")
240 .help
250    FNs(Help$)
260 .commands
270    FNs("Scrub")
280    DCD scrubentry
290    DCD &10101
300    DCD syntax
310    DCD scrubhelp
320    FNs("ScrubAuthor")
330    DCD 0
340    DCD 0
350    DCD 0
360    DCD authorhelp
370    DCB 0
380 .syntax
390    FNs("Syntax: *Scrub <Filename>")
400 .scrubhelp
410    FNs("*Scrub <Filename> 'Securely'
deletes a file by first overwriting it
with CHR$(0)'s, so the data may not be
recovered using a disk editor.")
420 .authorhelp
430    FNs("File Scrub Utility was writ-
ten by S.Tyrrell for The Micro User")
440 .return DCD 0
450 .remove
460    EQUS "REMOVE"+CHR$32+CHR$32
470 .string
480 ]:P%=P%+256:O%=O%+256
490 [OPT pass
500    ALIGN
510 .scrubentry
520    STR R14,return
530    ADR R2,string
540    .copyname
550       LDRB R4,[R0],#1
560       CMP R4,#32
570       MOVLE R4,#0
580       STRB R4,[R2],#1
590    BGT copyname
600 .checkok
610    FNnl
620    SWI "OS_WriteS"
630    FNs("Are you sure you want to
scrub '")
640    ADR R0,string
650    SWI "OS_Write0"
660    SWI &127
670    SWI &120
680    SWI &13F
690    SWI "OS_Confirm"
700    SWI "OS_WriteC"
710    CMP R0,#121
720    BNE end
730    FNnl
740    SWI "OS_WriteS"
750    FNs("Scrubbing : Pass 0")
760 .openfile
770    MOV R0,#200
780    ADR R1,string
790    MOV R2,#0
800    SWI "OS_Find"
 810    MOV R8,R0
820    MOV R1,R8
830    MOV R7,#0
840    .outerloop
850       MOV R2,#0
860       MOV R0,#1
870       SWI "OS_Args"
880       ADD R7,R7,#1
890       ADD R0,R7,#48
900       SWI &17F
910       SWI "OS_WriteC"
920       .loop
930          ADR R2,here
940          MOV R0,#2
950          MOV R3,#1024
960          SWI "XOS_GBPB"
970          BVS error
980          MOV R0,#5
990          SWI "OS_Args"
1000          CMP R2,#0
1010       BEQ loop
1020       CMP R7,#7
1030    BLT outerloop
1040    MOV R2,#0
1050    MOV R0,#0
1060    SWI "OS_Find"
1070    FNnl
1080    SWI "OS_WriteS"
1090    FNs("Deleting Catalogue Entry")
1100    ADR R0,remove
1110    SWI "OS_CLI"
1120 .end
1130    FNnl
1140    LDR R15,return
1150 .error
1160    ADD R0,R0,#4
1170    FNnl:FNnl
1180    SWI "OS_Write0"
1190    MOV R2,#0
1200    MOV R0,#0
1210    SWI "OS_Find"
1220    B end
1230    .here
1240 ]
1250 NEXT pass
1260 FOR T%=O% TO O%+1023 STEP 4
1270 !T%=0
1280 NEXT
1290 ENDPROC
1300 :
1310 DEFPROCsave
1320 SYS "OS_File",10,"Scrubmod",&FFA,,
mc,O%+1023
1330 PRINT'"Module saved as 'Scrubmod'"
1340 ENDPROC
1350 :
1360 DEFFNs(Text$)
1370 [OPT pass
1380 EQUS Text$
1390 DCB 0
1400 ALIGN
1410 ]:=0
1420 :
1430 DEFFNnl
1440 [OPT pass
1450 SWI "OS_NewLine"
1460 ]:=0
```

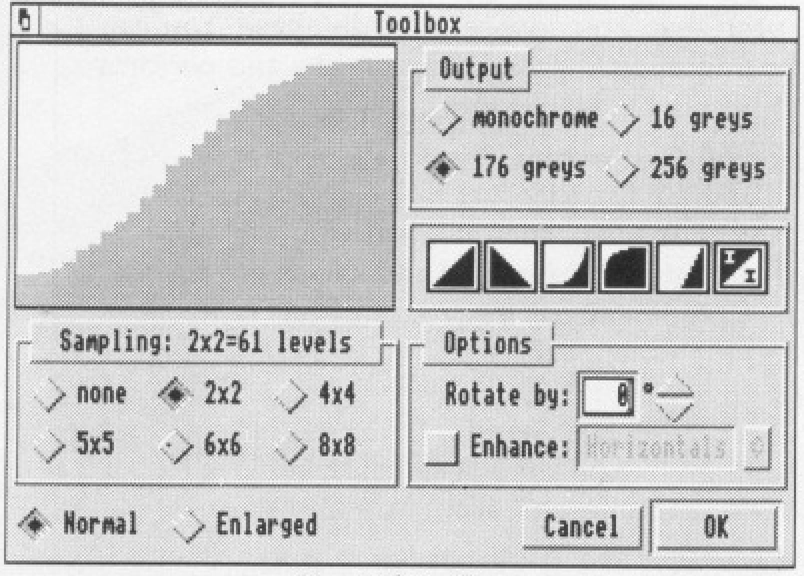
Get it right ✓

```
  10 =    0 0    230 = 8837 7    450 = E1DB 6    670 = 6D62 1    890 = 1AB7 A
  20 =    0 0    240 = 5B46 5    460 = BB49 6    680 = 4002 C    900 = 8CC6 2
  30 =    0 0    250 = EDDB 4    470 = DD01 7    690 = C015 6    910 = 5509 8
  40 = 6075 5    260 = A75E 6    480 = B123 3    700 = 5509 E    920 =  325 6
  50 = 126A D    270 = 4208 8    490 = 4E48 6    710 = 8CA4 E    930 = A10E 3    1110 = 64BE 7    1290 = ED0F E
  60 = 90DB 9    280 = D0D4 F    500 = 24FA 4    720 = 2651 4    940 = 9B19 3    1120 = E188 3    1300 = 9719 C
  70 = FD2E F    290 = D934 D    510 = 1055 0    730 = E453 2    950 = A2F8 0    1130 = E453 7    1310 = 7A2C A
  80 = 9719 1    300 = 3CBB A    520 = 91D1 1    740 = 567A 8    960 = 27A7 F    1140 = 9D2C 7    1320 = AD6F 1
  90 = 98E9 4    310 = 4B75 7    530 = F9A9 A    750 = 29E5 5    970 = B333 0    1150 = D394 2    1330 = 2D65 7
 100 =  1F8 A    320 = A81B 1    540 = 4E75 7    760 = C708 7    980 = EBFE 9    1160 = 3B4D 4    1340 = ED0F C
 110 = 6FFD 0    330 = 9CF6 3    550 = 51FD 6    770 = 74CF 3    990 = FC7B 0    1170 = E994 9    1350 = 9719 3
 120 = A1D2 C    340 = 9CF6 B    560 = F8AC A    780 = 31DC D   1000 =  BC7 1    1180 =  803 4    1360 = 7BA9 D
 130 = 8FDA D    350 = 9CF6 F    570 = 4A9D E    790 = 5633 E   1010 = 2484 7    1190 = 5633 0    1370 = 4E48 D
 140 = 4E48 0    360 =  156 E    580 = C2D1 1    800 = 9A62 4   1020 = C765 6    1200 = BB5B 1    1380 = 7BD8 2
 150 = 9CF6 B    370 = 2E56 9    590 = C079 C    810 =  5F0 0   1030 = 3EC9 0    1210 = 9A62 8    1390 = 2E56 6
 160 = 9CF6 4    380 = 5A3C C    600 = 897D F    820 = 778F 7   1040 = 5633 5    1220 = 1639 3    1400 = 24FA 4
 170 = 9CF6 2    390 = 70B5 4    610 = E453 3    830 = EA76 1   1050 = BB5B 6    1230 = 39AE 8    1410 =  B43 0
 180 = 9CF6 5    400 = E0B1 4    620 = 567A E    840 = 5CB8 E   1060 = 9A62 8    1240 = 8B58 5    1420 = 9719 D
 190 = 9C18 9    410 = 2A3C 4    630 = 1BC4 8    850 = 5633 0   1070 = E453 E    1250 = 301F C    1430 = 75D6 5
 200 =  48C C    420 = C1D7 E    640 = 760F A    860 = AB7A F   1080 = 567A C    1260 = 55B1 C    1440 = 4E48 9
 210 = E7BD 7    430 = ED0B C    650 =  803 F    870 = FC7B D   1090 = E978 B    1270 = 3583 3    1450 = C6E8 3
 220 = FD02 6    440 = F5C7 A    660 = 1D85 B    880 = 2381 1   1100 = 4AD5 E    1280 = 2C83 C    1460 =  B43 1
```

SCAN LIGHT Plus

The latest generation Scan-Light Plus software provides a new easy to use and very powerful interface to the range of Scan-Light scanners and represents the most advanced software available for monochrome scanners on the Archimedes.

The main features of Scan-Light Plus centre around the scan toolbox. This controls the altered image view and allows the original scaled image to be sampled or anti-aliased in numerous different ways. This feature allows monochrome dithered scans to be turned into full grey-level sprites, ideal for incorporation into DTP or other programs. For example 4 by 4 sampling provides 16 grey-level images, while 8 by 8 sampling will turn an image into a 64 grey-level.



Rotate by: 0°
Output: 176 greys
Sampling: 2x2
Enhance: ☐
● Normal

Scan-Light toolbox.

The grey-map allows precise and accurate control over these grey-levels. The grey-map cannot only lighten or darken the image but also invert it or, more usefully, compensate for any non-linearities in the original picture or the printer. The grey map provides direct control over the gamma correction curve. The toolbox also controls the number of greys in the output file - it's even possible to typeset images with 176 grey-levels suitable for photographic quality results.

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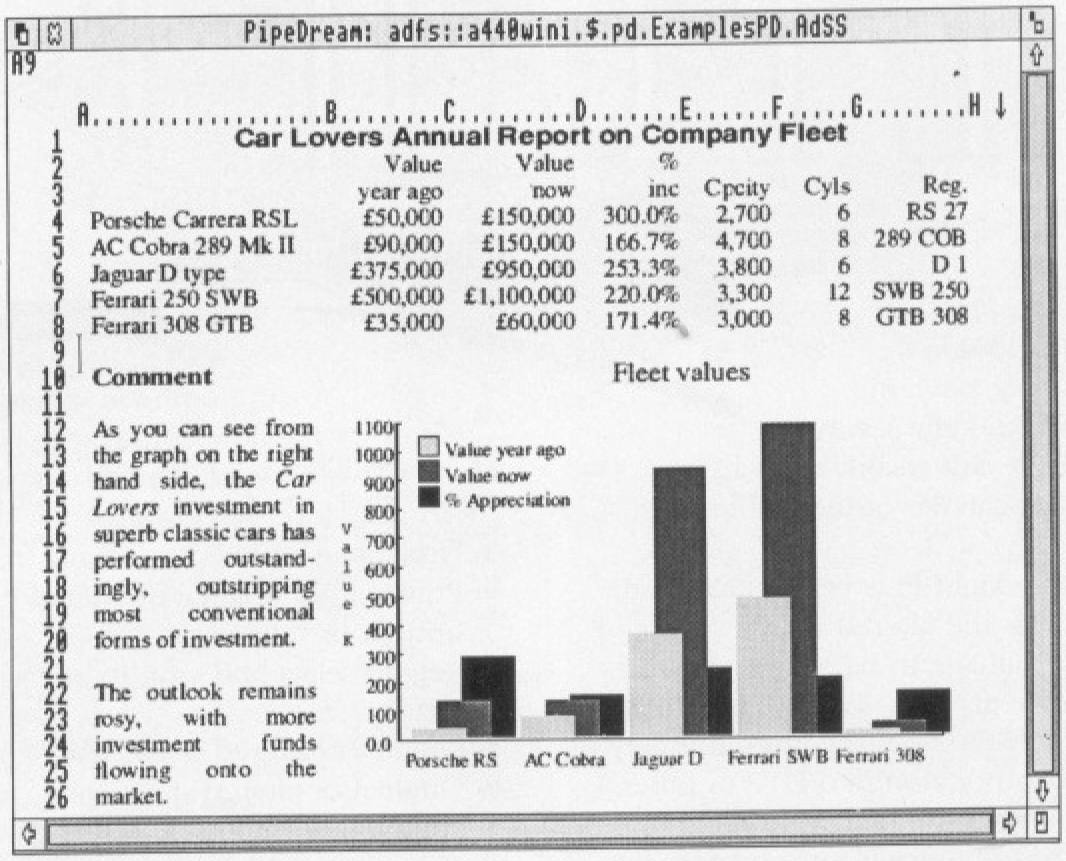
PIPEDREAM 3



Car Lovers Annual Report on Company Fleet

		Value year ago	Value now	% inc	Cpcity	Cyls	Reg.
4	Porsche Carrera RSL	£50,000	£150,000	300.0%	2,700	6	RS 27
5	AC Cobra 289 Mk II	£90,000	£150,000	166.7%	4,700	8	289 COB
6	Jaguar D type	£375,000	£950,000	253.3%	3,800	6	D 1
7	Ferrari 250 SWB	£500,000	£1,100,000	220.0%	3,300	12	SWB 250
8	Ferrari 308 GTB	£35,000	£60,000	171.4%	3,000	8	GTB 308

Comment

As you can see from the graph on the right hand side, the *Car Lovers* investment in superb classic cars has performed outstandingly, outstripping most conventional forms of investment.

The outlook remains rosy, with more investment funds flowing onto the market.

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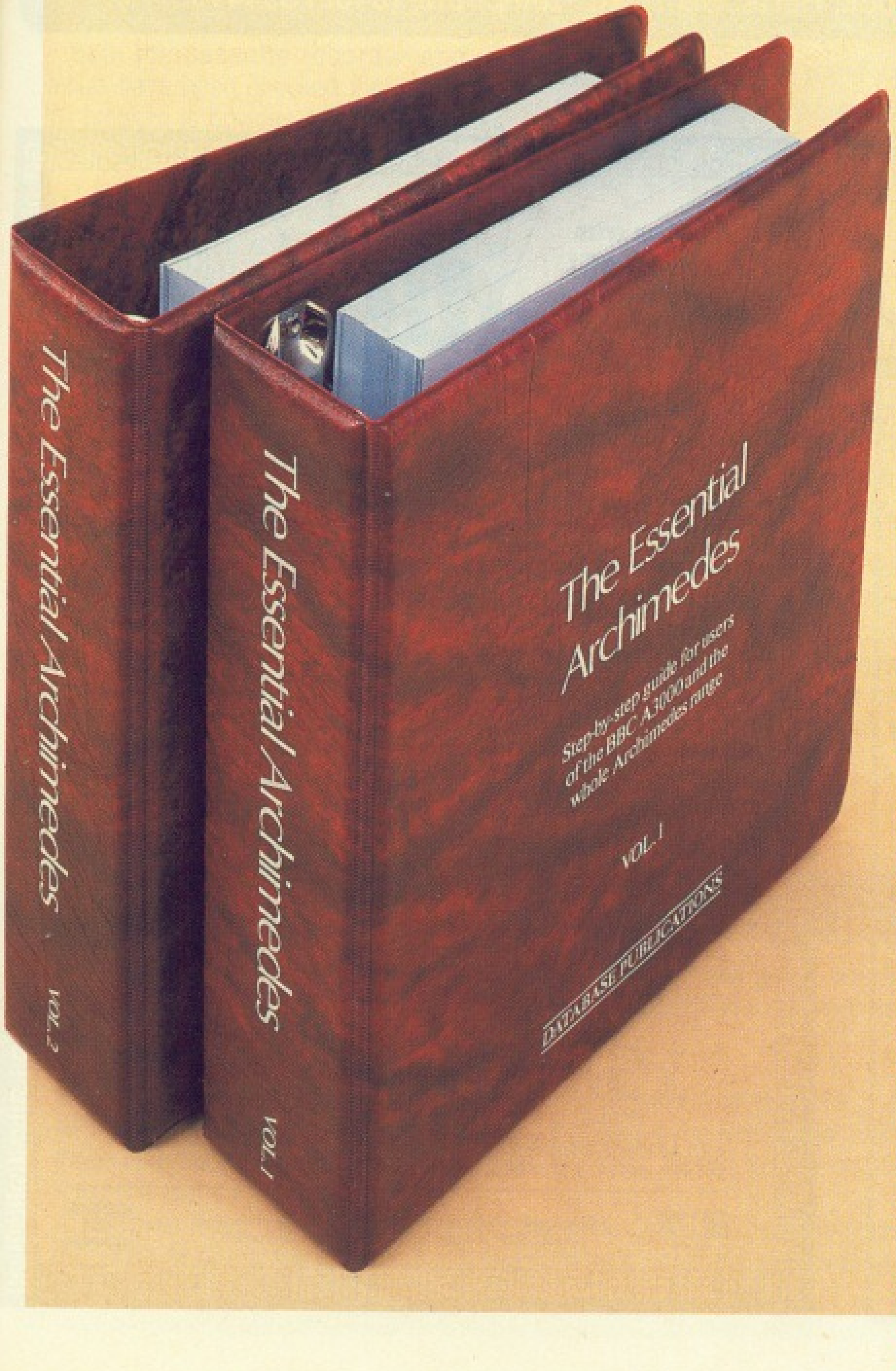

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PROBLEM Solved

Your technical questions answered by MIKE COOK

From tape to disc

I HAVE recently acquired a Watford Electronic 40/80 track disc drive for my BBC B. I'd like to transfer some ancient material from tape to disc, but as the tape system isn't working I'm wondering if there is anything inside the computer I can swop over temporarily to get the files on to disc.

Both the cassette recorder and its cables have been checked thoroughly, so the problem is obviously in the computer. Any suggestions? – E. Vincent, Dinton.

●*The main component that goes wrong in the tape interface is the LM324 quad op amp chip located just beside the tape input socket. Unfortunately, on some boards it's soldered in and is quite a job to replace.*

What you must do is cut out the old chip using side-cutters and then unsolder each chip leg seperately. Then you can solder in a new socket and replace the chip – which should cost less than £1.

However, extracting an old chip does call for skill if you are not to mess up the board. Perhaps your best bet would be to borrow someone else's machine for the transfer. You might try contacting a local school. They could be willing to let you use their machine for a small consideration in cash or kind.

Topics on the agenda...

- USA frequency problems
- Controlling stepping motors
- Hardware/software incompatability
- Diagnostic disc problems
- Damaged roms
- Connecting a Tube
- TRS80 printer problems
- Correct voltages
- Making a graphics tablet
- Connecting an IBM green screen
- Salvage from a tape interface

Keep taking the tablet

HAVE you ever made or thought of making a graphics tablet which could be interfaced to the BBC Micro? I would be grateful for any information. **– R. Williams, Bury.**

●*A simple pantograph graphics tablet was described in the June 1983 (Vol 1 No 4) issue of* The Micro User. *Though perhaps a bit of a collector's item now, this uses two potentiometers and a bit of maths. Other forms of tablet are a bit too involved for a magazine article.*

Connecting an IBM green screen

I AM trying to connect a BBC B+ 128k computer to an IBM green screen monitor. Would it be possible to use a circuit similar to the one published in the May issue of *The Micro User?* **– R. Clarke, Rochdale.**

●*Yes, it is possible to use a green screen monitor with the sync seperator pack 58. Two different types of monitor are available, those that take in the RGB signal and mix it and those that require a composite video signal. If it is the former, just connect it up as in my article in the May issue.*

However, if you have the latter, connect the Video Out at the back of the computer to the Video In of the monitor. You'll still need the sync separator to provide the vertical and horizontal syncs.

Capacitor voltage

I HAVE started to build the graphics digitiser from the June 1983 Body Building, but have hit a problem – it doesn't state what voltage the electrolytic capacitors are. I can get the components from a local dealer as long as I know the voltage.

The June 1989 Body Building article told how to make a Whole-body joystick, but I'd like to know what value the four resistors are. **– M. Whitbread, Chapeltown.**

●*The resistors in the Whole-body joystick should be 1MΩ as was shown in Figure III. However, virtually any value from 3kΩ upwards should do – as long as they are the same – as they only work as a potential divider.*

As for the capacitors, the voltage rating is only the maximum the capacitor can take before being damaged. As there is less that 5 volts in the circuit, any capacitor with a voltage rating of greater than this will do. In fact it's difficult to get capacitors with less.

Lower case please

PLEASE help me with a printer fault – I can't print lower case characters. I have an old TRS-80 line printer, linked via the parallel port to a BBC B. There are only seven data lines on the printer which I have connected leaving the eighth disconnected.

When the character set is sent to the printer all is fine until CHR$(95). Then instead of printing CHR$(96) it starts duplicating CHR$(64) onwards. As the printer only cost £6 I think it's worth repairing. **– D. Riley, Birmingham.**

●*There is nothing wrong with your printer. I had a TRS-80 – one of the first commercially available micros in the late Seventies, it had an operating system more sophisticated than the IBM PC has today. However, despite this it could never*

➤

When is a problem not a problem?

I HAVE a Watford Diagnostic disc which I run every few months to check my Master 128. Since I tried it last I have installed the new Master 128 system rom issued by Acorn. The test drive now fails on ram locations &8000 upwards.

Have I got trouble or is this a quirk or the rom, as I haven't noticed any problems with the programs I run? – **P. Stonebridge, Ipswich.**

● *Any diagnostic program can only perform a limited amount of fault detection. If your computer works at all, 95 per cent of it must be OK. What programs like this do is add up all the numbers making up the rom software. They then compare this to the result on a known system. If you put a different system in, this number will be different and so the utility will report an error.*

➤

display lower case, so the official printer had no need to print lower case characters. In those days people were moving from mainframe computers with teletypes that only printed in upper case, so they saw no need for a computer to produce lower case characters.

Processor hang-up

WHEN trying to use my friend's 6502 second processor with my BBC B and Disc Doctor nothing happened. Why? – **P. Eagles, Olney.**

●*In order to use a second processor you need to have the Tube interface code in rom. This is normally in the disc interface rom kit known as DNFS (Disc and Network Filing System). This code is also included in the later Watford DFS roms.*

Without it your computer cannot access a second processor. However the situation with Disc Doctor is slightly different. When it was originally written, Tube processors were uncommon so it doesn't take them into account, hence there is no effect.

Dead, but not forgotten

THE October issue of *The Micro User* mentioned an apparently damaged ViewSheet rom. I have a damaged version 1.0 – in &A000-&A3FF every eighth byte from &A006 onwards has its top and bottom bits set. So, for example, &00 becomes &81 and &7E becomes &FF. Everything else is as it was when it was new. What might the cause be? – **H. Boothroyd, Gaydon.**

● *All things must die and that includes electronic chips. In most cases failure is due to the breaking of internal connecting wires that are so thin that they make a human hair look like a telegraph pole. The normal mode of failure is due to corrosion from moisture getting into the package.*

However, elevated temperatures can cause these thin wires to melt. Another cause can be the diffusion into crystal deformations of the materials used to make the device. As the rom is made up of a number of identical cells arranged in a matrix, it's common for a run of memory locations to go bad all in the same way. It's not so much the memory locations as the addressing connections. Having said this, your rom did die early – most can expect a much longer life.

Stepping stones

I NEED to control two small stepping motors with a BBC B. Although I am already familiar with the additional circuitry, I just don't know how to power it with the 5 volts from the computer, or how to produce digital output in the form of fast pulses.

Do I need additional hardware or can I use the printer or user port? – **R. Conroy, Rowlands Gill.**

●*You can't connect stepping motors directly to the computer's port – you need to use some interface circuitry. You can find this described in the May 1984 issue of* The Micro User.

You can power the motor from the auxiliary power output of the computer as most stepping motors will run from 12 volts. However, the switching can cause interference on the power lines which could cause the computer to malfunction. This would require you to use supply decoupling techniques or a separate power supply.

As to generating the pulses it is simply a matter of software – again supplied in the earlier article.

Frequency shakes

FOLLOWING the guidelines in the July issue of *The Micro User* I tried to connect an IBM PC monitor to my BBC Micro. I am based in the USA and have connected the monitor to the modified micro after connecting pin 6 of the RGB socket to pin 9 of IC33, not 8. Unfortunately, it seems to be having some problem with the vertical hold.

At times the picture is stable, but sometimes it shimmers as if it is jumping up and down a scan line rapidly. Other times it jumps intermittently up and down a line. These effects seem to be random and I cannot adjust the monitor to correct them.

When I change mode the monitor usually loses the hold and the screen smoothly scrolls up a frame and locks again. What do you advise? – **J. Wright, Michigan, USA.**

●*The mains frequency is different in the USA and this is contributing to your stability problems, as the monitor is having the tendency to lock on to hum generated from the mains.*

These symptoms are normally associated with the frame oscillator running at the edge of its lock-in range. It should be possible to find an adjustment within the monitor which will restore stability. However, remember there are dangerous high voltages inside a monitor.

If there is no adjustment the frame oscillator capacitor will have to be changed to move it closer to the desired frequency. A TV engineer should be able to do this for you..

In search of the Grail

I RECENTLY bought Lancelot from Level 9 and have been unable to make it work. I've fitted a Watford solderless sideways ram board with 16k in two 4364 chips. Unfortunately, the game fails to find this sideways ram, although it does wipe anything present in the ram at the time.

I have written to both Watford and Level 9. Level 9 say that it is probably a faulty ram board and I could try to dissemble the !Boot program and alter the code. As I have no machine code dissembler nor understanding of machine code, I decided against this option. Watford Electronics say the game is probably to blame for not recognising the ram and assure me that the 4364 is exactly the same as the standard 6264. What do I do? – **M.R. Davies, Carterton.**

●*It's always difficult to say who is to blame when a piece of hardware and software don't get on. Especially as both were designed with no knowledge of each other.*

Certain assumptions must be made when designing anything, and in the absence of definitive guidelines conflicts are bound to arise. Perhaps we should blame Acorn?

However, assuming that in all other respects the sideways ram board is working, the onus must be on the software. Having said that though, I know that it's difficult for software authors to know about all the possible hardware configurations. I think you must be resigned to the fact that they are incompatible.

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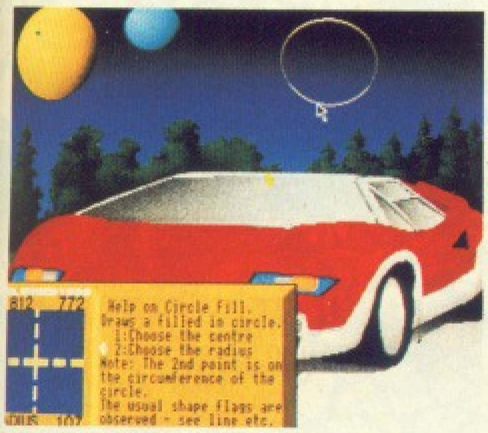

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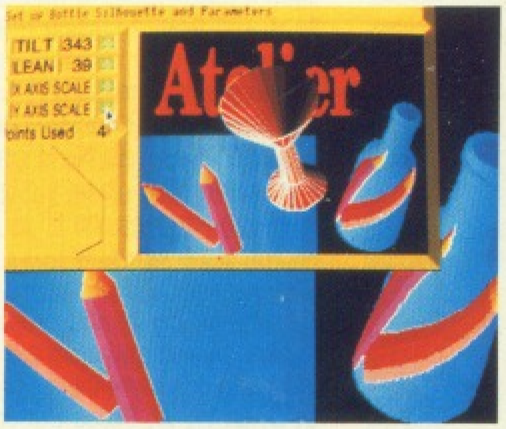
Help on Circle Fill.
Draws a filled in circle.
1:Choose the centre
2:Choose the radius
Note: The 2nd point is on the circumference of the circle.
The usual shape flags are observed - see line etc.



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Horse trading

The Mad Hatter goes shopping and picks up a few bargains

SHOPPING sprees are always enjoyable – provided you have some cash – but the trip to Harrids Department Store in this section of *Oxbridge* is going to involve some careful manipulation of objects. Pardon the pun, but it's more like a shoplifting exercise.

A hat and scarf have to be collected, but neither can be taken into the stairwell area without the shop's alarm ringing. Trying to use the lift – with its *Out of Order* sign – is an experiment you'll only attempt once.

The answer to this puzzle lies in employing a little lateral thinking in order to achieve a vertical resolution. The procedure is to take each object to the west end of the building on the same floor as you found it, summon the lift and open the doors.

Now you enter the lift and drop the object. Leave the lift, return to the ground floor and then summon the lift which will safely deliver the item required.

The precise moves are: E, N, N, N, N, N and Say Exeat to leave college then N, N, E, W, E, E, N, E, U, U and W. The hat awaits you here, so take it, go W, press the button to summon the lift, N to enter the lift and drop the hat.

Now move S, E, E, U and W to the scarf. Take it and go W and press the button for the lift, enter it and drop the scarf. The final moves to complete this section are: S, E, E, D, D, D, W, W, Press Button, N, Take Hat, Take Scarf, S, E, 12 moves S, W into the Trophy Room and there drop both items. Your score should now be 75.

I wonder if you have tried gaining access to the master's lodge? Well, the programmer won't admit you until you have solved the next puzzle – getting the various horses into their correct places. So it's time for the horseplay.

Go E, N, N, N, W, W, W, W, W, W, N and W and take the gelding then proceed E, N, N, N and drop the gelding. All right, I know you need to be a Hercules to carry a horse – and these aren't the Augean Stables anyway – but Take and Drop are the easiest input for getting the animals to follow you before leaving them in the manger stalls.

Now go S, S, S, W, N, take the stallion, moving S, E, N, and N before dropping it. Next proceed S, S, W, N, N, for the mule and S, S, E, N and drop it. After this move S, W, N, N, and N to find the percheron. Go S, S, S, E, S, S, S and S then drop it.

It's time for the equine equivalent of musical chairs now: N, N, N, N, N, TAKE STALLION, S, S, S, S, DROP STALLION, N, N, N, N, N, TAKE GELDING, S, S, S, S, and drop it.

Now we continue with the roundup by going N, W, and S for the mare then N, N, N, N, to drop it. S, S, S, S and S gets you the pony N, N, N, N, and drop it. Off again S. S. S. S. S. for the donkey and back as before.

We are now into the final moves of this evolution, so make your way S, S, S, S, S, for the foal, take it N, N, N, N, E, N, N, N and drop it. Next go S, S, S, W, N to the donkey and S, E, N and N to its stall.

Last manoeuvres of all are: S, S, W, N, N, Take Pony, S, S, E, N, Drop Pony, S, W, N, N, N, Take Mare, S, S, S, E and drop it. You can now go S and E to take the golden horseshoe and E then N to the master's lodge – and there I'll leave you for this month.

(To be concluded next month).

Grave discovery

Tom Chothia has discovered what he thinks is a space graveyard in **Elite.** At first he thought it was a group of four pirates, but they didn't move or return fire. As he closed in on them he saw that they were shielding a Worm class ship. Whatever they were, he was rewarded for destroying them.

Tom also raises an interesting point about the existence – or lack of it – of rock hermits. He encountered an asteroid that was harder to destroy than norma. Eventually it spewed out some cargo canisters and a Krait.

Since a friend with a 16-bit version has encountered something similar, only with more Kraits that were hostile, Tom wonders if it could be a space dredger. I've always taken it to be a hermit, and reckoned that the Krait is an escape ship.

My tactic is to let the Krait go but scoop up the cargo. However, you pays your money and you takes your choice.

While on this topic, Andrew Jenkins wrote in puzzlement about a strange encounter that indicates he has come across a hermit who was a trifle aggressive. This is what he had to say:

I was in deep space and I saw a kind of round ship. I went very close, paused the game and, looking in the manual, identified it as an asteroid. I brought my ship alongside and prepared to shoot it with my mining laser, when suddenly it started shooting at me.

The attack didn't do a lot of damage, and Andrew soon silenced it – but his status moved from Offender to Fugitive. It's a cruel world. However readers should note that Andrew has an unexpanded BBC Micro and the disc version of **Elite,** which means that encounters like that are possible for everyone with a disc drive.

It had to happen, didn't it? I've finally had a letter from Commander Blackadder. He has had a cassette-based version for three months and is now Deadly. He has a tip for Baldrick: If you fancy a spot of drug-running, try trips between Errati (buy) and Usraar (sell) in Galaxy Six.

M'Lord also posed a question: Has anyone scooped up a cargo canister in space with anything lower on the list than computers? The answer to this will depend on the version you have, I suspect. I've certainly scooped up ample alloys from time to time. How have other readers fared?

I am really stumped on this one: Matthew Salkeld is Dangerous, is in Galaxy Four and has the Electron version. What Matthew wants to know is whether or not his version has the Missions and Thargoids. My guess would be No to both questions, but can anyone give an answer based on experience?

Hatter's Helpline

I have had a plea for help from Peter Hewlett who is stuck in Epic's **Wheel of Fortune** and is having difficulty with the beggar in particular.

My former colleague Pendragon came up with the answer here: Give the penny to the beggar just *after* he has passed the vending machine and is walking down Beggars Walk. After that, things should go smoothly provided you wait for him to return and he hasn't been warned off by the policeman.

Barbara Bassingthwaite, an experienced adventurer, has come up with the necessary help for Ray Briddock who was stuck in **Dennis through the Drinking Glass**.

Dennis must have a drink every 10 moves: A drink too early makes him drunk, too late and he sobers up. The initial moves are as follows: N, N, Hide (until Maggie leaves), Get Golf Clubs, S, E, N, Examine Pot, Take Flask, Drink. After that it is a matter of methodical imbibing coupled with exploration.

I have some good news for those of you who would like to carry more items in certain Scott Adams and Digital Fantasia adventures – thanks to David Shepherdson. David warns, however, that his tip will not work on the later adventures such as **Kayleth.**

You *LOAD the adventure and then enter this line of code:

```
?&341F=x:CALL &1902
```

then press Return. Replace *x* with the number of items you want to carry, up to a maximum of 255. For example, if you want to carry up to 16 items:

```
*LOAD (name of adventure)
```

press Return and then enter:

```
?&341F=16:CALL &1902
```

For Digital Fantasia adventures the poke is:

```
?&1A1F=16:CALL &1D9B
```

Tom Chothia has offered help for those stuck in **Spellbinder** and **Spycat**. Let's take **Spycat** first: Suffocation in space can be prevented by possessing – but not using – the oxygen tank.

In space you'll find a resignation note which needs to be taken to Q. You can bypass the thirsty Brit by using a cup of tea, and Q will then give you Document X.

Garry Sawdy says that you should use the glucose pill – from the Greenland Embassy – before using the space permit in this game.

In **Spellbinder** you need to deal with the carnivorous plant like this: Take the worms, which are found on the table to the right of the mixing tool, add readily available sulphur and feed the plant with the poisoned mixture. Tom asks where he can find the mushrooms for the storm spell.

A recent plea from Alison Leigh made me realise that quite a number of readers have problems with the early moves in **Egyptian Adventure**. So instead of the hints that I've offered from time to time, here are some specific moves which will prove helpful:

At the start, take the rope, then move W, W to cross the bridge and pick up the torch. Now you must WORSHIP AMMON-RA, ignore the message that results, climb the obelisk and take the golden disc.

Go back down and worship again. You will now be able to cross the bridge safely instead of being hurled to the crocodiles below.

Once again, this is a reminder that whenever you come to a place of worship – temples, shrines and the like – you should always do the appropriate thing: Try entering KNEEL, PRAY, WORSHIP or some other devout action. It never does any harm and usually proves beneficial.

While we are on the business of getting people started, Max Kolombos has sent in some advice for those having trouble with **Jinxter**.

Here are the first few moves in that very entertaining adventure. Wait (four times), Show Ticket to inspector, Wait (three times), Press Button, Wait (three times) Get Out, Take Keyring, Wait (twice), Read Document, Open Gate, N, Drop All Except Keyring, Open Door with Iron Key – and off you go.

Max realises that the oil and water need to be separated, but he hadn't figured out that the oil needs collecting in the can that previously contained the worms.

He's also stuck at the baker's, but I get the feeling he's not been digging either. Max, you should drop the worms – use the milk bottle to hold them – on the compacted earth and let them help you. When you get to the baker's try your hand at a little baking.

Adrian Pearce wonders what use the gold, diamonds, rubies and the like are in **Gisburne's Castle**. The answer is fairly simple: For the most part they are just treasures, but the sapphires can actually be used in the cellar.

Alex Hunsley keeps exhausting his lamp in **Philosopher's Quest** about 20 moves before the end. Alex, you must only use the lamp when it is absolutely necessary. There are locations in this adventure that are well-lit and the lamp should then be turned off until it is needed again.

To save extra moves remember that you can extinguish the lamp one move before you enter a lit location and don't need to re-light it until you're actually in a dark location

Alex wonders where he can get a spare copy of Kingdom of Hamil. I suggest he inquires at Topologika, P.O. Box 39, Stilton, Peterborough PE7 3RL. Brian Kerslake might be able to help.

Out of Exile

James Bonfield prepares the route for your escape from the ultimate arcade adventure

EXILE is, debatably, the best arcade adventure ever to appear on the BBC Micro. It has a vast, continuously scrolling landscape, full physical effects like mass and gravity, strange creatures and, on the Master, digitised sound effects. But it has also been one of the hardest games to complete.

But now we present the ultimate cheat for the ultimate game, it meshes seamlessly with the original game by providing an extra option on the main menu: F8 Toggle Cheat that switches the various cheats you have selected on or off.

All the other options function correctly – including the option to Run Game, which automatically selects the appropriate cheat for normal or sideways ram version.

So type in Listing I, ensure you've made no errors using the checksums, and save it. When it's run you must ensure that the value of TOP is less than &2C00. The most important trick is to ensure that you don't type in the spaces after each line number. You can check the value of TOP by typing:

```
PRINT ~TOP
```

If it is over the limit, delete other extra spaces, any REM statements and join lines together until it falls within the allowed value. The reason for this is that the save-game position starts at &2C00, so the program should not corrupt this area.

Used excessively the cheats make the game both too easy and, in some cases, impossible to complete, so they should be used with care when absolutely necessary. Remember that you can always return to the menu to toggle them on and off.

The cheats

Disable certain events: This is a widely varied cheat, its most useful feature being that you cannot be forced to teleport by dying and it prevents the gun turrets and robots from firing at you.

A wide range of other small events have also been stopped, including bees, monkeys, fires, birds and so on. However, this cheat should be used with care as the game is impossible to complete with it working, as certain necessary events no longer happen – such as the dispensing of power pods from certain places.

Alter water level: This alters the level of the water with 255 at the bottom of the map, 0 at the top. Beware of using numbers too near the extremes. Not very useful really, but good for a laugh.

Make doors open and shut: This forces any door – including the portals – to continually open and shut. This makes it rather hard to get through some of the faster doors so, again, use with care. Its main use lies in getting through the portals which keys cannot unlock.

Set energy to full with function key: This puts the energy in any weapon or armour (F0 to F5) to full by simply pressing its corresponding function key.

Infinite energy: Much more subtle than the full energy cheat, this is less noticable but has much the same effect on game play.

The Mapper

Listing II may help if you are still having difficulties with Exile. Type it in, use the checksums to ensure it is free of typing errors and save it. Insert the original Exile disc and type RUN.

After loading up part of Exile the screen displays the start position – in the spaceship. Pressing the keys Z, X, * and / you can scroll around the landscape in the required direction. However this program uses the map from the menu, so it is slightly different from the proper map in a couple of places.

Listing II

```
    1 REM Exile Cheat
    2 REM by James Bonfield
    3 REM (c) The Micro User
   10 IF PAGE<>&1500 THEN PAGE=&1500:CHA
IN"EXCHEAT"
   20 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL:END
   30 MODE7:PRINT'CHR$133"Do you wish to
 cheat ?";
   40 X$=GET$:PRINTX$
   50 IFINSTR("Nn",X$)THEN D$="N":W$="N"
:OS$="N":EF$="N":IE$="N":GOTO170
   60 PRINT'CHR$129"Disable certain even
ts (Y/N): ";
   70 D$=GET$:PRINTD$
   80 PRINTCHR$129"Alter level of water
(Y/N): ";
   90 W$=GET$:PRINTW$
  100 IFINSTR("Yy",W$)THENPRINT"   ";:PR
INTCHR$129;:INPUT"Enter level (0-255) :"
L
  110 PRINTCHR$129"Make doors open & shu
t (Y/N): ";
  120 OS$=GET$:PRINTOS$
  130 PRINTCHR$129"Full energy with func
. keys (Y/N): ";
  140 EF$=GET$:PRINTEF$
  150 PRINTCHR$129"Infinite energy (Y/N)
 :";
```

➤

```
160 IE$=GET$:PRINTIE$
170 FORPASS=0TO2STEP2
180 P%=&1100
190 [OPTPASS
200 .loadmc EQUS"LO. EXILEMC"+CHR$&0D
210 .begin2
220 EOR#&F2
230 ADC&70
240 ADC#&97
250 STA&70
260 .c
270 EOR&3000,Y
280 .d
290 STA&3000,Y
300 EOR&70
310 INY
320 BNEmore2
330 INC&7998
340 INC&799B
350 INCc+2
360 INCd+2
370 PHA
380 PHP
390 LDAc+2
400 CMP#&7F
410 BEQout2
420 PLP
430 PLA
440 RTS
450 .more2
460 JSRbegin2
470 BNEbegin2
480 .start2
490 LDA#&23
500 STA&70
510 LDA#&78
520 LDY#&0
530 SEC
540 SEI
550 JMPbegin2
560 .out2 JMP out6
570 .sr
580 LDX#0
590 .loopsr
600 LDArelsr,X
610 STAz,X
620 INX
630 BNEloopsr
640 \      SELECT CHEAT (B / MC)
650 .z
660 CPY#&39
670 BEQsr
680 \      EXILEB CHEAT
690 LDX#textMOD256
700 LDY#textDIV256
710 JSR&FFF7
720 JMPstart2
730 .out3
740 LDA#&EA
750 STA&71B7
760 STA&71B8
770 STA&71B9
780 ]
790 IFINSTR("Yy",IE$)THEN[OPTPASS:STA&
3E8E:STA&3E9F:STA&3E90:]
800 IFINSTR("Yy",W$)THEN[OPTPASS:STA&3
DCE:LDA#&A9:STA&3DCF:LDA#L:STA&3DD0:]
810 [OPTPASS
820 LDA#&60
830 STA&4A5F
840 ]
850 IFINSTR("Yy",D$)THEN[OPTPASS:STA&3
687:]
860 IFINSTR("Yy",OS$)THEN[OPTPASS:STA&
437F:]
870 IFINSTR("Yy",EF$)THEN[OPTPASS:LDA#
&A9:STA&3DFA:LDA#&FF:STA&3DFB:LDA#&9D:ST
A&3DFC:LDA#&54:STA&3DFD:LDA#&8:STA&3DFE:
]
880 [OPTPASS
890 JMP&78ED
900 .text EQUS"LO. EXILEB"+CHR$&0D
910 .relsr
920 \      EXILEMC CHEAT
930 LDA#&19
940 STAc+2
950 STAd+2
960 LDA#(nextbit-relsr+z)MOD256
970 STAout2+1
980 LDA#(nextbit-relsr+z)DIV256
990 STAout2+2
1000 LDX#(loadsr-relsr+z)MOD256
1010 LDY#(loadsr-relsr+z)DIV256
1020 JSR&FFF7
1030 JMPstart2
1040 .nextbit
1050 LDA#(lmc-relsr+z)MOD256
1060 STA&1979
1070 LDA#(lmc-relsr+z)DIV256
1080 STA&197A
1090 JMP&1907
1100 .lmc
1110 LDX#loadmcMOD256
1120 LDY#loadmcDIV256
1130 JSR&FFF7
1140 LDA#&12
1150 STAc+2
1160 STAd+2
1170 LDA#(almost-relsr+z)MOD256
1180 STAout2+1
1190 LDA#(almost-relsr+z)DIV256
1200 STAout2+2
1210 LDA#&7A
1220 STAd+9
1230 LDA#&7D
1240 STAd+12
1250 ADC#1
1260 STAd+10
1270 STAd+13
1280 JMPstart2
1290 .almost
1300 LDA#&60
1310 STA&4AC6
1320 LDA#&EA
1330 STA&7640
1340 STA&7641
1350 STA&7642
1360 ]
1370 IFINSTR("Yy",IE$)THEN[OPTPASS:STA&
3EBD:STA&3EBE:STA&3EBF:]
1380 IFINSTR("Yy",W$)THEN[OPTPASS:STA&3
DFD:LDA#&A9:STA&3DFE:LDA#L:STA&3DFF:]
1390 [OPTPASS
1400 LDA#&60
1410 ]
1420 IFINSTR("Yy",D$)THEN[OPTPASS:STA&3
6B6:]
1430 IFINSTR("Yy",OS$)THEN[OPTPASS:STA&
43E6:]
1440 IFINSTR("Yy",EF$)THEN[OPTPASS:LDA#
&A9:STA&3E29:LDA#&FF:STA&3E2A:LDA#&9D:ST
A&3E2B:LDA#&54:STA&3E2C:LDA#&8:STA&3E2D:
]
1450 [OPTPASS
1460 JMP&7D78
1470 .loadsr EQUS"LO. EXILESR"+CHR$&0D
1480 .loadboot
1490 EQUS"LO. !BOOT"+CHR$&0D
1500 .exile_cheat
1510 LDX#loadbootMOD256
1520 LDY#loadbootDIV256
1530 JSR&FFF7
1540 .start
1550 LDX#&2C
1560 .a
1570 LDA&1F10
1580 .loop
1590 EOR&1F00,X
1600 STA&1F00,X
1610 INX
1620 BNEloop
1630 .loop2
1640 INC&1F13
1650 INCa+1
1660 LDA&1F13
1670 CMP#&2C
1680 BEQloop2
1690 CMP#0
1700 BNEstart
1710 LDA #&60:STA &1FDC:JSR &1F42
1720 LDA #&4C:STA &7877
1730 LDA #cont MOD 256:STA &7878
1740 LDA #cont DIV 256:STA &7879
1750 JMP &7800
1760 .cont
1770 LDX #hacker MOD 256
1780 LDY #hacker DIV 256
1790 JSR &FFF7
1800 JMP start2
1810 .out6
1820 LDA #&12:STA c+2:STA d+2
1830 LDA #out3 MOD 256:STA out2+1
1840 LDA #out3 DIV 256:STA out2+2
1850 LDA #&60:STA &758A
1860 JSR &74E1
1870 LDA #run_game MOD 256:STA &38BD
1880 LDA #&4C:STA &787E
1890 LDA #run_game DIV 256:STA &38BE
1900 LDX #&0
1910 .fudge
1920 LDA exlbits,X:STA &38DB,X
1930 INX:CPX #&0B
1940 BNE fudge
1950 LDA #toggle MOD 256:STA &38DD
1960 LDA #toggle DIV 256:STA &38DE
1970 LDA #do_toggle MOD 256:STA &38DB
1980 LDA #do_toggle DIV 256:STA &38DC
1990 LDA #&4C:STA &384A
2000 LDA #extra MOD 256:STA &384B
2010 LDA #extra DIV 256:STA &384C
2020 LDA #extra2 MOD 256:STA &3821
2030 LDA #extra2 DIV 256:STA &3822
2040 JMP &332F
2050 .do_toggle
2060 LDA tog_data
2070 CMP #0
2080 BEQ cheat_on
2090 LDA #&F7:STA &39F6
2100 LDA #&FF:STA &39F7
2110 LDA #0:STA tog_data
2120 JMP &3785
2130 .cheat_on
2140 LDA #z MOD 256:STA &39F6
2150 LDA #z DIV 256:STA &39F7
2160 LDA #1:STA tog_data
2170 JMP &3785
2180 .extra
```

```
 2190 JSR &32FA
 2200 .extra2
 2210 LDX #t1 MOD 256
 2220 LDY #t1 DIV 256
 2230 JSR &32FA
 2240 LDA tog_data
 2250 BEQ cheat_off
 2260 LDX #ton MOD 256
 2270 LDY #ton DIV 256
 2280 JSR &32FA:JMP more
 2290 .cheat_off
 2300 LDX #toff MOD 256
 2310 LDY #toff DIV 256
 2320 JSR &32FA
 2330 .more
 2340 LDX #message MOD 256
 2350 LDY #message DIV 256
 2360 JSR &32FA
 2370 JMP &384D
 2380  .t1 EQUS CHR$13+CHR$&11+CHR$69+ST
RINGS(40," ")+"Cheat "+CHR$0
 2390 .ton EQUS "ON"+CHR$0
 2400 .toff EQUS "OFF"+CHR$0
 2410 .message EQUS CHR$&0D+CHR$&0A+CHR$
&0D+CHR$&0A+CHR$&11+CHR$99+STRING$(10,"
")+"Hacked by Jimbo"+CHR$0
 2420 .run_game EQUS "Run Game"+CHR$0
 2430 .toggle EQUS "Toggle cheat"+CHR$0
 2440 .tog_data EQUB 0
 2450 .exlbits
 2460 EQUD &12091100:EQUD &FFFFFFFF:EQUB
 &FF:EQUB &FF:EQUB &FF
 2470 .hacker EQUS "*L. EXILEL"+CHR$&0D
 2480 ]
 2490 NEXT:MODE 7
 2500 PRINT'''CHR$131"INSERT EXILE DISC
AND PRESS ANY KEY":X=GET
 2510 CALLexile_cheat
```

Get it right

```
   1 =    0 0
   2 =    0 0
   3 =    0 0
  10 = 82E4 4
  20 = BC2B E
  30 = 8719 8
  40 = 8907 3
  50 = 4188 A
  60 = 6974 3
  70 = E31A A
  80 = 16A6 2
  90 = 40FB 3
 100 = 41A3 C
 110 = 1F4F 4
 120 = 146A A
 130 = B9C9 9
 140 = 9FDE A
 150 = EED6 8
 160 = 75D6 8
 170 = 4A5B A
 180 = E3C5 F
 190 = C8B2 7
 200 =  B49 F
 210 = 819C 6
 220 = 4FDC 5
 230 = DCA9 0
 240 = 97CB 7
 250 = A45F 6
 260 = 792C F
 270 = 316D B
 280 =  9CB F
 290 = 35C2 0
 300 = AE67 1
 310 = 6623 7
 320 = 5E3F 2
 330 =  FDA 1
 340 = D007 D
 350 =  744 A
 360 = 82D4 A
 370 = 824E 5
 380 = 805E F
 390 = EF83 9
 400 = 18FB E
 410 = 4735 5
 420 = 4C9A 0
 430 = 4E8A 8
 440 = 9843 F
 450 = 5497 1
 460 = E4C6 F
 470 = 88D6 C
 480 =  800 6
 490 = A53C 3
 500 = A45F E
 510 = EBA2 8
 520 = 3A54 B
 530 = 8D00 5
 540 = 2C4A 9
 550 = 2780 4
 560 = 7BA6 0
 570 = 9E18 3
 580 = ACA7 F
 590 = 224B A
 600 = 7A8A 4
 610 = BDD7 9
 620 = 7602 D
 630 = 2B01 8
 640 =    0 8
 650 = FA34 E
 660 = A7FC 6
 670 = ED13 8
 680 =    0 8
 690 = 1087 9
 700 = 92AA 2
 710 = 6C8A B
 720 = AE1C F
 730 = BB75 0
 740 = 6A27 7
 750 = 608A 1
 760 = 9165 5
 770 = 8144 1
 780 = 8B58 D
 790 = 1677 A
 800 = 1FF7 F
 810 = C8B2 5
 820 = 599B B
 830 = DC26 E
 840 = 8B58 6
 850 = 262B 7
 860 = 45FA 8
 870 = A24B 2
 880 = C8B2 6
 890 =  E56 3
 900 = 8481 E
 910 = E4EC F
 920 =    0 F
 930 = 5125 5
 940 = 345E E
 950 = B1CE A
 960 = F323 2
 970 = FB02 5
 980 = 1E4B 2
 990 = CB61 2
1000 = 7B45 A
1010 = FBF5 D
1020 = 6C8A 5
1030 = AE1C 5
1040 = 9577 0
1050 = DD60 5
1060 = F8D0 6
1070 = 3008 A
1080 =  74F 5
1090 = A7A7 8
1100 = 5AAD 2
1110 = 921A 8
1120 = 7C07 4
1130 = 6C8A 9
1140 = E04E D
1150 = 345E 7
1160 = B1CE 4
1170 = C503 4
1180 = FB02 1
1190 = 286B 2
1200 = CB61 2
1210 =  41C 7
1220 =   A5 6
1230 = 54B9 3
1240 = 3AB8 1
1250 = 2E6E C
1260 = 1AFA E
1270 = 2A99 3
1280 = AE1C 3
1290 = 6026 1
1300 = 599B 1
1310 =   4E 0
1320 = 6A27 4
1330 = 3702 9
1340 = 2723 C
1350 = 1740 4
1360 = 8B58 E
1370 = D28D A
1380 = E535 9
1390 = C8B2 F
1400 = 599B 4
1410 = 8B58 D
1420 = 3BC5 9
1430 = 32EF B
1440 = BC0C F
1450 = C8B2 F
1460 = 721F 1
1470 = CB19 0
1480 = DDF2 2
1490 = 7ED3 D
1500 =  80D 9
1510 = BC10 9
1520 = 2A19 1
1530 = 6C8A 4
1540 = 3208 2
1550 = 778D 2
1560 = 596E 2
1570 = E46B 5
1580 =  325 4
1590 = 7A0F A
1600 = 7EA0 3
1610 = 7602 B
1620 = A1BA D
1630 =  372 9
1640 = E4B8 3
1650 = 5947 4
1660 = D408 0
1670 = B7AB 1
1680 = 5ED0 2
1690 = 9388 E
1700 = 38A0 B
1710 = 309A F
1720 = 2055 5
1730 = 2B20 0
1740 = 76D8 0
1750 = 285D B
1760 = A47E 4
1770 = FCBA 7
1780 = 16C5 E
1790 = CECB 3
1800 = 16DD 7
1810 = EBD0 D
1820 = 4DE9 8
1830 = 6A6B E
1840 = 1A61 4
1850 = A9E9 6
1860 = 79F7 5
1870 = C702 E
1880 = 7E80 4
1890 = 9AFA 4
1900 = 86E2 3
1910 = 76D7 6
1920 = 53ED 9
1930 = 31D8 3
1940 = A340 E
1950 = 4434 D
1960 = 19CC F
1970 = 8ABF D
1980 = D747 7
1990 = A1A6 C
2000 = F3C7 8
2010 = AE3F D
2020 = E9A3 D
2030 = 9419 4
2040 = 6A6E 1
2050 =  B6F F
2060 = 826F B
2070 =  2F9 B
2080 = 9EAD A
2090 = 9E52 7
2100 = EDA8 B
2110 = 5037 2
2120 = 1791 A
2130 = 7262 3
2140 = 6101 5
2150 = 3CF9 A
2160 = 2B56 C
2170 = 1791 D
2180 = 5EE2 2
2190 = 2A62 5
2200 = 4F2A 7
2210 = 1399 F
2220 = 8F53 B
2230 = 2A62 3
2240 = 826F 0
2250 = 4ABE 0
2260 = 9AA4 0
2270 = DD52 D
2280 = FCBC 1
2290 = B91C 8
2300 = 7F07 2
2310 = 7EE7 0
2320 = 2A62 C
2330 = 422A A
2340 = 8420 0
2350 = 6887 3
2360 = 2A62 B
2370 = 107B 2
2380 = 5E86 9
2390 = CA03 5
2400 = AEFC B
2410 = 4EBC 8
2420 = ED3D E
2430 = EB03 D
2440 = 8836 8
2450 = CEC4 0
2460 = 8835 C
2470 = A403 F
2480 = 8B58 F
2490 = 4EA6 A
2500 = 5658 6
2510 = 3DB4 2
```

Listing II

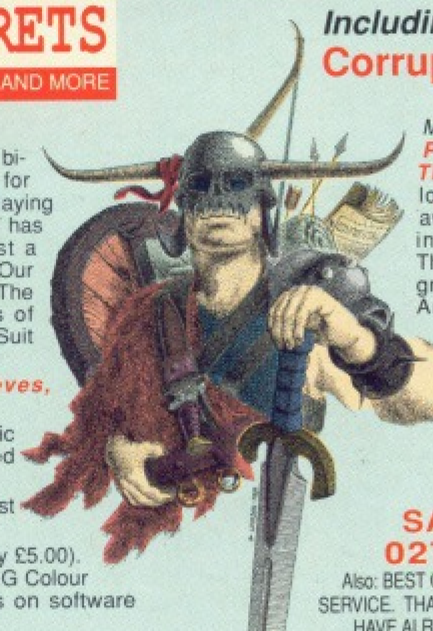
```
    1 REM Exile Mapper
    2 REM by James Bonfield
    3 REM (c) The Micro User
   10 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL:END
   20 FORPASS=0TO2STEP2
   30 P%=&1100
   40 [OPTPASS
   50 .begin2
   60 EOR#&F2
   70 ADC&70
   80 ADC#&97
   90 STA&70
  100 .c
  110 EOR&3000,Y
  120 .d
  130 STA&3000,Y
  140 EOR&70
  150 INY
  160 BNEmore2
  170 INC&7998
  180 INC&799B
  190 INCc+2
  200 INCd+2
  210 PHA
  220 PHP
  230 LDAc+2
  240 CMP#&7F
  250 BEQout2
  260 PLP
  270 PLA
  280 RTS
  290 .more2
  300 JSRbegin2
  310 BNEbegin2
  320 .start2
  330 LDA#&23
  340 STA&70
  350 LDA#&78
  360 LDY#&0
  370 SEC
  380 SEI
  390 JMPbegin2
  400 .out2 JMP out6
  410 .loadboot
  420 EQUS"LO. !BOOT"+CHR$&0D
  430 .exile_cheat
  440 LDX#loadbootMOD256
  450 LDY#loadbootDIV256
  460 JSR&FFF7
  470 .start
  480 LDX#&2C
  490 .a
  500 LDA&1F10
  510 .loop
  520 EOR&1F00,X
  530 STA&1F00,X
  540 INX
  550 BNEloop
  560 .loop2
  570 INC&1F13
  580 INCa+1
  590 LDA&1F13
  600 CMP#&2C
  610 BEQloop2
  620 CMP#0
  630 BNEstart
  640 LDA #&60:STA &1FDC:JSR &1F42
  650 LDA #&4C:STA &7877
  660 LDA #cont MOD 256:STA &7878
  670 LDA #cont DIV 256:STA &7879
  680 JMP &7800
  690 .cont
  700 LDX #hacker MOD 256
  710 LDY #hacker DIV 256
  720 JSR &FFF7
  730 JMP start2
  740 .out6
  750 LDA #&60:STA &758A
  760 JSR &74E1
  770 JMP start2
  780 .out6
  790 LDA #&60:STA &758A
  800 JSR &74E1
  810 LDX #0
  820 .mvloop
  830 LDA &1300,X:STA &3381,X
  840 INX
  850 CPX #&58:BNE mvloop
  860 JMP &3381
  870 .hacker EQUS "*L. EXILEL"+CHR$&0D
  880 ]
  890 NEXT
  900 FOR PASS=0 TO 2 STEP 2
  910 P%=&3381
  920 [OPT PASS
  930 JSR &2E52
  940 JMPstart
  950 .draw
  960 JSR&2EEA
  970 JSR&2F80
  980 .x
  990 LDA #&9B:STA &18
 1000 .y
 1010 LDA #&3B:STA &1A
 1020 JSR&2152
 1030 JSR&1DBE
 1040 JSR&2445
 1050 RTS
 1060 .start
```

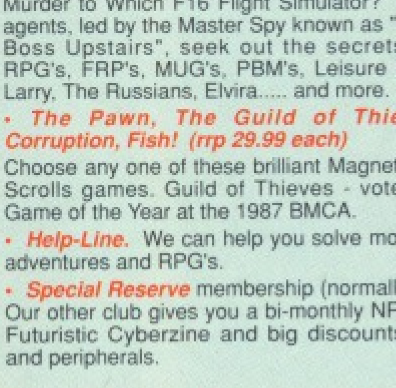
➤

```
➤
1070 JSR draw
1080 .loop
1090 JSR &FFED
1100 PHA
1110 LDA#15:LDX #0:JSR &FFF4
1120 PLA
1130 CMP #90
1140 BEQ left
1150 CMP #88
1160 BEQ right
1170 CMP #58
1180 BEQ up
1190 CMP #47
1200 BEQ down
1210 JMP loop
1220 .right
1230 INC x+1
1240 JMP start
1250 .left
1260 DEC x+1
1270 JMP start
1280 .up
1290 DEC y+1
1300 JMP start
1310 .down
1320 INC y+1
1330 JMP start
1340 ]
1350 NEXT
1360 FOR I=&3381 TO P% STEP 4:!(I-&3381
+&1300)=!I:NEXT
1370 MODE 7:PRINT TAB(5,10)CHR$131;"PLE
ASE INSERT EXILE DISC"
1380 X=GET
1390 CALLexile_cheat
```

Get it right ✓

```
   1 =    0 0 | 220 = 805E 3 | 460 = 6C8A 5 | 700 = FCBA C | 940 = A77D A | 1180 = DF1D B
   2 =    0 0 | 230 = EF83 E | 470 = 3208 D | 710 = 16C5 4 | 950 = D43C B | 1190 = 5332 6
   3 =    0 0 | 240 = 18FB 1 | 480 = 778D E | 720 = CECB 9 | 960 = F65C 1 | 1200 = D862 3
  10 = BC2B B | 250 = 4735 A | 490 = 596E F | 730 = 16DD 3 | 970 = BFBF 2 | 1210 = EC53 2
  20 = 4A5B 6 | 260 = 4C9A 4 | 500 = E46B 0 | 740 = EBD0 C | 980 = DA76 B | 1220 = E460 0
  30 = E3C5 C | 270 = 4E8A 8 | 510 =  325 C | 750 = A9E9 3 | 990 = 5A86 3 | 1230 = 59A0 9
  40 = C8B2 1 | 280 = 9843 6 | 520 = 7A0F 1 | 760 = 79F7 9 | 1000 = CA57 B | 1240 = 48C9 B
  50 = 819C F | 290 = 5497 0 | 530 = 7EA0 7 | 770 = 16DD 0 | 1010 = 21F9 9 | 1250 = 3EF8 3
  60 = 4FDC 2 | 300 = E4C6 5 | 540 = 7602 0 | 780 = EBD0 F | 1020 = B439 C | 1260 = 7008 B
  70 = DCA9 A | 310 = 88D6 C | 550 = A1BA 1 | 790 = A9E9 F | 1030 = 83A3 D | 1270 = 48C9 1
  80 = 97CB 8 | 320 =  800 5 | 560 =  372 D | 800 = 79F7 5 | 1040 = 1C1F 2 | 1280 = 14FC D
  90 = A45F A | 330 = A53C D | 570 = E4B8 D | 810 = EA45 8 | 1050 = 9843 4 | 1290 = 4738 E
 100 = 792C B | 340 = A45F B | 580 = 5947 7 | 820 = 591F 8 | 1060 = 3208 8 | 1300 = 48C9 C
 110 = 316D 5 | 350 = EBA2 F | 590 = D408 1 | 830 = 8B23 1 | 1070 = B5F9 2 | 1310 = FFC3 A
 120 =  9CB B | 360 = 3A54 1 | 600 = B7AB F | 840 = 7602 E | 1080 =  325 7 | 1320 = 6E90 9
 130 = 35C2 6 | 370 = 8D00 C | 610 = 5ED0 A | 850 = 647B 2 | 1090 = EB7F 8 | 1330 = 48C9 0
 140 = AE67 E | 380 = 2C4A 3 | 620 = 9388 0 | 860 = 8BD5 9 | 1100 = 824E 5 | 1340 = 8B58 1
 150 = 6623 7 | 390 = 2780 6 | 630 = 38A0 E | 870 = A403 9 | 1110 = B09A C | 1350 = 2C83 8
 160 = 5E3F B | 400 = 7BA6 0 | 640 = 309A 6 | 880 = 8B58 A | 1120 = 4E8A D | 1360 = 1FFB A
 170 =  FDA F | 410 = DDF2 6 | 650 = 2055 3 | 890 = 2C83 0 | 1130 = 5589 E | 1370 = 8772 A
 180 = D007 7 | 420 = 7ED3 6 | 660 = 2B20 5 | 900 = C046 4 | 1140 = 1959 E | 1380 = 61E9 3
 190 =  744 F | 430 =  80D C | 670 = 76D8 2 | 910 = F945 3 | 1150 = E7B0 B | 1390 = 3DB4 B
 200 = 82D4 F | 440 = BC10 6 | 680 = 285D 6 | 920 = DD44 2 | 1160 = 11E5 6
 210 = 824E B | 450 = 2A19 1 | 690 = A47E F | 930 = 12B0 3 | 1170 = 91EC 3
```





```
HR$131;"PLE
```

```
= DF1D B
= 5332 6
= D862 3
= EC53 2
= E460 0
= 59A0 9
= 48C9 B
= 3EF8 3
= 7008 B
= 48C9 1
= 14FC D
= 4738 E
= 48C9 C
= FFC3 A
= 6E90 9
= 48C9 0
= 8B58 1
= 2C83 8
= 1FFB A
= 8772 A
= 61E9 3
= 30B4 B
```

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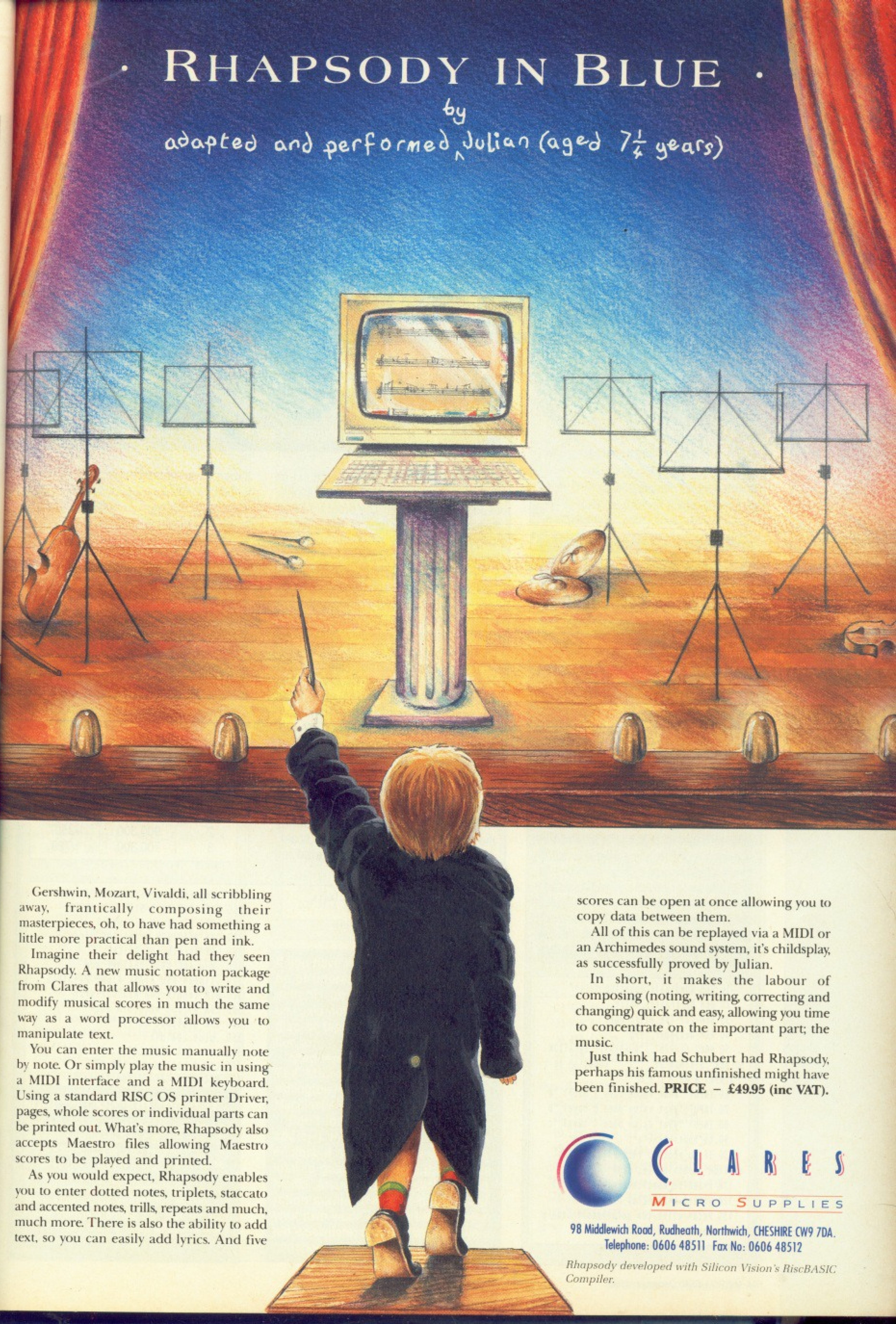

· RHAPSODY IN BLUE ·

adapted and performed by Julian (aged 7¼ years)

Gershwin, Mozart, Vivaldi, all scribbling away, frantically composing their masterpieces, oh, to have had something a little more practical than pen and ink.

Imagine their delight had they seen Rhapsody. A new music notation package from Clares that allows you to write and modify musical scores in much the same way as a word processor allows you to manipulate text.

You can enter the music manually note by note. Or simply play the music in using a MIDI interface and a MIDI keyboard. Using a standard RISC OS printer Driver, pages, whole scores or individual parts can be printed out. What's more, Rhapsody also accepts Maestro files allowing Maestro scores to be played and printed.

As you would expect, Rhapsody enables you to enter dotted notes, triplets, staccato and accented notes, trills, repeats and much, much more. There is also the ability to add text, so you can easily add lyrics. And five scores can be open at once allowing you to copy data between them.

All of this can be replayed via a MIDI or an Archimedes sound system, it's childsplay, as successfully proved by Julian.

In short, it makes the labour of composing (noting, writing, correcting and changing) quick and easy, allowing you time to concentrate on the important part; the music.

Just think had Schubert had Rhapsody, perhaps his famous unfinished might have been finished. **PRICE – £49.95 (inc VAT).**

CLARES
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Rhapsody developed with Silicon Vision's RiscBASIC Compiler.

ROUTINE MATTERS

This month featuring routines to...

- Add *Date to the Master
- Produce fascinating patterns
- Identify which micro is in use
- Solve quadratic equations
- Let you play a guessing game

Solving quadratics

Author : Frances White
Language : Basic
Filename : QuadSol

STUDENTS often find it more difficult to solve quadratic equations than general equations, because as well as having an unknown quantity, they incorporate the unknown quantity squared.

The usual method of finding the solutions is by graphing values resulting from trials on the equation, followed by a decimal search to find a more accurate figure. This is both time consuming and tedious, and often leads to inaccuracies.

However, by using a standard, complex formula, it is possible to find both solutions to 10 significant figures quickly by using our micros.

In the program, the formula is taken as being **A(x*x) + Bx + C = 0**. Type in the program and enter the values of A, B and C and, as long as a solution is possible, the two values will be displayed.

```
   10 REM Quadratic equation solver
   20 REM by Frances White
   30 REM (c) The Micro User
   40 REM December 1990
   50 MODE 6:PRINT '"QUADRATIC EQUATION
SOLVER"'STRING$(25,"¯")'''"Equation is :
 A(x*x) + Bx + C = 0"''
   60 INPUT'"What value does A have? "a
   70 INPUT'"What value does B have? "b
   80 INPUT'"What value does C have? "c
   90 to_root=b^2-4*a*c
  100 IF to_root<=0 THEN PRINT ''"Real
olution unobtainable.":END
  110 k=SQR(to_root):sol1=(-b+k)/(2*a)
  120 sol2=(-b-k)/(2*a)
  130 PRINT''"The two solutions to the p
roblem are"';sol1;" and ";sol2'
```

Pattern Happy

Author : Jonathan Hart   Language : Basic/6502 code   Filename : DecPats

MATHEMATICS can usually be found at the root of most computing applications, especially for graphs. The program listed below takes a new look at this subject, using the numerals resulting from long division as its parameters.

First you are asked to enter the scale size of the pattern – the number of Mode 4 pixels which each single unit is to cover. Then the initial graphics x and y co-ordinates are requested, followed by the fraction to use.

The fraction is entered in the format of *1/x* where x can be any value you wish. You will find that in most cases those fractions which relate to decimals containing several recurring figures will produce the most interesting patterns.

To draw a pattern on the screen, the fraction is converted to a decimal using long division, then displayed using this rule: Each digit is taken in turn and a line with a length of that many units is drawn, the exact length depending on the scale.

After this, the cursor is rotated left through a 90 degree angle. This process is then repeated continuously – although the display appears to come to an end when the numerals in the decimal all become zeros, or the pattern repeats itself.

For example, if we used the fraction 1/16, the decimal equivalent would be 0.0625, the overall display format being:

- Turn left through 90 degrees.
- Draw a line six units long.
- Turn left through 90 degrees.
- Draw a line two units long.
- Turn left through 90 degrees.
- Draw a line five units long.

Four good examples of how the recurring nature of a decimal can produce interesting patterns are:

Scale	Initial x,y	Fraction
1	600,400	1/973
2	300,500	1/5352
2	900,300	1/3507
3	700,300	1/729

```
   10 REM Patterns from decimals
   20 REM by Jonathan Hart
   30 REM (c) The Micro User
   40 REM December 1990
   50 MODE 4:INPUT "Scale: "scale
   60 IF scale>20 THEN 50
   70 PROCassemble
   80 INPUT "Start co-ords: "ox,oy
   90 INPUT "Fraction (eg: 1/2): "a$
  100 CLS:VDU 23,1,0;0;0;0;
  110 i%=INSTR(a$,"/"):IF i%=0 THEN 90
  120 r%=VAL LEFT$(a$,i%-1)
  130 x%=VAL MID$(a$,i%+1)
  140 IF r%>=10*x% THEN 140
  150 $&700="Key 1 "+a$
  160 X%=0:Y%=7:CALL cli
  170 ?dir=0:MOVE ox,oy
  180 VDU 31,39,0,&30+(r% DIV x%),8
  190 r%=r% MOD x%*10:A%=&2E
  200 CALL print:REPEAT:A%=r% DIV x%
  210 CALL draw:r%=r% MOD x%*10
  220 UNTIL r%=0:A%=&30:REPEAT
  230 CALL print:UNTIL FALSE
  240 DEFPROCassemble:dir=&70:fx=&FFF4
  250 length=&71:wrch=&FFEE:cli=&FFF7
  260 FOR I%=0 TO 2 STEP 2:P%=&900
  270 [OPT I%:.draw STA add+1
  280 ORA #&30:JSR print:INC dir
  290 LDX #scale:LDA #0:CLC
  300 .add ADC #&00:DEX:BNE add
  310 .times4 ASL A:ASL A:BNE P%+3:RTS
  320 STA length:LDA #25:JSR wrch
  330 LDA #1:JSR wrch:STA eor+1
  340 JSR plot:DEC eor+1
  350 .plot LDA dir
  360 .eor EOR #&00:LSR A:BCC zero
  370 LSR A:LDA length:LDY #0
  380 BCC P%+7:SBC #1:EOR #&FF:DEY
  390 JSR wrch:TYA:JMP wrch
  400 .zero LDA #0:JSR wrch:JMP wrch
  410 .print PHA:LDA #19:JSR fx:LDX #0
  420 .shift1:LDA &5808,X
  430 STA &5800,X:INX:BNE shift1
  440 .shift2 LDA &5908,X:STA &5900,X
  450 INX:CPX #&38:BCC shift2
  460 PLA:JSR wrch:LDA #8:JMP wrch
  470 ]:NEXT:ENDPROC
```

Another selection of your handy routines brought together by Stephen Wade

Guessing game

Author : Julia Siddon
Language : Basic
Filename : GuessGm

MANY programmers believe a computer game cannot be any good unless it is at least 10k long. Not true, as the listing below shows.

The object of the game is to guess the number which your micro has thought of. This can be anything between 1 and the maximum value which you are asked to enter – this needs to be a minimum of 50.

It is not as easy as it first seems because all you are told is whether the answer is higher or lower than your last guess, that is until you (eventually) get it right. When you do, your micro will tell you how many attempts you took to do so.

The random number generator is re-seeded from the *TIME* variable each time the program is run, in an attempt to keep the target number as random as possible.

```
   10 REM Number guessing game
   20 REM by Julia Siddon
   30 REM (c) The Micro User
   40 REM December 1990
   50 MODE 7:seed=RND(-TIME):PRINT "Numb
er guessing game   by Julia Siddon"''
   60 REPEAT:INPUT "Top of number range
(must be 50 or more): "max%:IF max%=0 TH
EN END ELSE UNTIL max%>49
   70 number=RND(max%):CLS:PRINT "Number
 guessing game   by Julia Siddon"'''"I h
ave thought of a number between 1 and";m
ax%;". All you have to do is guess it.":
trys=1:REPEAT
   80 REPEAT:INPUT '"Enter your guess: "
guess%:UNTIL guess%>=1 AND guess%<=max%
   90 IF guess%=number THEN PRINT '"CORR
ECT!"'"You needed ";trys;" attempts."''"
Press any key for another go.....":REPEA
T UNTIL GET:RUN
  100 IF guess%<number THEN PRINT '"It i
s higher than that." ELSE PRINT '"It is
lower than that."
  110 trys=trys+1:UNTIL 0
```

Monthly cassette and disc

All of this month's routines can be found on the monthly subscription disc and cassette. On the 5.25" disc the programs reside in the "R" directory, and on the 3.5" disc in the "RoutMats" directory.

Those routines designed to work on the Archimedes series and A3000 micros are already file-typed on the 3.5" disc for your benefit – they are the ones without a blank icon when viewed at in the desktop environment.

Micro identifier

Author : Jim Maguire
Language : Basic
Filename : MicrChk

IT is often useful to be able to identify which of the numerous Acorn micros your program is running on. Some of the top commercial games over the past few years have carried special enhanced versions for Master users as well as the standard one, these having to check automatically which version needs to run.

The various versions of the operating system all carry a different identification code – which can be read by INKEY-256 – which in turn allows us to decipher which of the micros our program is running on.

When the program below is run you will get a message stating which type of micro you are using. This is done by reading the INKEY-256 code, and then comparing it to those listed in the data statements, the appropriate message being displayed.

```
   10 REM Micro model checker
   20 REM by Jim Maguire
   30 REM (c) The Micro User
   40 REM December 1990
   50 PROCgetcode:REPEAT
   60 READ code%,micro$:IF comp%=code% T
HEN PRINT "This is a ";micro$:END ELSE I
F code%=256 THEN PRINT micro$:END
   70 UNTIL 0
   80 DEFPROCgetcode
   90 comp%=INKEY(-256):ENDPROC
  100 DATA 0,BBC Micro MOS 0.10
  110 DATA 1,Acorn Electron MOS 1.00
  120 DATA 160,Archimedes (Arthur)
  130 DATA 161,Archimedes (RiscOS)
  140 DATA 244,BBC Master 128 MOS 3.26
  150 DATA 251,BBC Model B+ MOS 2.00
  160 DATA 252,BBC Micro German MOS
  170 DATA 253,BBC Master 128 MOS 3.20
  180 DATA 254,BBC Micro MOS 1.00/1.10
  190 DATA 255,BBC Micro MOS 1.00/1.20
  200 DATA 256,Micro unrecognised!
```

If you have written a routine that may be of interest to other readers, and suitable for publication in this column, do not hesitate in sending it on disc or tape along with documentation to:

Stephen Wade, Routine Matters, The Micro User, Europa House, Adlington Park,
Macclesfield SK10 4NP

Don't forget to tell us your name, address and telephone number, and enclose a stamped addressed envelope to guarantee the return of your media. Also provide us with a declaration stating that the routine is all your own work, has not been submitted elsewhere, and that we have your permission to use it.

Dating with a Master

Author : Henry Brooks
Language : 6502 code
Filename :Data

ONE of the major enhancements of the Master series over the original BBC Micro is the built-in real-time clock. By using the **Time* command, we can find out the current day, date and time.

However, in some applications we may only want part of this information – for example the date for automatic insertion into a letter.

Within the Basic environment this is not too difficult to achieve – instead of **Time* we can use the *TIME$* function to read the string, extracting only the necessary parts.

It's not quite so straightforward In non-Basic languages and machine code because the *TIME$* function is not present, and **Time* can only be used to read and print up the entire string in one go. What we need is a new command – **Date* – which prints up only the relevant information.

The operating system command Osword 14 with XY set to function 0 will get this data. It reads a parameter block of 25 characters – the full string followed by a carriage return marker. We are concerned with bytes 4 to 14.

The short listing below assembles a piece of machine code to do just this, automatically saving it under the filename of *Date* in the currently selected directory. Subsequently using **Date* at the appropriate moment produces the desired result.

More details on the different formats of the Osword 14 (read CMOS clock) and Osword 15 (write CMOS clock) calls can be found on pages D.3-22 to D.3-25 of the Master Reference Manual Part One.

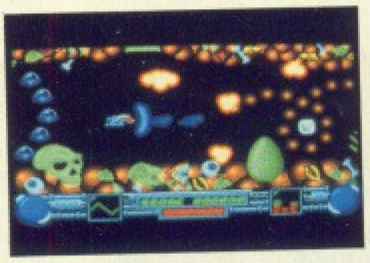
```
   10 REM *DATE for Master 128
   20 REM by Henry Brooks
   30 REM (c) The Micro User
   40 REM December 1990
   50 MODE 7:osword=&FFF1:oswrch=&FFEE:o
snewl=&FFE7:FOR L%=0 TO 3 STEP 3
   60 P%=&900:[OPT L%
   70 LDA #14:LDX #block MOD 256
   80 LDY #block DIV 256:JSR osword
   90 LDY #4:.loop:LDA block,Y
  100 JSR oswrch:INY:CPY #15:BEQ nomore
  110 JMP loop:.nomore:JSR osnewl:RTS
  120 .block:EQUS STRING$(25,CHR$(0))
  130 ]:NEXT:OSCLI "SAVE $.Date 900 "+ST
R$~P%
```

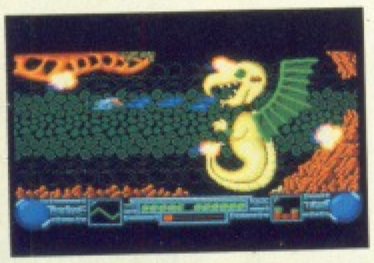
BLOWPIPE

Five levels of alien warfare lie before you – the most devilishly ingenious terra incognita you have ever faced awaits you, determined to question your genius and cause your downfall – can you keep ahead of this masterpiece of technical wizardry – conquer hitherto uncharted, undreamed of heights?

At the controls of the top specification ship, **The Annihilator**, you must establish a strategy to survive each level and collect as many credits as possible to use in the trading posts en route where you can equip your ship with even more powerful weaponry.

At the end of each stage, a fiendishly gruesome arch-guardian will try to check your progress through the portal to the next level – get it before it gets you and revel in your cunning.





Blowpipe is a masterpiece of Archimedes games' coding with over 2.5 megabytes of 256 colour graphics with up to 64 sprites on screen simultaneously. Over fifteen separate pieces of 4 channel stereo music with stunningly realistic sound effects heighten the excitement – explosive, mind-blowing, meteoric mega-action, all compressed onto just two discs.

WORLDSCAPE

Can you rectify world devastation? **Worldscape** affords you the opportunity to try, combining man's knowledge with your own ingenuity.

The fine balance of the planet Earth has been maintained by natural phenomena however catastrophic – volcanic eruption, earthquakes, tidal waves, plagues – but crucially, in the three hundred years since the Industrial Revolution, the human race has caused the global problems facing us today:

Atmospheric pollution caused by industrial gases

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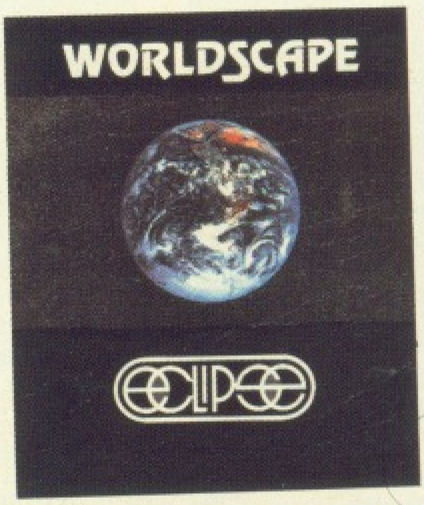
Can you improve on present-day thinking? **Worldscape** gives you the opportunity to try – use its built-in landscape generator to create totally unique landscapes – build cities, erect power stations, deal with sewage, plant your own forests – these and countless other options are available to you.

Remember you hold the advantage over scientists in the real world – you can correct your errors – mankind rarely can.



Complete on two discs with an accompanying comprehensive manual, **Worldscape** challenges you to change the world.

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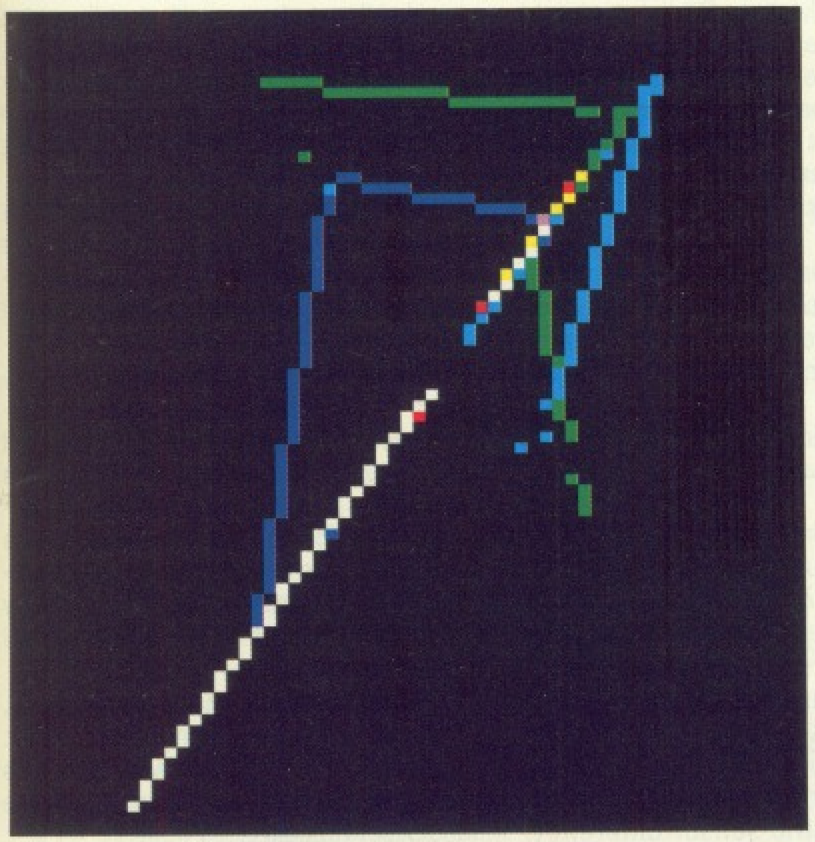


Line art

Kinky kinetics

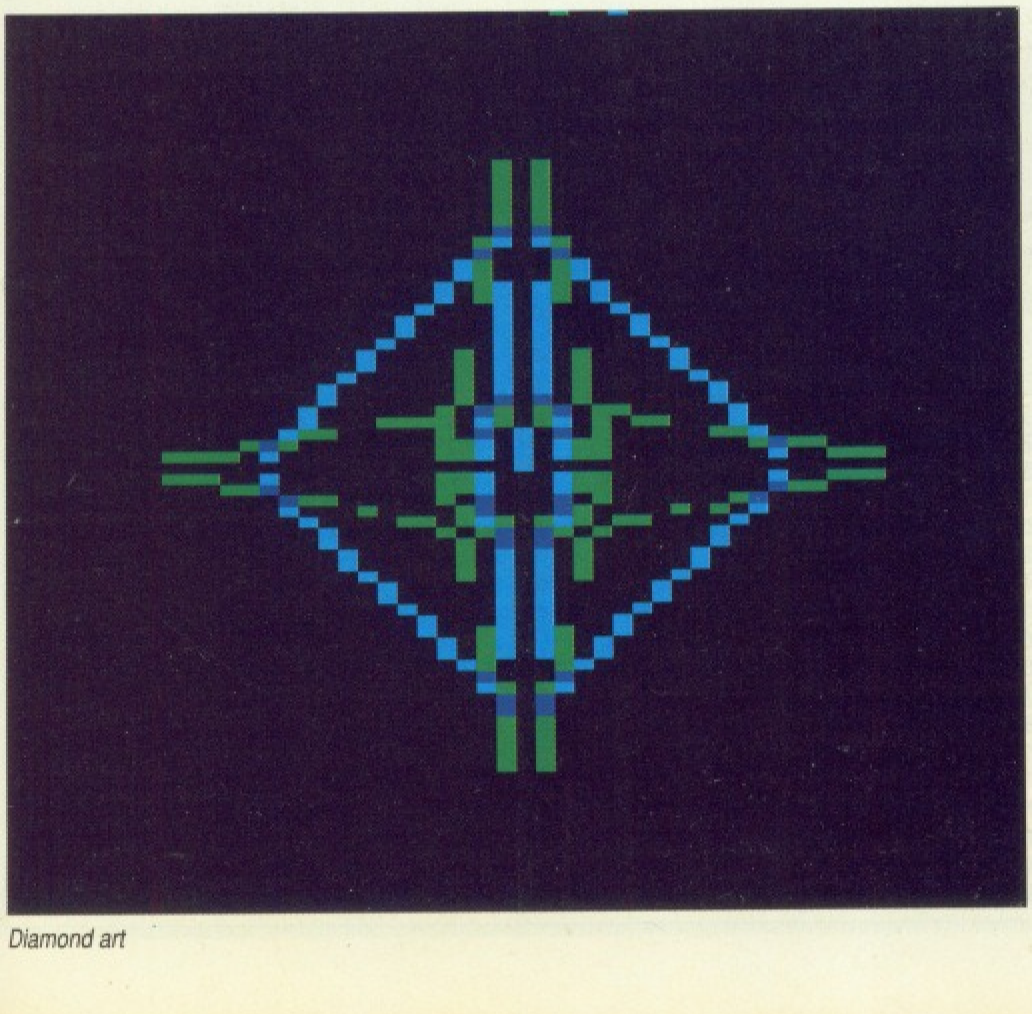
Mike Cook invites you to exercise your artistic talents with his light organ

KINETIC art is making a comeback. Perhaps it's something to do with the nostalgia for the Sixties – even flared trousers are fashionable again. Well for those of you who missed it the first time round kinetic art, as the name implies, involves a work that is constantly changing, offering new and surprising forms for the viewer.

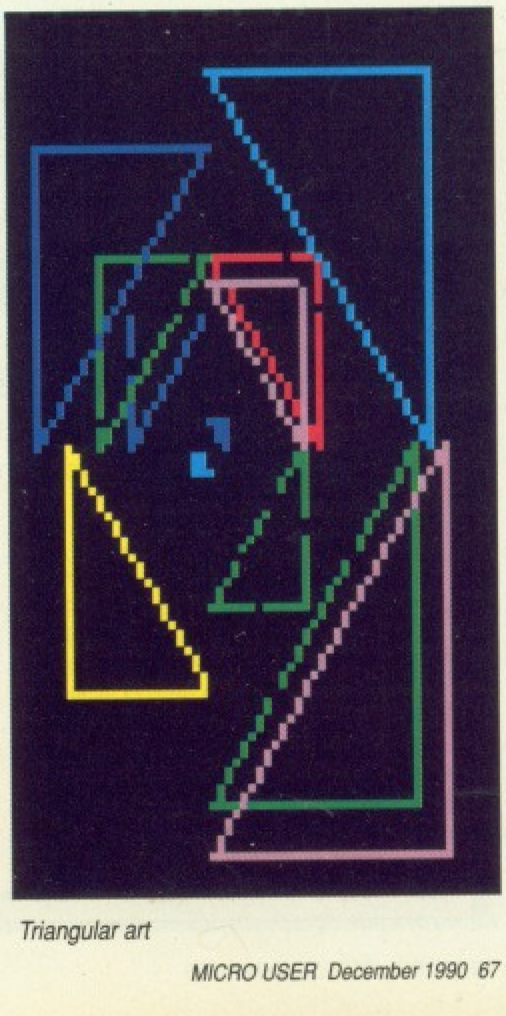
I recently saw a fine example of this in Bremen, Germany, by the river: Three huge, slowly revolving blades. However most kinetic art is passive, which means the viewer is accepting a pre-programed sequence of events. This sort of system is known as deterministic because all the possible patterns have been determined in advance when it was made.

What characterises the best of kinetic art is the ability of the viewer to take an active part in generating and guiding the presentation before him. However as most artists are not engineers this feedback tended to

➤



Diamond art



Triangular art

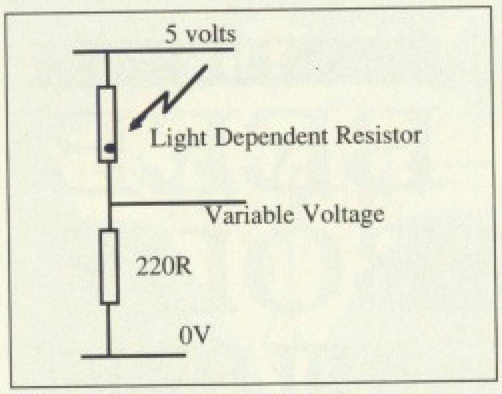


Figure I: The basic potential divider

➤ be rather crude. In the Sixties there was no easy access to computers, so most systems tended to be electro-mechanical affairs. So to end the year I have decided to investigate the capabilities of a simple but flexible computerised system.

What I needed was a low cost transducer which could respond to a person's presence. There are several possibilities, but I have decided to use four light-dependent resistors as they are cheap and easy to interface.

The cadmium sulphide light dependent resistor works like this: Particles of light (photons) hit the chemical and dislodge electrons from the atoms which allow them to take place in the conduction process.

The more light that falls on it the more electrons there are and the easier it is to conduct electricity. Hence more light equals lower resistance.

We can use this effect in a simple potential divider as shown in Figure I. We need four of these circuits connected to each channel of the analogue input port or joystick socket.

The full practical diagram is shown in Figure II. The numbers on the right hand side refer to the 15 way D-Type plug – if you look closely the numbers are printed on the back of the plug.

The electronic components are available as Body Build pack No.67 (see the order form).

Now how to arrange the photo cells? There are various options: One is to place them in a group in a box, then by waving your hands over the box you will affect each photoelectric sensor differently. Another idea is to place a photo cell at each corner of the monitor, then with a little backlighting a viewer in front of the screen will cause changes dependent upon his viewing position. You could arrange a bo with light bulbs at one side and the cells o the other. The viewer then inserts his hands to manipulate the display.

However the hardware, as ever, is only part of the story. What brings it all to life is the software. This is where your imagination comes in, however to get you going have come up with the program in Listing I.

This is split up into two parts, a test program and a sample art package. A procedure common to both is SAMP, defined a line 1140, which samples the light sensors and scales it to the range 0 to 39. The variable *SCALE%* controls the dynamic range and *OSET%* is used to remove any residual offset. You will probably have to play about with these variables to suit your local light levels.

The test portion,which starts at line 980, produces a line bar graph for each sensor. You can use this to adjust your light levels or to see the results of changing the size and offset variables.

Having set up the system, pressing any key takes you to the art part of the pro-

```
   10 MODE7
   20 PRINT"Beeb Bodybuilding Course"
   30 PRINT"Kinetic Art"
   40 PRINT"THE MICRO USER"
   50 PRINT"December 1990"
   60 PRINT"By Mike Cook"
   70 PRINT
   80 TLIM=3000
   90 TIME=0
  100 *FX16,4
  110 SCALE%=1024
  120 OSET%=16
  130 N%=8
  140 DIM X%(40),Y%(40),OX%(N%,4),OY%(N%
,4)
  150 DIM SX%(4),SY%(4)
  160 PROC_LOOKUP
  170 REPEAT:UNTIL TIME>200
  180 MODE 7
  190 PROCBAR
  200 REPEAT
  210 MODE 2
  220 VDU 29,640;512;
  230 PROC_POLYGON
  240 PROC_LINE
  250 PROC_TRI
  260 UNTIL FALSE
  270 END
  280 DEF PROC_LOOKUP
  290 FOR A=0 TO 40
  300 X%(A)=A*16
  310 Y%(A)=A*12.8
  320 NEXT
  330 FOR A=0 TO N%
  340 FOR B=1 TO 4
  350 OX%(A,B)=0
  360 OY%(A,B)=0
  370 SX%(B)=1:SY%(B)=1
  380 NEXT
  390 NEXT
  400 SX%(2)=-1:SX%(3)=-1
  410 SY%(3)=-1:SY%(4)=-1
  420 ENDPROC
  430 DEF PROC_LINE
  440 CLS
  450 VDU23,1,0;0;0;0;
  460 LOCAL A%,B%,C%,NP%
  470 NP%=1
  480 REPEAT
  490 GCOL3,RND(7)
  500 FOR A%=1 TO 4
  510 PROC_SAMP(A%)
  520 OX%(NP%,A%)=X%(V%)
  530 OY%(NP%,A%)=Y%(V%)
  540 NEXT
  550 FOR A%=1 TO 4
  560 FOR B%=1 TO 4
  570 FOR C%=1 TO 4
  580 MOVE SX%(C%)*OX%(NP%,B%),0
  590 DRAW 0,SY%(C%)*OY%(NP%,A%)
  600 NEXT:NEXT:NEXT
  610 NP%=NP% EOR 1
  620 FOR A%=1 TO 4
  630 FOR B%=1 TO 4
  640 FOR C%=1 TO 4
  650 MOVE SX%(C%)*OX%(NP%,B%),0
  660 PLOT 7,0,SY%(C%)*OY%(NP%,A%)
  670 NEXT:NEXT:NEXT
  680 UNTIL TIME>TLIM
  690 TIME=0
  700 ENDPROC
  710 DEF PROC_POLYGON
  720 CLS
  730 VDU23,1,0;0;0;0;
  740 LOCAL A%,NP%
```

Get it right ✓

```
  10 = 8AFC C
  20 = 17E7 E
  30 = 8125 7
  40 = D9FA 5
  50 = 635E 5
  60 = FC23 8
  70 = FF3E C
  80 = C91E 9
  90 = 173E 8
 100 = 7552 C
 110 = 8C54 7
 120 = C4EC 1
 130 = 6562 B
 140 = 6AF5 9
 150 = D366 6
 160 = 4BA6 1
 170 = DEF4 D
 180 = 1092 E
 190 = 45A2 A
 200 = BFBA 8
 210 = 4037 9
 220 = BF50 6
 230 = B5E6 A
 240 = FE07 C
 250 = E93E 6
 260 = 226C F
 270 = FD2E 4
 280 = 66D9 C
 290 = 917A A
 300 = 15A8 0
 310 = 8563 4
 320 = 2C83 4
 330 = 347C B
 340 = 7BE5 E
 350 = BDE8 C
 360 = 56CB 2
 370 = EC50 E
 380 = 2C83 7
 390 = 2C83 4
 400 = E917 9
 410 = 97DD 6
 420 = EDOF E
 430 = F070 9
 440 = 7A16 8
 450 = 1E64 A
 460 = EFB3 0
 470 = 9376 5
 480 = BFBA 1
 490 = B716 9
 500 = C813 1
 510 = F2F9 D
 520 = 69E1 D
 530 = 3CA3 F
 540 = 2C83 2
 550 = C813 5
 560 =   66 A
 570 = 47B5 B
 580 = 522F 0
 590 = 672A 2
 600 = 7A89 9
 610 = C758 5
 620 = C813 0
 630 =   66 D
 640 = 47B5 A
 650 = 522F 3
 660 = A98C B
 670 = 7A89 8
 680 = C466 B
 690 = 173E E
 700 = EDOF C
 710 = 3F29 9
 720 = 7A16 8
 730 = 1E64 F
 740 = 8F48 E
 750 = 9376 A
 760 = BFBA 7
 770 = 3C56 0
 780 = C813 3
 790 = F2F9 5
 800 = 6DE7 B
 810 = 2890 4
 820 = 2C83 8
 830 = E07C 2
 840 = 26C1 6
 850 = 6C06 4
 860 = 2C83 C
 870 = 1FFB D
 880 = ABF7 F
 890 = C377 A
 900 = E07C 2
 910 = 26C1 F
 920 = 8C71 E
 930 = 2C83 7
 940 = D15D 5
 950 = C466 8
 960 = 173E B
 970 = EDOF B
 980 = A7E1 8
 990 = 1E64 A
1000 = 7A16 3
1010 = 6887 C
1020 = FF3E A
1030 = 60E0 7
1040 = AF12 5
1050 = BFBA 5
1060 = 20B6 D
1070 = 173E 7
1080 = A367 4
1090 = 3CF5 F
1100 = 4F0D 3
1110 = 2C83 8
1120 =  7E0 5
1130 = EDOF 1
1140 = 635B 2
1150 = 8E8A E
1160 = B990 6
1170 = B7E8 5
1180 = EDOF 9
1190 = 7752 8
1200 = 3638 D
1210 = 9376 8
1220 = 7A16 8
1230 = BFBA A
1240 = C813 A
1250 = 8E96 B
1260 = 9C5F 2
1270 = 65D6 E
1280 = 8C71 0
1290 = 79F6 5
1300 = F2F9 7
1310 = 2E4F F
1320 = 553A D
1330 = 8E96 2
1340 = A2C0 1
1350 = 5B49 A
1360 = 6C06 8
1370 = 2C83 C
1380 = ABF7 6
1390 = C377 D
1400 = C466 5
1410 = 173E 0
1420 = EDOF 2
```

gram. This is basically three different types of pattern you can alter with the light sensors, the length of time each one is shown is controlled by the variable in line 80, which is currently set for 30 seconds.

To speed up the pattern generation use is made of a lookup table *X%(n)* and *Y%(n)* to relate the sample value to the appropriate screen co-ordinates.

The procedure POLYGON uses the light sensors to control the position of each corner of a quadrilateral. This changes shape in sympathy with the light sensors. A record of each shape is stored in the arrays *OX%()* and *OY%*and when a certain number have been displayed the oldest one is removed.

The number of shapes on the screen at any one time is controlled by the variable *N%* set up in line 130. If you are running this on the faster Archimedes you might like to make this a large value. This pattern responds very quickly to light changes.

The next pattern, PROC_LINE, is more subtle. It is formed by a cross at the centre of the screen. Points along the arms of the cross are determined by the light sensors and then each point is connected to every other point. This has a four fold symmetry, the number of patterns on the screen for it being limited to two.

Finally PROC_TRI makes each corner of the screen respond to a different light sensor. A triangle is drawn with size and displacement from the centre controlled by the light sensor.

In all these displays I have chosen the colours at random, and there is nothing to stop you assigning this to one of the sensors. Archimedes owners will be able to experiment in the higher colour modes and achieve even better results. As usual I want the Body Build article to be a springboard for your own ideas.

I hope when you put on your one man (or woman) retrospective of kinetic art at the Tate you will invite me to the opening night. Have a very merry time this Christmas. See you next month.

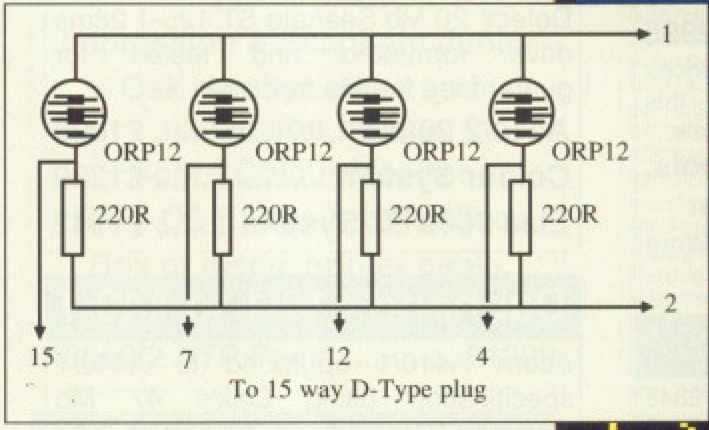
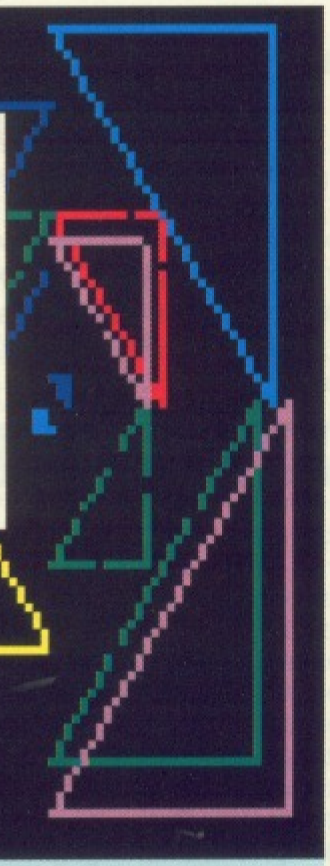


Figure II: Kinetic Art Machine



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```
 750 NP%=1
 760 REPEAT
 770 GCOL1,RND(7)
 780 FOR A%=1 TO 4
 790 PROC_SAMP(A%)
 800 OX%(NP%,A%)=SX%(A%)*X%(V%)
 810 OY%(NP%,A%)=SY%(A%)*Y%(V%)
 820 NEXT
 830 MOVE OX%(NP%,1),OY%(NP%,1)
 840 FOR A%=2 TO 4
 850 DRAW OX%(NP%,A%),OY%(NP%,A%)
 860 NEXT
 870 DRAW OX%(NP%,1),OY%(NP%,1)
 880 NP%=NP%+1
 890 IF NP%>N% THEN NP%=1
 900 MOVE OX%(NP%,1),OY%(NP%,1)
 910 FOR A%=2 TO 4
 920 PLOT 7,OX%(NP%,A%),OY%(NP%,A%)
 930 NEXT
 940 PLOT 7,OX%(NP%,1),OY%(NP%,1)
 950 UNTIL TIME>TLIM
 960 TIME=0
 970 ENDPROC
 980 DEF PROCBAR
 990 VDU23,1,0;0;0;0;
1000 CLS
1010 PRINT"BAR GRAPH OF LIGHT SENSORS"
1020 PRINT
1030 PRINT"ADJUST THE LIGHT LEVELS"
1040 PRINT TAB(0,21)"Press a key for th
e art";
1050 REPEAT
1060 PRINT TAB(0,8)
1070 TIME=0
1080 FOR A=1 TO 4
1090 PROC_SAMP(A)
1100 PRINT STRING$(V%,"*");SPC(40-V%)
1110 NEXT
1120 UNTIL NOT(INKEY(0))
1130 ENDPROC
1140 DEF PROC_SAMP(C%)
1150 V%=ADVAL(C%) DIV SCALE% - OSET%
1160 IF V%<0 THEN V%=0
1170 IF V%>39 THEN V%=39
1180 ENDPROC
1190 DEF PROC_TRI
1200 LOCAL NP%
1210 NP%=1
1220 CLS
1230 REPEAT
1240 FOR A%=1 TO 4
1250 MOVE OX%(NP%,A%),OY%(NP%,A%)
1260 PLOT 7,0,OY%(NP%,A%)
1270 PLOT 7,OX%(NP%,A%),0
1280 PLOT 7,OX%(NP%,A%),OY%(NP%,A%)
1290 GCOL0,RND(7)
1300 PROC_SAMP(A%)
1310 OX%(NP%,A%)=X%(V%)*SX%(A%)
1320 OY%(NP%,A%)=Y%(V%)*SY%(A%)
1330 MOVE OX%(NP%,A%),OY%(NP%,A%)
1340 DRAW 0,OY%(NP%,A%)
1350 DRAW OX%(NP%,A%),0
1360 DRAW OX%(NP%,A%),OY%(NP%,A%)
1370 NEXT
1380 NP%=NP%+1
1390 IF NP%>N% THEN NP%=1
1400 UNTIL TIME>TLIM
1410 TIME=0
1420 ENDPROC
```

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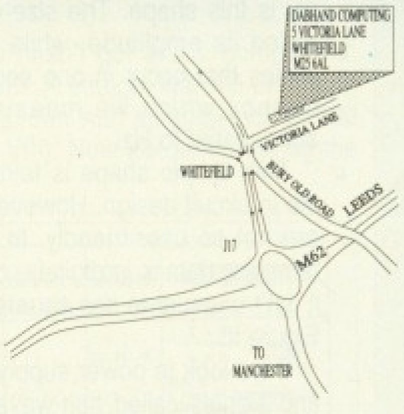

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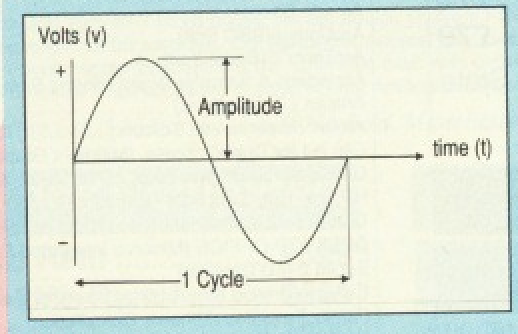


Figure Ia

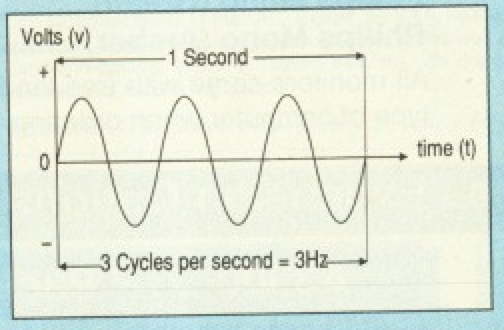


Figure Ib

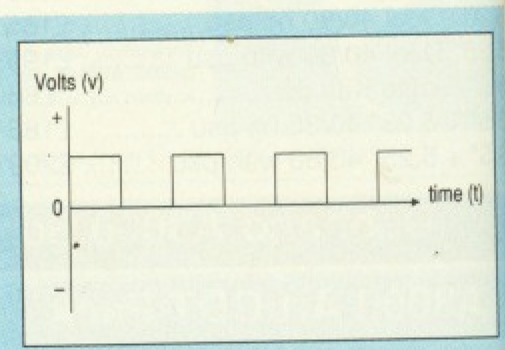


Figure II

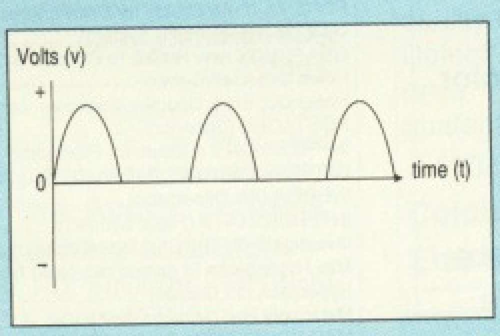


Figure IIIa

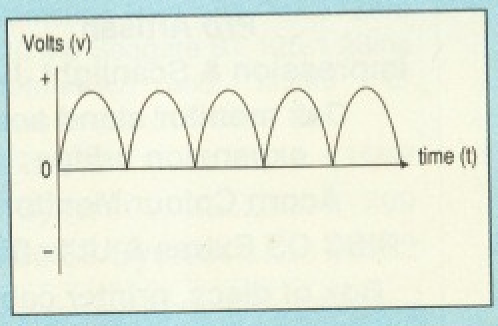


Figure IIIb

Paul Houghton makes waves

And Fourier

IN the world of electronics, it's very important to be able to understand the nature of the signals which travel around our circuits and systems. The interesting thing is that all waveforms can be built up from a basic wave shape, and you can do it yourself using your BBC Micro.

Many types of wave are simple shapes, such as the sinusoidal signal shown in Figures Ia and Ib.

The voltage of our mains electricity supply is this shape. The size of the signal is called its amplitude, while the number of cycles that occur in one second is the frequency which we measure in Hertz – abbreviated to Hz.

This simple shape is fairly easy to handle in circuit design. However, other signals are not so user-friendly. In computer systems the data is in digital – on-off form – so it isn't unusual to see square wave signals, Figure II.

If we look in power supply units, we may find signals called half-wave and full-wave rectifier waveforms (Figures IIIa and IIIb). And delving into other circuitry may reveal such shapes as the sawtooth and triangular signals shown in Figure IV.

The remarkable thing is that these more complex signals can be created by adding together a number of pure sinusoidal signals composed of a basic signal called the fundamental plus other smaller signals called harmonics which have frequencies which are simple multiples of the fundamental. This idea is shown in Figure V.

For example, the second harmonic is twice the frequency of the fundamental, the third harmonic three times the fundamental frequency and so on.

This idea was first shown by a French mathematician, Baron Jean Baptiste Joseph Fourier (1768-1830), who certainly wasn't to know just how useful his work would become in electronics and communication engineering. The signals are named the Fourier series in his honour.

Theoretically, an infinite number of harmonics are required to reproduce the complex signal exactly, but by just adding a few together we get a good approximation. Once we realise that complex signals are made up of a series of sinusoidal signals, we can predict the effects of circuits upon them.

Suppose that you are sending digital data down a pair of wires to a printer. The longer the length of wire used, the harder it is for high frequency signals to get through. Now remember that digital data consists of a whole range of sinusoidal signals at different frequencies.

If the higher frequencies can't get through then, at the receiving end, our on-off signal will be distorted because all its harmonics will no longer be present. In practice this limits the length of connection to your printer to just a few metres.

If we try to increase the rate at which we send data to the printer we have a signal whose harmonics are going to be higher still, and so even more prone to distortion. These facts limit both the rate at which data can be sent down a wire and the length of the wire.

To start with a complex signal and then work out the size and frequency of each of the sinusoidal signals in the series needs a great deal of mathemagics. It's much more fun, and just as instructive, to start with the individual sinusoidal signals and add them together to produce a resultant complex waveform.

The Basic program given here lets you do just that. So type it in, ensure you've made no typing errors using the checksums, save it then type RUN.

The program lets you to enter the size and frequency of each sinusoidal waveform and watch it being drawn. At any time you may instruct it to show you what happens if

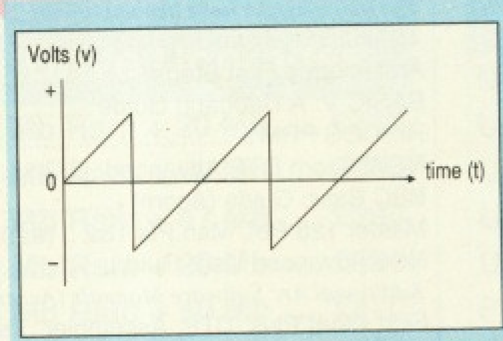


Figure IVa

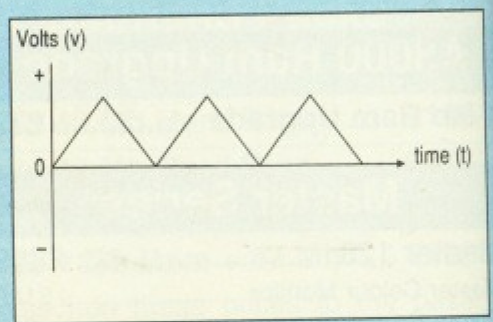
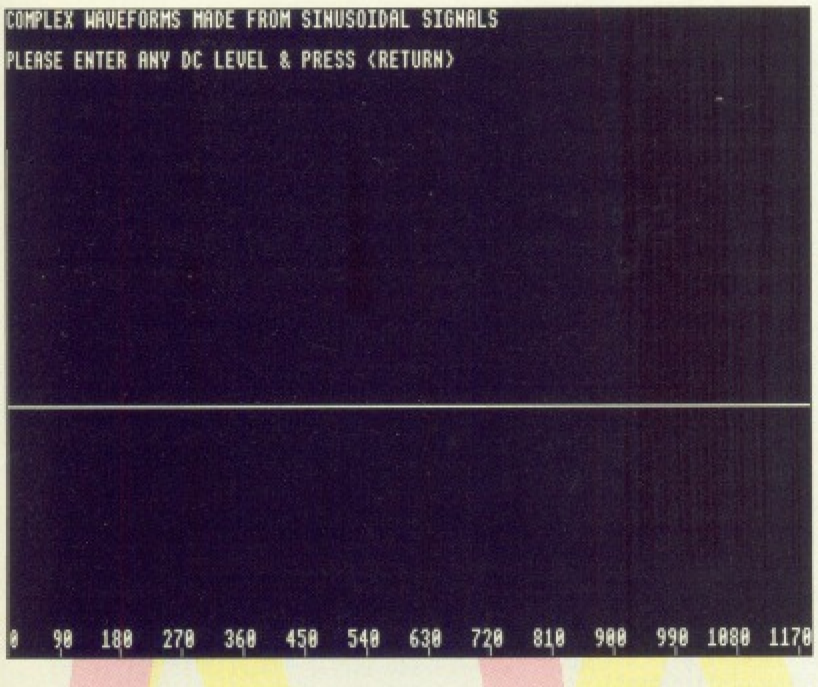


Figure IVb

my next trick...



```
COMPLEX WAVEFORMS MADE FROM SINUSOIDAL SIGNALS
PLEASE ENTER ANY DC LEVEL & PRESS <RETURN>
```

Figure VI

you add all the different waves together.

The results can be printed out using your own screen dump program – alter line 1090 to the command required by your screen dump program. If you aren't using a printer, delete line 1090.

In Table I you will find the values you need for the complex waveforms that have already been mentioned. For the more adventurous, the formulae for calculating more harmonics are provided – so get those calculators working.

To see how the program works, let's take the square wave as an example. When the program is run you will see the graph-type display shown in Figure VI.

The figures on the vertical axis represent the amplitude of each signal, while the horizontal figures determine how many cycles are plotted. One cycle of the fundamental frequency corresponds to 360 degrees marked on this axis.

You are asked if you want to enter a d.c.(direct current) component. This is a constant value sometimes needed to lift the resultant waveform. Its value for the square wave is given as 100.The difference result if we didn't include it is shown in Figures VIIa and VIIb.

You can see what I mean about the lifting effect. Type in 100 and press Return. If a waveform hasn't got a d.c. component, just hit Return. A straight line will be drawn across the screen with an amplitude of 100 (see Figure VIII). Now we start entering the ➤

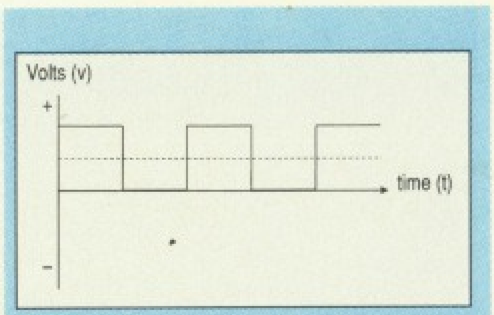


Figure VIIa

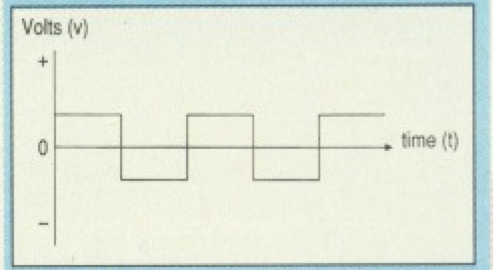


Figure VIIb

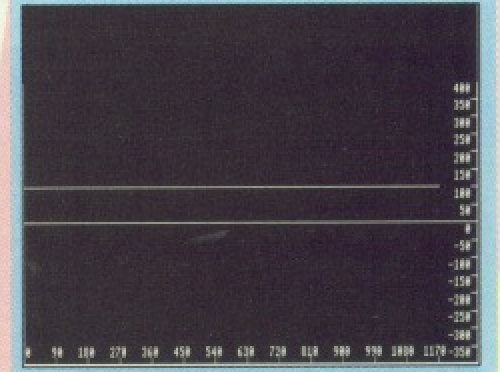


Figure VIII

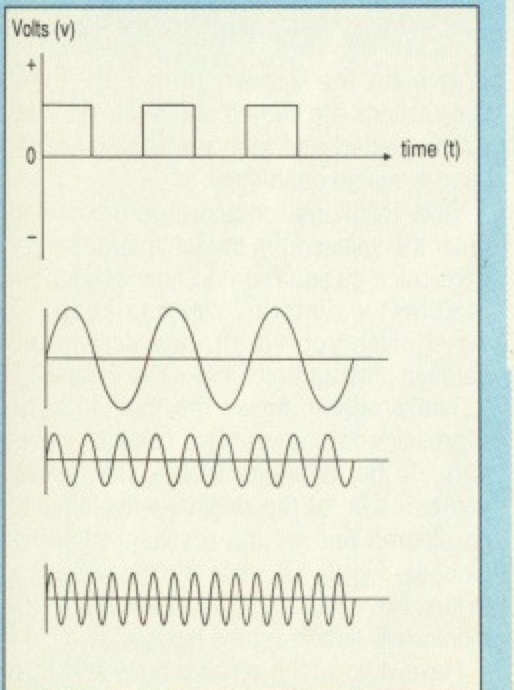
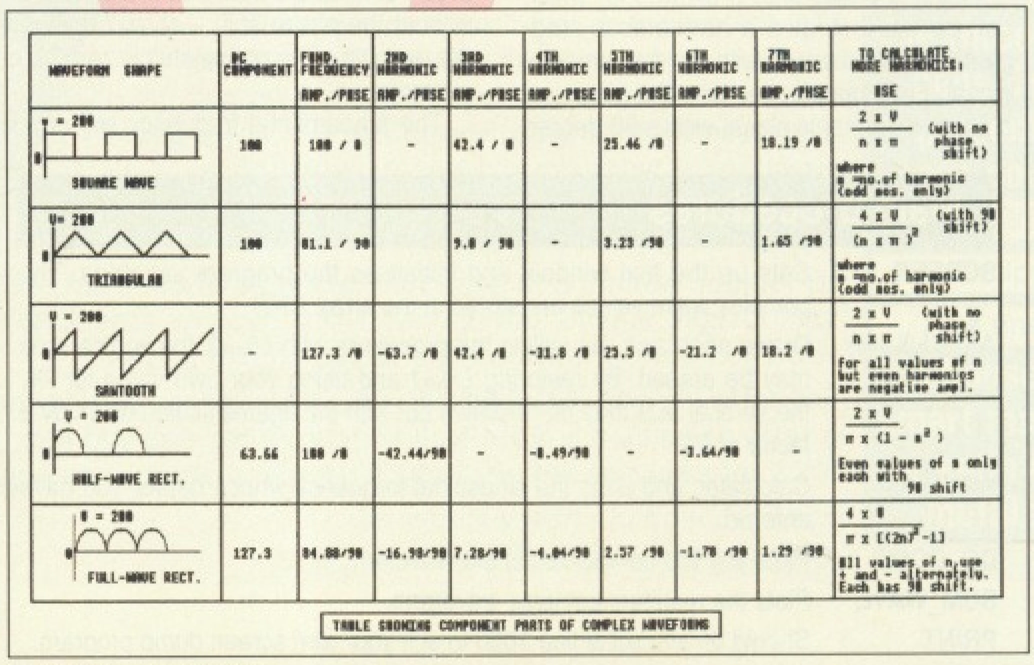


Figure V



WAVEFORM SHAPE	DC COMPONENT	FUND. FREQUENCY AMP./PHSE	2ND HARMONIC AMP./PHSE	3RD HARMONIC AMP./PHSE	4TH HARMONIC AMP./PHSE	5TH HARMONIC AMP./PHSE	6TH HARMONIC AMP./PHSE	7TH HARMONIC AMP./PHSE	TO CALCULATE MORE HARMONICS: USE
V = 200 0 SQUARE WAVE	100	100 / 0	-	42.4 / 0	-	25.46 /0	-	18.19 /0	2 x V / n x π (with no phase shift) where n =no.of harmonic (odd nos. only)
V= 200 0 TRIANGULAR	100	81.1 / 90		9.0 / 90	-	3.23 /90	-	1.65 /90	4 x V / (n x π)² (with 90 shift) where n =no.of harmonic (odd nos. only)
V = 200 0 SAWTOOTH	-	127.3 /0	-63.7 /0	42.4 /0	-31.8 /0	25.5 /0	-21.2 /0	18.2 /0	2 x V / n x π (with no phase shift) for all values of n but even harmonics are negative ampl.
V = 200 0 HALF-WAVE RECT.	63.66	100 /0	-42.44/90	-	-8.49/90	-	-3.64/90	-	2 x V / π x (1 - n²) Even values of n only each with 90 shift
V = 200 0 FULL-WAVE RECT.	127.3	84.88/90	-16.98/90	7.28/90	-4.04/90	2.57 /90	-1.78 /90	1.29 /90	4 x V / π x [(2n)² -1] All values of n, use + and - alternately. Each has 90 shift.

TABLE SHOWING COMPONENT PARTS OF COMPLEX WAVEFORMS

Table: Sample waveforms

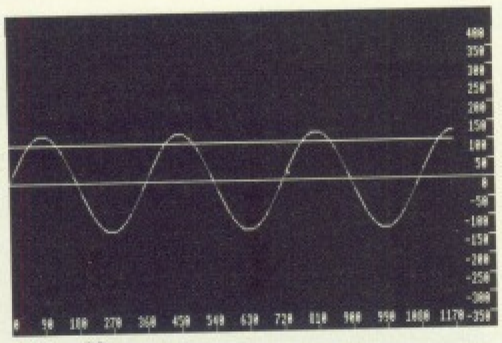
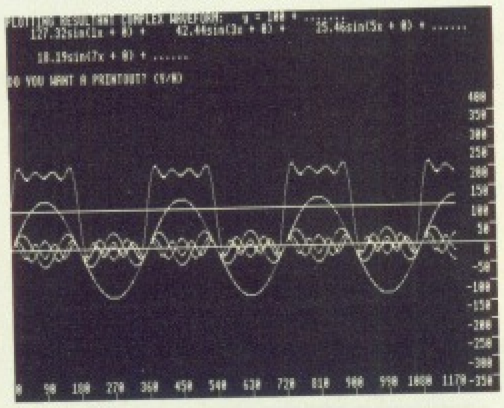
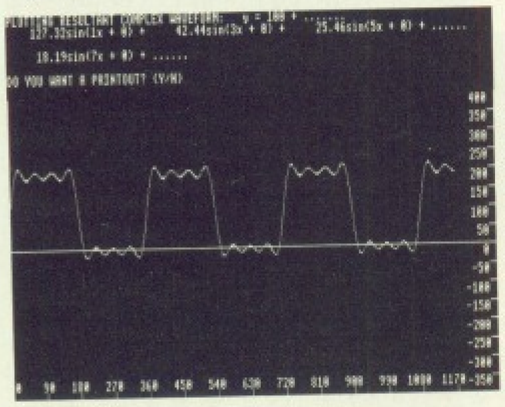


Figure X



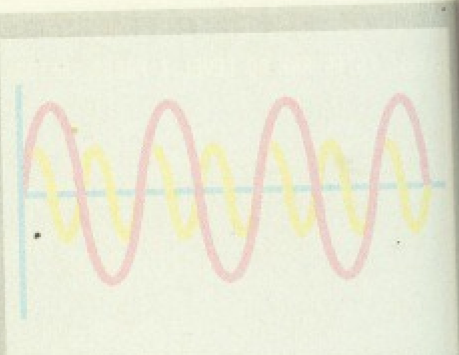
```
PLOTTING RESULTANT COMPLEX WAVEFORM:   y = 100 + ......
   127.32sin(1x + 0) +     42.44sin(3x + 0) +     25.46sin(5x + 0) + ......
    18.19sin(7x + 0) + ......
DO YOU WANT A PRINTOUT? (Y/N)
```

Figure XI



```
PLOTTING RESULTANT COMPLEX WAVEFORM:   y = 100 + ......
   127.32sin(1x + 0) +     42.44sin(3x + 0) +     25.46sin(5x + 0) + ......
    18.19sin(7x + 0) + ......
DO YOU WANT A PRINTOUT? (Y/N)
```

Figure XII



```
   10 REM MAKING WAVES
   20 REM by P.L.Houghton
   30 REM (c) The Micro User
   40 MODE135:IFHIMEM=&8000:M%=128:ELSEM
%=4
   50 MODEM%:PROCscreen
   60 VDU23;8202;0;0;0;30
   70 PRINT"Complex Waves from Sinusoida
l Signals":PRINT
   80 PROCaxis(1,1):PROCDC_COMP
   90 F%(J%)=FNval("Please enter the fre
quency as a multiple of the fundamental
(1 for fundamental, 2 for 2nd harmonic e
tc.) then press Return")
  100 V(J%)=FNval("Enter the peak value
of the waveform & press Return (a value
of 200 is suggested for the fundamental
then other harmonics may be easily scale
d)")
  110 P%(J%)=FNval("Enter any phase shif
t from fundamental (in degrees between 0
 and 359) and press Return")
  120 PROCwave("Now plotting y=")
  130 IFFNy("Draw another frequency")J%=
J%+1:V(J%+1)=-999:F%(J%+1)=-999:P%(J%+1)
=-999:GOTO90
  140 CLS:IFNOTFNy("View the resultant c
omplex wave") THEN 170
  150 CLS:IFFNy("Clear components first"
)CLG
  160 PROCSUM_WAVE
  170 IFFNy("Do you want a printout")PRO
Cprint
  180 CLS:PRINT
  190 IFFNy("Clear components & re-plot"
)CLG:GOTO160
  200 CLS:IFFNy("Run program again")RUN
  210 CLS:PRINT"BYE":PRINT:END
  220 DEF PROCscreen
  224 IFM%=4J%=39:ELSEJ%=79
  225 VDU28,0,6,J%,0,12
  230 DIM A%(1279),V(20),F%(20)
  240 DIM P%(20),G%(359)
  250 V(0)=100:V(1)=-999:F%(0)=1
  260 F%(1)=-999:P%(0)=0:P%(1)=-999
  270 J%=0:ENDPROC
  280 DEFPROCaxis(L%,I%)
  285 LOCAL@%,J%,K%,S%,T%
```

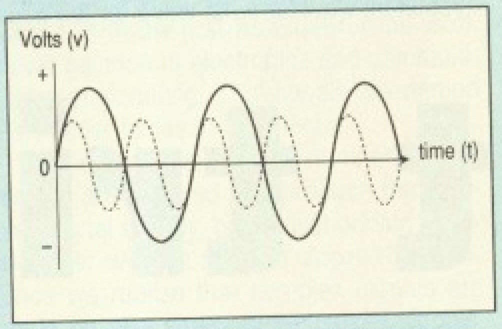


Figure IXa

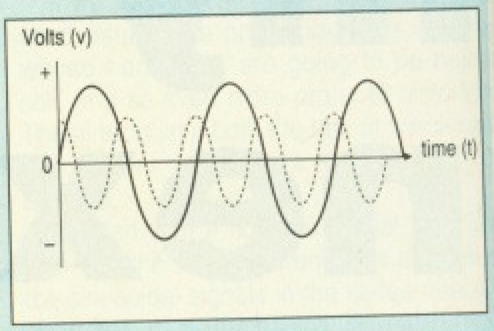


Figure IXb

➤

details of each sinusoidal component – the frequency is simply entered as a number. The fundamental frequency is one, the second harmonic – being twice the frequency of the fundamental – is two and so on. Just follow the on-screen prompt.

In this instance we want the fundamental, so press the one. The waveform amplitude is entered next and it may be a positive or negative number. For our square wave the amplitude of the fundamental is 127.32.

Finally a phase shift is allowed for which can be used to give a harmonic a staggered start compared with the fundamental signal. For example, see how the picture of a second harmonic signal with a 90 degree phase shift differs from that of the harmonic without the phase shift – shown in Figures IXa and IXb . The phase-shift is zero for our example.

The fundamental frequency will now be drawn on the screen (see Figure X). Calculations are carried out for the first 360 points plotted and then the values are reused to speed up the plot.

Now follow the on-screen prompts and enter the values from the table for the other harmonics given. You can now ask for the resultant waveform. You can keep the waveforms you've already drawn and obtain a printout which looks like Figure XI.

The program shows the mathematical expression for the resultant complex waveform. To get a clearer look at the results, you can ask for the original waveforms to be cleared and for the resultant to be re-plotted – Figure XII – this is already starting to look like a square wave. A few more harmonics will flatten out the bumps.

Have a go at the other shapes and then experiment with your own values. If you're interested in electronics, you should find it useful – if not, I hope you still find it fun.

Main procedures

SCREEN	Sets up the text window and initialises the program variables. The complex wave values are stored in the array *A%()*.
AXIS(L%,I%)	Draws each axis. By calling the procedure with *L%=0*, the vertical axis may be erased. By restoring *L%=1* and using your own value for *I%*, the vertical axis may be re-drawn but with the figures scaled down by a factor of *I%*.
WAVE(A$)	Calculates and plots the sinusoidal frequency whose details you have entered.
DC_COMP	Plots any DC component of the waveform.
SUM_WAVE	Plots the resultant complex waveform.
PRINT	Should be altered at line 1090 to suit your own screen dump program.

```
290 GCOLO,1:MOVEO,0:DRAWO,800
300 MOVEO,400:DRAW1279,400:MOVEO,0
310 DRAW1279,0
320 IFM%=4K%=120:J%=-48:ELSEK%=90:J%=0
330 FORS%=0TO1170STEPK%:MOVES%,0
340 DRAWS%,20:MOVES%+J%,50:VDU5
350 PRINT;S%;:VDU4:NEXT
360 GCOLO,L%:MOVE1279,0:DRAW 1279,800
370 MOVE1260,0
380 FOR T%=0 TO 800 STEP 50
390 MOVE1260,T%:DRAW1279,T%
395 IFM%=4J%=0:ELSEJ%=48
400 MOVE1132+J%,T%+16:VDU5
410 PRINT(T%-400)/I%:VDU4:NEXT:ENDPROC
420 DEF PROCwave(A$):CLS
430 PRINT"Calculating...please wait";
440 FOR X%=0 TO 359
450 H=(P%(J%)+(F%(J%)*X%))*1.7453E-2
460 G%(X%)=V(J%)*SINH
470 PLOT69,X%,G%(X%)+400
480 A%(X%)=A%(X%)+G%(X%):NEXT:CLS
490 PRINTA$FNW(J%)
500 FOR C%=360 TO 1440 STEP 360
510 FORX%=0+C%TO359+C%
520 IFX%<1171A%(X%)=A%(X%)+G%(X%-C%):P
LOT69,X%,G%(X%-C%)+400:ELSEX%=1799:C%=14
40
530 NEXT:NEXT:ENDPROC
540 DEFFNW(J%)=FNs(V(J%))+"sin("+STR$F
%(J%)+"x+"+STR$P%(J%)+")"
550 DEFFNs(V)LOCALL%,v$:v$=STR$INT(V*1
00):L%=LENv$:IFL%>2:=LEFT$(v$,L%-2)+"."+
RIGHT$(v$,2)ELSE="0."+RIGHT$("0"+v$,2)
560 DEF PROCDC_COMP
570 D=FNval("Please enter DC level & p
ress Return")
580 IFD:Y%=INTD:FORX%=0TO1170:A%(X%)=A
%(X%)+Y%:PLOT 69,X%,Y%+400:NEXT
590 ENDPROC
600 DEF PROCSUM_WAVE:PROCaxis(1,1):CLS
610 PROCout("Plotting resultant comple
x waveform:"):T$="y="+STR$D
620 J%=0:REPEAT T$=T$+" + "+FNW(J%)
630 J%=J%+1:UNTIL V(J%)=-999
640 PRINT:PROCout(T$)
650 MOVEO,400:GCOLO,1:FORX%=0TO1170
660 DRAWX%,A%(X%)+400:NEXT:ENDPROC
670 DEF PROCPRINT
680 *GDUMP 0 1 1 1
690 ENDPROC
700 DEFFNy(T$)PROCout(T$+"? (y/n)")
710 LOCALI%:REPEATI%=INSTR("YyNn",GET$
):UNTILI%:=I%<3
720 DEFFNval(T$)LOCALV:CLS:PROCout(T$)
:INPUT'"?"V:=V
730 DEFPROCout(T$)LOCALL%,W%
740 IFM%=4:W%=40:ELSEW%=80
750 REPEAT w$=FNw:L%=LENw$
760 IFCOUNT+L%>=W%-1PRINTELSEIFCOUNT>0
PRINT" ";
770 PRINTw$;:UNTILT$="":ENDPROC
780 DEFFNw:LOCALL%
790 L%=INSTR(T$+" "," ")
800 w$=MID$(T$,1,L%-1)
810 T$=MID$(T$,L%+1):=w$
```

```
 10 =    0 0     180 = 8005 3     320 = 692F 3     480 = B78C 8     650 = 9B53 5
 20 =    0 0     190 = 4BD1 1     330 = 5E3B 6     490 = 50AF B     660 = 9307 9
 30 =    0 0     200 = 3B0B 8     340 = 108A 7     500 =  9AC 9     670 = 2E64 7
 40 = 20AD D     210 = CCCC B     350 = 99DB 0     510 = 712E 7     680 = FAD7 E
 50 = D5F8 0     220 =  3F6 5     360 = 9F30 E     520 = 1521 A     690 = ED0F D
 60 = 9E34 3     224 =  ED2 0     370 = D3C4 7     530 = BB05 D     700 = 10C6 C
 70 = A753 1     225 = 98D3 4     380 = 3461 F     540 = CBAB F     710 = D3ED 2
 80 = 5ADF 1     230 = CDF4 D     390 = CB44 2     550 =  E3B 9     720 = 1B23 F
 90 = 81F4 F     240 = C811 A     395 = 64BD C     560 = C2FC A     730 = FB04 8
100 = 9243 5     250 = 8F93 F     400 = 9482 B     570 =  E6F 0     740 = B5D7 D
110 =  DFC E     260 = 5F30 0     410 =  885 D     580 = F062 1     750 =  E1F C
120 = 3329 1     270 = 106A 8     420 = 92AF 6     590 = ED0F D     760 = C588 D
130 = AF99 5     280 = 7B54 0     430 = 2500 5     600 = A872 5     770 = B0D8 A
140 = 5A2E 7     285 = 241A 8     440 = 6CDC B     610 = 7886 5     780 = 296B C
150 = 22C5 E     290 = ED27 4     450 = D953 9     620 = 897C 7     790 = 68E7 7
160 = A444 2     300 = C632 E     460 = D756 1     630 = FFD4 9     800 = E2C9 0
170 = 10D9 2     310 = BAEE 7     470 = D76B 0     640 = 6945 0     810 = 77E4 A
```

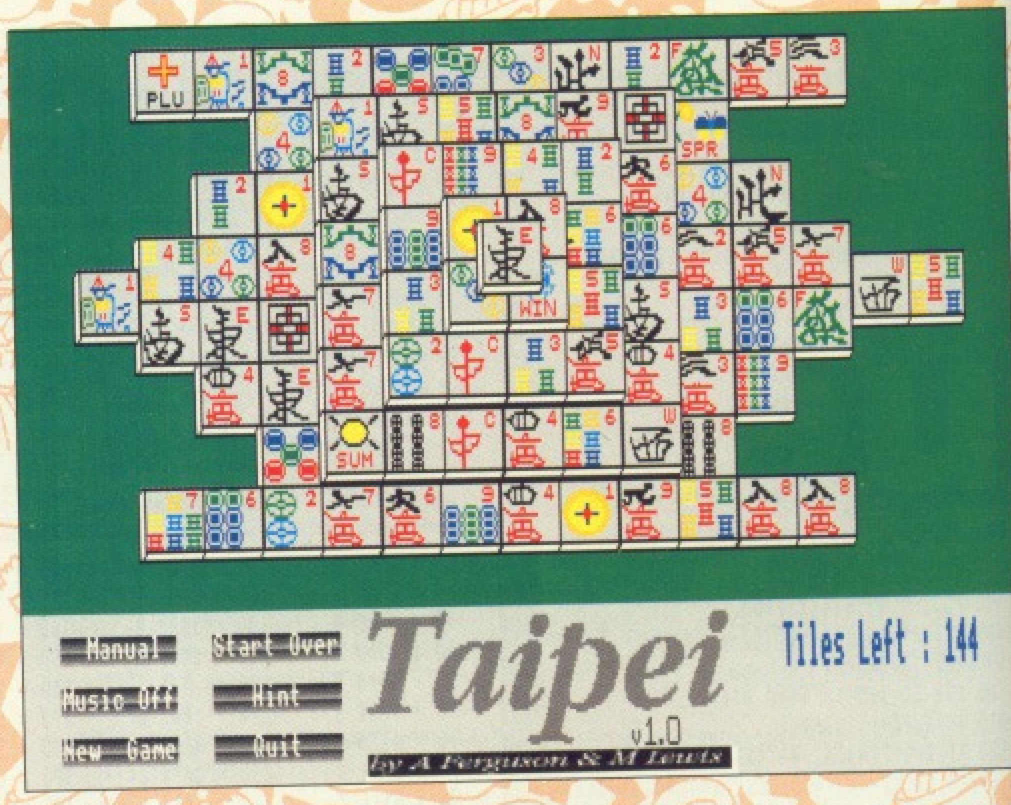
Cut-price

CHRISTMAS comes but once a year, and the usual cynical rejoinder is Thank goodness! As public domain software is not really seasonal, there is little in the way of festive offerings.

But do not despair, a couple of programs arrived to add the right atmosphere to the occasion: David Baker sent me a brilliant Snowman. Created using Render Bender the snowman melts as the sun comes out to be magically reborn as darkness returns.

Unfortunately, due to the size of the sprite files this demo will only work on a 2Mb machines which also meant that I couldn't fit in on the subscription disc this month. It will be on the January disc though.

On the BBC Micro PD front Rafael Jay has come up with some interesting versions of some popular carols: Good King Wencelas, While Shepherds, God Bless Ye Merry Gents, Deck the Halls and Once in Royal David's. Space permitting I'll squash this on to the BBC Micro subscription disc, although the 40 trackers may miss out on the complete selection – Happy Christmas.



Taipei – from the Orient

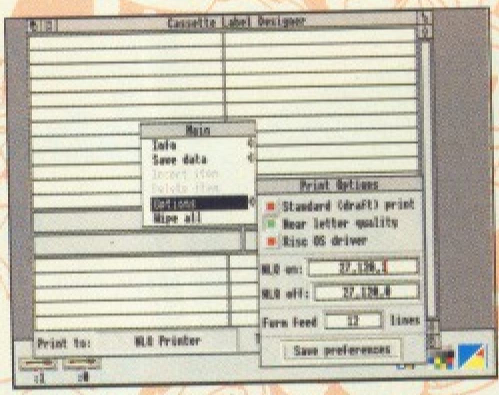
Around the yule log

To put you in the Christmas spirit there are a couple of games I'd like to bring to your attention – in particular one from Brothers in Arm called BIATetris. If you don't play any other, do try this one. Based on the Russian game which smashed its way into the hearts of computer users across the spectrum, it's simple, frustrating and excessively addictive. Offering excellent music, lovely graphics and the usual scrolling comments, it's brilliant.

The more classically inclined could always try Taipei. Known as Gun-Shy on the Apple Macintosh and as a variety of other names in its original board format, this is an ancient Japanese game of strategy.

My copy came courtesy of Norwich Computer Supplies. Though it does redraw the screen each time, it's easy to grasp even if you don't understand the Japanese ideograms. A hint option is available, but if you become well and truly stuck the sinister voice of Hal will tell you: "You can't do that".

On the same disc came a more usual text adventure. OK, so this doesn't use the Archimedes to its utmost, but you tell me how to use a ladder, anti-grav box and golden trident to collect an elusive crystal apple?



NLQ on: 27,120,1
NLQ off: 27,120,0
Form feed 12 lines
Print to: NLQ Printer

Making cassette labels

It'll come in useful

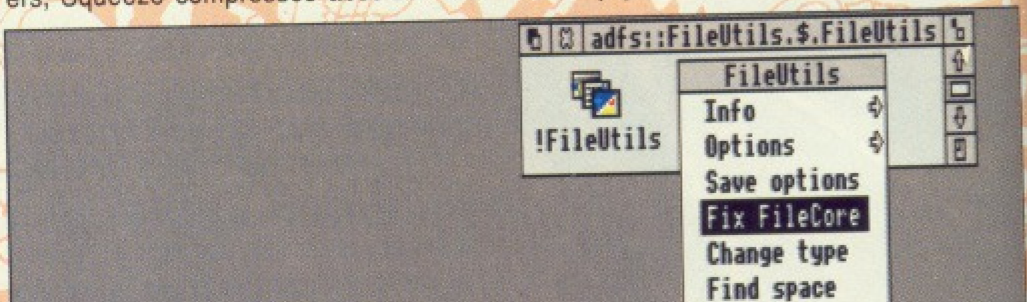
This is usually the phrase accompanying talc, socks or handkerchiefs. Well these PD offerings could save you from both irritation and headaches.

Two utilities will help more serious readers, Squeeze compresses absolute code while MakeApp converts Basic to absolute. Tom Lakofskis offers HotKey Basic which allows you to enter Basic without any fuss when you hold down Shift+Alt+B.

Ben Summers has supplied a very nice set of applications called FileUtils. There's a *command menu for files – you just drag a file to the icon and a menu appears. Then the Fix Filecore utility is especially useful: If, like me, you have been sent to screaming pitch with the *Filecore in use* error when you are in the middle of something, this is a crucial program to have.

What it does is extract the Filecore module from rom and actually fixes it. Do use this at the beginning of a session or you may still lose data. The ChangeType, FindSpace and FindFile programs are all also definitely worth having.

Ben also supplied a couple of hard disc utilities, !Boot and !BootCtrl. You can now set up your system to load whatever you



Useful file functions

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Do use
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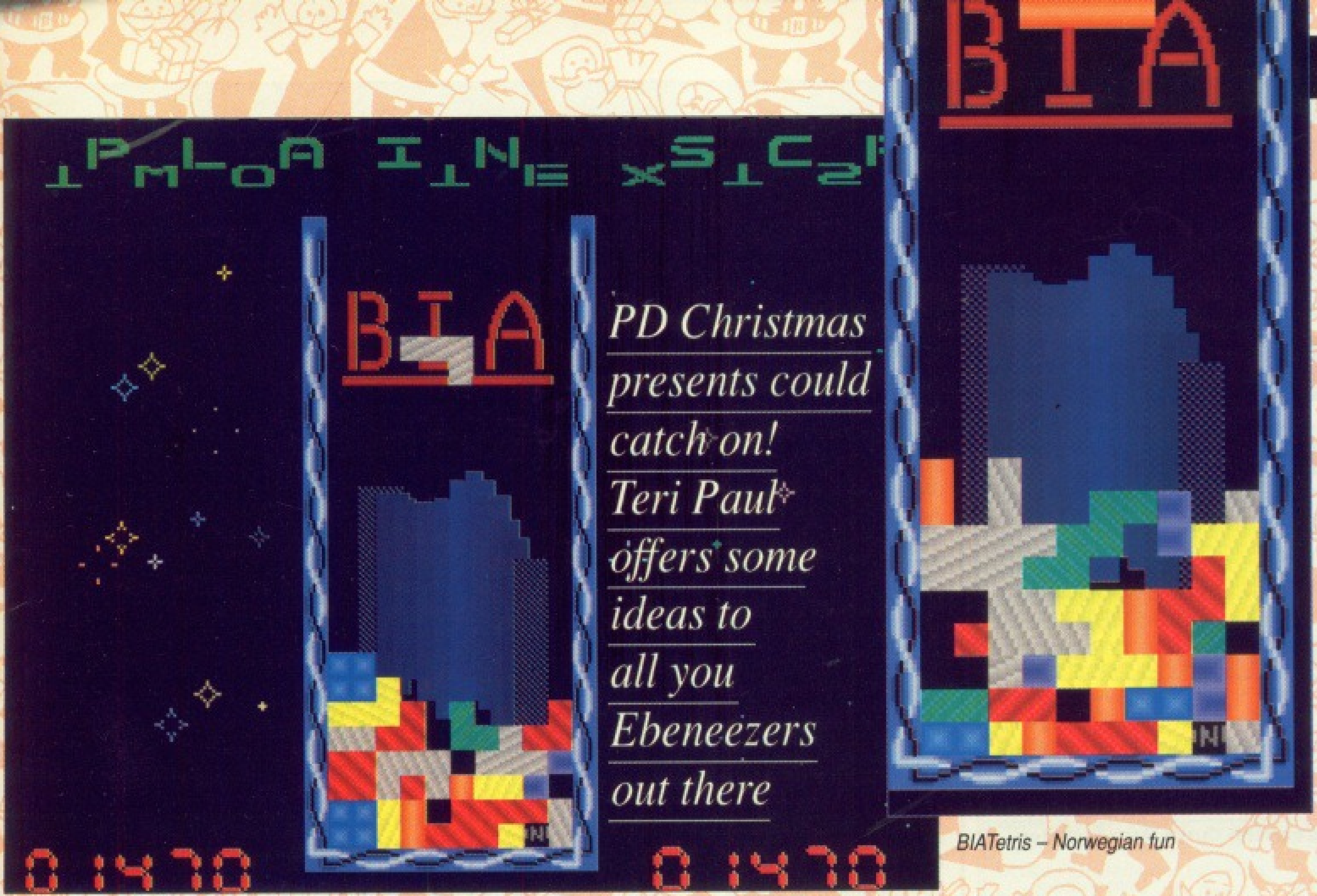


PD Christmas presents could catch on! Teri Paul offers some ideas to all you Ebeneezers out there

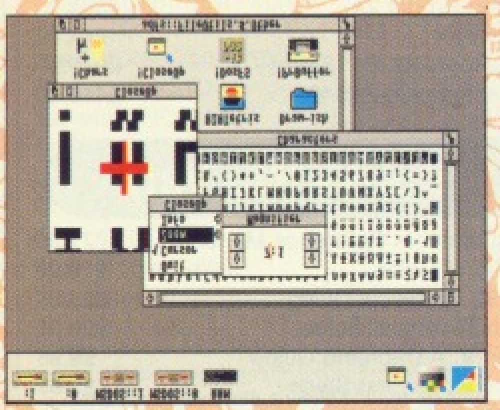
BIATetris – Norwegian fun

eCrimbals!

want automatically: Deskduck, !Draw, !Edit and so on.

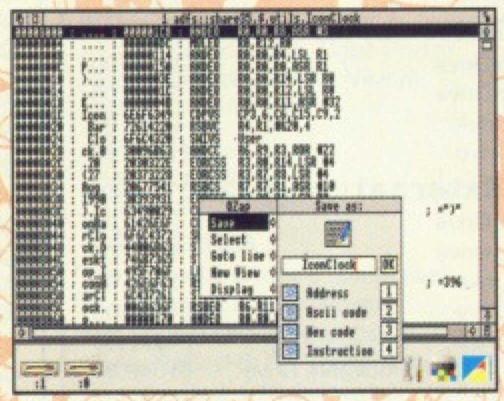
To round off with some more general useful bits, there's !Chars. If you have ever played about with DTP and fonts you may well have come across such fonts as Selwyn and Dingbats. Each key on your keyboard representing a symbol or piece of artwork.

It's not easy to remember which key is what, but with !Chars the character set is in front of you while you are using your word processor. You can choose which character you want using the mouse and this will then appear in the same way as if you used the keyboard.



This way up!

Finally, !Shutdown is a utility Mac owners will recognise. All DeskTop tasks are killed, open files are closed and heads are parked. A restart button will then allow you to start again without switching off the machine. You can add this to your utilities directory or use it as a *command.



Easy disassembly

Stocking fillers

Some fun bits you might want to try on your friends are Whoops and !WrongWay. The first will confuse your mouse pointer and the second will encourage you to go to Australia.

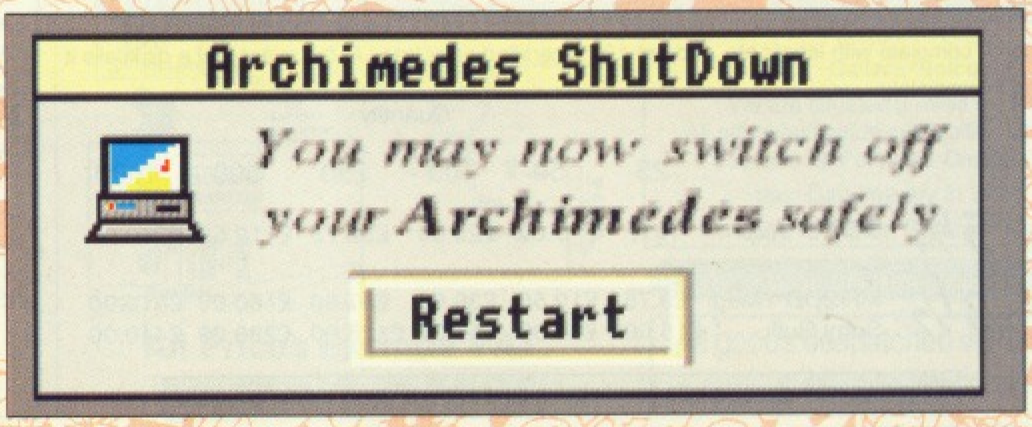
BBC PD

I promised you a look at the BBC programs this month, but I've had so many that I'm still working my way through them. The January column, therefore, will be dedicated to the BBC Micro.

The monthly disc

You can acquire the Archimedes programs mentioned this month – plus others – on the December subscription disc. To get as much as possible on the disc we have archived the programs, cramming 1.6Mb into 800k.

If you are unsure about de-archiving and creating ram discs, read the relevant !Help/Double Click Me file on the subscription disc before doing anything else.



Archimedes ShutDown

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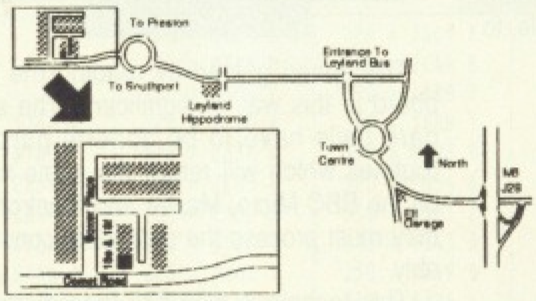

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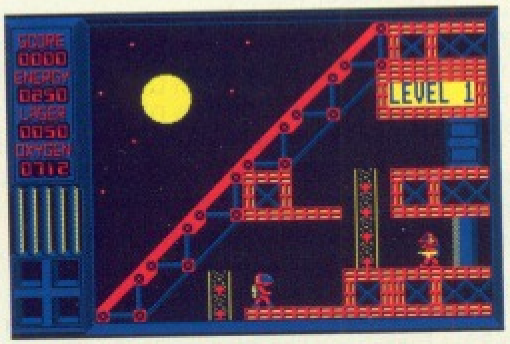


LAST month we looked at a technique of reducing the size of the screen on the Electron by blanking the colours during a delay provided by two different interrupts. This time we'll see how every ounce of processing power can be squeezed out of the machine by software alone.

Several techniques can give substantial increases in speed. The first thing to do is to disable the analogue to digital interface using a machine code osbyte with the accumulator set to 163, the *X* register set to 128 and the *Y* register set to one.

The equivalent FX call can be used from Basic, but this returns an error if the +1 interface is not attached. If the joystick is required only two of the four channels need to be disabled.

Another major speed increase can be obtained by disabling the keyboard interrupt, using an osbyte call with the accumulator set to &81.

The keyboard can still be scanned using the Inkey function with negative numbers as given in the User Guide. For example, to scan for the spacebar being pressed:

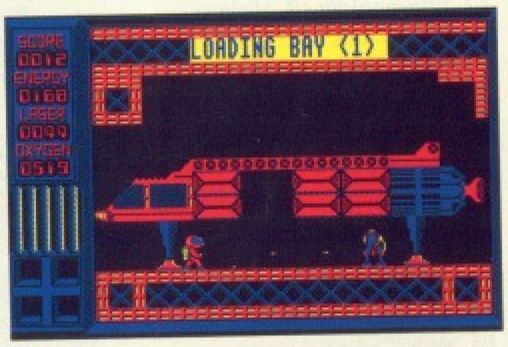
```
LDA #&81
LDY #&FF
LDX #(255-99)
JSR &FFF4
BCC space_not_pressed
\space pressed
```

However this takes time, so alternatively the keyboard can be scanned directly.

The keyboard on the Electron maps on to rom slot eight, so to read the data the Basic rom must be paged out and the keyboard paged in. This may be done by storing eight in register &FE05.

If the program is written entirely in machine code this only needs to be done once when the game is initially run as you won't be requiring Basic again.

The 14 address lines from the rom socket are attached to the keyboard columns. If a particular address line is low then one of the keys in that column is pressed. The row data from the keyboard is returned on the low order bytes of the data bus. For example, to find out if Space is being pressed:



```
LDA &BBFC
AND #8
BEQ space_not_pressed
\space key pressed
```

To find out if X is being pressed use:

```
LDA &B7FF
AND #8
BEQ X_not_pressed
\X key pressed
```

The speed gained by reading the keyboard in this way is significant. The standard calls have to be general purpose routines which will return the same value on the BBC Micro, Master and Electron, so they must process the data quite considerably.

This technique also has the advantage that it takes less memory than the standard keyscan routine and so can be substituted in to the Electron version of a program with the minimum amount of effort.

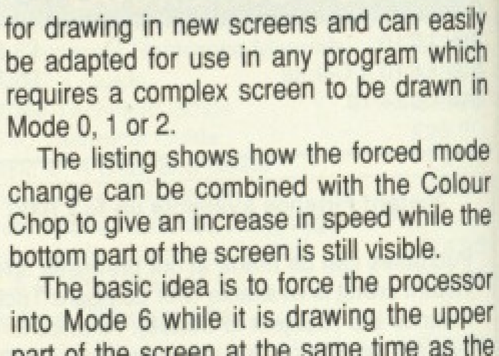
Getting radical

It is also possible to speed up the Electron in Modes 0, 1 and 2 by temporarily forcing the operating system into Mode 6. This is relatively easy to accomplish and involves storing &B0 into the mode select register at &FE07.

This register also controls the cassette port, sound generation, cassette motor and the caps lock light. However unless the program is loading from tape while attempting to change mode there is no problem.

The key factor here is that the change is temporary – we change screen mode only while the screen blanking is occuring, so the change is invisible to a games player.

This technique is often used in games for drawing in new screens and can easily be adapted for use in any program which requires a complex screen to be drawn in Mode 0, 1 or 2.



The listing shows how the forced mode change can be combined with the Colour Chop to give an increase in speed while the bottom part of the screen is still visible.

The basic idea is to force the processor into Mode 6 while it is drawing the upper part of the screen at the same time as the colours are turned black.

When the palette is restored the screen is also returned to Mode 1.

The mode change also has the side effect of causing a hardware scroll which has to be compensated for by resetting the screen start address registers at &FE02 and &FE03.

Line 380 changes the screen start address

Tony Oakden concludes his series on how to coax the last bit of speed from an Electron

to compensate for the scroll forced by the mode change.

Line 410 checks that we're looking at the right interrupt and exits if we're not.

Line 430 blanks the palette.

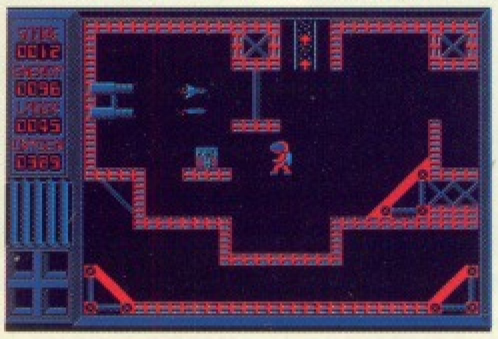
Lines 530 to 560 restore Mode 1 and the palette.

Star Port

A similar technique to this is used in Star Port. The game uses the Vsync interrupt to change the colours to black and force Mode 6, but a different method was found to control the timing for the second colour and mode change.

The program was organised so that the sprite routine itself could be used as a timing loop. To do this certain compromises had to be made: There are always three sprites on the screen – though sometimes only one or two are visible – and they are all the same size – four bytes wide by 24 high.

The routine which draws the sprite is actually part of the interrupt routine – when the Vsync interrupt is detected the palette is blanked and Mode 6 is forced and the sprites are drawn.



Finally, Mode 1 and the palette are restored to normal. By doing this it is possible to get a 50 per cent increase in speed while blanking five lines of the top of the display. The three sprites never flicker because the colours are always blanked while being drawn.

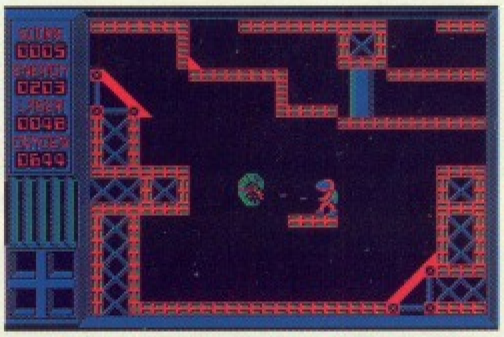
The main problem encountered with this arrangement was ensuring that the routine to draw the sprites always took the same time to execute.

The speed of certain machine code instructions vary depending on the location of the data which they are manipulating. For example the instruction:

```
LDA &3080,X
```

may take either four or five instruction cycles to execute depending on whether the addition of the X register to the address causes the resulting address to cross a page boundary. However, by using waiting loops to balance this it was possible to get the final colour change line steady to within two pixels.

● *Well, that's it. Speeding up the Electron with software is quite realistic, and it is possible to recover valuable memory from the screen without producing a messy hash of images. I hope you find it useful.*



The techniques described in these articles have been used by Tony Oakden in his new game Star-Port released by Superior Software on the Play It Again Sam 14 collection

```
   10 REM Speed up (part 2)
   20 REM by Tony Oakden
   30 REM (c) The Micro User
   40 PROCassemble
   50 A%=163:X%=128:Y%=1:CALL&FFF4
   60 MODE1
   70 CALLsetint
   80 TIME=0   .
   90 PROCtriangle
  100 PRINTTAB(7,20);"FAST MODE ";TIME/1
00;" SECS"
  110 STOP
  120 **
  130 DEF PROCtriangle
  140 GCOL 3,1
  150 FOR A=0 TO 1023 STEP 32
  160 MOVE 640-A,0
  170 MOVE 640+A,0
  180 PLOT 85,640,A
  190 NEXT
  200 ENDPROC
  210 *
  220 DEF PROCassemble
  230 FOR A=0 TO 2 STEP 2
  240 P%=&900
  250 [
  260 OPT A
  270 .setint
  280 SEI
  290 LDA&204:STAoldvector
  300 LDA&205:STAoldvector+1
  310 LDA#interrupt MOD 256:STA&204
  320 LDA#interrupt DIV 256:STA&205
  330 CLI
  340 RTS
  350 :
  360 .interrupt
  370 \ALTER SCREEN START ADDRESS REGIST
ERS TO COMPENSATE FOR SCROLL
  380 LDA#&0:STA&FE02:LDA#&22:STA&FE03
  390 \
  400 LDA&FC:PHA:TXA:PHA:TYA:PHA
  410 LDA&FE00:AND#4:BEQrtc
  420 \BLANK PALETTE
  430 LDA#&FF:STA&FE08:STA&FE09
  440 \FORCE MODE CHANGE
  450 LDA#&B0:STA&FE07:STA&282
  460 .exit
  470 PLA:TAY:PLA:TAX:PLA:STA&FC
  480 JMP(oldvector)
  490 :
  500 .rtc
  510 LDA&FE00:AND#8:BEQexit
  520 \FORCE MODE CHANGE TO MODE1
  530 LDA#&88:STA&FE07:STA&282
  540 \RESET PALETTE
  550 LDA#&34:STA&FE08
  560 LDA#&35:STA&FE09
  570 JMPexit
  580 .oldvector:EQUW0
  590 ]
  600 NEXT
  610 ENDPROC
```

Get it right ✓

```
 10 =     0 0    140 = 38CB 3    270 = 76C1 F    400 = D8B9 D
 20 =     0 0    150 = D8ED B    280 = 2C4A B    410 = 4145 3
 30 =     0 0    160 =  509 F    290 = AD8B 7    420 =    0 3
 40 = 126A A    170 = 2290 B    300 = 1F8B 1    430 = 93A9 9
 50 = A7A7 F    180 = 2336 A    310 = 6AB3 9    440 =    0 9    530 = 9250 6
 60 = EA3A 0    190 = 2C83 2    320 = F054 6    450 = CE8D 6    540 =    0 6
 70 = CAF4 D    200 = EDOF 6    330 = D5B1 2    460 = DC83 0    550 = 2897 1
 80 = 173E E    210 = 8528 1    340 = 9843 3    470 = F4CE 1    560 = 57F3 B
 90 = BAAD D    220 = 98A5 A    350 = 9719 B    480 = 3D0D 5    570 =  45C 7
100 = DCCF 0    230 = FCB5 9    360 = 83BD 4    490 = 9719 D    580 = B40E 7
110 = 4E55 2    240 = C92F 1    370 =    0 4    500 = BB24 B    590 = 8B58 5
120 = 6C05 D    250 = EB9E 7    380 = A6D3 4    510 = 46C6 4    600 = 2C83 C
130 = 3062 4    260 = DDA7 B    390 =    0 4    520 =    0 4    610 = EDOF 6
```

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"Will I keep playing it the way I've played Elite for years? And the answer is YES. Graphics 10, Playability 10, Value for Money 10"........................***The Micro User, Nov' 89.***

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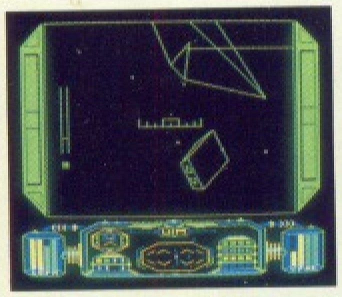

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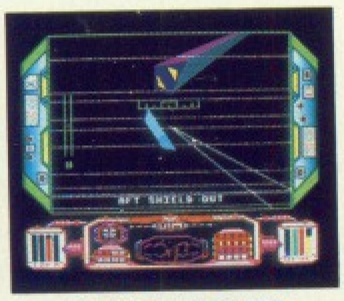

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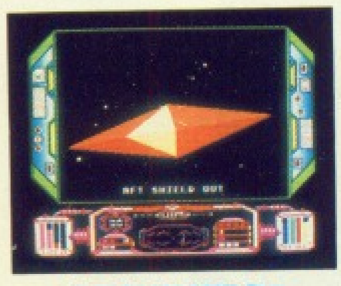

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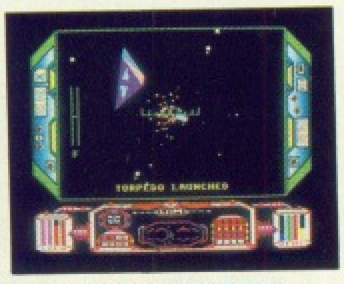

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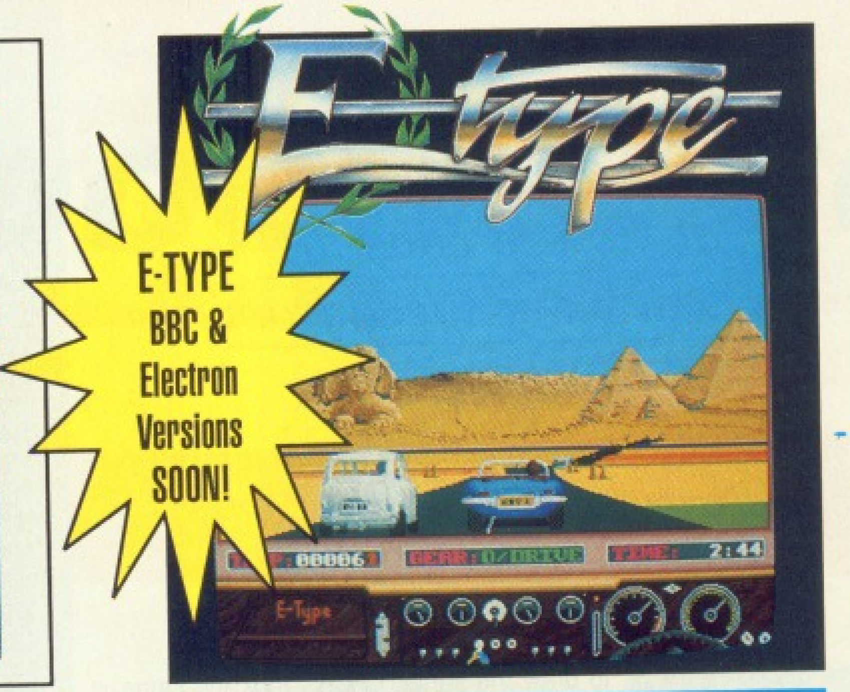

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"E-Type" takes racing simulations into the world of 32 - bit RISC processing and gives you smoother, faster and more detailed graphics than you are even likely to see in the arcades.

E-TYPE

"On the Archimedes the illusion of speed is terrifyingly real and the way the landscape moves in three-dimensional perspective is a joy - a stunning experience"..........***The Independent, Dec' 89***

"This is a superb game....the tracks are fantastic"........***The Times, Dec' 89***

"No race game, on any other machine, looks as good"..........***The Times Educational Supplement, Dec' 89***

"For challenging races with a real sense of speed and fun, go for E-Type's ignition key"...........***The Games Machine, Feb' 90***

"There's just one word to describe E-Type: FANTASTIC! Graphics 10, Value for Money 10"...........
The Micro - User, Dec' 89

"The graphics in E-Type are really superb. E-Type in my opinion is probably the best game yet for the Arc"....
Risc User, Dec' 89

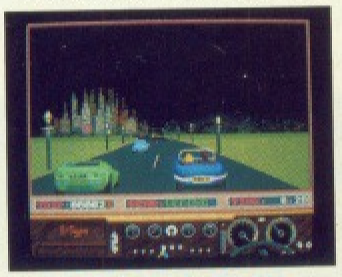
E-TYPE DESIGNER & EXTRA 100 MILES

Design your own "E-Type" tracks with this highly advanced but simple to use designer. It is enormously flexible to produce an endless variety of tracks to challenge you and your friends.

"The perfect complement to E-Type"... ***The Games Machine, Feb'90***

There is also an extra tracks disc featuring extra sprites and 100 miles of cunningly designed roads.

Please note that you will need the original E-Type game to use either the Designer or the Extra Tracks discs.



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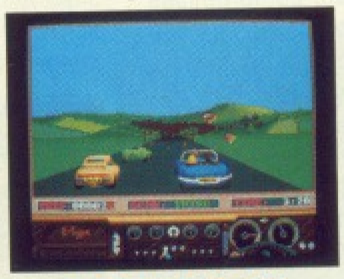

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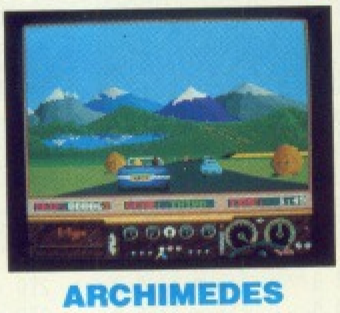

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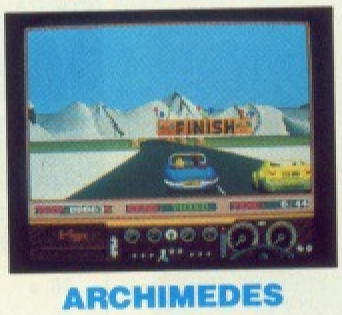

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WHITE MA WHI

White Magic is a unique
adventure in which you
varied adventures:-

**Kaldor the Leprechaun,
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Warrior and Mandrake
Enchanter.**

You can transform betw
characters at will and us
much needed special ab

It features 32 massive a
packed levels filled with
aggressive guards and t
haunting ghosts and spe
curious objects to find a
and much more .....

White Magic is not a gam
faint-hearted; it is a fast-
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APOCALYPSE

Produced by Gordon Key, the author of Holed Out and E-Type, this incredible new game sets new standards of excellence in 3-dimensional solid graphics and digitised sound effects. Your overall task is to rescue a whole solar system from an evil dictatorship. Apocalypse is a feast for your eyes, ears and grey matter.

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Nevryon	-	14.95	-	15.95
U.I.M.	29.95	19.95	-	21.95
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E-Type	19.95	14.95*	9.95*	15.95*
E-Type Designer	16.95	-	-	-
E-Type Extra 100 Miles	16.95	-	-	-
White Magic	19.95	12.95	9.95	13.95
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Holed Out Extra Courses 2	16.95	11.95	9.95	12.95
Holed Out Designer	19.95	-	-	-

* E-Type BBC & Electron versions due for release 7th May, 1990. All the above Archimedes games will work on the Archimedes A3000, 310 and 400 series

H DIMENSION

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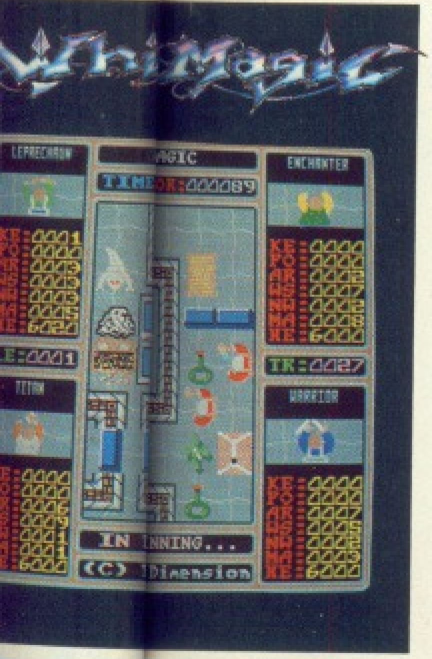
BBC MICRO
ELECTRON



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WHITE MAGIC 2

This includes 32 brand new and highly dangerous levels plus a complete level designer.

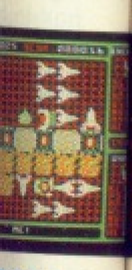
The level designer is a doddle to use and can be used to alter or design levels from scratch.

An extra invisible feature in White Magic 2 will really confuse our adventurers!

Reviews of White Magic

"The graphics are superb ....
An absolute winner"
Electron User Golden Game August '89.

"Playability is good and I had to tear myself away in order to write this update review."
Archie review - The Micro User, October 1989.



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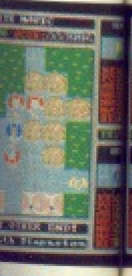

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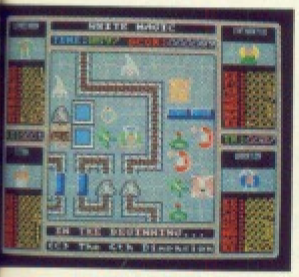

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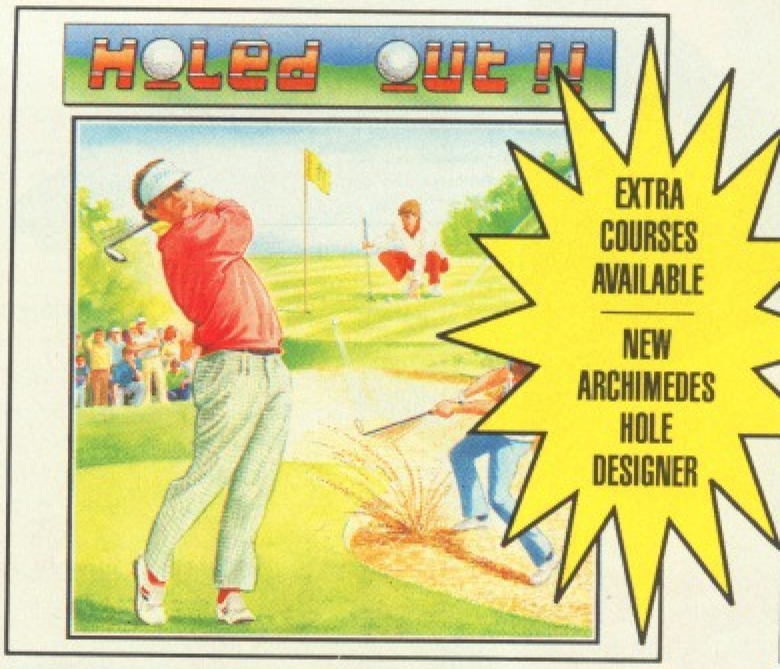

HOLED OUT

The most comprehensive, realistic and highly acclaimed golf simulation on the market today. This volume contains the original 2 contrasting 18 hole courses and comes complete with an easy to follow 16 page manual.

"I play golf and this game is the closest thing I've seen to the real game on a computer". *Archive, June 1989*
"I wouldn't have thought it possible to get a better simulation out of the beeb".
BBC Acorn User, June 1989

"The 3D perspective graphics are stunning"............***Electron User GOLDEN GAME June 1989***

"Holed Out is great ..... The game plays very well and the graphics are superb"...............
Popular Computing Weekly. March 1989

"The Electron version is brilliant - it's almost the same as playing at Gleneagles. Unreservedly recommended"................ ***A & B Computing Game of the Month, June 1989***

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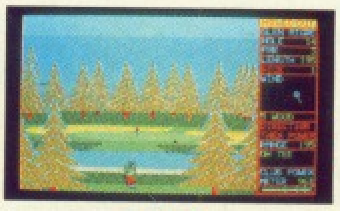
ARCHIMEDES HOLE DESIGNER

Create your own golf courses with this easy - to - use yet highly sophisticated hole designer. Its flexibility allows you to define all aspects of the holes from their pars to the position and size of the lakes. It will keep you enthralled for years.

"The Holed Out Designer is very easy to use and it makes a perfect complement to the original game"........
The Micro - User, Jan' 90



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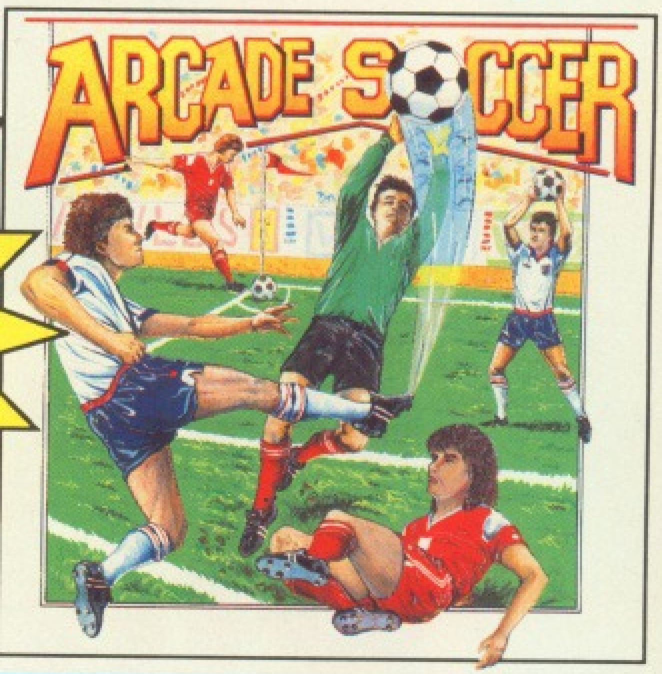


ARCADE SOCCER

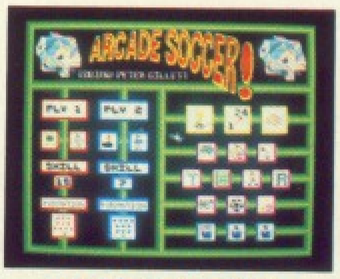
Arcade Soccer really is football action at its very best.

Using an overhead view to make game play as exciting as possible it features everything that you could want in a football game. Corners, sliding tackles, throw-ins, goal kicks, dribbling, shooting, passing and much more. But not only does Arcade Soccer give you Total Action it also puts you in Total Control.

Firstly you can play with either keyboard or joysticks, against the computer and/or with up to 23 friends. The options are almost limitless; you can choose the skill of the goalkeepers, the speed and length of the game, play "friendlies" or tournaments and even enter the most coveted of championships - the World Cup.

"The game is very playable and you do get a feeling of involvement as you knock the ball into the corner of the net straight past the diving goalie. It's definitely one to play again, and if you've enough friends it could make for a good day of enjoyment - and not a lot of games can do that. Value for money ... 10 out of 10"......
The Micro User, October "89.

"This game is excellent ... I'm not a real soccer buff, but I thoroughly enjoyed this desktop version. The micro-controlled players behave in an amazingly realistic manner. Playability 10." ... ***Archimedes review, The Micro user, Feb' 90***



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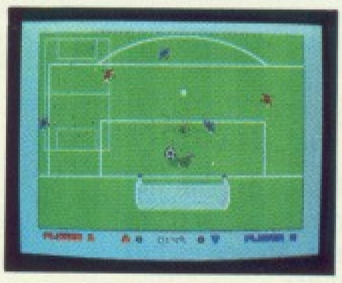

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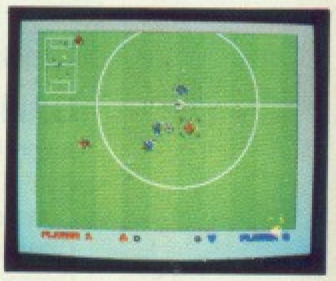

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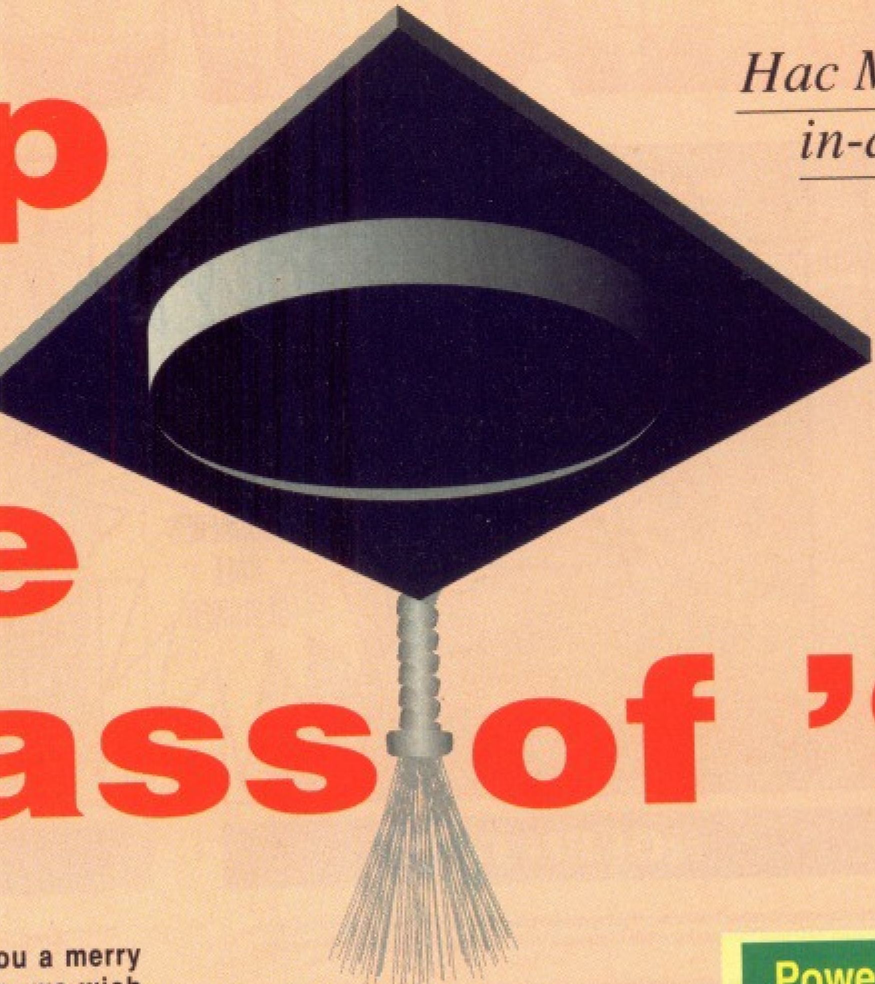


Hac Man takes an in-depth look at two arcade adventure classics

WE wish you a merry Christmas, we wish you a merry Christmas, we wish you a merry Christmas, and a Happy New Year. And no Christmas would be complete without an update to the Hac Man high-score table. Although the first edition was composed entirely from the high-scores of the authors of the featured games, I have long since thrown it open to all readers.

The only qualification for inclusion is that the score must be achieved without the use of pokes or cheat facilities. Of course, I cannot check on the validity of these scores, so I leave it up to individual consciences.

Most of these scores are quite incredible, all the more so for being genuine. However, three in particular really stands out for me: Gary Hunt's Thrust score, Perdita Patterson's more than five-fold improvement on her own high-score for Android Attack, and Corinne Berg's success with Tetris. This last one is particularly astounding because Corinne completed more than 900 lines in the course of this record-setting game.

She asks: "Can the score go to six figures?" Well, Corinne, Tetris stores its high-score table in memory using three bytes for each score, and each byte is used for two digits of the score. For example, a score of 98202 is stored in memory as 098202. I think this answers the question: Yes, Tetris can accept scores up to 999999. Keep going.

Power Pills

- High-score table
- Golden Figurine infinite energy and Master conversion
- Ravenskull Level Two Part Two

Incidentally, I have heard of higher scores than some of these, particularly a 30 million-plus Orlando totted up for Zalaga when it was first released way back in 1983. However, these are the highest scores that I have received. If you can do better, drop me a line.

The Hac-Man High-score Table

GAME	SCORE	PLAYER
Android Attack	2707680	Perdita Patterson
By Fair Means or Foul	758340	Kris McCann
Conqueror (Strategy game)	3621905	Jonathan Griffiths
Conqueror (Arcade game)	121333	Jonathan Griffiths
Crazee Rider	105390	Jason Stone
Crazy Painter	66540	Jason Stone
Frenzy	1327604	Jason Stone
Galaforce II	264100	Jason Stone
Hopper	37725	Jason Stone
Labyrinth	552790	Nick Glencross
Skirmish	153500	Chris Harrison
Snapper	100000	Jonathan Griffiths
Tetris	98202	Corinne Berg
Thrust	10080800	Gary Hunt
Yie-Ar Kung Fu	875700	Jason Stone
Zalaga	456090	Jason Stone

Going for the prize

As has often been said in this column, the arcade adventure is a very popular breed of game because it combines arcade action with adventure-style puzzles to bring out the best in a games player.

Although full-price offerings such as Exile and Citadel are possibly the best-known examples of the genre, arcade adventures more than hold their own at the budget end of the market.

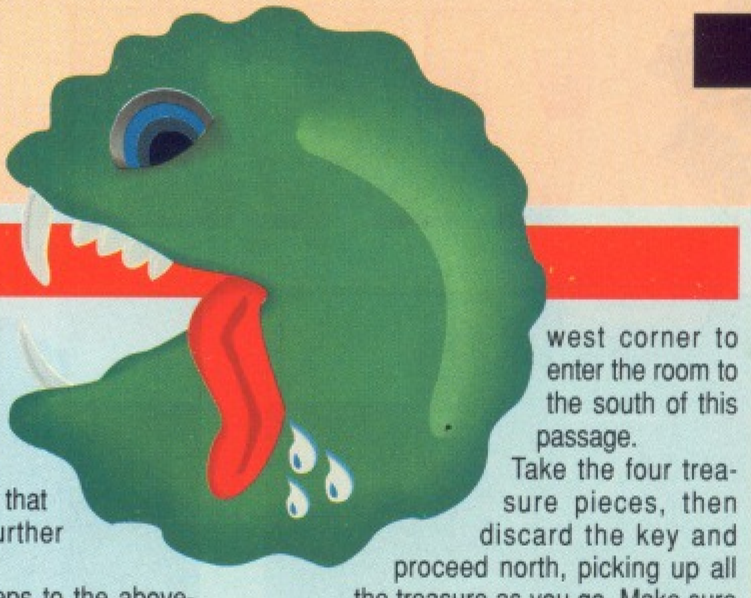
One such offering is **The Golden Figurine** which was released by Atlantis Software a couple of years ago.

I recently received a letter from Oliver Robinson of Hemel Hempstead, Herts, who said that he could not get it to run on his Master 128, either with or without Acorn's Convert utility. The game loads from tape in 10 parts, but crashes as soon as the Figurine8 file has finished loading.

The reason for this is that Figurine8 loads into memory at page &A00 and overwrites what is called the extended vector table at the upper end of page &D00.

This table does not exist on an ordinary Model B but the Master needs it when call-

Castle assault



Let's press on with the solution to level two of **Ravenskull** which I started last month. We left our hero at the crossroads just north of the start position, having cleared all the treasure pieces from the south-west and south-east corners of the map. It is from this position that we continue our exploration of level two.

Unlike the south-west and south-east sections of this level, the north-west and north-east sections are quite independent of each other and in theory can be tackled in any order. Nevertheless, we will first attempt the north-east section.

Before we start, I should point out that the objects I described last month as boulders are in fact supposed to be wooden casks. So here we go, with casks and without boulders:

Proceed north from the crossroads, taking care with the room of spikes, and take the east fork at the T junction. At the end of this passage go north (ignoring the cask between the spikes – we'll come back to that later) and then go east until you reach a small crossroad.

On its right you can see two items of treasure, but it is imperative that you do not go right of this crossroad or a gate will close over the top of the nearer treasure piece, making it impossible to complete the level. Instead go north.

Take the treasure from either end of this passage. If you do not remove the treasure from the alcove at the easternmost end of this passage you will not later be able to move the nearby cask which – at that time – will obstruct further progress.

Now retrace your steps to the above-mentioned crossroad and clear the treasure from the room to the south of the crossroad. Return to the crossroad and go west then south through the wide corridor to the right of the corridor through which you arrived at the crossroad.

As you make your way down this corridor you will see a scroll to the south and a fork to the west. Take the fork.

If you continue south you will cause two blocks to slam together behind you, trapping you with the scroll in a confined space with no means of escape. Instead, go west and skirt around the area of the scroll and remove the piece of treasure below the cask, together with the other two bits of treasure in the vicinity.

Retrace your steps to the point above the slamming blocks. This time go straight down and take the scroll. Use it immediately – it is another strength scroll – then discard it and leave the room by pushing the cask south.

Now go east avoiding the spikes and use the key that you found in the south-west corner to enter the room to the south of this passage.

Take the four treasure pieces, then discard the key and proceed north, picking up all the treasure as you go. Make sure that you pick up the two pieces from the right-hand side of the oft-mentioned crossroad without activating the slamming door, because you won't get another chance.

Make your way out of the north-eastern passage and leave this mid-eastern area by pushing the cask into the alcove.

Now proceed into the north-east corner of this level, carefully moving the casks to gain access to the treasure pieces and the second key. Now retrace your steps to the cask between the spikes mentioned in the first paragraph of the solution.

Move it out of the way to allow yourself access to a door. Open it with the key retrieved from the cask maze in the north-east section, then discard the key. Return to the T junction mentioned earlier.

As before, thanks to Alan Busvine of Brislington, near Bristol, and Bill Hensman of Keighley, Yorks, for all their hard work. Look out for the third and final part of the solution to level two in next month's column.

ing operating system routines – *FX calls and the like – from Basic.

This is normally not a problem on any machine, since most games are written entirely in machine code. However, the last file of The Golden Figurine code – Figurine9 – is a Basic program that manages the data loaded in the Figurine3 to Figurine8 files.

Accordingly, any OS calls made after this table has been overwritten will make the program crash. To circumvent this, I have written Listing I, which prevents the extended vector table from being overwritten, thereby allowing the game to run on the Master.

One fairly serious problem I encountered with The Golden Figurine was that although it claims Electron/BBC compatibility on the cover, the versions of the game on both sides of my cassette were identical – both apparently for the Electron. As many readers will know, the Electron is a much slower machine than the BBC.

Many modern games access the Electron's video hardware directly in order to speed things up as much as possible, and will not therefore run on the BBC Micro.

However, if a legally-written game is designed to run at a suitable speed on the Electron, it will run blindingly fast on the BBC Micro. This is what I found with Figurine.

To compensate for this lines 200 and 210 of the listing set up an artificial delay loop by causing the System 6522 VIA to generate interrupts much more often than it would normally do. Because all interrupts literally interrupt the 6502 CPU from its normal processing, this slows the whole system by keeping the 6502 busy.

The variables *hislow* and *loslow* allow the player to specify how much the system is slowed. The values I have set – zero for *loslow* and eight for *hislow* – give a playing speed with which I feel comfortable. If the game is too slow for you, increasing the value of *hislow* will increase the speed, and vice versa.

The variable *loslow* has 1/256th the effect of , and is really for fine tuning. I doubt that many readers will want to alter it. However, if for example, a value of eight is too slow and nine too fast, setting *hislow* to eight and *loslow* to 128 will give a result that is exactly half way between.

Incidentally, you will notice that the game slows considerably when you are pressing keys. This is because keyboard interrupts are being generated in addition to those produced by the 6522 – the poor 6502 doesn't really know what's hitting it!

Finally, line 170 provides an infinite energy facility. If you don't want it, delete this line before typing RUN.

```
10 REM Golden Figurine infinite energy
20 REM and Master conversion
30 REM by Hac-Man 1990
40 REM (C) The Micro User
50 REM
60 *FX 200,3
70 osbyte=&FFF4
80 loslow=0:REM low-byte of delay
loop (1-255)
90 hislow=8:REM high-byte of delay
 loop (1-255)
100
110 FOR I%=0 TO 2 STEP 2:P%=&120:[
OPT I%
120 LDA#0:STA&70:STA&72:TAY
130 LDA#&48:STA&71:LDA#&A:STA &73
140 LDX#3:.loop1 LDA(&70),Y:STA(&72),Y
150 DEY:BNEloop1:INC&71:INC&73:DEX
:BNEloop1
160 .loop2 LDA&4C00,Y:STA&E00,Y:DE
Y:BNEloop2
170 LDA#&60:STA&FCD:\infinite energy
180 LDA#&81:LDX#0:LDY#&FF:JSR osbyte
190 TXA:BPL return
200 SEI:LDA&FE4E:ORA#&F0:STA&FE4E
210 LDA#loslow:STA&FE44:LDA#hislow
:STA&FE45:CLI
220 .return RTS:]:NEXT
230 *KEY0 PAGE=&2800|MLOAD"FIGURIN
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M430*LO."FIGURINE8"4800|M435CALL&1
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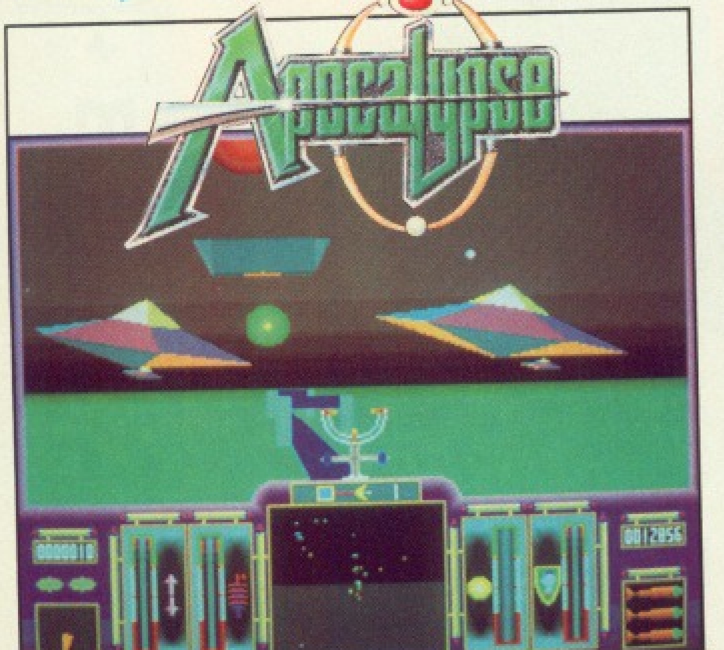


APOCALYPSE

Apocalypse is designed purely for the Arc. The author, Gordon Key, has created a masterpiece which could not have been produced on any other computer.

The game places you on the surfaces of varied futuristic hostile planets colonised by ruthless enemies. In your highly advanced and extremely fast craft you must find your way around the planets and systematically annihilate the enemy.

The graphics are truly unbelievable. They are animated at revolutionary speed and explode into a terrifyingly real ball of flames when you shoot them accompanied by devastating sound effects.

Apocalypse is easy enough for a beginner to enjoy yet develops into a much deeper game with increasingly hostile foes. It will be up to you to discover how to destroy them.

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.***

"it has the fastest 3D realtime graphics I've yet seen on the Archie .... My advice is to rush out and buy the game now, and be the envy of your Amiga owning friends .... quite simply the best Archie game available." .... ***Micronet May '90***

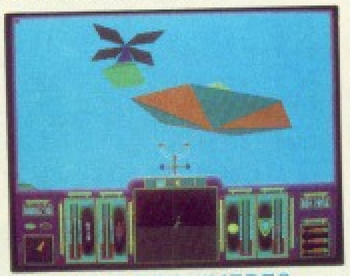
"featuring some of the most impressive graphics yet seen on the Archimedes .... Colourful, fast action along with ease of play and addictiveness ensure that this will be an all-time classic for the Archimedes." .... ***ACE '90***

"Simply, this is the best release yet for the Arc by absolutely miles. Stunning graphics, stunning sound and masses of action. Brilliant." .... ***Risc User Sept '90***

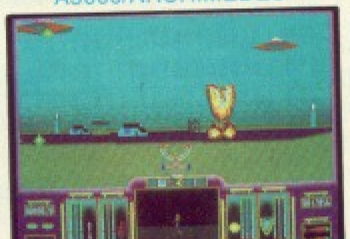
"The programming of Apocalypse is superb and the gameplay excellent. Playability 10, Value for money 10, Overall 10." .... ***Micro User, July, 90***

PRICE: A3000/Archimedes £29.95

A3000/ARCHIMEDES


A3000/ARCHIMEDES

A3000/ARCHIMEDES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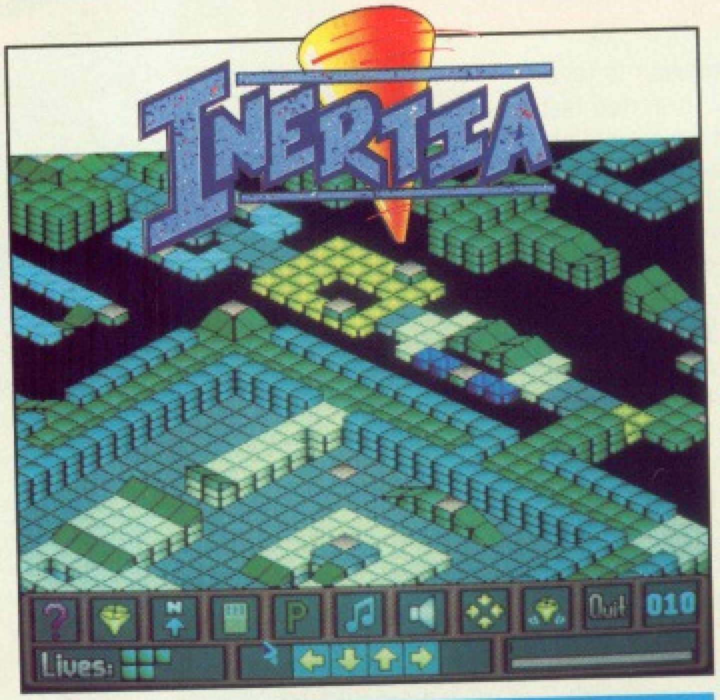

INERTIA

Inertia is a totally original game with an immense landscape just waiting to be explored. Scattered (or rather fiendishly placed) around the landscape are many special tiles which need to be collected. Your craft floats freely around the landscape and you must exert forces upon it to guide its speed and direction.

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.

The Archimedes version is considerably enhanced and has superb digitised sound and background music. It even features full colour 3 dimensional maps of the 2 levels which are 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.

"the accompanying music is superb .... Inertia is another reasonably priced game for all ages. Highly recommended." .... Archimedes Review **Micro User Oct' 90**

"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." .... BBC Review **Micro User Aug '90**

PRICE:		
	A3000/ Archimedes	**£19.95**
	BBC B/Master 5 1/4" disc	**£12.95**
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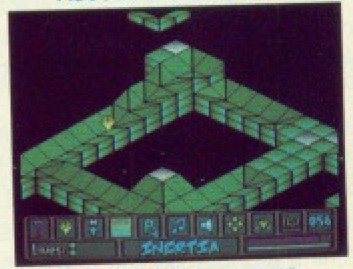
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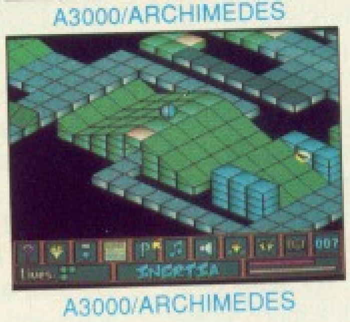
A3000/ARCHIMEDES

MAARI

In the age when the ca t. When y
supreme it took dedicated periment
to overcome their defence operties y
and pillage, and finally to
The sub

You are armed with a ning and
sword cast from the rema ake Man
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many millennia ago. Also the 4 c
possession is a magic pot creasingl
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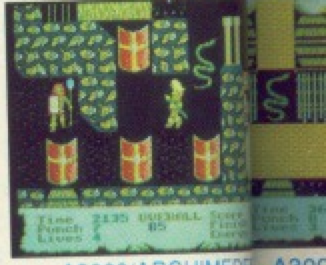
periods of time. Armed kill all f
you must penetrate th vord and
recesses of 4 castles and e most va
with all you find in them. n carry.

As you progress you wil Man-At-A
many intriguing objects allenge w
behave very strangely. d music.
documented such as s been s
panels, hour glasses, re of ma
portculli, mirrors etc.. But come. .

PRICE: A nedes


A3000/ARCHIMEDE A300

A3000/ARCHIMEDE A30

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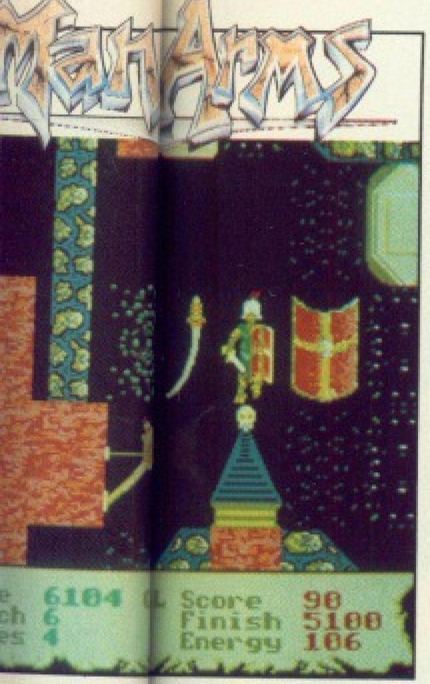

MAN-ARMS

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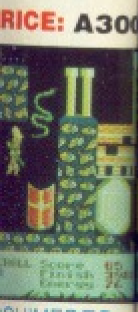
ot. When you think your stuck, experiment and you'll discover properties you never knew existed.

The subtle blend of arcade ming and adventurous puzzles make Man-At-Arms fiendishly addictive. You must plunder each of the 4 castles which become increasingly "puzzling" as you progress. Your overall objective is to kill all foes with your mighty sword and to plunder as much of the most valuable treasure as you can carry.

Man-At-Arms is a fascinating challenge with superb sound effects and music. No attention to detail has been spared and you can be sure of many late nights for weeks to come..

PRICE: A300 medes £19.95



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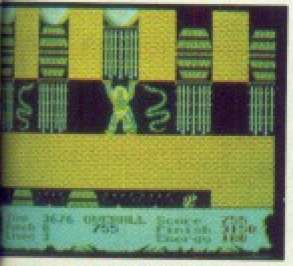

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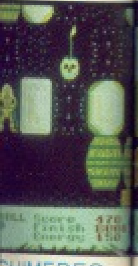
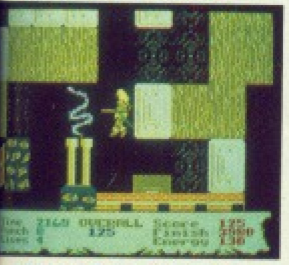


CHIMEDES



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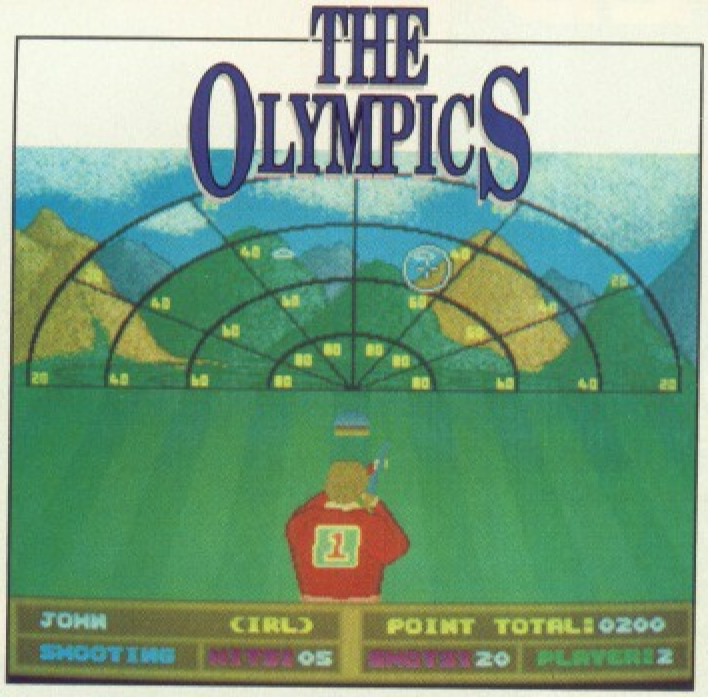


THE OLYMPICS

The Olympics is an experience which can be played by 1 to 8 players. It contains a superb piece of music, opening and closing ceremonies and 14 national anthems. When a player wins a gold medal the national anthem for his chosen country is played. Any World Records that you achieve can be saved to disc. With the click of a button all the relevant information concerning the record is automatically saved including your name, the exact time, day and date!

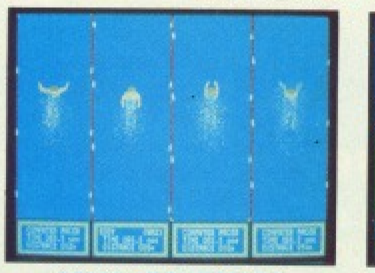
It is comprised of 6 main events: Diving, Shooting, Javelin, Swimming, Canoeing and Pole Vault. Some of these have several "sub-events" to choose from - there are 2 Shooting events, 12 Swimming events and 3 Canoeing events. These events have been chosen for maximum variety and enjoyment. They will "extract" all sorts of abilities: manual dexterity, timing, memory, perseverance, 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 practised or competed individually, or altogether for maximum Gold, Silver and Bronze medals. You can also play all 6 events as a sort of "hexathlon" where points are awarded for each event - the player with the greatest number of points is deemed to be the winner. For each event - the player with the greatest number of points is deemed to be the winner.

"Compilation packages of sporting events may have been round on other machines for ages but the first one for the Arc is every bit as good .... VERDICT: A Gold Medalist" ....
A&B Computing June '90

"Excellent graphics .... Classy presentation .... and plenty of variety .... Should find favour with all members of the family. Definitely recommended." ....
Risc User June '90

PRICE: A3000/Archimedes £19.95



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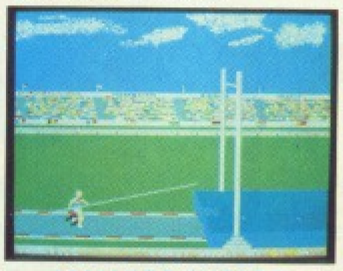
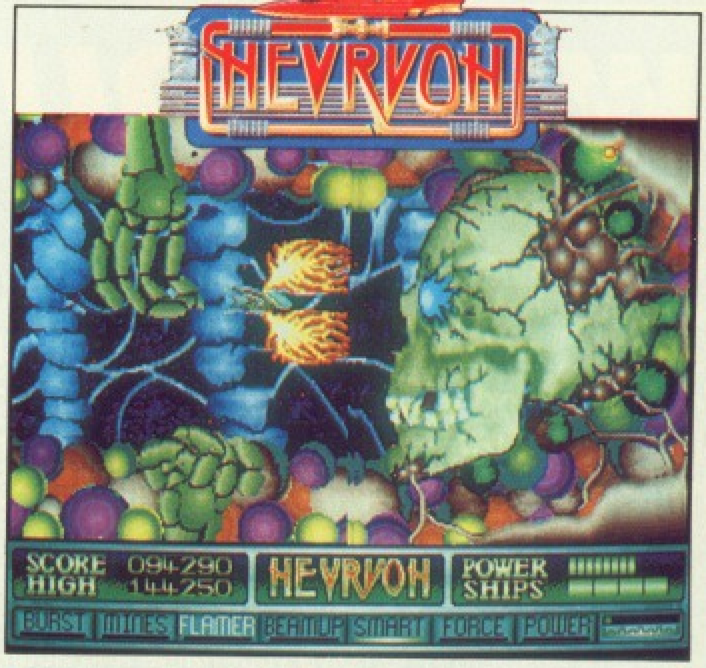


A3000/ARCHIMEDES

A3000/ARCHIMEDES

A3000/ARCHIMEDES



NEVRYON

This fast arcade game is disc based only and boasts 100k of graphics and game code for the BBC Micro and 2 discs of over 1.5 megabytes for the Arc. It is a fast sideways scrolling shoot'em up which features 8 levels of furious opponents and very varied and very detailed graphics.

Whilst the BBC Micro version is superb the Arc version has been considerably enhanced and is truly exceptional putting many arcade games to shame.

"If you think that games for the Archimedes are a bit second rate, then you're out of date because now there's Nevryon .... Nevryon features the best graphics and sound I have ever come across. All of the superb sprites are packed with amazing detail and the animation and scrolling are completely flicker-free. Sound 10, Graphics 10, Playability 10, Value for money 10, Overall 10." ....
Micro User Nov '90

"The 4th Dimension have come up trumps with another classic ....Graphics are superb .... The number of animated objects, missiles, scenery and details will put many an ST and Amiga to shame with the sheer power of the ARM chip. Who needs a blitter for fast action? .... to sum up, another unbelievable game that pushes the Archie standards even higher. Buy it now." ....
Micronet Aug '90

"The raw processing power of the Archimedes is fully exploited to provide a superb, flicker-free scrolling backdrop which includes large sprites, 256 colours and six levels of parallax scrolling .... Coupled with background music, explosions and over sixty on screen sprites excitement is guaranteed all the way .... Nevryon is the first true arcade style game for Archimedes owners to reach for their joysticks for." ....
ACE '90

PRICE:		
	A3000/ Archimedes	**£19.95**
	BBC B/Master 5 1/4" disc	**£14.95**
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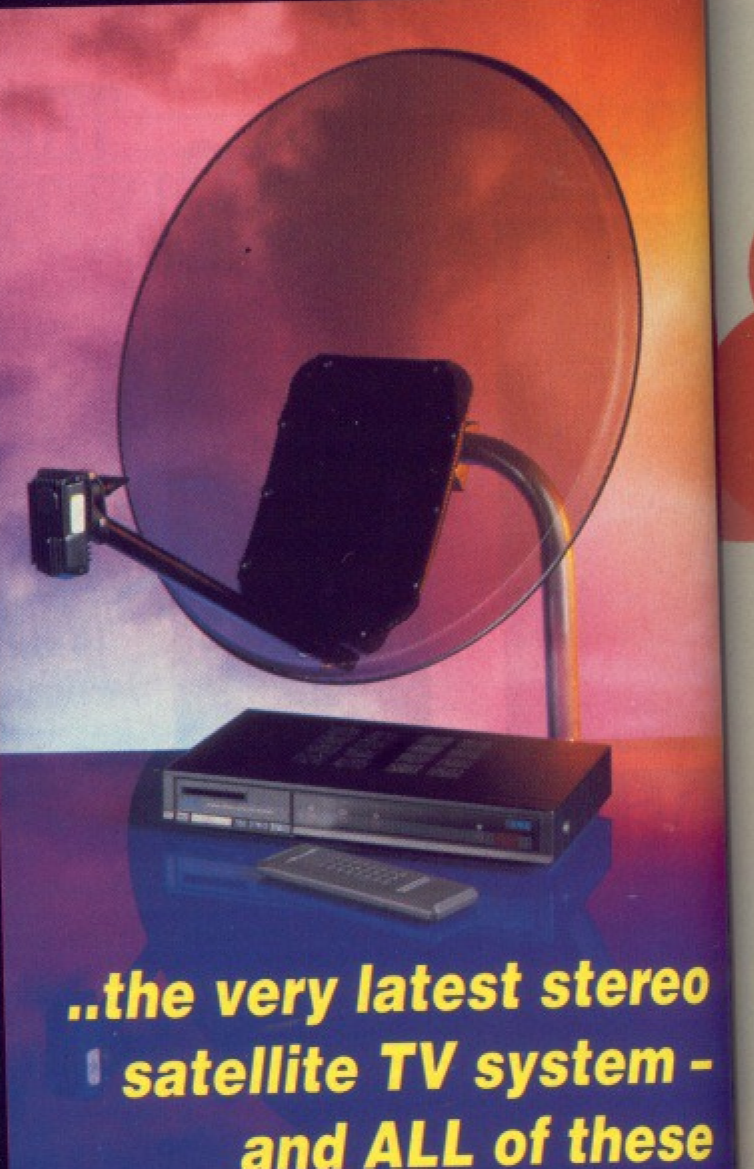

..the very latest stereo satellite TV system - and ALL of these valuable additions

Household names Grundig, Hitachi, Sky and Pace combined to bring you the prize of the year – a complete stereo satellite TV system, with EVERYTHING else you need to bring you all-round TV enjoyment! Every item is right up-to-the-minute. Here is the very last word in TV technology . . . all at the touch of a button.

To win the ENTIRE collection all you have to do is make a phone call and answer six simple questions. We've even presented you with a choice of answers! Then give your name and address...and the first correct answer pulled from our electronic sack will be the winner.

One item alone is worth £380 – the new Pace Receiver/Decoder & Dish. It's been hailed as the very last word in satellite technology.

Pace is Europe's largest manufacturer of satellite TV receivers and their SS9000 IRD has just about everything you might need – including a built-in videocrypt decoder for scrambled channels such as Sky Movies. It's all ready to receive the 16 extra channels of the new Astra 1b satellite – giving you 60 channels in all. It even incorporates a VCR timer that lets you pre-select different channels so that they can be recorded unattended! Remote control on-screen graphics make it simplicity to use. The 60cm dish that comes with your prize is made of a stylish black mesh which blends well with any surrounding.

These are the questions:

1 *Who invented the very first TV set?*
a) Bell in 1900 b) Baird in 1926 c) Einstein in 1929

2 *When did commercial TV start in Great Britain?*
a) 1955 b) 1969 c) 1970

3 *Which was the first Royal coronation to be screened on TV?*
a) Elizabeth II b) George VI c) Edward VIII

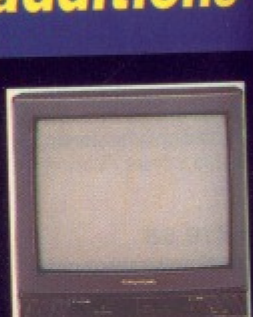
4 *Who wrote the theme tune to the award winning film, Chariots of Fire?*
a) Phil Collins b) Mike Oldfield c) Vangelis

5 *Which star of Wall Street is a famous son of a famous actor?*
a) Jason Connery b) Kiefer Sutherland c) Michael Douglas

6 *Mork appeared in Good MorningVietnam. Who is he better known as?*
a) John Belushi b) Robin Williams c) Tom Conti

PLUS Latest stereo TV receiver

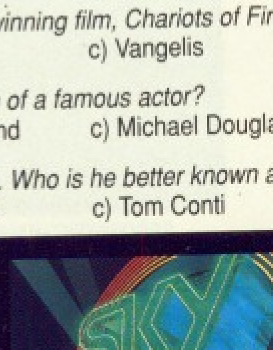
Grundig ST55-450
WORTH £530



With stereo sound, the popular 21in flat square tube PLUS remote control and teletext combine with Grundig's exceptional CTI for increased colour contour sharpness, electronically eliminating colour overlap to give you a much crisper picture. The sound quality is excellent with 2x8 watts of music power, two lateral wideband speakers and two frontal tweeters. Add to this a stereo base expansion and switchable sound channels and you have the very best in 1991 TV technology.

PLUS Watch a year of Sky Movies!

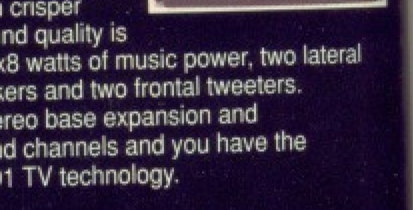
A year's viewing
WORTH £120



Here's a whole year's subscription to the Sky Movie Channel. Would you turn down a date with your favourite Hollywood star in your own home? With prestigious films such as Dangerous Liaisons, Tequilla Sunrise and The Dead Pool already under their belt – future features and releases are very exciting and far too good to miss.

PLUS Latest stereo video recorder

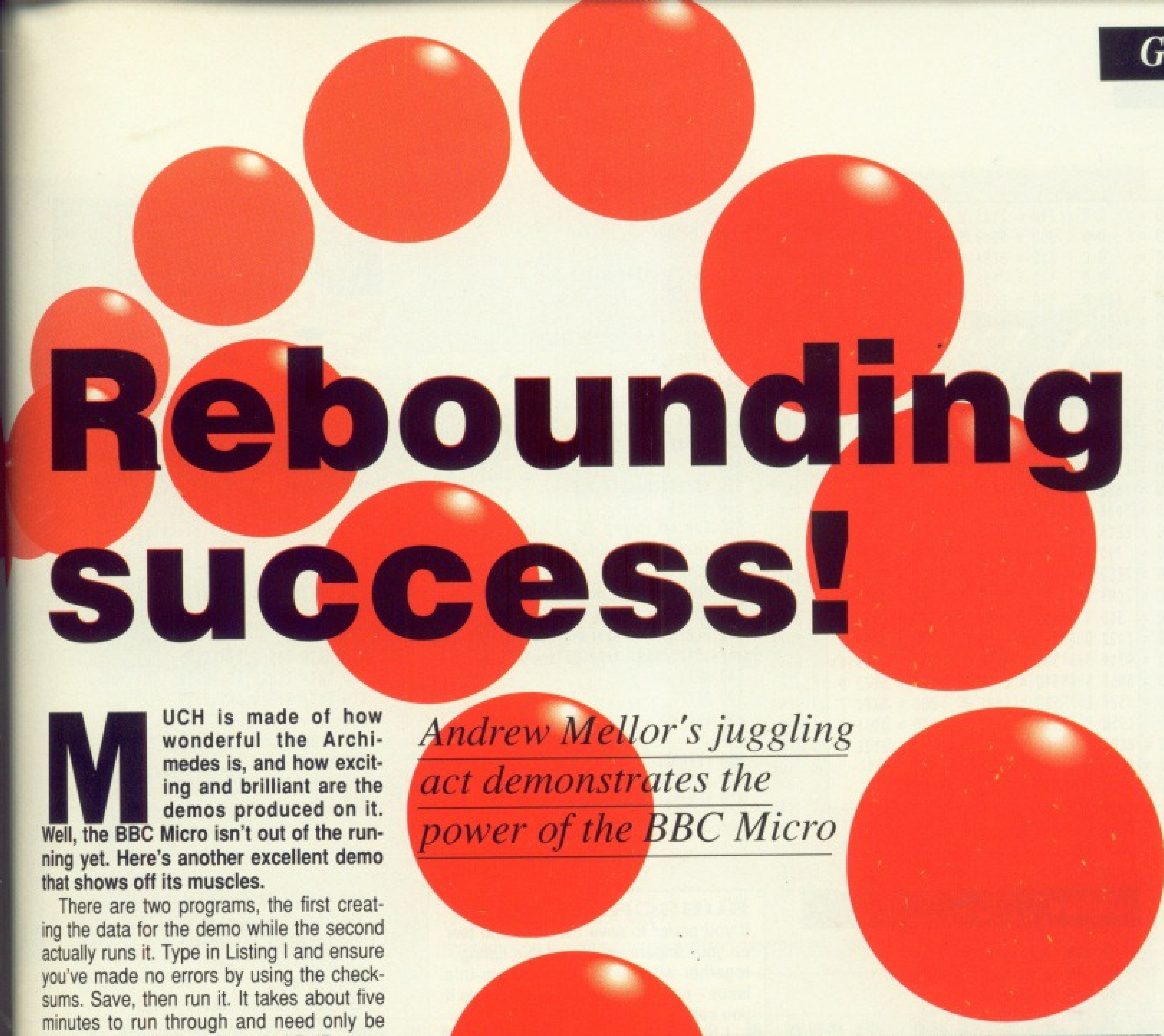
Hitachi VT-M740
WORTH £380



The new sleek design of this two-speed front-loading remote control VCR with four video heads hides a range of features including a title making facility and audio dubbing. You can also have clean still and variable slow motion PLUS digital auto-tracking enhancing the quality of sound and picture by automatically keeping the heads and tracks aligned. Other new features are the on-screen display facility and demonstration and a child lock – proof against little fingers. This really IS state-of-the-art in video recording.

To enter, simply phone: 0898 333 530

Calls cost 33p per minute cheap; 44p per minute at all other times. ***Contest ends December 31 1990*** **Database Publications/Legion**



Rebounding success!

Andrew Mellor's juggling act demonstrates the power of the BBC Micro

MUCH is made of how wonderful the Archimedes is, and how exciting and brilliant are the demos produced on it. Well, the BBC Micro isn't out of the running yet. Here's another excellent demo that shows off its muscles.

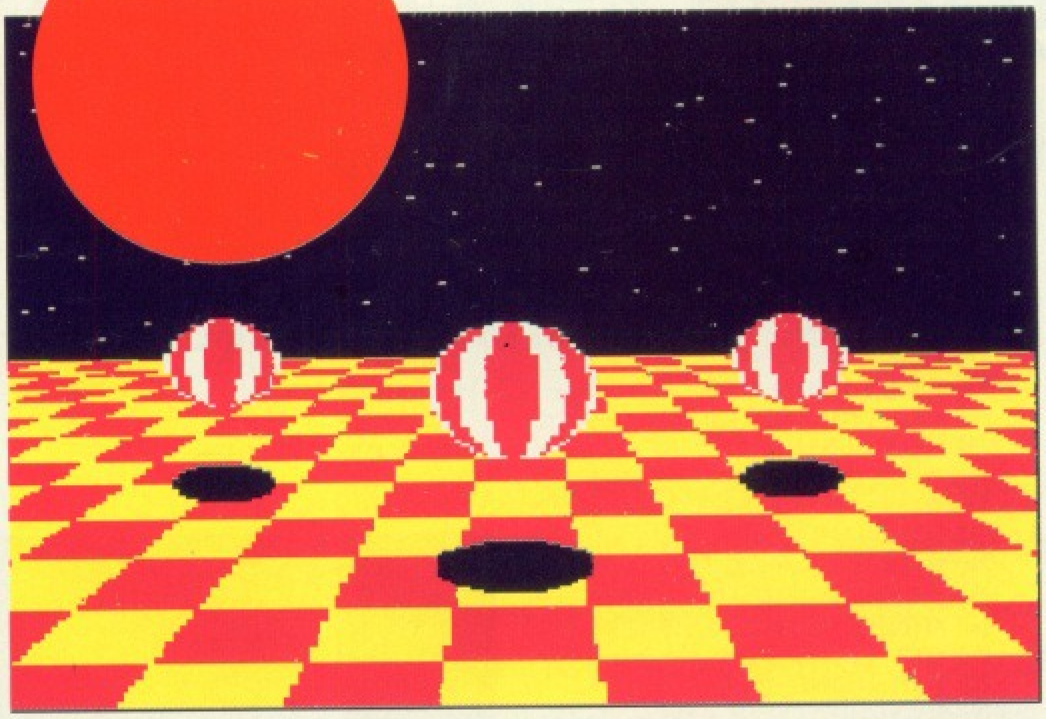
There are two programs, the first creating the data for the demo while the second actually runs it. Type in Listing I and ensure you've made no errors by using the checksums. Save, then run it. It takes about five minutes to run through and need only be used once to create a file called BalData.

Now type in Listing II, check it with the checksums and save it. When run it loads in the data file and, by using a small machine code routine, quickly displays each frame, giving the effect of movement.

The method of animation is a bit like that used in the Beeb's Revenge demo. However, instead of drawing and saving each complete screen, only the areas which are changing are saved – called Delta Compression – in this case where the balls are.

This conserves memory and allows more frames to be used, even though a full screen is displayed.

The second listing uses a short piece of machine code to take the graphics data from memory and display each area, but only where the picture has changed, stepping through each frame to provide the illusion of movement.



Listing I

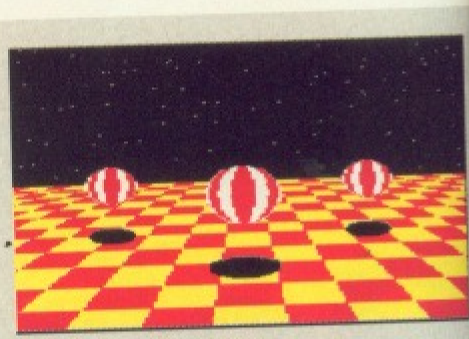
```
 10 REM  Perpetual Bouncing
 20 REM  Listing I - Create data
 30 REM  by Andrew Mellor
 40 REM  (C) The Micro User
 50 ON ERROR GOTO790
 60 MODE5
 70 VDU19,2,0;0;19,0,3;0;
 80 file=OPENOUT("BALDATA")
 90 FOR hgt=200 TO 0 STEP-50
100 CLS
110 PROCground
120 PROCshadow(632,200,100-(hgt/25))
130 PROCshadow(272,320,65-(hgt/35))
140 PROCshadow(976,320,65-(hgt/35))
150 PROCball(632,300+hgt,100)
160 PROCball(272,385+(hgt/1.4),65)
170 PROCball(976,385+(hgt/1.4),65)
180 PROCoutput
190 NEXT
200 CLOSE#file
210 END
220 :
230 DEFPROCground
240 GCOL0,1
250 FOR L=0 TO 1279 STEP80
260 MOVEL-20,550:MOVEL+20,550
270 PLOT85,(L-532)*5,0
280 PLOT85,(L-492)*5,0
290 NEXT
300 Y=1:GCOL3,1
310 REPEAT
320 FOR Y2=Y TO Y*1.2 STEP4
330 MOVE0,550-Y2:DRAW1279,550-Y2
340 NEXT
350 Y=Y*1.44:UNTIL Y>550
360 GCOL0,2
370 MOVE0,1023:MOVE1279,1023
380 PLOT85,0,500:PLOT85,1279,500
```

➤

```
 10 =    0 0   290 = 2C83 B   570 = C433 6
 20 =    0 0   300 = 5BF9 E   580 = 2C83 E
 30 =    0 0   310 = BFBA F   590 = 2C83 3
 40 =    0 0   320 =  E5F B   600 = ED0F 8
 50 =  A8B B   330 = CC40 3   610 = 9719 E
 60 = AABE 6   340 = 2C83 E   620 = 1203 1
 70 = 5C36 C   350 = 3BC7 5   630 = 9FF8 7
 80 = 150F 4   360 = 334C 5   640 = EC47 6
 90 = 2A5A 5   370 = EB83 8   650 = 79D3 0
100 = 7A16 7   380 = 828F 4   660 = 7FBF 7
110 = 3BE4 C   390 = ED0F 9   670 = BFBA 9
120 = F0D2 B   400 = 9719 7   680 = 2358 2
130 = E543 3   410 = 998E 2   690 = 5971 3
140 = F688 1   420 = 334C 4   700 = 2C83 F
150 = 3DAE 4   430 = B4E0 F   710 = 5831 7
160 = EEC3 D   440 = 5919 3   720 =  2C4 1
170 =  791 8   450 = B4E0 3   730 = 2C83 1
180 = 7282 6   460 = FC5F 1   740 = ED0F 8
190 = 2C83 7   470 = 2C83 2   750 = 1AE5 4
200 =  3C5 9   480 = ED0F B   760 = C482 D
210 = FD2E 0   490 = 9719 5   770 = 6C8D B
220 = 9719 5   500 = 8AB0 2   780 = 9719 9
230 = 5B65 5   510 = C183 B   790 = 9EE3 D
240 =  32F E   520 = 482F 3   800 = 8AFC 7
250 = C95B 7   530 = D451 7   810 = 6BDF 8
260 = 6CBE 3   540 = B4E0 3   820 = FD2E D
270 = F546 D   550 = 5919 C
280 = 41DB 4   560 = B4E0 7
```

➤

```
 390 ENDPROC
 400 :
 410 DEFPROCshadow(X,Y,R)
 420 GCOL0,2
 430 MOVEX,Y
 440 FOR ang=0 TO 360 STEP5
 450 MOVEX,Y
 460 PLOT85,X+R*SIN(ang*PI/180),Y+R*COS
(ang*PI/180)*COS(68*PI/180)
 470 NEXT
 480 ENDPROC
 490 :
 500 DEFPROCball(X,Y,R)
 510 col=1
 520 FOR ellipse=0 TO 19 STEP5.5
 530 col=(col+2)MOD4:GCOL0,col
 540 MOVEX,Y
 550 FOR ang=0 TO 360 STEP5
 560 MOVEX,Y
 570 PLOT85,X+R*SIN(ang*PI/180)*COS(ell
ipse*4.5*PI/180),Y+R*COS(ang*PI/180)
 580 NEXT
 590 NEXT
 600 ENDPROC
 610 :
 620 DEFPROCoutput
 630 RESTORE
 640 FOR ballnum=1 TO 3
```



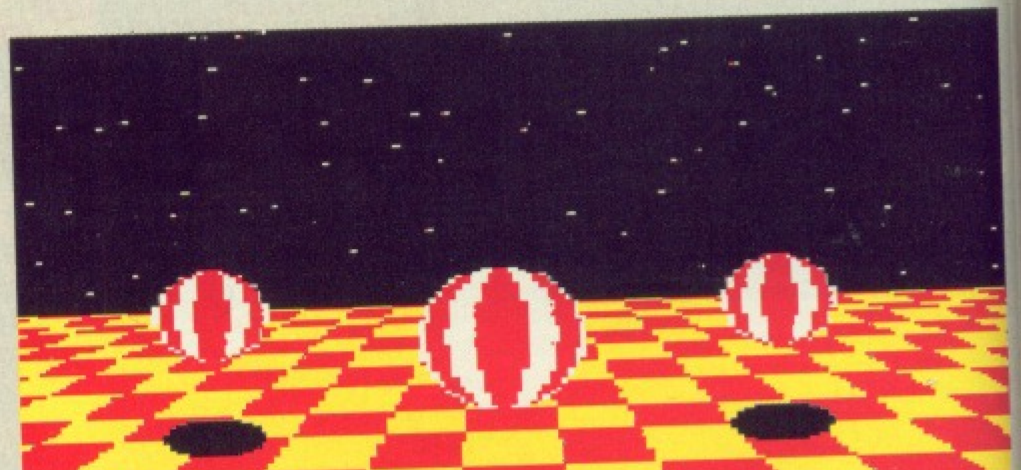
```
 650 READ memstrt,memfin,rowlen
 660 memloc=memstrt
 670 REPEAT
 680 FOR byte=0 TO rowlen
 690 BPUT#file,?(memloc+byte)
 700 NEXT
 710 memloc=memloc+320
 720 UNTIL memloc=memfin
 730 NEXT
 740 ENDPROC
 750 DATA &68C0,&7A40,55
 760 DATA &6870,&74F0,39
 770 DATA &6920,&75A0,39
 780 :
 790 CLOSE#0
 800 MODE7
 810 REPORT:PRINT" at line ";ERL
 820 END
```

Listing II

```
  10 REM  Perpetual Bouncing
  20 REM  Listing II - Animate
  30 REM  by Andrew Mellor
  40 REM  (C) The Micro User
  50 ON ERROR GOTO1240
  60 MODE5:HIMEM=&3000
  70 VDU23;11,0;0;0;0
  80 VDU19,2,0;0;19,0,3;0;
  90 *LOAD BALDATA 3000
 100 PROCground
 110 PROCstars
 120 PROCassem
 130 CALL code
 140 END
 150 :
 160 DEFPROCground
 170 GCOL0,1
 180 FOR L=0 TO 1279 STEP80
 190 MOVEL-20,550:MOVEL+20,550
 200 PLOT85,(L-532)*5,0
 210 PLOT85,(L-492)*5,0
 220 NEXT
 230 Y=1:GCOL3,1
 240 REPEAT
 250 FOR Y2=Y TO Y*1.2 STEP4
 260 MOVE0,550-Y2:DRAW1279,550-Y2
 270 NEXT
 280 Y=Y*1.44:UNTIL Y>550
 290 GCOL0,2
 300 MOVE0,1023:MOVE1279,1023
 310 PLOT85,0,500:PLOT85,1279,500
 320 ENDPROC
 330 :
 340 DEFPROCstars
 350 GCOL0,3
 360 FOR N=0 TO 100
 370 PLOT69,RND(1280),RND(512)+512
 380 NEXT
 390 ENDPROC
 400 :
 410 DEFPROCassem
 420 dataptr=&70:scrnptr=&72
 430 frmxsize=&74:frmysize=&75
 440 frmcount=&76:code=&900
```

```
 450 FOR pass=0 TO 2 STEP2
 460 P%=code
 470 [OPT pass
 480 .start
 490 LDA#0:STA dataptr
 500 LDA#&30:STA dataptr+1
 510 LDA#5:STA frmcount
 520 .scnloop
 530 LDX#56:STX frmxsize
 540 LDY#14:STY frmysize
 550 LDA#0:JSR frame
 560 LDX#40:STX frmxsize
 570 LDY#10:STY frmysize
```

```
 580 LDA#2:JSR frame
 590 LDX#40:STX frmxsize
 600 LDY#10:STY frmysize
 610 LDA#4:JSR frame
 620 JSR delay
 630 DEC frmcount:BNE scnloop
 640 LDA#1:STA frmcount
 650 .scnloop2
 660 LDA dataptr:SEC:SBC#&60
 670 STA dataptr
 680 LDA dataptr+1:SBC#&C
 690 STA dataptr+1
 700 LDX#56:STX frmxsize
 710 LDY#14:STY frmysize
 720 LDA#0:JSR frame
 730 LDX#40:STX frmxsize
 740 LDY#10:STY frmysize
 750 LDA#2:JSR frame
 760 LDX#40:STX frmxsize
 770 LDY#10:STY frmysize
 780 LDA#4:JSR frame
 790 JSR delay
 800 INC frmcount:LDA frmcount
```



```
 810 CMP#4:BNE scnloop2
 820 BIT&FF:BMI esc
 830 JMP start
 840 .esc RTS
 850
 860 .frame
 870 TAY
 880 LDA table,Y:STA scrnptr
 890 LDA table+1,Y:STA scrnptr+1
 900 .frmloop
 910 LDY frmxsize:DEY
 920 .rowloop
 930 LDA(dataptr),Y:STA(scrnptr),Y
 940 DEY:BPL rowloop
 950 LDA dataptr:CLC
 960 ADC frmxsize:STA dataptr
 970 LDA dataptr+1:ADC#0
 980 STA dataptr+1
 990 LDA scrnptr:CLC:ADC#64
1000 STA scrnptr
1010 LDA scrnptr+1:ADC#1
1020 STA scrnptr+1
1030 DEC frmysize:BNE frmloop
1040 RTS
1050 .table
1060 OPT FNequw(&68C0)
1070 OPT FNequw(&6870)
1080 OPT FNequw(&6920)
1090 .delay
1100 LDA frmcount:ASL A
1110 TAY:INY:INY:INY
1120 .dloop
1130 TYA:PHA
1140 LDA#19:JSR&FFF4
1150 PLA:TAY:DEY:BNE dloop
1160 RTS:]
1170 NEXT
1180 ENDPROC
1190 :
1200 DEFFNequw(N%)
1210 ?P%=N% MOD256:P%?1=N% DIV256
1220 P%=P%+2:=pass
1230 :
1240 MODE7
1250 IF ERR<>17 REPORT:PRINT" at line "
;ERL
1260 END
```

Get it right ✓

```
  10 =    0 0  |  280 = 3BC7 9  |  550 = 6833 9
  20 =    0 0  |  290 = 334C 0  |  560 = B0AD 9
  30 =    0 0  |  300 = EB83 6  |  570 = 5015 D
  40 =    0 0  |  310 = 828F 4  |  580 = C880 8
  50 = 9CC6 6  |  320 = ED0F B  |  590 = B0AD 1  |   820 = C0D8 A   |  1050 = 8902 C
  60 = 7C8D 2  |  330 = 9719 A  |  600 = 5015 B  |   830 = 48C9 8   |  1060 = C057 6
  70 = A427 4  |  340 = 46DC 3  |  610 = 3974 F  |   840 = FCBB C   |  1070 = C49F 0
  80 = 5C36 9  |  350 = 236D 7  |  620 = 40CE A  |   850 =    0 C*  |  1080 = 59DB 8
  90 = 2FBE 7  |  360 = AC6F 8  |  630 = C871 D  |   860 = 23C1 7   |  1090 = F949 5
 100 = 3BE4 D  |  370 = 7C7B B  |  640 = B32A 1  |   870 = 772F 7   |  1100 = 4382 C
 110 = EDB8 2  |  380 = 2C83 C  |  650 = AE08 7  |   880 = A1D5 9   |  1110 =  61B 0
 120 = B854 8  |  390 = ED0F C  |  660 = D107 1  |   890 = B020 8   |  1120 = E148 9
 130 = AF58 3  |  400 = 9719 4  |  670 = 7CFB E  |   900 = C505 A   |  1130 = 6E12 E
 140 = FD2E 4  |  410 = 1330 A  |  680 = F662 9  |   910 = BB69 2   |  1140 = DC80 C
 150 = 9719 F  |  420 = 8139 A  |  690 = EF2E 3  |   920 = 258B F   |  1150 = 1AD8 5
 160 = 5B65 2  |  430 = D48B 9  |  700 = 1536 7  |   930 = F626 9   |  1160 = 88E3 5
 170 =  32F 2  |  440 = 3111 F  |  710 = ADB0 E  |   940 =  996 9   |  1170 = 2C83 E
 180 = C95B C  |  450 = 5E7C 0  |  720 = 6833 C  |   950 = F9F2 A   |  1180 = ED0F 2
 190 = 6CBE A  |  460 = 3FB3 F  |  730 = B0AD C  |   960 = 99BF F   |  1190 = 9719 F
 200 = F546 F  |  470 = 4E48 0  |  740 = 5015 9  |   970 = 7665 C   |  1200 = 7392 D
 210 = 41DB D  |  480 = 3208 6  |  750 = C880 D  |   980 = EF2E D   |  1210 = 142D B
 220 = 2C83 4  |  490 = 276A 3  |  760 = B0AD 2  |   990 = 4C00 1   |  1220 = 237D 6
 230 = 5BF9 6  |  500 = 9BE0 9  |  770 = 5015 E  |  1000 = C0EF 7   |  1230 = 9719 C
 240 = BFBA B  |  510 = 4E8F 3  |  780 = 3974 8  |  1010 = 3A13 7   |  1240 = 8AFC E
 250 =  E5F 8  |  520 = 3A2F 7  |  790 = 40CE 8  |  1020 = E6FB D   |  1250 = A620 3
 260 = CC40 3  |  530 = 1536 4  |  800 = E285 B  |  1030 = A72B 6   |  1260 = FD2E 9
 270 = 2C83 E  |  540 = ADB0 9  |  810 = 3B4D D  |  1040 = 9843 5
```

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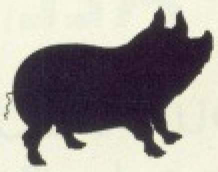

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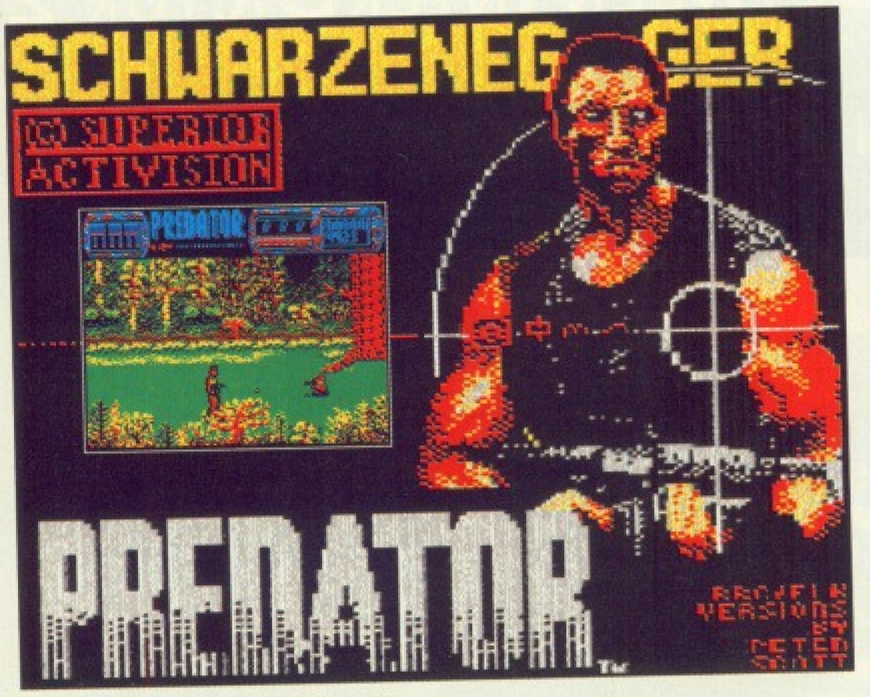
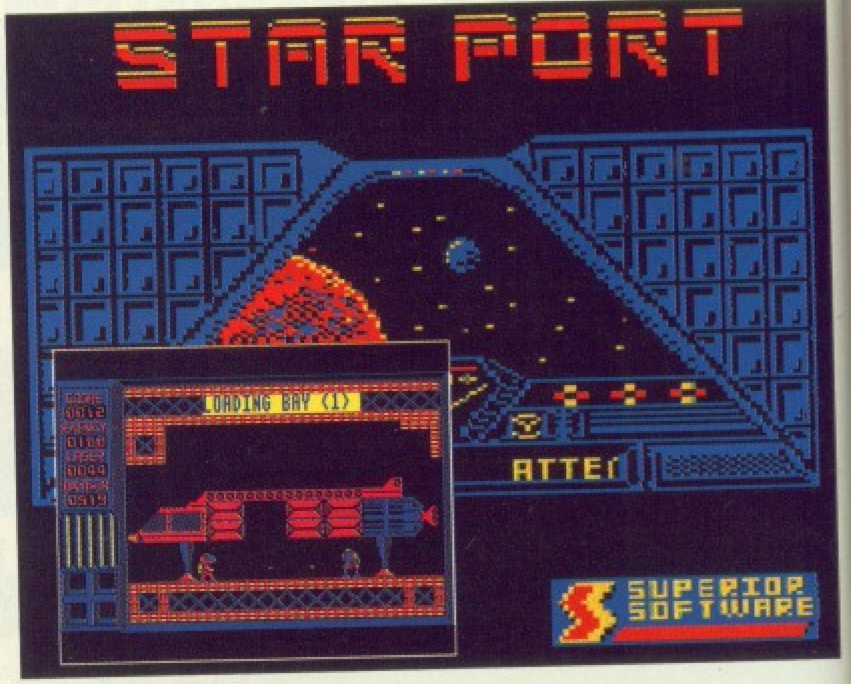


Schwarzenegger – Uzi 9mm maestro



Intergalactic medicine man

PLAY IT AGAIN

Product: Play it Again Sam 14
Price: £9.95 (tape) £11.95 (disc)
Supplier: Superior Software, PO Box 6, Brigg, South Humberside DN20 9NH.
Tel: 0652 585

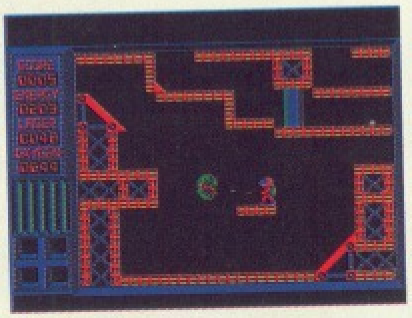
SUPERIOR'S long running affair with the BBC Micro continues to go from strength to strength as Play It Again Sam 14 hits the screens. Three full-price best sellers and an all-new arcade adventure constitute one of their best compilations so far.

The first stars that master of monosyllabic mayhem Arnold Schwarzenegger in one of his more interesting films, **Predator**. As big Arnie you enter uncharted jungle and pit your muscle and terrestrial firepower against the cunning and extraterrestrial weaponry of the Predator.

Four horizontally scrolling levels lay between you and the alien, so the chances of spotting him are pretty slim. However, the chances of him finding you are very good, as you will soon discover.

Much of your time is spent gunning down enemy troops and flocks of vultures, but every now and then the screen will darken and a cluster of three dots will appear. These signal your impending death as they are the Predator's gun sights.

All things considered, the film's atmosphere is recreated to good effect in this top notch blaster.



Trouble ahead

Ballistix is the 1990s version of a game called Crossfire, a hit way back in the dark ages when people thought that Pong was a pretty neat video game.

By firing balls at a puck you drive it towards your opponent's goals. Score three goals and you win, concede three and you lose. Simple.

Variety is introduced with the addition of walls around which you must guide the puck, and tokens that initiate random events when hit.

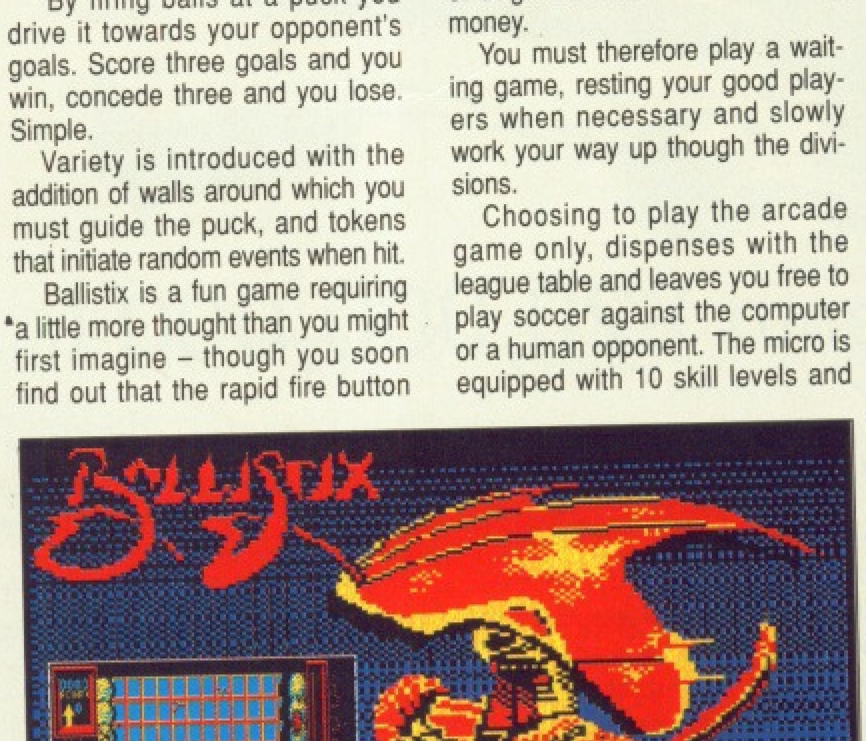
Ballistix is a fun game requiring a little more thought than you might first imagine – though you soon find out that the rapid fire button technique is the quickest way to notch up a hat trick of own goals.

Moving on from one ball game to another we have **Superior Soccer**, which mixes the strategy and tactics of Player Manager with the best action of the arcade football games.

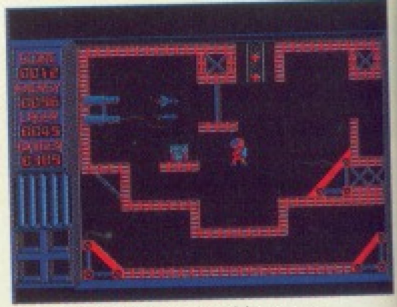
In true to life fashion the management side of the game is dominated by money. Without cash you cannot afford to buy fresh, skilful and strong players, and without such players you cannot pull in big enough crowds to earn the big money.

You must therefore play a waiting game, resting your good players when necessary and slowly work your way up though the divisions.

Choosing to play the arcade game only, dispenses with the league table and leaves you free to play soccer against the computer or a human opponent. The micro is equipped with 10 skill levels and on most of these you'll be beaten.



Catch it on the rebound



Blast the aliens to smithereens

In my experience the quickest way to the top of the division is to concentrate on the management game and leave play to the computer. You'll score more goals that way.

Game number four is called **Star-Port** and is the latest arcade adventure game from the author of Quest and Camelot. The program follows the usual format for this genre: Search the Star-Port to find five cases of medical supplies.

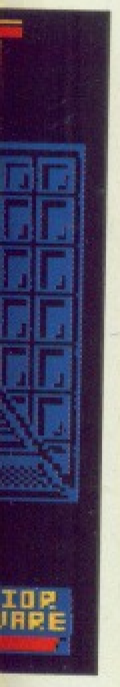
While doing this you have to also destroy 500 points worth of robot guards and solve a series of unreasonably difficult numeric puzzles against the clock.

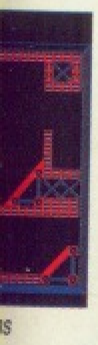
Star-Port is a good game that holds its own in this illustrious company, and is in no way a stocking filler.

Once again, Superior can do no wrong in their continuing domination of the BBC/Electron software field.

Jon Revis

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





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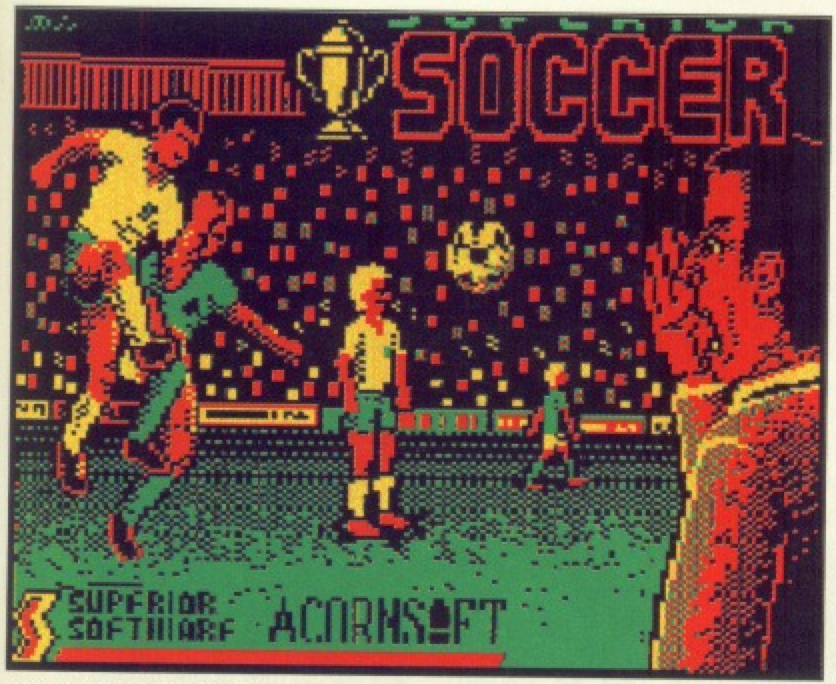
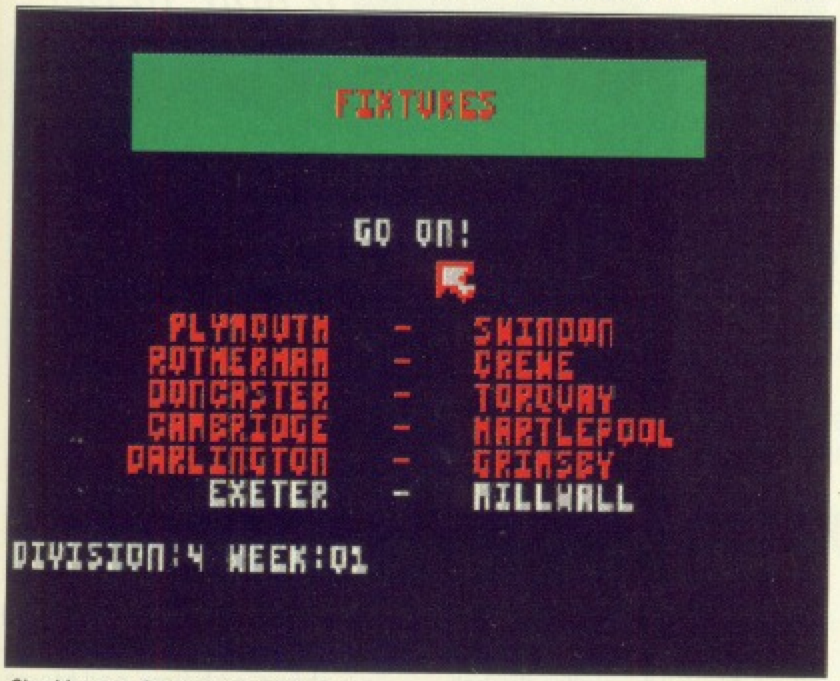


Kicking off with Superior Soccer

NSAM 14

... one more time



```
FIXTURES

GO ON!

PLYMOUTH    -  SWINDON
ROTHERHAM   -  CREWE
DONCASTER   -  TORQUAY
CAMBRIDGE   -  HARTLEPOOL
DARLINGTON  -  GRIMSBY
EXETER      -  MILLWALL

DIVISION:4 WEEK:01
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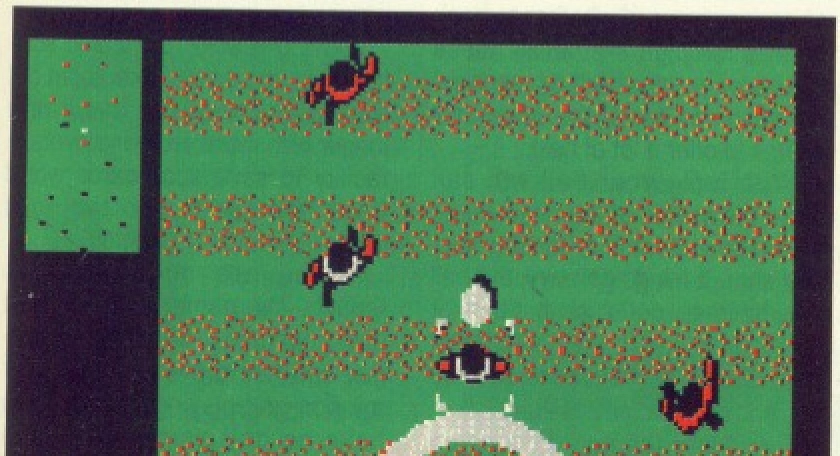
Checking out the week one fixtures



Man on!

PON!

...mayhem on the menu

Price: £17.95
Supplier: RTFM, 43 Hill Street, St Helier, Jersey JE2 4UA.
Tel: 0534 67870
Requirements: BBC A3000 or Archimedes series

OF all the strange scenarios, none have sunk quite so low as to suggest that the player is a mutated cornflake who has escaped the breakfast horror to find himself in the land of Yosh. Not only that, but he is now running for his life from the evil Tonneh.

Well, Pon is said distressed cereal, and for him to return to his proper place on the breakfast menu he must get through the dimension gate.

I don't quite know which is the worst fate, but as death seems more imminent at the hands of the Tonneh, perhaps the breakfast option is a little more open. A cheery but long title sequence with music gives way, after hammering the spacebar, to level one. A beautiful scrolling piece of text passes, assuring you that you are at the beginning. Then you are left to the real thing.

There's a time indicator on the left of the screen and the landscape moves in a slick vertical scroll. Consequently all the screens are in a strip form and Pon is limited to sideways scampering within the bordered area.

You objective is to turn all the green and grey tiles to red while avoiding your homicidal adversaries in this strange land. Should you meet them head on they will drain your time bar.

However, these are not the only hazard you are likely to meet. Among the chartered paths are more taxing squares, such as ones which look like crazy-paving but crumble on touch, one-way arrows divert you into a cul-de-sac, lurking tombstones are inevitably fatal and are sometimes cunningly partnered with slippery blue icy blocks.

You get a real sense of achievement as Pon whizzes around the screens – the tiles recede to red in a relaxing blotchy way and all the time our rancid hero winks and blinks his own body language.

A word to the wise – beware mysterious items that manifest themselves before you. Should you innocently jog up to and collect a poison bottle, Pon's face drops as nice red tiles become green.

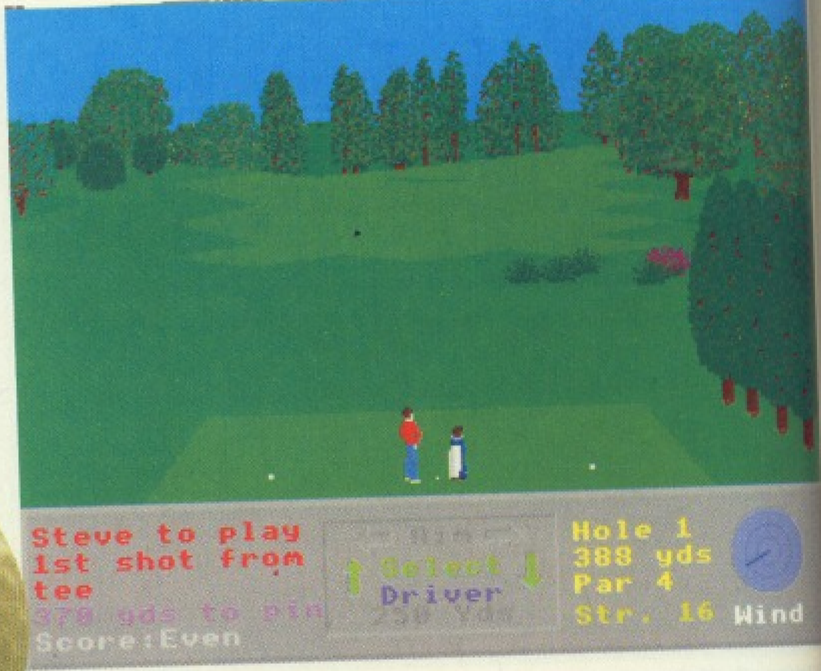
However, should you meet any fellow nutritional cornflakes a touch of cannibalism will replace any of the three lives you may have mislaid earlier. Also an extremely useful tile allows you to short cut to areas to which you might not have access. Though the Tonnehs are tenacious and mean they can be quashed by finding an exploding stone or more dexterously stepping on to a crumbling section just as a furry foe approaches. Beware of the generator machines at higher levels too – they regenerate even nastier cousins.

The arrangement of the game is set to lull you into a false sense of security. You should be able to whiz through the first level, but then a more considered and strategic approach is required.

I could critise the graphics and simplistic game format, but I'm not going to as nothing detracts from the all-out, racing pace and fun. Only the addition of a jump level option and a pause key could enhance Pon. The music is swell and I don't even miss any sound effects.

Matthew Ridd

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



Choose your weapon

MICRODRIVE

... a hole in one?

Price: £19.95
Supplier: CIS, 8 Herbrand Street, London WC1N 1HZ.
Tel: 071-833 4023
Requirements: BBC A3000 or Archimedes series

NO! This has nothing to do with cars or discs – it is, in fact, a new golf program. You can choose to play either the Lauren Hills or San Rivero course and a quick overview of each can be obtained before the selection.

Then the names of up to four players are entered, allocating them a skill factor and selecting whether they be left or right handed. Next choose which hole to start from, and let action begin.

The display shows a 3D view down the fairway. Hazards, in the form of bunkers, water and out-of-bounds areas, are clearly indicated. By watching the way the screen is drawn – it takes only a few seconds – some insight into the position of hills and valleys can be gained.

Also on screen is a wind strength and direction meter, plus information about the length of the hole and how far from the flag your ball lies. A helpful – but invisible – caddy will already have selected a possible club for you. You can, of course, make your own decision. There is onscreen advice on the hitting distance for each club.

At any time a plan of the hole can be called up, along with advice on methods for tackling problems. Switching between this screen and the 3D view is instant.

After mulling over the options and selecting a club you start your back swing and – with a satisfying "thwack" – wallop the ball.

There is control over the amount of back swing and whether to hook or slice. At high skill levels these touches are very hard to manage. On the easy level, the computer seems to offer a lot of help.

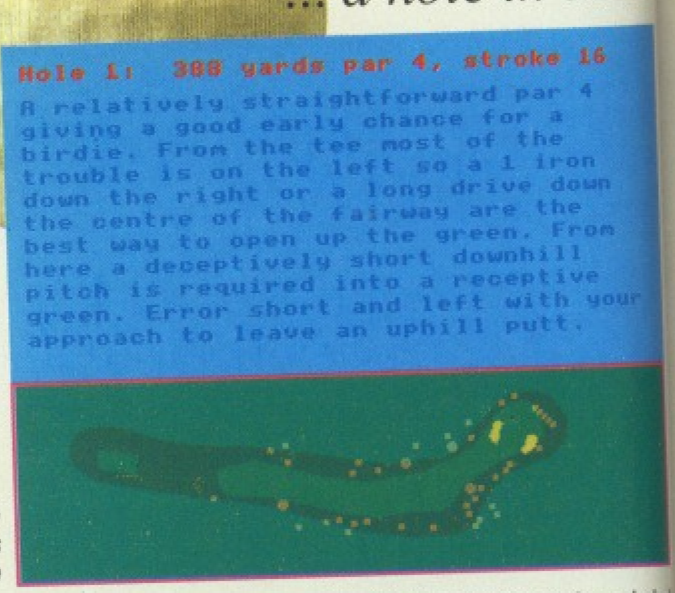
With luck, your ball will sail down the middle of the fairway and so select a next club for the second shot. If things go awry, the ball may hit trees, get stuck in a bunker or perhaps land in the water. Most hazards are accompanied by very realistic digitised sound effects.

Eventually the ball will land on the putting green. These far-from-level surfaces are hard to portray on a 2D screen. Unlike Holed Out, you retain the 3D viewpoint and it's essential to watch how they are drawn if you are to sink the long putts. The satisfying noise of ball in hole makes the effort really worthwhile. When all players have holed out, a score sheet is shown indicating above or below par scores. There is no match play option, which I feel is a pity.

Playing a solo round and scoring close to par will take about half an hour. Obviously, it will take longer with more or poor players. A facility to save scorecards would have been useful so that long games could be completed.

These are minor quibbles though. The game is an excellent implementation, with good graphics, and has proved great fun for my non-golf playing family. If you have no golf game MicroDrive could well fit the bill.

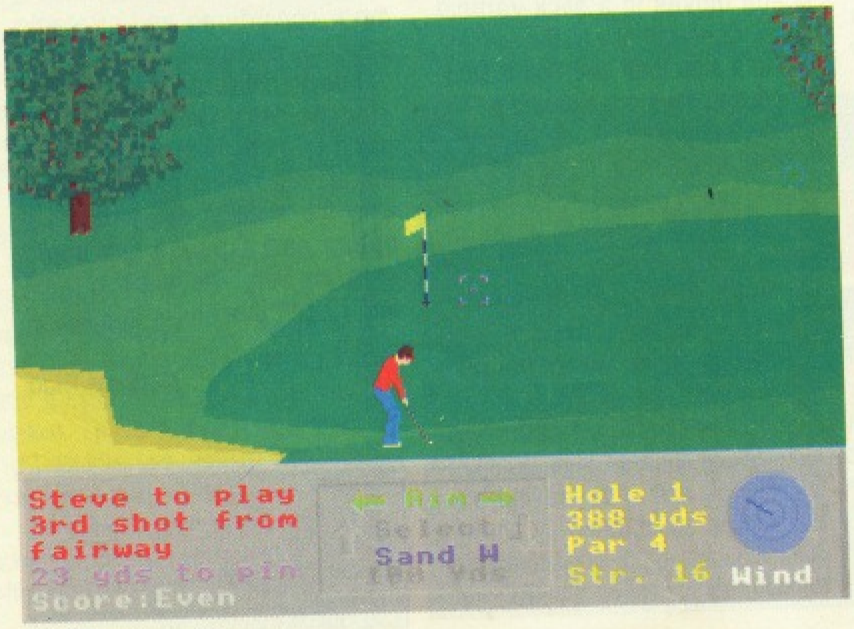
Rog Frost



Hole 1: 388 yards par 4, stroke 16

A relatively straightforward par 4 giving a good early chance for a birdie. From the tee most of the trouble is on the left so a 1 iron down the right or a long drive down the centre of the fairway are the best way to open up the green. From here a deceptively short downhill pitch is required into a receptive green. Error short and left with your approach to leave an uphill putt.

On-line hole descriptions available



Getting on to the green

Sound	9
Graphics	8
Playability	10
Value for money	8
Overall	9

BRIXX!

... one more wall of bricks

Product: Brixx!
Price: £17.95
Supplier: RTFM, 43 Hill Street, St Helier, Jersey JE2 4UA.
Tel: 0534 67870
Requirements: BBC A3000 or Archimedes series

OLD favourites tend to die only to be resurrected a couple of years later. While the scrolling text on the high-score table tries its best to convince you that you are saving the space/time continuum, this is yet another version of Breakout for the Archimedes.

Control of your trusty bat is by mouse only and you will need to develop a swift hand movement to return a deflected ball successfully because the mouse sensitivity is not controllable.

Each screen has its own title and unique mosaic of multi-coloured bricks to hack away at. The ball glides across the embellished backgrounds with flicker-free ease and bounces off objects at unusual angles.

The shade of the brick donates whether it will vanish on impact, or merely darken a little before disappearing after another hit. Some hues of block are indestructible and will block your path as you fight to reach the remaining rectangles.

Random capsules descend from the minced masonry – catch them before they disappear and each will affect the gameplay. Some are beneficial and others are not – that trick of reversing the controls I find extremely irritating.

I rather like the sticky bat which offers a little timein which to aim your projectile, while the laser capsule is vital to complete certain levels. Other capsules widen the bat, excite or dull the ball's speed, or build a temporary fence to save you all those volleying dashes – this is a great option when coupled with the multi-ball effect, by the way you only have to hit the white ball.

Sets of four bopping aliens provide a relentless cabaret as they appear in various positions on the screen and then dance back and forth, sending your best shots astray.

It is worthwhile taking a little time to shoot at them, as they deflect the ball disastrously in addition to being difficult to aim around.

An editor is provided in case you tire of the action. Flexing your artistic talent you can order ranks of bricks as you wish, finished arrangements being titled and set against a textured background.

Options such as copying, swapping, cutting and pasting are all available.

Strangely, all screens can only be saved as one datafile and on the game disc.

If your designs ovewrite the original you can retrieve it using the default screens icon.

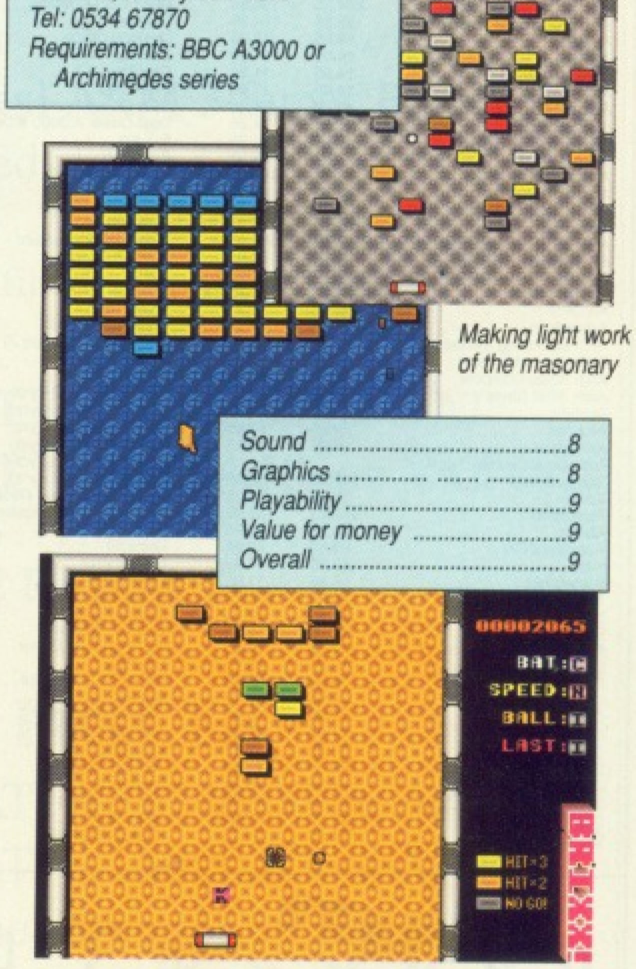
This is a very limiting approach and means that it is impossible to swap home-designed screens with your friends.

The print option does little more that drop basic text screen information to the printer – a screen dump would have been more acceptable.

Sound is where Brixx! scores highest. Sampled messages are relayed each time you begin play or are returned to the first screen. You can kill sound and music, but there is no sanity-saving skip level option. Despite the niggles, Brixx! proves that the simplest concepts are sometimes the best.

For a little addictive fun, you could do worse.

Matthew Ridd



Making light work of the masonary

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

MEMORY MAGIC

Price: £15.95
Supplier: CIS, 8 Herbrand Street, London WC1N 1HZ.
Tel: 071-833 4023
Requirements: BBC A3000 or Archimedes series

MEMORY Magic is a version of Kim's Game. This is hardly a novel idea, although it needs a computer with Archimedes-quality graphics to get a good implementation.

Also, with a micro you get a few extra features plus a high score table – and you do not have to scrabble around the house looking for bits and pieces.

After loading the program you are prompted for your name and can then select from a number of options. The idea of this old American Indian game is that you are shown a number of objects for a couple of minutes after which you go away and remember what you saw.

On level one you are offered four items, which can be displayed together or shown in sequence. You must then type a description of the pictures. To help you, a list of possible objects is included. This is essential since the program is totally inflexible about spelling which can lead to problems – since players who press the spacebar at the end of a word will be told that they got it wrong even if they didn't.

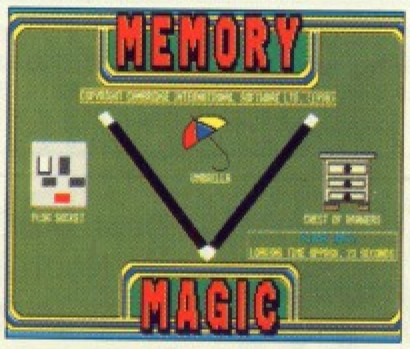
Only 100 per cent success will qualify players for level two, which involves memorising 10 objects, while level three displays 20 different pictures selected from the full range of 60 full colour sprites.

There are six levels, but I've not yet completed level three. The program's author says level two is his limit!

A score is given for each correct answer and if you remember enough your name will go on the high score table and be saved permanently on disc.

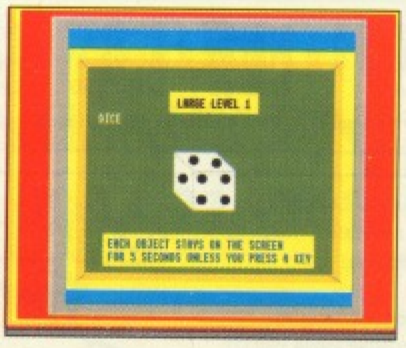
This is a simple game that will probably not amuse one person for too long. It could provide some party fun but it lacks that quality which gets people hooked.

Rog Frost



LOADING TIME APPROX. 23 SECONDS

Remember this title screen



EACH OBJECT STAYS ON THE SCREEN FOR 5 SECONDS UNLESS YOU PRESS A KEY

Sound	N/A
Graphics	7
Playability	5
Value for money	5
Overall	5

SOFTWARE Bargains AND Mercury Games

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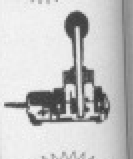

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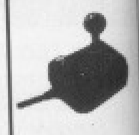

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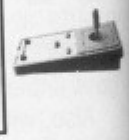

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Micro	Free Offer
A410/1	Upgraded to 2MB RAM & a 20MB Hard Disc, (A420)
A420/1	Upgraded to 4MB RAM 40MB Hard Disc (A440), MK II Learning Curve pack and Acorn DTP pack
A440/1	Upgraded to 4MB RAM 40MB Hard Disc (A440), MK II Learning Curve pack and Acorn DTP pack
540/1	High Res Multiscan Monitor & Panasonic KX-P1180 Printer
A3000	Upgraded to 2MB RAM on board

+ 12 months FREE On-Site Maintenance

ACCESSORIES

● NEW Multitasking RISC OS	£29
● ROM Podule (Computer Concepts)	£45
● 3.5" 800K 2nd Floppy Drive (305/310)	£118
● 5.25" 800K external Floppy Drive	£85
● I/O Podule (with Analogue port, User port, & 1MHz bus)	£78
● MIDI add-on to I/O Podule	£29
● MIDI Expansion Card	£65
● Sound Sampler Mono (Armadillo)	£129
● Sound Sampler Stereo (Armadillo)	£166
● Sound Sampler Stereo /Midi (Armadillo)	£186
● Chromalock Podule (Wild Vision)	£275
● Econet Network Board	£46
● Archimedes IEEE Interface Adaptor	£269
● Dual RS232 Podule	£195
● 16 bit parallel I/O Card	£195
● NEW – Archi MK II Replacement Mouse	£39
● PC Emulator NEW Faster Version	£62
● Software Developers Toolbox	£149
● Floating Point Unit	£455
● SCSI Adaptor Expansion Card	£169
● Keyboard Extension Lead	£6
● 2 Podule Backplane	£25
● 4 Podule Backplane	£38
● Fan for above backplanes	£8
● Archi Real-time digitiser	£199

8Meg RAM Upgrade for Archimedes A400 Micros

● **R810** –	A410/1 upgraded to 8MB	£910
● **R820** –	A420/1 upgraded to 8MB	£859
● **R840** –	A440/1 upgraded to 8MB	£749
● **R814** –	R140 upgraded to 8MB	£749

Turbo Charge Your Archimedes

Increase the speed of your Archimedes by a factor of THREE to SIX times (depending on the software you are running), with Watford's ARM3 Upgrades.

● **ARM-3**	20MHz Upgrade Board	£349
● **ARM-3**	30MHz Upgrade Board	£399
● **MEMC**	1A Upgrade	£49

(Special Offer – If purchased together with an Archimedes Micro, then not only will we fit the card Free of Charge but we will also reduce the price by £60 i.e. You pay only £289 for ARM3 20MHZ & £339 for ARM3-30MHz)

Convert your Archi 410 to a 420 or 440 with Watford's unique Upgrade Kits

UP10 –	to 2MB RAM + 20MB Hard Disc	£229
UP15 –	to 2MB RAM + 40MB Hard Disc	£334
UP20 –	to 4MB RAM + 20MB Hard Disc	£335
UP30 –	to 4MB RAM + 40MB Hard Disc	£445
UP40 –	to 4MB RAM + 53MB Hard Disc	£515

Archimedes RAM Upgrade

All our memory upgrades are simple to fit. No soldering required. Fitting instructions supplied.

● **R302**-A3000 – to 2MB RAM Upgrade	£65
● **R304**-A3000 – to 4MB RAM Upgrade	£179
● **R311**-A305 – to 1MB RAM Upgrade	£99
● **R312**-A305/310 – to 2MB RAM Upgrade	£245
● **R314**-A305/310 – to 4MB RAM Upgrade	£435
● **R412**-A410/1 – to 2MB RAM Upgrade	£65
● **R413**-A420/1 – to 4MB RAM Upgrade	£120
● **R414**-A410/1 – to 4MB RAM Upgrade	£173

Archimedes Hard Disc

Watford's Hard disc drives for A310 & A410 series fit internally into the space provided. The 'simple to follow' fitting instructions supplied makes drive fitting very easy. All disc drives are self parking. 40Meg & 53Meg drives are fast 24mS type, while 20MHz are 28mS.
P.S. A310 upgrades require a backplane and a fan.

● **3HDP** – Hard Disc Podule only	£135
● **3HD20** – 20Meg H' Disc + Podule for 310	£299
● **3HD40** – 40Meg H' Disc + Podule for 310	£399
● **3HD50** – 53Meg H' Disc + Podule for 310	£474
● **4HD20** – 20Meg Hard Disc for 410	£169
● **4HD40** – 40Meg Hard Disc for 410	£269
● **4HD50** – 53Meg Hard Disc for 410	£399
● A3000 20Meg Hard Disc + Podule	£359
● A3000 40Meg Hard Disc + Podule	£489

Silicon Vision Corner

Gerber Plot	£93
Risc Basic	£74
Solid CAD	£74
Super Plot	£20
Super Dump	£20
ROBO LOGO	£54
Solids Render	£54
Solid Tools	£199
Arc PCB Professional	£275
Realtime Solids Modeller	£110

● RB2 – Archi Marconi Trackerball	£46
● Risc Os Extras Software Disc	£5
● Smoked Perspex Low profile Keyboard Cover	£8
● Ethernet Card	£220
● Laser Direct	£849

Desk Top Publisher

Acorn's Archi DTP Package	£125
Impression DTP Package	£135
Impression 2 DTP Pack	£165
Impression Junior	£79
Tempest DTP Package	£99

Archi Wordprocessors

Wordwise + Disc	£24
Image Writer	£25
Interword Disc	£24
1st Word Plus – 3	£69
Archie Spell Master	£39
P.Spellchecker	£40
View	£45
Viewindex	£12
Graphic Writer	£23
EAS!WORD	£30

Databases

AlphaBase	£36
Knowledge Organiser	£45
Multistore	£195

Spreadsheets

Intersheet Disc	£24
Sigmasheet	£55
Viewsheet	£45

Business Graphics

GammaPlot	£39
Interchart Disc	£20
Sigmaplot	£39

Integrated Packages

● Logistix	£85
● Pipedream 3	£120
● Desktop Office – Database, Graphs & Charts, Wordprocessor, Spreadsheet, Communications	£105

Graphics, Art, Design & Games

GRAPHICS

Atelier	£65
Artisan II	£54
Pro Artisan	£72
Autosketch II	£68
Graph Box	£64
Kermit	£46
Render Bender 2	£58
Euclid 2	£52
Mogul	£19

GAMES

Alerion	£11
Arcade 3	£11
Apocalypse	£23
Arcade Soccer	£15
Battle -Tank	£14
Break 147	£20
Bug Hunter	£14
Chocks Away	£20
Clares 3 Pack	£12
Class Mate	£35
Conqueror	£19
Drop Ship	£17
Enthar Seven	£22
E-Type	£15
E-Type Designer	£15
E-Type Extra 100 miles	£18
Freddy's Folly	£10
Freedom Fighter	£21
Holed Out Designer	£15
Holed Out Golf	£15
Hostages	£17
Hoverbod	£11
Ibix the Viking	£14
Inertia	£17
Inter Dictor 2	£27
Jet Fighter	£10
Knowledge Organiser	£49
Man at Arms	£15
Minotaur	£11
Missile Control	£11
Nevryon	£17
Olympics	£15
Orion	£12
Pacmania	£14
Quazar	£10
Real McCoy	£25
Redshift	£15
Repton 3	£17
Sporting Triangles	£24
Superior Golf	£17
Talisman	£14
The Pawn	£19
Thundermonk	£11
White Magic	£15
Zarch	£13

Miscellaneous

Armadeus Sound	£69
Arccomm Pack	£24
BBC DFS Reader	£15
Genesis	£65
Hearsay Comms Pack	£50
Laser Direct	£875
Rhapsody in Blue	£42
Toolkit (Clares)	£42

LANGUAGES (Archimedes)

ISO-PASCAL; FORTRAN 77	**£77 each**
ANSI C Release 3	**£125**
Assembler; LISP or Prolog X	**£149 each**
LOGOTRON LOGO	**£55**
ROBO LOGO	**£49**
TWIN EDITOR	**£25**
RISC BASIC	**£85**
BASIC Compiler	**£77**

MINERVA's Archimedes Software

Sigmasheet	**£55**
Home Accounts*	**£36**
Stock Manager*	**£53**
Nominal Ledger*	**£53**
Ancestry	**£59**
System Delta+	**£55**
Sales Ledger*	**£53**
Purchase Ledger*	**£53**
Reporter	**£29**
Mailshot*	**£29**
MultiStore	**£195**
System Delta + Reference Manual	**£25**
Order Processing/Invoicing*	**£53**
School Administrator	**£118**

** Requires System Delta*

NEW Business Accounts Packages
Nominal Ledger, Order Processing/Invoicing, Purchase Ledger, Sales Ledger & Stock Control
Price: **£85** per Module or
£325 for complete package

ULTIMUM – Archimedes A3000 Podule Racking System

THE ONLY LOGICAL WAY TO EXPAND YOUR A3000 COMPUTER

The accepted standard for Archimedes computer expansion is the Acorn Podule, designed initially to fit the old 310, and also for the later A400 and A400/1 series micros. The podules fit inside these computers up to four at a time. The A3000 is the little brother of the family, but can only have one podule at a time, plugging into the back of the computer.

Other attempts have been made to expand the A3000 by trying to introduce a 'mini-podule'. This is impractical for many reasons, amongst which is the reluctance of manufacturers to produce them. Nobody wants to re-design podules already produced. Some cannot be produced on a 'mini-podule' as they are far too complicated and simply wouldn't fit.

Watford Electronics listens to the demands and requirements of its customers, and we are glad to say that we have come up with the only real solution to the A3000 expansion problem. The ULTIMUM Podule Racking System allows up to three FULL SIZE standard Archimedes 300/400 series podules to be fitted to the computer. In addition, there is also provision for a hard disc drive and a podule to be fitted internally.

Since the ULTIMUM Podule Racking System takes proper full size podules, you will be able to use any of the currently available peripheral equipment, from companies like Computer Concepts, Armadillo, Acorn and of course, our own brand.

Fitting the podules to 'ULTIMUM' is simple. They are neatly fitted inside the metal case of the rack, avoiding the previously untidy method of hanging the podule off the back of the computer, risking damage to both, it and to the computer.

'ULTIMUM' has its own power supply, so no strain is put on the A3000 power supply. There is also an IEC mains output socket for an Acorn type monitor so reducing the number of plugs required to go to the mains. The ULTIMUM is rigidly clamped over the top and under the computer, and allows direct access to the floppy disc drive and reset button, rather than obstructing access as on other systems. One can also place a standard monochrome or 14" colour monitor (even a multiscan type) safely on top. The mounting method employed is so firm that the computer could even be safely transported without the assembly falling apart.

By popular demand, we are now able to supply refurbished and fully guaranteed, Acorn range of Micros.
(Please telephone for price & availability)

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

Archimedes 5.25"/3.5" Disc drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. NO SOLDERING is involved. Supplied complete with necessary lead.
Only £21

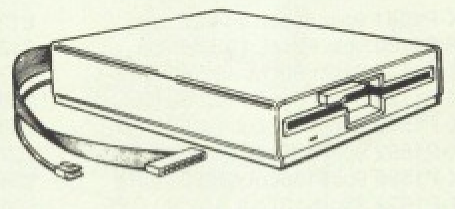
Special Education Prices

All education establishments qualify for special education prices on micros, etc. Please write in or telephone (0923) 37774 or 50335 for written quotation.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£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.

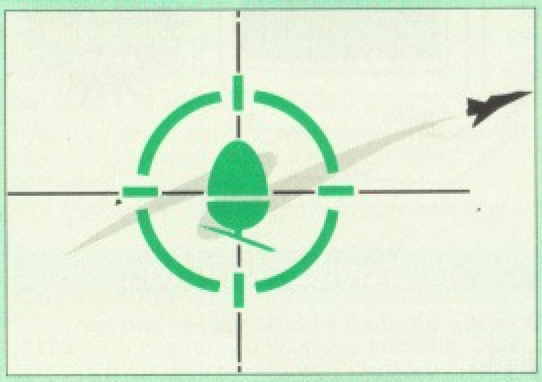
FREE with every BBC Master purchased from us during November

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	**£115**
Econet Module for the Master	**£47**
Twin ROM Cartridge for Master	**£9**
Quad ROM Cartridge for Master	**£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 B	**£42**
ALL ECONET UPGRADES Available	
ARIES' IEEE Interface for BBC B & Master	**£238**
Morley Teletext Adaptor with ATS Rom	**£99**
Filestore E01S	**£899**
Filestore E40s	**£749**
Filestore E60S	**£949**
Ecolink	**£270**

(Carr. £2 to £7 depending on the weight)

Take the Acorn Archimedes Test Flight and win yourself a Supersonic Concorde Flight



Take the new Archimedes 420/1 Learning system home by booking a slot in Watford's Acorn approved Test Schedule. Call in at our showroom and check it out for yourself – Leave a deposit and you may borrow one of our specially chosen Learning Curve System for up to 14 days. Be satisfied before you buy. Return the system in good order for a complete refund. At the same time you may enter our FREE aviator competition. You could win stunning prizes; Fly in First Class Luxury in Concorde; Learn to fly a helicopter' Take a weekend of flying lessons; and many more prizes. So why not take a test fly at Watford.

For Archimedes Mk II Hand Scanner, Real Time Digitiser, Graphics Tablet, Software & Books, see pages 5, 8, 10 & 12 of our advert.

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.

Z88 ACCESSORIES

● 32K RAM Pack or 32K EPROM Pack	**£18.00**
● 128K RAM Pack or 128K EPROM Pack	**£45**
● 512K RAM Pack	**£175**
● Z88 Eprom Eraser Unit	**£35**
● Z88 Spellmaster for Pipedream	**£51**
● Z88 Carrying Case	**£9**
● Z88 Computing Book	**£9.95**
● AA Nicad Rechargeable Battery	**£1.50**
● Battery Charger Compact & Fast	**£6**
● Z88 Serial Printer Cable	**£9**
● Z88 Parallel Printer Cable	**£25**
● Z88 to Archi Link	**£15**
● Z88 to BBC Link	**£20**
● Z88 to PC Link II	**£30**
● Z88 to Macintosh	**£52**
● Z88 Mains Adaptor	**£9**
● Z BASE	**£56**
● Z TAPE	**£42**
● Z TERM	**£42**
● Z88 Modem	**£149**

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

Continued→ → → → → → → → → →

Microvitec Monitors

● **1431** – Standard resolution as used on the BBC television computer programme	£172
● **1451** – Medium resolution, suitable for word processing in mode 0	£215
● **Cub3000** Medium Res for A3000	£195
● **1455** – MS Medium resolution, ideal for Archimedes	£220
● **1441** – High res, exceeds the capabilities of the BBC Micro	£359
● **1451AP** RGB + PAL and AUDIO	£255
● **2040 CS** 20" Hi Res	£675
● Dust Cover for Microvitecs	£5.50
● **Touchtec 501 Touch Screen**	£239

Multiscan Colour

● **TAXAN** 775 Plus – 0.28 Dot pitch Ultra high resolution, anti-static screen	£429
● **TAXAN** 795 TRINITRON 0.26 Dot pitch 1024 x 768 Non interlaced	£499
● **TAXAN** 770LR Low Radiation Multiscan	£425
● **PANASONIC** – 14" Super High Res. 0.29" Dot pitch, non glare screen. Built-in Swivel base	**Launch price** £349
● **EIZO** 9060SZ Low Radiation, Super High Resolution, Antistatic screen, multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch	£409
● **EIZO** 9070S 16" Low Radiation .28 Dot pitch. As used on Archi 540/1	£625

Philips

● **BM7502** 12" Hi-res Green Monitor	£70
● **CM8833** 14" Med. Res Colour Monitor	£199

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor . A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £179

Dust Cover for Philips Monitors £6
(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.

£12

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Microvitec and Multiscan colour monitors; all Panasonic, Hewlett Packard, and all Laser Printers, Roland Plotters and of course the full range of Archimedes micros. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours. (Offer applicable only when bought at prices advertised in this advert. UK mainland only).

Concept Keyboards

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

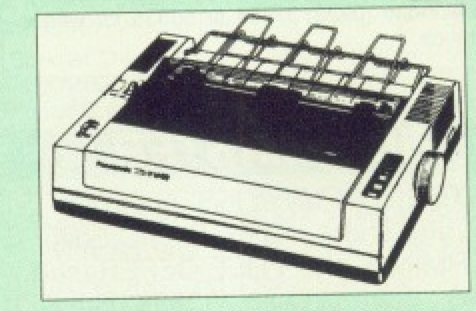
Roland Plotters

(Official Roland Appointed Distributor)

● **DPX 2500**	£2389	● **DXY 1100**	£545
● **DXY 1200**	£715	● **DXY 1300**	£899

Panasonic Printers

12 MONTHS FREE MAINTENANCE ON SITE



FREE with every **KX-P1081 & KX-P1180** Printers: A printer lead (please specify type required) and a Dump Out 3 ROM for the BBC Micro or 1,000 sheets of fanfold paper for other micros, please specify)

● **KX-P1081** 9pin 80col. 144/28 cps	£124
● **KX-P1180** 9pin 80col. 192/38 cps	£134
● **KX-P1123** 24pin 80col. 192/63 CPS	£179
● **KX-P1124** 24pin 80col. 192/63 CPS	£185
● **KX-P1540** 24pin 136col. 240/80 CPS	£390
● **KX-P1592** 9pin 136col. 216/45 CPS	£275
● **KX-P1595** 9pin 136col. 288/61 CPS	£345
● **KX-P1624** 24pin 132col. 192/63 CPS	£318
● **KX-P1695** 9pin 132col. 330/86 CPS	£320

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-P1124 (P36)	£85	KX-P1180 (P37)	£79

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

Serial Interfaces

P17	P1081/1592	£32	**P19**	P1124/1180	£55

Integrex Colour Jet

● Colour Jet 132 Printer	£515
● Paper Roll	£6.50
● Screen Dump Software	£10
● Colour Cartridge	£19.50
● Colour Textile Cartridge	£29
● Black Cartridge	£11.25
● Black Textile Cartridge	£17
● 100 A4 OHP transparencies	£55
● 8K Serial Interface Optional	£123

Citizen Printer

120D Plus	£105	Swift 9	£198
Prodot 9	£275	Prodot 24	£275
Swift 24	£238		
Swift 24 Colour Option			£34
Swift 24 Ribbons	Black **£4**		Colour £13

Canon Printer

Canon Bubblejet BJ 130E	£435
Canon Bubblejet 10E	£269

Hewlett-Packard Printers

● Desk Jet 500	£379	● Quiet Jet Plus	£415
● Desk Writer	£620	● Scan Jet Plus	£1199
● Desk Jet Cartridge	£15	● HP Think Jet	£250
● Paint Jet Colour	£676		

Star Printers

● **LC10** 9pin 80col. 144/36 CPS	£119
● **LC10** Colour 9pin 80col. 144/36 CPS	£158
● **LC10-II** 9pin 80col. 180/45 CPS	£145
● **LC15** 9pin 136col. 180/45 CPS	£250
● **LC24-10** 24pin 80col. 180/60 CPS	£185
● **LC24-15** 24pin 136col. 200/67 CPS	£315
● **XB24-10** 24pin 80col. 240/80 CPS	£379
● **XB24-15** 24pin 80col. 240/80 CPS	£489
● **XB-24** Colour Kit	£35
● **LC-200** Colour 9pin 80col. 180/45 CPS	£185
● **LC-24-200** 24pin 80col. 222/67 CPS	£229
● **LC24-200** Colour 24pin 80col. 222/67 CPS	£265

Star Accessories

Cut Sheet Feeder

LC10/LC24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139
LC24-200	£63		

Serial Interfaces

SPC-10	LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200	£49
8K Ser	LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15	£64

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour	£29

Buffers

32K Ram Card for LC24-10; 15 & 200	£55
32K Ram Card for XB24-10 & 15	£55

Ribbons

LC10; LC10-II; LC15	Black **£4**;	Colour £6
LC-200; LC24-200	Black **£5**;	Colour £12
XB24-10; XB24-15	Black **£5**;	Colour £12

Laser Printers

● Canon LBP-4	4ppm	£735
● Canon LBP-8 III	8ppm	£1279
● Epson EPL7100	6ppm	£779
● HP Laserjet IIP**	4ppm	£725
● HP Laserjet III	8ppm	£1199
● HP Laserjet IIID	8ppm	£1875
● Panasonic KX-P4420	8ppm	£785
● Panasonic KX-P4450i	11ppm	£1105
● Panasonic KX-4455 Postscript	11ppm	£1799
● Qume Crystal Print WP+		£749
● Qume Crystal Print Ser. 2		£1065
● Qume Crystal Print Publisher 2		£1899
● Star LP-8 II		£1099
● Star LP-8 Star(post)script		£1575

** Lower Paper Cassette Tray & Premier Collection Software, **FREE** with every HP Laserjet IIP printer purchased from us. Offer subject to availability.

Laser Toners

Canon 2 & 4	£60	Laserjet II & IIP	£60
Epson GQ	£18	Laserjet III	£75
Star LP-8	£59	Qume Crystal	£63
KX-P4420/50	£25		

Laser RAM Upgrades

HP Laserjet II RAM		GQ5000 512k	£99
Jetware II 1MB	£175	KX-P4420	1M £249
Jetware II 2MB	£330	KX-P4450i	1M £299
Jetware IIP 1MB	£199	KX-P4450i	2M £575
Jetware IIP 2MB	£319		

Laser Drum & Developer

● Epson Drum	£129
● Panasonic 4450 Drum	£119
● Panasonic Developer	£90
● Qume Drum	£76

Epson Printers

EX800	**£410**	LQ1050	**£540**
EX1000	**£540**	LQ1060	**£619**
FX850	**£295**	LQ2550+	**£729**
FX1050	**£370**	LX400	**£120**
FX1060	**£599**	LX850	**£179**
LQ400	**£179**	SQ850	**£515**
LQ550	**£246**	SQ2550	**£779**
LQ850	**£439**	TLQ4800	**£1449**
LQ860 Colour	**£499**		

Cut Sheet Feeders for

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	**£65**
● Multifont Card for LQ550/850/1050	**£95**

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	**£32**	RS232 + 2K Buffer	**£52**
IEEE 488	**£40**	RS232 + 8K Buffer	**£79**

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£6
IBM/Archimedes Parallel Lead 5 metres	£13
IBM/Archimedes Parallel Lead 10 metres	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	**P.O.A.**
IBM Keyboard extension lead coiled	£5

Important Notice to All our Customers

Watford Electronics only supplies printers fitted with British Specification 240V AC Mains 3 core cable with connections for Live, Neutral and Earth. We do not sell, nor intend to supply grey imports from Europe or Hong Kong with incorrect 220V European mains connections (2 core cable!) which could be dangerous to the end user.

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 compatiblity 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)

Universal Printer Sharers/Changer

Connect up to 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.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£16	£17	£3
3 to 1	£22	£24	£3
5 to 1	£36	£32	£4

(Cables extra at £6 each. Please specify type required when ordering)

2 Way Compact Printer Switch

A handy 2 way compact printer switch. Enables one micro to be connected to 2 printers or vice versa.
Centronics **£18;** Serial **£17**
(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£36	£39
4 to 1	£59	£55
8 to 1	–	£85

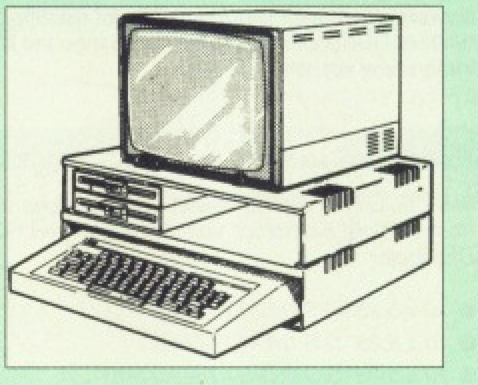
256K Multi Spooler (Auto Printer Sharers – Centronics)

● 2 In/1 out	**£135**	● 4 In/2 out	**£169**
● 8 In/1 out	**£199**		

Compact Converter Units

Serial to Parallel	**£36**	Parallel to Serial	**£37**

Plinths for BBC Micro, Master & Printer



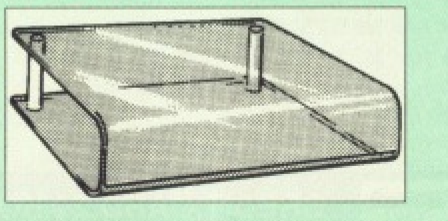
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & 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.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Printer Plinth	420 x 310 x 105mm	**£12**
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)

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Listing Paper (Perforated)

● 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
● 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	£9
● 1,000 Sheets true A4 Fanfold Paper 70gms	£11
● 2,000 Sheets true A4 Fanfold Paper 70gms	£21
● Teleprinter Roll (Econo paper)	£4

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

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

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	**£6.00**
1,000 90 x 36mm (Twin Row)	**£6.25**
1,000 90 x 49mm (Twin Row)	**£7.50**
1,000 102 x 36mm (Twin Row)	**£6.75**

Carriage on 1,000 Labels £1.00

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

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£6.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.50	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	£2.75	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£9	

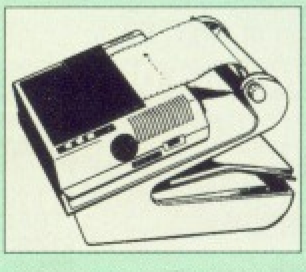
Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£8
P115 for KX-P1180	£8
P145 for KX-P1124	£8
P140 for KX-P1540	£10
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	**£9.95 each**

Professional Printer Stand

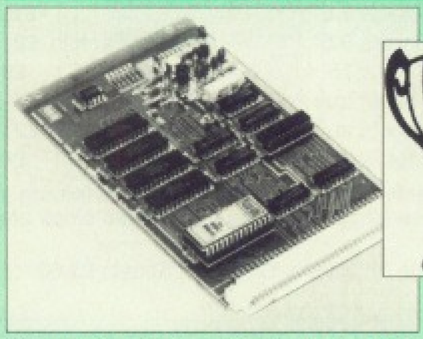


The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and refold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergon-omic design ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £3)
132 Column version £28 (carr. £4)

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser



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. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

Archi Graphic Tablet

The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic).

(FREE this month, PC Mouse Drivers & Art package)

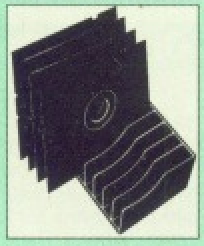
(Now, fully LinCAD compatible. Recommended by Linear Graphic).

(FREE this month, PC Mouse Drivers & Art package)

Special Price £225

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£29**

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.
- 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	£30.00

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford 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)*	*£5*
● *10 x 5.25" S/S D/D 80 Track (746)*	*£7*
● *10 x 5.25" D/S D/D 80 Track (747)*	*£7*
● *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	*£11*
● *10 x 3.25" S/S D/D 40/80 Track*	*£7*
● *10 x 3.25" D/S D/D 40/80 Track*	*£8*
● *10 x 3.5" Double Sided High Density*	*£15*

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*	*£7*
● *10 x* ***M9*** *3.5" D/S High Density*	*£14*
● *10 x* ***M4*** *5.25" S/S D/D 40 Track*	*£5*
● *10 x* ***M5*** *5.25" D/S D/D 40 Track*	*£5*
● *10 x* ***M7*** *5.25" D/S D/D 80 Track*	*£7*
● *10 x* ***M8*** *5.25" D/S H/D Hi-Density*	*£11*
● ***M2*** *3" Double Sided*	***£2.50*** *each*

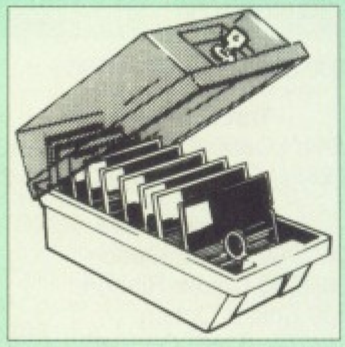
CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

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.

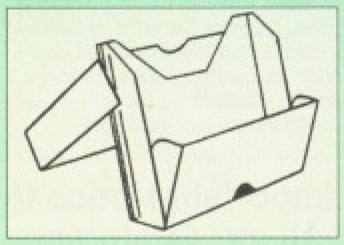
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.

Dividers and adhesive title strips are supplied for efficient filing of discs.

● **M35** – holds up to 50 5.25" discs	£4.95
● **M85** – holds up to 95 5.25" discs	£6.95
● **M25*** – holds up to 25 3.5" discs	£4.95
● **M50** – holds 50 3.5" discs	£6.50
● **M10** – holds 8 of No. 10 Data Cartridges	£15

* Not lockable

Plastic Library Cases



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)	£3.90

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 Discs

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

PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves 5.25"	£30	£35	£40
● With Sleeves 5.25"	£33	£38	£43
● 3.5" D/S D/D	£22 for 50	£40 for 100	

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Only £2.00

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£3.25
£3.85
£3.90

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£4

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f 100
D-S 80T
£40
£43
for 100

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below. The tinting of the boxes indicates 40/80 track switchable disc drives. For ease of use, the switches are mounted on the front panel.

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.

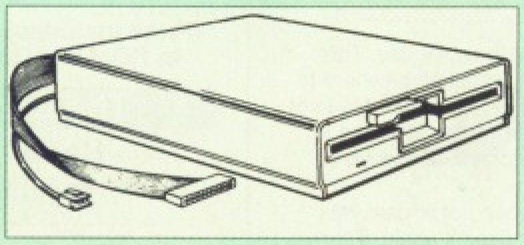
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides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

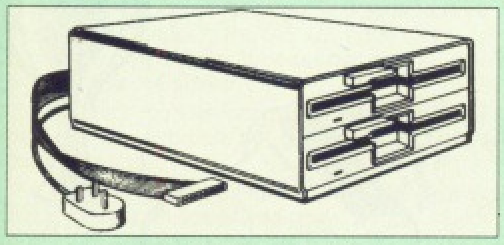
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives 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.***

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"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS 400S £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**				

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

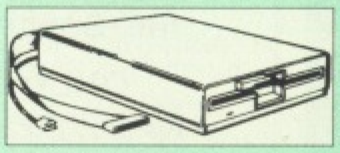
Suffix ***S** = 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.

Refurbished Disc Drives now available
CLS400 £50; CLD800 £98; CS400 £59; CD800

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

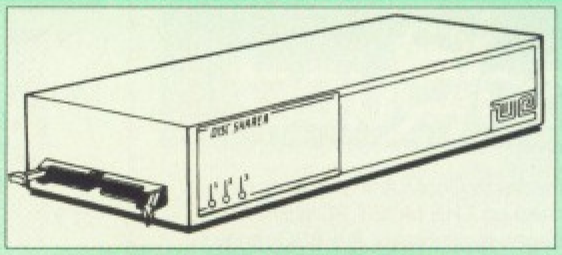
- **CLS35 400K Unit £65**
- **CLD35 Twin 800K £119**

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).

DISC DRIVE SHARER

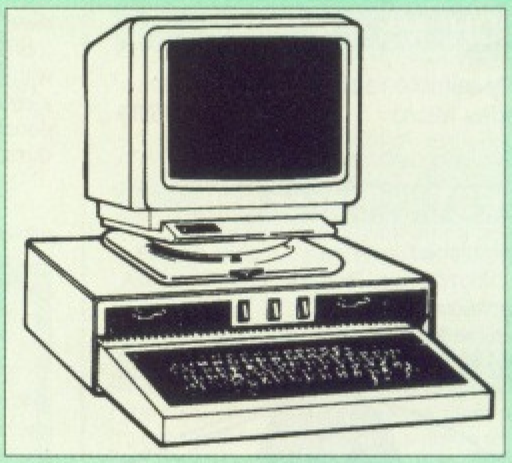


(Ideal for educational establishments)

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.)

Price includes 3 Cables Offer Price : **£55**

CDPM 800S DP35-800S



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

CDPM 800S for the BBC B & Master £165

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" 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 Series.

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

The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £154

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →

QUEST MOUSE Mk II

- Quest Mouse II & Quest Paint £58
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont £89
- 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)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

ConQuest

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.

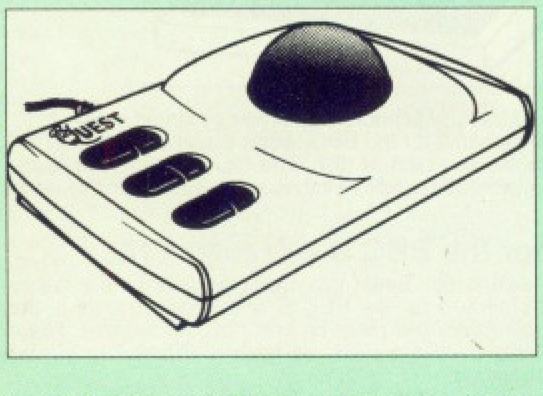
ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

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**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

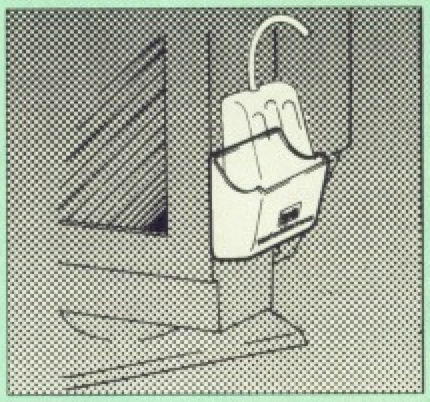
Inc. Super Art package

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

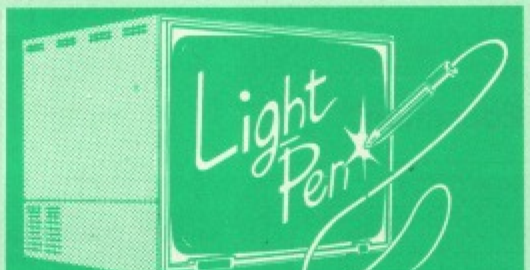
WE Mouse House



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	£39
Admin Xtra 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, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.

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.

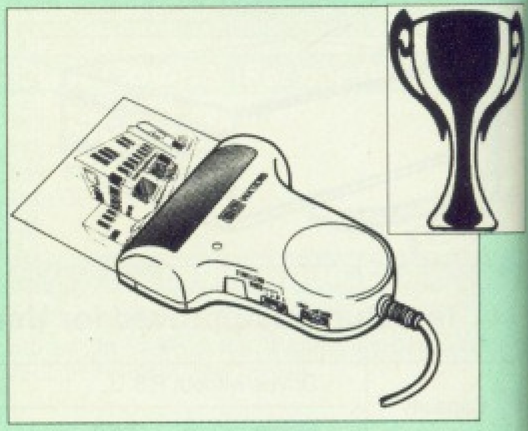
£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

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 £135

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 incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, 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.

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 individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack	**£69**
Wapping Editor plus Mouse	**£89**

(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

Wapping Font Disc 1

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.

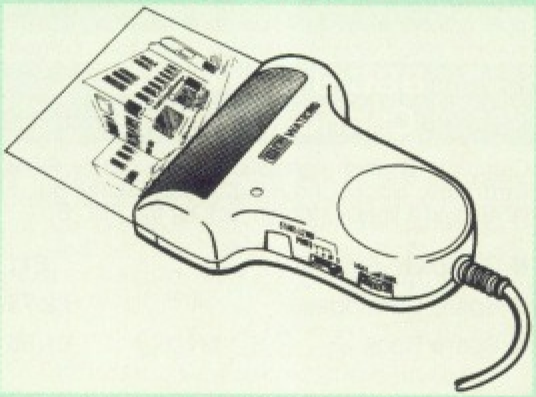
£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts.
On 80 track disc only

£13

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 system. 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**

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

Laser Direct

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: £849

High Res Laser Direct Card	**£245**

(For demonstration, call in at our retail shop)

ArcLaser

ArcLaser uses the considerable power of the Archimedes to control the Laser printer directly via a very high speed interface software. This gives speed and economy. The Scaleable fonts facility enables every font to be scaled to any size at 400 dpi, and in portrait or landscape mode. Full Page Graphics produced in 20 to 60 seconds at 300 dpi typically.

Introductory Offer: £799

(Price includes, Laser Engine, Card, Software & Operating manual)

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

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

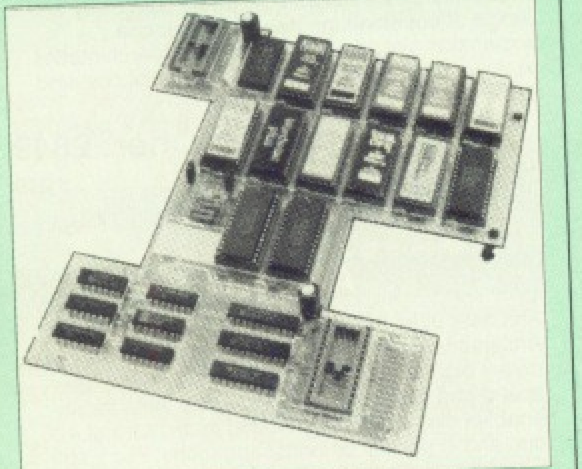
(Please write in for technical literature)

Continued→ → → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has 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, 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 instructions.

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.

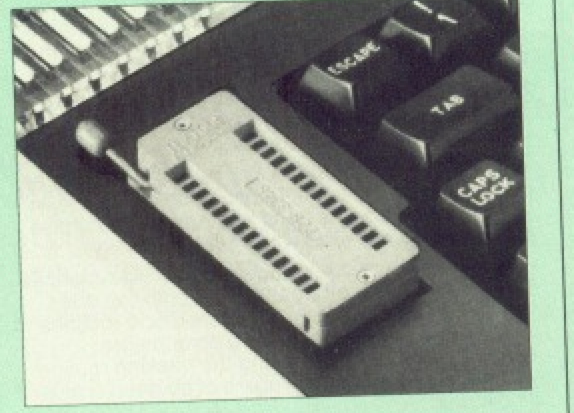
Only: £8

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 & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

BBC B 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**

ROM Cartridges for the BBC Master

Will accept the new larger PIggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9**; Quad **£14**

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 collector.
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 £3

ARIES CORNER

B-32 Shadow RAM Card

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

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, 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.

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: **£69** (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

Price:	Aries B-12	£36
	Aries B-12C	£5

Aries B-488 IEEE-488 Interface Unit

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

£238 (Carr £3)

Voltmace Joysticks

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24

Delta Base B

Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 £25

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Card

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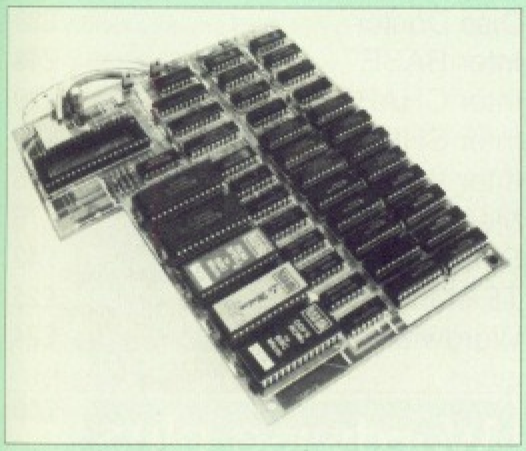
ROM/RAM Card



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 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 Board.

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

INTRODUCTORY 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 RAM	£109

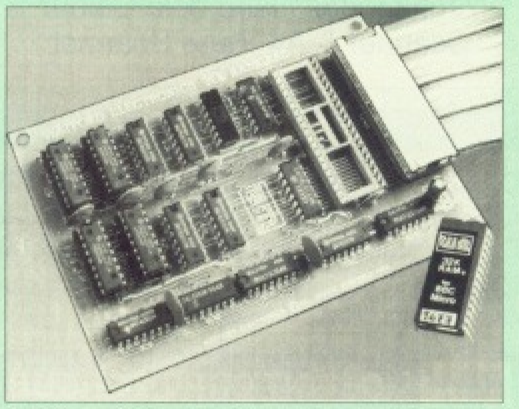
(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

16k plug-in Static RAM kit	£9
16k Dynamic RAM for Upgrade	£13
Battery backup	£3
Read and Write protect switches	£2 each
Complete ROM-RAM board All options installed	£115

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

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, 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.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)
(Price includes a comprehensive manual and the ROM)

BBC SOFTWARE'S Popular Educational Software

Maths with a Story 1 (Disc). 4 primary level maths programs	£11.25
Maths with a Story 2 (Disc). 4 further maths programs.	£11.25
Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs.	£17.00
ECOLOGY O-Level program.	£20.00
POLYMERS O-Level program.	£20.00
Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20.00
DEUTSCH DIREKT! (Disc & Audio Cassette)	£19.95
ADVANCED TELETEXT SYSTEM	£8.65
PERIOD TABLE SOFTWARE	£20.00
Astronomy – Primary (Disc)	£12.00
Computers at Work – Primary	£17.35
Introducing Geography 11-17 years	£17.50
Electric Fields 6-14 years	£11.25
Black Queen Contract Bridge	£13.00
Espana Viva – 3 Discs	£19.95
WHITE KNIGHT Chess game	£16.00
Inside Science	£22.00
A Vous La France	£29.00

More Educational Software

FUN SCHOOL 2 – Red: Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic.	**£12.00**
FUN SCHOOL 2 – Green: 6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump	**£12.25**
FUN SCHOOL 2 – Blue: Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape.	**£12.50**
FUN SCHOOL 3 – Red	**£19.95**
FUN SCHOOL 3 – Green	**£19.95**
FUN SCHOOL 3 – Blue	**£19.95**
Six French Games – Aimed at pupils in their first year of French, but also useful as revision for more advanced students 11 years+	£26
More French Games – Another 6 games 12 years+	£26
Au Restaurant and Accident de Route 12 years+	£26
Boulogne and Oh-Les – 2 programs for beginners	£26
Letters to French Penpals – 11 years+	£26
French Programs with Henri Beret – The programs in this series present vocabulary, grammar and role-play phrases in the form of animated games. 11-16	£22
Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+	£22
More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+	£22
The Cloze Program – Using context clues to predict is much more than a gap filling exercise. All ages	£26
An Introduction to Electronics – Brings together all the basic electronics required for a GCSE Physics or CDT course. 14-16 years	£26
Computer Control – This is a package of 3 programs simulating control of a greenhouse, a robotic arm & a chemical plant. 14-16 years	£26
The Nuclear Reactor – An interactive, menu driven program for GCSE pupils. Demonstrates & explains nuclear fission & the chain reaction. 14-16 years	£22
PUNCMAN Learning punctuation Puncman 1 & 2 for 7 – 13 years	£15
Puncman 3 & 4 for 8 – 14 years	£15
Puncman 5 & 6 for 8 – 15 years	£15
Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+	£18
Letters & Pictures – Introduces phonic skills to Infants 6-8 years	£15
Numbers & Pictures – Early number learning is a great fun (4-6 years)	£15
Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults)	£15
Maps & landscapes No. 1 (9-14 years)	£18
Help Your Child learn Basic Map work No. 2 (9-14 years)	£18
Pirate – Educational Adventure (8-14 years)	£15
Spelling Week by Week (6-14 years)	£18

Archimedes Software

BUMPER DISC	£14
Bumper Disc 2	£14
Bookbinder	£43
Craftshop 2	£29
DigiSim	£35
Jigsaw	£28
Craftshop 1	£28
Desktop Stories	£27
Droom	£17
Numerator	£60
Gate Array Teaching System	£68
Fun School 2A Red (up to 6 years)	£14
Fun School 2A Green (6-8 years)	£14
Fun School 2A Blue	£14

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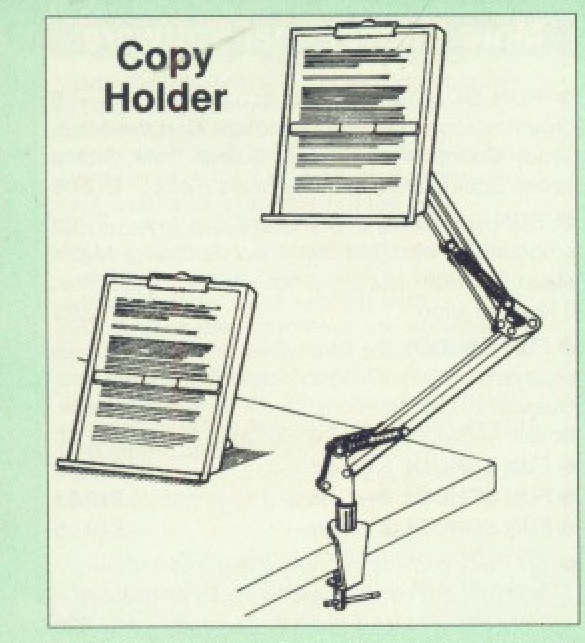
Copy Holder



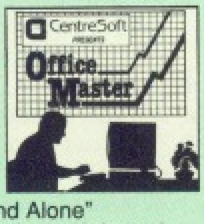
Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

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)

OFFICE MASTER



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

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

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

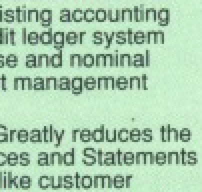
EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

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

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

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

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

SPREADSHEET – Offers many calculation and editing features

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Archimedes Hand held Colour Scanner & A4 Page Scanner

MINI OFFICE II

DISC Version for BBC B & B+	**£14.00**
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(When ordering please specify for which Micro & 40 or 80 track Disc)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
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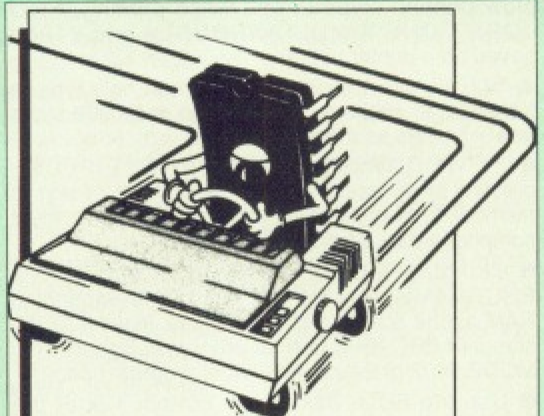
VIEW PRINTER DRIVER ROM



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, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

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

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, 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 tips.

Price: Only £33

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Communicator	£49
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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-Aid

The most comprehensive utilities ROM for Wordwise-Plus

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

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

Only £24

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

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View 3.0 ROM	£45
View Professional	£50
Viewsheet (Acornsoft)	£36
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Viewspell with 80 track disc	£25
Viewplot Disc (Please specify for Master 128 or Compact)	£20
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Watford's own Sophisticated View Printer Drivers

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8

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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.

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

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Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

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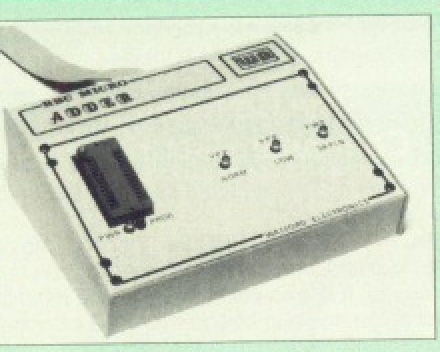
ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

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

£65 (£5 Carr)

TEX EPROM ERASERS

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

- **ERASER EB** – Standard version erases up to 16 chips. **£32**(carr £3)
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Watch this space for our forthcoming new products for the Archimedes Micro

Servisol Foam Cleaner

This king size multipurpose foam cleaner spray is ideal for cleaning Keyboard, Monitor, Disc Drive & Computer furniture surfaces.

£2.50

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Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

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BBC Refurbished Keyboard	**£46**	Speaker	**£3**
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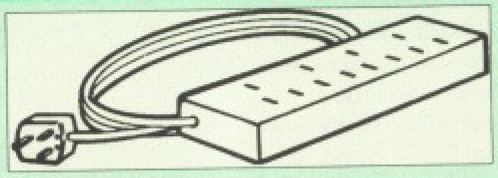
Replacement Flexible 17 way Keyboard Connector			**£4**

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage transient spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



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

£9.50

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

£13.50

ROM Extraction Tool

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

Metal Chip Extractor **£3**

28pin DIL Header Plug

SOLDER type **£1.50** IDC CRIMP type **£1.95**

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Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

Only **£1.00**

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28 pin ZIF SOCKET (Textool) **£6.95**

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(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
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Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00**; Dual **£3.75**

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Single **£4** Twin **£6**

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Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

£14

Watford POWER DUCK **£8**

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Assorted ROMS

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Numerator – BBC	£39
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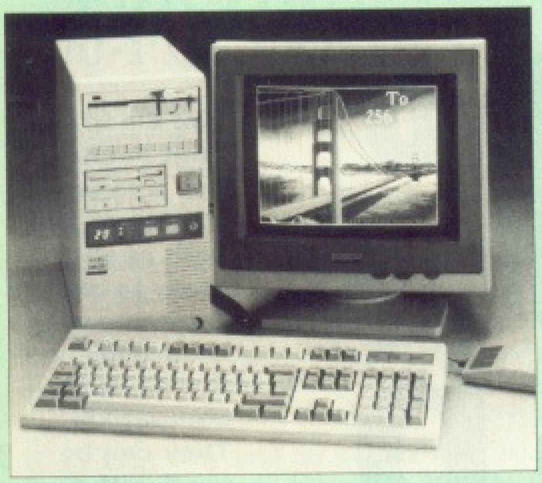
ARIES PC 386-SX



The Aries PC 386-SX combines many of the powerful features of the 386 system with the frugality of a price tag more at home on a 286 system. With 8/16MHz CPU, this system provides virtually full 386 performance, including the more convenient scheme of memory control that allows easy configuration of expansion RAM as EMS for DOS application.

Features:

- 80386-SX CPU with optional 80287/80387 Maths Co-Processor
- 8/16 MHz selectable speed
- Legal Bios with built-in Setup routine
- OS/2 and XENIX compatible

Specifications:

- 1MB RAM on-Board expandable to 16Meg
- 1 x 5.25" – 1.2Meg Drive fitted
- 1 x 3.5" – 1.44Meg Drive fitted
- 40Meg 28mS Hard Disc Drive fitted (1:1 interlaced)
- HDD/FDD Controller Card
- 102 Key Keyboard
- Case with Keylock
- Eight expansion slots
- Two Serial and One Parallel Ports
- Logitech mouse
- 12 months On-Site maintenance
- £300 worth of Software, (MS DOS 3.30, GW BASIC 3.21, Digital Research's GEM, Finesse 1.1 DTP pack, Multiwriter Wordprocessor & Spellchecker, PC Organiser), FREE with every micro.

New Low prices:

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AUTHORS: I wish to thank Hugo Fiennes, David Pilling, Emmet Spier, Nigel Gent, R.K. Lloyd, B. Summers, Steve Evans, Dave Tomlinson and everyone else, especially Gary (GARF) Forrest for all their help.

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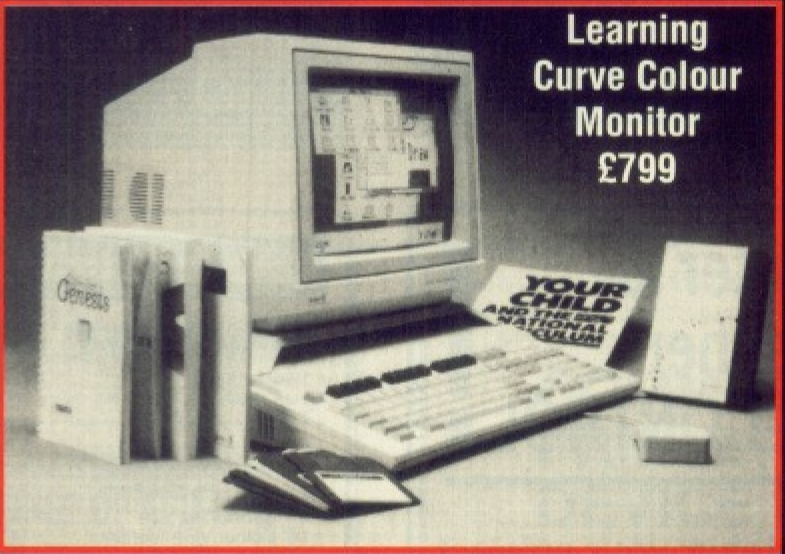

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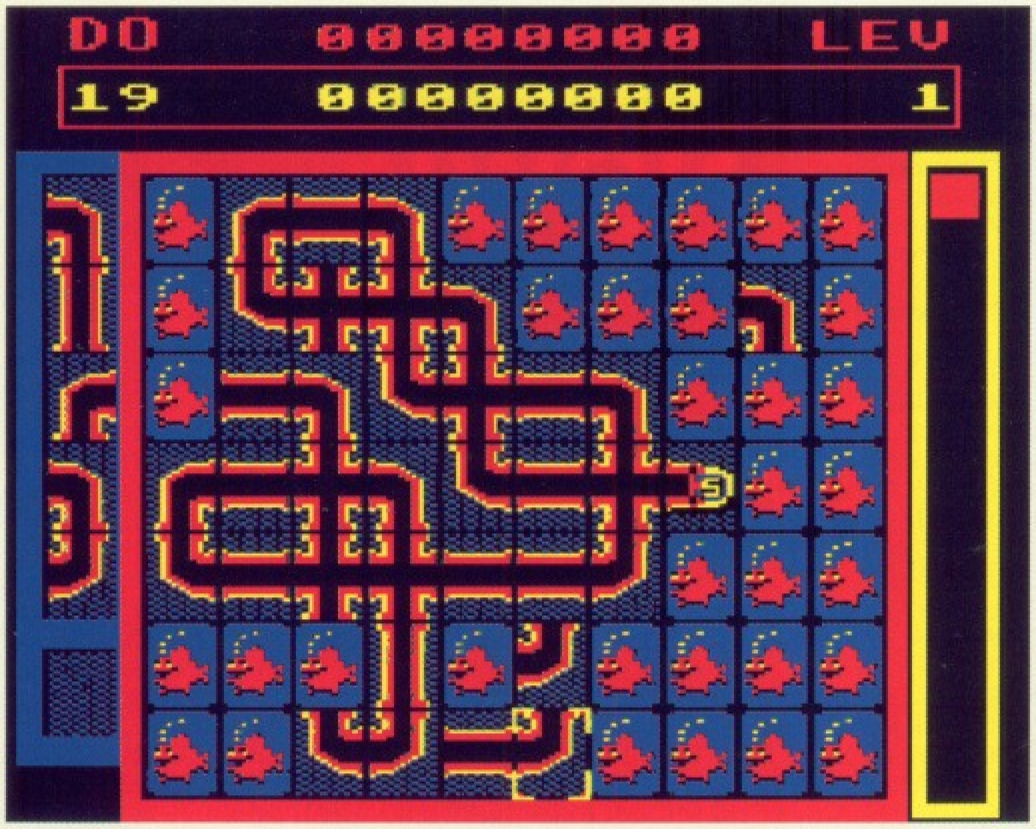


Delving the depths of tube mania, Mike Goldberg and his cat present a game with a large bore – but by no means boring

Plumb loonacy!

JUST like any self-respecting plumber, it looks like you're going to be too late to get those leaking pipes fixed before the main valve loses control. And each house you visit has a worse problem than the one before – more pipes to fix and less time to do it in.

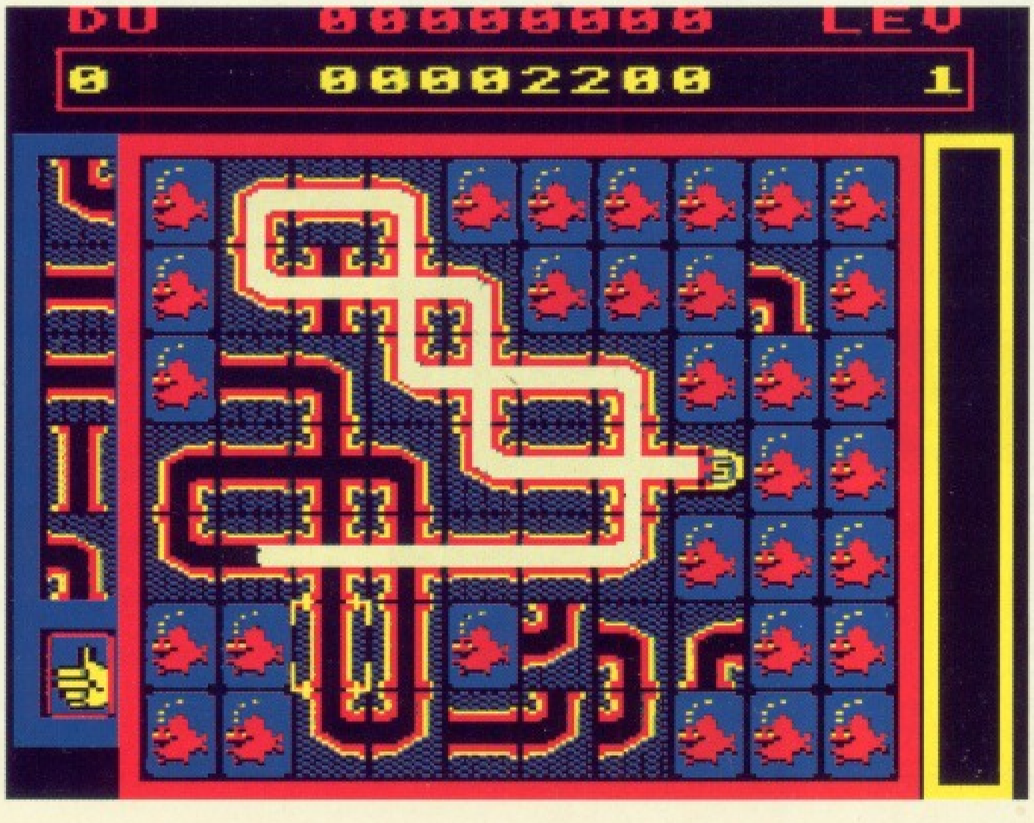
Can you finish connecting enough pipe before the inevitable surge of water courses through the plumbing and soaks everybody and everything? And can you do it before tea break?

This superb version of the popular game comes to you courtesy of no less than five listings. The first three create the machine code and data files so you'll need to type in and run them first. Use the checksums to ensure you've made no typing errors.

Finally enter Listing IV – Pipe – check it and save it, then do the same with Listing V, Loon. Now just CHAIN"Pipe" for loads of dripping fun.

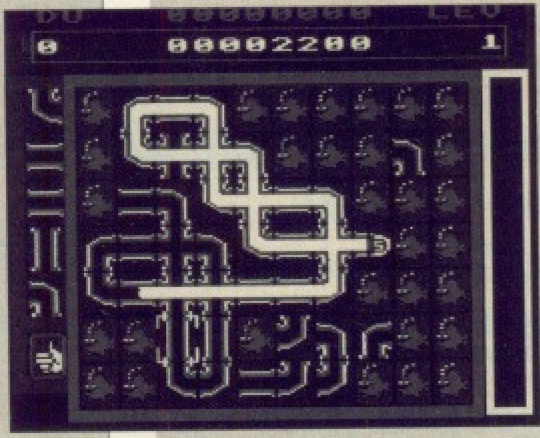
Oh yes, use the Z, X, / and : keys to move the cursor and Return to place a piece. You can lay one pipe over another, but it takes longer to position.

Keep your feet dry!



Listing I

```
 10 REM Pipe Loonacy - Code Generator
 20 REM by Mike Goldberg
 30 REM (c) The Micro User
 40 HIMEM=&5650:code=HIMEM
 50 DIM B%256
 60 FOR L%=0 TO 2 STEP 2
 70 P%=code
 80 [OPT L%
 90  JMP drawCursor
100  JMP drawGrid
110  JMP drawDraw
120 \
130 .drawCursor
140  LDA #4:STA &72
150  LDY #0
160 .loop1
170  LDX #32
180 .draw1
190  LDA (&70),Y:STA &80
200  LDA (&73),Y:EOR &80
210  STA (&70),Y
220  INY:DEX:BNE draw1
230 \
240  CLC
250  LDA &70:ADC #&20:STA &70
260  LDA &71:ADC #1:STA &71
270  DEC &72:BNE loop1:RTS
280 \
290 .drawGrid
300  LDA #10:STA &81
310  LDA #&A8:STA &74
320  LDA #&5F:STA &75
330 .init
340  LDA #7:STA &80
350 .again
360  LDA #3:STA &70
370  LDA &82:STA &77
380  LDA &83:STA &78
390 .loop2
```



➤

```
  400  LDY #0:LDX #24
  410 .draw2
  420  LDA(&77),Y:STA(&74),Y
  430  INY:DEX:BNE draw2
  440 \
  450  CLC
  460  LDA &74:ADC #&40:STA &74
  470  LDA &75:ADC #1:STA &75
  480  CLC
  490  LDA &77:ADC #24:STA &77
  500  LDA &78:ADC #0:STA &78
  510  DEC &70:BNE loop2
  520  DEC &80:BNE again
  530  SEC
  540  LDA &74:SBC #&28:STA &74
  550  LDA &75:SBC #&1A:STA &75
  560  DEC &81:BNE init:RTS
  570 \
  580 .drawDraw
  590  LDY #0
  600 .loop3
  610  LDX #24
  620 .draw3
  630  LDA (&73),Y:STA (&70),Y
  640  INY:DEX:BNE draw3
  650  CLC
  660  LDA &70:ADC #&28:STA &70
  670  LDA &71:ADC #1:STA &71
  680  DEC &72:BNE loop3:RTS
  690 ]:NEXT
  700 $B%="SAVE PLcode "+STR$~code+" "+S
TR$~P%
  710 X%=B%MOD256:Y%=B%DIV256:CALL&FFF7
  720 END
```

Get it right ✓

```
 10 =    0 0 | 250 = 3F16 A | 490 = B1A2 6
 20 =    0 0 | 260 = 12BB 4 | 500 = D110 5
 30 =    0 0 | 270 = 19E5 6 | 510 = 28F1 D
 40 = 2B89 9 | 280 =    0 6 | 520 = A638 3
 50 = 9F3E 5 | 290 = C67F 9 | 530 = 8D00 3
 60 = AAB9 7 | 300 = 5474 3 | 540 = 13C2 5
 70 = 3FB3 8 | 310 = E025 3 | 550 = 2B1A E
 80 = 1EF3 6 | 320 = 5A1C 8 | 560 = C29C 4
 90 = 4A4D 0 | 330 = 6272 C | 570 =    0 4
100 = FCD3 7 | 340 = 4AD6 8 | 580 = F658 0
110 = CCF4 6 | 350 = 9E58 0 | 590 = 9CF1 0
120 =    0 6 | 360 = C607 A | 600 = 1353 3
130 = D475 8 | 370 = 4EEB 3 | 610 =  9D1 8
140 = 57EE 3 | 380 = 5427 6 | 620 = B1C9 9
150 = 9CF1 B | 390 =  372 7 | 630 = 4989 D
160 = 3311 B | 400 = 980A 1 | 640 = 7BB5 5
170 = 5A26 F | 410 = A1E8 D | 650 = 74FB 9
180 = 918B C | 420 = 34F2 C | 660 = 16E9 9
190 = E989 D | 430 = 6B94 A | 670 = 12BB C
200 = 9860 9 | 440 =    0 A | 680 = 5D66 C
210 = 7F58 2 | 450 = 74FB 1 | 690 = DA42 C
220 = 5BF7 B | 460 = FC8A E | 700 = C725 8
230 =    0 B | 470 = D2ED 5 | 710 = 50F9 0
240 = 74FB E | 480 = 74FB 1 | 720 = FD2E 7
```

Listing II

```
   10 REM Pipe Loonacy - Ikon Generator
   20 REM by Mike Goldberg
   30 REM (c) The Micro User
   40 HIMEM=&4E28:P%=HIMEM
   50 REPEAT READ a$
   60 IFa$>"!"!P%=EVAL("&"+a$):P%=P%+4
   70 UNTIL a$="!"
   80 PROCo("SAVE Ikons "+STR$~HIMEM+" "
+STR$~P%)
   90 END
  100 DEFPROCo($&700):LOCALX%,Y%
  110 Y%=7:CALL&FFF7:ENDPROC
  120 DATA34340300,35353434,F0F00F00
  130 DATAF2FBFDFC,E1E10E00,EDEDE9E1
  140 DATA34343434,34343434,F0FA7F2
  150 DATAA050A05,6969E5ED,69616961
  160 DATA34343434,3343434,82850A05
  170 DATAFF0F0D2,E1E16961,EE1E1E1
  180 DATA37370300,37373737,FFFF0F00
  190 DATADCDCDCEE,EFEF0E00,676767EF
  200 DATA14263737,14142614,E010DCDC
  210 DATAF0F000E0,E1C1A367,6161E1E1
  220 DATA37262626,3373737,10E0E000
  230 DATAFFF8860,E1E1E1A1,EEF23C1
  240 DATA77773300,77767777,FDFFFF00
  250 DATADFFFFFF7,FFFFEE00,FFFFFFFF
  260 DATA45677776,66444765,70F8F8F
  270 DATAF070B87,7FFFFFFF,1F3F1F5F
  280 DATA67664547,33777766,10F0F0F
  290 DATAFFFFFFEE,FFFF551B,EEFFFFFF
  300 DATA76773300,77777676,F3F3FF00
  310 DATAC7E7EEFF,FFFFEE00,FF111199
  320 DATA77767576,75647677,CFCFCFCF
  330 DATAED21C3CF,FFFFFFFF,FFFFFFFF
  340 DATA47474756,33776767,1F0E0FC3
  350 DATAFFFF3B1D,FFFFFFFF,EEFFFFFF
  360 DATA76773300,77777577,EFFFFF00
  370 DATAF1DB8ECF,7FFFEE00,FFFBBF37
  380 DATA76766677,76767676,8040F0F0
  390 DATAD0F0F0C0,1191F7FF,77F3F391
```

```
  400 DATA77777777,33777777,FCF8E0D0
  410 DATAFFFFFEFC,FFF777F7,EEFFF3F5
  420 DATA77773300,77777777,FFFFFF00
  430 DATADEEFEFFF,FFFFEE00,FBFDFDDF
  440 DATA77777777,77777777,FABCBDDE
  450 DATAFAF9FDF8,FBF7F7FB,F7F7F3FB
  460 DATA74746476,33767474,313131F2
  470 DATAFFF3B131,FFFFFFFF,EEFFFFFF
  480 DATA77773300,77777777,CFEFFF00
  490 DATAF8F8FCF,1F3FEE00,7FFFFF5F
  500 DATA37473747,67373747,F8F0F8F
  510 DATA70A878F,6F9F6F9F,376FE79F
  520 DATA47474767,33455746,7FFFAA8D
  530 DATAFFFF777F,1F9F9FBF,EE9D571B
  540 DATA77773300,77777777,C9CEFE00
  550 DATADBBDDBAC,B7FFEE00,FFFFFF33
  560 DATA47677777,47475757,CB2D5BBD
  570 DATAFEFFFFFD,7FFFFFFF,1B3F7F7F
  580 DATA56564756,33664547,F0F0F0F
  590 DATAFF0E0F0F,3B1D5F5F,EEFF777F
  600 DATA77773300,75733676,7EFFFF00
  610 DATAF5F5FDFD,DF7FEE00,F5E7FBFB
  620 DATA76753776,37757634,F0A0F0F8
  630 DATAD0A070F0,F3F5E7FB,E7F573E1
  640 DATA76377576,33775776,FDF5F5F8
  650 DATAFF7BFBFD,EBF6F5FB,EEFF7FFB
  660 DATA77773300,77777777,DFFFFF00
  670 DATACC8F0F4F,7FFFEE00,3F1F5F7F
  680 DATA77777674,77777476,80809088
  690 DATAE8E8C80,11333333,11111111
  700 DATA77777777,33777777,CCCCCF4F
  710 DATAFF008888,11111111,EE111111
  720 DATA47235500,55225523,FA85500
  730 DATA878F058A,1FAE5500,D5AA55AE
  740 DATA45235432,45234523,7880070F
  750 DATAAF8F0F0F,1DA6516A,9DAE1D2E
  760 DATA45234523,55225532,A55AFAF
  770 DATA55F8870F,1D269DAE,55AAD56A
  780 DATA55225500,7345122,55AA5500
  790 DATAFF055AA,55AA5500,FE154AA
  800 DATA15040407,7040415,FFCC440F
  810 DATAF44CCFF,DD11110F,F1111DD
  820 DATA55623407,55225522,55AAF00F
  830 DATA55AA55AA,55BAE10F,55AA55AA
  840 DATA55225500,7345122,55AA5500
  850 DATAFF055AA,55AA5500,FE154AA
  860 DATA55444407,7444455,FF11110F
  870 DATAF1111FF,CD89010F,F0189CD
  880 DATA55623407,55225522,55AAF00F
  890 DATA55AA55AA,55BAE10F,55AA55AA
  900 DATA54216500,54325432,5D087F00
  910 DATA2A5D082A,592C3D00,596A596A
  920 DATA54325432,54325432,2A7F5D08
  930 DATA7F7F5D08,596A596A,596A596A
  940 DATA54325432,65215432,5D08082A
  950 DATAF2F7F7F,596A596A,3D2C596A
  960 DATA54216500,54325432,7F2F0F00
  970 DATA8085D7F,592C3D00,596A596A
  980 DATA54325432,54325432,5D7F7F2A
  990 DATA5D7F2A08,596A596A,596A596A
 1000 DATA54325432,65215432,85D2A08
 1010 DATA7F085D2A,596A596A,3D2C596A
 1020 DATA45235500,24025712,A5A55500
 1030 DATAFF,95A65500,211357CA,6,2400000
0
 1040 DATA0,0,3,2100000,57200206,552345
12
```

Listing III

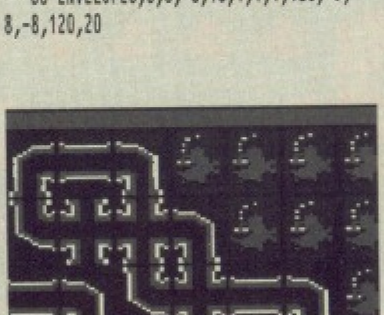
```
   10 REM Pipe Loonacy - Cursor Gen
   20 REM by Mike Goldberg
   30 REM (c) The Micro User
   40 HIMEM=&5700:P%=HIMEM
   50 REPEAT READ a$
   60 IFa$>"!"!P%=EVAL("&"+a$):P%=P%+4
   70 UNTIL a$="!"
   80 PROCo("SAVE Curmem "+STR$~HIMEM+"
"+STR$~P%)
   90 END
  100 DEFPROCo($&700):LOCALX%,Y%
  110 Y%=7:CALL&FFF7:ENDPROC
  120 DATA8080C0F0,808080,0,0,1070
  130 DATA0,80808080,808080,0,0,0,0
  140 DATA0,0,0,0,80808000,C0808080
  150 DATA0,0,0,10000000,80808000
  160 DATA80808080,F0,0,0,0,70,0,80
  170 DATA0,!
```

Get it right ✓

```
 10 =    0 0 | 100 = 95C1 F
 20 =    0 0 | 110 = 50E0 6
 30 =    0 0 | 120 = E93B 5
 40 = 3D0E E | 130 = 3EA8 1
 50 =  4A3 4 | 140 = 1AD4 F
 60 = C929 0 | 150 = D3F6 4
 70 = 222B F | 160 = 9352 C
 80 = E1B3 3 | 170 = 555C A
 90 = FD2E 6 |
```

Listing IV

```
   10 REM Pipe Loonacy - Pipe
   20 REM by Mike Goldberg
   30 REM (c) The Micro User
   40 ENVELOPE1,1,1,0,0,1,0,0,126,-1,-5,
-5,100,50:ENVELOPE2,1,-1,0,0,200,0,0,126
,-1,-1,-1,0,0
   50 ENVELOPE3,140,8,16,12,1,1,1,126,-1
,-4,-6,120,2
   60 ENVELOPE4,140,8,16,0,1,1,1,126,-1,
-4,-6,120,2
   70 ENVELOPE5,1,90,90,90,40,40,40,126,
-1,-3,-4,120,20
   80 ENVELOPE6,8,8,-8,16,1,1,1,126,-5,-
8,-8,120,20
```

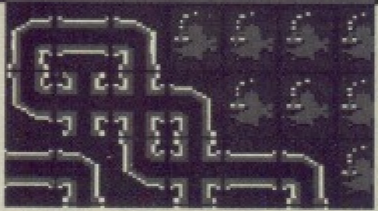


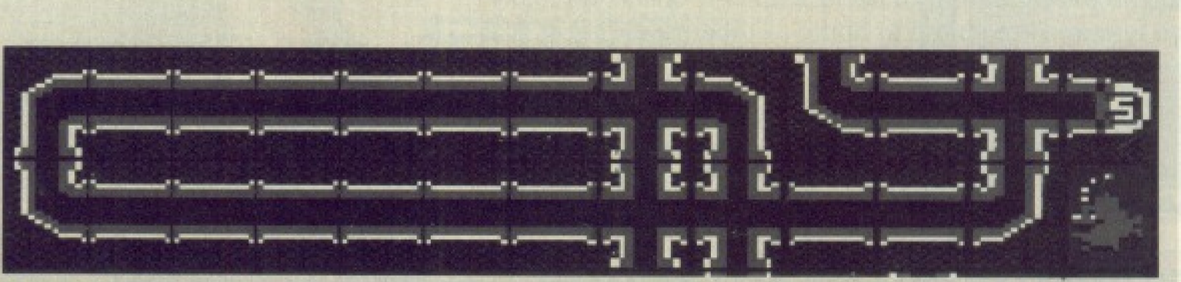
```
   90 ENVELOPE7,1,1,-1,4,1,1,1,200,-1,-1
,-1,120,100
  100 ENVELOPE8,132,-2,-1,2,1,6,1,126,-1
,-6,-8,120,20
  110 ENVELOPE9,1,4,4,2,1,1,1,126,-1,-1,
-1,126,126
  120 ENVELOPE10,5,0,1,0,0,200,5,12,-1,-
1,-2,120,100
  130 VDU23,224,224,224,224,224,224,224,
0,0,23,225,-1;-1;-1;-1;23,226,254,0,0,0,
0,0,0,0,23,227,128,128,128,128,128,128,1
28,128,23,228,128,128,128,128,128,128,12
8,0,23,229,64,64,224,224,64,64,0,0
  140 *LOAD PLCode 5650
  150 *LOAD CURMEM 5700
  160 *LOAD IKONS 4E28
  170 MODE5:VDU23;8202;0;0;0;19,3,4;0;
  180 PROClayout
  190 PAGE=&1100:CHAIN"LOON"
  200 DEFPROClayout
  210 GCOL0,1:MOVE56,944
  220 PLOT1,1160,0:PLOT1,0,-64:PLOT1,-11
60,0:PLOT1,0,64
  230 VDU24,1160;136;1264;852;
  240 GCOL0,130:CLG
  250 VDU24,1176;152;1248;836;
  260 GCOL0,128:CLG
  270 VDU24,136;132;1144;852;
  280 GCOL0,129:CLG
  290 VDU24,160;156;1120;828;
  300 GCOL0,128:CLG
  310 VDU24,0;192;128;852;
  320 GCOL0,131:CLG
```

```
1050 DATA0,55A5A5FF,57311303,55A695DB
1060 DATA45237600,24240612,8088000
1070 DATA88,1D2EF300,212103CA,24240606
1080 DATA24240606,0,0,21210303,21210303
1090 DATA6240606,76234512,0,80080888
1100 DATA3210303,F32E1DCA,54307400
1110 DATA54325432,8080800,8080808
1120 DATA59687900,596A596A,54325432
1130 DATA46215432,8080808,D828587
1140 DATA596A596A,1BA4D1E2,74307421
1150 DATA55327430,F8C8F882,F0F7F898
1160 DATAF9E8F9A4,D5E2F9E8,55225500
1170 DATA54225522,55AA5500,C2A955AA
1180 DATA55AA5500,FE154AA,72727130
1190 DATA71726272,3E3EFC2,CEE363C3
1200 DATAF,F000000,44001030,55225522
1210 DATAE1C2,55AA55AA,10E10F,55AA55AA
1220 DATA74325500,74307430,F8F7F000
1230 DATAF898F8C8,F9E2D500,F9E8F9E8
1240 DATA65026520,54325432,F0D82F7
1250 DATA8080808,3D0AB5A0,596A596A
1260 DATA54325432,74325432,8080808
1270 DATA8080808,596A596A,796A596A
1280 DATA55225500,7345122,55AA5500
1290 DATA1AA455AA,55AA5500,D1AA55AA
1300 DATA7,7000000,1636371A,1B362616
1310 DATA32F2FCE0,ECF272F2,403407
1320 DATA55225522,B41A,55AA55AA,1100C0E
0
1330 DATA55AA55AA,55225500,55225522
1340 DATA55AA5500,55AA55AA,55AA5500
1350 DATA55AA55AA,55225522,55225522
1360 DATA55AA55AA,55AA55AA,55AA55AA
1370 DATA55AA55AA,55225522,55225522
1380 DATA55AA55AA,55AA55AA,55AA55AA
1390 DATA55AA55AA,55225500,55225522
1400 DATA55AA5500,65BA55AA,55AA5500
1410 DATAFE154AA,54325522,54325432
1420 DATA80C86CB,8080808,F,7000000
1430 DATA54325432,65215432,8080808
1440 DATA8080808,597A690F,3D2C596A
1450 DATA55225500,7345122,55AA5500
1460 DATA2CE255AA,55AA5500,55AA55AA
1470 DATA7,7000000,1031E,0,596AD5AA
1480 DATA596A596A,54723407,65215432
1490 DATA8080808,8080808,596A596A
1500 DATA3D2C596A,54216500,7255032
1510 DATA8080800,8080808,592C3D00
1520 DATA596A596A,7,7000000,0,3D160301
1530 DATA596A596A,55AAD56A,55623407
1540 DATA55225522,55AAD56A,55AA55AA
1550 DATA55AA55AA,55AA55AA,54216500
1560 DATA54325432,8080800,8080808
1570 DATA592C3D00,F2D586A,54325432
1580 DATA55225532,8080808,65CB860C
1590 DATA7,F000000,55225522,55225522
1600 DATA55AA55BA,55AA55AA,55BAE10F
1610 DATA55AA55AA,54216500,54325432
1620 DATA8080800,8080808,592C3D00
1630 DATA596A596A,54325432,54325432
1640 DATA8080808,8080808,596A596A
1650 DATA596A596A,54325432,65215432
1660 DATA8080808,8080808,596A596A
1670 DATA3D2C596A,55225500,7345122
1680 DATA55AA5500,FF055AA,55AA5500
1690 DATAFE154AA,7,7000000,F,F000000
1700 DATAF,F000000,55623407,55225522
1710 DATA55AAF00F,55AA55AA,55BAE10F
1720 DATA55AA55AA,54216500,7345032
1730 DATA8080800,8080808,592C3D00
1740 DATAF69586A,7,7000000,8,8000000
1750 DATAF,F000000,54723407,65215432
1760 DATA8080808,8080808,597A690F
1770 DATA3D2C596A,!
```

Get it right ✓

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 8426 6
  50 =  4A3 3
  60 = C929 C
  70 = 222B 1
  80 = 9575 E
  90 = FD2E C
 100 = 95C1 2
 110 = 50E0 B
 120 = 5810 0
 130 = 557F 3
 140 = 3F53 E
 150 = F989 3
 160 = BFDE 0
 170 =  FC1 4
 180 = CE6D C
 190 = 69DE C
 200 = A828 9
 210 = B0C9 E
 220 = A190 0
 230 = C7E1 9
 240 = C771 4
 250 = DAA7 1
 260 = 2D95 D
 270 = F092 6
 280 = F865 1
 290 = DD14 3
 300 = 3660 A
 310 = BDC8 7
 320 = 3A34 7
 330 = 2A2D D
 340 = 17D7 5
 350 = 6A50 F
 360 = 57D8 9
 370 = 811D A
 380 = 543A B
 390 = 22AF D
 400 = F335 1
 410 = 7CE2 F
 420 = DCF3 5
 430 = 39DD A
 440 = DC83 D
 450 = 9CE1 B
 460 = 2614 0
 470 = EFB3 9
 480 = 5AAD A
 490 = 2E7B 2
 500 = 115A 4
 510 = 273D D
 520 = 4F4F D
 530 = AADB 2
 540 = 6E46 A
 550 = FCD6 6
 560 = 5E7F 6
 570 = 4492 5
 580 = D84D 6
 590 = 9D8D 8
 600 = 27FF 1
 610 = B6FA D
 620 = 7A1D C
 630 = F1DA 1
 640 = 45A4 F
 650 = D143 1
 660 = 5355 E
 670 = A074 2
 680 = 89D4 4
 690 = D2B3 6
 700 = 52CA 1
 710 = 6B88 4
 720 = 90A4 5
 730 = D9BF B
 740 = CFFF A
 750 = CFA5 7
 760 = 54B9 D
 770 = 706F 1
 780 = E3C4 D
 790 = 33FB 6
 800 = 593F 8
 810 = 9B3E B
 820 = 1061 F
 830 = 50AA 9
 840 = E3C4 5
 850 = 33FB 2
 860 = B34C 6
 870 = 8EC9 A
 880 = 1061 3
 890 = 50AA 5
 900 = 17AE E
 910 =  86D 4
 920 = B834 6
 930 = 25E5 E
 940 = 3E49 A
 950 = 5246 B
 960 = F0A8 1
 970 = C668 F
 980 =  C5F 0
 990 = 450A A
1000 = FF65 3
1010 = 7FD8 2
1020 = 78B5 9
1030 = D3BC 6
1040 = A5C7 9
1050 = 6313 7
1060 = 1AA6 3
1070 = ACAD 7
1080 = 66C7 7
1090 = 7CB5 7
1100 = 7FC6 2
1110 = 2340 4
1120 = 1C4E F
1130 = D67B 5
1140 = 4A61 6
1150 =  C14 9
1160 = 5221 7
1170 =  BE9 7
1180 = EBDF A
1190 = 87CB 2
1200 = 3CCB 0
1210 = C4D6 D
1220 = AFEF 2
1230 = BB7A 4
1240 = 610D C
1250 = 98EB B
1260 = 3324 4
1270 = ECBC D
1280 = E3C4 5
1290 = E15F 5
1300 = C65C 1
1310 = 2064 5
1320 = 92FD 5
1330 = FF29 4
1340 = 8F0F 3
1350 = 8110 8
1360 = A076 1
1370 = 8110 1
1380 = A076 B
1390 = FF29 F
1400 = 5D0C 4
1410 = 1E34 6
1420 = 3254 B
1430 = 8138 7
1440 = 43CF 0
1450 = E3C4 1
1460 = 2ABB 3
1470 = 1A16 D
1480 = AFCF 9
1490 = F061 C
1500 = CEB1 F
1510 = 3AFC 8
1520 = D1AE 4
1530 = 22E1 E
1540 = 1D2A 0
1550 = 40EF 6
1560 = 2340 3
1570 = 6EB0 B
1580 =  2D2 B
1590 = E459 8
1600 = E579 B
1610 = ECCB 5
1620 = 3AFC 8
1630 = DAFA 8
1640 = F061 6
1650 =  19C 2
1660 = F061 9
1670 = 4187 E
1680 = B9DE F
1690 = 121F 6
1700 = 47B6 A
1710 = B20C 5
1720 = 6F54 E
1730 = 3AFC D
1740 = 3E33 3
1750 = 63C8 9
1760 = F45C 1
1770 = E6C7 4
```





```
330 VDU28,0,20,1,6
340 COLOUR131:CLS
350 ENDPROC
```

Get it right ✓

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = E965 5
 50 = 9B06 1
 60 = 37EF C
 70 = D36D 6
 80 = 5842 A
 90 = 33BB 5
100 = 8085 5
110 = E7C2 B
120 = 5082 B
130 = B78B 8
140 = 7CF1 F
150 = 8AA5 E
160 = EAA0 2
170 = 2A3E 0
180 = 67EA 8
190 = 8A9B 0
200 =  76B B
210 = 806A B
220 = FCF9 F
230 = D1C9 6
240 = C3D2 5
250 = E09B 7
260 = 1CC7 F
270 = 5CCE 9
280 = 2BF7 3
290 = 35F5 E
300 = 1CC7 C
310 = 4EB5 2
320 = F4E2 3
330 = EDFE 4
340 = 2149 D
350 = EDOF 2
```

Listing V

```
   10 REM Pipe Loonacy - Loon
   20 REM by Mike Goldberg
   30 REM (c) The Micro User
   40 DIMvc%(3),bof%(3),box%(70),m%(12),
X%(12,26),Y%(12,26),osx%(3),osy%(3),W%(4
),num%(3),x%(3,20),y%(3,20),v%(3,20),w%(
3,20)
   50 bof%(0)=-10:bof%(1)=1:bof%(2)=10:b
of%(3)=-1:vc%(0)=134:vc%(1)=431:vc%(2)=3
65:vc%(3)=521
   60 FORJ%=1TO12
   70 READm%(J%)
   80 FORI%=1TOm%(J%)
   90 READX%(J%,I%)
  100 READY%(J%,I%)
  110 NEXT
  120 NEXT
  130 DATA24,0,4,0,4,0,4,0,4,0,4,0,4,0,4
,0,4,0,4,0,4,0,4,0,4,0,4,0,4,0,4,0,4,0,4
,0,4,0,4,0,4,0,4,0,4,0,4
  140 DATA18,0,4,0,4,0,4,0,4,0,4,0,4,0,4
,0,4,0,4,0,4,0,4,0,4,0,4,8,4,8,4,8,0,8,0
,8,0
  150 DATA18,0,4,0,4,0,4,0,4,0,4,0,4,0,4
,0,4,0,4,0,4,0,4,0,4,0,4,-8,4,-8,4,-8,0,
-8,0,-8,0
  160 DATA12,8,0,8,0,8,0,8,0,8,0,8,0,8,0
,8,0,8,0,8,0,8,0,8,0
  170 DATA13,8,0,8,0,8,0,8,0,8,4,8,4,8,4
,0,4,0,4,0,4,0,4,0,4,0,4
  180 DATA15,8,0,8,0,8,0,8,0,8,0,8,-4,8,
-4,0,-4,0,-4,0,-4,0,-4,0,-4,0,-4,0,-4,0,
-4
  190 DATA24,0,-4,0,-4,0,-4,0,-4,0,-4,0,
-4,0,-4,0,-4,0,-4,0,-4,0,-4,0,-4,0,-4,0,
-4,0,-4,0,-4,0,-4,0,-4,0,-4,0,-4,0,-4,0,
-4,0,-4,0,-4
  200 DATA17,0,-4,0,-4,0,-4,0,-4,0,-4,0,
-4,0,-4,0,-4,0,-4,0,-4,0,-4,0,-4,8,-4,8,
-4,8,0,8,0,8,0
  210 DATA17,0,-4,0,-4,0,-4,0,-4,0,-4,0,
-4,0,-4,0,-4,0,-4,0,-4,0,-4,0,-4,-8,-4,-
8,-4,-8,0,-8,0,-8,0
  220 DATA12,-8,0,-8,0,-8,0,-8,0,-8,0,-8
,0,-8,0,-8,0,-8,0,-8,0,-8,0,-8,0
  230 DATA13,-8,0,-8,0,-8,0,-8,0,-8,4,-8
,4,-8,4,0,4,0,4,0,4,0,4,0,4,0,4
  240 DATA15,-8,0,-8,0,-8,0,-8,0,-8,0,-8
,-4,-8,-4,0,-4,0,-4,0,-4,0,-4,0,-4,0,-4,
0,-4,0,-4
  250 FORI%=0TO3:READosx%(I%),osy%(I%):N
EXT
  260 DATA40,-52,56,-40,40,-48,40,-40
  270 FORJ%=0TO3
  280 READnum%(J%)
  290 FORI%=1TOnum%(J%)
  300 READx%(J%,I%),y%(J%,I%),v%(J%,I%),
w%(J%,I%)
  310 NEXT:NEXT
  320 DATA12,0,4,16,0,0,4,-16,0,0,4,16,0
,0,4,-16,0,0,4,16,0,0,4,-16,0,0,4,16,0,0
,4,-16,0,0,4,16,0,0,4,-16,0,0,4,16,0,0,4
,-16,0
  330 DATA5,8,0,0,-20,8,0,0,20,8,0,0,-20
,8,0,0,20,8,0,0,-20
  340 DATA13,0,-4,16,0,0,-4,-16,0,0,-4,1
6,0,0,-4,-16,0,0,-4,16,0,0,-4,-16,0,0,-4
,16,0,0,-4,-16,0,0,-4,16,0,0,-4,-16,0,0,
-4,16,0,0,-4,-16,0,0,-4,16,0
  350 DATA5,-8,0,0,-20,-8,0,0,20,-8,0,0,
-20,-8,0,0,20,-8,0,0,-20
  360 VDU26,4:COLOUR128:COLOUR2:PRINTTAB
(6,3)"00000000":COLOUR1:PRINTTAB(1,1)"DO
    00000000  LEV"
```

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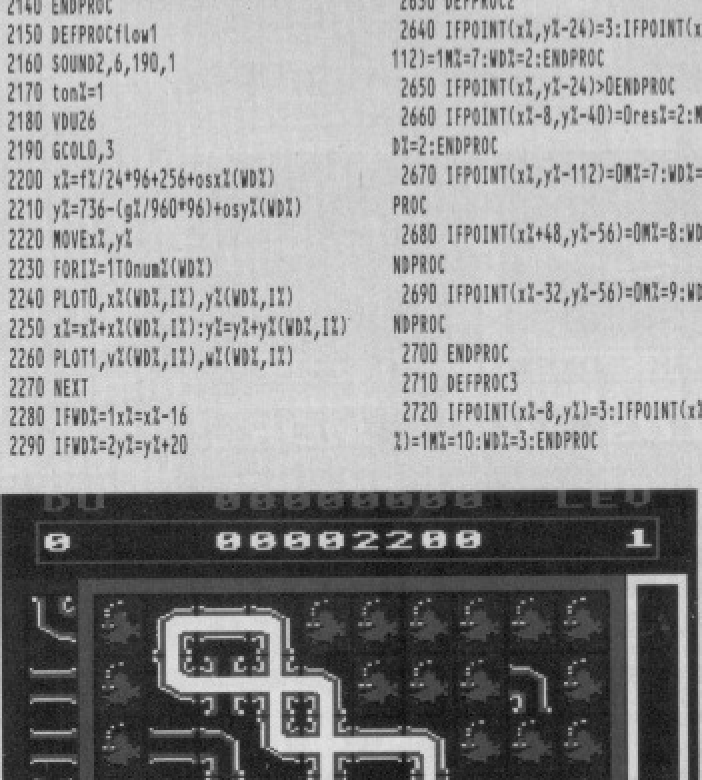
From Page 119

```
  370 PROCinit
  380 REPEAT
  390 REPEAT
  400 PROCgrid
  410 PROCbox
  420 PROCtap
  430 PROCstart
  440 REPEAT
  450 PROCkeys
  460 PROCtime
  470 UNTILW%=0
  480 PROCflow1
  490 REPEAT
  500 IFss%=0PROCkeys
  510 IFM%>0:IFk%<tk%k%=k%+1:PROCdraw
  520 IFk%=tk%PROCflow2:k%=0:tk%=m%(M%):
PROCscore(V%)
  530 IFss%>0PROCduo
  540 UNTILM%=0
  550 IFy%=156y%=828
  560 IFy%=848y%=176
  570 IFx%=1120x%=160
  580 IFx%=144x%=1104
  590 VDU5:GCOL0,2:MOVEx%,y%:PRINTW$:GCO
L0,1:MOVEx%,y%:PRINTE$
  600 COLOUR128
  610 IFt%=-1PROCwin
  620 IFM%=0PROClose
  630 IFp>3!&70=C%:!&73=K%:CALLE%
  640 VDU5:GCOL0,0:MOVEx%,y%:PRINTW$
  650 IFis%=1col%=1:GOSUB3520
  660 IFis%=2col%=1:GOSUB3530
  670 IFis%=3col%=1:GOSUB3520:GOSUB3530
  680 VDU26:GCOL0,0:MOVE164,156:PLOT1,0,
676:PLOT1,960,0:PLOT1,0,-676:PLOT1,-960,
0
  690 UNTILM%=0
  700 UNTIL0
  710 END
  720 DEFPROCinit
  730 R1%=12
  740 R2%=20
  750 R3%=18
  760 t%=19
  770 lev%=1
  780 ok%=&7388
  790 oldS%=0
  800 V%=100
  810 Bg%=&4EB8
  820 S%=0
  830 W$=CHR$224:B$=CHR$225:R$=CHR$226:R
2$=CHR$227+CHR$8+CHR$10+CHR$228:E$=CHR$2
29
  840 data%=3630
  850 HS%=0
  860 W1%=50
  870 B%=&5F88
  880 E%=&5650
  890 G%=E%+3
  900 D%=E%+6
  910 K%=&5700
  920 ikon%=&5410
  930 ob%=&50F8
  940 cc%=1
  950 VDU20,19,3,4;0;
  960 ENDPROC
  970 DEFPROCgrid
  980 !&82=Bg%
  990 CALLG%
 1000 ENDPROC
 1010 DEFPROCbox
 1020 FORI%=0TO4
 1030 R%=RND(7)*&48+ikon%
 1040 W%(I%)=R%
 1050 NEXT
 1060 P%=W%(0)
 1070 FORI%=4TO0STEP-1
 1080 !&70=B%:?&72=3:!&73=W%(I%):CALLD%
 1090 B%=B%+960
 1100 NEXT
 1110 ENDPROC
 1120 DEFPROCstart
 1130 B%=&5F88
 1140 C%=&5FA8
 1150 !&70=C%
 1160 !&73=K%
 1170 CALLE%
 1180 a%=0:b%=0
 1190 ton%=0
 1200 k%=0:tk%=0
 1210 ss%=0:wc%=0
 1220 COLOUR2:COLOUR128:VDU26,4,30:PRINT
TAB(1,3);t%
 1230 tt%=t%
 1240 IFlev%<10PRINTTAB(17,3);" ";lev% E
LSEPRINTTAB(17,3);lev%
 1250 VDU26,5
 1260 btx%=1184:bty%=180
 1270 VDU24,1184;192;1240;828;
 1280 GCOL0,129:CLG
 1290 !&70=ok%:?&72=3:!&73=&5410:CALLD%
 1300 res%=-1
 1310 dv%=10
 1320 p=5:M%=0
 1330 TIME=0
 1340 ENDPROC
 1350 DEFPROCkeys
 1360 IFINKEY-90REPEATUNTILINKEY-106
 1370 IFINKEY-98PROCmc(-1,0,-24)
 1380 IFINKEY-67PROCmc(1,0,24)
 1390 IFINKEY-73PROCmc(0,-1,-960)
 1400 IFINKEY-105PROCmc(0,1,960)
 1410 IFINKEY-74PROCfix:*FX21,0
 1420 REM
 1430 IFton%=2FORT=1TO12:NEXT
 1440 IFton%=0FORT=1TO80:NEXT
 1450 ENDPROC
 1460 DEFPROCmc(d%,e%,c%)
 1470 IFa%+d%<0ORa%+d%>9ENDPROC
 1480 IFb%+e%<0ORb%+e%>6ENDPROC
 1490 a%=a%+d%:b%=b%+e%
 1500 !&70=C%:!&73=K%:CALLE%
 1510 C%=C%+c%
 1520 !&70=C%:!&73=K%:CALLE%
 1530 ENDPROC
 1540 DEFPROCfix
 1550 bn%=a%+1+(b%*10)
 1560 IFbox%(bn%)=3SOUND1,9,190,1:ENDPRO
C
 1570 IFbox%(bn%)=2SOUND1,8,190,1:ENDPRO
C
 1580 IFC%=Xtap%:SOUND1,7,100,1:ENDPROC
 1590 !&70=C%:!&73=K%:CALLE%
 1600 IFbox%(bn%)=1ANDton%<1PROCslow
 1610 IFbox%(bn%)=1ANDton%=2ss%=1:ENDPRO
C
 1620 !&70=C%:?&72=3:!&73=P%:CALLD%
 1630 !&70=C%:!&73=K%:CALLE%
 1640 box%(bn%)=1
 1650 IFP%=ob%box%(bn%)=3
 1660 PROCscroll
 1670 ENDPROC
 1680 DEFPROCslow
 1690 !&70=C%:?&72=3:!&73=ikon%:CALLD%
 1700 FORI=1TO3
 1710 !&70=C%:?&72=1:!&73=P%:CALLD%
 1720 SOUND3,5,90,1
 1730 PROCtime
 1740 IFton%=0FORT=1TO400:NEXT
 1750 NEXT
 1760 ENDPROC
 1770 DEFPROCscroll
 1780 VDU28,0,20,1,6,4:COLOUR131
 1790 B%=&5F88
 1800 FORI%=0TO3
 1810 W%(I%)=W%(I%+1)
 1820 NEXT
 1830 P%=W%(0)
 1840 R%=RND(7)*&48+ikon%
 1850 IFlev%>8PROCothers
 1860 W%(4)=R%
 1870 COLOUR131
 1880 SOUND1,1,190,1
 1890 FORI%=2TO0STEP-1
 1900 VDU30,11
 1910 !&70=B%
 1920 ?&72=1
 1930 !&73=W%(4)+(I%*24)
 1940 CALLD%
 1950 NEXT
 1960 ENDPROC
 1970 DEFPROCwait(w%)
 1980 FORT=1TOw%:NEXT
 1990 ENDPROC
 2000 DEFPROCtap
 2010 FORI%=1TO70:box%(I%)=0:NEXT
 2020 WD%=RND(4)-1
 2030 RESTOREdata%
 2040 tuL%=-1:tuR%=-1:tuU%=-1:tuD%=-1
 2050 READW%,is%
 2060 IFis%>0PROCholes
 2070 Wtap%=&52F0+(WD%*&48)
 2080 f%=(RND(8)-1)*24
 2090 g%=(RND(5)-1)*960
 2100 sbn%=f%/24+2+(g%/960+1)*10
 2110 Xtap%=&6380+f%+g%
 2120 !&70=Xtap%:?&72=3:!&73=Wtap%
 2130 CALLD%
```

```
 2140 ENDPROC
 2150 DEFPROCflow1
 2160 SOUND2,6,190,1
 2170 ton%=1
 2180 VDU26
 2190 GCOL0,3
 2200 x%=f%/24*96+256+osx%(WD%)
 2210 y%=736-(g%/960*96)+osy%(WD%)
 2220 MOVEx%,y%
 2230 FORI%=1TOnum%(WD%)
 2240 PLOT0,x%(WD%,I%),y%(WD%,I%)
 2250 x%=x%+x%(WD%,I%):y%=y%+y%(WD%,I%)
 2260 PLOT1,v%(WD%,I%),w%(WD%,I%)
 2270 NEXT
 2280 IFWD%=1x%=x%-16
 2290 IFWD%=2y%=y%+20
 2300 PROCflow2
 2310 k%=0:tk%=m%(M%)
 2320 ENDPROC
 2330 DEFPROCflow2
 2340 M%=0:res%=-1:rmc%=-1
 2350 ton%=2
 2360 sbn%=sbn%+bof%(WD%):wb%=sbn%
 2370 IFss%>0ANDwb%=a%+1+(b%*10)ss%=0:M%
=0:ENDPROC
 2380 PROCtunnels
 2390 IFwb%>70ORwb%<1ENDPROC
 2400 box%(wb%)=2
 2410 VDU5:GCOL0,3
 2420 IFWD%=0PROC0:ENDPROC
 2430 IFWD%=1PROC1:ENDPROC
 2440 IFWD%=2PROC2:ENDPROC
 2450 IFWD%=3PROC3:ENDPROC
 2460 ENDPROC
 2470 DEFPROC0
 2480 IFPOINT(x%,y%+4)=3:IFPOINT(x%,y%+9
2)=1M%=1:WD%=0:ENDPROC
 2490 IFPOINT(x%,y%+4)>0ENDPROC
 2500 IFPOINT(x%-8,y%+20)=0res%=0:M%=1:W
D%=0:ENDPROC
 2510 IFPOINT(x%,y%+92)=0M%=1:WD%=0:ENDP
ROC
 2520 IFPOINT(x%+48,y%+44)=0M%=2:WD%=1:E
NDPROC
 2530 IFPOINT(x%-32,y%+44)=0M%=3:WD%=3:E
NDPROC
 2540 ENDPROC
 2550 DEFPROC1
 2560 IFPOINT(x%+24,y%)=3:IFPOINT(x%+104
,y%)=1M%=4:WD%=1:ENDPROC
 2570 IFPOINT(x%+24,y%)>0ENDPROC
 2580 IFPOINT(x%+40,y%+12)=0res%=1:M%=4:
WD%=1:ENDPROC
 2590 IFPOINT(x%+88,y%)=0M%=4:WD%=1:ENDP
ROC
 2600 IFPOINT(x%+56,y%+32)=0M%=5:WD%=0:E
NDPROC
 2610 IFPOINT(x%+56,y%-56)=0M%=6:WD%=2:E
NDPROC
 2620 ENDPROC
 2630 DEFPROC2
 2640 IFPOINT(x%,y%-24)=3:IFPOINT(x%,y%-
112)=1M%=7:WD%=2:ENDPROC
 2650 IFPOINT(x%,y%-24)>0ENDPROC
 2660 IFPOINT(x%-8,y%-40)=0res%=2:M%=7:W
D%=2:ENDPROC
 2670 IFPOINT(x%,y%-112)=0M%=7:WD%=2:END
PROC
 2680 IFPOINT(x%+48,y%-56)=0M%=8:WD%=1:E
NDPROC
 2690 IFPOINT(x%-32,y%-56)=0M%=9:WD%=3:E
NDPROC
 2700 ENDPROC
 2710 DEFPROC3
 2720 IFPOINT(x%-8,y%)=3:IFPOINT(x%-88,y
%)=1M%=10:WD%=3:ENDPROC
```



```
 2730 IFPOINT(x%-8,y%)>0ENDPROC
 2740 IFPOINT(x%-24,y%+12)=0res%=3:M%=10
:WD%=3:ENDPROC
 2750 IFPOINT(x%-88,y%)=0M%=10:WD%=3:END
PROC
 2760 IFPOINT(x%-56,y%+32)=0M%=11:WD%=0:
ENDPROC
 2770 IFPOINT(x%-56,y%-56)=0M%=12:WD%=2:
ENDPROC
 2780 ENDPROC
 2790 DEFPROCdraw
 2800 VDU26,5:GCOL0,3
 2810 x%=x%+X%(M%,k%)
 2820 y%=y%+Y%(M%,k%)
 2830 MOVEx%,y%:PRINTW$
 2840 IFres%>-1PROCres(res%):ENDPROC
 2850 dv%=6
 2860 ENDPROC
 2870 DEFPROCtime
 2880 IFTIME<W%ENDPROC
 2890 bty%=bty%+4
 2900 VDU5:GCOL0,0
 2910 MOVEbtx%,bty%:PRINTB$
 2920 IFbty%=828W%=0
 2930 TIME=0
 2940 ENDPROC
 2950 DEFPROCscore(s%)
 2960 COLOUR2:COLOUR128:VDU26,4,30
 2970 IFt%>0t%=t%-1
 2980 IFt%>-1PRINTTAB(1,3);t%;" "
 2990 S%=S%+s%
 3000 COLOUR2:PRINTTAB(14-LENSTR$(S%),3)
;S%
 3010 IFt%=0SOUND2,3,100,1:SOUND3,4,100,
1:!&70=ok%:?&72=3:!&73=&4E70:CALLD%:t%=-
1
 3020 COLOUR131
 3030 ENDPROC
 3040 DEFPROCwin
 3050 SOUND1,10,70,10:SOUND2,10,86,10:SO
UND3,10,98,10
 3060 *FX21,0
 3070 IFlev%>8:IFR2%>=8R2%=R2%-1
 3080 IFlev%>20:IFR3%>=8R3%=R3%-1
 3090 M%=-1
 3100 IFlev%MOD4=0Bg%=Bg%+&48
 3110 FORT=1TO3000:NEXT
 3120 FORI%=1TO3:VDU19,I%,VALMID$(STR$(v
c%(cc%)),I%,1);0;:NEXT
 3130 lev%=lev%+1:cc%=(cc%+1)MOD4
 3140 data%=data%+10:t%=tt%+1
 3150 V%=V%+25
 3160 IFlev%=33lev%=1:data%=3630:Bg%=&4E
B8:t%=16
 3170 oldS%=S%
 3180 IFS%>HS%VDU26,4:COLOUR1:COLOUR128:
PRINTTAB(14-LENSTR$(S%),1);S%:HS%=S%
 3190 ENDPROC
 3200 DEFPROCres(r%)
 3210 IFres%MOD2=0mod%=2ELSEmod%=4
 3220 rmc%=(rmc%+1)MOD4
 3230 IFrmc%MODmod%>0x%=x%-X%(M%,k%):y%=
y%-Y%(M%,k%):k%=k%-1
 3240 IFres%=0:IFk%>4ANDk%<(tk%-4)MOVEx%
-16,y%:PRINTR$
 3250 IFres%=1:IFk%>1ANDk%<(tk%-3)MOVEx%
+24,y%+16:PRINTR2$
 3260 IFres%=2:IFk%>4ANDk%<(tk%-4)MOVEx%
-16,y%-20:PRINTR$
 3270 IFres%=3:IFk%>1ANDk%<(tk%-3)MOVEx%
-8,y%+16:PRINTR2$
 3280 dv%=5
 3290 ENDPROC
 3300 DEFPROCduo
 3310 IFss%=1!&70=C%:?&72=3:!&73=ikon%:C
ALLD%:ss%=2:p=1:wc%=0
 3320 IFss%=2wc%=wc%+1:IFwc%>dv%wc%=dv%
 3330 IFwc%=dv% !&70=C%:?&72=p:!&73=P%:C
ALLD%:SOUND3,5,90,1:p=p+1:wc%=0:IFp=4ss%
=0:!&70=C%:!&73=K%:CALLE%:box%(bn%)=1:PR
OCscroll
 3340 ENDPROC
 3350 DEFPROCothers
 3360 IFlev%>12:IFRND(R1%)=1R%=(RND(2)-1
)*&48+&5260:ENDPROC
 3370 IFlev%>8:IFRND(R2%)=1R%=(RND(4)-1)
*&48+&5140:ENDPROC
 3380 IFlev%>20:IFRND(R3%)=1R%=ob%:ENDPR
OC
 3390 ENDPROC
 3400 DEFPROCtunnels
 3410 IFWD%=3:IF(wb%-bof%(WD%))=tuL%sbn%
=sbn%+10:wb%=sbn%:x%=x%+960:ENDPROC
 3420 IFWD%=1:IF(wb%-bof%(WD%))=tuR%sbn%
=sbn%-10:wb%=sbn%:x%=x%-960:ENDPROC
 3430 IFWD%=0:IF(wb%-bof%(WD%))=tuU%sbn%
=sbn%+70:wb%=sbn%:y%=y%-672:ENDPROC
 3440 IFWD%=2:IF(wb%-bof%(WD%))=tuD%sbn%
=sbn%-70:wb%=sbn%:y%=y%+672:ENDPROC
 3450 ENDPROC
 3460 DEFPROCholes
 3470 VDU5:col%=0
 3480 IFis%=1READtuL%,tuR%:GOSUB3520
 3490 IFis%=2READtuU%,tuD%:GOSUB3530
 3500 IFis%=3READtuL%,tuR%,tuU%,tuD%:GOS
UB3520:GOSUB3530
 3510 ENDPROC
 3520 hx%=140:hy%=828-(tuL%DIV10)*96:GCO
L0,col%:FORI%=hy%TOhy%-72STEP-24:MOVEhx%
,I%:PRINTW$:MOVEhx%+992,I%:PRINTW$:NEXT:
RETURN
 3530 hy%=852:hx%=164+((tuU%-1)MOD10*96)
:GCOL0,col%:FORI%=hx%TOhx%+72STEP24:MOVE
I%,hy%:PRINTW$:MOVEI%,hy%-698:PRINTW$:NE
XT:RETURN
 3540
 3550 DEFPROClose
 3560 VDU26,4,30
 3570 S%=oldS%
 3580 !&70=ok%:?&72=3:!&73=&4E28:CALLD%:
SOUND0,-15,3,20:SOUND1,2,120,20
 3590 t%=tt%
 3600 REPEATUNTILGET=32
 3610 COLOUR128:COLOUR2:PRINTTAB(6,3)"00
000000"TAB(14-LENSTR$(S%),3);S%
 3620 ENDPROC
 3630 DATA50,0
 3640 DATA50,0
 3650 DATA50,0
 3660 DATA50,0
 3670 DATA50,0
 3680 DATA50,0
 3690 DATA50,0
 3700 DATA50,0
 3710 DATA48,0
 3720 DATA48,0
 3730 DATA48,0
 3740 DATA48,0
 3750 DATA48,0
 3760 DATA48,0
 3770 DATA48,0
 3780 DATA48,0
 3790 DATA48,1,31,40
 3800 DATA48,2,6,66
 3810 DATA48,1,51,60
 3820 DATA48,2,2,62
 3830 DATA48,1,1,10
 3840 DATA48,2,1,61
 3850 DATA48,1,61,70
 3860 DATA48,2,10,70
 3870 DATA48,3,31,40,8,68
 3880 DATA48,3,51,60,2,62
 3890 DATA48,3,1,10,1,61
 3900 DATA48,3,11,20,9,69
 3910 DATA48,3,41,50,7,67
 3920 DATA48,3,61,70,8,68
 3930 DATA48,3,21,30,4,64
 3940 DATA48,3,1,10,6,66
```

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 8F35 5
  50 = 17F0 C
  60 = E0C5 2
  70 = E91B 6
  80 =  D57 0
  90 = 11C6 C
 100 = FAE5 5
 110 = 2C83 E
 120 = 2C83 7
 130 = E369 C
 140 = 3320 0
 150 = B365 6
 160 =  85A B
 170 = 5399 0
 180 = 5C5B 8
 190 = 22CD 4
 200 = 8D48 0
 210 = E651 4
 220 = 5585 C
 230 = 81E2 8
 240 = C1AA 1
 250 = 5ABD F
 260 = 7C8F 2
 270 = 46CE B
 280 = C943 C
 290 = 9C7D 1
 300 = 531C 4
 310 = 24BD 9
 320 = 9643 5
 330 = 150C 9
 340 = B2F5 5
 350 = FBBE F
 360 = B8C6 A
 370 = DEBB E
 380 = BFBA F
 390 = BFBA 5
 400 = 58D2 B
 410 = 63A5 5
 420 = 3061 3
 430 = 9D5F B
 440 = BFBA C
 450 = B0B6 E
 460 = B7DE F
 470 = 1296 7
 480 = D8A3 F
 490 = BFBA A
 500 = B902 1
 510 = 6263 0
 520 = E257 8
 530 = A6C4 6
 540 = 619A 7
 550 = F018 7
 560 = C735 A
 570 = 1F37 5
 580 = 3BC1 C
 590 = 59C1 3
 600 = A76B 6
 610 = CA2F 8
 620 = A688 1
 630 = 8F3D 2
 640 = C476 B
 650 = 59AD 0
 660 = 79C3 7
 670 = 5C88 1
 680 = FD21 7
 690 = 619A A
 700 = 53CE 6
 710 = FD2E 4
 720 = 344C A
 730 = 7121 2
 740 = EAE2 3
 750 = 94E8 8
 760 =  9A1 7
 770 = 3311 2
 780 = 529F 1
 790 = 3B99 D
 800 =  2AA C
 810 = AC01 F
 820 = C64B 9
 830 = FD7E D
 840 = BC06 4
 850 = D50E 8
 860 = DEA6 6
 870 = CE1F A
 880 = 265B F
 890 = FCF6 9
 900 = 74D1 F
 910 = 708F 6
 920 = 6DB2 E
 930 = 94F8 B
 940 =  D8D 7
 950 = 721F 9
 960 = ED0F F
 970 = B225 E
 980 = 1913 E
 990 = 37A8 5
1000 = ED0F 7
1010 = 753D 7
1020 = F8C9 4
1030 = F631 A
1040 = 25C7 5
1050 = 2C83 9
1060 = DBAE A
1070 = EE5C 2
1080 = 377A 3
1090 = 3859 4
1100 = 2C83 2
1110 = ED0F A
1120 = 363B 7
1130 = CE1F D
1140 = 3B0D 6
1150 = 8201 B
1160 = 9074 4
1170 = 51CA C
1180 = 6A8D 4
1190 = EC3C 1
1200 = 7BF9 D
1210 =  D5D 1
1220 = 9C8D 5
1230 = 6B18 1
1240 = 3B29 A
1250 = CD0C F
1260 = DF84 5
1270 = DB59 C
1280 = 2BF7 C
1290 = 3D9A 0
1300 = 51F8 0
1310 = 85B2 3
1320 = 5AF0 D
1330 = 173E 9
1340 = ED0F 7
1350 = 5A41 A
1360 = C366 2
1370 = 8E16 0
1380 = 3DED 4
1390 = E115 E
1400 = 875B 1
1410 = F589 8
1420 =    0 8
1430 = BD93 7
1440 = FEDE 6
1450 = ED0F 0
1460 = 606D 2
1470 = DB5E 0
1480 =  46A 8
1490 = 2047 D
1500 = E76F 1
1510 = 6003 7
1520 = E76F D
1530 = ED0F D
1540 =  35B C
1550 = 5BE5 1
1560 = 3759 0
1570 = 9919 2
1580 =  D1A 8
1590 = E76F 6
1600 = 8FDC 4
1610 = B882 C
1620 = D2A7 E
1630 = E76F F
1640 = DBD8 1
1650 = 9B00 A
1660 = C823 B
1670 = ED0F E
1680 = B3E5 7
1690 = AAE3 7
1700 = 8AA2 B
1710 = 3237 D
1720 =  D9E 3
1730 = B7DE E
1740 = EC08 E
1750 = 2C83 B
1760 = ED0F 4
1770 = A8A2 E
1780 = B975 2
1790 = CE1F B
1800 = 882E B
1810 = 9556 2
1820 = 2C83 A
1830 = DBAE A
1840 = F631 7
1850 = F6CB 3
1860 = F958 5
1870 =  573 6
1880 = DC09 E
1890 = 63BD E
1900 = 639F 5
1910 = B130 7
1920 = AC04 8
1930 =  AAD 4
1940 = 62FB 5
1950 = 2C83 A
1960 = ED0F E
1970 =  4D5 D
1980 = E3D1 1
1990 = ED0F B
2000 = 26F9 A
2010 = B94C 4
2020 = 2E43 E
2030 = AE55 6
2040 = AC17 9
2050 = 3067 8
2060 = 624C 1
2070 = A0AE 8
2080 = B209 F
2090 = DE96 4
2100 = 8E52 B
2110 = A41A C
2120 = 6F30 6
2130 = 62FB 7
2140 = ED0F E
2150 = 73C7 B
2160 = E809 A
2170 = FC1D 4
2180 = B962 4
2190 = 236D 8
2200 = 50A4 8
2210 = DE40 A
2220 = 21DA 5
2230 = 4169 3
2240 = 9ACD 9
2250 = CF62 8
2260 = D532 C
2270 = 2C83 E
2280 = 364B 2
2290 = 71B8 7
2300 = E8C0 A
2310 = 295E A
2320 = ED0F 1
2330 = 43A4 D
2340 = 4AFB F
2350 = CC7E 9
2360 = 1DEC C
2370 = CA84 5
2380 = DCC5 A
2390 = 61B1 8
2400 = 3915 B
2410 = 97AA 7
2420 = 3D49 F
2430 = A028 B
2440 = 17AA 6
2450 = 8ACB 5
2460 = ED0F D
2470 = 6435 3
2480 = E388 C
2490 = 74DD 9
2500 = 6A63 1
2510 = B60D 2
2520 = 4BF6 4
2530 = D2BC 4
2540 = ED0F 8
2550 = 7414 0
2560 = 4E35 0
2570 = F242 5
2580 = 50E6 2
2590 = 8288 4
2600 = 3821 0
2610 = 997F E
2620 = ED0F C
2630 = 4477 C
2640 =  32A 1
2650 = 7065 8
2660 = 97DA B
2670 = DC30 0
2680 = F401 D
2690 = 6D4B 2
2700 = ED0F 1
2710 = 5456 E
2720 = 87FA 4
2730 = 50EE A
2740 = F603 2
2750 = B548 9
2760 = 4033 9
2770 = A47B 1
2780 = ED0F D
2790 = 8202 F
2800 = 34DD 6
2810 = 702F D
2820 = 3685 D
2830 = 8041 F
2840 = D58D 6
2850 = BD5C 2
2860 = ED0F 4
2870 = 5D29 7
2880 = 633B 3
2890 = E5D9 3
2900 = A7C9 A
2910 = 8D1B 4
2920 =  15D E
2930 = 173E 2
2940 = ED0F 1
2950 = 2786 5
2960 = EB7C 1
2970 = 6C4B 1
2980 = F792 E
2990 = 5A9E D
3000 = 6289 5
3010 =  D9C 6
3020 =  573 4
3030 = ED0F E
3040 =  5FF A
3050 = 1DB4 6
3060 = 2B9A 3
3070 = BE55 7
3080 = 45CF 8
3090 = 6A25 4
3100 = 8120 1
3110 = 5CB2 7
3120 = 32BE 5
3130 = C8B7 D
3140 = 5489 4
3150 = 1DBB E
3160 = 1728 B
3170 = 3486 C
3180 = 1605 8
3190 = ED0F B
3200 = 6CFF E
3210 = 1A4E B
3220 = 25A0 A
3230 = 4343 5
3240 = 71A9 9
3250 = CBAC 0
3260 =  2A1 6
3270 = F3D0 7
3280 = 8D3F 7
3290 = ED0F 2
3300 = 49F3 A
3310 = 9981 5
3320 = F3F4 D
3330 = 767B A
3340 = ED0F E
3350 = AD24 3
3360 = 30E2 8
3370 = DEB8 6
3380 = 769F E
3390 = ED0F D
3400 = 3163 B
3410 = A736 7
3420 = 4391 D
3430 = 395A 6
3440 = F19C A
3450 = ED0F 6
3460 = 7374 5
3470 = A8F3 6
3480 = 5534 4
3490 = 6E2B 6
3500 = D89A A
3510 = ED0F B
3520 = 5A1A 9
3530 = 3C1E 2
3540 =    0 2*
3550 = 5191 1
3560 = C24D 3
3570 = 77CA 2
3580 = A2F7 9
3590 = C923 1
3600 = 5B81 0
3610 = DB49 A
3620 = ED0F 1
3630 = 9C18 4
3640 = 9C18 F
3650 = 9C18 0
3660 = 9C18 D
3670 = 9C18 C
3680 = 9C18 5
3690 = 9C18 4
3700 = 9C18 F
3710 = 430D 0
3720 = 430D 5
3730 = 430D 4
3740 = 430D 8
3750 = 430D 2
3760 = 430D 2
3770 = 430D 9
3780 = 430D 3
3790 = B7C4 F
3800 = CF92 B
3810 = 1C23 5
3820 = 45E7 5
3830 = A90E 1
3840 = EE58 5
3850 = C1C0 2
3860 =  822 B
3870 = F72F 4
3880 = 2D92 4
3890 = 23D5 8
3900 = EE15 7
3910 = 76B5 3
3920 = EDDD C
3930 =  F90 6
3940 =  21F 9
```

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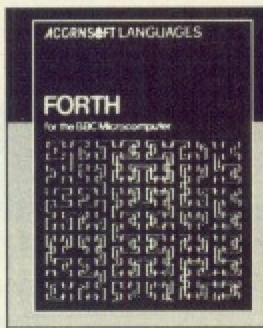

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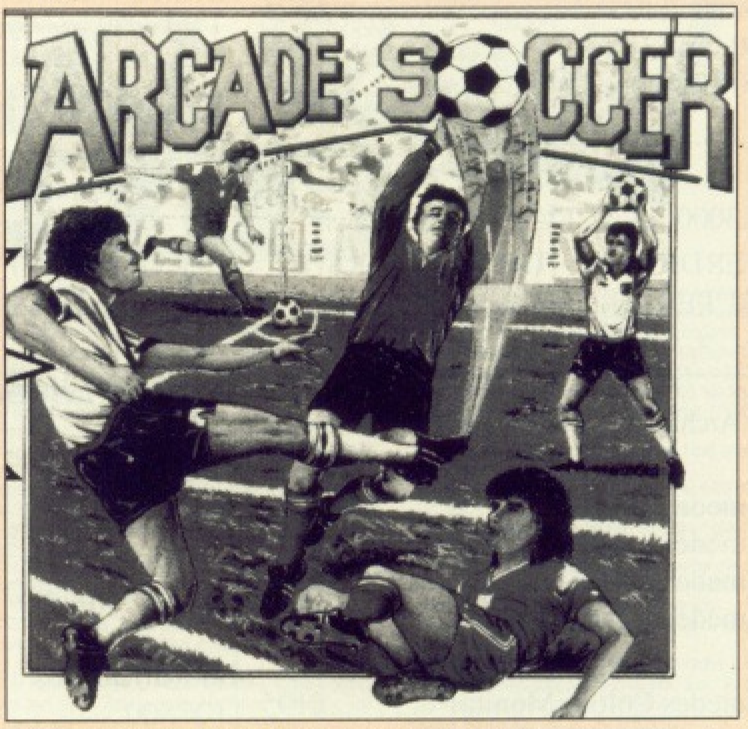

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Commanding short cut

£10 *Prize letter*

SPACE-efficient programming is an important idea, making the best use of all the commands available. This is especially true when writing subroutines for inclusion in longer programs for the Model B since it has so little ram.

It does not always involve solving problems as you would do mentally – more often it is finding a combination of commands that provide a short cut.

Mr Ellis's solution to rounding a number to two decimal places appeared in the June issue of The Micro User.

Apart from its several problems which I outline below, I felt that this 20 line routine was a very lengthy approach to such a simple problem and that there must be an easier way. Well there is.

The trick is to multiply the number by 100 and then to take the INTeger of this, thus removing all digits to the right of the decimal place. Rounding up is achieved by adding 0.5 before taking the INT.

The last task is to move the decimal point back two places to the left. But if we do this by dividing by 100 we may lose one, or both, of the decimal places if the rounded number ends in a zero since, for example, 123.40 is printed as 123.4.

The trick here is to introduce a string variable, say n$, which represents the string of the number.

To insert the decimal point, we simply take the leftmost digits, add a dot and then add on the two right most digits: "123" +"."+"40" = "123.40"

It is only a small step from here to a function which rounds any number to any number of decimal places. This is the six line function set out below. It takes your number n *and the required number of decimal places* p *and returns a string rounded as specified:*

```
100 DEF FNround(n,p):LOCAL
n$,sign$
110 n$=STR$(INT(ABS(n)*10^p
+0.5))
120 IF n<0 AND VALn$>0 sign
$="-" ELSE sign$=""
130 IF p=0 =sign$+n$
140 IF LENn$<p+1 n$=STRING$
(p+1-LEN$,"0")+n$
150 =sign$+LEFT$(n$,LENn$-p
)+"."+RIGHT$(n$,p)
```

Line 110 and 150 form the main algorithm, line 130 prevents a decimal point form being added when rounding to whole numbers. Line 140 solves the algorithm's only failures.

Try out decimals between 0-1 without this line and you'll soon see why it's needed. The variable sign$ is set in line 120 and enables the procedure to handle negative numbers.

The method I used works on the positive value of n – ABS(n) – and includes a minus sign at the end if necessary.

So to print the number stored in the variable A to three decimal places, you would use:

```
PRINT FNround (A,3)
```

*Finally, there is a limitation with this solution. The INT function only works on numbers less than 2,147,483,648 (2^31). So n*10^p must not exceed this. Also, there's no point in specifying* n *to more than nine significant figures. as Basic cuts the decimal short at this point.*

Mr Ellis's solution suffered from the problem of using the function STR$ on a decimal. He also tediously worked backwards from the last decimal place, when it is only the third place which decides whether or not to round up the second one.

This causes a flaw in his algorithm: As printed, if one decimal digit is greater than 5, it will cause the one on its left to be incremented. But this wrongly rounds 12.345 to 12.34.

If, however, we change the rules so that the increment occurs when the digit is more than 4, another problem crops up. For exmaple, 12.3445 first becomes 12.345 and then finishes as 12.35, which is also incorrect.

Mr Ellis's program cannot cope with rounding negative numbers. It also fails with numbers less than 0.1 and more than 10^9 because these numbers are converted to scientific notation, which is not expected by the program.

I hope I have shown how space-efficient programming can not only significantly shorten programs, thus easing the task of debugging, but can also lead to simpler algorithms which are more easily adaptable to the general situation. – **Simon Shaw, Oxhey, Herts.**

PROCedure for Viewing DTP

WE purchased the Database DTP program for Oaklands School and it works very well for the price, but gave a fault when loading a View file.

On inspection of the program line 850 seemed to be in error and the change shown here gives correct operation:

```
850DEFPROCremove:VDU26:PROC
show:PROCset:ENDPROC
```

Hope this will help others. – **J. A. Schofield, Warsash, Southampton.**

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.

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Art for art's sake

I WOULD like to thank you for the current PD articles, and associated software. Arctist+ on the July disc will not run on a 1Mb machine and if you want it to run then this is what you have to do:

- *Bring up the Task Manager and drag System sprites to 440k.*
- *Select Mode 15*
- *Press f12 and enter:*

```
*Dir !Arctist+.Files
```

Press Return twice to get back to the DeskTop, then bring up the directory viewer for !Arctist+ then Shift+double-click on the !Arctist+ icon. Double-click on Files then double-click on boot.

Things to notice with Arctist+ are the fonts inside the Files directory. Double-clicking on one of them from the DeskTop wil replace the system font with a new one.

This has a wider use than just making your DeskTop look more friendly, as they can be used with !Paint and !Draw for hard copy print-outs.

With !Draw select System Font from the font menu then double click on the required font in the Files directory of Arctist+.

If you find yourself waiting for an outline font to be loaded off floppy disc into !Draw each time they select a new font

➤

➤

size, the answer is to copy the !Fonts directory into the ram disc then double-click it. – **Edward Turner, Maidenhead, Berks.**

More memory for a Master

I HAVE a standard Master 128 and would like to increase the memory size as much as possible. How would I be able to do this and what would I need to fit? I am looking in the region of 2Mb of ram.

Is this possible? If not what size ram can I fit as an option without having to change over to another computer?

Are there any disadvantages of doing this as far as my present software is concerned? – **R. Bowler, Whatton, Notts.**

● While it's possible to increase the memory available on the Master to such a vast amount – using a system similar to that in our July issue – none of your existing software would use it, nor is there any software on the market that would.

To get the kind of memory you're talking about you'd have to upgrade to an A3000 or Archimedes.

With a Master you've already reached the limit of memory for the 8 bit BBC Micro and your only option is to change machines.

However this will affect your existing software as most of it will only work on the 6502 emulator – slowly – if it works at all.

Quest grinds to a halt

HACMAN's Castle Quest fix in the August issue of The Micro User *seems to have part of line 250 missing. Can you help?* – **R. Saunders, Basingstoke, Hants.**

● Oops, the complete line should have been:

```
250 IF INKEY(-256)<>-1 AND
?&ED0<>&A2 PROCconvert
```

The ultimate game?

I HAVE played quite a few very good games on my BBC Micro, like Citadel, Castle Quest, Elite, Dr.Who and the Mines of Terror, Repton 3, XOR and Enthar Seven to mention some of the very best.

But then one day I began playing Exile and now, more than a year later, I have divided computer games into two groups: Exile, and all the others.

Exile is such a fascinating and exciting game that I simply don't understand why there have been so few notes on it in The Micro User. *Is anyone else out there playing the game?*

Well, I have a few problems: First of all, I am not sure that I have finished Exile completely. I managed to find the destinator and take it to the spaceship – which is the aim of the game – but only one of the two rockets started and I seem to have gone into circuit around the planet.

I would have expected some spectacular ending in a game of this quality. Am I missing something?

Another thing: Once I was engaged in fierce combat with the red robot found near the maggot machine. It suddenly stopped dead and sank to the bottom of the lake and just stood there.

Unfortunately I didn't save the position, and later I have not been able to repeat the situation. I must have done something right in the heat of the fight, but I don't know what. Can anybody tell me?

What about the two doped astronauts? Am I expected to save them? It must be impossible to get them to the spaceship.

When you feed bees to the red imps you sometimes get energy capsules in return. Is it possible to get anything else from them?

And now to my worst problem: What can I play after Exile? The game has been such fun that anything else seems so pale and uninteresting in comparison.

There was a mention in The Micro User *of a game named Destiny, which should be something like Exile, but is it? And when can we expect it?* – **Torben Osted, Denmark.**

● We'll pass your questions on to Hac Man, but we're sure you have to rescue the astronauts.

However in this very issue, exclusively to *The Micro User*, we have the complete Exile cheat routine so you can find out if you've missed anything.

Sprite redemption

VERY recently I purchased Computer Concepts hand-held scanner for my BBC A3000 and was looking forward to scanning pictures and manipulating them in Pro-Artisan.

Unfortunately it isn't that easy, the scanner will not function correctly in Mode 15 and therefore sprites loaded into Pro-Artisan will corrupt the screen.

Simply loading the Mode 12 sprite in Mode 15 doesn't work either as the palette is different. A quick solution is to scan and save the picture as a sprite and load it into !Paint while working in Mode 12 on the DeskTop. Then change to Mode 15 using the palette.

Click Menu on the !Paint icon and select the Get screen area option, now you can grab any part of the screen and save it before loading it into Pro-Artisan.

Artisan users can load sprites straight into the program without the need for conversion as it runs in Mode 12 and the palette remains unchanged. I hope this has cleared a hurdle as some amazing results can be achieved using Pro-Artisan. – **Chris Hunter, Gildersome, Nr. Leeds.**

Getting into adventures

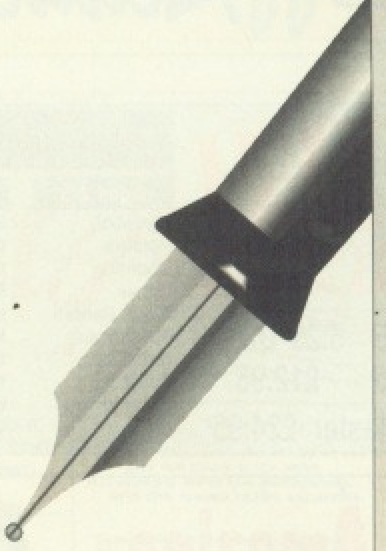
HAVING bought a BBC Micro about six months ago for my children aged four and ten, the whole family are now using it.

With the computer came a mass of discs, with many games like Colossal Adventure, Colditz, Adventure Quest, Dungeon Adventure and a few more.

Unfortunately there are no instructions with the games and though I've tried endlessly at local shops to obtain instructions, and other software – educational and adventure games – for the BBC B all I get is that they do not stock the software.

My neighbour gave me the February issue of The Micro Usr *and it seems adventure games are still being played, but are they ever solved?* – **B. Newport, Basingstoke, Hants.**

● You can always write to the Mad Hatter for help with adventures, and educational programs are readily available by mail order.



Machine code conversions

WHEN converting other people's machine code utilities to run from rom there is always the problem of deciding where to change an RTS to a JMP exit and if more than one exit exists for the routine or command there can be problems sorting them out.

You can always go through the code a few times and work it out but you may miss one or more. What is needed is some method of forcing the code to return to the exit routine no matter how many, or where, the exits may be. The following code achieves it:

```
310 \Command recognised
320 .this_rom INX
330 LDA command_list,X \ Lo
w byte of command address
340 STA z_page+2       \ z_
page = zero page location
350 INX
360 LDA command_list,X \ Hi
gh byte of command address
370 STA z-page+3
380 \ Get exit address, the
 -1 is crucial
390 LDA #exit-1 MOD256 \ Re
turn address of exit low by
te
400 PHA                \ Pu
sh it on stack
410 LDA #exit-1 DIV256 \ Re
turn address of exit high b
yte
420 PHA
430 JMP  (z-page+2)    \ Do
 command

1000 .exit             \ Ex
it
1010 PLA               \ Pu
ll Y and discard
1020 PLA               \ Pu
ll X and discard
1030 RTS               \ Ro
m exit
```

Lines 310 to 370 get the address of the command and save it somewhere in page zero. This is followed by line 440 JMP (z-page+2) or equivalent.

If the address of the exit routine-1 is pushed on to the stack before the JMP (z-page+2) when an RTS is executed, at the end of the command, the address on the stack is loaded into the program counter just as normal and automatically incremented by one. – **Randy Hutchinson, Pudsey, W. Yorks.**

All in the family

I AM writing to you as a reader of your monthly magazine to ask, if you could advise me of a program for laying out a family tree. – **B. H. Green, Colwyn Bay, Clwyd.**

- We reviewed programs for the family tree back in June 1989, Minerva produce the program Ancestry for the Archimedes while BBC Soft sell the equivalent program for the Master 128.

The program Family History System is produced by Micro-Aid and works on a Model B.

Technique of going sideways

I HAVE noticed that many games have sideways scrolling landscapes. I am contemplating writing a machine code game and was wondering about a sideways scrolling one. I have seen routines in books that do this by programming the 6845 directly.

The problem is that when graphics go off one side of the screen they come back the other one line down. What I want is a continuous scroll – how do I get it? – **Richard Tonge, Chesterfield.**

- The trick is to draw the new part of the screen on the section that's just scrolled on to the right.

As far as the line offset is concerned, you need to apply an adjustment to the scroll value – you'll learn more by working out the exact details yourself.

Building roms

THANKS for printing my Sideways Ram Builder program suite in the October issue – unfortunately there were some omissions and errors that prevent it working.

Listing IV should have been Listing V and neither the original Listing IV nor the memory map were printed, so here they are:

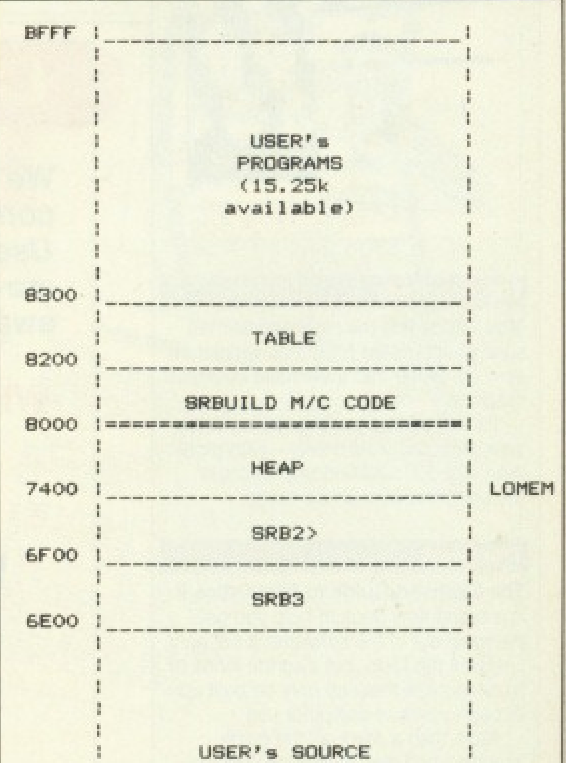
```
 10 REM PROG1
 20 REM by H.R Wall
 30 REM (c) The Micro User
 40 LOMEM=&7400
 50 FOR pass%=4 TO 6 STEP 2
 60 P%=!&70:O%=!&74
 70 [OPT pass%
 80 LDX #(text1-text)
 90 JSR print
100 RTS
110 ]:P%=P%+10:O%=O%+10:[OPT pass%
120 .text
130 .text1 EQUS "Program One":EQUB 0
140 .print
150 LDA text,X:BEQ rts:JSR &FFEE
160 INX:BRA print
170 .rts RTS
180 NOP
190 ]
200 NEXT
210 CALL !&78
220 END
```

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = D214 4
 50 = ED95 4
 60 = 3889 E
 70 = 95CD F
 80 = 4C92 3
 90 = AD7B C
100 = 9843 F
110 = 28FA E
120 = 80E0 E
130 = CB52 5
140 = 14FC C
150 = 9B5D B
160 = 7FAD 7
170 = 1E9F E
180 = 41AB 3
190 = 8B58 2
200 = 2C83 8
210 = 7F24 5
220 = FD2E 7
```

There are a couple of small changes needed as well. In Listing II the program won't accept directory specifications so to fix this change #48 in line 1900 to #45 and the #90 in line 1910 to #95. In the same listing it's also possible that a false No room *error will occur, this is fixed by changing lines 1040 and 1050 to:*

```
1040 LDA &441:CMP #&BF:BEQ
store
1050 BCC store
```

Finally, due to line number changes the reference to line 90 on page 100 paragraph 1 should refer to line 110 instead. – **Harry Wall, Worcester.**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8300
TABLE
8200
SRBUILD M/C CODE
8000
HEAP
7400
LOMEM
SRB2>
6F00
SRB3
6E00
USER's SOURCE and ASSEMBLED CODE (24k available for each program)
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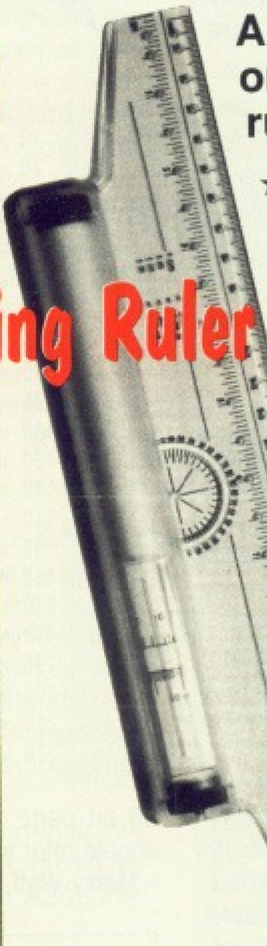

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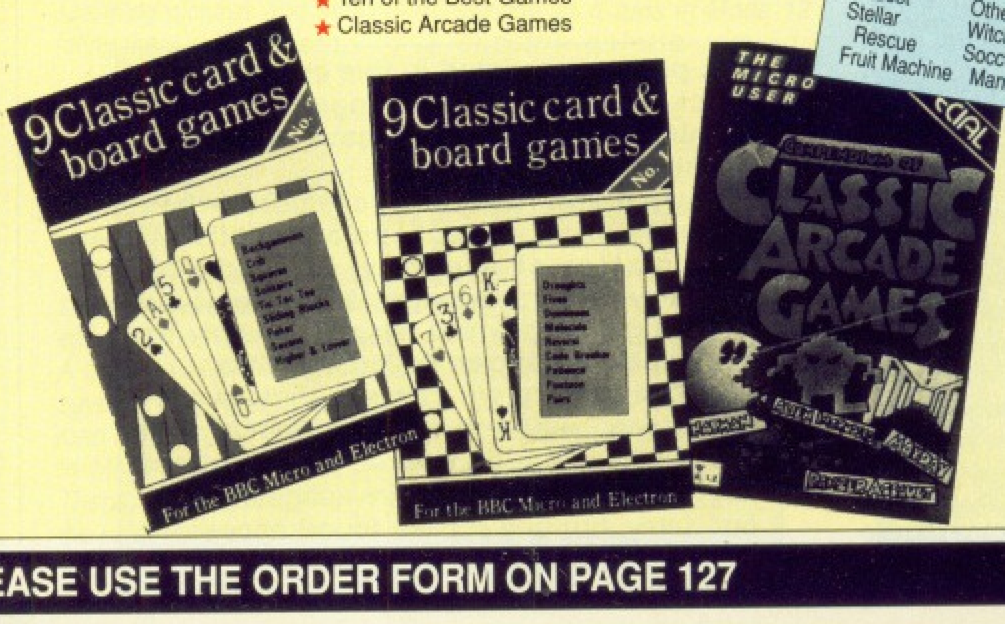
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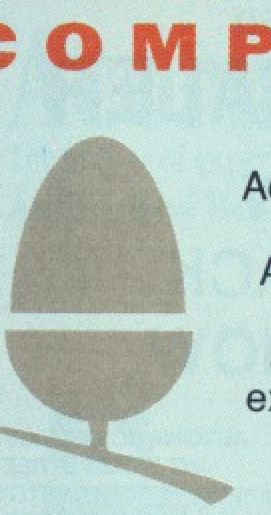

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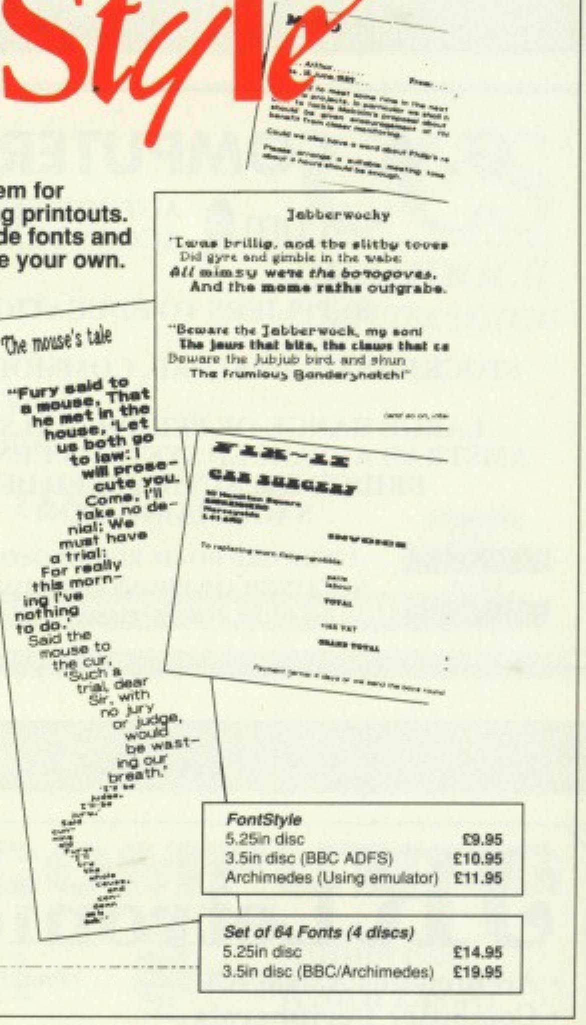

Jabberwocky

'Twas 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 bite, the claws that ca
Beware the Jubjub bird, and shun
The frumious Bandersnatch!"

The mouse's tale

"Fury said to a mouse, That he met in the house, 'Let us both go to law: I will prosecute you. Come, I'll take no denial: We must have a trial: For really this morning I've nothing to do.' Said the mouse to the cur, 'Such a trial, dear Sir, with no jury or judge, would be wasting our breath.'

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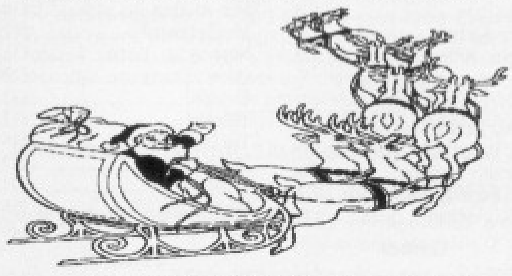

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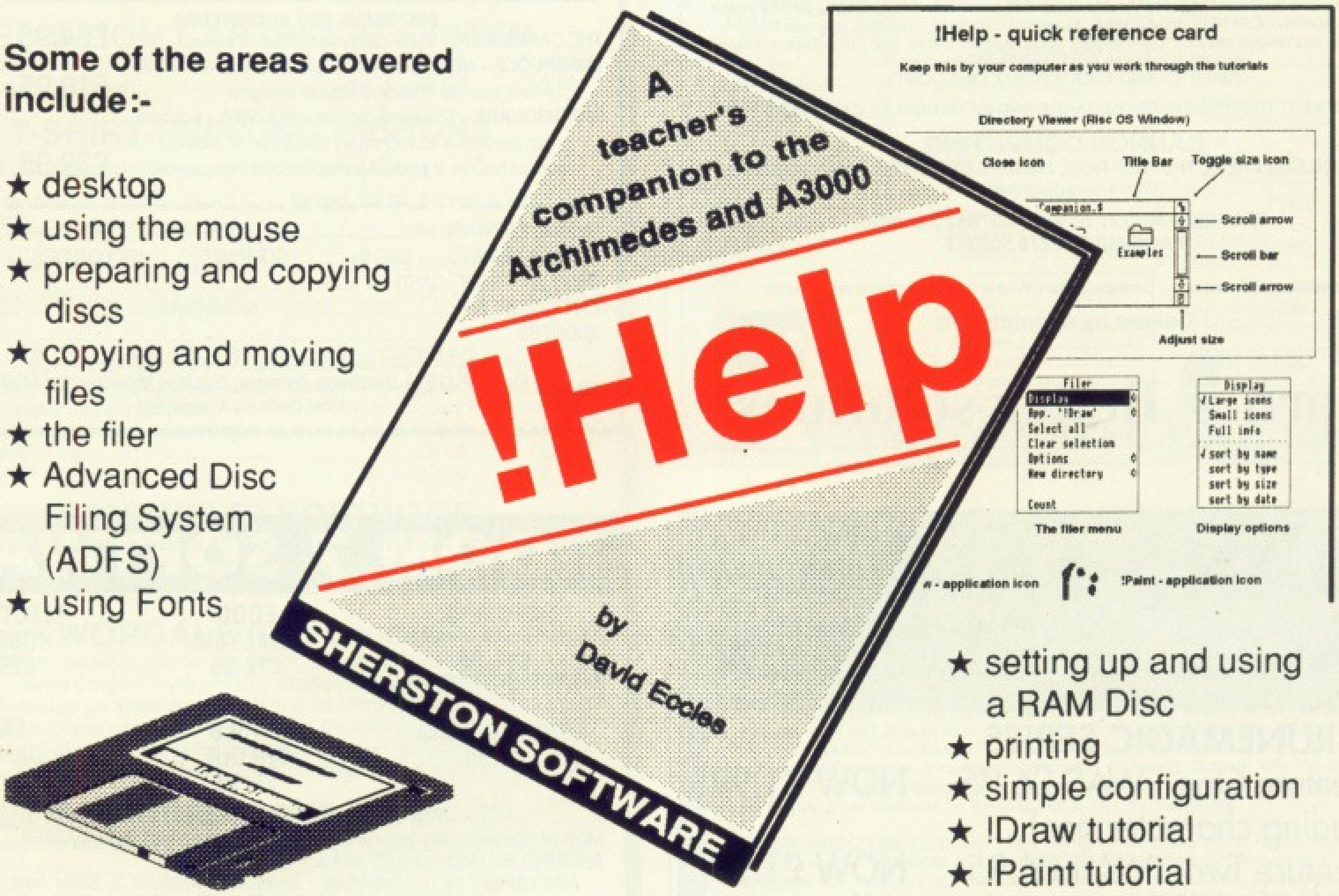

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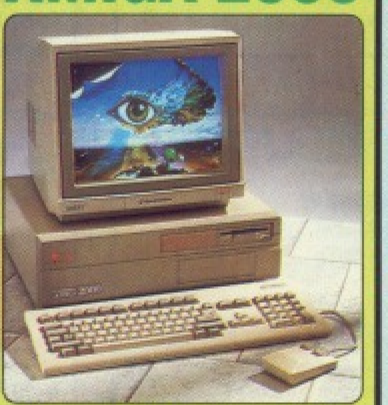

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* = Expected release date late November '90

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NEVRYON

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BREAK 147

A full 3D snooker implementation with superb solid graphics and brilliant digitised sound effects. Incredibly realistic interaction between the balls allows swerve, stun, backspin etc. You can view the table from any angle even as the balls are moving. All the rules of snooker are implemented and you can play matches, set up tricks shots or just practice. Play against friends or the computer and save whole frames to replay later.

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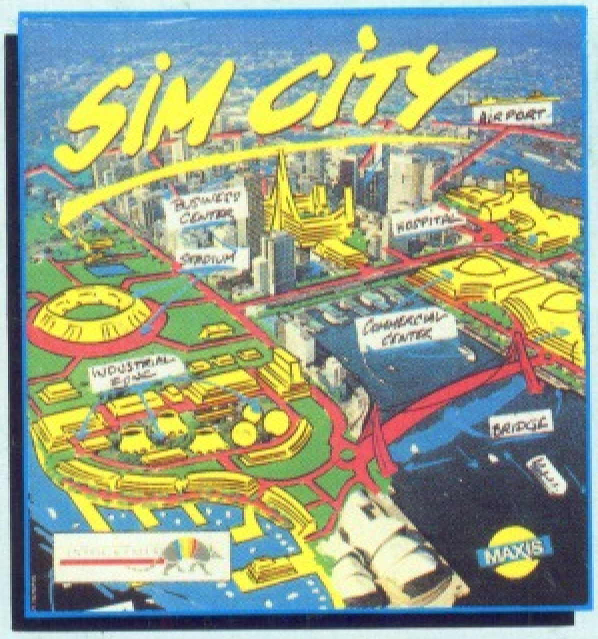

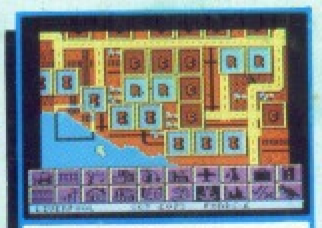
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Regional Map

SIM CITY

The Unique Award-Winning City Simulation Game

With SIM CITY, take the destiny of the world's greatest cities in hand. Build houses, streets, factories, airports and power stations. You will have to fight crime and pollution, collect taxes and balance your budget.

Everything is managed and animated in real time. Every decision influences instantly the life of your town. You will face crises, natural disasters (tornadoes, earthquakes, etc.), but - who knows - maybe one day you will construct the perfect city.

SIM CITY is an all-absorbing and unique game. Other computer versions were voted the TOP GAME and TOP SIMULATION of the year in America (1989) and received a TILT D'OR award in France (1990).

BBC Micro/Master & Electron

HOSTAGES

Realistic Graphics & Gameplay...Superb Sound Effects & Tunes

An urgent phone call from the National Security Minister....an Embassy has been overrun by terrorists. As Head of the Terrorist Combat Squad you are in control of all operations.

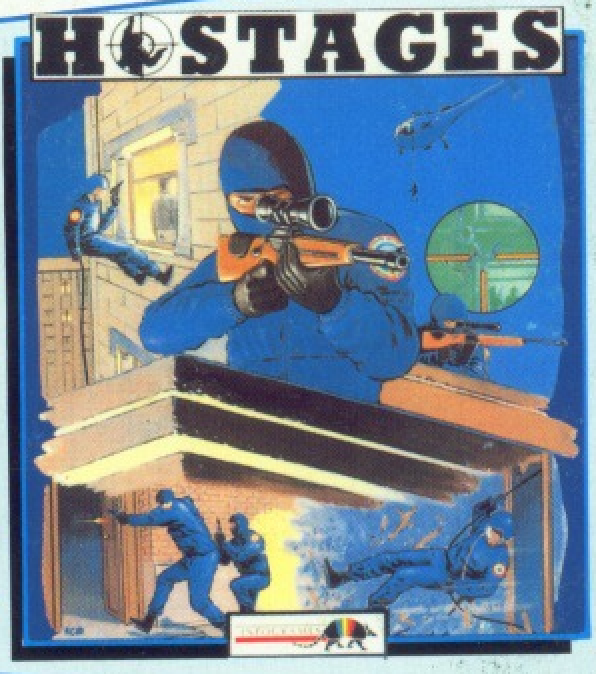
First, you must place your crack marksmen in nearby buildings, avoiding infrared lights and the terrorists' deadly aim. Then, after descending by rope, and protected by your marksmen, enter the Embassy through the windows and begin your search in silence. But beware, each door, each room, could be a death trap!

You must rescue the hostages, without any loss of life, and this will depend on the cohesion and co-ordination of your team.
NOW IT'S YOUR MOVE ! KEYBOARD OR JOYSTICK/MOUSE CONTROL.

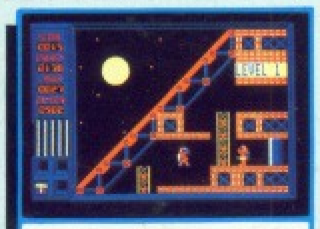
BBC Micro/Master, Electron & A3000/Archimedes

BBC Micro/Master

A3000/Archimedes



Superior Soccer


Star Port

PLAY IT AGAIN SAM 14

A New Action-Packed Four-Game Compilation

PREDATOR

Nothing like it has ever been seen before! You've heard about the Schwarzenegger film PREDATOR...now you can play the leading role. Fight your way through the South American jungle, but, beware the mysterious alien...

"A fun game having a lot of the feel of a Schwarzenegger film"...Micro User

SUPERIOR SOCCER

A fast action arcade game, with realistic graphics, or a challenging football management game...or, for the ultimate in football excitement and realism, you can play a combination of both!

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BALLISTIX

It's a whole new ball game! The fastest, wackiest, toughest computer game yet to appear. Play against a friend or the computer...60 different screens.

"Ballistix is original, fun and very addictive. Each new level is a challenge which brings a new court layout with several surprises" ...Electron User

STAR PORT

A brand-new arcade-adventure with 60 action-packed screens, written by the author of QUEST and CAMELOT. Rescue the medical supplies from the strange triangular space station...but only if you can solve the increasingly difficult letter-puzzles on each level.

BBC Micro/Master & Electron

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Master Compact 3½"Disc......£19.95

HOSTAGES
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Master Compact 3½"Disc....£14.95 A3000/Archimedes 3½"Disc...£19.95

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We have in stock over 30 different titles for the BBC Micro/Master and Acorn Electron computers including such great games as: ELITE, REVS + REVS 4 TRACKS, EXILE, A QUESTION OF SPORT, REPTON INFINITY, RICOCHET, LAST NINJA 2 and PERPLEXITY, and the compilation titles: ACORNSOFT HITS 1 & 2, SUPERIOR COLLECTIONS 1, 2 & 3 and PLAY IT AGAIN SAMS 1 to 14. All are available for immediate despatch.

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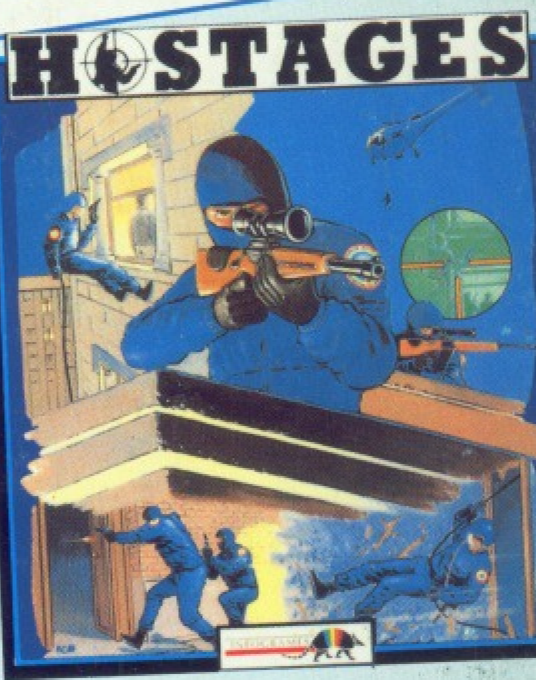
Harbour Development

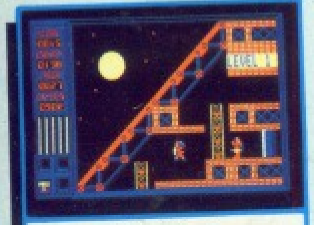
Regional Map

BBC Micro/Master

A3000/Archimedes



Superior Soccer



Star Port

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