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Volume 6
Number 5
July 1988
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Archimedes and Z88

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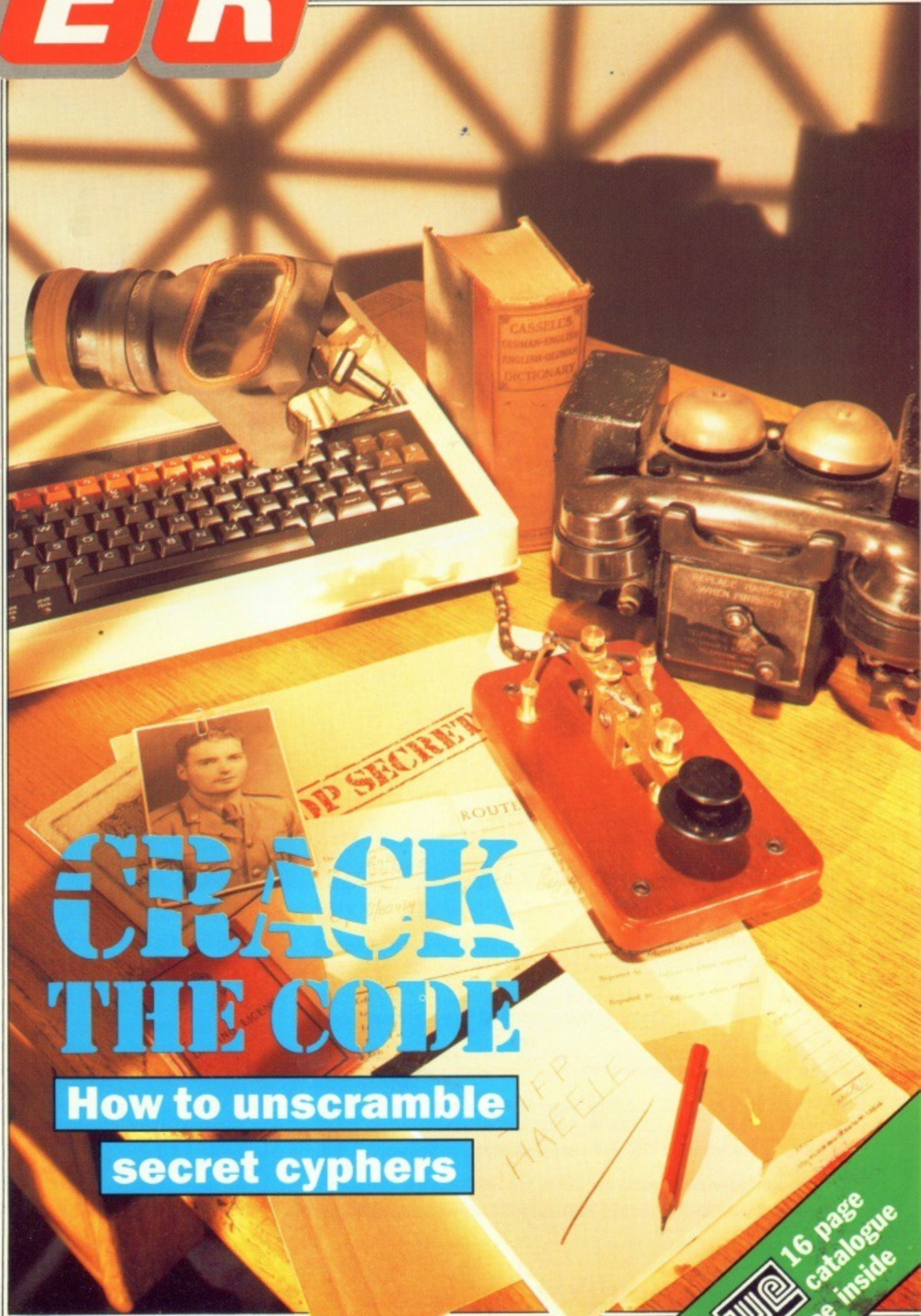
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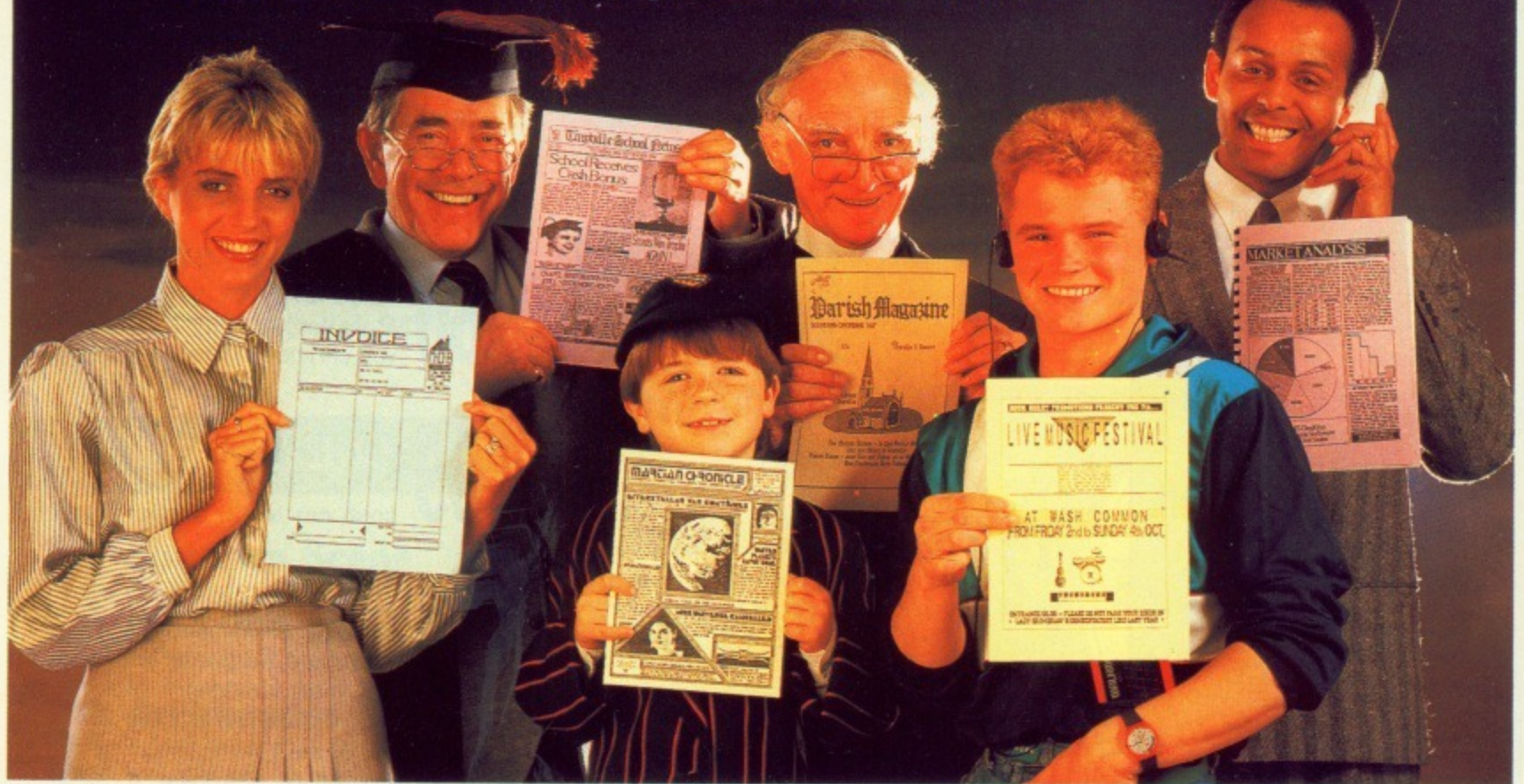
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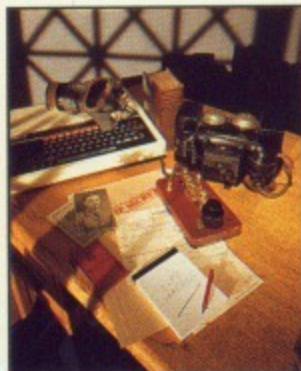
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To commemorate the arrival of the stunning Barbarian game on the BBC Micro, Superior Software offers you the chance to see the famous Barbarians rugby team playing the Wallabies at Cardiff Arms Park plus over £500 worth of other great prizes. Turn to Page 77.

Join our search for the most innovative use of a BBC Micro or Archimedes and you could share

OVER £1,700

worth of prizes that go to winners of The Micro User Innovation Awards for 1988. Full details are on Page 127




M · I · K · E · S
M · I · C · R · O
Memos

This month we start a new series reminding you of all those facts you once knew or have always been afraid to ask. Whether you're an expert or a novice there's useful information for you on Page 44.



Can an Archimedes act as a PC? On Page 79 you'll find a review of the PC Emulator, together with comparisons of operating speeds.

MICRO USER CLASSIFIEDS

The best bargains in the world of the BBC Micro come from fellow readers of *The Micro User*. Turn to **Page 141** find just what you're looking for – from cheap modems to complete computer systems.



All major listings in this issue are accompanied by a checksum to help overcome any typing mistakes. For full details of how they work, see the article on Page 28 of the February 1988 issue of *The Micro User*.

NEXT MONTH

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Moon Patrol

UTILITY
Automatic archiving

ARCHIMEDES
Text editors compared

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BEEBUG

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

Each issue of BEEBUG provides 72 pages of articles, programs (utilities, applications etc), tutorials, workshops, reviews, hints & tips, news and information for beginners and experts alike. All our programs are tested on all versions of the BBC Micro, and are also available monthly on disc or tape.

RISC USER

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

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

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

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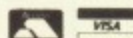
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MU7

NEWS *beat*

A foot in Japanese market

ACORN has received a massive boost from the news that Japanese electronics giant Sanyo is to manufacture its Risc chip set and market it worldwide. The company says it expects the deal to result in "rapid penetration of new markets and fresh applications – especially for embedded controllers and peripherals processors".

American firm VLSI Technology has previously been the sole source of the Acorn-designed integrated circuits which power the Archimedes.

According to market research company Dataquest, VLSI secured over 33 per cent of the Reduced Instruction Set Computer chip market last year. But increased exposure for the Acorn Risc Machines – ARM – is vital to Acorn's strategy in promoting its use on a worldwide scale by the computer industry. Only in this way can the company hope to recoup the massive costs of developing ARM.

Acorn believes the Sanyo deal will accelerate international acceptance of Risc technology and establish it as "the standard against which others are judged".

An Acorn spokesman said: "Sanyo evaluated the ARM and found it offered a price-performance ratio up to six times better than any other commercially available chip set".

Harvey Coleman, Acorn managing director, said: "Last year VLSI sold some 30,000 ARM chip sets, and with a world class alternate source like Sanyo now working with them we expect that number to increase dramatically.



Harvey Coleman, Acorn managing director, receives the best new technology application of the year award for the Archimedes. Pictured left to right: Electronics Times publisher Roger Michael, Electronic Times editor Mick McLean and Harvey Coleman.

Top award for Archie

THE electronics industry has voted the Archimedes "best new technology application of the year" in the 1988 British Electronics Week awards.

The accolade is the third for Acorn's Risc technology since last September. The Archimedes was voted small business/home computer of the year in the British Microcomputing Awards and the Risc chip set was included in US magazine Electronic Design's top products of the year for 1987.

Sponsored by Britain's leading electronics industry publications, the latest award is for technical and business innovation in electronics.

In its nomination Acorn was praised for introducing the 32 bit Risc-based Archimedes "at a time when most other manufacturers were playing safe by producing yet more IBM-compatible machines".

Receiving the award, Acorn

managing director Harvey Coleman said: "The Archimedes was developed using our own advanced Risc designs to offer a way forward for both education and business users who want powerful, flexible and affordable machines".

Z88 is US bound

SIR Clive Sinclair has signed a deal that will take the Z88 portable and its peripherals into the US. The contract is for an initial 13,000 units, worth \$7.1 million at retail prices.

A new company called Sinclair Systems Inc has been set up to market Z88 products which will range in price from \$549 for the computer itself to \$14 for the serial printer cable.

ENTRIES are already coming in for the 1988 Micro User Innovation Awards – and the standard seems set to be even higher than last year.

The first entry received – very professionally presented and accompanied by a welter of colour transparencies – slotted into the new category for Archimedes users.

So far, however, entries are equally divided between novel applications for the Archimedes and BBC Micro.

The Innovation Award winners will be declared in November at the Electron & BBC Micro User Show. The closing date for entries is October 14.

The international competition is open to all BBC Micro users – individuals or groups, schools or businesses – and the project entered for consideration can be serious, commercial or just for fun.

In the BBC Micro category the winner will receive – among other prizes – an Archimedes, while the winner in the Archimedes section will take home a 24 pin Brother 1709 printer.

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Drive Select Translation Cable

When used with above, interface links in external drive can stay set to '0', saves hassle when moving a drive from a Beeb. £9.00.

DFS Reader

This program will transfer the files on a DFS disk globally or selectively to an Archimedes disk quickly and simply. £15.00.

Monitor Switch Box

Archie/BBC. Plug both a BBC and an Archimedes into an Archimedes colour monitor. £10.00.

Archimedes <-> BBC RS423 link kit including file transfer software. £15.00.



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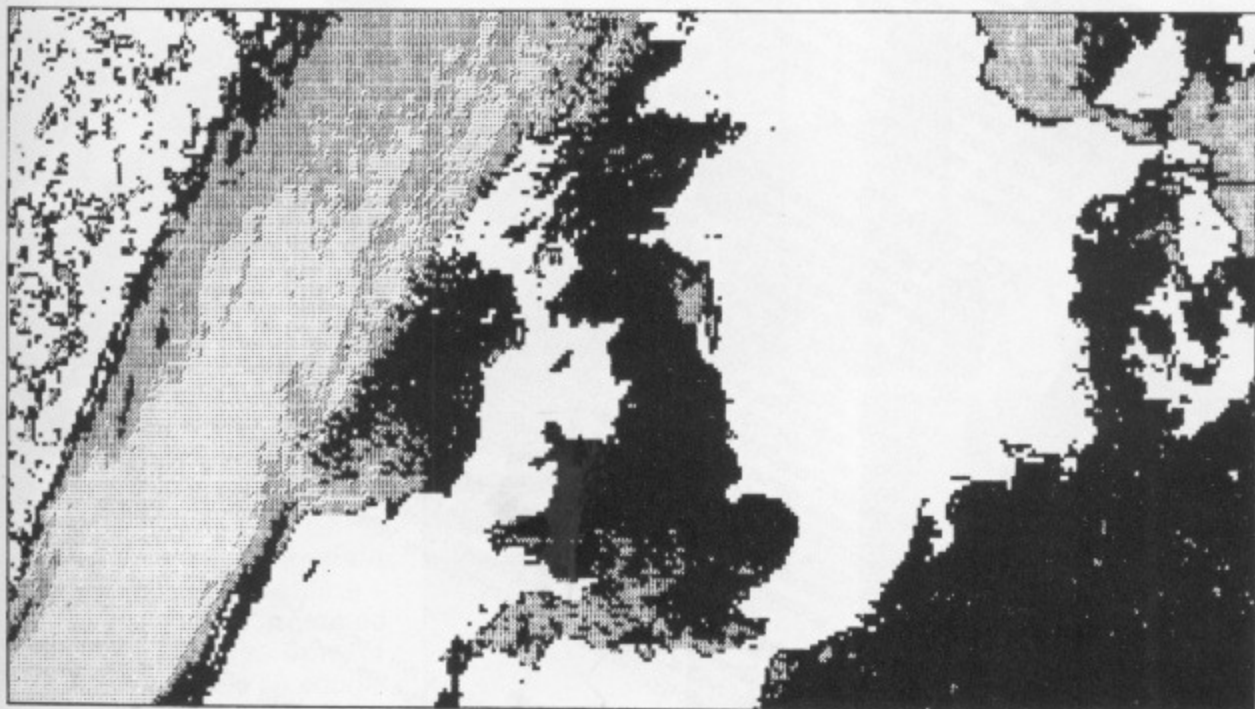
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NEWS *beat*



Better weather's on the way

A MUCH enhanced WeatherLink service specifically for Acorn computer users has been launched on MicroLink.

The result is a dramatic improvement in the quality of satellite weather pictures and the speed at which they can be downloaded.

MicroLink's top programmers worked for months to produce brand new machine-specific software which has reduced download time by up to 75 per cent.

A specially designed data compression technique incorporating full error correction provides pictures three times

sharper than before.

Colour resolution has been considerably heightened, making the weather maps easier to understand. The new WeatherLink graphics standard for Acorn machines is 320 x 200 pixels.

For the first time, instead of a kaleidoscope of colours only a professional meteorologist could interpret, WeatherLink users will see a rationalised and more comprehensible picture.

There are four colours available in mode 1 or eight colours in mode 2 on the BBC Micro. Archimedes owners will have

16 colours or shades of grey as shown above.

WeatherLink uses data from a range of satellites – notably those in the NOAA system – which provide for the best quality picture definition. The pictures are updated every 24 hours.

Although WeatherLink has the facility to put up maps of anywhere on the globe, initially only the British Isles and nearby parts of the continent will be covered.

Feedback from WeatherLink users will decide which additional geographical areas are included in the future.

Three in one pack

A NEW package for the Archimedes combines word processing, database and spreadsheet facilities – and allows all three activities to be carried out in the same window of a document, eliminating the need for cutting and pasting.

PipeDream, from Colton Software (0954 211472) is also claimed to be completely file-compatible with Acornsoft's View Professional for the BBC Micro.

The package is also available for the Z88 and IBM PC, and all four versions are file compatible and keyboard similar.

Price £113.85.

New games are magik

THE long-awaited Time and Magik adventure games trilogy from Level 9 has arrived under the exclusive Mandarin Software label. Price £14.95.

It consists of three award winning titles – Lords of Time, Red Moon and Price of Magik.

Suitable for any ram-enhanced BBC Micro, the package features mixed screen mode graphics with four colour scenes scrolling vertically over 80 column text.

Each of the three adventures has been substantially improved. There are up to 60,000 words of text, 700 locations, high quality pictures and a vocabulary that has been increased five fold over the original versions.

There is also a 10,000 word manual containing detailed play guide and short story.

Level 9 is offering a free back-up clue service for those who get bogged down in the intricacies of the trilogy. Clue-sheets, with a total of 1,600 entries, are available.

"We are delighted to be releasing software again for the good old Beeb – for it's a machine that's part of our roots", says Pete Austin of Level 9.

AWARD FOR WATFORD

HARRY Kurokawa (left) director of office automation for Panasonic Industrial UK, and Len Carlton (centre) printer sales and marketing manager, presents Watford Electronics managing director Nazir Jessa (right) with an engraved plaque to commemorate his company's role as premier dealer for Panasonic in 1987.

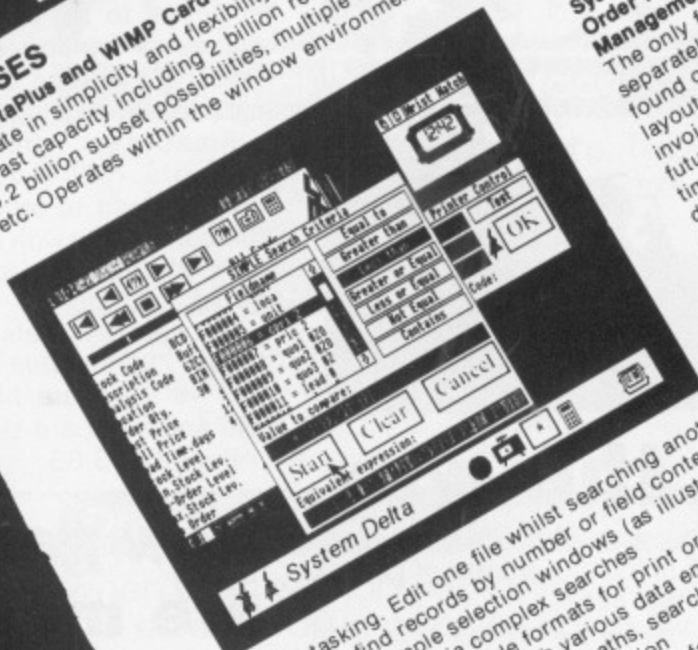


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NEWS *beat*

Now Arc is on TV

THE new BBC television quiz show *Four Square* features graphics generated by an Archimedes. In the game, compered by former *That's Life* presenter Michael Groth, contestants answer general knowledge questions in an attempt to win four adjoining spaces on a 36-square grid.

The successful contestant then takes on Michael's Maze — an animated display generated by the Archimedes. Correct answers keep a ball on course through the maze, wrong ones send it up a blind alley.

The Archimedes was chosen for its fast, high-resolution colour graphics and easy-to-use yet powerful software environment.

A key requirement was to synchronise the machine's PAL output to studio timing — achieved by using a plug-in Genlock card. Toby Freeman, programme originator of *Four Square*, said: "We needed a computer capable of providing television graphics and the Archimedes has produced good results".

Mark Patterson, editor of BBC South and East general programmes unit, said: "I'm thinking of using an Archimedes for a series of 84 quiz shows called *Going for Gold*, and I'm interested in the machine's potential for other broadcast applications".



Four Square presenter Michael Groth with two contestants in his TV quiz show — which also features the Archimedes

Cut price rumpus

RETAILERS are incensed by the prices being charged by a Bedfordshire dealer for the Z80 second processor for the BBC Micro.

They are objecting not to the expense but to the fact that they can purchase the device more cheaply there than they can from Acorn.

The processor has a recommended price of £399, but TowerHill Computers is offering it for just £189 — below the normal cost price to dealers.

"I don't know what they are

complaining about", said David Carter, TowerHill's MD.

"The deal we struck with Acorn is absolutely kosher. If retailers want to purchase Z80s from me then I would be happy to sell them wholesale.

"There is nothing underhand about the way we conduct our business. With good negotiating skills anyone could have come to a similar agreement with Acorn", he said.

According to Carter, another reason for the low price is that Acorn wants to clear its current stocks to make room in its warehouse for other products.

"By buying a large quantity of the processors it was possible to get the price down to below the RRP", he said.

Repton's a star

director Richard Hanson.

Repton's mission this time takes him from the prehistoric era to ancient Egypt, Victorian England and even into the future.

Superior has also unleashed *Palace Software's*

Barbarian the Ultimate Warrior on the BBC Micro market. The conversion retains all the elements which made the original one of last year's best selling — and most controversial — titles. *Decapitation* and *head-butting* all feature in the gameplay.

Both *Repton* and *Barbarian* are priced at £9.95 on cassette and £11.95 on disc. BBC Master compact discs are available at a price of £14.95.

WITH 100,000 units sold in 18 months, the *Repton* series of games has firmly established Superior Software's hero as the most popular character on the BBC Micro.

Each new *Repton* release has outsold its predecessors, and *Superior* (0532 459453) is optimistic the trend will continue with the latest game — *Repton Thru Time*.

"The number of *Repton* fans still seems to be increasing", said *Superior's* managing

Records Mastered

MASTER series computers are keeping tabs on patients at two hospitals in the East Hertfordshire Health Authority. Networked systems have been installed in the pathology laboratories at Hertford County Hospital and Queen Elizabeth II Hospital, Welwyn Garden City.

Using specially developed data collection software, records are kept of all diagnostic treatments from patients' specimens.

Information from patient request forms is catalogued on to nine different fields of data including test data, hospital and ward, GP and practice, consultants, and whether the tests were routine or urgent or done out of normal hours. Further software is being developed so that the Masters can record test results and clinical budgeting.

Previously both hospitals used BBC Micros to collect data and transfer it between locations via modems. Dr John Fyffe, consultant biochemist at the Queen Elizabeth II Hospital said: "The new Master networks have provided us with powerful management tools for compiling DHSS Korner statistics.

"It was a natural progression for us to move from our BBC Micros to a Master-based system — a relatively trouble-free transition".



A RANGE of Enterprise modems has been released by Anglo Computers (0970 624321), from a simple V21/V23 version to the top of the range, multi-speed Hayes-compatible Enterprise II Turbo.

All modems are fully BABT approved for PABX and PSTN use. Prices range from £114.95 to £264.45.

ARCHIMEDES & BBC SOFTWARE

INTER-CHART

A general purpose chart and graph plotting program that can display data in the most easily understood format—graphically.

While it integrates directly with other members of the 'INTER' family it can also accept data from ASCII files, produced by WORDWISE, VIEW and programming languages such as BASIC.

Supports line, and bar graphs, pie charts and also scatter graphs. These may be automatically scaling, or the user may view any portion of the scale so allowing 'zooming' into any area of interest.

Pie charts may have highlighted segments (pulled out) with the values optionally displayed as percentages.

All graph displays may have optional text headings or messages positioned anywhere on screen. These are saved with the graph and may be edited at any time.

Multiple graphs can be held in memory at the same time. Any number of graphs may be overlaid allowing easy comparisons etc. (Not applicable to pie charts.)

Graphs may be displayed in any BBC graphics mode. The colours of bars, lines, or segments may be altered from a simple table of colours. In addition special striped colour combinations and a variety of cross hatching styles are available for bar charts.

Where appropriate either axis may be displayed with a log or linear scale, and optional dotted graduation lines are available.

INTER-CHART has built in screen dump routines for EPSON matrix printers and compatibles. Other screen dump routines may be used from within (or external to) INTER-CHART for other printers or plotters.

BBC ROM—£32.00+VAT

(£36.80 incl.)

Archimedes ROM £25+VAT (£28.75 incl.)

INTER-WORD

The ultimate word processor for the BBC Micro.

The most comprehensive WYSIWYG image of the final page showing at all times, page breaks, headings, footings, bold text, underlines etc, ensuring the page on screen looks as close as possible to the final printout.

Works in 40, 53, 80 or a special 106 column screen mode and offers super-fast scrolling in all modes, even sideways scrolling if necessary.

All margin and tab settings are controlled by rulers placed in the text. These may be altered by moving the cursor onto the ruler and simply dragging the required margin or tab to the new position. All text controlled by the ruler is instantly re-formatted to the new settings.

Pull down menus may control nearly all operations—no complicated commands to remember. This ensures that it really is easy to use.

Printer control menu allows easy access to all printers' special effects and allows easy configuring to any printer. Printer codes may be saved and re-loaded—no need for special printer drivers.

A special multi-file mode enables very long documents to be generated, even to the size of a disc, yet enables simple movement to any page in the document.

File selector for all file operations. This enables fast and very simple file name selection when saving, loading etc.

Integrates directly with other members of the INTER family and with SPELLMASTER, the fastest and most flexible spelling checker available for the BBC.

BBC ROM £49+VAT (£56.35 incl.)

Archimedes ROM £39+VAT (£44.85 incl.)

INTER-SHEET

A simple to use, but very powerful spreadsheet program offering many unique features.

The fastest spreadsheet available for the BBC Micro.

The largest capacity spreadsheet. This means more data and larger spreadsheets are possible.

40, 80 and a special 106 column screen mode. Especially useful for viewing large sheets.

Multiple spreadsheets in memory at once. Data from one may be included in the calculations of other sheets.

Super-fast replication allows anything from a single box to an area of the sheet to be copied to any other position. Formulae may be automatically updated relative to their new positions.

Simple WORDWISE like cursor movement.

A unique windowing system enables any row or column to be fixed on screen, while allowing the sheet to scroll underneath. Simpler than other windowing systems yet more flexible.

While it integrates directly with INTER-WORD it can also transfer data to and from other word processors such as VIEW and WORDWISE.

A large range of standard maths functions is included in addition to special spreadsheet functions such as AVERAGE, COUNT, IF . . . , LOOKUP, MAX, MIN, SUM etc.

Simple auto-prompting commands structure..if you can't remember the complete command syntax, just enter the first letter and INTER-SHEET will prompt from then on.

BBC ROM (2 chips) £49+VAT

(£56.35 incl.)

Archimedes ROM £39+VAT (£44.85 incl.)

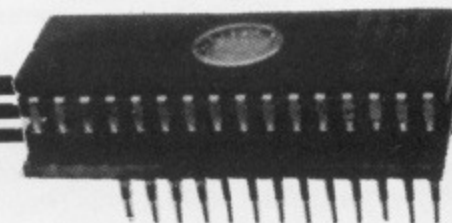
All the above ROMs are fully compatible with DFS, ADFS, Econet, all BBC machine variants and Watford or Aries shadow RAM boards.

MEGA 3

MEGA 3— the single chip solution

A new single 1 megabit chip containing complete versions of all the above programs is now

available. This replaces 4 chips and so offers a more compact and more economic way of obtaining the above three programs.



BBC ROM £85+VAT (£97.75 incl.)
Archimedes ROM not yet available.

ACCESS & BARCLAYCARD ACCEPTED

Computer Concepts Ltd

Gaddesden Place
Hemel Hempstead
Herts HP2 6EX.
Telephone 0442 63933

NEWS *beat*

Emulator upgraded

LATEST version of the PC Emulator from Acorn lets the Archimedes run all major PC-compatible software designed for MSdos systems.

Among the packages that can now be used are Lotus 1-2-3, Symphony, MS Word, dBase III, Flight Simulator, GWBasic, SideKick and Supercalc 4.

The new version is available as an upgrade from Acorn (0223 245200) price £15.

Shift at Summit

HAVING changed its name to Alpine, the Irish software house formerly called Summit has come up with a new range of products.

It now has a Master Compact version of its adventure language programming system ALPS available. The 3.5in disc contains the APLS rom image, utility programs, sample games and costs £28.95. An Archimedes version is under development.

A mammoth disc-based adventure with 82k of text called Plague Planet has been released for the BBC Micro and Master 128. It includes more than 250 locations, and 1,000 messages of compressed text displayed in a range of colours.

Repton winners

THE Repton Editor Competition in the March issue of *The Micro User* offered over £600 in prizes. Although there was some ambiguity in the competition instructions many of you managed to struggle through.

First prize of 10 Superior Software games was won by Gray Robertson of Livingston, while five games go to Matthew Sandell of Surrey and three to Morag Hughson from Shetland.

The 25 runners up who will each receive one of the chart-topping Superior titles are: C Mottram, Sussex; R Lees,

It costs £10.95. There is also an ALPS Extras disc containing a number of additional programs and routines, many of them suggested by users. Price £9.95.

The ALPS Extension Disc has been designed to enable ALPS users to generate and run disc-based text adventures. Price £9.95.

Trade-in boom

NEW lamps for old seems to be the theme of deals being offered to BBC Micro owners by Computek.

The company is offering to take in used computer hardware and software in exchange for cash or new equipment.

So far the scheme is proving popular with educational establishments who see Computek's stocks of low-priced used BBC Micros as a real alternative to buying new.

Since the company was launched 15 months ago it has amassed a large selection of hardware and software.

BBC Micro owners who may not have been able to afford a piece of software costing around £80 stand a chance of finding the package on Computek's list at a greatly reduced price.

"One of the main advantages of trading in or selling unwanted items is that you can dispose of them in one fell swoop", said director Gerry Hill.

THE GALLUP CHART

TOP 20
BBC SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	PRICE
1	4	STEVE DAVIS SNOOKER <i>Blue Ribbon</i>	1.99
2	1	WINTER OLYMPIAD <i>Tynesoft</i>	9.95
3	2	DOTTY <i>Blue Ribbon</i>	1.99
4	6	PLAY IT AGAIN SAM <i>Superior</i>	9.95
5	●	GRID IRON <i>Top Ten</i>	2.99
6	3	STAR WARS <i>Domark</i>	9.95
7	●	SPY CATS <i>Superior</i>	9.95
8	5	QUEST <i>Superior</i>	9.95
9	8	PLAY IT AGAIN SAM 2 <i>Superior</i>	9.95
10	7	LIFE OF REPTON <i>Superior</i>	6.95
11	●	WAY OF THE EXPLODING FIST <i>Mastertronic</i>	1.99
12	12	GRAND PRIX CONSTRUCTION SET <i>Superior</i>	9.95
13	●	MOON CRESTA <i>Alternative</i>	1.99
14	13	COMPUTER HITS 10 VOLUME 4 <i>Beau Jolly</i>	9.95
15	●	HERCULES <i>Powerhouse</i>	1.99
16	●	INDOOR SPORTS <i>Advance</i>	9.95
17	●	PSYCASTRIA <i>Alternative</i>	1.99
18	11	LEAGUE CHALLENGE <i>Atlantis</i>	2.99
19	●	JETPAC <i>Mastertronic</i>	1.99
20	19	COLOSSUS 4 CHESS <i>CDS</i>	9.95

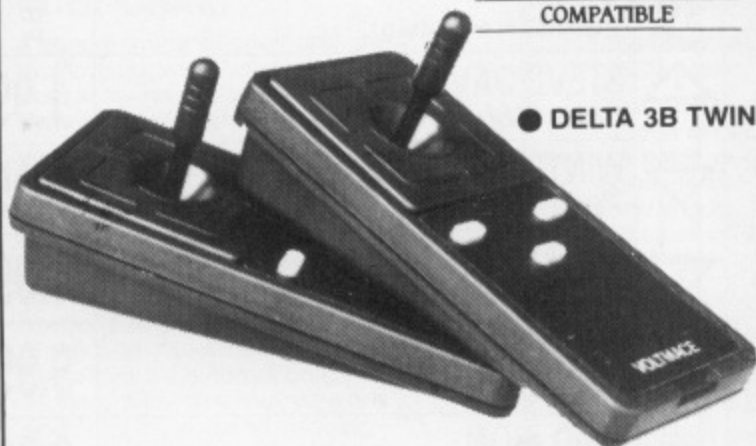
Compiled by Gallup/Microscope

There are five new entries this month, with Jetpac, Indoor Sports and Psycastria reappearing in the chart. Spy Cats is the new one from Superior and enters at seven, but budget priced Grid Iron from Top Ten is the highest entry.

VOLTMACE



COMPATIBLE



● DELTA 3B TWIN

STILL USING CASSETTES???

Get into Discs with our clearance sale

Disk Pack 1: 1 40Tr Single sided 1/2 height, 5.25" Drive, cased + connecting lead, 1 Watford Mark 2 ddsf kit. Complete with manual + 5 free discs - £85.00

Disk Pack 2: As above but with double sided 40Tr Drive - £115.00

Only the drive needs to be changed if you want to upgrade later to a 80Tr drive

DRIVES ON THEIR OWN CASED WITH LEADS

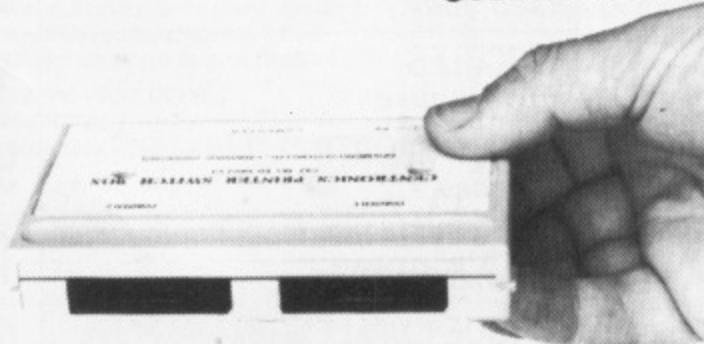
40Tr Single sided £30.00
40Tr Double sided £74.95



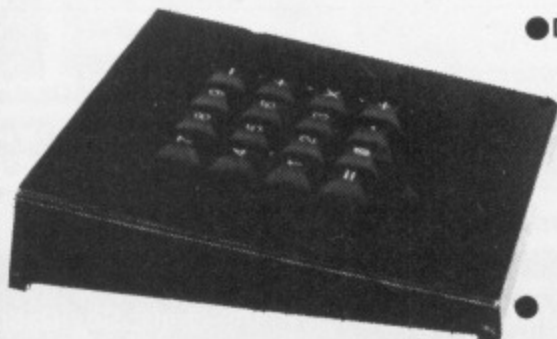
COMPATIBLE



● DELTA 3S or 3SO



● DATAPRINT 2P



● DATAPAD 16B

SPECIAL OFFER- FEW ONLY MITSUBISHI DISC DRIVES

Double Sided, Double Density, 80 Track, 1/2 Height Mitsubishi Model M4853 with flap front in cream steel case complete with leads for BBC B, Master etc.

£84.95 inc. VAT and P&P

Also available uncased £70.00 inc. VAT and P&P

FOR A BBC A, B, B + & MASTER

DELTA 3B TWIN - £19.95

2 joysticks wired to one plug.

As with all our joysticks they have the fast action sprung to centre return of the steel shafted nylon covered joystick. The light action makes them ideal to hold and the 3 fire buttons allow left or right-handed use.

DELTA 3B SINGLE £12.95

A single joystick that in some ways can act as two. The custom made potentiometers are wired so that it will work as a left hand or right hand joystick. It can run some programs written for two joysticks and has two independent fire functions.

DELTA 14B £14.95

Our original ACORN/BBC handset. The same super light joystick, but with 14 long life buttons, video game tested for many years. A DELTA14B/1 is needed to run the keypad but a 14B on it's own will work as a joystick and fire buttons, so you can always add the 14B/1 to it later.

DELTA14B/1 for use with 1 or 2 DELTA 14B's £14.85

DELTA DRIVER CASSETTE £5.95

The A/D/USER PORT interface box. This gives simultaneous access to both the analogue port, for the joystick part and the user port, for the keypad. Two handsets can be plugged into the box giving a total of 24 user definable keys.

N.B. On a Master a small extension lead is needed to clear the RGB socket (£5.95 extra).

Full instructions are provided to include the keypad in your own programs even in BASIC or for the non-programmer a DELTA DRIVER cassette is available with keyboard to joystick/keypad conversions and keypad set up programs.

FOR THE MASTER COMPACT OR ELECTRON FITTED WITH A SWITCHED JOYSTICK INTERFACE

DELTA 3S £12.95

For an ELECTRON with a switched joystick interface (not a PLUS 1) this gives you the same delightful light, fast action of the DELTA joysticks but fitted with a 9 way D plug as per Atari, Commodore, etc. and will run on First Byte interface or similar.

DELTA 3SO - OPTICAL FEED BACK £19.95

Now you can see exactly when each switch has operated so you can move about faster and more certainly guaranteeing diagonals.

FEW LEFT ONLY - LAST MONTH OF OFFER

CUMANA TOUCHPADS - The touch pad allows you to transfer sketches onto your screen by using a stylus on a touch sensitive pad
Absolute bargain £14.95 inc. VAT and P&P

Unbranded Guaranteed Discs

10 5.25" 40Tr Double sided £4.95

10 5.25" 80Tr Double sided £4.95

10 3.5" 135TPI - DS/DD £10.95

Disc-Drive head cleaner kits-Liquid type-non-abrasive 3.5" or 5.25" £3.95

NEW!!! DATAPRINT 2P LOW COST - LOW PROFILE - PRINTER SHARER £34.95

A neat small unit which allows two parallel printers to be connected to one computer and simply switched between the two. e.g. one printer for paper and one for labels.

DATAPRINT 2C LOW COST - LOW PROFILE COMPUTER SHARER £34.95

The opposite of the DATAPRINT 2P this little box just 125 x 90 x 20mm allows two computers to share one printer.

Computer to Sharer leads £5.00

Sharer to Printer leads £5.00

DATAPAD 16B £39.95

A commercial spec. 16 way keypad. Full travel mechanical keys with double shot moulded keycaps mounted in a low profile metal case. The keys are marked with calculator legend, but the software included allows the pad to be defined as any keys, including function keys or single byte VDU commands such as PRINTER ON/OFF. No tampering with the computer as it fits onto the user port.



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MU/MN/788

TELETEXT ADAPTER

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

The answer is Teletext. Yes the same system everyone has seen incorporated into television sets, but with a difference. When Teletext is read by a computer you can actually use the data. The MORLEY TELETEXT ADAPTER introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than ten years ago, will be fully compatible with any future advances in the Teletext system.

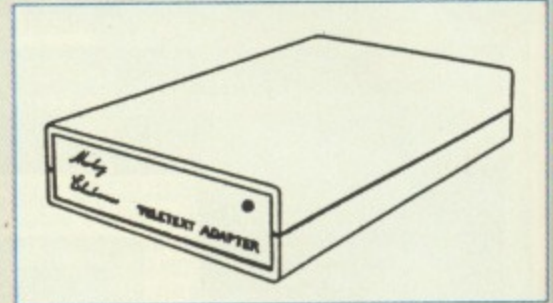
With the Morley adapter you will get a state of the art unit that automatically tunes itself into the required station (no more messing around with screwdrivers or twiddling little knobs in the back of the case), a user friendly menu driven program, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

FEATURES:

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

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

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



(no more TV or Radio Times to buy).

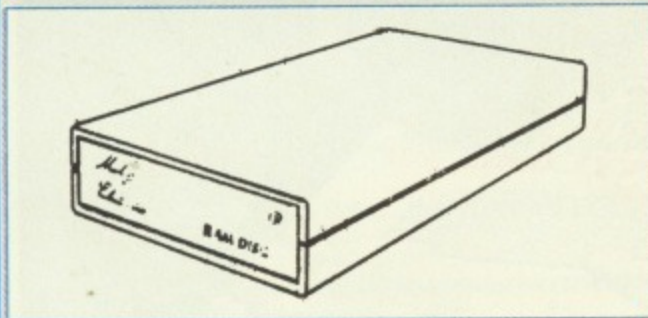
WHAT THE REVIEWERS SAID:

"...In terms of price, performance, future expansion possibilities and those little touches that show thought for the end user I would recommend the Morley unit."—(*Acorn User*, January, 1986).

"...The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."—(*A&B Computing*, June, 1986).

"...Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."—(*The Times Educational Supplement*, September, 1986).

THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLDWIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.



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

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

FEATURES:

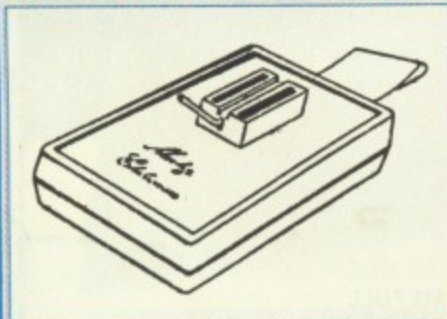
One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about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

RAMDISC

working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' *commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.

Well that's the spec., add to this our usual 12 month no quibble guarantee and we're sure you'll agree the Morley RAMdisc is the sensible alternative if increased storage capacity and speed is your requirement.

EPROM PROGRAMMER V2



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

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

THE HARDWARE

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

THE SOFTWARE

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

The whole system is available now for less than the price of one WORDWISE chip. So get yourself the all new MORLEY EPROM PROGRAMMER V2 today and start using those expansion boards for what they were made for! ROMS. Immediate delivery no quibble 12 month guarantee.

MASTER CARTRIDGE

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

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

QUADS—also available quad cartridges, specifications as Duels but 4x16k ROMs.

MASTER SMART CARTRIDGE

This device was designed and manufactured jointly by Morley and Care Electronics.

The Smart cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination. The Smart cartridge will prove useful to the novice, allowing him to do the simple things like dump any screen to printer, and make backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.

BUILT IN FEATURES (at the press of a button)

- Autosaves computer's entire memory.
- Freeze program at any point.
- Screen dump (any mode) to printer or disc.
- Allows any OSCLI command without disturbing memory.
- Copies 90% of protected software.
- Tape to disc, disc to tape.
- User friendly menu.
- Sound On/Off.

ALL CARTRIDGES COME WITH A 12 MONTH NO QUIBBLE WARRANTY

NEW PRODUCT

MORLEY MASTER BOARD 'AA'

At long last the add-on all MASTER users have been waiting for, an internal ROM board.

No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.

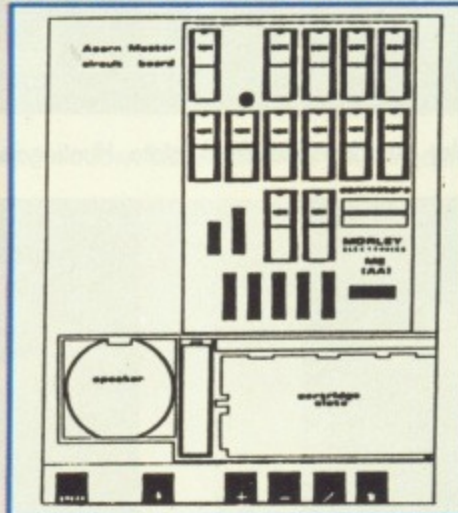
The new MORLEY MASTER BOARD "AA" allows you to have up to 8x16k and 4x32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permanently, whilst retaining the standard 4 x sideways ram banks and four banks by using cartridges

A staggering 32 ROM images installed and accessible at any time

Included in the package is a utility ROM which has many useful features such as 'FICOPY', a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

So for less than the price of four external cartridges you get a MASTER BOARD "AA" which with twice the capacity has got to be THE ROM expansion for the serious MASTER user.

The unit comes with the usual Morley, full no-quibble twelve months warranty, and our usual after sales service



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ELECTRONICS



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THE COMPLETE RANGE OF TELETEXT SOFTWARE from M/B SOFTWARE

***NEW... DESIGN 7 PLUS** - now 'the best' is even better. Held in high regard by reviewers and hundreds of satisfied owners, DESIGN 7 has been further improved, with revised keystrip & even more features. Design/load/save and MODE 7 screen with ease, up to full CEEFAX/Oracle standard. Will convert ANY MODE 7 screen to a BASIC procedure, for inclusion in your own programs. ROM version includes a file copier, printer dumps useable from BASIC etc. B/MASTER/COMPACT.

TELETEXT EMULATORS/SCREEN DISPLAYS/INFORMATION SYSTEMS - A complete range of teletext programs to cater for all needs, with full teletext adapter interfacing.

***NEW... DESFAX** - totally new version - streets ahead of the competition - run your own information/display system. Stores hundreds of screens on dual 80 track drives (96 screens on single-sided 40 track), with access to any screen with a SINGLE KEYPRESS. Lots of special effects - screens can scroll, slide, overwrite etc. Animation, loops, subroutines - send for details - not enough space here to even begin to describe the advanced features!! B/MASTER/COMPACT

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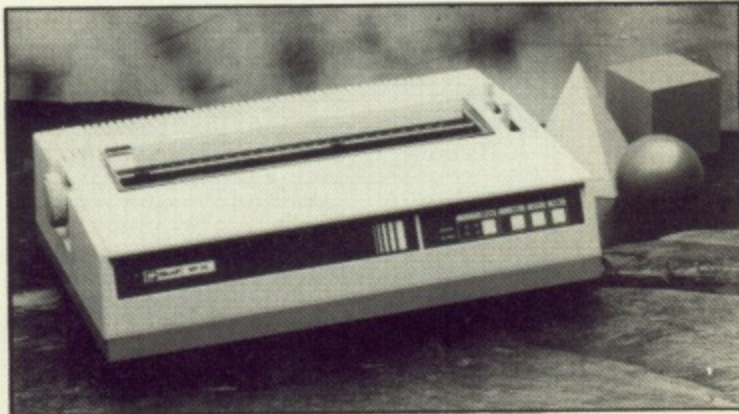
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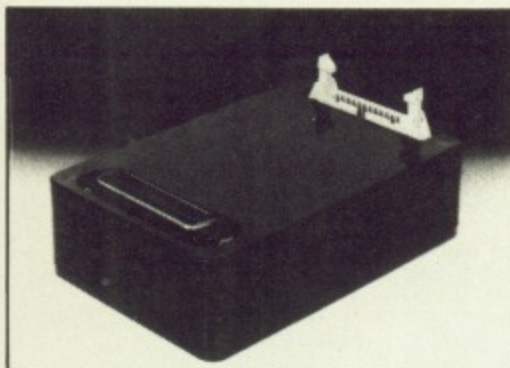
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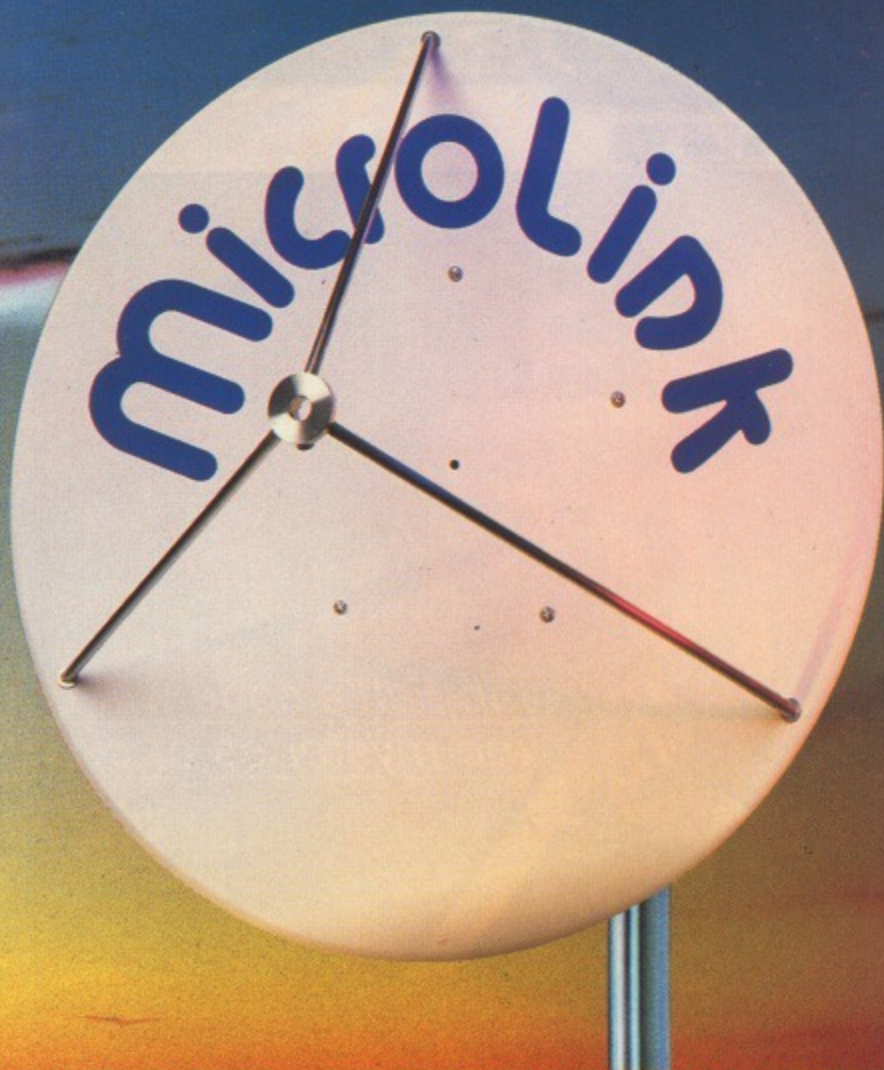
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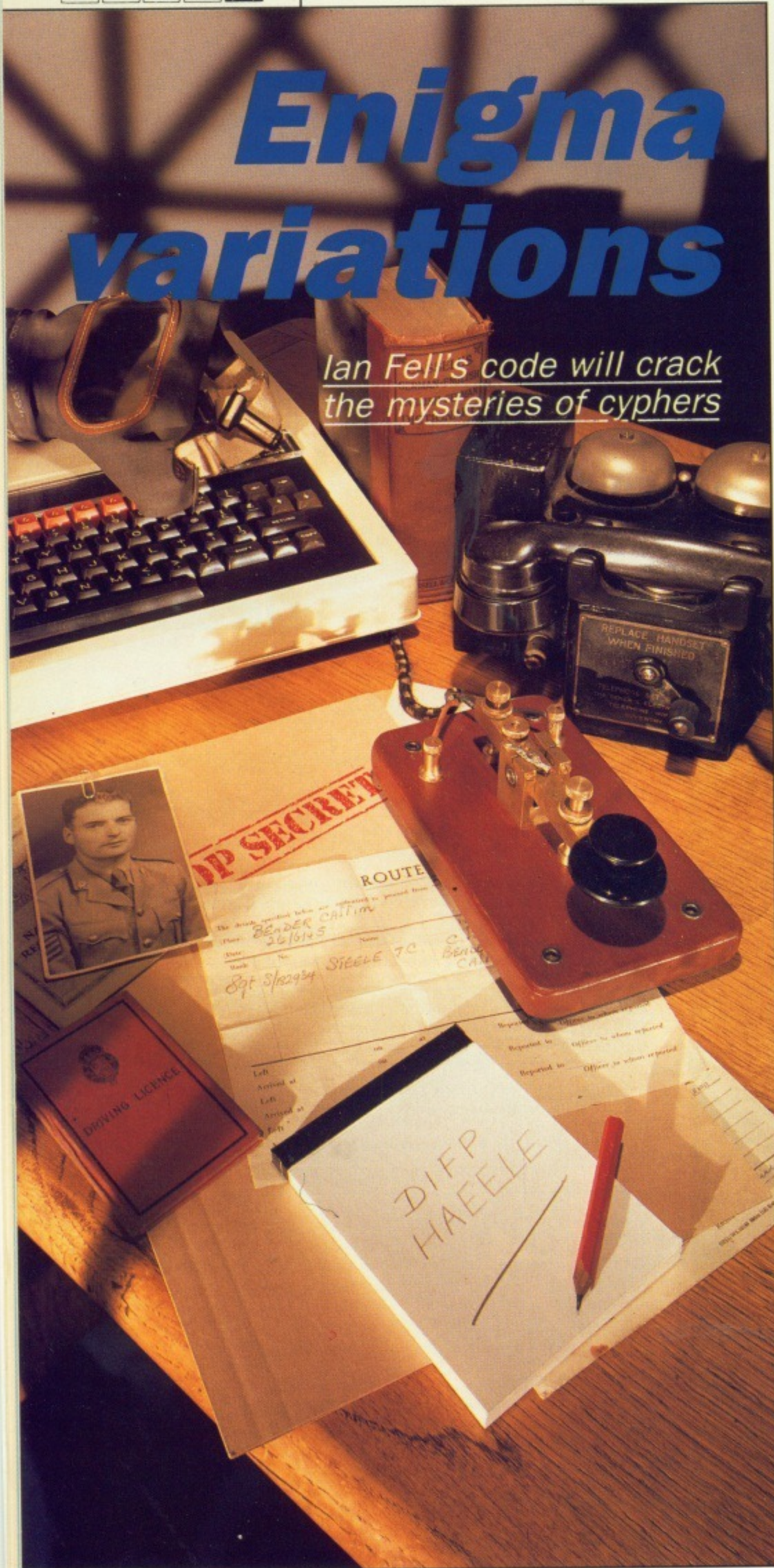
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R109

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Enigma variations

Ian Fell's code will crack the mysteries of cyphers

AN old friend of mine was one of those who, during the Second World War, tackled the Germans with his grey matter. He wrote and broadcast black propaganda to the enemy from the secret base at Bletchley Park in Bedfordshire trying to undermine enemy morale.

One of my friend's associates was Professor R.V.Jones who, in his book *Most Secret War* (Coronet Books / Hodder & Stoughton), gives an account of the cracking of the Enigma code – a machine-produced Nazi cypher. He wrote:

"Travis introduced me to Alan Turing, the brilliant mathematician who later contributed so much to the development of computers and machine intelligence, and together we worked out ways in which the process might be done mechanically, with a machine that would recognise when genuine German was coming out by the frequencies with which various letters and diphthongs appeared."

And what's good enough for Turing is good enough for us – we can build our own code cracker. Or at least find out how much can be decoded by analysing a piece of code on the basis of the frequency of its letters.

Unravelling the secret

The key to the program CodeCatcher is:

ETAONISHRDLCUFMPBWGYVKXQJZ

This is the order of frequency with which letters occur in the English language. I found this ritual string in an old 1920s *Commonplace Book* – I wonder what they used it for?

Anyway, CodeCatcher comes with a few trimmings, but in essence the program discovers the frequency with which letters occur in a given phrase and, having sorted them into frequency order, guesses what the code equivalent might be. Then the program invites you to suggest alternative possibilities, and ultimately the secrets are revealed for your eyes only.

This is the theory. The variable success of the routine depends on having a big enough chunk of coded message for letter frequency to have any validity. And it also requires your ingenuity in spotting regular patterns of letters – representing *the* for instance – to speed the decoding. It's surprising how your skills develop.

To get things going, either key in a piece of coded material or load it in from disc via the option offered on the menu – any file of data must be in upper case Ascii and called *message*. Decoding begins when you load a disc file or input the data and press Return.

The core of the program resides in PROCletcount and PROCbubble and you change the guesses with PROCoptions. This gives you the chance to alter characters and backtrack on a guess, to end the process and print out the code equivalents. If you've got a Master, you can toggle to the shadow screen and see the most likely equivalent letters.

For example: The program may suggest Z is A, but Z could just as easily be any other character

which occurs on the same or a numerically-adjacent line. Note too that after the first decoding, the original coded message will disappear. Don't worry, you won't need it and the version presented will be nearer to the uncoded message.

Recruiting spies

Short of starting a war and intercepting the cryptographic messages with which our airways are doubtless cluttered, coded messages are tricky to come by. And remember that this program only has a chance of success with those codes in which one letter is always represented by the same other letter – known as substitution codes.

So I have resorted to two ploys to advance my cryptographic skills. One is to get my children to encode short passages for me – my sons are by now decidedly reluctant spies. Their messages are consequently disrespectful, but at least I have no pre-knowledge of their content. The other option is the not-uninteresting exercise of keying in uncoded material and seeing how accurately the program restores the original.

Professor Jones also mentioned the frequency of diphthongs – this offers scope for program development. Blind users will be familiar with the use in Braille of single symbols for complete sounds like *wh*, *th* and *ed*. And a Braille primer provides a good source of regular letter combinations to look for.

On the tape and disc for this month is an encoded file called *message* which will tell you a little more about my friend at Bletchley – once you decode it. He wasn't a cryptographer, but he did write a book called *Krankheit Rettet*, loosely translated as *Sickness Saves Lives*. This was a guide to feigning assorted diseases and was dropped over the German lines to encourage malingering.

It was a great psychological ploy – until, that is, the Germans translated it and dropped it back on the British.

Turn to Page 138 ▶

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Halfway through
decoding

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DEVELOPED BY THE ACORN RESEARCH AND DEVE
LOPMENT TEAM, USING VLSI TECHNOLOGY DESI
GN TOOLS AND PROCESS RULE

Decoded message

MAIN ROUTINES

setup	Defines variables and strings
choice	Sets up and responds to choices
menu	Offers menu options
screen(T\$,C1%,C2%)	Lays out menu screen
line(col\$)	Draws solid lines
getchoice(C%,L%)	Inputs and regulates choices
input	Inputs coded text from keyboard – option 1
delete	Deletes last character input in error
unstore	Inputs coded text from file – option 2
display	Displays text and <i>Decoding</i> message
letcount	Reads frequency table and counts frequency of characters in target text
bubble	Bubble sorts target characters into frequency order
swap(rec1%,rec2%)	Swaps character order according to frequency
guess	Produces list of characters on shadow screen and suggests what they represent
format	Formats display of characters
colour	Highlights – with colour – decoding changes
replace	Replaces coded letters with the letters they hopefully represent
change	As PROCreplace
alter	Manages and responds to suggested changes
options	Offers backtrack, end sequence, character changes or toggle to shadow screen
transfer	Sorts codes for latest equivalence
toggle	Toggles to Shadow or Main Screen
backtrack	Backtracks to rescind previous change
copy	Makes a copy of initial text
lastcode	Displays key to codes once next is decoded
turnabout	Carries out proposed coding changes
update	Updates main screen text display

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Encoding
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Dig deeper into Dump Out

Peter Davidson shows you how to get more from this rom in the first of a new series

ONE of the problems with easy-to-use software is that you often don't take advantage of all its features — or even know they exist. **Dump Out 3** from Watford Electronics comes into this category.

You can fit the rom into your micro and obtain superb graphic dumps at any time just by entering a command like:

`*GIMAGE EPS`

But there's lots more you can do with this rom — so we'll take a look at some of its capabilities, beginning with the easiest.

You start by specifying the printer. This is done by putting a three letter code — shown in Figure 1 — after the *GIMAGE command. You can also get a full list of the printers supported by entering:

`*HELP PRINTERS`

Remember, a lot of printers are Epson-compatible, so EPS will be used for makes like the Panasonic KX-P1081, Citizen LSP-100 and so on. In this article, if yours is not one of the Epson-compatible types, just substitute the appropriate code in place of EPS in the examples given.

Following the *GIMAGE command by K activates a delayed key-triggered dump on version 3.0J of Dump Out 3 and greater. This gives an easy way to print screens — even interrupting a program while it is running.

So if you use:

`*GIMAGE EPS K`

at any time you can press Shift+Ø or Control+E-scape to get a dump. Two key options are given so that if one clashes with the software you are using, the other may work. The former is the best to use if possible, as the latter acts as if Escape has been pressed once the dump is complete.

When you press the trigger keys an adjustable window appears covering the full screen — we'll look at how to alter it later — and pressing Return starts the printer. If you change your mind, pressing Shift+Return cancels the operation and lets you continue with the program. The key trigger remains in operation until Escape or Break is pressed and the K in the command line may be followed by any other Dump Out 3 options apart from X and Y.

Another feature that works in a similar way to the key-triggered one is the switch-triggered

This is red
This is green

Th This is red
Th This is green
Th This is yellow
Th This is blue
Th This is magenta
This is cyan
This is white

A comparison between a fast dump (behind) and one done at normal speed

Code	Printer
SEK	Seikosha GP80/100
SE2	Seikosha GP250
TND	Tandy LPVII/DMP100
DMP	Tandy DMP200/400
NEC	PC8023
EPS	Epson fx/rx/mx
EPC	Epson fx/rx crt graphics
KAG	Kaga/Taxan
SHI	Shinwa CP80

Figure 1: The printer codes

dump using the S option. Again, you need the later versions of the rom, but this time instead of using keys to activate the printout you use a switch connected to the user port. It's simple to make — details are in the manual — and this method has the advantage that there's less chance of a clash with the software you're trying to dump.

Moving on to the actual printouts, the default dump — the one you get if you don't follow the

Turn to Page 26 ►

Dump Out 3 was reviewed in the February 1985 issue of *The Micro User*.

Later versions — from 3.0J — than the one looked at then also have a key triggered dump.

◀ From Page 25

*GIMAGE command by any parameters – is a negative of the screen. That's usually best because the display is black and paper is white so it's what we expect. However, if you want a true image just follow the command with G:

*GIMAGE EPS G

Remember, dumps in this form may contain a lot of black and you'll wear out ribbons fast.

If you're not too worried about the quality of a particular dump – say you want to get an idea of what changes you need to make before doing a better one – Dump Out 3 allows you to do a faster printout on some machines. The simplest way to see if your printer supports this feature is to try it – by putting an F as the first item in the command line.

Now on to the colours. The software dumps screens in black and white using dot pattern shades to represent the colours as they were before any VDU19 commands altered them. However, if the logical colours. (the ones you get when you switch the micro on) have been assigned different physical ones (the colours you see) including a P in the command line causes the latter to be dumped. So to combine the last

two instructions we've met will give a fast printout of a screen using shades corresponding to the colours you see on the screen.

*GIMAGE EPS F P

Note that, in four colour modes, if the colours you can see on the screen have a similar brightness the output will all have similar shading.

If you dump a screen full of multi-coloured text the blue words, for example, may not be clear. Dump Out 3 allows you to produce two colour dumps where the background shows on the paper as white and everything else as black. With everything in black and white text is easily read. To obtain a printout in this form just follow the command with T:

*GIMAGE EPS T

Now let's look at how you can select a portion of the screen to dump. As we saw earlier, with the K and S options, a window appears on the screen before the printout starts. If you are entering the commands directly – or including them in a Basic program – all you need to do to get the window on the screen is to precede the *GIMAGE command with *GWINDOW. The area to be dumped can then be selected using the controls shown in Figure II and, once you are satisfied with it, Return starts the printer.

Finally for this month – here's a use of *GWINDOW that's nothing to do with printing. After entering the command select the area in the usual way and press P: The VDU24 values for that window will be displayed – ideal if you're programming.

● The best way to find out what the commands do is to try them for yourself. So experiment with them until next time, when we'll look at more of the Dump Out 3 commands and also give a program to sort out the exact parameters for your needs and dump screens using them.

Keys	Effect
Arrow keys	Adjust left and bottom edges
Tab+Arrow keys	Adjust right and top edges
Shift+Arrow or Shift+Tab+Arrow keys	Adjust border faster
D	Reset default – full screen window
P	Print the VDU24 codes corresponding to the window *
V	As P but pressing another key erases the data (except Mode 7)
Return or Escape	Exit GWINDOW

Figure II: The window controls

Leaky Listing

THIS month Leaky Listing – the program for you to debug – covers setting up a printer from Basic. There are five simple mistakes and two logical errors plus the screen display is a bit untidy – a couple of simple changes will make it much better.

The program also demonstrates a simple menu system that you can extend to cover your own printer requirements.

By the way, there's nothing wrong with line 1 – it's just there to stop rubbish being sent to the printer while you're debugging the routine. You can take it out when you're sure you've made all the amendments needed. We'll give you our corrections next month.

```

1 *FX5,0
10 REM Printer Set-up
20 REM =====
30 REPEAT
40 PRINT"Printer Set up
50 PRINT"-----"
60 PRINT"1. Re-start"
70 PRINT"2. Condensed"
80 PRINT"3. Italic"
90 PRINT"4. Quit"
100 PRINT
110 PRINT"Enter your choice:"
120 REPEAT AS=GET
130 UNTIL AS>"0" OR AS<"5"
140 PRINT AS
150 IF AS="1" PROCrestart
160 IF AS="2" PROCcondense
170 IF AS="3" PROCitalic
180 UNTIL AS=4
190 DEF PROCrestart
200 VDU 2,1,27,1,"@",3:ENDPROC
210 DEF PROCcondense
220 VDU 2,1,15,3:ENDPROC
230 DEF PROCitalic
240 VDU 2,1,27,1,ASC"4",3:ENDPROC

```

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Easy road to adventure

Enter the world of fantasy with the Mad Hatter

It is always interesting to come across new adventure software houses interested in catering for the BBC Micro, so recently I was pleased to receive a copy of *Xadomy* by Brassington Enterprises. The plot is straightforward. Once again you have to save Earth from hostile aliens, this time by activating the only hyponuclear (sic) weapon in existence by entering the correct code in a computer.

Designed to run on the Electron as well as the BBC Micro, this text-only adventure has fairly simple location descriptions in upper case characters. You are invariably told where the exits are and what you can see. Rather than the normal prompt "What now?" the instruction is "Enter command" which no doubt will help first-time adventurers.

The parser leaves a little to be desired: If you want to know what you are carrying you must enter "Inventory" in full as the normal contraction - INV - is not accepted. One grammatical solecism that grated constantly was to be told "You are *stood* in a hallway (or whatever)" rather than "You are standing in a..."

At various points in the game you have to examine an object in order to reveal the thing that is really needed. At other times what you need is perfectly obvious.

The fairly straightforward puzzles make this an ideal choice for beginners. Before you are allowed to enter a cave system you need to find a working torch, before you can gain access to the house, you must find a key ... and so on.

In many ways, *Xadomy* reminded me of the early Artic adventures: It is not over-large at a 100 locations, nor is it over-complicated, but at £6.95 I feel it is a little over-priced costing £2 more than a Larsoft adventure, but it's not up to Geoff Larsen's standards. However, novices who want to cut their teeth on something simple should contact Brassington Enterprises on the 1st Floor, 31 High Street, Keynsham, Bristol BS18 1DP.

More from Topologika

By the time you read this, *Return to Doom* - the sequel to Peter Killworth's *Countdown to Doom* - should be generally available on disc at £9.95 from Topologika, P.O. Box 39, Stilton, Peterborough PS7 3RL.

Return to Doom is a big adventure, full of the amusing touches you expect from Peter Killworth. Your task is simply stated: Rescue the ambassador of Regina who has crashed on Doom and is in mortal danger of being turned into a robot. Accomplishing it is quite the reverse. Once you

have left your ship you find yourself in a jungle: Leaping before you look is essential here or you'll find that you go West permanently.

Further on into the game it is helpful to observe the biblical injunction found in Matthew 7 verse 7, though the grobber problem turns out to be - to use an Americanism - a bit of a gas. Once more, Peter has incorporated a spring-loaded problem into an adventure.

The fascinating thing is that all this fun and games can be found just in the initial moves. There is as much packed in here as in some so-called full length adventures. Once you enter the main game the move-counter which operates in the early part is turned off.

Note that it's well worth taking the risk of being bored in order to make a valuable discovery: Players should never be afraid to hang about from time to time.

There are plenty of excellent descriptions and the text is larded with clues that help the careful player to work out how to proceed. You will find that you have to perform some unlikely - but never illogical - actions on occasions in order to get important pieces of equipment.

There's another artefact. Once inside, you'll need to be relentlessly logical or you'll never get out safely. You are rewarded by more than just survival, though - the canine companion provided turns out to be the best friend an adventurer could have.

Return to Doom has got to be a prime contender for 1988 Adventure of the Year.

Writing adventures

Thirteen-year-old Paul Whatley wants advice on what to do now he's nearly finished writing an adventure using Incentive's **Graphic Adventure Creator**. I hope the following will be of help to him and any others interested in producing a marketable product.

- It's a hard world we live in. The days when computer whizz-kids could earn a fortune overnight are long gone.

- The customer demands a far higher standard of game today than was generally the case three years ago.

- Pay attention to detail - to retain any sort of credibility you must take extreme care with text descriptions: Crusty old reviewers like me don't take kindly to spelling errors and grammatical mistakes, we see them as a sign of carelessness.

- Let a few people play-test your masterpiece, and listen carefully to what they say. Make sure you pick a wide enough range of age and ability.

Hatter's Helpline

Paul Whatley is having some light problems in *Wizard's Challenge*: The simple command ON is illuminating.

Problem Corner

Can anyone help Adrian Emery? He'd love a copy of *Quondam* and can't get one for love or money. Any legal suggestions welcome.

J.D. Martin is stuck in a game I've never heard of, *Space Quest II*. He's in the clearing by the trees but keeps getting caught in the snares and thus caged. How can he avoid this?

One of them should be chosen to make sure the game is as idiot-proof as possible, either through natural talent or the ability to simulate idiocy.

● Read and learn from the article by Geoff Larsen in the May 1988 issue of *The Micro User*.

Only after all this are you ready to see if a software house will market your offering. So how do you choose one?

Keep reminding yourself that they are in business to make money. They will have to undertake the expense of mass production, advertising and distribution, and still make enough profit to stay solvent.

That means no one will offer you 90 per cent royalties or anything like it. In Paul's case, since he used an Incentive package, the logical people to contact first would be them. **Alien from Outer Space** was written by an "outsider" using the Graphic Adventure Creator and then marketed by Incentive.

Another firm specialising in adventures is Robico. The author of **The Hunt** was Ian Muriss and Robico coded, produced and marketed it. Readers may well be aware that Geoff Larsen is



working on an Archimedes adventure which will be coded and produced by Robico.

What I can say for certain is that Robico would only be interested in adventures of the highest quality – it has a reputation to maintain. If the game has potential, Robico will always give help in improving the standard so as to make it marketable.

The alternative approach is to contact a well-established firm such as Superior, which specialises in games for the BBC Micro and the Electron even though it doesn't concentrate on adventure games.

A final thought for the month. Pendragon, my *Electron User* colleague, and I very much enjoyed meeting readers at the Manchester Micro User Show. You really are a great bunch of people, even if one of you did tell me: "I never thought you were so old".

Stop press news: Robico is well on the way to producing the Archimedes version of **Enthar Seven**, which will have some graphics screens as well as greatly extended text. We can also expect the BBC Micro version of **Communion** – the sequel to **Village of Lost Souls** – to appear very shortly.

See you next month: Until then, happy adventuring.

HALL OF FAME

Kristoffer Gavin has sent in the first full solution to the Larsoft Adventure **The Puppet Man** so I can now provide help for this game.



Into the labyrinth

LAST month I introduced you to Roger White and his analysis of the adventure **Labyrinths of La Coshe**. Now we're going to take a look at the beginning of his general solution to the adventure in section E of his analysis:

▀ *The game begins in a clearing in a thick forest. The forest is a simple maze containing three locations of interest. Since the maze is simple, it is not worth constructing a detailed map of it.*

● *The room in the forest with one tree larger than the rest: From here you can go up and find a hinged porcelain egg – this is a treasure. If you try to open it, you'll destroy its contents. For further details see section G of the analysis, where the way to really get it open is spelled out.*

● *The room with the thick pile of leaves in the forest: These may be moved to reveal a grating which will be locked and the keys not yet obtainable – for further details of the use of the grating, see section F (details below).*

● *East of the clearing is the room containing the Necklace of Numbers. This forms the basis of a teleportation system. When you have it, you can teleport between locations. For details see sections F, M and P.*

*If you travel due S of the clearing, you eventually arrive at a valley with a waterfall at the end – an apparent dead end. However, here you should type **THROUGH WATER** to arrive at the Grotto, the basis for the whole of the rest of the game.*

The Grotto contains the sword and the lamp, it's the location where you store treasure to gain maximum points and is the main way in and out of the caves. You gain 10 points for visiting the Grotto initially.

Above the Grotto is an oval-shaped room with sloping floors to a hole in the middle. To the E of the Grotto is a narrow exit, through which you can pass only if you're carrying no objects.

And so Roger continues in great detail. Now, here's a highly compressed summary of his section F: Any object dropped in the room above the Grotto falls through the hole in the floor. That way you can use the narrow exit E of the Grotto and find the objects awaiting your arrival.

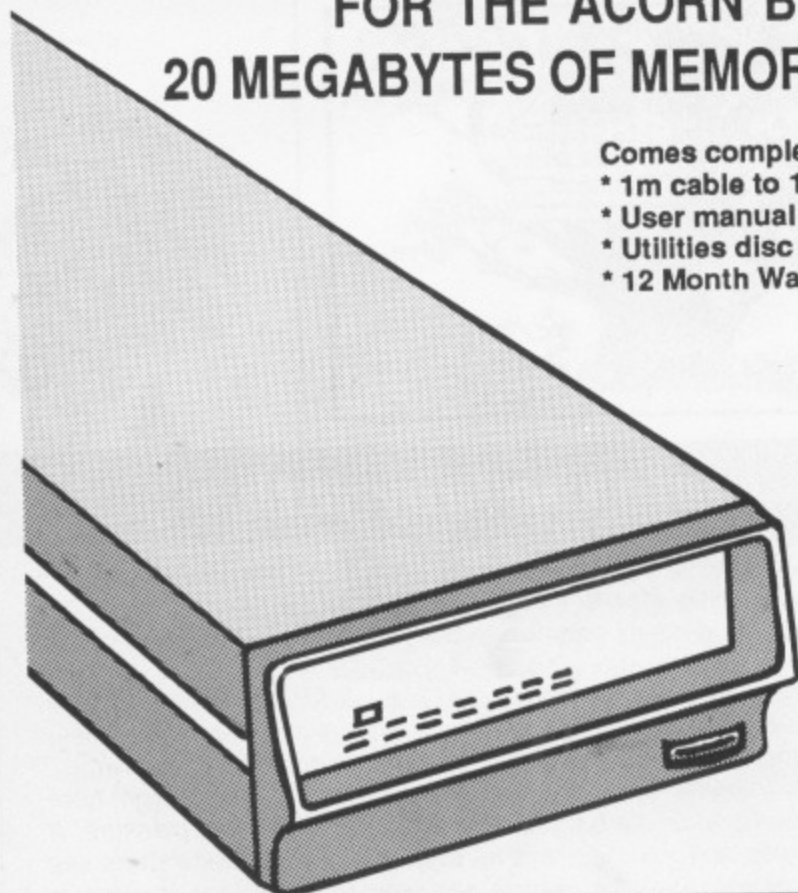
Once in the caves, go E to the Troll Room and kill the Troll with the sword. Now you are free to explore the rest of the system. Movement from the cave system to the Grotto can be achieved in three ways: Unlock the grating in the forest by going N, D and S from the Troll Room to find the keys in the maze of twisty little passages. Then go E, W and W to get back and the grating can be found N and N of the second Mirror Room.

Another method involves the Cyclops who is at the far end of the twisty passage maze. Give him the wine skin to make him fall asleep and you can visit the thief's lair to recover your stolen property. But, if you say "Ulysses", the Cyclops gets so enraged that he charges through the wall and opens up a way to the Grotto. To go from the Cyclops' room to the Troll room move N, D, S, S, E and W.

The best movement solution involves the necklace of numbers. When you own it you can – for example – enter **JUMP TROLL** or **JUMP GROTTTO** and teleport to your destination. Other commands may be tried, but I don't intend to spoon feed you too much.

Next month, we'll have a look at the Thief.

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SOFTWARE SCENE

ICARUS ... double date with death

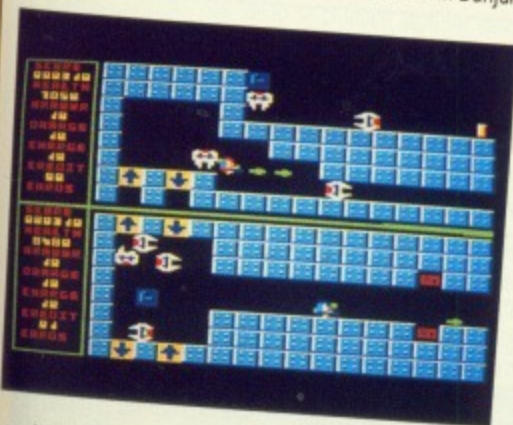
Price: £9.95 (cassette), £11.95 (3.5in and 5.25in disc)
 Supplier: Mandarin Software, Europa House, Adlington Park,
 Adlington, Macclesfield SK10 4NP.
 Tel: 0625 878888

WHILE transporting a shipment of battle droids to the Andromeda system, the master computer of the Starship Icarus suffers a major malfunction. Having lost all navigational control, it is on collision course with a nearby sun. If the ship's matter configuration drives explode there will be one almighty bang and no need to pay the next instalment on the mortgage.

To save the ship by reaching its computer you must fight your way through 20 decks of droid-infested starship - why can't computer rooms be on the first floor?

Laser in hand, you blast away at the automaton army. If you're astute you'll soon notice that no matter how many metal menaces you destroy, their numbers remain constant. This is because reinforcements are free to enter the deck via the service lifts, so your main objective must be to deactivate them.

Great care should be exercised when blasting lifts as their highly-polished doors will reflect your laser bolts. The quick-shot and side-step method that proved so useful in Dunjanz



can be put to good use on the Icarus. Not until you have deactivated every service lift on a deck will you be allowed access to the emergency lift - and the next level.

The duration of your solitary life is determined by a combination of factors which are displayed as a series of bar graphs. Each player's *Damage* and *Armour* levels reflect the degree of injury that can be inflicted and sustained. *Charge* affects the rate at which your laser recharges when not in use. The final graph is the one showing the state of your health - allow this to reach zero and you'll no longer have to



worry about the Icarus' appointment with the sun.

Your chances of completing the mission successfully can be greatly increased by collecting game tokens - depending upon the type found they can be used to boost firepower, armour, or recharge rate. Straightforward credit tokens can be inserted into vending machines in exchange for health points.

Mission Icarus is a one or two-player game written by Julian Avis, the author of Dunjanz. By reducing the number of players from four to two Julian has been able to double the screen area available to each, increase the speed of the action and reduce the amount of congestion around the keyboard.

The two player option, in conjunction with several clever features, prevents Icarus from becoming a monotonous zap

and blast game. Your way will often be barred by security-coded forcefields - if two people are playing, one can concentrate on cracking the code while his partner fends off the battle droids.

As a single player game, Icarus is superb - play it with a friend and you'll experience the excitement of true two player arcade action. With software of this calibre, Mandarin is destined for the top.

Jon Revis

Sound	8
Graphics	8
Playability	10
Value for money	9
Overall	9

SOFTWARE SCENE

SAIGON ... it's fighting all the way

Price: £9.95 (cassette), £11.95 (disc)
 Supplier: Tynesoft, Unit 3, Addison Industrial Estate, Blaydon,
 Tyne & Wear NE21 4TE.
 Tel: 091-414 4611

SAIGON is a Commando/Who Dares Wins II-style game and follows a similar format – one soldier, armed only with a machine gun and a handful of grenades, against almost overwhelming odds.

Like these other games, you start at the bottom of the screen and fight your way to the top. When you get there, the screen scrolls to reveal further dangers.

You begin with three men and five grenades. Extra men are awarded at regular intervals and further caches of grenades are scattered around the battlefield. This is certainly no picnic – you need everything you can get.

You're the commander of a team of US Marines during the Vietnamese war. The object is to rescue a number of your comrades being held hostage by the Viet Cong – no mean feat, as even a cursory exploration shows.

From the outset it is obvious that your enemies do not intend to give up their territory or hostages without a fight. Time after time you find yourself caught in an almost hopeless crossfire. However, you soon realise that you stay in the same horizontal position when you move from one sector to the next, so if you reach the top of the screen on the extreme left-hand side, you will start the next sector on that side too.

Once you learn the layouts of the various sectors, and particularly what to expect from the next one, you can exit

one in an ideal position for a full-scale assault on the next.

Like Commando, Saigon runs in the four-colour Mode 5 – red, green, black and yellow throughout. However, a lot of thought has been put into the design of the background details. Each of the many different features has been very carefully drawn, so that the end result is atmospheric and realistic. Rather than just being drab blobs – which they could so easily have been – the trees, bridges and other various land masses are unmistakable.

I would go so far as to say that it is a better Commando look-alike than the official Commando itself. The characters are large but move smoothly and quickly. One nice touch is that when your opponents turn to face you, their faces have a

definite oriental appearance. Although my overall impression of Saigon was of a game that is frustrating enough to keep me going once I'd started, it's not one I'd keep returning to time and again. However, it is certainly fun, and probably the best implementation of this type of game yet seen.

Hac-Man

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



HEX ... the legend of Vianna

Price: £3.95 (mail order only)
 Supplier: Larsoft, 4 Chantry Road, Bristol BS8 2QD.

HE'S done it again! Geoff Larsen's last adventure, The Puppet Man, had me using all my superlatives to describe it. Now, I shakily pluck out my thesaurus in a vain attempt to find more words of praise of his latest Quilled masterpiece, Hex.

While on a hiking holiday in Cornwall in 1902 you find yourself in Padstow during the Hobby Horse celebrations. After this you become engaged in conversation with a couple of local Cornishmen in one of the taverns. When you tell them of your interest in myth and folklore they relate the legend of a witch named Vianna who lived in the area some 200 years earlier.

Common to most witches of her time, she had been ceremonially put to death by the local populace. People say that

now, at certain times she returns to stalk the night with various demons and familiars.

Thus the scene is set and as you accept a lift in a carriage to Bude the next day, the story you heard the previous evening sends a shiver down your spine.

As there's no overt purpose it will take you some time to realise exactly what your quest is to be. As with previous Larsoft adventures, some moves are remembered and they put certain important events into operation. For instance, after about 30 moves the trinket shop will be open for business, and, 30 moves later, a fisherman will appear outside the inn and explain that the tide is turning. Shortly afterwards a means of reaching the island will be uncovered.

That is as much of the plot as I can give away without spoiling it for you. However, I will say that it is essential that you TALK to the characters you may meet, as they will provide most important hints to unravelling this mystery.

Once again this Larsoft adventure is only restricted by the

utility which Geoff has used to write it. I long ago groaned at having to use verb-noun input. Perhaps I am just becoming spoilt. Considering such limitations, the adventure reeks atmosphere and is also incredibly addictive.

I won't go so far as to say that Hex surpasses The Puppet Man in quality, as it carries the plot in a totally different vein. However, once again the Quill has been taken to its limits, by the sheer creativity and ingenuity of Geoff Larsen.

This adventure immediately jumps into my all-time top ten of personal favourites. I only have one final thing to say: Go out and order it now.

Pendragon

Presentation	9
Atmosphere	8
Frustration factor	9
Value for money	10
Overall	9

SOFTWARE SCENE

DREAMTIME ... adventuring for insomniacs

Price: £7.50 (5.25in disc only)
 Supplier: Heyley Software, 24 Ley Hey Road, Marple,
 Stockport SK6 6PQ.
 Tel: 061-427 5266

A YEAR ago I was given copies of Heyley's first two releases, The Ultimate Prize and Pirate's Peril. Although both adventures had much to commend them as first offerings, they lacked real thought in their puzzle construction and the programs were slow to respond to commands. They also took about 80 seconds to load from disc.

Dreamtime still takes an eon to load, but after 10 minutes' play I was hooked for a further four hours and my criticisms were negated. Despite constant disc access this adventure is fast, well constructed and, above all, addictive.

You are presented with an ingeniously-designed loading screen which helps reduce some of the tedium while waiting for the game to load. You are also given atmospheric

background notes which put you in a role akin to a cross between Adrian Mole and Alice in Wonderland.

You awake to find yourself in the entrance hall of a large hotel. A reconnaissance of your immediate surroundings will present you with direct problems which need to be overcome. How do you book a room at reception when you have no money? What is the purpose of the salt cellar in the dining room? What do you do about the demon alcohol? These problems must be tackled methodically if your dream is to unfold.

What I loved about this adventure is that although the scenario is that of dreamland, there are no hackneyed fire-breathing dragons and wizards. The puzzles are all totally rational in retrospect, if a little far-fetched at times. Furthermore, the whole adventure can be mapped logically, which makes adventuring more tolerable, though no less frustrating.

This large scale text adventure was composed and written using a modified form of Jonathan Evans' Adventurescape

program. As with all programs written using such a utility, design and parser limitations apply. However, Dreamtime succeeds remarkably well and leaves you to wonder what Heyley would be capable of producing if it used pure machine code.

The atmosphere created is comforting and often humorous but not quite in the league of Robico or Level 9 - a fault of the utility used to write it, rather than the adventure design.

If you're a seasoned campaigner, here's a game that should keep your drive whirring for many hours and give you a few sleepless nights to boot.

Pendragon

Presentation	6
Atmosphere	7
Frustration factor	9
Value for money	8
Overall	8

SPYCAT ... tongue in cheek arcade adventure

Price: £11.95 (disc)
 Supplier: Superior Software, Regent House, Skinner Lane,
 Leeds LS7 1AX.
 Tel: 0532 459453

ARCADE adventures are becoming increasingly popular and there are a lot about. The trouble is that it's getting harder for writers to come up with new ideas to supply the tremendous demand.

Superior Software has failed to produce anything new in the genre with Spycat, its latest offering, but has succeeded in bringing out a game which is fun to play - particularly since the company has obviously produced it with tongue firmly embedded in its cheek.

You only have to read the description on the packaging to realise that it pokes fun at the recent Spycatcher affair. It makes lots of thinly-veiled and humorous references to some of the personalities involved in the long-running court case on which it's based.

The game is pretty standard stuff: You play the role of

Peter Correct, a spy cat employed by MI4 (and a half), who has decided to gather together three classified documents on microfilm. He will take them with him to Greenland where he intends to write his memoirs.

You have to guide Spycat to the documents he needs through the 100 or more screens which make up the corridors of Blackhall, Drowning Street, three embassies and a surveillance complex.

Along the way you need to unlock doors using special passes which are scattered about, avoid the many droids, surveillance cameras and security guards which drain Peter's energy if they touch him - employing the numerous objects you encounter. These vary from a pound coin to a Z88 Micro. Other useful objects are the energy and glucose pills which restore Peter's power.

A small hint: You need to get to see Q, use the Z88 in his presence and he will supply you with a disguise kit. Q, by the way, is the code name of that famous inventor Sir Clive Amstrad.

The game has six icons which, when highlighted, perform various tasks. One allows you to pick up or drop objects, another lets you go through unlocked doors and a third lets you use objects which you are carrying. The fourth icon pauses the game and tells you your current location.

The other two control the sound level - a heart-beat which speeds up when you lose energy and a vibrating noise as mechanically-operated doors open and close behind you. There are one or two other noises, but overall sound is quite limited.

Spycat can carry three objects at any one time: He keeps them in his three pockets and each corresponds to one of the function keys - f0 to f2. By pressing the desired one you can highlight the object you wish to use or drop.

The graphics are good and the Spycat moves smoothly

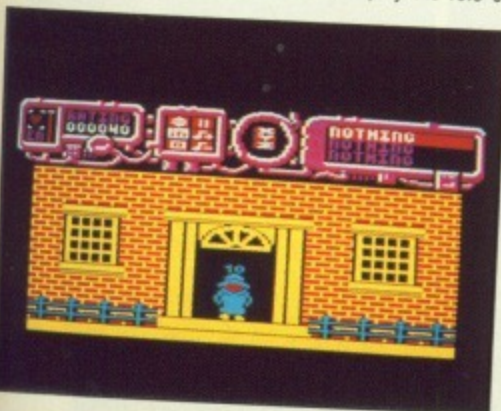


across a background similar in style to Omega Orb. I did come across one possible bug: A wall which Spycat could pass through into a totally different area if he jumped against it. But once through he was stuck, suspended in mid-air, and unable to go anywhere. I don't think that this is a deliberate trap, but, I could be wrong.

Once again Superior Software has come up with a good product which most arcade adventure fans will enjoy. I'm sure it is going to be another big hit for them over the next few months.

Desmond

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



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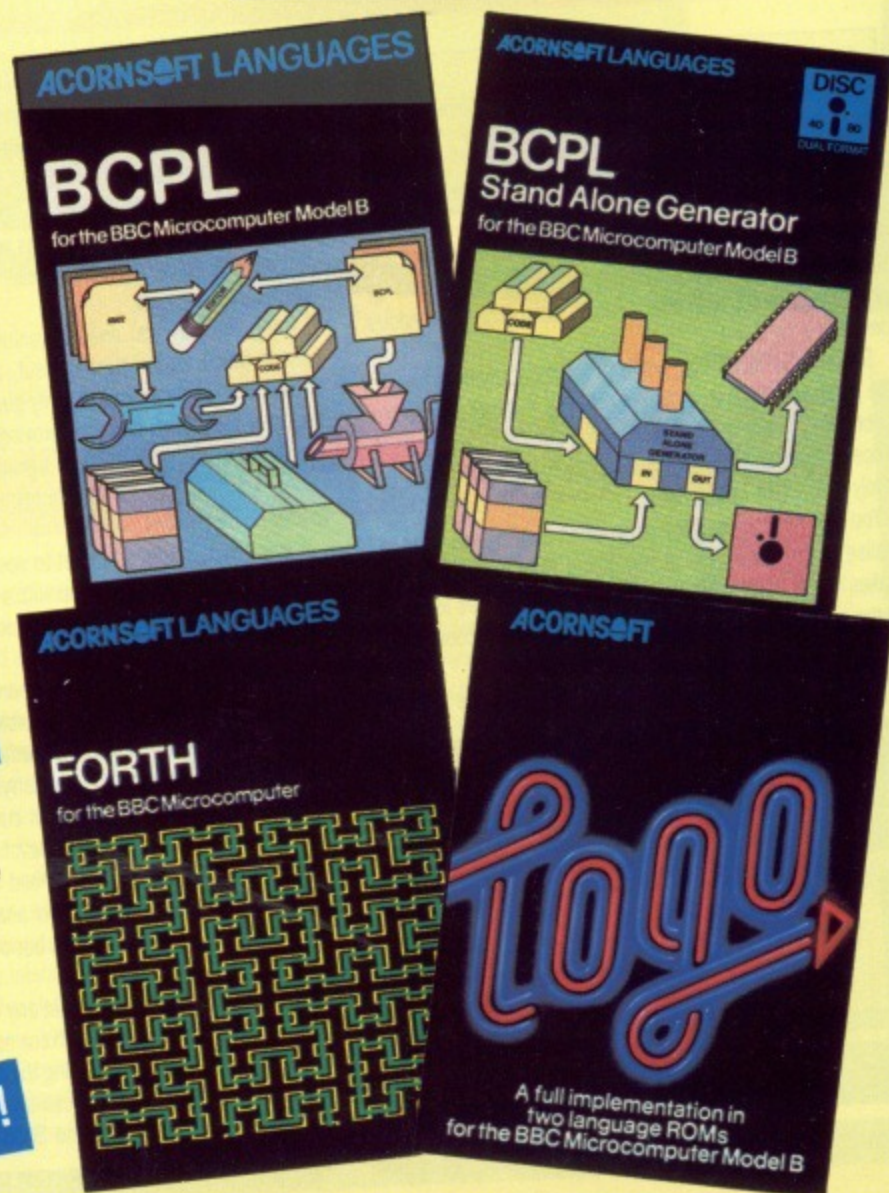
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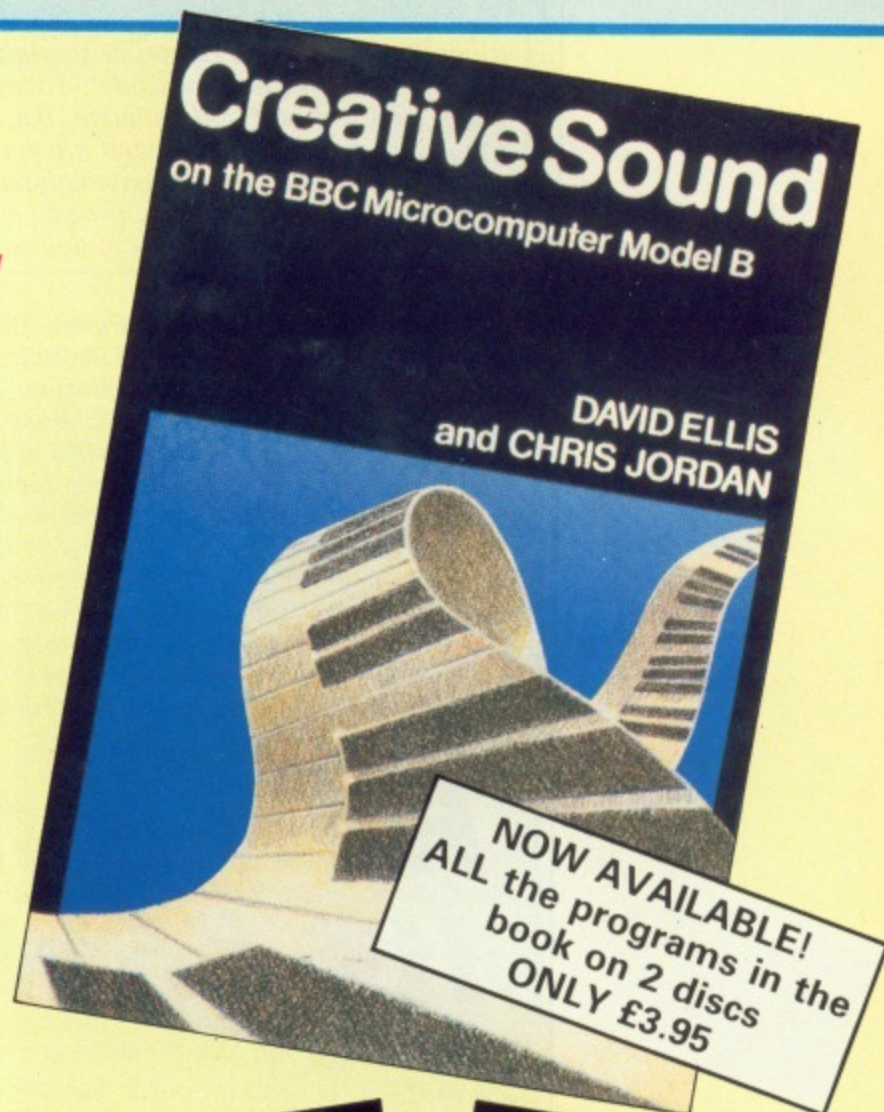
Creative Sound is a beautifully presented 320 page book, packed with everything you need to know about music on the BBC Micro.

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EDUCATION

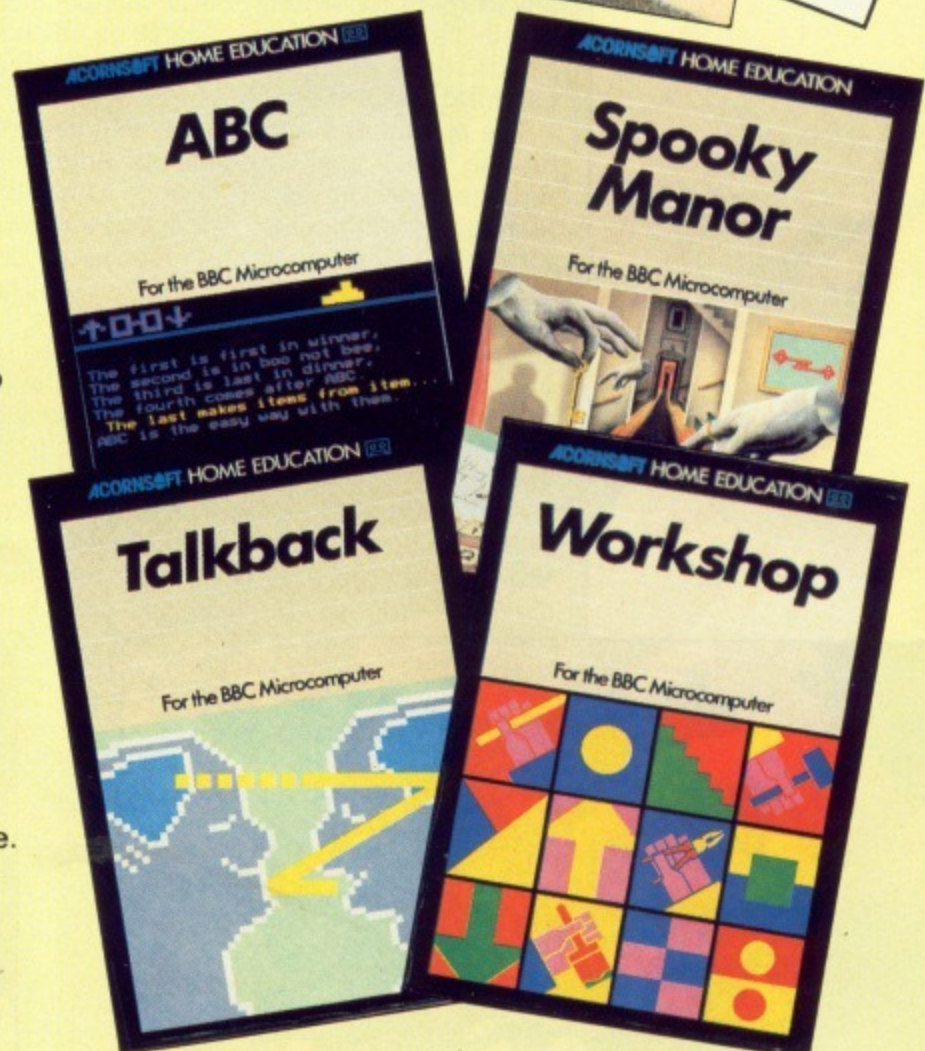
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TO ORDER TURN TO THE FORM ON PAGE 151

It used to be a combination of the labours of Hercules and Waiting for Godot. Today it still takes plenty of puff and patience, but at least things are getting better. What are we talking about? Bringing a new modem to market. Here TONY LEAH describes what is involved in putting a modem on to your local micro dealer's shelf.

GETTING a modem through the British Approvals Board for Telecommunications used to be a tortuous process. It could – and in many cases did – take anything up to 12 months to obtain the right to put BABT's green sticker on a comms device. Since September last year, however, things have changed for the better.

To solve the problem of ever-lengthening queues of applications at the Board's Walton-on-Thames headquarters a pilot scheme has started which transfers some of the work to three independent laboratories accredited by BABT.

The new MicroLink modem could have gone to

Stephen Denison. "Only then can we write our test and assessment schedule".

Having written the test schedule, KTL sends the manufacturer its quotation for the work that has to be carried out and, if accepted, makes arrangements for the job to begin. "We're usually able to start within a fortnight of receipt of the order", said Denison. Normally the manufacturer is asked to supply at least two samples of his device along with associated spare components – "just in case".

Another time-saver under the new system is that once the project begins KTL sends off a duplicate set of all information supplied by the manufacturer, plus a copy of the test and assessment schedule, to BABT.

Testing is mainly a mixture of two things – safety and network compatibility. The first is to ensure that the device protects the user from voltages likely to arrive on the network and the network is protected from the device. The second involves measurement of impedance, dialling

How a modem gets its seal of approval

any of them for testing, but it was decided – for reasons of convenience as much as anything – to send it to Kingston Telecommunications Laboratories at Hull.

The procedures announced last year to speed up the BABT approval process enable KTL to arrange approval testing directly with the manufacturer. In addition KTL can discuss a new device with the manufacturer while it is under development, eliminating much time-wasting in technological blind alleys.

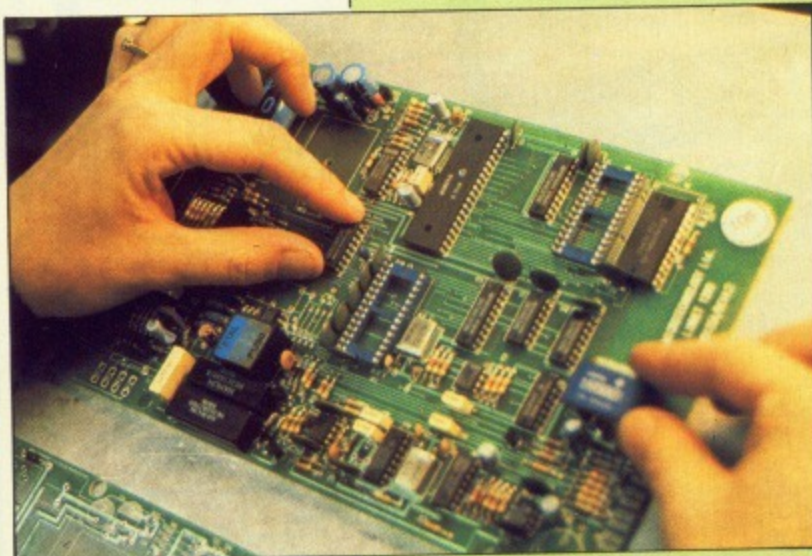
When the manufacturer is ready, he submits detailed technical information about the product to the laboratory. This includes the full technical description, circuit diagrams, parts lists and user guides.

"We go through that documentation thoroughly and work out what tests are required and to what standards", said KTL's laboratory manager

characteristics, signal power levels and so forth.

"The manufacturer can witness the tests – in fact we encourage him because it is beneficial to both parties", said Denison. "For instance, he can save a lot of time by helping configure equipment for testing, particularly where transmission speeds are concerned. We're quite happy to have his representatives looking over our shoulders, and in keeping with our policy of complete confidentiality we have six separate testing rooms so visiting engineers can't see another firm's equipment".

During testing KTL keeps a close liaison with BABT, whose engineers visit the laboratory at least once a fortnight to check on the progress of all the equipment undergoing examination. If a device hits a failure the lab wastes no time informing the manufacturer and mutually agreeing a formula for modification, and re-



testing if necessary. This can be an important factor due to the knock-on effect of component failure. For instance, if a device fails an impedance test the problem could affect signal power levels.

A major task is to check that the manual supplied with the modem contains ALL the statements necessary to meet BABT and OfTel standards. Failure to "get the words right" is as common a reason for rejection as bad wiring according to Stephen Denison.

Another key area the lab looks at is labelling of the device, but that concerns only the "back and underneath" of the equipment – all those little labels that start off with "warning" or "caution" – but not the business end the user sees when operating the device.

Odd though it may seem to comms users like myself, the lab doesn't concern itself with whether, for example, the modem connect button actually connects the modem if you push it. Or whether the line hold light works or is merely decorative.

"It has been decided by the powers that be that the user and market forces control the quality of data transfer", explained Stephen Denison. "We don't check if the modem transfers data to other equipment correctly – it isn't our job. Correct interfacing with the telephone network is what we're paid to ensure".

When the test and assessment schedule is completed, KTL makes out a full report describing everything that has happened since the device came through its front door. This is no light task. The average report is more than half an inch thick, weighing nearly as much as the modem itself.

The report includes a full analysis of all the test results – and even colour pictures of the modem's insides for BABT records to make sure it continues to be made the same way as the original version. Depending on the type of modem, the test alone can cost up to £2,500, but the manufacturer at least knows that the toughest part of the approvals process should now be over.

Contrary to popular opinion, BABT is not a quasi autonomous bureaucracy armed with a big stick to bash innocent modem manufacturers. Assistant director Barry Cartman was at pains to point out: "We're no quango – we're a private limited company set up to operate on a commercial basis and given responsibility by the government to

ascertain whether communications devices meet the standards of the 1984 Telecommunications Act.

"The main concern is to decide if the device is safe for the user, the network and safe for connection to the mains – all of which is in everyone's interests. Dialling and answering capabilities and functions are checked out to ensure they won't interfere with other network users. Assuming that one of the three independent laboratories has handled the test and assessment procedures, BABT comes into the picture in three ways.

"First we have to exercise our professional judgement and decide if the test data is satisfactory – the lab does not have this authority – so that the approvals process can go forward. Then we have to check out the manufacturing facilities for the device and, finally, we have an ongoing responsibility to ensure that approved standards are maintained".

To do all this, BABT – set up in January 1983 – maintains a permanent staff of 20 professional engineers plus an equal number of support staff at its headquarters in suburban Walton-on-Thames.

Perhaps surprisingly, the engineers at BABT don't usually see the modems they are dealing with. Documentation from the manufacturer and the test lab is what's important. "But let me make it clear that this is far from being a mere paper-shuffling exercise", Barry Cartman insisted. "When the test data report and product information is allocated to an engineer he goes through it with a toothcomb from start to finish and back again.

"In addition to checking that the test data is fine, we also inspect the production facilities to

Turn to
Page 38 ▶



Making the MicroLink multi-speed modem: The task involves more than 200 components requiring 600 soldered joints – every one of them inspected at least once. The device is built around the new K222 V21/22 chip from the US which is much more reliable and easier to interface than the old 7910 V21/V23 chip. Only after two full-function tests – interposed by a 24-hour soak test to burn in the components – is the MicroLink modem ready for the customer.

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.

The coveted seal of approval

◀ From Page 37

see that they are capable of producing a modem to the required standards".

At the end of the day if the factory arrangements are satisfactory and BABT feels it has an approvable modem on its hands it issues a recommendation to OfTel and the manufacturer is free to market the device. The legal approval document is issued by OfTel, usually within weeks.

However, BABT's interest doesn't stop there. The manufacturer will have paid between £1,000 to £1,800 to BABT in addition to the hefty sum he has also paid the testing laboratory. And he has to continue paying an ongoing annual licence fee

– 20 per cent of the original BABT charge for approval – for as long as he wants to go on selling the product.

This annual fee covers any modifications and changes to the device and a once-yearly check on the factory. Inspections of overseas manufacturing facilities naturally incur an extra charge.

The purpose of this ongoing interest by BABT is to make sure that manufacturers continue to supply products that are made to the original approved standards. As a further check BABT also procures random samples from various sources to check against the original. Remember those colour photos?

In the extreme BABT has the power to terminate the approval of a device if the manufacturer ceases to meet the requirements laid down. "We can call back all the units he's made and force him to issue a public warning notice", said Cartman. "We've never had to do it yet, but the authority exists".

The picture is of a shortening approvals timespan. Although the majority of devices being processed today have been carried over from last year, there is nothing like the overload of pre-September.

"The theory is that now, under the new system, it's possible for modems to go through the approvals process in six to eight weeks", said Barry Cartman. "However that hasn't happened yet and our current record is nine weeks from start to finish".

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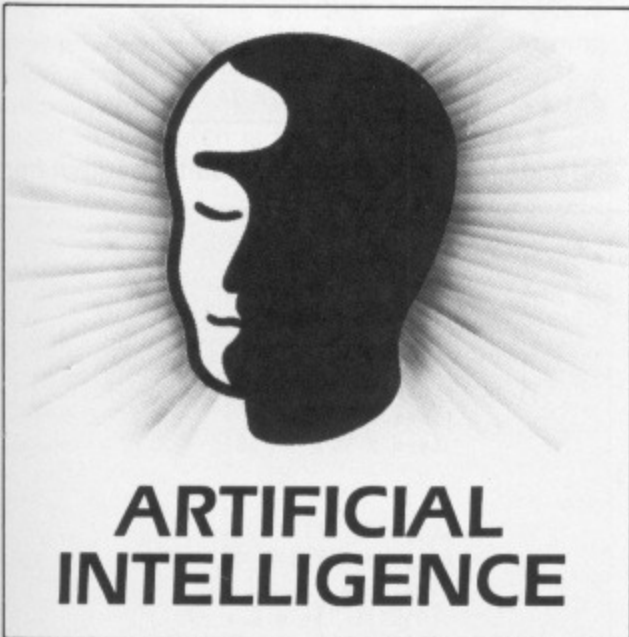
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Parsing power in Prolog

John Ashurst concludes his hands-on series exploring programming in Prolog



OUR final venture into Prolog programming is a form of interface to make your BBC Micro understand the English language. Though not a true parser, it allows questions to be put to your micro. When any computer program is written, one of the most important features is the user interface – the part that allows you to enter requests or information and returns answers.

There are many examples of poor interfaces and few good ones – everyone has their favourites – the Wimp (windows, icons, menus and pointers) is the result of work into what constitutes good man-machine communication. However, another approach which may be of considerable value in schools is to allow a dialogue with the micro in more or less normal English.

Let's suppose we have some geographical data about the North of England and we want to be able to deal with questions like:

```
What are the rivers
of Lancashire?
Tell me about the
rivers of Lancashire?
Please tell me where
Leeds is?
Where is Leeds?
```

The first thing to recognise is that in each query only a few of the words are actually needed to identify the data. A surprising number of *noise*

words convey no information and can safely be ignored. We need two lists: One built into the program and one specific to the application that can be added to as we go along. We'll use *int-ig* for the internal ignore list:

```
((int-ig (where know about
tell me a what are the of
how many live in is there)))
```

These words can be ignored in this kind of application. The first task, then, must be to reduce our input sentence by removing them. To do this, the clause *member-of* which we met last time is invaluable.

What we do is call *reduce* with our input sentence in the first argument and get the desired result as the third argument. The second is required internally as you will see:

```
((reduce (X1Y) Z x)
 (ig-list y)
 (mem X y)
 (reduce Y Z x))

((reduce (X1Y) Z x)
 (append X Z z)
 (reduce Y z x))
```

This is nearly complete, but we must trap the

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Prolog stands for PROgramming LOGic and was first implemented in 1972 in Marseilles by Colmerauer and Roussel. It was designed to get away from machine procedure and move towards human logic to give a language that can be applied to almost any situation.

REFINEMENTS

The full listing on the following page contains a number of refinements which make it more useful:

- It is in the form of a module.
- The RPRED predicate allows files on disc to be used if required.
- The predicate *assign* is used to call *ignore*, *synonym* and *test*.
- It is best if you type the program into a word processor and save it as plain text, before loading it into Prolog because the funny looking line at the start executes immediately if typed into Prolog. The instruction itself loads a Mode 7 screen for you to look at while the rest of the module is loading provided you have created one.
- A similar arrangement is provided for you to incorporate help screens. The file NHELPS should load the screens one by one when called by (helpages X). It can be removed by KILL helpages and the front page restored.
- The clause *readline* accepts input until it finds a full stop.

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empty list – as the first clause – so as to exit in good order. In this case we transfer the value in the second term into the third, like this:

```
((reduce () X X))
```

You can test it with something like:

```
?((reduce (please tell me
what you know about Prolog)
() X)(PP X))
```

This should return:

```
Prolog
```

As everything else is in the ignore list. A more compact method would be to use the IF predicate:

```
((reduce () X X)
 (reduce (X1Y) Z x)
 (ig-list y)
 (IF (mem X y) () ((append X Z z)) )
 (reduce Y z x))
```

The IF predicate can be understood to work as

shown in the following line:

```
(IF (condition) THEN
DO ((clause 1)(clause 2)(...))
ELSE DO ((clause a)(clause
b (...)))
```

In the example given () means "do nothing". The double brackets are so that multi-term actions may be taken. I find that I have trouble with IF when backtracking is involved, so always be prepared to use the long form.

To get rid of that nasty empty list as the second term, call it with another predicate:

```
((compact X Y)
 (reduce X () Y))
```

You can test it with:

```
?((compact (tell me about
yourself) X)(PP X))
```

and you should find that the resulting output from

```
nat-mod (. run add help pause RPRED) (sy
nonym data ignore-list type identifier o
bject where know about tell me a what ar
e the of how many live in is there helpa
ges)
```

```
((run X)
 (clear)
 (SPACE Y)
 (PP Ask me a question, finish with a st
op .)
 (readline Z)
 (assign Z x)
 (output y)
 (IF (EQ x ()) () ((PP I do not know the
se words) (PP
x)))
 (PP)
 (run z))
```

```
((clear)
 (KILL (type identifier object)))
```

```
((readline X)
 (R Y)
 (IF (EQ Y .) ((EQ X ())) ((readline Z)
(append (Y) Z X))))
```

```
((assign X Y)
 (assgn X () Y))
((assgn () X X))
((assgn (X1Y) Z x)
 (ignore X)
 (assgn Y Z x))
((assgn (X1Y) Z x)
 (syn X y)
 (test y z)
 (append z Z X1)
 (assgn Y X1 x))
```

```
((ignore X)
 (int-ig Y)
 (mem X Y))
((ignore X)
 (DEF ignore-list)
 (ignore-list Y))
```

```
(mem X Y)
((output X)
 (DEF type)
 (DEF identifier)
 (type Y)
 (identifier Z)
 (PP The Y of Z are)
 (FORALL ((Y Z x)) ((lprint x)))
 (PP))
((output X)
 (DEF object)
 (object Y Z x)
 (lprint (x is one of the Z Y)))
((output X)
 (PP Sorry, I have no relevant informati
on .))
((stlen X Y)
 (IF (NUM X) ((EQ Y 4)) ((STRINGOF Z X)
(length Z Y))))
```

```
((length X Y)
 (len X () Y))
```

```
((len () X X)
 ((len (X1Y) Z x)
 (SUM 1 Z y)
 (len Y y x))
```

```
((test X ())
 (data Y)
 (mem X Y)
 (KILL type)
 (ADDCL ((type X))))
```

```
((test X ())
 (data Y)
 (mem Z Y)
 (DEF Z)
 (Z X x)
 (KILL identifier)
 (ADDCL ((identifier X))))
```

```
((test X ())
 (data Y)
 (mem Z Y)
 (DEF Z)
 (Z x y)
```

```
(mem X y)
 (KILL object)
 (ADDCL ((object Z x X)))
 ((test X (X)))
```

```
((mem X (X1Y))
 ((mem X (Y1Z))
 (mem X Z))
```

```
((lprint ())
 ((lprint (X1Y)
(stlen X Z)
(OSBYTE 134 0 0 x y)
(SUM Z x z)
 (IF (LESS z 39) () ((PP)) )
 (P X ""))
 (lprint Y))
 ((append () X X))
 ((append (X1Y) Z (X1x))
 (append Y Z x))
```

```
((int-ig (where know about tell me a wha
t are the of how
many live in is there)))
```

```
((add2 X Y)
 (DEF X)
 (DELCL ((X Z)))
 (ADDCL ((X (Y1Z))))
 ((add2 X Y)
 (ADDCL ((X (Y))))))
```

```
((output X)
 (DEF type)
 (DEF identifier)
 (type Y)
 (identifier Z)
 (PP The Y of Z are)
 (FORALL ((Y Z x)) ((lprint x)))
 (PP))
```

```
((output X)
 (DEF object)
 (object Y Z x)
 (lprint (x is one of the Z Y)))
((output X)
 (PP Sorry , I have no relevant informati
```


this simple clause is:

```
yourself
```

This trick of concealing the extra argument is frequently done so get used to it.

The next task is to test for synonyms and in this case to substitute the root term for the one used in the query:

```
((syn X Y)
 (DEF synonym)
 (synonym Z x)
 (mem X x)
 (EQ Y Z))
((syn X X))
```

The word to be tested is supplied in *X* and the first step is to see if any synonyms are defined because if you look for a clause which does not exist, you get error 3.

The next two lines will test to see if *X* is a member of any of the synonym lists, showing Prolog at its neatest and most compact. If a match is found it exits with *Y* equal to the head of the list. If no match is found *Y* is equal to *X*.

Having simplified the query, we now need to

```
ion .))

((help X)
 (LOAD NHELPS)
 (helpages X)
 (KILL helpages)
 (SPACE Y)
 (**"LOAD NATFP 7C00")
 (window)
 (cls))

((window)
 (VDU 28 0 24 39 11))

((cls)
 (VDU 12))

((pause)
 (INKEY 32767 X)
 (VDU 12))

((RPRED X Y Z x)
 (SEEK X Y)
 (READ X y)
 (SEEK X z)
 (OR ((EQ (x1X1) y) (? X1)) ((less z Z)
 RPRED X z Z x))))

((less X Y)
 (VAR Y)
 (/))

((less X Y)
 (/)
 (SUM X Z Z)
 (LESS Z Y))

((add X)
 (R Y)
 (add2 X Y))

((add2 X Y)
 (DEF X)
 (DELCL ((X Z)))
 (ADDCL ((X (YIZ))))
 ((add2 X Y)
 (ADDCL ((X (Y))))))

CLMOD
```

sort out the type of words we have isolated. We'll identify the parts using the following line:

```
((type identifier (object
 object ...)))
```

There are three test clauses which will sort out the remaining words. The empty list at the end is to allow any unidentified words to be neatly appended to a list to be dealt with later.

Each word is first tested to see if it is a type indicator. If so, a new clause is created storing this fact and replacing the previous type. If two types occur in one query, only the second will be recorded.

Next it is tested for being an identifier, and lastly an object:

```
((test X ())
 (data Y)
 (mem X Y)
 (KILL type)
 (ADDCL ((type X))))
((test X ())
 (data Y)
 (mem Z Y)
 (DEF Z)
 (Z X x)
 (KILL identifier)
 (ADDCL ((identifier X))))
((test X ())
 (data Y)
 (mem Z Y)
 (DEF Z)
 (Z x y)
 (mem X y)
 (KILL object)
 (ADDCL ((object Z x X))))
```

Now we must output what has been found in a readable form. The use of FORALL ensures any additional data is also displayed. In our example, all the towns listed for Lancashire would be listed, not just those in the first list. The *lprint* routine writes to the screen without chopping words in half. If the query fails, an apologetic message is printed.

```
((output X)
 (DEF type)
 (DEF identifier)
 (type Y)
 (identifier Z)
 (PP The Y of Z are)
 (FORALL ((Y Z x)) ((lprint x)))
 (PP))
((output X)
 (DEF object)
 (object Y Z x)
 (lprint (x is one of the Z Y)))
((output X)
 (PP Sorry , I have no relevant information .))
```

Finally, the list of words which have not been recognised is printed with a suitable message. To add these to the ignore list the user types:

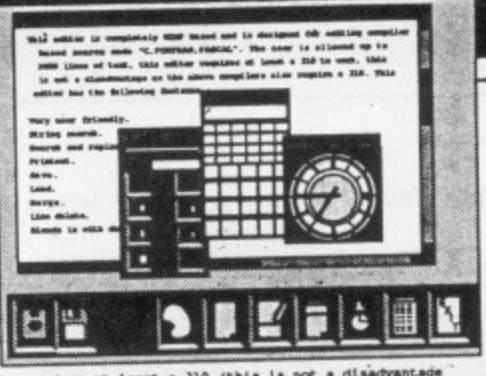
```
add ignore-list <word>
```

There we must leave Prolog for now. I hope this short series has given you a good insight into the power of this fascinating language and the confidence to write your own programs.

● Next month we begin a series on programming in Ample, the language used by the Hybrid Music System.

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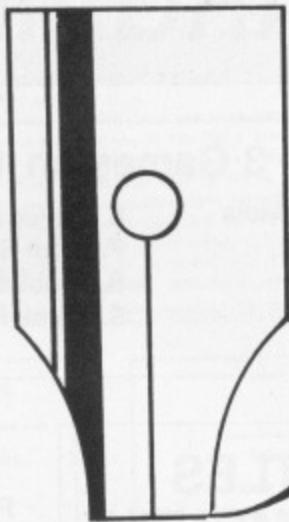
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Mike Bibby starts a series on getting the best out of your BBC Micro



M · I · K · E · S M · I · C · R · O *Memos*

DESPITE its venerable age the BBC Micro is still giving sterling service to tens of thousands of active users. But how many of us really make optimum use of its capabilities? Often we tend to stick to one or two tried and tested techniques when, with just a little more information, we could put our micro to far more use.

So in an effort to refresh those parts of your micro

that you normally find hard to reach, here's the start of an easy-to-read series devoted to explaining all the things about your BBC Micro that you once knew – or never did and have been afraid to ask!

If there's something you want to know about getting the best out of your micro, or if you just want some of the buffs' more puzzling pieces of code explaining, why not write in and ask? Unfortunately we can only answer on these pages – we can't send personal replies.

TIP

When you think about it, since a spooled file mirrors what goes on the screen, it must consist of a straightforward sequence of Ascii characters – the type word processors can use. Basic programs, on the other hand, aren't stored in a straightforward manner. Line numbers are held in a convoluted way, as are the keywords of the language – such as PRINT and INPUT. If you're not convinced try loading a Basic program into a word processor and see what you get!

This is a pity because sometimes we could do with using Mini Office II or Wordwise on a program. Suppose you've misspelt the variable label all 70 times it occurs in your program. A quick search and replace would handle that nicely, wouldn't it?

The answer is to load your Basic program in under Basic as normal. If you now type LIST, of course, you'll see it all displayed on the screen in a nice straightforward Ascii sequence. Enter:

```
*SPOOL filename
LIST
```

and your program is displayed and sent to the specified file at the same time. When the listing's done close things off with:

```
*SPOOL
```

Now you have your file in a form you can load into a word processor so you can use all its facilities to rework your program. It'll have the odd LIST at the beginning and *SPOOL at the end, but these are easily dealt with. Once you've finished tinkering you will, of course, save your program. Remember, though, it isn't actually a Basic program – it isn't stored in the correct convoluted fashion.

It's easy enough to get it back into a runnable, Basic format, though. Suppose your file from the word processor was called PROGRAM. Press Control+Break and enter:

```
*EXEC PROGRAM
```

The *EXEC takes your file and types it in so the micro receives it as if it were coming from its own keyboard. It then stores it in memory as a Basic program – as it would do ordinarily – and you can run it. By the way, the program's only in memory – don't forget to save it.

Spool spiel

ON your BBC Micro spooling is a way of outputting the characters that appear on your screen to a file. In other words, just as you can use Control+B to make sure what appears on the screen also goes to the printer, you can spool so that the characters appearing on screen are also saved on disc or tape.

To turn spooling on enter:

```
*SPOOL filename
```

This is equivalent to the Control+B, except, of course, since it's going to be saved you have to supply a filename.

From now on everything that appears on the screen – both your input and the micro's output – will be "echoed" to the filing system and saved under the name you've given.

Once you've finished your "recording" you turn it off with a simple:

```
*SPOOL
```

This is equivalent of turning the printer off with a Control+C so there's no need for the filename this time.

If you're using disc, spooling's easy to try out. Open a spool file with, say:

```
*SPOOL TEST
```

then type away a few bits of rubbish and finish off with:

```
*SPOOL
```

And with:

```
*TYPE TEST
```

you can redisplay the whole sequence.

Roms and rams

ONCE you're past the absolute beginner stage you tend to hear an awful lot about rom and ram memory – shadow ram, sideways ram, sideways rom and so on. All this can be a bit disconcerting if you don't know what ram or rom is and lack the temerity – or patience – to ask the buffs.

Well, both rom and ram are types of memory – that is, they're the bits of your micro that store things like your program or the data it's working on. Without any rom or ram your computer would be a total amnesiac with no idea at all it's supposed to be a BBC Micro. So rom and ram are important.

And there's an important difference between them: What's in rom memory is fixed, permanent, forever graven . . . whereas ram memory can be changed.

If you like, rom memory is similar to an LP – it can only play the tune already on it. Rom can only present the micro with the data already on it. Ram, on the other hand, corresponds more to a cassette tape – if you don't like the music on it you can record a new piece on top of it. So, with ram, you can replace old data with new. More formally we say that rom can be read, while ram can be written to *and* read.

The point is that ram tends to be volatile. Unless it's got its own battery power supply – as in some of the Master's ram – or is of a special

type, its contents disappear when you switch off.

Rom, though, is fixed and when you switch back on what's in rom is still there.

When you power up your BBC Micro you want it to know where its keyboard is, how to send things to the screen and the like. You put this information – and the program to take advantage of it – into an operating system rom so your micro never forgets it.

But you also need some ram, too. After all, you want to be able to type different programs into your micro so you have to have some ram space to put them in. And the memory that stores what's on your screen has to be ram, otherwise you'd have a never-changing picture!

So why the names rom and ram? Well, rom stands for Read Only Memory – you can't write to it, only get information from it. Ram stands for Random Access Memory which isn't a particularly informative description (especially as rom is "random access", too). I think it should be called rwm for Read/Write Memory, but I suppose ram is easier to say than rwm unless you're Welsh!

And what's an eprom I hear you ask? Well, it's a chunk of memory that normally acts like a rom. However, with the right electronic kit you can wipe its contents and rewrite the data in it. Hence eprom – Erasable and Programmable Read Only Memory.

Hex magic

ONE of the simplest ways of convincing lesser mortals that you're a computer buff is to spout hexadecimal (hex) numbers at them. A sprinkling of &FFFFs and &A00s in your conversation does your micro-cred a power of good. Actually hex is fairly easy to master once you get the idea that, instead of the numbers' columns being our old-fashioned thousands, hundreds, tens and units, they're actually worth 4096, 256, 16 and units respectively.

The numbers 4096 and 256 may look odd, but they're based on 16 – 256 is 16*16 and 4096 is 16*16*16. For reasons too complex to go into here, your micro likes numbers to come at it in multiples of 16, and when you get used to it, you'll find it natural too.

Of course, if we're going to have a sixteens column, it means our units must have room for a count of up to 15 before we "carry one". This presents problems for our normal digits, which only stretch from 0 to 9. Since each column should only have one digit in it (otherwise chaos would ensue) we need single digits to represent 10 to 15.

This turns out to be simplicity itself: We just let the letter A represent 10, B represent 11 . . . up to F for 15. We'll never need more than F because we've got a column for sixteens and one for sixteen sixteens and so on.

So an F on its own would mean simply 15, whereas an 9F would mean $9*16 + 15 = 175$. And FFFF would be $15*4096 + 15*256 + 15*16 + 15 = 65535$.

It's these Fs, As and other letters that make hexadecimal so odd – FADE can now be a number

as well as a word! And an "old fashioned" number like 20 could be ambiguous: Does it mean hexadecimal 20 ($2*16+0=32$) or our ordinary "two tens" 20? To prevent confusion, we prefix hexadecimal numbers with &. So &20 translates to our normal 32.

In practice we tend to describe the micro's memory locations in hexadecimal: It's a lot easier to think of memory ranging from &0 to &FFFF rather than from 0 to 65535. And saying Basic starts at &8000 is far more intelligible than using 32768.

Here are some hex numbers to impress your friends with. The operating system begins at &C000 and the numbers you can get in a byte range from 0 to &FF (0 to 256).

Once you start thinking in hex you'll find its neater numbers make for much more memorable memory!

TIP

It's quite simple to use your BBC Micro to convert from hexadecimal to our ordinary denary or decimal system. To see what &FFFF makes in decimal enter:

PRINT &FFFF

If you want to see the hex equivalent of an ordinary number just ask for it to be PRINTed, but precede it with a ~ (tilde) sign – this looks like a divide sign in Mode 7. So, if you want the hex for 255 enter:

PRINT ~255

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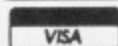
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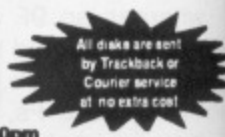
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PROBLEM SOLVED

Wear and tear

CAN you offer help to cure faults on my issue 3 BBC B board? Cups of coffee poured into the machine over the years have taken their toll. Nevertheless it continues to work remarkably reliably – thanks to a resoldering of power leads plus turned-pin DIL sockets between chips and the original on-board sockets.

However some persistent but intermittent problems still remain:

■ There's a loss of screen image: In Mode 7 the cursor remains visible but the prompt and text disappear. In other modes, the cursor and prompt are both visible but the text isn't.

■ I get multiple repetition of the screen image, displaced both horizontally and vertically, coupled with a fainter enlarged and reversed image.

Pressing down in the centre of the board generally restores the screen image, but persistent pressure may be needed to retain it. – **P.J. Cox, Bristol.**

● *Multiple images on the screen can be caused by the high address lines from the CRT controller being open circuit, causing the same piece of memory to keep being read out.*

As the cure is to press the board I suspect that your problem is a faulty socket, and this should be replaced. There is little point in placing another in series with it.

It is a fairly delicate operation to replace a socket. The best bet is to cut the old one out using sharp side cutters so that you can remove the pins one at a time. Then go over the filled holes with a solder pump to clear them. There is no point in trying to get the socket out intact, as it is broken anyway.

The same advice holds for removing soldered-in chips – cut all the pins off with side cutters before removing the pins one at a time.

Opus challenge

I HAVE an Opus Challenger disc drive and I would never have bought it if I had known that it plugged into the 1MHz bus. However, now that I have it I need to know if it is possible to alter it so that I can use DFS, ADFS, ADI, ADT and so on. I know that you have said that it isn't possible before,

but can't you physically alter the drive and/or cable in some way? Or can you alter the BBC Micro so that ADFS/DFS is rerouted through the bus port? – **Michael Gallard, Wirral, Merseyside.**

● *Sorry, it is all but impossible. To do it you would need the skill and time to be able to rewrite the DFS and ADFS so that they see the hardware in a new location. It's one of those problems that needs a professional programmer to solve – it would be cheaper to buy a new drive than pay his bills.*

Numeric keypad

I UNDERSTAND that one of the problems of using a BBC B with a Co-Pro Adaptor and the 8086 Co-processor is the lack of a separate numeric keypad. A query in the March edition of *The Micro User* does, however, refer back to the Body Building article of July 1985. Would that keyboard be suitable, is it complete and is it still for sale? – **G.A. Mangham, Worksop, Notts.**

● *I am not all that attracted to numeric keypads and never use them even on computers like the Archimedes. While I have not tried the keypad with this second processor I see no reason why it should not work. The 16 keys on it can be programmed to put any character into the input buffer and it works by an interrupt service routine in the BBC Micro. It is still available for £20.00 for the kit and £25.00 assembled from Musbury Consultants. You will also need a cable – pack 2 – priced at £8.99.*

Midi controller

PLEASE could you tell me if it is possible to use my BBC Micro as a Midi controller for my electric piano which has the interface? Also is it possible to use a Brother electric typewriter as a printer and, if not, could you tell me a good one to buy? – **Andre-John Mas, Lower Kingswood, Surrey.**

● *Many companies produce Midi interfaces to allow a micro to control or monitor a suitable synthesiser – the micro can digitally record the details of an instrument's key presses and then play the tune back through another instrument. You can even compose music on the micro and*

On the agenda...

- Screen image problems
- Upgrading Opus Challenger
- Numeric keypad for BBC Micro
- Midi control for piano
- Intermittent garbage fault
- Tape transfer trouble
- Unusual switch-on noise
- Hot start-up failure

Turn to Page 48 ►

◀ From Page 47

have it played on a synthesiser.

While the Midi interfaces are reasonably priced – between £65 and £200 – you will often have to spend between £300 to £2,000 for a suitable synthesiser to control. Companies that produce Midi equipment include Electromusic Research, Rod Argents keyboards and Hybrid Technology. Any good music shop should be able to help you.

As far as I know the Brother electric typewriter does not have the internal mechanism to allow it to be used as a printer. I don't know your exact requirements so it's impossible to recommend any particular make, but you should look for Epson-compatibility.

Beep and garbage

WHEN my BBC Micro is switched on it sometimes makes a continuous beep and at other times it seems to be OK. Also, when a star command like *HELP is issued it starts up the disc drive.

When I type *WORD I get a load of jumbled up words and letters: They seem to be ones which would be used in programs and also occur when the micro is switched on.

I have a small knowledge of the workings. Please could you help? – **T. Everard, Lincoln.**

● The most likely cause of your problem is a

loose connection – probably one of the IC sockets. As it is an intermittent fault it is very difficult to track down but I think you will find that the rubbish you get consists of Basic's keywords.

You could try the hands-on therapy of pushing each IC firmly back in its socket but, if that does not work, maybe you will have to get a socket replaced. Unfortunately knowing which one is not that easy and the best bet is to take it to a good service centre. But, even professionals could have trouble tracking down such an intermittent fault.

Master playback

I HAVE lost the facility of loading tapes on my Master 128. Mindful of a similar past problem on my BBC Micro being due to a faulty LM324, I desoldered this and replaced it – at great effort and to no effect.

The recorder and lead work perfectly on the BBC B and no other fault is apparent with the Master. In particular it is still possible to save files to tape. Have you any ideas of what may need replacing? – **Dr. Fraser Hadden, Hadleigh, Suffolk.**

● As you say, the LM324 would be the prime suspect in this situation. My hunch is that you have a faulty socket or loose connection. Other



suspects would be Q5 or Q6 – BC239 – or the serial ULA itself – IC48. However, without test equipment it is difficult to pinpoint the culprit.

If you have a high impedance crystal earpiece you could do some signal tracking. Set your recorder to play and connect one side of the earpiece to 0v – say the metal case of the UHF modulator. Then touch the other side of the earpiece to pin 3 of the LM324. If no sound is heard then the fault is in the lead or socket.

If there is sound try pins 1, 8 and 7. With no sound there it is the LM324 that is suspect. Finally, if you get sound on pin 12 of IC48 then it looks like it might be a new serial ULA you need.

Video vibrations

I HAVE a BBC Micro fitted with a DFS which has worked very well until recently. I switched it on and, instead of having the usual two notes, I had a single continuous note and the picture was in lines going across the screen and not stable. Could you please give me any indication of what this fault could be? – **B. McLean, Torquay, Devon.**

● The picture in a line across the centre of the screen points to some fault in the video circuitry. The most likely culprit is the 6845 CRT controller or the crystal oscillator. You could also be missing a sync pulse to your monitor.

Hot stuff

IF my BBC B is switched off when hot I am unable to switch on again for approximately 15 minutes until the micro has cooled down. When it is hot the first audible buzz is present but the high-pitched bleep is not, and the monitor screen remains blank.

I have a second problem which also occurs when the micro is hot – the background graphics of some computer games become corrupted, for example random blocks appear in a different colour.

This fault can only be cleared by reloading the software. I suspect the two faults are related. Have you any idea what they may be? **D.F. Hulme, Marston, Oxford.**

● I think the two faults are not related. The break-up of graphics when hot is due to a faulty Video ULA – a replacement chip is the only answer. However, the failure to start when hot is most probably due to the power supply.

I am reluctant to give advice in this area to people without the appropriate test equipment and experience, as mistakes can lead to electric shocks.

However, you can see if this is the problem by force cooling the power supply by blowing cold air into it from a hairdryer. If this does the trick the best solution is to get it replaced.

Have you any hardware problems with your BBC Micro? If so, write to Mike Cook, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP, giving full details of your system and the problem.

Unfortunately, Mike cannot send you personal replies, but as many questions as possible will be answered on the pages of The Micro User.

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Forging the link

A package designed to allow painless file transfers evaluated by Peter Davidson

Product: Archimedes Serial Link
 Price: £18.16
 Supplier: Beebug Ltd, Dolphin Place, Holywell Hill, St Albans, Herts., AL1 1EX
 Tel: 0727 40303

NEVER thought the time would come when I would be reviewing a link between two BBC Micros. After all, it's only a matter of soldering a couple of plugs to a lead and entering a few FX calls into the micros. Or is it?

The Beebug Archimedes Serial Link is a complete package — lead, software and instruction leaflet — and it goes much further than just making a simple connection between the micros. Once it is in use all control is from the Archimedes Wimp environment and you don't need to touch the old BBC Micro — in fact you can switch the monitor off if you wish.

The lead is almost three metres long with a D plug on one end to connect to the Archimedes and the usual reversible domino plug at the other. The instructions tell you to plug it in with the notch up.

The D plug is of good quality, but the one to connect to the BBC Micro is the plastic type that falls apart after a lot of use. I would have preferred a more robust plastic or even metal type.

Neither plug is moulded to the cable so if you're unfortunate enough to damage the lead or want to alter its length, they can be re-used.

Once the lead is connected, transferring files couldn't be easier. First you set the BBC Micro to talk to the Archimedes: This is just a matter of entering the two commands given in the instructions at the BBC Micro keyboard:

*FX7,6
 *FX2,1

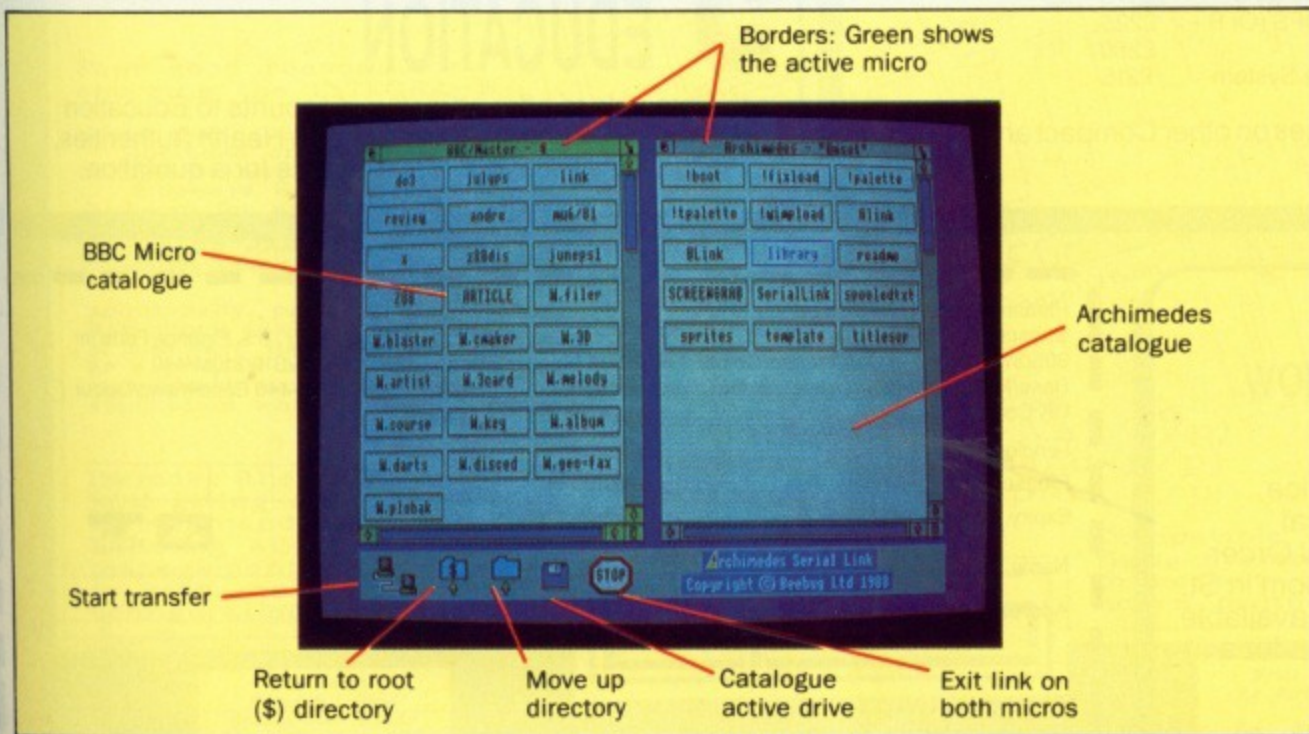
From then on all control is via the Archimedes.

Moving over to that micro, it's just a matter of booting the disc. Providing your BBC Micro is set up correctly, you'll see a program being automatically transferred over to it and run. Once that is complete, you are left in the Wimp environment on the Archimedes and all your commands are entered there.

To save you the trouble of transferring this software from your Archimedes disc to the BBC Micro each time you want to use the package, once you exit the link on the Archimedes end you can press F0 on the BBC Micro to save a copy. Then next time you want to use the link you can CHAIN the program at the BBC Micro end and boot the Archi-

Turn to Page 55 ▶

The Beebug Archimedes Serial Link goes much further than just making a simple connection



The Archimedes screen display

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◀ From Page 53

medes disc with the Alt key pressed down. This is a nice touch that some people may like, but I prefer all the software on the one 3.5in disc – it doesn't take long to pass the appropriate bits over the link.

If your BBC Micro is not ready to talk – or the lead is not connected – an error message is displayed. It's a pity the message doesn't include the FX calls in case you've lost the instructions. Pressing the spacebar lets the Archimedes try again to confirm the link.

Once connection has been established two windows show the BBC Micro and Archimedes disc catalogues. The active one has a green border and the other grey. Clicking anywhere on one makes it active. If you then select the disc icon that drive is re-catalogued to show the new contents of a disc if you have changed it.

To transfer a file either way just highlight it by clicking on it and select the transfer icon in the bottom left hand corner of the screen. More than one file can be highlighted, so a multiple file transfer is easily achieved. Files are saved on the other micro with the same name as the one it is being taken from – truncated where necessary.

The Acorn serial bug fix is included in the software and is automatically loaded as you boot the

disc so there should be no problems transmitting or receiving files – I certainly didn't have any. The instructions explain how to reduce the transfer rate from its default setting of 9600 baud if you have problems but I didn't find this necessary. That part of the manual is the only section that would not be understood by a novice.

That's how easy it is to transfer files, but there are a couple of other nice touches in the package. Directories – as opposed to files – are bordered in blue on the menus. Double clicking on them moves you to that directory and there are two icons to step you back through the directories. The one labelled \$ takes you straight to the root directory while the other steps you back one at a time.

One omission is an easy way to use drive 1, a hard disc or other filing system. You can type, for example, *DRIVE 1 but I was surprised that on such a well thought out package there was no icon to show and allow selection of the available filing options.

The whole package is a pleasure to operate. The instructions are clear for beginners and the software is so easy to use that – apart from finding out how to get the BBC Micro to talk – they soon become redundant. If you want to transfer files between your old and new BBC Micros I thoroughly recommend this serial link.

The bottom line...
A professionally produced package that makes the moving of files between an Archimedes and BBC Micro easy

INTEGRA-B

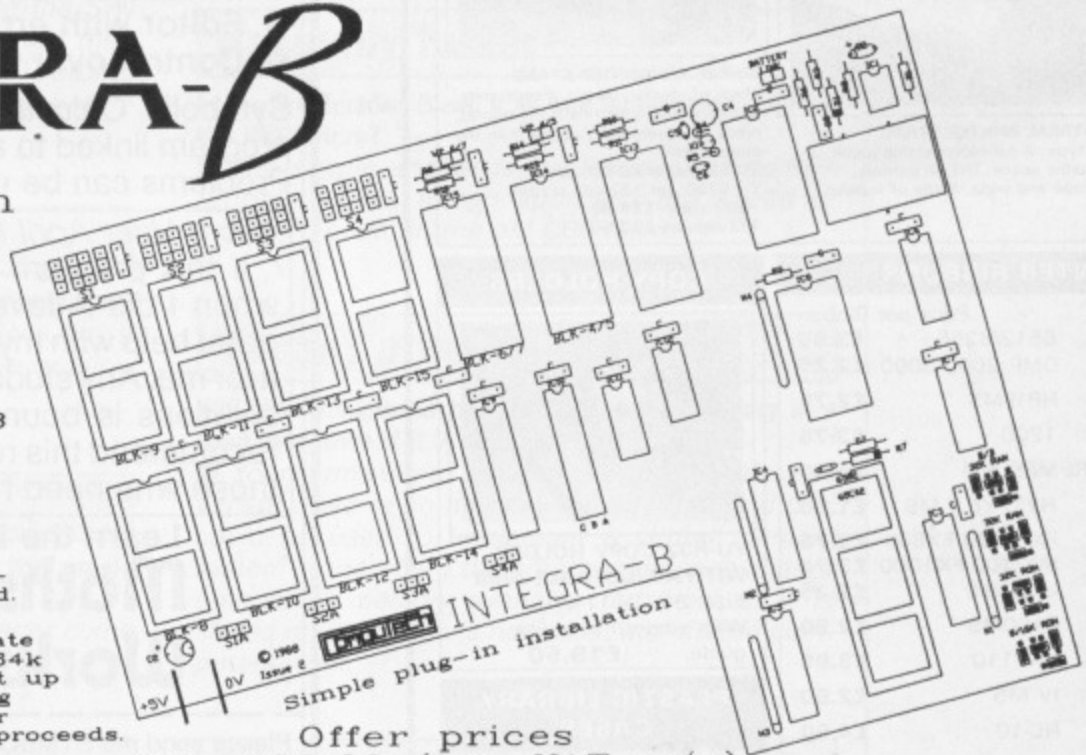
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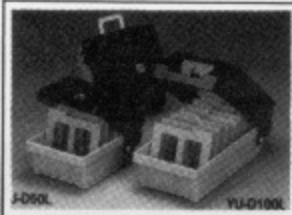
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Address

Faster with Fred?

I'm using my Archimedes 310 with an I/O podule in a high-speed data acquisition system. On a BBC Micro non-Tube compatible machine code a 100 data bytes block can be read from an external VIA connected to FRED in 2.5mS. If legal coding using osbyte is used the access time increases to 100mS.

This time reduces to 50mS using legal osbyte coding on the Archimedes but this is still far too slow for the purpose required.

We have tried, unsuccessfully, to access the 1Mhz Bus Fred area in the I/O podule directly but receive a *Bad immediate constant* error. Is there any way that direct access to Fred can be achieved to enable the high processing speed of the Archimedes to be utilised?

● You get the error because the Risc chip only accepts immediate values that contain eight significant binary bits. The assembler will shift them automatically into any position, so while an immediate value of &FF0 is fine a value of &FF1 will cause the error.

The answer is to load the number into the required register in more than one go using the MOV instruction to get the most significant bit in and then the ADD or SUB instructions to alter it to the correct value. In this way most values required can be loaded in using two instructions but it could take up to four.

However, having overcome that problem you will be faced with a privilege violation when you try to run the code. This is because the Archimedes only allows direct access to the podule space in Supervisor mode. The way around that is to either claim the vector for unused SWIs and direct it into your own routines, or use the SWI which returns in Supervisor mode. You will then be able to access podule address space. You will have to release the unused SWI vector before returning to Basic.

Paired for chords

Will the music editor use all eight voices or only four?

● The music editor uses all eight voices but it assigns them in groups of two per staff to allow simple chords.

Unfinished melody

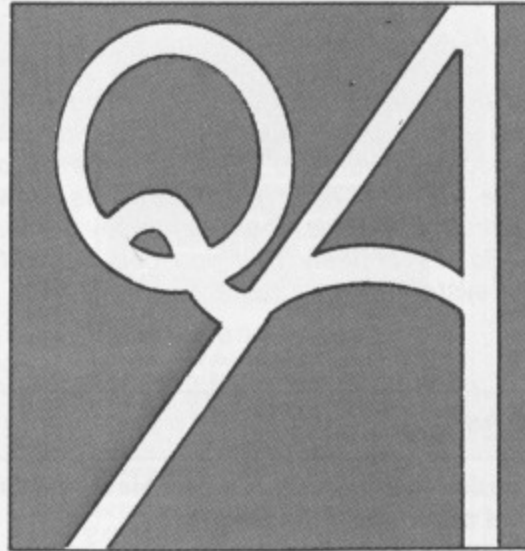
How long can the score go on for in the music program?

● We don't know this one. Has any reader come up against the limit?

Images and chips

Will the majority of the type of utilities that would be supplied on rom for the BBC Micro be in rom image form which can be loaded into memory or will they continue to be chips?

● Some suppliers will continue to supply software on rom which will have to be fitted in a rom podule. This will provide a measure of copy protection and also not take up so much ram space inside the Archimedes. However, anything



that can be produced as a rom could also be produced as a relocatable module – Archimedes jargon for rom image.

Interrupted palette

Will it be possible to write interrupt routines to obtain more colours in a low colour mode?

● Yes you should be able to re-program the colour palette part way through the frame scan to produce more colours. However, do you really need to when there is still a relatively large amount of memory left even in modes with a lot of colours.

Basically faster

Is the Archimedes Basic V as fast as machine code on the BBC Micro?

● The simple answer is no. However, in certain artificial cases it can approach the speed of compiled code on the old BBC Micro.

Vacant possession

Will the Archimedes be able to use the memory in a hard disc drive if it is vacant?

● Your terms seem a bit muddled. If the drive is vacant there is no memory to use. The hard disc could be used to implement a virtual memory system – one where the programmer sees a large amount of memory available but most of it is stored on disc. This is how most mainframe computers work.

Speeding up Archimedes

It is said that the Archimedes is only running at 4 to 5 MIPS. If, in the future Acorn get the Archimedes running at 14 MIPS, will it be possible to just fit a new chip – or something similar – into an old Archimedes and gear it up to 14 MIPS?

● The problem is that the memory chips cannot run so fast and therefore the Archimedes is

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- ★ Accessing the 1Mhz bus
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- ★ Voices and the music editor
- ★ The MSdos co-processor
- ★ Storing screens on a 440
- ★ Music waveform editing
- ★ Screen storing on a 440
- ★ More colours in low colour mode

Turn to Page 58 ►

We are receiving a large number of questions about the Acorn Archimedes. Some of them are dealt with here, and we will be answering more over the next few months.

So, if you have any questions about the super micro from Acorn don't hesitate to send them to:

Archimedes Questions,
The Micro User,
Europa House,
Adlington Park,
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SK10 4NP.

◀ From Page 57

slowed down when accessing rom and ram. In fact it is slowed down more for rom, which is why ram Basic runs quicker. If faster chips become available you will have to modify this slowing down circuitry and this would be, to say the least, tricky. So it's unlikely that you could modify a present system to work faster.

Tenor to bass

In the music editor program, is it possible to re-define a voice and use it within the program?

● The music editor is not a voice editor – it cannot change any of the sounds. It can only give the sound generating modules parameters and these can also be given from Basic.

MSdos co-processor

Will the MSdos co-processor be using the Archimedes ram chips, or will they be supplied on the co-processor board? Also, will it use the Archimedes 3.5in drive, or will a 5.25in one be supplied, as most PC software is on this format?

● Assuming someone builds an MSdos co-

processor it would probably only use the Archimedes memory for display. The 640k MSdos normal limit would probably be on the board. The most likely option is that a 5.25in drive socket would be provided for running software on the original media. Also the internal drives of the Archimedes could be used.

Editing waveforms

Is some sort of waveform designer included in the bundled software for use with the music editor?

● There is no waveform editor with the system, but one should be available before long. Many people are working on producing one, including Mike Cook.

Storing screens

How many screens can be stored in the memory of a 440 machine?

● It depends upon what mode you are in and what else you want to have in the memory. A Mode 0 screen, for example, takes 20k. If all the systems memory were to be devoted to this – which is not possible as you would not be able to do anything with them – then you could store up to 204 screens.

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Use of all available RAM	Yes	No	No
Macros	Yes	No	Yes
Relocatable output	Yes	No	No
Linker with libraries	Yes	No	No
High level constructs	Yes	Yes	No
Number of error reports	39+warnings	3+BASIC errs	20
65C00 extended opcodes	All	65C 12 only	65C 12 only
Switch of 65 C 12 opcodes	Yes	No	No
ROM size	32K	16K	16K
Disassembler	Yes	No	Yes
Label restrictions	No	Yes	Yes



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Library

Compiled by Steve Turnbull

HERE's another assortment of programming goodies. For the first time in Library we have some Lisp routines designed to make programming in Lisp easier. There's a text scroller with a difference: It's vertical. We have an improved error reporting facility and an enhanced version of the machine code label highlighting.

Centering and underlining in combination can cause problems with Wordwise Plus, so we present a little segment program to make it easy. Finally, what is the shortest route from A to B? Now you can find out: Here's a program to calculate the shortest distance between any two points on the Earth's surface.

If you've written any software that you'd like to see included in Library, send it to Library, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.

Title: Label Highlights 2
Language: 6502
Author: P.West

Here's a new version of the machine code label highlighter from the March 1988 Library. It still occupies less than 256 bytes but now has extra features:

- It works on screen in all modes except 7.
- It produces printed highlights in

bold for Epson-compatibles.

- You can turn the effect off and on with Control+H.
- In general, only full stops within assembly code should be highlighted.
- Control+Z will disable the routine allowing the code to be safely over-

written by another utility.

The routine works on any BBC Micro – it could be relocated to &DD00 (the transient program area) on Master series machines and it can be assembled on either Basic I or II.

The resultant code is saved automatically with the filename HILIGHT.

```

10 REM Label Highlighter
20 REM version 2 by P.West
30 PROCinit:PROCassem
40 PROCos("SAVE HILITE A00 "+STR
S^PX)
50 END
60 DEFPROCinit:code=&A00:wrchv=&
20E
70 byte=&FFF4:wrch=&FFEE:ENDPROC
80 DEFPROCassemble
90 FOR LX=0 TO 2 STEP 2
100 PX=code:[OPT LX
110 LDA wrchv:LDX #mywrchv MOD256
120 STA oldwrchv+1:STX wrchv
130 LDA wrchv+1:LDX #mywrchv DIV2
56
140 STA oldwrchv+2:STX wrchv+1:RT
S
150 .mywrchv PHP:PHA:TXA:PHA:TYA:
PHA
160 LDA #218:LDX #0:LDY #&FF
170 JSR byte:TXA:BNE exit
180 .notexit TSX:LDA &103,X
190 CMP #26:BNE not26
200 LDX oldwrchv+1:STX wrchv
210 LDX oldwrchv+2:STX wrchv+1
220 .not26 LDX #&FF
230 CMP #91:BNE not91:STX asm
240 .not91 CMP #2:BNE not2:STX pr
n
250 .not2 LDX #0
260 CMP #93:BNE not93:STX asm
270 .not93 CMP #3:BNE not3:STX pr

```

```

n
280 .not3 CMP #8:BNE not8
290 TAX:LDA hi:EOR #&FF:STA hi:T
XA
300 .not8 LDX hi:BEQ exit
310 LDX asm:BEQ exit:LDX hnf:BEQ
off
320 CMP #46:BNE exit:LDX prn:BEQ
scrn
330 LDA #27:JSR prsend
340 LDA #69:JSR prsend:JMP doneo
n
350 .scrn LDA #135:JSR col
360 LDA #0:JSR col
370 .doneon LDA #0:STA hnf
380 .exit PLA:TAY:PLA:TAX:PLA:PLP
390 .oldwrchv JMP &FFFF
400 .off CMP #10:BEQ skip
410 CMP #32:BNE exit
420 .skip LDX prn:BEQ scrff
430 LDA #27:JSR prsend
440 LDA #70:JSR prsend:JMP doneo
ff
450 .scrff LDA #7:JSR col
460 LDA #128:JSR col
470 .doneoff LDA #&FF:STA hnf:JMP
exit
480 .col PHA:LDA #17:JSR wrch
490 PLA:JMP wrch
500 .prsend PHA:LDA #1:JSR oldwrc
hv
510 PLA:JMP oldwrchv
520 .hnf OPT Fnb(0):.hi OPT Fnb(&

```

```

FF)
530 .prn OPT Fnb(0):.asm OPT Fnb(
0)
540 ]:NEXT:ENDPROC
550 DEF Fnb(BX):?PX=BX:PX=PX+1:=L
%
560 DEF PROCos($&700):LOCAL XX,YX
570 YX=7:CALL &FFF7:ENDPROC

```



10 = 00	200 = E865 7	390 = D64E 2
20 = 00	210 = 96D3 1	400 = CC64 E
30 = 597F F	220 = BA57 D	410 = B466 C
40 = A9F1 B	230 = E121 8	420 = D15E 3
50 = FD2E E	240 = E9EA 5	430 = 2954 5
60 = 424A 9	250 = A488 3	440 = BE38 2
70 = 431B F	260 = 8B59 7	450 = A0B9 0
80 = 98E9 C	270 = 7990 A	460 = 6623 8
90 = AAB9 4	280 = 2C34 8	470 = 21BA 1
100 = 7CBB D	290 = E9A0 1	480 = 2907 2
110 = 5EF6 C	300 = 3A69 9	490 = 6544 B
120 = 3B4D 1	310 = EA6A F	500 = 8E1C D
130 = 50F1 5	320 = DCBC 0	510 = 5A71 2
140 = 610E B	330 = 2954 7	520 = 256E 1
150 = 8585 D	340 = 9602 2	530 = C293 D
160 = 5627 6	350 = 22CA C	540 = 953B 6
170 = 6C04 E	360 = 3F0F 3	550 = 9BB4 B
180 = 9069 1	370 = E891 C	560 = 61B0 9
190 = 85D5 4	380 = 2124 D	570 = DB66 E

Title: Barrel Scroller
Language: Basic/6502
Author: John Pegg

There has been a plethora of screen text scrollers in recent issues of *The Micro User*, but this time we have something a little bit different. Instead of scrolling the text across the screen, each character is rolled into position – as if it were on a barrel – and anything previously in that position is rolled out giving you a

fascinating way to display text.

To use it you need to call PROCscroll specifying the string to be scrolled off the screen – *a\$* – the one being scrolled on – *b\$* – the coordinates of the string start position, and the speed of scroll.

It works by reading the definitions of the two characters then redefining

character 255 to be part of each and placing it on the screen. Each time through the loop there is less of the old character and more of the new.

A possible improvement would be to scroll complete strings instead of doing it character by character or even to produce a-character *dissolve* in a similar fashion.

```

10 REM * Reel Scroller *
20 MODE1:VDU23;8202;0;0;0;
30 PROCinit:PROCassem
40 PROCscroll("","Scrolling text
reel",5,10,60)
50 PROCscroll("Scrolling text re
el","By John Pegg",5,10,60)
60 PROCscroll("By John Pegg","Fo
r The Micro User",5,10,60)
70 PROCscroll("For The Micro Use
r","Text can be scrolled at many sp
ds",5,10,70)
80 PROCscroll("Text can be scrol
led at many spd's","From slow",5,10,
120)
90 PROCscroll("From slow","To fa
st",5,10,10)
100 CLS
110 PROCscroll("","SYNTAX:",
0,10,30)
120 PROCscroll("","PROCscroll(str
ing1,string2,X,Y,spd)",0,12,80)
130 PRINT:END
150 DEFPROCscroll(a$,b$,X%,Y%,S%)
160 PRINTTAB(X%,Y%)a$
170 IF LENb$<LENa$ b$=b$+STRING$(
LENa$-LENb$," ")
180 IF LENa$<LENb$ a$=a$+STRING$(
LENb$-LENa$," ")
190 FOR R%=1 TO LEN a$
200 ?old=ASC MID$(a$,R%)
210 ?new=ASC MID$(b$,R%)
220 IF XX-1+R%>39 XX=1-R%:Y%=Y%+1
230 ?xpos=XX-1+R%:?ypos=Y%:spd=S
%
240 CALL scroll:NEXT:ENDPROC
260 DEF PROCinit
270 wrch=&FFEE:word=&FFF1
280 code=&A00:buf =&60
290 old =&80:new=&81:xpos=&82
300 ypos=&83:spd=&84:temp=&85
310 ENDPROC
330 DEFPROCassem
340 FOR LX=0 TO 2 STEP 2
350 PX=code:[OPT LX]:scroll
360 LDX #buf MOD256:LDY #buf DIV
256
370 LDA old:STA buf:LDA #10:JSR
word
380 LDX buf+8:STX temp
390 LDX new:STX buf+8
400 LDX #(buf+8)MOD 256
410 LDY #(buf+8)DIV 256
420 JSR word:LDA temp:STA buf+8
430 .start LDX #0
440 .lp LDA #31:JSR wrch
450 LDA xpos:JSR wrch
460 LDA ypos:JSR wrch
470 LDA #23:JSR wrch
480 LDA #255:JSR wrch
490 LDA buf+1,X:JSR wrch
500 LDA buf+2,X:JSR wrch
510 LDA buf+3,X:JSR wrch
520 LDA buf+4,X:JSR wrch
530 LDA buf+5,X:JSR wrch
540 LDA buf+6,X:JSR wrch
550 LDA buf+7,X:JSR wrch
560 LDA buf+8,X:JSR wrch

```

```

570 LDA #255:JSR wrch:INX
580 JSR delay:CPX #9:BNE lp:RTS
590 .delay
600 PHA:TXA:PHA:TYA:PHA:LDX spd
610 .lp2 LDY spd
620 .lp3 DEY:BNE lp3:DEX:BNE lp2
630 PLA:TAY:PLA:TAX:PLA:RTS
640 ]:NEXT:ENDPROC

```



10 = 00	230 = 99AF D	460 = A2AF D
20 = E947 7	240 = 3BFC E	470 = 5249 7
30 = 597F B	260 = 40D7 2	480 = A68D D
40 = 31B0 5	270 = 63E4 A	490 = 7E86 4
50 = 2235 9	280 = E92C 8	500 = 7B19 9
60 = 335D C	290 = 1105 B	510 = 786C B
70 = 8808 C	300 = 7899 7	520 = 7027 A
80 = E5D4 4	310 = ED0F E	530 = 7352 B
90 = 6814 0	330 = 1330 8	540 = 76CD A
100 = 7A16 A	340 = AAB9 6	550 = 75B8 C
110 = AF3B E	350 = 1466 1	560 = 665B C
120 = 9435 7	360 = 1A94 B	570 = 86A4 3
130 = FDDF E	370 = 3BE7 5	580 = 338A C
150 = 4C42 B	380 = 115E 0	590 = F949 3
160 = 8A31 7	390 = C569 6	600 = 6940 7
170 = 12C2 0	400 = EE9B 1	610 = 39C9 4
180 = 7A1D 4	410 = 4E4 7	620 = 8AC8 A
190 = D193 8	420 = F5CB 7	630 = 4E06 3
200 = 5D21 E	430 = B09F C	640 = 953B 0
210 = CF2A 8	440 = 3B6D 8	
220 = 3E5B A	450 = E7CC 4	

Title: Centre and Underline
Language: Wordwise Plus
Author: Mike King

Some people have problems centering and underlining text together on Wordwise Plus. This is due to a feature of the package that makes the underline start from the left margin even if the text is centred.

The solution is to issue the centre command, insert a space, then issue the underline instruction. The utility here does this automatically.

By loading it into a Wordwise Plus segment, then pressing the appropriate function key, a window is cleared at the top of the screen, and you are prompted for some text. When you press Return it is inserted into your main text at the cursor position with the centering and underlining commands.

```

REM Center and Underline
REM by Mike King
VDU28,0,6,39,0,12
DO THIS
VDU141,157,129
PRINT" Centre and Underline"
REM ^ 6 spaces
TIMES 2
PRINT
PRINT
PRINT"Enter string:"
BS=GLK$
AS="IGCEIW "+"IGUSIW"
CS="IGUEIWIR"
SELECT TEXT
TYPE AS+BS+CS
DISPLAY
IF (?&8F AND 1)=0 THEN *FX138,0,27

```

Title: Functions
Language: Lisp
Author: Peter Harris

Lisp is a very powerful language, but it does require you to build your own functions rather than giving you everything you need in the first place. So here are a few that I have developed and found to be very useful.

The function *ITEM* extracts the Nth element of a list *L*. *LISTCOUNT* returns the number of elements in a list *L*, including elements of sublists. *HEADCOUNT* also counts elements — but only of the main list — treating sublists as single elements.

The functions *LEFT*, *MID* and *RIGHT* operate on Lisp lists in the same way

that *LEFT\$*, *MID\$* and *RIGHT\$* operate on Basic strings. An interesting point is that the Electron Lisp cartridge works perfectly on the Master.

Here are some examples:

Function	Result
(ITEM m(A B C D E F) 4)	(D)
(LISTCOUNT m(A B (C D) E F))	(6)
(HEADCOUNT m(A B (C D) E F))	(5)
(LEFT m(A B C D E F) 2)	(A B)
(MID m(A B C D E F) 3 2)	(C D)
(RIGHT m(A B C D E F) 2)	(E F)

```
(DEFUN ITEM (L N)
(COND ((ONEP N) (CAR L))
      (T (ITEM (CDR L) (SUB1 N)))))

(DEFUN LISTCOUNT (L (N.0))
(COND ((NULL L) N)
      ((ATOM L) (ADD1 N))
      (T (LISTCOUNT (CDR L) (LISTCOUNT (CAR L) N)))))

(DEFUN HEADCOUNT (L (N.0))
(COND ((NULL L) N)
      (T (HEADCOUNT (CDR L) (ADD1 N)))))

(DEFUN LEFT (L N)
(COND ((ONEP N) (CAR L))
      (T (CONS (CAR L) (LEFT (CDR L) (SUB1 N)))))

(DEFUN MID (L S N)
(LOOP (UNTIL (ONEP S))
      (SETQ S (SUB1 S))
      (SETQ L (CDR L)))
(LEFTLIST L N))

(DEFUN RIGHT (L N)
(SETQ N (DIFFERENCE (HEADCOUNT L) N))
(LOOP (UNTIL (ZEROP N) L)
      (SETQ N (SUB1 N))
      (SETQ L (CDR L))))
```

Title: Where on Earth?
Language: Basic
Author: David Cook

Calculating the shortest distance between two points on the Earth's surface is not simply a matter of getting out an atlas and measuring it: The curvature of the planet interferes with this simple idea.

The routine given here allows you to enter the geographical coordinates of two places and then calculates the distance between them in kilometres. The distance is calculated along the Great Circle and is the shortest distance *as the crow flies*.

It treats the Earth as a perfect sphere so there may be small errors over long distances but these should be no more than about 5km in the worst possible case.

Longitude and latitude are usually measured relative to the Greenwich Meridian and the Equator. Values to the North and West should be treated as positive and those to the South and East negative to ensure correct results.

If both points are in the same quadrant of the globe then there is no need to use negative values but it is good practice to be consistent.

```
10 REM * Where on Earth *
20 MODE 6:PRINT"Where on Earth..
."
30 VDU 23,ASC"!",&A040;&0040;&0;
&0;
40 DIM Descr$(1),Lat(1),Long(1)
50 PRINT"Enter northings and westings as""positive numbers, southings and""eastings as negative numbers."
60 PRINT"Coordinates written as 56!34'N should""be entered as 56,34"
70 FOR P%=0 TO 1:PROCENTER(P%):N
EXT
80 ca=COSLat(0)*COSLat(1)+SINLat(0)*SINLat(1)*COS(Long(0)-Long(1))
90 dis=ACS(ca)*6371
100 IF dis>20015 dis=40030-dis
110 IF dis<1 dis=0
120 PRINT"Descr$(0)" to "Descr$(1)";
130 PRINT" on Great Circle is""dis""km"
140 REPEAT UNTIL GET=32:RUN
160 DEF FNLong(X%,Y%)=RAD(ABSX%+ABS Y%/60)
170 DEF FNLat(X%,Y%)=RAD(90+(ABS X%+ABS Y%/60)*S)
190 DEF PROCENTER(P%):PRINT'
200 IF P%=0 a$="first" ELSE a$="s
```

```
econd"
210 PRINT"Name of ""a$"" location";
220 INPUT Descr$(P%)
230 PRINT"Latitude of ""a$"" location:";
240 INPUT Deg,Mins
250 IF Deg<0 S=1 ELSE S=-1
260 Lat(P%)=FNLat(Deg,Mins)
270 PRINT"Longitude of ""a$"" location:";
280 INPUT Deg,Mins
290 Long(P%)=FNLong(Deg,Mins)
300 IF Deg<0 OR Mins<0 Long(P%)=Long(P%)*-1
310 ENDPROC
```

Get it right!

10 = 00	110 = 4CEC 7	230 = 80FF 0
20 = 1526 6	120 = 97F3 7	240 = 5163 D
30 = 655C C	130 = 8FEE 4	250 = 1990 5
40 = F304 2	140 = 2C03 9	260 = 0057 2
50 = C9E6 F	160 = 2E5C 2	270 = 1E08 A
60 = 5D6B 5	170 = 7E34 5	280 = 5163 A
70 = 129B D	190 = 3758 9	290 = 4359 C
80 = 8034 6	200 = 615D A	300 = D386 7
90 = 4BDE 9	210 = F213 B	310 = ED0F 7
100 = 505E A	220 = 4C1 E	

Here's a really sticky one . . .



It's a challenge!

Mike Cook poses a problem based on the card album caper

HERE's the second of my challenges where I set a problem one month, give hints the next and my solution the month after. Can you write a program to solve it before I do? So, on to the challenge. This time it's based around a children's pastime.

"Look Daddy, stickers", pleads your small son, "and they're only 15p a packet". You pick up a small sealed envelope festooned with cartoon pictures of cuddly teddy bears. "Where will you put them?", you muse. No sooner than the thought has entered your head than the album is thrust into your hand.

"I can put them in here", a small voice cries. You take the album and look at it: It's quite thick, lots of pages, line illustrations and a bit of text but mainly it's full of blank spaces for the stickers. Glancing at the back you see the price - only 35p, quite a bargain.

Inside the back cover is an offer from the publisher. In order to finish off your collection you can buy the last 15 stickers no matter what they are. That sounds fair, so you dig into your pocket and hand over the money and you are stuck in the card album caper.

When you look at the problem in more detail, there are, say, 220 cards to collect and fairly soon you realise that you are collecting a large number of duplicates: Just how much is this *bargain* album going to cost to fill?

Well, with 220 cards costing 15p for a pack of five that's about £6.60 - you could have bought a real book for that. But hang on a minute. That doesn't cover all the duplicates you are getting. To top matters, your other child says that she wants an album of horses. It's only fair, as her brother has got one. You decide before you get in any deeper you had better check the costs out on your trusty computer.

There is no way to work out mathematically the average number of packs you will have to get to complete an album, so you want a computer

simulation. It will generate a pack of cards, stick them in the album and find out if your collection is complete.

The program must keep track of how many packs you buy and how many duplicates you collect. Also, as simulating this once will not give you a very good idea of the average time to complete an album, you will want to fill many imaginary ones and keep track of your results so you can work out a running average.

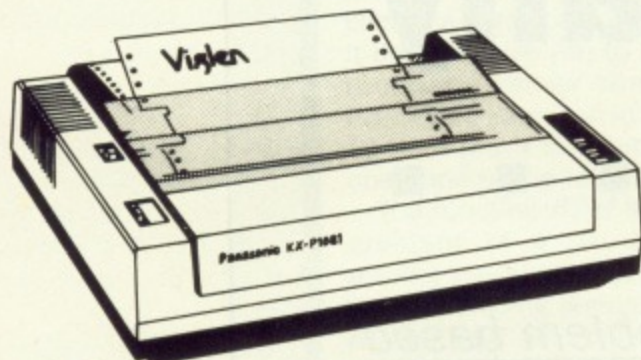
Rather than build constants into your program, arrange that all the parameters of the simulation are stored in variables so you can easily change them to simulate different collection schemes. For example, the number of cards to collect and the number of cards you can buy to complete your collection should be declared in a line near the start, rather than being hard coded in the program.

● *Well there it is. Are you up to the challenge or do you need some more help? Next month we'll be looking at how you can go about tackling the problem, with my solution the month after that. So try to beat me to it.*



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PANASONIC PRINTER KIT



The Panasonic KX-P1081 come complete with £45.00 worth of accessories FREE including tractor feed and roll feed units with paper, printer cable, and a specially designed metal printer stand. Features include:

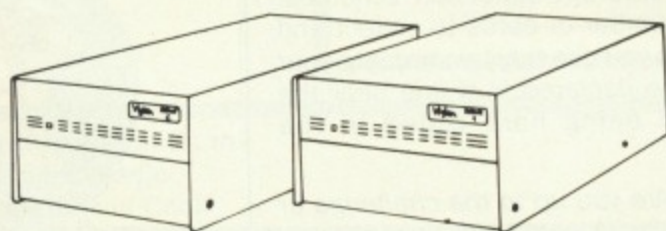
- ★ 120 cps draft printing 24 cps NLQ
- ★ IBM and Epson compatibility through dip switch settings
- ★ Prints 80 columns on A4 cut sheets, continuous stationery or roll paper 9 x 9 draft and 18 x 23 NLQ

Stock Code	Description	Price inc. VAT
SP079	Panasonic KX-P1081 plus accessories	£185.95

Please add £8 for insured courier delivery.

MEGA BYTES FOR MINI BUCKS

NEW LOW PRICES



Plug in 20 to 112 Megabytes of extra storage with the Viglen Winchester system.

The Viglen Winchester is ready to plug in and use on a BBC Master micro; for a BBC B or B plus you will merely need to fit the Acorn ADFS Rom. The Winchesters are 100% compatible with the Acorn Winchester and Acorn ADFS and will also work with the Acorn Master 512 board with DOS plus.

Drive 1 Winchesters are also available for backup or just more storage and simply plug into the back of the Drive 0 unit.

The Winchester package consists of: Winchester unit (cased with controller boards, power supply and fan), Master reference Manual part 1, Winchester user guide and Winchester utilities on disk (such as formatter, verifier, ADFS menu and sophisticated backup program allowing you to make fast backups on DFS disks, ADFS disks or Drive 1 Winchester).

Stock Code	Description	Price inc. VAT
Drive 0 Single		
SP0150	VB20 20Meg Viglen Winchester	£499.00
SP0152	VB28 28Meg Viglen Winchester	£519.00
V155	VB40 40Meg Viglen Winchester	£799.00
V156	VB56 56Meg Viglen Winchester	£899.00
Drive 1 Second Drive		
SP0160	VB120 20Meg Drive 1 Winchester	£479.00
SP0162	VB128 28Meg Drive 1 Winchester	£499.00
V165	VB140 40Meg Drive 1 Winchester	£739.00
V167	VB156 56Meg Drive 1 Winchester	£769.00
V157	20MB Tape Streamer Backup	£689.00
V503	Acorn ADFS Rom and Manual	£29.95
(Only necessary for BBC B or B Plus)		

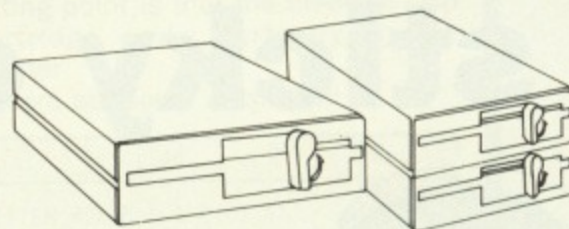
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All disc drives are supplied with a manual, packed utilities disc and a full 12 Months warranty (2 Year Warranty available) and are ready to plug in and use on a BBC B (fitted with a DFS) B + or Master micro. 40/48 Track drives have a switch which enables operation in either 40 or 80 track mode.

The capacity quoted are given in single density mode; for double density mode (1770 DFS + ADFS as in the Master) the capacities should be approximately doubled.

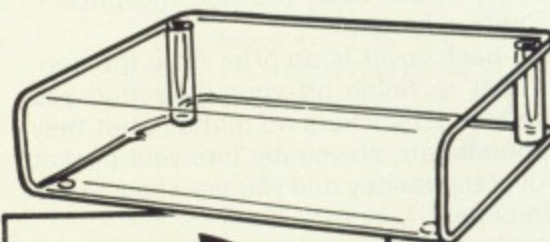
An integral power supply is not necessary as the disc drives run from the micro's power source however should you require drives with their own power supply, these are also available. If your BBC B micro does not have a DFS fitted then you will also require the Acorn dfs kit. These are available from Viglen.

Stock Code	Description	Price inc. VAT
SP014	400K Single Drive 40/80T	£99.95
SP030	400K Single Drive 40/80T + PSU	£109.95
SP019	800K Dual Drive 40/80T	£189.95
SP020	800K Dual Drive 40/80T + PSU	£209.95
VPD0240	100K Single Drive	£105.95
VPD0241	400K Single Drive 40/80T	£113.00
VPD0242	200K Dual Drive	£195.95
VPD0243	800K Dual Drive 40/80T	£219.00
VPD0245	100K Single Drive + PSU	£119.95
VPD0246	400K Single Drive + PSU	£135.00
VPD0247	200K Dual Drive + PSU	£209.95
VPD0248	800K Dual Drive 40/80T + PSU	£235.00
VPD0249	800K Dual Drive 40/80T + PSU in Metal Bridge Unit	£265.00

V0060	3.5" 400K Single Drive	£95.95
V0061	3.5" 800K Dual Drive	£199.95
V0062	3.5" 400K Single Drive + PSU	£135.00
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V0064	3.5" and 5.25" 800K Dual Drive	£219.00
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DISK DRIVES



TABLE

CLEAR PERSPEX PRINTER STAND

The Viglen printer stands are beautifully finished in clear perspex and raise the printer high enough to put continuous stationary underneath.

Stock Code	Description	Price inc. VAT
V490	80 Column Printer Stand (15" x 13" x 3.5")	£19.95
V491	136 Column Printer Stand (23.5" x 13" x 3.5")	£29.95

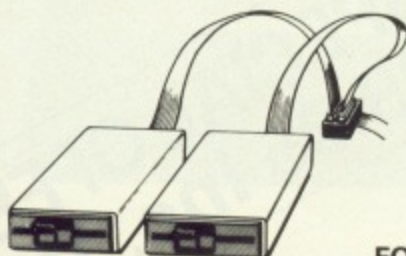
Please add £3 P & P

PRINTER STANDS

CONSOLE SYSTEM

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DUAL DRIVES FOR LESS THAN £17!

The Viglen Data DUCK (Dualling Up Connector Kit) converts any two single drives to a dual drive instantly. Simply plug the duck into the micro's disk drive socket and plug two single drives (any type and any make) into the duck to obtain a dual drive system accessed as drive 0 (and 2 if double sided) and drive 1 (and 3 if double sided). If neither single drive has its own power supply then you will require a Viglen power DUCK in order to obtain two disk drive power sockets from the micro.

- ★ No soldering simply plugs in.
- ★ No need to take disk drives apart to change links.

Stock Code	Description	Price inc. VAT
V084	Viglen data duck	£16.95
V085	Viglen power duck	£7.95

Please add £2.50 for P & P.

MASTER TRANSFORMATION



Give your BBC Master micro the professional PC look by replacing your existing lid with this smartly styled package. The system is strong and constructed in high impact ABS colour matched to the BBC Master and it gives your Master a very neat and impressive look.

- ★ Will support monitors including up to 16" TV.
- ★ Can house two 5¼" disk or Winchester drives.
- ★ Capable of housing 3½" drives.
- ★ Will accept Acorn cartridges and the Viglen Master Cartridge system.
- ★ Full internal metal screening.
- ★ Also available with fitted drives (5¼", 3½" or Winchester) or as a complete system including the Master.

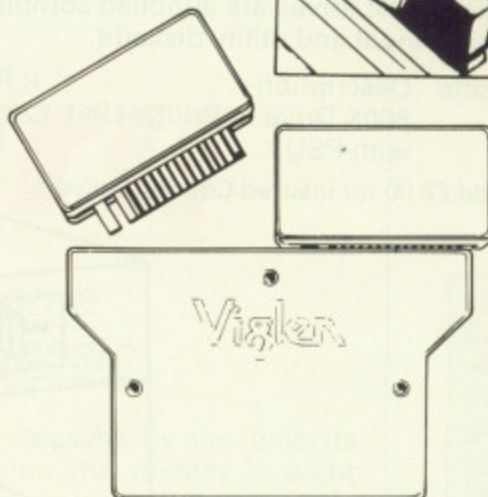
The Master console unit system packages includes:

- ★ Remote Keyboard case with cable.
- ★ Metal screened main unit casing (including internal fittings for 5¼" drives).
- ★ Two switches which can be used for 40/80 track switching and can be either fitted on the front or rear of unit.
- ★ Two blanking plates to blank out any drive aperture that is not used.
- ★ Full labelling kit.
- ★ Fully illustrated fitting instructions.

Stock Code	Description	Price inc. VAT
V861	Viglen Master Console unit	£59.95
Accessories for the Master Console unit		
V853	Dual Drive data cable for console unit	£9.95
V854	Dual Drive power cable for console unit	£7.95
V855	Power supply for the console unit	£34.95
V866	Fan Kit for console unit	£34.95
V858	Fitting bracket for 3½" drive	£8.95
V851	Viglen Professional Console Unit for the BBC micro	£49.95
	Fitting service available from	£15.00

Please add £8 for insured courier delivery.

VIGLEN ROM CARTRIDGE SYSTEM



Having fitted the Viglen Rom cartridge system to your BBC, Master or Master COMPACT, you can plug in your Roms/Eproms simply by inserting each one in a Viglen cartridge and plugging in whichever cartridge you want to use. The same Viglen cartridge can be used on all the micros mentioned and there is no need to switch the micro on and off between cartridge changes.

The Viglen cartridge system for the BBC micro consists of the cartridge cable assembly and socket, blanking off plates, 1 cartridge and cartridge storage rack. The cartridge socket when fitted protrudes from the rectangular slot on the left of the keyboard where the cartridges are subsequently inserted. It is simple to fit and requires no soldering.

The Viglen cartridge system for the Master and Master COMPACT simply plugs into your Master cartridge slot (or COMPACT expansion port) and accepts two Viglen cartridges. On the Master you can plug in up to two Viglen cartridge systems thus giving you access to 4 Viglen Cartridges simultaneously. The system comes complete with 2 cartridges and cartridge storage rack. On the Master you can also use Viglen cartridges which have 32 and 64K paged Roms inserted.

Stock Code	Description	Price inc. VAT
V560	Viglen Rom cartridge system for BBC	£12.95
V559	Viglen Rom cartridge system for BBC (low profile)	£12.95
V550	Viglen Rom cartridge system for Master	£14.95
V551	Viglen Rom cartridge system for COMPACT	£14.95
V561	Single Viglen cartridge	£3.45

Please add £2.50 P & P (£00.50 for single cartridge).

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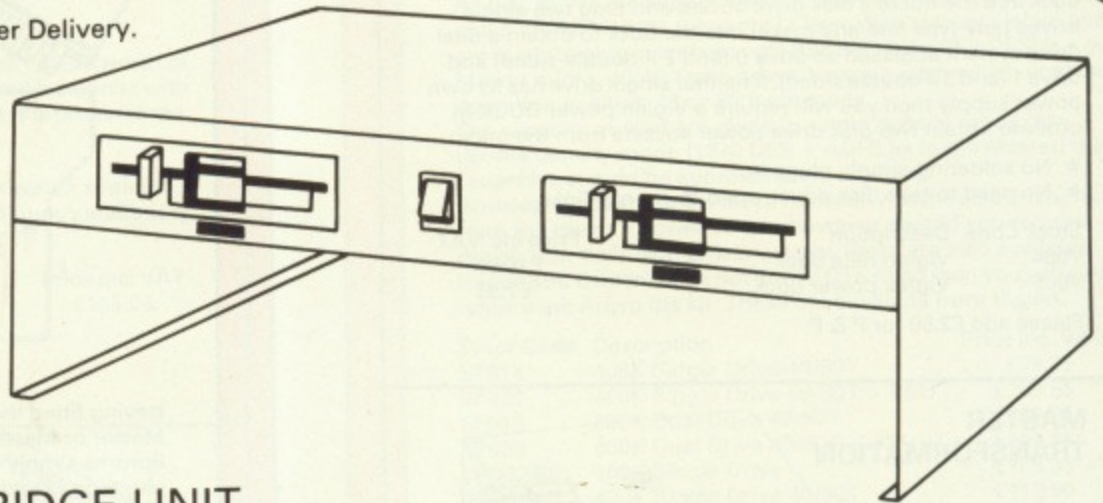
Direct disk drives are manufactured to the highest standard using high quality Japanese mechanisms. All drives are supplied complete with user manual and utility diskette.

Stock Code	Description	R.R.P.
SP0249	800K Drive in Bridge Unit with PSU	£229.95

Please add £8.00 for insured Courier Delivery.

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Breakthru

Andrew Moore demonstrates some Z88 animation with an arcade classic

LET'S face it, the Z88 is not well suited to running a flight simulator. In fact, when it comes to animation, the 8 by 94 character display is going to provide some significant challenges. Despite this, I am confident that – with some ingenuity – much will be achieved with this remarkable portable.

In this article we'll consider some of these problems, and how I dealt with them as I developed a simple implementation of the classic game of Breakout for the Z88.

Almost all forms of software which require more than the minimum degree of interaction with the user are likely to require some kind of animation. This ranges from the movement of a pointer in a design package to the progress of the invasion forces of Planet Zoop in a typical game.

The two main problems which the Z88 poses are the slowness of LCD response and the letter box display. To demonstrate the first of these, consider the following procedure to move an object – S\$ – across the screen at a speed set by DELAY:

```
10 DEF PROCANIM(SS,DELAY)
20 L = LEN(SS) : VDU 1,67 : REPEAT :
PRINT TAB(POS-L,3);" ";SS;
30 UNTIL INKEY$(DELAY) <> " " : VDU 1,
67 : ENDPROC
```

Try animating an asterisk with PROCANIM(" * ",8). Eight centiseconds per character is a reasonable speed, yet you can hardly see

the asterisk. This is because by the time its image is appearing on the display – eight centiseconds after being placed there – it is already being removed.

Only when the delay is increased to around 20 centiseconds do we get more than the faintest blur, and at this speed the movement is jerky and too slow.

The way I am going to deal with this is to use streaks: The things that do the moving will be long thin lines. As a result, even though they move quickly, each of the segments is displayed long enough to make an impression on the LCD display. Their ends are slightly blurred, but this is useful as it tends to reduce jerkiness. To see the effectiveness of this try entering a string of underscores as in:

```
PROCANIM(" _____ ", 2)
```

In Breakout both the moving entities – ball and bat – can be streaks, so the first problem is solved. The second problem, the screen display shape, must also be dealt with.

Traditionally, the bat moves horizontally on the bottom of the screen and blocks are removed from the top. This would be hopeless here: More than one or two layers of blocks, and there would hardly be a gap between bat and ball. Transposing the board so that the bat will move vertically will also be unsatisfactory – its range will be

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The similarity of Basic on the Z88 and BBC Micro means that this game can easily be adapted for the latter. It's great fun on either micro and, being short, is easy to type in.

The changes you need to make to the program to make it run on the BBC Micro are those concerning the screen display and VDU statements. They are shown in Listing II.

Z88

BASIC

02

CRPS

ON/OFF Press both (SHIFT) keys	Delete last character (DEL)	Escape (abort) (ESC)	Edit expression (F7)	Options (O)	Previous word (SHIFT) ←	Beginning of line (HOME)
Insert character (U)	Delete character (G)	Delete character (SHIFT) DEL	Column width (W)	Recalculate (A)	Next word (SHIFT) →	End of line (END)
Insert reference (K)	Delete to end of line (D)	Mark (M)	Reformat paragraph (R)	Set margin (H)	Screen up (SHIFT) ↑	Top of column (PAGE UP)
Insert/overtyp (V)	Delete word (T)	Clear marks (Q)	Swap case (S)	Margin left (←)	Screen down (SHIFT) ↓	Bottom of column (PAGE DOWN)
Insert row (N)	Delete row (Y)	Delete row (DEL)	Next option (J)	Margin right (→)	Previous column (SHIFT) ←	Next column (SHIFT) →

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RISC USER November 1987

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A & B December 1987 & January 1988

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too restricted for an interesting game.

My solution is to allow the bat to move horizontally across a portion of the bottom of the display, protecting the ball from a row of spikes below. The blocks we want to break are at either side of the display.

This is a demonstration of how the screen shape problem should be tackled – by changing underlying design if necessary, rather than trying to squash or squeeze a standard format on to the display directly.

Enter Listing I into your Z88 either directly or by typing it into your BBC Micro and transferring it using a method like the one described last month. If you haven't got a Z88 you can run the program on your BBC Micro if you include the changes shown in Listing II.

Control of the bat is by means of the comma

and dot keys. Hitting the comma will give the bat momentum left and dot will stop this. Pressing dot again will then provide rightwards momentum. This method of control may seem a little strange at first, but you should get used to it fairly quickly.

I have done it this way – rather than options like pressing the comma to move one unit left – to make it possible to move a large distance quickly without having to hammer the key over and over, or waiting for it to start auto-repeating.

To finish playing the game, simply hit Escape, and to return the screen characteristics to normal, enter PROCN.

The game consists of a series of waves. To complete one you must remove three-quarters of the original blocks as you avoid impaling the ball on the spikes below the bat. You have five lives, and the waves get progressively harder. May your fingers serve you well.

Listing I

```

10 REM Breakthru
20 REM by Andrew Moore
30 REM (c) The Micro User
40 PROCSSU : DIM Z%(46*8),PXX(3),PYX(
3) : PROCGAME
50 DEF PROCMOVE
60 OY% = Y% : XX = XX + 2 * (DX AND 2
) - 2
70 Y% = Y% + 2 * (DX AND 1) - 1
80 IF FNEXISTS(X%,Y%) THEN HIT = FALS
E : PROCBREAK : ELSE 110
90 Y% = OY% : IF NOT FNEXISTS(X%,Y%)
THEN DX = DX EOR 1 : GOTO 110
100 PROCBREAK : DX = DX EOR 2 : GOTO 6
0
110 IF Y% = 7 AND XX > 29 AND XX < 63
THEN PROCBC
120 PRINT TAB(PXX(CURX%),PYX(CURX%));"
";
130 IF DX = 0 OR DX = 3 PRINT TAB(X%,Y
%);BL2$;:ELSE PRINT TAB(X%,Y%);BL1$;
140 PXX(CURX%) = XX : PYX(CURX%) = Y%
150 CURX% = (CURX%+1) AND 3 : ENDPROC
160 DEF PROCSSU
170 VDU 1,&8A,&3D,110, 0,0,0,0,&83,&86
,&98,&800
180 VDU 1,&36,&3D,111, &83,&86,&98,&800
190 VDU 1,&36,&3D,112, &80,&98,&86,&83
200 VDU 1,&8A,&3D,113, 0,0,0,0,&80,&98
,&86,&83
210 VDU 1,&8A,&3D,114, 0,0,0,0,&88,&88
,&9C,&8E
220 VDU 1,&8A,&3D,115, &8F,&8F,&8F,0,&
88,&88,&9C,&8E
230 VDU 1,&8A,&3D,116, &80,&8F,&8F,&8F
,&8F,&8F,&8F,&800
240 VDU 1,&8A,&3D,117, &80,&8E,&8E,&8E
,&8E,&8E,&8E,&800
250 BL1$ = CHR$(1)+CHR$(50)+CHR$(63)+C
HR$(110)+CHR$(1)+CHR$(50)+CHR$(63)+CHR$(
111)
260 BL2$ = CHR$(1)+CHR$(50)+CHR$(63)+C
HR$(112)+CHR$(1)+CHR$(50)+CHR$(63)+CHR$(
113)
270 ENDPROC
280 UX = UX - 2 : IF UX = 28 THEN UX =
60
290 NBX = UX + LH% : IF NBX > 60 THEN
NBX = NBX - 32

```

```

300 P = UX : Q = NBX : GOTO 330
310 NBX = UX + LH% : IF NBX > 60 THEN
NBX = NBX - 32
320 P = NBX : Q = UX : IF UX = 60 THEN
UX = 30 ELSE UX = UX + 2
330 PRINT TAB(P,7);:VDU 1,50,63,115,1,
50,63,115 : PRINT TAB(Q,7);:VDU 1,50,63,
114,1,50,63,114
340 RETURN
350 DEF PROCUSER : INX = INKEY(0)
360 IF INX = 44 THEN IF NOT(V% = -1) T
HEN V% = V% - 1
370 IF INX = 46 THEN IF NOT(V% = 1) T
HEN V% = V% + 1
380 IF V% = -1 THEN GOSUB 280 ELSE IF
V% = 1 THEN GOSUB 310
390 ENDPROC

```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

```

400 DEF PROCBC
410 IF (DX AND 1) = 0 THEN Y% = 6 : EN
DPROC
420 IF X% = 30 OR X% = 62 THEN GOTO 44
0
430 IF ((X%-UX) AND 31) > LH% THEN RES
ULT = 0 : ENDPROC
440 IF RND(5) = 3 THEN Y% = 5 ELSE Y%
= 6
450 DX = DX EOR 1 : ENDPROC
460 DEF PROCBSU
470 PRINT TAB(30,7); : FOR IX = 1 TO 3
2 : VDU 1,50,63,114 : NEXT IX
480 PRINT TAB(UX,7); : FOR IX = 1 TO L
H% : VDU 1,50,63,115 : NEXT IX
490 ENDPROC
500 DEF PROCBREAK : IF HIT OR X%<0 OR
Y%<0 OR X% > 90 OR Y% > 7 THEN ENDPROC
510 HIT = TRUE : Z%(4*X%+Y%) = 0 : PRI
NT TAB(X%,Y%);" "; : VDU 1,52,33,33,33,
35
520 SC% = SC% + 100 : BLF% = BLF% - 1
: IF BLF% <= BLT% THEN RESULT = 1
530 ENDPROC
540 DEF FNEXISTS(X,Y)
550 IF X<0 OR X>90 OR Y<0 OR Y>7 THEN

```

```

= TRUE : ELSE = Z%(X*4+Y) <> 0
560 DEF PROCDBR(X,Y) : Z%(4*X+Y) = 1
570 PRINT TAB(X,Y); : VDU 1,50,63,116
: VDU 1,50,63,117
580 BLF% = BLF% + 1 : ENDPROC
590 DEF PROCWAVE : FOR X = 0 TO WV% +
WV% + 6 STEP 2
600 IF RND(8)>3 OR X = 0 THEN FOR Y
= 0 TO 7 : PROCDBR(X,Y) : PROCDBR(90-X,Y
) : NEXT Y
610 NEXT X : ENDPROC
620 DEF PROCSTAT : PRINT TAB(37,0);"Sc
ore: ";SC%;" Lives: ";LV%;
630 FOR K% = 0 TO 1965 : NEXT K% : EN
DPROC
640 DEF PROCCLS : FOR Y = 0 TO 6 : PRI
NT TAB(24,Y);SPC(44); : NEXT Y
650 X% = 40 : Y% = 6 : UX = 34 : VX =
0 : PROCBSU : ENDPROC
660 DEF PROCFAIL : LV% = LV% - 1 : PRI
NT TAB(41,3)"No No NO!" : PROCSTAT : EN
DPROC
670 DEF PROCSUCC : PRINT TAB(36,3);"Ex
cellent. I'm impressed!" : PROCSTAT : EN
DPROC
680 DEF PROCGAME : VDU 1,127
690 REPEAT
700 WV% = 1 : LV% = 5 : LH% = 12 : SC%
= 0
710 REPEAT
720 CLS : FOR I = 0 TO 367 : Z%(I) = 0
: NEXT I : BLF% = 0 : PROCWAVE
730 BLT% = INT(BLF%/4)
740 REPEAT
750 CURX% = 0 : FOR I = 0 TO 3 : PXX(I)
= 40 : PYX(I) = 6 : NEXT I : DX = 2
760 PROCSTAT : PROCCLS : RESULT = -1 :
REPEAT : PROCMOVE : PROCUSER : UNTIL RE
SULT >= 0
770 IF RESULT = 0 THEN PROCFAIL
780 UNTIL RESULT <> 0 OR LV% = 0
790 IF RESULT <> 0 THEN PROCSUCC : WV%
= WV% + 1
800 UNTIL RESULT = 0
810 CLS : PROCSTAT : PRINT TAB(31,3);"
Game Over. Press P to Replay";
820 REPEAT : UNTIL GET$="P"
830 UNTIL FALSE : ENDPROC
840 DEF PROCN : VDU 1,127,1,67,1,83 :
ENDPROC

```

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Listing II

```

1 MODE 0 : VDU 23;8202;0;0;0;

55 TIME=0:REPEAT UNTIL TIME>5

170 VDU 23,110,0,0,0,0,883,886,898,&B0
180 VDU 23,111,883,886,898,&B0,0,0,0
190 VDU 23,112,&B0,898,886,883,0,0,0
200 VDU 23,113,0,0,0,0,&B0,898,886,883
210 VDU 23,114,0,0,0,0,888,888,&9C,&BE
220 VDU 23,115,&BF,&BF,&BF,0,888,888,&
9C,&BE
230 VDU 23,116,&00,&9F,&9F,&9F,&9F,&9F
,&9F,&00
240 VDU 23,117,&00,&BE,&BE,&BE,&BE,&BE
,&BE,&00
250 BL1S = CHR$(110)+CHR$(111)
260 BL2S = CHR$(112)+CHR$(113)

330 PRINT TAB(P,7);VDU 115,115 : PRIN
T TAB(Q,7);VDU 114,114

470 PRINT TAB(30,7); : FOR IX = 1 TO 3
2 : VDU 114 : NEXT IX
480 PRINT TAB(UX,7); : FOR IX = 1 TO L

```

HX : VDU 115 : NEXT IX

```

500 DEF PROCBREAK : IF HIT OR XX<0 OR
YX<0 OR XX > 78 OR YX > 7 THEN ENDPROC
510 HIT = TRUE : ZX(4+XX+YX) = 0 : PRI
NT TAB(XX,YX);" "; : SOUND&10,-15,12,2

```

```

550 IF X<0 OR X>78 OR Y<0 OR Y>7 THEN
= TRUE : ELSE = ZX(X*4+Y) <> 0

```

```
570 PRINT TAB(X,Y); : VDU 116,117
```

```

600 IF RND(8)>3 OR X = 0 THEN FOR Y
= 0 TO 7 : PROCDBR(X,Y) : PROCDBR(78-X,Y
) : NEXT Y

```

```

620 DEF PROCSTAT : PRINT TAB(27,0);"SC
ORE: ";SCX;" LIVES: ";LVX;
630 FOR KX = 0 TO 3965 : NEXT KX : END
PROC

```

```

660 DEF PROCFAIL : LVX = LVX - 1 : PRI
NT TAB(31,3)"NO NO NO!": PROCSTAT : END
PROC

```

```

670 DEF PROCSUCC : PRINT TAB(26,3);"EX
CELLENT. I'M IMPRESSED!": PROCSTAT : EN
DPROC

```

```
680 DEF PROCGAME
```

```

810 CLS : PROCSTAT : PRINT TAB(21,3)
;"GAME OVER. PRESS P TO REPLAY";

```

```
- 830 UNTIL FALSE : ENDPROC
```

PINEAPPLE SOFTWARE

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DIAGRAM II - now also available for ARCHIMEDES

Diagram II is a completely new version of Pineapple's popular 'Diagram' drawing software. The new version has a whole host of additional features which make it into the most powerful and yet quick to use drawing program available for the BBC micro. The new features mean that 'Diagram II' can now be used for all types of drawings, not just circuit diagrams. Scale drawings are possible and the facilities for producing circles and rubber banded lines together with the pixel drawing routines make any type of drawing possible. This advert has been produced completely using Diagram II.

Summary of Diagram II features:-

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

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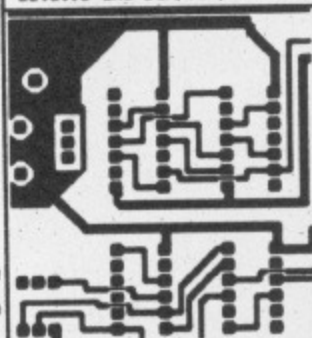
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PCB

Pineapple's now famous PCB drafting aid produces complex double sided PCB's very rapidly using any model BBC micro and any FX compatible dot-matrix printer. The program is supplied on Epron and uses a mode 1 screen to display the two sides of the board in red and blue either separately or superimposed. Component layout screens are also produced for a silk screen mask. The print routines allow a separate printout of each side of the board in an expanded definition high contrast 1:1 or 2:1 scale. The print time is typically about 5 mins. for a 1:1 print of a 7" x 5" board. This program has too many superb features to adequately describe here, so please write or 'phone for more details and sample printouts.

£85.00 + vat Plotter driver to suit most plotters £35.00 +vat



PCB AUTO-ROUTING

This brand new addition to the PCB program greatly increases the power of the software and speeds the design of PCB's even more. A list of up to 190 connections may be entered in the form of a 'rats nest' and then the computer does the rest! You may specify which side of the board you wish a track to be on or you may leave the choice to the computer, and you may also say whether tracks should be allowed to pass between i.c. pins. The program is in the form of a second Epron and full features are available on a standard model 'B'. Please write or 'phone for full details.

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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 areas such as repeated disc compaction, saving and loading Rom images, auto booting of files and many more. Copying of DFS discs onto ADFS discs can be made in one pass with automatic creation of the required directories on the ADFS disc. All functions are fully compatible with Winchester drives including BACKUP which allows backing up of Winchester onto multiple floppies.

New commands are as follows: *ADU, *BACKUP, *CATALL, *CHANGE, *DFSADFS, *DIRALL, *DIRCOPY, *DIRDESTROY, *DIRRENAME, *DISCCREDIT, *DRIVE, *FILEFIND, *FORMAT, *KILLADD, *LOCK, *MENU, *PURGE, *PURBRK, *UNLOCK, *VERIFY, *WFORMAT, *WIPE

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It can't be easy developing software for the Z88 because anything new must work alongside other applications already present. One of the first of these new packages – and one which fully exploits the portability of the machine – is Stopwatches. This is a 32k rom which, as its name suggests, allows you to keep track of competitors, say in athletics or motor racing.

It's like having 14 separately controlled stopwatches, collecting statistics along the way – things like position, shortest lap time and how far a competitor is behind the leader.

Like all Z88 roms, it is easy to install – select Index, open the flap and plug it in, then it's accessed either by the menu bar or \square Q.

Stopwatches assumes that there are 14 competitors and invites you to enter their names and numbers or use a pre-prepared file. Up to 14 characters are allowed for the name and three for the number – indeed you can have two competitors with the same number.

You have to have 14 competitors regardless – so if you want less you have to keep pressing Enter to make up the numbers. Plus you can give a minimum lap time so that accidental key presses are ignored – an excellent idea.

The screen then changes to a spreadsheet type display, showing the figures for the first seven – the others can be seen by pressing the cursor down key. A particular stopwatch is started by pressing a key from the top row on the Z88 or they can all be started by \diamond Sta. Every lap you press the appropriate key again and, at the end, press it with Shift to stop it.

The display has three different forms or modes: It starts in practice mode, the others being race and endurance. Don't be put off by the names – all three modes can be used during the same race with the statistics in the dormant modes still

being updated. The current lap time, time of last lap and number of laps are always shown and practice mode also has best lap time and a position based on the quickest lap.

In race mode statistics are related to the current leader so you are given the times behind him and the actual race positions. Endurance mode shows the gap between a competitor and the next one in front and the position in the race is also given.

At any time you can take a status snapshot which is saved as SNAPxx.xx where xx.xx is the Z88 clock time in hours and minutes. The file is in the text form of Pipedream internal format – all in column 1 – so it can be loaded into Pipedream or transferred to your BBC Micro for examination or printing – although proper multi-column format would have been better for Pipedream itself.

Where needed for long races the best time column can be reset each day, as can all of the clocks.

If you are timing races Stopwatches is pretty good and comprehensive. Its reaction time is fast but as the display is a little cramped you do need good eyesight to be able to glance at particular figures when you're outdoors.

When you do something wrong – like trying to load a competitor file that does not exist – it gives up rather easily, killing the entire application and placing you back in the Z88 Index. It does however follow the Z88 rules and goes into suspension, showing updated times when reselected. You can also have multiple copies running which the manual suggests can be used when there are more than 14 competitors, although you can't start the clocks at precisely the same time.

The manual deserves special commendation as it is both easy to read and comprehensive, although my copy was obviously the product of a dot matrix printer.

In short, if you have a serious use for the software I can recommend it. But if you just want to time simple things there are a number of good electronic devices around these days which, for single competitors, will do much of the same for less money.

Points for

- Easy to use
- Very clear manual

Against

- Fails easily on errors
- Not ideal file format

The bottom line...

If you regularly need to use multiple stopwatches it's a very good buy

128k S I L I C O N Spelling Checker

One of the most successful products ever on the BBC machine, this is now available on a single chip, for the Archimedes and soon for the Z88.

All versions of SPELLMASTER offer instant spelling and typing checking - as you type. The single chip contains almost 60,000 English words and user created dictionaries can extend this number.

A range of dictionary search utilities are provided, in all versions, that rapidly search the entire dictionary and enable any of the following to be found;

- 1) Words that sound like the one specified.
- 2) Words that are spelt approximately like the one specified. This is ideal for correcting typing errors where words have a pair of letters transposed, one letter wrong, missing, or one too many.
- 3) Words where only a few characters are specified, (solves crosswords).
- 4) Words that have the correct letters, but are mixed up, (solves anagrams).

All these search facilities are accessible from any program that can issue star (*) commands.

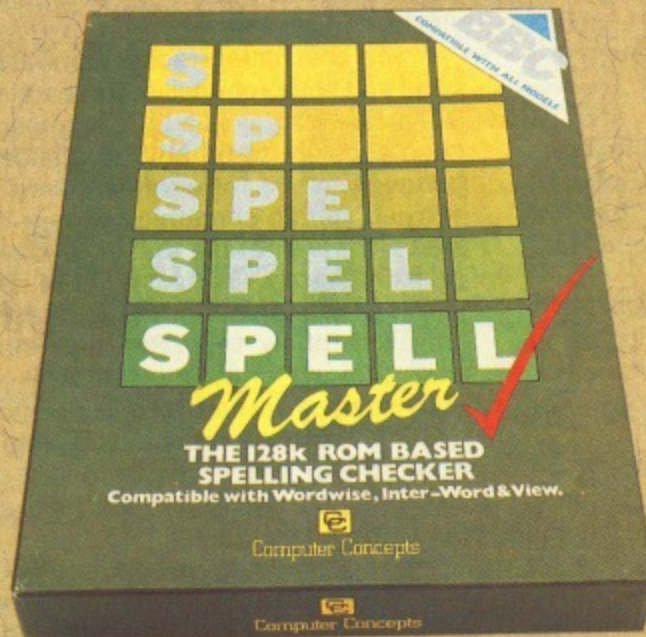
In addition there are facilities to check text directly within a variety of text editors or word processors, to check the word at the cursor, to check all text from a specified point, or to just browse through the dictionary.

The BBC SPELLMASTER can check-as-you-type in INTER-WORD, WORDWISE, and VIEW, in all versions of the BBC Micro. The Archimedes version can check-as-you-type in INTER-WORD, is compatible with ArcWriter files and requires a ROM expansion board.

SPELLMASTER for the Z88 is compatible with Pipedream files and contains its own powerful text editor.

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Painless Basic transfer

John Allen presents an easy way to exchange BBC Micro and Z88 programs

BOTH the BBC Micro and the Z88 use the same language – BBC Basic. So if you've got both machines you'll want to transfer Basic programs back and forth between them. One way of sending routines from the BBC Micro to the Z88 was described in the February 1988 issue of *The Micro User*, but here we've a utility which works in both directions, is easier to use and makes a few useful modifications to your programs automatically.

Our previous method involved sending the files in Ascii text form from the BBC Micro using Pipedream and the Z88 Filer to load it into Z88 Basic. The way described here takes a saved Basic file on either micro and transfers it to become a saved file on the other. Sending programs is not as simple as sending text because, although the language is virtually identical on the two micros, the files are stored differently. This utility deals with all that.

First type the listing into your BBC Micro and save it. To use it you'll need a serial connecting cable – also described in the February issue, or see our offer on Page 127. You should make sure that the panel on the Z88 – select with $\square+S$ – has these settings:

Transmit baud rate	9600
Receive baud rate	9600
Parity	None
Xon/Xoff	No

CHAIN the utility and select Import/Export on the Z88 – $\square+X$. Then set one machine to send a file and the other to receive. To give greater flexibility our utility allows you to use star commands on the BBC Micro to, for example, change directory or list files.

On the Z88 some of the BBC Basic commands are missing: The ones relating to graphics, sound and analogue to digital conversion. The utility

checks for these when sending files and does the best that it can. Generally this is just to flag the problem by preceding the statement with "REM*****". However, MODE is replaced by CLS and the appropriate WIDTH selected, and a beep – VDU7 – is substituted for SOUND.

At the end of the transfer you're given the option of a report of what has been changed. Answering Y will put the report on the screen and, if you've got a printer, P will also print it. The report lists line numbers where non-implemented commands were found, any which went over the maximum length of 255 characters and also any which contained commands which are present in both Basics but unlikely to mean the same thing: CALL, OSCLI, * and VDU. These are not changed

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Storage of BBC Basic files

All BBC Basic files are stored in tokenised form – keywords, like PRINT, only take a single byte. In addition each line has three bytes at its start, two of which give the line number and the other the length. The line finishes with a Return and the length includes the three bytes at the start and the Return at the end.

On the BBC Micro the three leading bytes are in the order: <high byte of line number>, <low byte of line number>, <length of line>. The Z88 has these in reverse order and the transfer program automatically changes them.

Also a BBC Micro file starts with a Return but only has &FF after the last line, while Z88 files start straight away with the length of the first line but have &00, &FF and &FF as the last three bytes. Again, the transfer program deals with these differences.

⚡ Sending programs is not as simple as sending text because the files are stored differently. This utility deals with that


```

10 MODE 0
20 SOUND 1,-15,20,30
30 PRINT"Some commands are changed to
work on a Z88 while others are flagged
as possible errors"
40 PRINT"Press a key"
50 X=GET
60 CLG
70 VDU 5
    
```

A demo program from a BBC Micro...

```

10 CLS
20 VDU7 :REM ***** SOUND 1,-15,20,30
30 PRINT"Some commands are changed to
work on a Z88 while others are flagged
as possible errors"
40 PRINT"Press a key"
50 X=GET
60 REM ***** CLG
70 VDU 5
    
```

and the Z88 version

```

CLG appeared on line(s): 60
SOUND appeared on line(s): 20

Check VDU on line(s): 20 70
    
```

A report from the demo program

since the program being transferred may be one that is only intended to work on the Z88.

If your program contains multiple statement lines, you'll need to check no commands have been REMmed out before the last of the statements on the line. If this has happened you'll need to modify the line before the program will run.

When you send files in the other direction — from the Z88 to the BBC Micro — the utility does a straightforward transfer, changing the file format but not checking the Basic program.

Overall this transfer program gives a quick and convenient way to transfer your routines between micros.

Commands not implemented on the Z88

If you use any of the following BBC Basic commands on the Z88 you get a not implemented error:

Graphics	CLG, COLOUR, DRAW, GCOL, MOVE, PLOT, MODE
Sound	ENVELOPE, SOUND
Analogue	ADVAL

```

10 REM BBC/Z88 Basic program transfer
20 REM by John Allen
30 REM (C) The Micro User 1988
40 :
50 DIM convert$(10,100),convert$(10),
warn$(4,100),warn$(4),long$(100)
60 DIM Q% 500,command% 100,code% 100
70 *FX3,6
80 PROCassemble
90 *FX3,0
100 *FX2,0
110 REPEAT
120 MODE7
130 ON ERROR GOTO 90
140 banner$=CHR$(132)+CHR$(157)+CHR$(1
41)+CHR$(131)
150 line1$=" The Micro User"
160 line2$="BBC / Z88 Basic Program Tr
ansfer"
170 PRINT TAB(0,1) banner$+line1$ TAB(
0,2) banner$+line1$
180 PRINT TAB(0,3) banner$+line2$ TAB(
0,4) banner$+line2$
190 PRINT TAB(1,7) CHR$(134);"1) Send
Basic program file"
200 PRINT TAB(1,8) CHR$(134);"2) Rece
ive Basic program file"
210 PRINT TAB(1,9) CHR$(134);"3) Fini
sh"
220 PRINT TAB(1,12) "Please Enter Choi
ce:";CHR$(134);
230 *FX15,1
240 REPEAT:AS=GET$:UNTIL INSTR("123*",
AS)<>0
250 PRINT AS
260 IF AS = "1" THEN PROCsend
270 IF AS = "2" THEN PROCreceive
280 IF AS = "3" THEN MODE7:PRINT "" T
ransfer completed.";END
290 IF AS = "*" THEN GOTO 320
300 UNTIL FALSE
310 :
320 VDU31,0,15
330 INPUT "*" $command%
340 ON ERROR REPORT:PRINT:GOTO 360
350 XX=command% MOD 256:YX=command% DI
V 256:CALL &FFF7
360 ON ERROR GOTO 90
370 PRINT " Press any key":Z$=GET$
380 IF Z$ = "*" THEN PRINT:GOTO 330 EL
SE GOTO 120
390 :
400 DEFPROCreceive
410 *FX7,7
420 *FX2,1
430 REPEAT:BX=GET:UNTIL BX=27
440 BX=GET:IF BX <> 78 THEN GOTO 430
450 Z88$="":FILES=""
460 BS=GET$
470 REPEAT
480 Z88$=Z88$+BS
490 IF BS <> "." THEN FILES=FILES+BS
500 IF BS = "/" THEN FILES=""
510 BS=GET$
520 UNTIL ASC(BS) = 27
530 BX=GET:IF BX <> 70 THEN GOTO 430
540 PRINT TAB(0,15) CHR$(130);"Receivi
ng ";Z88$;" ...."
550 FILES=LEFT$(FILES,7)
560 XX=OPENOUT FILES
570 BPUT#XX,13
580 AX=FNget
590 REPEAT
600 BX=FNget:CX=FNget
610 BPUT#XX,CX:BPUT#XX,BX:BPUT#XX,AX
620 FOR IX=1 TO AX-3
630 BPUT#XX,FNget
640 NEXT
650 AX=FNget
660 UNTIL AX = 0
670 BPUT#XX,255
680 REPEAT:BX=GET:UNTIL BX=27
690 BX=GET:IF BX <> 69 AND BX <> 90 TH
EN GOTO 680
700 CLOSE#XX
710 PRINT TAB(0,17) CHR$(130); ".... s
aved as ";FILES
720 *FX2,0
730 PRINT "Press any key":Z$=GET$
740 ENDPROC
750 :
760 DEFFNget
770 SX=GET:IF SX <> 27 THEN GOTO 820
780 TX=GET:UX=GET-48:SX=GET-48
790 IF SX > 9 THEN SX=SX-7
800 IF UX > 9 THEN UX=UX-7
810 SX=SX+(UX*16)
820 =SX
    
```

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◀ From Page 75

```

830 :
840 DEF PROCsend
850 *FX8,7
860 RESTORE
870 FOR IX=1 TO 10
880 convert%(IX,0)=0:READ convert$(IX)
890 NEXT
900 FOR IX=1 TO 4
910 warn%(IX,0)=0:READ warn$(IX)
920 NEXT
930 long%(0)=0
940 PRINT TAB(1,15) "Filename: ";CHR$(1
34);
950 INPUT " FILES
960 ON ERROR GOTO 1480
970 XX=OPENIN FILES
980 ON ERROR GOTO 90
990 IF XX = 0 THEN GOTO 1480
1000 BX=BGET#XX:IF BX <> 13 THEN GOTO 1
510
1010 *FX3,7
1020 VDU27,78:PRINT FILES;:VDU27,70
1030 BX=BGET#XX
1040 REPEAT
1050 line%=BX*256 + BGET#XX:len%=BGET#X
X
1060 LX=0:KX=0
1070 REPEAT:BX=BGET#XX:KX=KX+1:UNTIL BX
<> 32
1080 FOR IX=KX TO len%-3
1090 IF BX <> 42 THEN GOTO 1110
1100 IF IX = 1 THEN PROCwarn(4):GOTO 12
60
1110 IF BX < 896 THEN GOTO 1260
1120 IF BX = 896 THEN PROCnogood(1):GOT
0 1260
1130 IF BX < 804 THEN GOTO 1260
1140 IF BX = 804 THEN PROCnogood(2):GOT
0 1260
1150 IF BX = 8FB THEN PROCnogood(3):GOT
0 1260
1160 IF BX = 8DF THEN PROCnogood(4):GOT
0 1260
1170 IF BX = 8E2 THEN PROCnogood(5):GOT
0 1260
1180 IF BX = 8E6 THEN PROCnogood(6):GOT
0 1260
1190 IF BX = 8EB THEN PROCmode:GOTO 126
0
1200 IF BX = 8EC THEN PROCnogood(8):GOT
0 1260
1210 IF BX = 8F0 THEN PROCnogood(9):GOT
0 1260
1220 IF BX = 8D4 THEN PROCsound:GOTO 12
60
1230 IF BX = 8D6 THEN PROCwarn(1):GOTO
1260
1240 IF BX = 8FF THEN PROCwarn(2):GOTO
1260
1250 IF BX = 8EF THEN PROCwarn(3)
1260 QX?LX=BX:LX=LX+1
1270 BX=BGET#XX
1280 NEXT
1290 IF LX+3 > 255 THEN long%(0)=long%(
0)+1:long%(long%(0))=line%:LX=252
1300 ?880=LX+3:CALL out
1310 ?880=line% MOD 256:CALL out
1320 ?880=line% DIV 256:CALL out
1330 FOR IX = 0 TO LX-1:?880=QX?IX:CALL

```

```

out:NEXT
1340 UNTIL BX=255
1350 VDU27,66,48,48,27,66,70,70,27,66,7
0,70
1360 VDU27,69
1370 CLOSE#XX
1380 *FX3,0
1390 PRINT 'CHRS(130);FILES;" sent ....
"
1400 PRINT "Do you want a report? (Y/P
/N)";CHR$(134);
1410 REPEAT:AS=GET$:UNTIL INSTR("YnNpP
",AS)<>0
1420 PRINT AS
1430 IF AS = "P" OR AS = "p" THEN VDU2
1440 IF AS <> "N" AND AS <> "n" THEN PR
OCreport
1450 PRINT "Press any key":Z$=GET$
1460 ENDPROC
1470 :
1480 PRINT CHR$(136);CHR$(129);FILES;"
does not exist"
1490 PRINT "Press any key":Z$=GET$:RUN
1500 :
1510 PRINT CHR$(136);CHR$(129);FILES;"
is not a basic program"
1520 PRINT "Press any key":Z$=GET$:RUN
1530 :
1540 DEFPROCnogood(no%)
1550 convert%(no%,0)=convert%(no%,0)+1

```

```

1560 convert%(no%,convert%(no%,0))=line
X
1570 IF no% <> 1 OR LX = 1 THEN QX?LX=&
F4:$(QX+LX+1)=" ***** ":LX=LX+8:ENDPROC
1580 MX=0:FOR JX = LX-1 TO 0 STEP -1
1590 IF CHR$(QX?JX) = ":" THEN MX=JX:JX
=0 ELSE QX?(JX+8)=QX?JX
1600 NEXT
1610 QX?MX=&F4:$(QX+MX+1)=" *****":QX?(
MX+7)=32:LX=LX+8:ENDPROC
1620 :
1630 DEFPROCwarn(no%)
1640 warn%(no%,0)=warn%(no%,0)+1
1650 warn%(no%,warn%(no%,0))=line%
1660 ENDPROC
1670 :
1680 DEFPROCmode
1690 convert%(7,0)=convert%(7,0)+1
1700 convert%(7,convert%(7,0))=line%
1710 num$=""
1720 REPEAT:BX=BGET#XX:IX=IX+1:UNTIL BX
<> 32
1730 BS=CHR$(BX):IF BS >= "0" AND BS <=
"9" THEN num$=num$+BS
1740 BS=CHR$(BGET#XX):IX=IX+1
1750 IF BS >= "0" AND BS <= "9" THEN nu
m$=num$+BS:GOTO 1740
1760 BX=ASC(BS):mode%=VAL(num$) MOD 128
1770 QX?LX=8DB:QX?(LX+1)=32:LX=LX+2
1780 IF mode% MOD 3 = 2 THEN QX?LX=&FE:
QX?(LX+1)=50:QX?(LX+2)=48:LX=LX+3

```

```

1790 IF mode% MOD 3 = 1 OR mode% = 6 TH
EN QX?LX=&FE:QX?(LX+1)=52:QX?(LX+2)=48:L
X=LX+3
1800 ENDPROC
1810 :
1820 DEFPROCsound
1830 convert%(10,0)=convert%(10,0)+1
1840 convert%(10,convert%(10,0))=line%
1850 QX?LX=&EF:$(QX+LX+1)="7 : "
1860 QX?(LX+4)=&F4:$(QX+LX+5)=" ***** "
:LX=LX+12
1870 ENDPROC
1880 :
1890 DEFPROCreport
1900 IF long%(0) = 0 THEN GOTO 1930
1910 PRINT "These lines were too long:
";
1920 FOR IX=1 TO long%(0):PRINT " ";lon
g%(IX);:NEXT
1930 PRINT:FOR JX = 1 TO 10
1940 IF convert%(JX,0) = 0 THEN GOTO 19
80
1950 PRINT 'convert$(JX);' appeared on
line(s):';
1960 FOR IX = 1 TO convert%(JX,0)
1970 PRINT " ";convert%(JX,IX);:NEXT
1980 NEXT
1990 PRINT:FOR JX=1 TO 4
2000 IF warn%(JX,0)=0 THEN GOTO 2030
2010 PRINT "Check ";warn$(JX);' on lin
e(s):';
2020 FOR IX=1 TO warn%(JX,0):PRINT " ";
warn$(JX,IX);:NEXT
2030 NEXT
2040 PRINT:VDU3:ENDPROC
2050 :
2060 DEFPROCassemble
2070 oswrch=&FFEE
2080 FOR pass=0 TO 2 STEP 2
2090 PX=codeX
2100 [
2110 OPT pass
2120 .out LDA 880
2130 CMP #32:BMI twobyte
2140 CMP #127:BPL twobyte
2150 JSR oswrch:RTS
2160 .twobyte LDA #27:JSR oswrch
2170 LDA 880:AND #8F0
2180 LDA 880:AND #8F0
2190 LSR A:LSR A:LSR A:LSR A
2200 CLC:ADC #48:CMPI #58:BMI ok
2210 CLC:ADC #7
2220 .ok JSR oswrch
2230 LDA 880:AND #80F:CLC:ADC #48
2240 CMP #58:BMI ok2
2250 CLC:ADC #7
2260 .ok2 JSR oswrch:RTS
2270 ]
2280 NEXT:ENDPROC
2290 :
2300 DATA ADVAL,CLG,COLOUR,DRAW,ENVELOP
E,GCOL,MODE,MOVE,PLOT,SOUND
2310 DATA CALL,OSCLI,VDU,"*" command"
**** END ****

```

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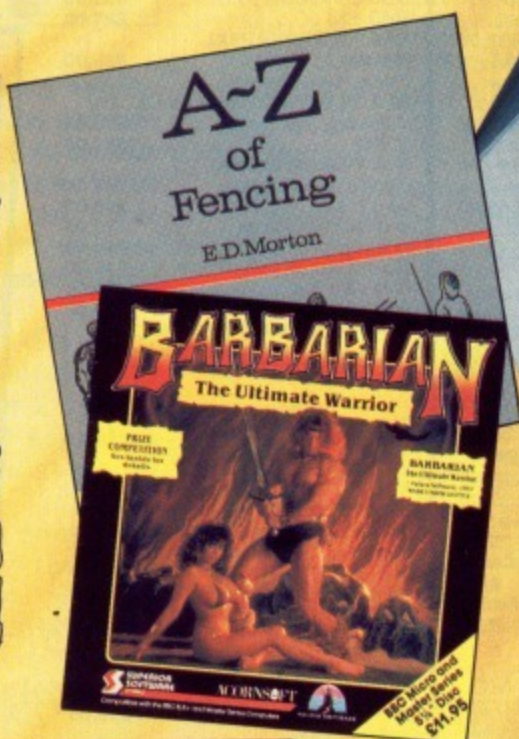
This listing is included in this month's tape & disc offer. See order form on Page 151.

Meet the BARBARIANS

Barbarian – the Ultimate Warrior is now available for the BBC Micro. To commemorate its arrival, Superior Software offers you a chance to add this game to your collection. For the first prize winner there is also the opportunity of a lifetime – to meet the Barbarian and Australian Rugby Football teams and to see them in action. The second prize is a book full of facts and history about swords and the art of fencing. There are also 30 runners-up prizes in this superb competition – making a total value of over £500

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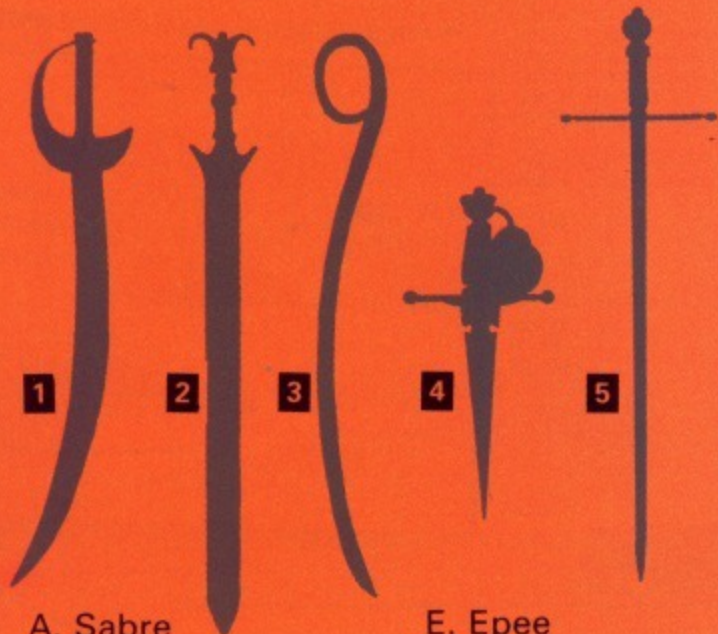
Below are the silhouettes of five swords and eight possible names for them – match these and you could win one of 32 fantastic prizes. Photocopy or cut out your completed entry form and send it to arrive no later than July 29. The winners will be the first correct entries pulled from the sack.



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- | | |
|------------------|-----------------|
| A. Sabre | E. Epee |
| B. Main Gauche | F. Roman sword |
| C. Rapier | G. Colichemarde |
| D. German Dusack | H. Foil |

ENTRY FORM

ANSWERS

If you think that sword 1 is a colichemarde then put G next to the number 1.

1 _____	4 _____
2 _____	5 _____
3 _____	

Name _____
 Address _____

 _____ Postcode _____

Send your completed entries to: **The Barbarian Competition, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.**

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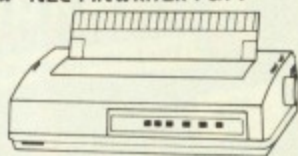
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P6 80 characters	434.00
P7 136 characters	608.00



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*Ian Whitmore
 emulates the
 PC on his
 Archimedes*

BECAUSE of its very high operating speeds, your Archimedes can run special software that allows it to pretend that it is another kind of micro – becoming a BBC Micro using the 6502 emulator. Now Acorn has provided access to the vast range of IBM PC software with a PC emulator, which comes in a smart plastic wallet with two discs and a manual.

Although the software was the very latest version, the review copy only had the issue 1 manual. Acorn tells me that the issue 2 manual will be sent out with all version 1.20 emulators and will be supplied to anyone wishing to upgrade.

Instructions in the issue 1 manual cover hard disc installation and a smattering of the more common MSdos commands. However, there is nothing on the two Acorn commands GETFILE and

PUTFILE – fully documented in the issue 2 manual – that allow files on the ADFS disc format to be transferred to MSdos and vice versa. If you have a lot of files to copy be prepared for a long session, because no wildcards are allowed.

You can partition the hard disc so that it is shared between the MSdos and ADFS filing systems. When you call the emulator off the hard disc in an A440 it takes 13 seconds to load, leaving you in MSdos version 3.21. In use the system behaves well, simulating a PC with up to 640k of memory. With a 1Mb Archimedes you get a 500k emulator – only an A440 allows the full

Turn to Page 80 ▶

	WordPerfect A440	WordPerfect Tandon	GraphicWriter A440	Inter-Word B+
Scroll	143	35	8	16
Search found	11	3	2	4
Not found	11	3	1	2
Save	14	6	55	7
Load	6	11	55	6

All times in seconds

Table 1: PC Emulator speed comparisons



◀ From Page 79

640k supported by MSdos.

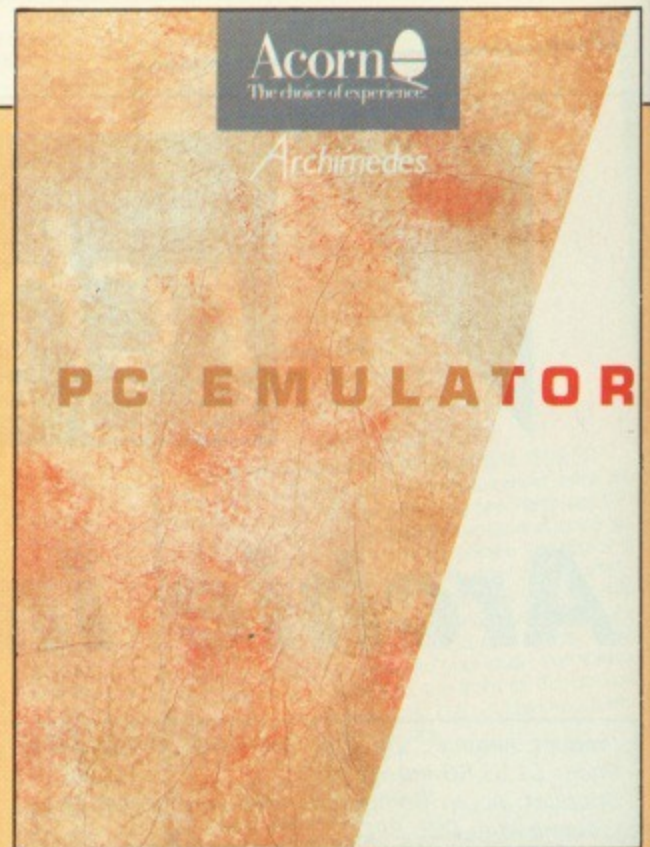
Emulation extends to the IBM CGA – colour graphics adapter – with all its modes, but not to the Hercules or EGA formats. It will also support a mouse if a Microsoft or Logitek mouse driver is installed. As the disc controller in the Archimedes is different from that in any PC, software that directly accesses the disc chip will not run. However this is so rare it should not prove to be much of a problem.

Although I've only been able to try a small number of packages, the level of compatibility is a great improvement over the 512 co-processor in the Master. Most of my time has been spent using Wordperfect 4.3 which runs in colour, and other major applications that run successfully are PC Promise, Lotus 123, Wordstar, dBase III and, at least partially, PC Paintbrush – I haven't got the various options sorted out yet.

Table 1 includes some simple timing comparisons of various word processing combinations based on 4,000 words in 40 paragraphs, 80 columns and only left justified – similar to the Byte standard test document. The tests were:

- Scroll from beginning to end of the text
- Search for a character at end of document
- Search for a character not present
- Load the document from disc
- Save the document to disc

At present the PC emulator is the only way of



running PC software on an Archimedes and as it does it without any additional hardware it is a very creditable achievement for Acorn.

However it is slow and limited to CGA graphics so I would not recommend the combination of an Archimedes and the PC emulator if you just want a PC clone.

But if you want to use the Archimedes for its own sake and have the ability to run PC software from time to time, this is the only way ahead.

The bottom line...

- The only way ahead if you want to run PC software in an Archimedes

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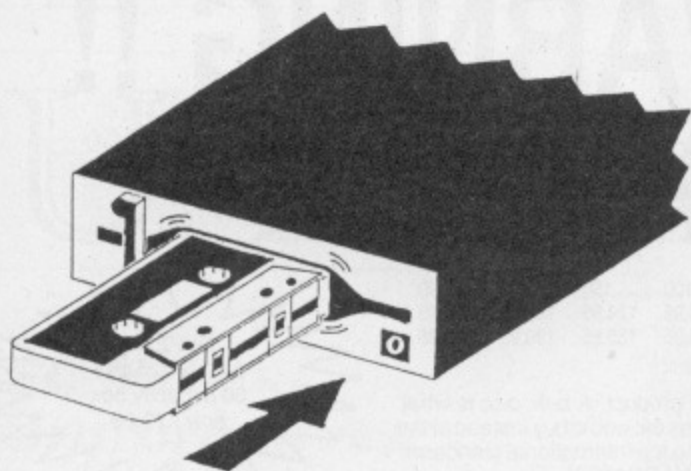
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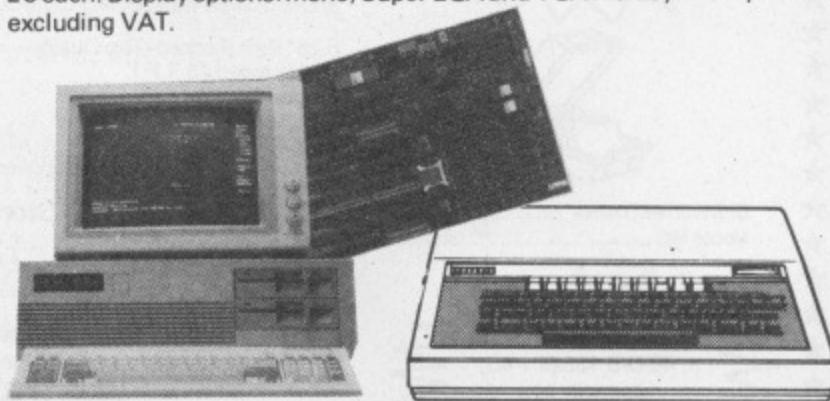
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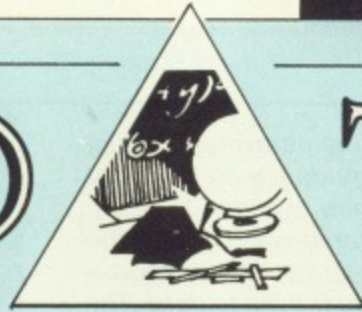
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BBC Micro transform lives

A MAN with cerebral palsy, wheelchair-bound and unable to speak, has just written the first letter of his life using a BBC Micro . . . a youngster labelled as disruptive and a failure at school, is spending hours absorbed in the pleasure of learning on a computer . . . an elderly man with a terminal illness has developed an interest in microelectronics through using a micro and now makes devices himself.

These are just three of the people whose lives have been transformed thanks to the pioneering work with BBC Micros at Beechcroft, the Birmingham Social Services Centre for Special Needs.

It was officially opened in April by MP Tom Clarke, the moving force behind the Disabled Persons Act 1986.

"The centre has something to offer almost every client – old and young, the mentally ill and those with mental or physical disabilities", says development officer John Shermer. "We have only just begun to explore the possibilities of this exciting new field".

The majority of systems used at Beechcroft are BBC Micros and ancillary equipment "because the Acorn machine has more software available off the shelf for use in the caring professions than any other comparable micro, and it's very reliable and robust".

Software has largely originated from the Education Department's special needs area where the government has sponsored software development. But other professions are now beginning to create software for use in occupational therapy, speech therapy, clinical psychology, mental handicap and other areas.

The centre sells its expertise and markets its products to other local authorities and voluntary agencies in the UK and countries like Norway, Belgium and Australia. Profits are used to further develop the work going on at Beechcroft.

A new look at the planets

LATEST educational simulation package from Magnolia Soft – publisher of Farmer Giles and Rompton Combe – is Space Apprentice. Three years in development, the adventure for ages 10-14 is designed to give pupils "the real feeling of exploring most of our planets and their moons" according to Magnolia's Nick Willink.

They are encouraged to learn about escape velocities, orbital periods, interplanetary distances and surface properties through active participation. "It originated from a BBC Zigzag project on space and its present form is the result of innumerable suggestions and ideas from both

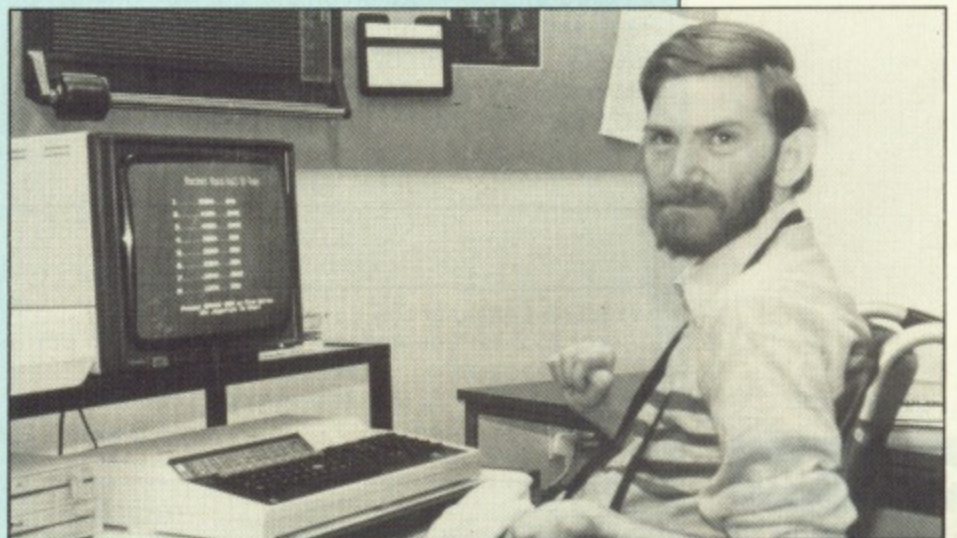
children and teachers to whom we are greatly indebted", said Willink.

"Pupils are invited to work in groups and plan away from the micro, but we found many were tempted simply to play it. The program includes a host of interactive features which motivate groups to rely on each other and share experiences".

Space Apprentice from Magnolia Soft (0392 213724) costs £17.50.

More specialist aid for teachers

GOOD classroom practices, in-service support and information provision are key features of the



Ron Eaglesfield communicates via a BBC Micro at Beechcroft

National Information Base concerned with microtechnology applications in educating the visually handicapped.

The MESU-funded project is housed at Exhall Grange, Coventry – one of the largest schools for the visually handicapped in Europe – and is initially funded until next March.

The group steering the project includes representatives from the DES and the Royal National Institute for the Blind and Warwickshire LEA. Main aim of the project is to support teachers who are using technology to teach visually handicapped children, using aids like large character displays and synthetic speech.

Data on classroom use and good practices is being collected and evaluated. In-service training is being provided and information on hardware, software, suppliers and prices is being disseminated to teachers.

The project is designed to build on the specialist advice available to teachers through the Research Centre for the Education of the Visually Handicapped at Birmingham University and the RNIB.

EDUCATION

B B+ m

Mike Cannon examines two aids for job applications

In these days of mass unemployment young people need to be given guidance on how best to present themselves when applying for jobs. A vital part of their job search education is the compiling of a curriculum vitae – CV for short – a biographical sketch of their lives to date. The

image a good CV can create with future employers is important.

Now two CV packages are available to simplify and enhance this image: LPS Computer CV and FJP Software's Write Your Own CV. We assess their respective merits.

On yer bike!

THE FJP Software package comes on a single disc and leads to a two page, double-spaced document in draft print. It is therefore capable of quickly producing a neat typewritten CV. A built-in disc-based tutorial entitled Learning about CVs gives basic information about curriculum vitae.

With it comes an eight-page A5 booklet, with a disc holder glued inside the back cover. It is essential that working copies of the original disc are made as user-corrupted ones won't be replaced free of charge.

I tried this package on an old 1.2 BBC Micro. All went well except for printing a CV. I was continually frustrated by *No room* errors and the micro locking up, leading to a loss of work.

On the third attempt I gave up and shifted to a

Product: Write Your Own Curriculum Vitae
Price: £20
Supplier: FJP Software, 11 Eastnor Grove,
Leamington Spa, Warwickshire CV31 1LD.
Tel: 0926 25820

Master. Here all CVs attempted were accepted and stored. I then tried it on a Symbnet network, again without fault. I did encounter some input difficulties; for example names shorter than four letters are not accepted – *Tom* could not be a filename.

The examinations section demands known results – an older individual with access would perhaps find the package more valuable than a

Product: Computer CV
Price: £22 inc free updates (£5 for upgrade to 6th form package)
Supplier: LPS, 12 Fir Tree Avenue, Hathershaw, Oldham OL8 2SR.
Tel: 061-626 9036

LPS Computer CV is a two-disc package designed to produce a CV which can be adjusted to fit a single A4 page, and edited in draft mode. However it produces a final attractive version in differing NLQ print styles with emphasised headings, ready to slot into a more comprehensive Personal Profile and comes with space for a photograph.

The package comes in a very strong, plastic-covered folder with space for the discs and 16-page instruction manual. The two discs are the Input Master and Utilities. Both are menu-driven, with a highlight bar to assist selection. Make sure you read the manual before doing anything.

The Input Master disc contains the fictitious pseudo CV which students will follow, the security password check, and the software necessary to operate the system. The original Master disc must not be used and copies must be made before creating CVs. This is a vital step which the Utilities Disc makes easy and at the same time simplifies disc housekeeping by allowing for each one copied to be given a different title.

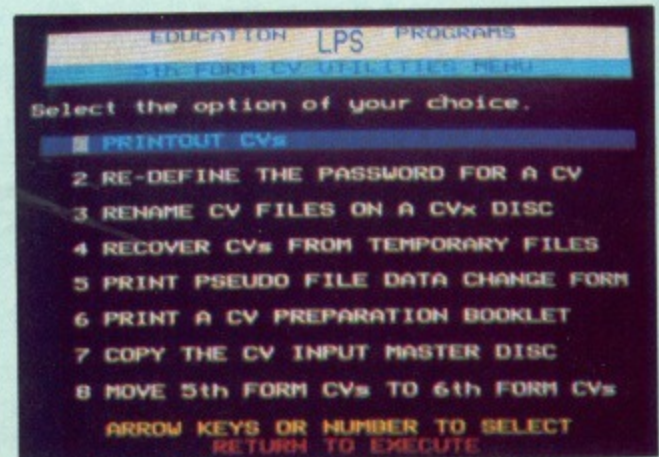
There are two other preliminaries – the printing out of a CV preparation booklet and a pseudofile data change form. The booklet is completed by each student writing a CV and can be done in a

single 35 minute lesson before they touch the micro. Then the intending users need to be acquainted with the basic do's and don'ts of the package such as how to load the disc, the concept of a pseudo file – an example CV which they adapt to their needs – and how to use the Copy and Delete keys when working through it.

Data input is achieved by accepting or replacing information displayed from the pseudo file to form a unique CV. Any unwanted text is wiped out by pressing the Return key.

Another attractive teaching aid is that the screens presented are numbered to match the pages in the CV preparation booklet. It is obvious from such little touches of professionalism that the program and its ancillary material have been monitored by a practising teacher who actually uses the material.

The whole process has been followed through



The LPS menu

Points for

- Professional
- Several print styles
- Data protection

Against

- Rather fussy

The bottom line...

FJP is good for quick and easy entry, but LPS comes out on top for a full, well-presented document

Hello there.
 Today you are going to learn about
 CURRICULUM VITAE.
 I will refer to them as CV's and, with
 this computer, you will write your CV.
 A CV is a piece of writing that
 introduces you to your prospective
 employer.
 Let's think about what you want
 him or her to think when your CV
 is read.
 Press any key to continue.

The FJP tutor

careers teacher wishing to produce CVs for his current fifth years. Although, in fairness, the manual does state the package is designed for 16 to 21 year olds. Under the heading Work Experience I was unable to enter a date longer than four characters – 1988 was all right but not 9/7/88.

The finished CV is output in whatever mode the printer is set up for before running the program, so you can get good quality output if the printer is prepared.

A program disc will accept all the CVs sent to it until the catalogue is full. Normal CVs are so

and refined to cut down on unnecessary work caused through mishandling. Students of all abilities can use the program and find great satisfaction in producing a valuable introduction for themselves into the world of work.

Confidentiality of the data is protected by asking each student to invent their own password – which can be changed by the teacher if forgotten. Its use also prevents those students from accessing other students' CVs and changing exam grades and so on.

The completed CVs can be copied on to separate data discs: The program itself will compact these transferred CVs to ensure that no space is wasted.

There is an audio tape available which provides step-by-step instructions and LSP has recently released a 6th form version. Future developments include expansion to cater for college students and adults.

The whole package is full of useful procedures, advice and solutions to common problems and the company offers immediate attention if you discover some difficulty outside the normal.

And a final bonus: In the event of damage to a disc LPS undertakes *in normal circumstances* to replace it provided that the two discs are returned with an account of how the problem arose.

To sum up, the final output of the LPS package on an Epson printer is far more professional than that from the FJP one, but the latter – with its in-built tutorial – is better for beginners.

The finished LPS CV

short that it is usually possible to fit 20 or more on one disc. But there could be problems, such as too-easy access by others to private information.

All in all there are a lot of little niggles which the ordinary careers guidance teacher would not be able to resolve without help. There is also the problem of unsuitability for current fifth year students.

However, given its limitations, I found the package quick and easy to use – it was understood by a group of 12-year-olds who entered a fictional CV in less than an hour. But the minor hold-ups related to learning the correct forms of input did cause irritation and wasted a good deal of time.

The package does what it claims and anyone familiar with BBC Micros could certainly be able to produce an acceptable CV. However the instruction booklet assumes too much for the non-technical and occasional micro user and does not provide help and answers to problems which occur.

Points for

- Built-in tutorial
- Quick and easy to use

Against

- Too big for model B
- Input niggles

CURRICULUM VITAE

PERSONAL DETAILS

name.....PAUL MUDIE
 home address.....12, FIR TREE AVENUE,
 HATHERSHAW,
 OLDHAM,
 OL8 2SR.
 telephone.....061-678-7419
 date of birth.....13-06-1951
 sex.....MALE
 place of birth.....OLDHAM
 nationality.....BRITISH
 marital status.....MARRIED
 disabilities.....NONE
 health.....GLASSES WORN FOR READING ONLY, GOOD HEARING, NO R
 ILLNESSES, NO SERIOUS ILLNESSES

EDUCATIONAL RECORD

junior school.....ALEXANDRA PARK JUNIOR SCHOOL, BROOK LANE, OLDHAM.
 date started: SEPTEMBER 1958 date finished: JULY 1962
 senior school.....HATHERSHAW SCHOOL, BELLFIELD AVENUE, OLDHAM.
 date started: SEPTEMBER 1962 date finished: MAY 1967
 subjects studied.....MATHEMATICS, ENGLISH LANGUAGE, GERMAN, GEOGRAPHY,
 CHEMISTRY, PHOTOGRAPHY, TECHNICAL DRAWING, MUSIC,
 GUIDANCE.
 exams to be taken.....GCSE: MATHEMATICS, ENGLISH LANGUAGE, GERMAN, GEOGRAPHY,
 BIOLOGY, CHEMISTRY, PHOTOGRAPHY, TECHNICAL DRAWING
 qualifications held.....RLSS AWARD OF MERIT, BJC GREEN BELT, VICTORIA COLLEGE
 MUSIC GRADE 3, RSA STAGE 2 WORDPROCESSING (DISTINGUISHED)
 school activities.....SPORTS TEAM MEMBER: BASKETBALL, BADMINTON, TABLE-TENNIS,
 GYMNASTICS, SWIMMING.
 DRAMA/MUSIC: DRAMA SOCIETY: LIGHTING TECHNICIAN, DRAMA
 SOCIETY: SOUND TECHNICIAN, CHOIR.
 CLUBS/SOCIETIES: CHESS, BRIDGE, COMPUTER, DEBATING, PUBLIC
 SPEAKING.
 POSTS OF RESPONSIBILITY HELD: FORM CAPTAIN, PREFECT.
 PRIZES WON: SUBJECT PRIZE FOR MATHEMATICS, PROGRESS AND
 EFFORT PRIZE.

SPORTS, HOBBIES & INTERESTS


sports.....BADMINTON, SQUASH, WEIGHT LIFTING.
 hobbies.....DO-IT-YOURSELF, MOTOR MAINTENANCE, COMPUTER PROGRAMMING
 interests.....MUSIC, SINGING, ELECTRONICS.

EXPERIENCE OF WORK

part-time work.....EMPLOYER: RENT-A-SLAVE, TORTURE LANE, HATHERSHAW, OLDHAM
 OL8 2TT.
 date started: 12-09-1969 date finished: 13-04-1972 hours per week: 5
 duties: SHOP ASSISTANT: FILLING SHELVES AND CHECK-OUT
 OPERATOR
 EMPLOYER: RENT-A-WORKER, ARDWORK ROAD, HATHERSHAW, OLDHAM
 OL8 2TT.
 date started: 05-12-1975 date finished: 23-06-1977 hours per week: 4
 duties: DELIVERING GOODS DOOR TO DOOR

REFEREES

first referee.....NAME & POSITION: Mr J C MIDGLEY, HEADTEACHER, HATHERSHAW SCH
 ADDRESS: BELLFIELD AVENUE, HATHERSHAW, OLDHAM, OL8 3EP.
 TELEPHONE: SCHOOL 061-624-3613
 second referee.....NAME & POSITION: Mr J NEWMIST

B B+ m 

Roger Frost examines two packages that bring the country to your micro

Points for

- Very good graphics
- Lots of useful ideas

Against

- Nothing

Points for

- Stunning graphics
- Excellent story
- Well written manual

Against

- No save facility

Country life

Product: *The Farm*
 Price: £15
 Supplier: Sherston Software, Swan Barton,
 Sherston, Malmesbury, Wiltshire SN16 OLH.
 Tel: 0666 840433

THE Farm is designed to help with a number of middle infant mathematical and language concepts as part of a topic based on farms. The programs come on a reversible disc with a menu of options on each side. The first, *Visit a Farm* allows you to tour the main features of a farm, adding animals or objects in appropriate places. These modifications are accompanied by a suitable sentence.

At any point, the *What will happen* option can be chosen. This will cause something to occur, along with appropriate sounds and a sentence. For example the cat might wake up and scare the rats away. It is designed as a language stimulus and is suitable for the spoken or the written word.

Scarecrow is a number game for one or two players with attractive graphics to encourage pupils to add, subtract and multiply. Before proceeding the manual recommends that you

look at the Farm Dictionary which contains a store of words and pictures. This features sections on plurals and mothers and babies.

Old Macdonald needs help with the names of animals in his song and there are five variants on the theme – some based on language and others on numbers.

If you choose *Rats in the Barn* you will have to use some skill with prepositions such as *in*, *on* or *behind*. The aim is to tell the cat where the rats are. *Hide and seek*, however, is a version of the grid game Battleships. Two players hide three animals on the grid and must use co-ordinates to find their opponent's animals.

Once again, Sherston has come up trumps with an excellent package. The software is easy to use and is well equipped with options and variations on themes that a teacher can select for the pupils. It goes without saying that the graphics are top quality and the sound effects are well implemented.

It also comes as no surprise that the back-up materials are of the highest quality: The teacher's handbook contains an abundance of useful information, not only with regard to the software, but also to its use within the infant school curriculum.

Product: *The Nature Park Adventure*
 Price: £17.50
 Supplier: Sherston Software, Swan Burton,
 Sherston, Malmesbury, Wiltshire SN16 OLH.
 Tel: 0666 840433

THE Nature Park Adventure is an adventure style program for seven to nine year olds who must attempt to find and release some rare blue butterflies. These have been captured by an evil Trogg, aided by two rather irksome Glob Monsters.

The trail leads you through many areas of the park where you must use your skill at recognising animals, birds, trees and footprints to gain help from the various creatures that inhabit this beautiful piece of parkland. At the same time you must use a number of mathematical skills if you are to complete the entire game.

The adventure is in three parts and Sherston says that each should take about half an hour: The brightest will certainly achieve this but less able pupils may require a little longer. Teachers should be aware of this since there is no save position facility. Each of the problems has two levels of difficulty and these can be chosen in advance by the supervising adult.

In part one, which may be freely copied and distributed, you must use skills of estimation, shape and colour recognition and complete a logic problem. Part two sets problems based on time and arithmetic while part three presents a money puzzle and requires skills with sequences and coordinates. The program is presented on two

flippy discs, the fourth side being used to allow youngsters to practise the problems, away from the adventure sequence.

Anyone who knows Sherston's software will not need telling that the screen graphics are stunningly good: When you have to recognise a butterfly, the pictures make it an easy task. The general scenes are superb and the animation, when used, is extremely good. The sounds are subtle but effective.

The story-line maintains interest in the entire program and each part ends with a crisis which makes you want to move on to the next stage. Distributing copies of part one is an excellent sales ploy.

The software comes with some good back up materials: A well-written and illustrated story book which sets the scene, some colour information cards about the wildlife found in the park and some work cards. This is supplemented by a useful teacher's book which gives suggestions for getting the best out of the software and for including The Nature Park in various areas of the curriculum.

Adventure programs are now widely used in primary schools. Many are available and new programs of this type need to have something special. Sherston has produced a superb package here. Its mixture of fantasy and reality is appealing to youngsters and, in using the program, they will benefit from the mathematical and environmental problems as well as from the reading. The Nature Park Adventure deserves a place in the software collection of all schools with primary aged pupils.



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Supports all plotters including HP-GL, Plotmate, Penman II, Hewlett Packard, Epson HI-80, Hitachi 672, Watanabe, Graphtec, Calcomp, Seckonic, Houston DMP, Roland and paper sizes from A0 to A4 for professional results.

The package consists of a 32k Realtime Graphics Language rom, Solids Design disc, Wireframe Design disc, Multi-plotter and printer driver disc, Demonstration disc, Applications disc, Database library disc and a fully comprehensive 150 page manual designed for complete beginners and experts alike.

Design facilities include 3D Solid/Wireframe Editors to design objects with lines and surfaces, create symmetrical objects by Sweeping or Extruding simple sections, use objects as building blocks to create more complex objects which in turn may be used as building blocks, specify individual surface and line colours for multi-coloured objects, dynamic 3D viewing in any graphics screen mode and a Data convertor for interfacing to other CAD systems and applications.

The Solids Realtime Graphics Language (RGL) rom provides 52 star commands to write your own 3D applications. The facilities include 3D Rotation, Scaling, Translation, Perspective and Isometric displays, Orbiting, 3D Turtlegraphics, Geometric processing, unique 35,000 pixels/sec line generator (faster than Acorn's 9000/sec) for high speed 3D animation and many more options.

The Solids RGL is compatible with all the BBC graphics screen, plotting and colour modes including Shadow screen and is up to 5 times faster than the original RGL. The 32k RGL rom board can be plugged into any 16k rom socket.

Minimum requirements: BBC B/keyboards/single drive. Also compatible with BBC B+, Master series, all versions of DFS & DDFS. The system will also take advantage of a 6502 2nd Processor/Turbo or AMX/QUEST Mouse. REALTIME SOLIDS MODELLER: £89.95.

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3D CAD/ANIMATION SYSTEM

ARCHIMEDES & BBC VERSIONS

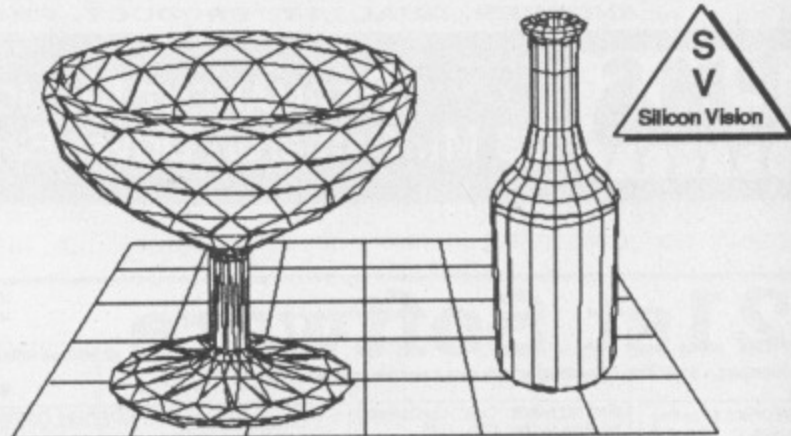
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Near Plotter Quality hardcopy at a fraction of the cost.

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Graphics power plus

*Chris Hill sees if Watford's latest
rom makes any new conquests*

Product: ConQuest
Price: £29 plus VAT
Supplier: Watford Electronics, Jessa House, 250
High St, Watford, Herts WD1 2AU.
Tel: 0923 37774

CONQUEST is a rom-based extension to Quest Paint, the mouse-driven graphic package reviewed in the July 1987 issue of *The Micro User*. On its own it provides a font editor, but in addition it enables Quest Paint to take advantage of more ram extension boards and, for Master users or owners of Acorn's Graphics rom it calls on a few of Acornsoft's graphic facilities and introduces two new ones of its own.

ConQuest, even more than Quest Paint, is a tool for the serious buff. You do need ram extension to get the most out of it. Quest Paint's text characters are designed on a 16 by 16 pixel grid and the ConQuest font designer is the nicest I've ever used. All the usual features are there, but in addition you can scroll the current character in any direction with optional wraparound. You can erase, invert, flip, rotate and copy the complete character.

On a row or column of pixels you can insert or delete-and-close-up, which is invaluable in adjusting proportions. And with the ability to define brushes and the instant response from the mouse the whole thing becomes easy to the point of addiction. I hope that Watford Electronics has some other application for it: Perhaps in its coming DTP package – Wapping Editor.

New graphic facilities

You still type *PAINT to enter Quest, but now you can pick the new facilities from Quest Paint's Global FX and Extended I/O menus. By clicking on the FX option and then on the screen the software cycles through the new options.

There are several facilities for curved shapes followed by two new paste options each having its own descriptive mouse pointers. These are called by two more presses, or cancelled with a third button – very logical, but it can get confusing.

ConQuest's new painting facilities include rotation and transformation of the area defined as the paste window and several fill patterns ready defined. For rotation, the click on the mouse button defines the centre of the new window –

you can unclick it until you get it right.

The destination window is outlined on the screen and its angle of rotation is precisely controlled by the horizontal position of the mouse pointer. The next click copies the image from the paste window into the window. The flicker-free response is excellent.

Transformation is similar except that you draw a four-sided figure and ConQuest stretches and squeezes the paste window to fit it. So a square paste window can be scaled into a rectangle, diamond, or any four-sided shape – including twisted figure-eight shapes.

Both of these routines can read the image from shadow ram or from the screen. They are well implemented but slow and Mode 1 resolution cannot do justice to these effects. The transformation algorithm prevents many simple perspective effects and certainly does not include *any shape* as the manual claims.

However, both functions automate some very tedious donkey work and, if you don't like the result, you can always undo it from ram or disc, or touch it up yourself.

The other routines – arcs, sectors, segments

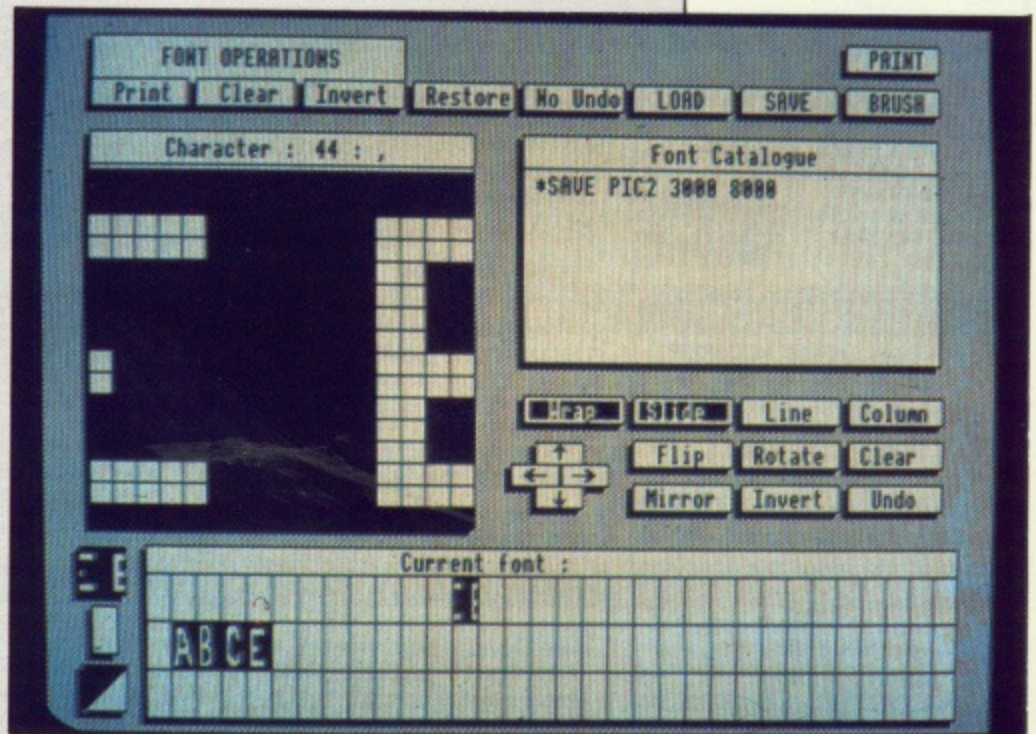
Turn to Page 90 ►

Points for

- Extra graphics functions include pre-defined fills
- Excellent font designer
- Shadow ram compatibility

Against

- Produces flat images
- Tricky mouse handling



ConQuest Font Editor

◀ From Page 89

and ellipses – are derived from the Graphics rom and are also slower and less responsive. Although they can't take advantage of Quest's extensive colour facilities they do fill important gaps – notably the rotated ellipses for sketching

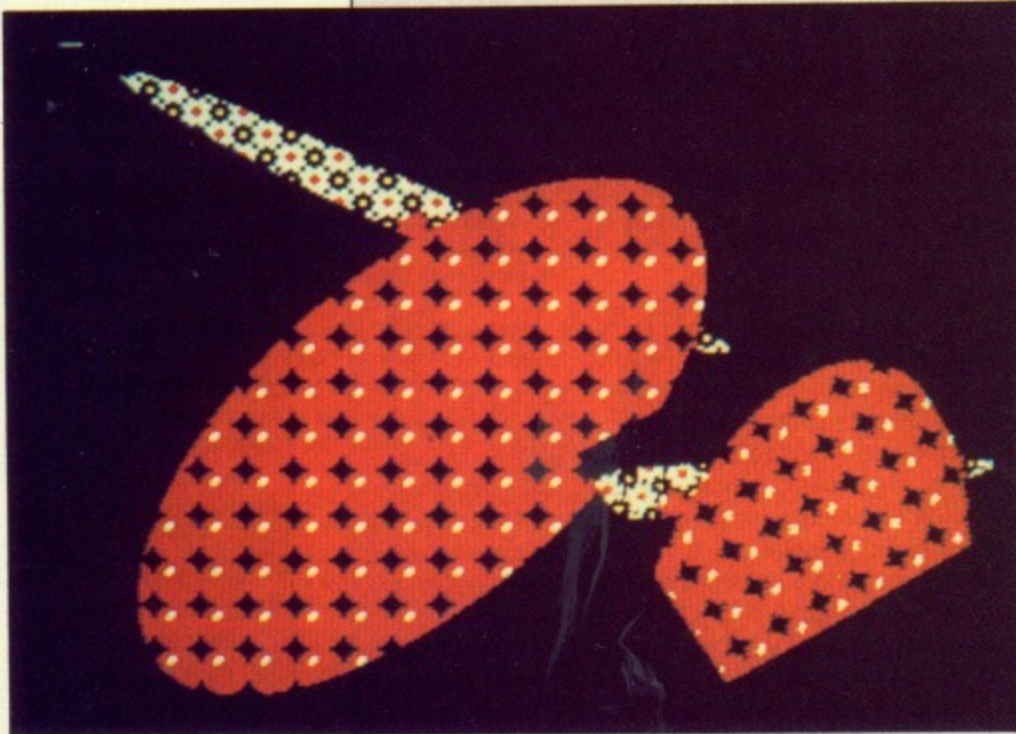
arches, cans and wheels and they're not difficult to use. The 20-page manual is clear and sets out the extra potential of the package – as well as its limitations – with refreshing honesty.

The authors have clearly tried to take advantage of every proprietary ram extension but, if your extra ram still doesn't talk to ConQuest, you can add a short routine to observe the write protocols of your extra memory. It's a commendable catch-all – albeit a little offhand.

The new manual gains enormously from adopting a good quality typeface: It now reads like an authoritative document – and some concession to graphic competence is important in a graphics manual.

No package is perfect, but Quest is one of the best. For my money, its chief drawbacks are the restriction to Mode 1, the limitations on specifying perspective points off the screen and the general flatness. Of these, ConQuest goes towards alleviating the third for those who use previously incompatible ram. The extra Graphics rom routines are valuable, especially the ellipses, and the rotation and transformation could be useful.

ConQuest's main attraction is to those who cannot use Quest with their ram extensions. Watford Electronics has done well to produce ConQuest as an add-on rather than releasing it in a whole new package. If Quest doesn't use your ram extension, or you need extra curved shapes and transformations, this is the answer.



ConQuest gives ellipses, rotations and new fills

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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. Using this package it is possible to transfer any data from the BBC to Archimedes at upto 19200 baud.

By far the easiest way to transfer data to your new computer.

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Archimedes 5¼"/3½" Disc drive Interface

With this interface it is possible to connect almost any 5¼"/3½" disc drive with its own power supply to the Archimedes. NO SOLDERING is involved. Supplied complete with necessary lead.

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Note: This is not simply a lead. Attempting to connect an external disc drive by direct connection may result in damage to your Micro.

Watford Electronics are the main Approved Stockist of ACORN SPARES and ECONET Referral Centre

The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, 1770 Disc Upgrade and Acorn ADFS. This is a complete package, with its own power supply, ready to interface with your BBC Micro. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

£259

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

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

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Continued

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CO-PRO Adaptor



Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

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

Master owners may use Co-Pro to add a second Co-processor externally. Watford, brings power to your BBC at only:

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NEW

BBC PCB DESIGNER

At last! A PCB design package for the BBC Micro that eclipses some industry CAD software. Hard to believe, isn't it? Just look at some of the impressive package specification:

- Library Component Designer
- Component Library (over 200 parts)
- Component List Editor
- NetList Editor
- PCB Board Designer
- Plotter Driver
- Dot Matrix Printer Driver

This integrated suite of programs is packed full of sophisticated PCB related features making the design of a circuit board a dream instead of a nightmare.

Input for the design may be manual, taking components from the library and connecting them, or highly automatic starting from a netlist and list of components. In auto mode, PCB Designer will never allow you to forget a connection again! And of course, either in manual or auto mode, connectivity is maintained no matter how you later move the parts around and route the tracks. Connections snap together and angles are corrected. Through hole vias and track thickness are established automatically and many more features, far too numerous to mention here, are included in the system.

Some of the PCB Designer's features are:

- Over 120 library pad sizes/shapes
- Four colour adjustable palette
- Zoom range 2:1 to 1:4
- Highlighting of specific tracks
- Normal and surface mounted components
- Rapid screen review
- Menu driven
- Variable gridlock
- Switchable measurement grid
- Pre-select pan/scroll facility
- Large 24" x 24" Board size
- Copy route facility
- Connectivity held at all times
- Ratsnesting of part connections
- Auto-placement of text references
- Text linked to parts
- Automatic placement of vias
- Printer and plotter outputs provided
- Comprehensive manual

TYPES OF PLOT OUTPUT

Top and bottom track artworks, top and bottom silkscreens, solder resist mask, drilling detail drawing and check plot. All these may be with pad holes on/off, scale of 2:1 or 1:1, board edge on/off, 90 degrees rotation, mirror image, width of pen, x & y offsets and batch plots to disc.

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

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

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

Introductory Offer: £99

(Please write in for further technical details)

Archimedes Real-Time Digitiser

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 television signals may also be digitised via a video recorder or TV tuner.

Once captured, Video images can be stretched, squashed, rotated, stored on disk, printed, or used by applications software.

Applications include desktop publishing, graphics, animation, image analysis and recognition, medical imaging, automatic inspection and measurement, databases, interactive video, remote transmission of pictures via a modem, movement detection ... or anything else you can think of!

SPECIFICATION

SOFTWARE

All the driver software for the digitiser is contained in a ROM on the podule. Facilities provided include:

- Grabbing of images to the screen or dumping to memory.
- Continuous grabbing and display for previewing or camera alignment.
- 'Hot key' grabbing - pressing a (configurable) key combination grabs and displays an image on the screen while another program (e.g. paint software such as Artisan) is running.
- Scaling (zoom/shrink) any section of an image to any size in X and Y directions, with optional X/Y flip, window clip and logical (AND/OR/XOR) plotting.
- Rotation and scaling to any angle and size, rotating about any point, with optional window clip, and logical (AND/OR/XOR) plotting.
- Very versatile matrix printer screendump facility for Epson FX, LQ and EX compatible printers - pictures can be printed to ANY size (including multiple sheets) at any orientation, using any available printer density and one of six internal sets of dot patterns, or with user definable patterns (pattern editor supplied). The screen-dump can also be used for general purpose graphics screen printing.
- Pixel value lookup tables: pixel values can be passed through a user defined lookup table to allow contrast enhancement, thresholding pseudo-colouring etc.
- Smoothing and noise spot removal to enhance image quality.
- Creation of sprites from all or part of a digitised image.
- Saving and loading of digitised images in compressed format.
- Combination of pictures by adding, averaging, subtracting, multiplication etc.
- Much faster versions of the Arthur *ScreenLoad and *ScreenSave commands.

Software facilities are accessed via operating system star (*) commands and SWI calls. High resolution screen modes using MultiSync type monitors are supported.

UTILITY DISK

A disk is included, containing sample pictures, examples and utility programs including the following:

- Colour image grabbing using colour filters with monochrome or colour cameras, including colour balance adjustment and scaling facilities.
- Pattern editor for 2 colour display modes and printer screendumps.
- 512 line interlaced display for non MultiSync monitors.
- Thresholding to create two colour images.
- Capture and replay of animated sequences.
- Several example programs illustrating the use of digitiser software.

RESOLUTION

Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

Any 2,16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied).

SPEED

Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

HARDWARE

The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

Automatic video level control and black level clamping circuitry is used to ensure that the optimum contrast is obtained from a variety of video sources. A filter is included to avoid patterning effects when using colour sources.

Price £249



Watford Electronics

Distributors of: Electronic Components, Micro Computers & Peripherals



250 High Street, Watford, WD1 2AN, England. Tel: Watford (0923) 37774. Telex: 8956095 WATFRD. Fax: 01-950 8989

AT LAST! THE FIRST TRULY PORTABLE PERSONAL COMPUTER

FREE With every Z88 purchased from us this month, we are giving away absolutely **FREE**, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

The Z88 is smaller than an A4 pad, weighs less than 2lb, and measures only 7/8" thick. No other portable personal computer offers so much, in so small a package . . . and at so small a price:

JUST £239.00 PLUS VAT

Memory

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

Keyboard and display

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

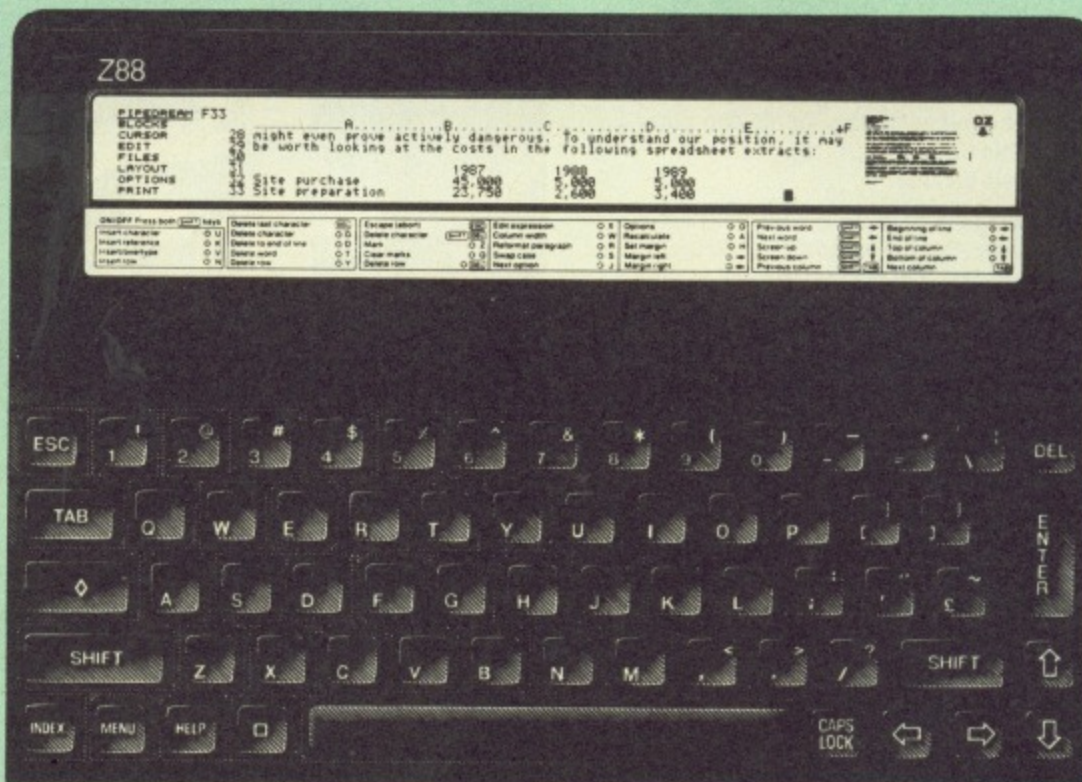
The screen is a state-of-the-art supertwist LCD, which provides a massive improvement on normal displays in both contrast ratio and viewing angle – providing a clear, sharp read-out. The screen's format is 8 lines x 106 characters, and provides a large working area of 8 x 94.

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

Software

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

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



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

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

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

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

Diary The Z88 diary software is a free-form


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

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

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

Power supply

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

Continued 



Z88 - £239 + VAT



A COMPLETE PERSONAL COMPUTING SYSTEM.

Z88 is a complete Personal Computing System

All prices in this advert are exclusive of VAT.

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

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

32K £17.35 128K £43.40

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

32K £17.35 128K £43.40



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

£34.75

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

£30.00

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

£21.70

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

£8.65

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

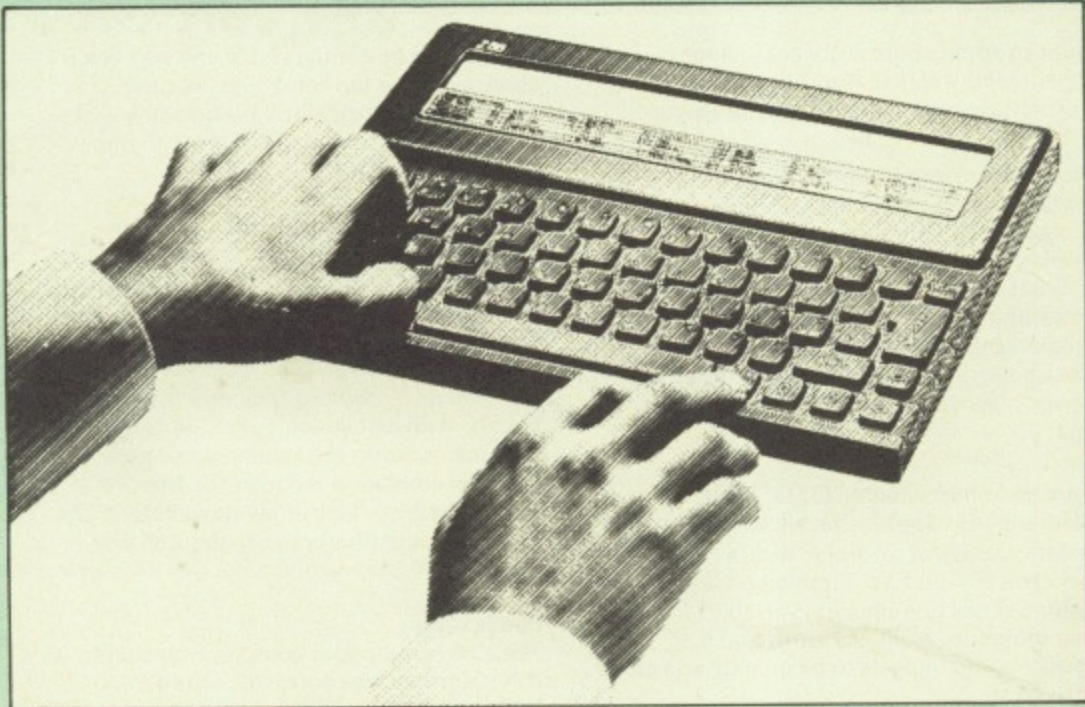
£24.00

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

£86.90

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

£8.65



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



Watford Electronics

Jessa House, 250 High Street, Watford, WD1 2AN, England. Tel: Watford (0923) 37774. Telex: 8956095 WATFRD. Fax: 01-950 898



All Monitors are supplied complete with BBC connecting leads FREE.

MICROVITEC 14"

- 1431 - Standard resolution as used on the BBC television computer programme **£175**
- 1451 - Medium resolution, suitable for word processing in mode 0 **£225**
- 1441 - High res, exceeds the capabilities of the BBC micro **£359**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£255**
- 2030 CS 20" Med Res **£380**
- 2040 CS 20" Hi Res **£675**
- Dust Cover for Microvitecs **£5.50**
- Touchtec 501 Touch Screen **£239**

TAXAN 12" & 14"

- TAXAN Super Vision 2 Type 620 Hi-res RGB Colour monitor. Ideal for Wordprocessing **£263**
- TAXAN Super 3, Type 625 Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£313**
- TAXAN 14" Multisync 770 Plus - An autoscanning Ultra high res, colour monitor. Ideal for Archimedes, IBM & Compatibles **£495**
- NEC JC-1401P3EE 14" Multisync Ultra Hi-res Intelligent Colour monitor. Auto scans frequencies between 15KHz to 35KHz. Text switch provides 7 colours for Database & wordprocessor. **£489**

PHILLIPS Monochrome 12"

- BM7502 Hi-res Green **£69**
- BM7522 Hi-res Amber **£74**

STAR BUY

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

ONLY £195

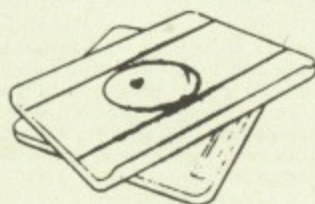
ZENITH 12"

- Amber (New Design) Hi-resolution **£72**
- N.B. carriage on Monitors **£7** (securicor)

SPARE LEADS

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

SWIVEL BASES



for Video Monitors

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

for 12" Monitors **£7** (carr. £2.50)

for 14" Monitors **£10** (carr. £2.50)

Anti-Glare VDU Screen

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

£12

TAXAN KP-815 PRINTER

80 column, Bi-directional, 160 CPS, (NLQ 24cps); Friction & tractor feed + paper roll holder as standard; Epson FX compatible.

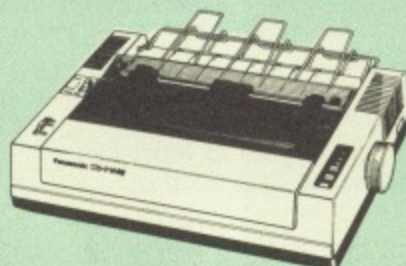
Offer Price £159

KAGA/TAXAN PRINTERS

(IBM/Epson compatibles)

- Kaga KP915 Printer **£275** (carr £7)
- RS232 Interface **£49**
- RS232 Interface with 2K Buffer **£69**
- RS232 Interface with 16K Buffer **£89**

Panasonic KX-P1081



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

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

Special Price: **£145** (carr. £6)

Optional RS232 Interface: **£39**

Panasonic KX-P1082

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

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

Introductory Offer: **£172** (carr. £7)

Panasonic KX-P3131 Daisy-Wheel Printer

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

Only **£245** (carr. £7)

- Single Sheet Feeder **£175**
- Tractor Feed **£90**
- Daisy Wheel (various) **£12**
- Panasonic KX-P3131 Ribbon **£4.50**

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

NEC P2200 PINWRITER

24 pin; 80 column; 168CPS - 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

Price: **£285**

- Cut Sheet Feeder **£59**
- Additional Font Cartridge **£27**
- NEC P2200 Pinwriter Ribbon **£6.50**

VARIOUS PRINTERS & ACCESSORIES

- Brother HR20 Daisy Wheel **£349**
 - HR20 Tractor Feed Attachment **£110**
 - Epson EX800 Printer **£395**
 - Epson EX1000 Printer **£529**
 - Epson FX800 Printer **£295**
 - Epson FX1000 Printer **£389**
 - Epson GQ3500 Laser Printer **£1290**
 - Star LC10 Printer **£175**
 - Star LC10C Colour **£215**
 - Epson LQ500 Printer **£275**
 - Epson LQ800 Printer **£399**
 - Epson LQ850 Printer **£419**
 - Epson LQ1050 Printer **£529**
 - Epson LQ2500+ Printer **£749**
 - Epson LX800 Printer **£189**
 - Epson SQ2500 Printer **£975**
 - Epson Paper Roll Holder **£17**
 - EX800/1000 Colour Option **£55**
 - EX800/1000 Colour Ribbon **£18**
 - EX800 Cut Sheet Feeder **£130**
 - EX1000 Cut Sheet Feeder **£195**
 - FX/LQ/LX800 Single Sheet Feeder **£135**
 - FX/LQ1000 Single Sheet Feeder **£169**
 - Hi-80 Refills - Set of 4 Pens **£7**
 - LX800 Cut Sheet Feeder **£75**
 - LQ800 Tractor Feed **£44**
 - LQ1000 Tractor Feed **£50**
 - LQ2500 Cut Sheet Feeder **£195**
 - LX1000 Cut Sheet Feeder **£305**
 - Hitachi 672 Colour Plotter **£475**
- (Securicor Carriage on Printers **£7**)

EPSON PRINTER INTERFACES

- All these interfaces fit inside the printer.
- | | | | |
|----------|------------|-------------------|------------|
| RS232 | £27 | RS232 + 2K Buffer | £52 |
| IEEE 488 | £65 | RS232 + 8K Buffer | £62 |

INTEGREX COLOUR JET PRINTER

- Colour Jet 132 Printer **£515**
- Paper Roll **£6**
- Screen Dump Software **£10**
- Colour Cartridge **£14**
- Black Cartridge **£8**
- 100 A4 OHP transparencies **£55**

PRINTER SHARERS

(Ideal for School environment)

- | | | |
|---------------------------|------------|------------|
| Connects | Serial | Centronics |
| 2 BBC Micros to 1 Printer | £25 | £26 |
| 3 BBC Micros to 1 Printer | £36 | £35 |
| 6 BBC Micros to 1 Printer | - | £99 |

PRINTER CHANGER

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

Professional Printer Stand



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

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

£26 (carr. £2.50)

Continued

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

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

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

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

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

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

£5.95 (No VAT)

PRINTER LEADS

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

Standard length (4 feet long)	£6
Extra long (6 feet long)	£8
Compact's Special Centronics Lead	£9
RS232 Cable	P.O.A.
IBM Parallel 1 metre Cable	£7
Double ended 36 way Centronics Lead	£9

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	-	£3.50
BBC Master	-	£4.00
Archimedes Micro pair	-	£9.00
Brother HR15/20	£3.00	£5.00
EX/LQ800	£7.50	£4.50
EX/LQ1000	£8.00	£5.00
RX/FX80/85/800/MX80	£4.00	£4.95
RX/FX100/1000	£6.00	-
Kaga/Texan KP810/815	£5.25	£4.00
LQ2500	£9.00	£5.50
LX80/86	£4.00	£4.50
LX800	£4.00	£4.75
M1009/GLP	£4.00	£3.75
Panasonic KX1080/81	£4.50	£4.75
SQ2500	£25.00	£5.50
Star NL10	£4.00	£4.50
Microvitec Metal	-	£5.50

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

Listing Paper (Perforated)

- 1,000 Sheets 9½" x 11" Fanfold Paper **£7**
- 2,000 Sheets 9½" x 11" Fanfold Paper **£12**
- 1000 Sheets 9½" x 11" NCR 2 Part Fanfold **£19**
- 1,000 Sheets 15" x 11" Fanfold Paper **£9**
- 1000 Sheets true A4 Fanfold Paper **£11**
- 2000 Sheets true A4 Fanfold Paper **£20**
- Teleprinter Roll (Econo paper) **£4**

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

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

PRINTER LABELS

(On continuous fanfold backing sheet)

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

Carriage on 1,000 Labels £1.00

MEGABUFFER 256



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

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

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

Only £125 (carr £2)

OFFICE MASTER



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

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

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

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.

BEEBPLOT - Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

New Launch Offers Disc Drives DP35-800S



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

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

The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.

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

Launch Offer: £165 (carr. £7)

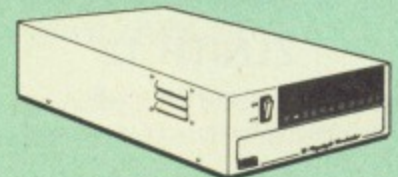
OKIMATE COLOUR PRINTER

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

Only: £139

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

30 Megabyte Winchester Drive



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

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

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

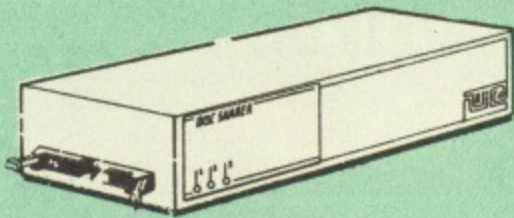
Compatible with the Master, and the BBC B (with 17" X disc interface).

Launch Offer £425 (Carr. £12)

Panasonic KX-P1083
Fast 240CPS (48CPS NLQ);
8K Buffer, Epson compatible, etc.
Launch Offer: £299

NEW

DISC DRIVE SHARER



(Ideal for educational establishments)

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

Launch Price: £59

Price includes 3 Cables

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

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

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

WATFORD's & ACORN's SINGLE DENSITY DFS

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

- Complete Disc Interface Kit including DFS ROM and fitting instructions £58
 - Acorn's 0.90 DFS Kit complete £59
 - DFS Manual (Comprehensive) (no VAT) £6.95
- (P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).
- Watford's sophisticated DFS ROM only £16
 - We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only £12
 - DNFS ROM only £17 ● ADFS ROM only £25

NEW

WATFORD's Mk II Double Density DFS INTERFACE

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

Added features include:

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

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

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

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

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

SPECIAL DISC DRIVE/DDFS OFFER

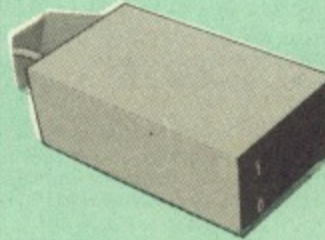
Type CLS400S



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

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

3 1/2" DISC DRIVE OFFER



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

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

Mysteries of Disc Drives & DFS Revealed

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

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

£5.95 (Book No VAT)

DISC ALBUMS

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

£4

FLOPPY HEAD CLEANER KIT

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

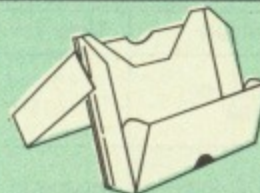
£6

ANTISTATIC LOCKABLE DISC STORAGE UNITS

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

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

* Not lockable



PLASTIC LIBRARY CASES

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

DISC PLONKER RACK

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5 1/4" Discs.



Protection at Only: £2

DUST COVERS (For our Disc Drives)

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

Continued

Quality Disc Drives from Watford

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

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

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

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

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

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

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

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



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £98	
400K (720K)	CLS400S £85	CLD 400 £168	CS 400S £96	CD400 £188
800K (1.44M)		CLD 800S £167		CD 800S £186

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

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

Suffix S = 40-80 Switchable

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

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

3M - DISKETTES

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

- 10 x 5 1/4" S/S D/D 40 Track Diskettes (744) £8.00
- 10 x 5 1/4" D/S D/D 40 Track Diskettes (745) £9.75
- 10 x 5 1/4" S/S D/D 80 Track Diskettes (746) £12.50
- 10 x 5 1/4" D/S D/D 80 Track Diskettes (747) £12.75
- 10 x 5 1/4" 1.6M D/S D/D High Density Discs for IBM XT and AT £28
- 10 x 3 1/2" S/S D/D 40/80 track Discs £13.50
- 10 x 3 1/2" D/S D/D 40/80 track Discs £15
- 10 x 3 1/2" High Density Diskettes £43



FREE

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

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

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

- 10 x M3 3 1/2" D/S D/D 80 Track Discs £13
- 10 x M4 5 1/4" S/S D/D 40 Track Discs £6.50
- 10 x M5 5 1/4" D/S D/D 40 Track Discs £8
- 10 x M7 5 1/4" D/S D/D 80 Track Discs £9
- 3" Double Sided Discs £3 each

Special BULK OFFER on 5 1/4" DISCS

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

PRICES
SLASHED

BULK PACK DISCS in lots of 100

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

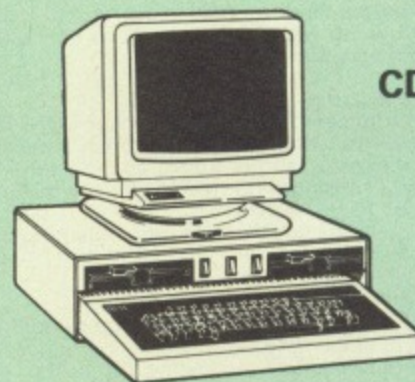
PRICES
SLASHED

WATFORD'S WINCHESTER DRIVES

- 10 Megabyte Unit with ADFS £375
 - 30 Megabyte Unit with ADFS £425
- (30 Meg Unit is supplied complete with utilities software. For full details see Page 6 of our advert)

CDP800S

CDPM800S



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

CDP 800S for BBC Micro £192
CDPM 800S for Master £196
DP35-800 for BBC/Master £165
(For DP35-800S spec. see Page 4 of our advert)

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

NOMINATED FOR



1987



QUEST MOUSE

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

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

QUEST PAINT

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

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

SOFTWARE FEATURES

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

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

Take The Guesswork Out of Selecting a Mouse Package

With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87

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

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

Micro User June '87

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

A&B Computing June '87

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

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

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

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

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

Acorn User, September '87

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

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

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

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

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

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

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

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

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

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

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

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

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

Beeblet User Group, New Zealand Oct '87:

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

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

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

ConQuest

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

Some of the features are:

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

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

N.B.

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

MARK II LIGHT PEN

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

Price Only £21

(Price includes FREE software Disc and Operating Manual)

RB2 Marconi Tracker Ball

RB2 (AMX/Quest compatible)	£52
RB2 including Quest Paint	£78

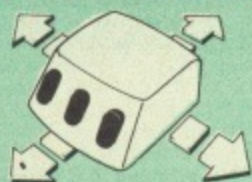
FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Software Pack for Compact	£40
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

Continued



THE NEW Mk III AMX MOUSE



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

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

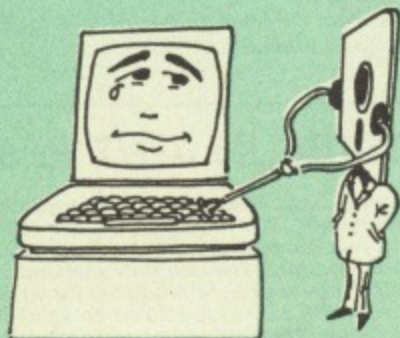
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX UTILITY Package	£11
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32

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

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker **£12**

AMX DESIGN (ROM)	£55
AMX 3D ZICON Disc	£19
AMX XAM Educational	£15
AMX EXTRA EXTRA	£15
AMX MAX A gem of desktop (ROM)	£15

DIAGNOSTICS DISC



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

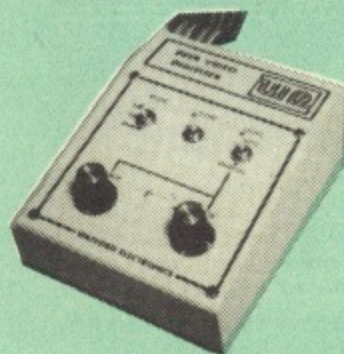
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

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

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

Only £20.00

BEEB VIDEO DIGITISER



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

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

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

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

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

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

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

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

£109 (Carr. £3)

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

Magazine Maker

(As seen on TV)

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

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

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

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

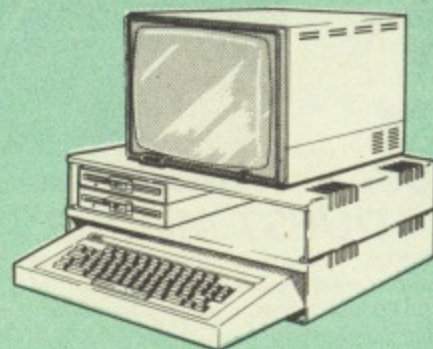
Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

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

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

Complete Package £135.00 (carr. £3)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS

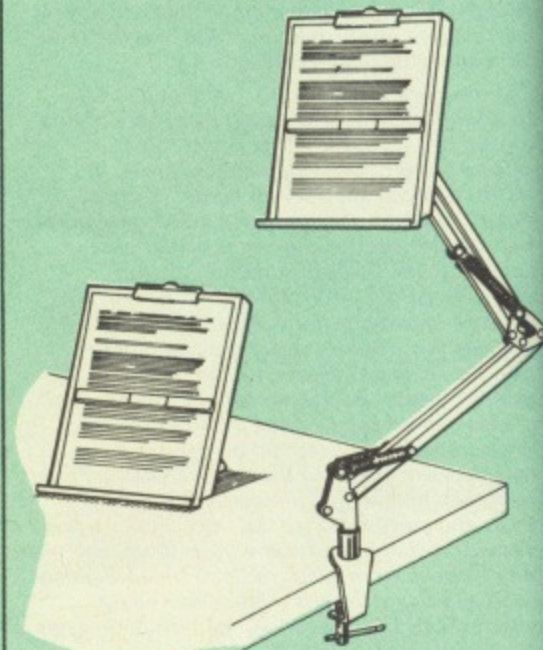


Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It

allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	£11 (carr. £1.50)
DOUBLE BBC PLINTH	£19 (carr. £3.00)
PRINTER PLINTH	£10 (carr. £1.50)
SINGLE MASTER PLINTH	£14 (carr. £1.50)
DOUBLE MASTER PLINTH	£24 (carr. £3.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only

Desk Top **£10 (carr. £2)**

Angle poise **£14 (carr. £3)**



ARIES CORNER

The Aries B-32 Shadow RAM Card

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

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

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

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

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

Price: **£80** (carr. £2)



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

Aries B-12 Sideways ROM Board

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

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

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

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

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

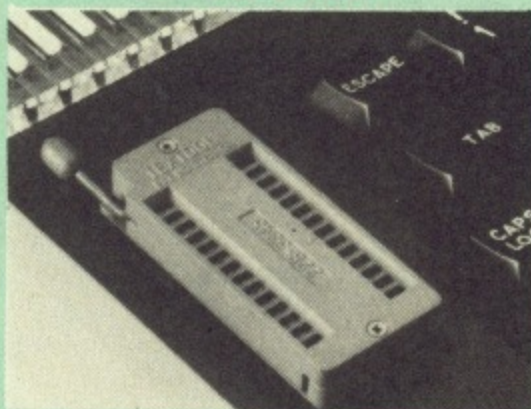
ARIES B-488 IEEE-488 INTERFACE UNIT

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

£238 (Carr £3)

All prices in this advert are
exclusive of VAT.

SIDEWAYS ZIF SOCKET



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

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

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

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

ONLY £16 (carr £2)

Low Profile CARTRIDGE SYSTEM

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

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

ROM Cartridges for the BBC Master
Twin **£7.50**; Quad **£11**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

Key points to note about this new addition to the Watford range of products are:

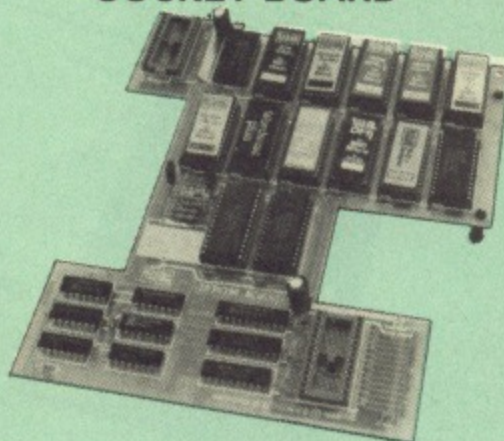
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities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

Only: **£24** (carr £2)

Optional extras

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

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



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

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

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

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

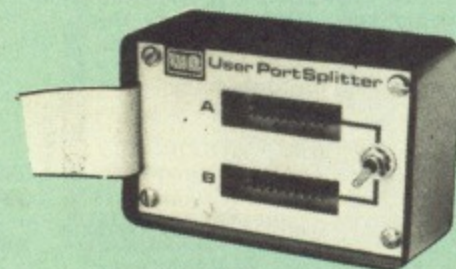
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card,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

Price: **Only £32**
Battery backup fitted **£36**
Battery Backup only **£3**
(carriage £2)

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

Only: **£8**

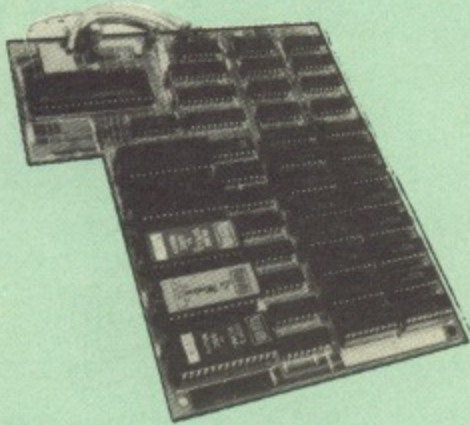
USER PORT SPLITTER UNIT



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

Continued

ROM/RAM CARD



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

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

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

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

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

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

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM£45
- ROM/RAM card with 64k dynamic RAM£59
- ROM/RAM card with a massive 128k dynamic RAM£89

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit£9
- 16k Dynamic RAM for Upgrade£9.20
- Battery backup£3
- Read and Write protect switches£2 each
- Complete ROM-RAM board
- All options installed£106

P.S.

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

Le Modem



The MODEM from Watford

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

The features that make Le MODEM such good value are:

- A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.

- Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!

- Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.

- Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.

- Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.

- A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!

- FULLY controlled by simple **COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!

- Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.

- Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.

- Packaged in such a way that you need nothing else except a BBC Micro to communicate with computers all over the world.

- FREE Registration to MicroLink.

SPECIAL OFFER

Price: **£88**
(carr £3)



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

Minerva Systems Software

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

APOLLO



The NEW Modem from Watford

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

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.

- V23 for Prestel, Home Banking, and other Viewdata services.

- Reverse V23 allows User run Viewdata service.

- 1200-1200 half duplex for communications.

- XMODEM, HEX and ASCII file transmission.

- Auto Dial of given 'phone number.

- Auto Answer for User's Bulletin Board.

- 80 column terminal with split screen facility.

- Prestel text screen dump.

- Fully BABT approved.

- FREE Registration to MicroLink.

- £6.50 off annual Membership to Micronet, Prestel and Telecom Gold.

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

Only: **£88** (Carr £3)

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

VOLTMACE JOYSTICKS

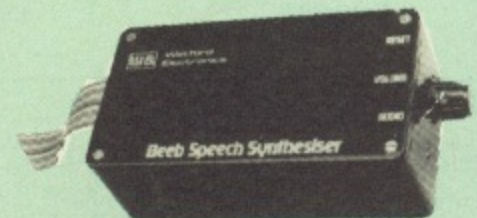
Delta 3B Single Joystick	£12
Delta 3B Twin Joysticks	£17
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.

Only **£10** (£2 carr.)

Versatile BEEB SPEECH SYNTHESISER Unit



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

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

SPECIAL PRICE £32 (carr £2)

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£46
CARETAKER Basic Utility	£23
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£25

Wordwise

£23

Wordwise plus

£40

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

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

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

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

Only £24

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

HI-WORDWISE-PLUS DISC:	£5
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SPELL MASTER	£42
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Inter SHEET	ONLY £37
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INTER-CHART

ONLY: £25

Inter-WORD

£36

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM

£76

INTERBASE	£49
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All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£35
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VIEW 3.0 ROM	£48
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VIEW PROFESSIONAL	£79
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HI-VIEW	£36
(for use with 6502 2nd Processor)	

VIEW Printer Driver Generator	£9
(Please specify Disc or Cassette)	

VIEW SHEET (Acornsoft)	£36
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VIEWSTORE	£36
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VIEWSPELL with 80 track disc	£29
------------------------------	-----

VIEWPLOT Disc	£20
(Please specify for Master 128 or Compact)	

VIEW-INDEX	£12
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OVERVIEW Packs 1 & 2 for the Master	£72
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Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	£29
Adv 1770 DFS for Mast/Compact	£29
Adv 1770 DFS for BBC/BBC+	£29
Adv Disc Investigator	£24
Adv. Control Panel	£29

MINI OFFICE II

DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.50
ROM Version	£43.00

(When ordering please specify for which Micro & 40 or 80 track Disc).

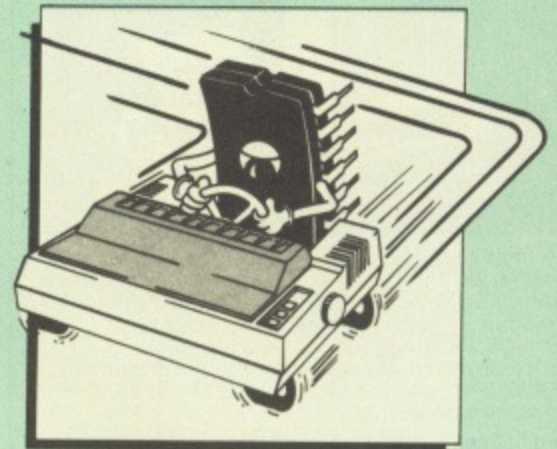
REPLICA 3

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

£15 (40 or 80 track)

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

VIEW PRINTER DRIVER ROM



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

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, Hi80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features). NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

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

Price: Only £33

EPSON NLQ ROM for the BBC Micro



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

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM	£7
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Continued

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics. Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

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

The Micro User Feb. 1985.

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

For use with the following printers:

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

Only: £25

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc) 4 primary level maths programs **£11.25**
- Maths with a Story 2 (Disc) 4 further maths programs **£11.25**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£17**
- WAVES: Science Topics (Disc) CSC O Level Physics program. **£14.95**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£20.00**
- BONDING: Science (Disc) O Level Chemistry program. **£20.00**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£20.00**
- ELECTRONICS IN ACTION (Disc) O Level program **£19.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Classification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£11.25**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£21.70**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£19.95**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETXT SYSTEM **£8.65**
- PERIOD TABLE SOFTWARE **£20**
- Astronomy - Primary (Disc) **£12**
- Computers at Work - Primary **£17.35**
- Introducing Geography - Primary **£17**
- Introducing Geography 11-17yrs **£17.50**
- Electric Fields 6-14 years **£11.25**
- BlackQueen Contract Bridge **£13**
- Espana Viva - 3 Discs **£19.95**
- A Vous La France Disc **£21.50**

THE NLQ DESIGNER

(The First & still the Best)

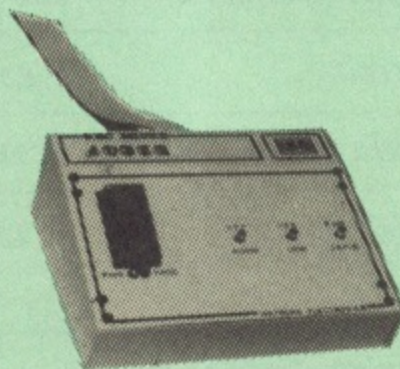
Supplied with over 25 Different fonts

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

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

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

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS. Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.

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

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

Features:

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

£75 (£3 Carr)

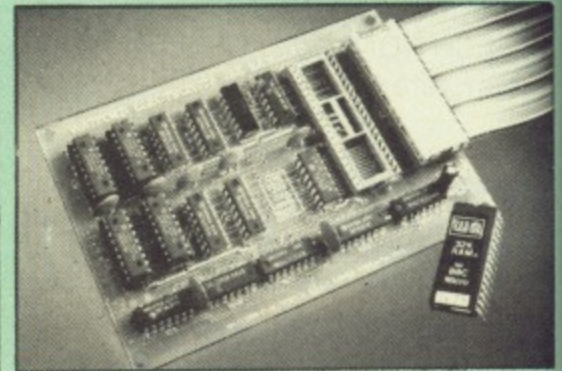
TEX EPROM ERASERS

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

- ERASER EB - Standard version erases up to 16 chips. **£28 (carr £2)**
- ERASER GT - Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30 (carr £2)**
- Spare UV tubes. **£9**

32K

SHADOW RAM-Printer Buffer Expansion Board



A MUST FOR WORD PROCESSING

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

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

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

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

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

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,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.

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

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

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

at Only **£89 (carr £2)**

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£4.95
15 Hr Wordprocessing BBC/WW & WW+	£4.95
30 Hour BASIC (BBC Micro)	£9.95
40 Best machine Code Routines	£7.95
50 Programs in BBC BASIC	£6.95
6502 Assembly Language Program	£19.95
6502 Application	£13.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development Package	£7.50
6502 Reference Guide	£10.95
6800 Assembly Language	£15.95
68000 Assembly Language Prog.	£19.95
68000 Machine Code Programming	£13.00
68000 Microprocessor Handbook	£14.95
68000 Programming the	£22.95
68000 User Guide	£8.95
6809, Programming the	£18.95
6809 Machine Code Programming	£7.95
8086/8088 Assembly Language Prog.	£11.95
8086/8088 Programming the	£17.95
Advanced Disc User Guide	£16.95
Advanced Prog. Guide to BBC	£9.95
Adv. Sideways RAM User Guide	£9.95
Advanced User Guide for BBC	£10.95
Advanced Graphics with BBC	£10.50
Assembly Language Programming on BBC Micro	£11.50
Adventure into BBC BASIC	£6.95
Amiga Hardware Ref Manual	£23.70
Applied Assembly Lang. for BBC	£9.95
ARM Assem, Lang, Programming	£12.95
Art of Microcomputer Graphics	£15.95
Assembly Lang. within BBC	£11.95
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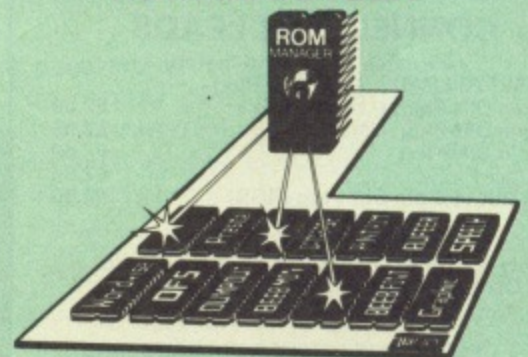


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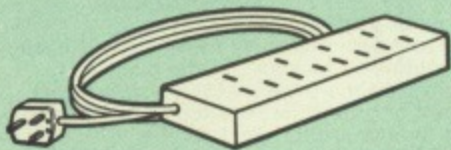
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Special FX

Mike Bibby gets down to the nitty gritty of his micro

I CAN vividly remember seeing my first BBC Basic listing. Acorn had described its Basic as "Microsoft-like" – a practice it soon gave up – and I was expecting something I could read at a glance. I was aghast: The thing was littered with *FX calls, whatever they were. And incredibly unfriendly they looked, too, with all those meaningless strings of numbers behind them...

However, first impressions don't count, and over the years I've come to love the stark but powerful *FX commands – especially having worked on micros without their equivalents – as they provide a low-level interface between Basic and the operating system (OS).

A lot of micros' languages make it nigh on impossible for you to get anywhere near the OS. The main reason being that operating systems tend to evolve and programmers trying to be clever might use tricks which are rendered ineffective with an operating system update.

Fortunately Acorn realised that:

- Creative programmers would never give up trying to gain access to – and taking advantage of – the OS.
- It wasn't a bad thing to open up the OS – it could only enhance the potential of the BBC Micro.

Hence the carefully planned OS interface – the *FX calls, *oswords*, *osfiles* and so on. It was a structure that let you get at the OS in a way that Acorn guaranteed would work with later updates: Any program that stuck to the rules would function properly.

And to give Acorn credit, it has worked, right from the days of 16k Model As through the B+, Compact and Master to the Archimedes.

Admittedly it still isn't the most user-friendly system, which is a pity because it is far easier than it looks: The *FX calls can be made to do much more than the average programmer uses them for with just a little extra effort, and they also provide a simple introduction to machine code.

So let's have a look at one. Switch on your micro and enter:

```
*FX0
```

You'll get the number of your OS version on screen. Very simple and very quick. Yet would you believe that on some other micros you virtually have to fight to get that information out of the thing?

*FX commands work at a very primitive level: All they do is pass the number or numbers you supply

with them straight over to the 6502.

So what are these magic numbers? Well the 6502 has three special registers – A, X and Y – which you can think of as three variables. These can only hold whole numbers from 0 to 255.

Now an awful lot of machine code consists of setting up these registers with appropriate values and then calling a subroutine – also in machine code.

Calling a subroutine means pointing the 6502 at the memory location the subroutine code is stored at – again specified by a number, this time in the range 0 to 65535 – and telling it to go to it. In 6502 we tell it where to go with a JSR – Jump to SubRoutine.

This is all that the *FX calls do: They load the registers with various values and then call a machine code subroutine that Acorn guarantees starts at &FFF4. Incidentally, we tend to use hexadecimal numbers – 0 to F instead of 0 to 9 – for describing OS routines. Once you get used to them they're far more meaningful and memorable: For instance, the decimal equivalent of &FFF4 is 65524.

The first number or parameter after the *FX goes in the A register. So – via the Basic interpreter – our *FX0 boils down to:

```
Load the A register with zero
and jump to the subroutine
at &FFF4.
```

The routine at &FFF4 is given a special name – the *osbyte* routine. Once there, the code decides what to do next depending on the value in A. Since A can have values 0 to 255 (try *FX256) Acorn have the option of 256 different categories of *osbyte* or *FX calls – not that they've used them all.

However, *FX calls can "pass parameters" to the X and Y registers as well. You simply give three numbers following the *FX separated by commas. The first number goes into A, the second into X and the third into Y. They all have to be integers between 0 and 255, though.

For instance, if you try *FX0,0,0 you'll get zeros in X and Y as well as A. Try it. As you'll see these extra parameter values have no effect on *FX0. If you don't specify X or Y in a *FX call they're assumed to be zero.

However, if you enter:

```
*FX0,1,0
```

something new happens: No message. But there's more to it than that as you can see in the

FX calls can be made to do much more than the average programmer uses them for with just a little extra effort

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◀ From Page 107

accompanying panel.

To show how these extra parameters affect things we can experiment with *FX11. This determines how long you have to wait before the key you're pressing starts to auto-repeat. The X parameter sets the delay in hundredths of a second – centi-seconds. It's normally at 32 so you wait about a third of a second for the key to start stuttering.

Try the effects of the following – and remember Break will restore you to normal:

```
*FX11,64
*FX11,128
*FX11,255
*FX11,1
*FX11,0
```

Can you explain the effects of the last? It is rational when you think about it.

Notice that, since it isn't supplied, Y is zero by default. Actually Y is ignored totally in this call, as:

```
*FX11,0,200
```

will show.

Ok, we've used A and X parameters so let's try Y. Perhaps the most entertaining example of this uses the keyboard buffer, so we'd better explain what that is. A buffer is just an area of memory that the micro uses to store input – or output – data while its main concern is elsewhere.

For instance, while your program's running, the micro's OS is continually looking at the keyboard to see what you're pressing even though you aren't specifically requesting an INPUT. It does this so that it doesn't miss what's going on and it stores the characters you've typed into the keyboard buffer to be dealt with when it gets time.

The following program shows the idea. When you get the prompt type a few letters in while the delay loop holds things up. You won't see the letters while the program's running.

```
10 REM Keyboard buffer
20 PRINT "Type some letters now"
30 TIME=0:REPEAT UNTIL TIME>500
40 PRINT CHR$(7);"Stop"
50 TIME=0:REPEAT UNTIL TIME>500
60 REM *FX21,0
```

When it ends though, the OS gets round to looking at the keyboard buffer to see what's been happening in the meantime. On finding some letters in there – and the program finished – it prints them out for you, as it would any other text you enter at the prompt.

This idea of buffers isn't just restricted to the keyboard – there are buffers for the RS423 and the sound channels. Sometimes having a buffer with indeterminate contents can be rather messy, so Acorn lets you flush them with *FX21, followed by the number of the buffer. For the keyboard buffer you need 0. Remove the REM from line 60 of the above program so that it now reads:

```
60 *FX21,0
```

This time when you run it you won't get any letters

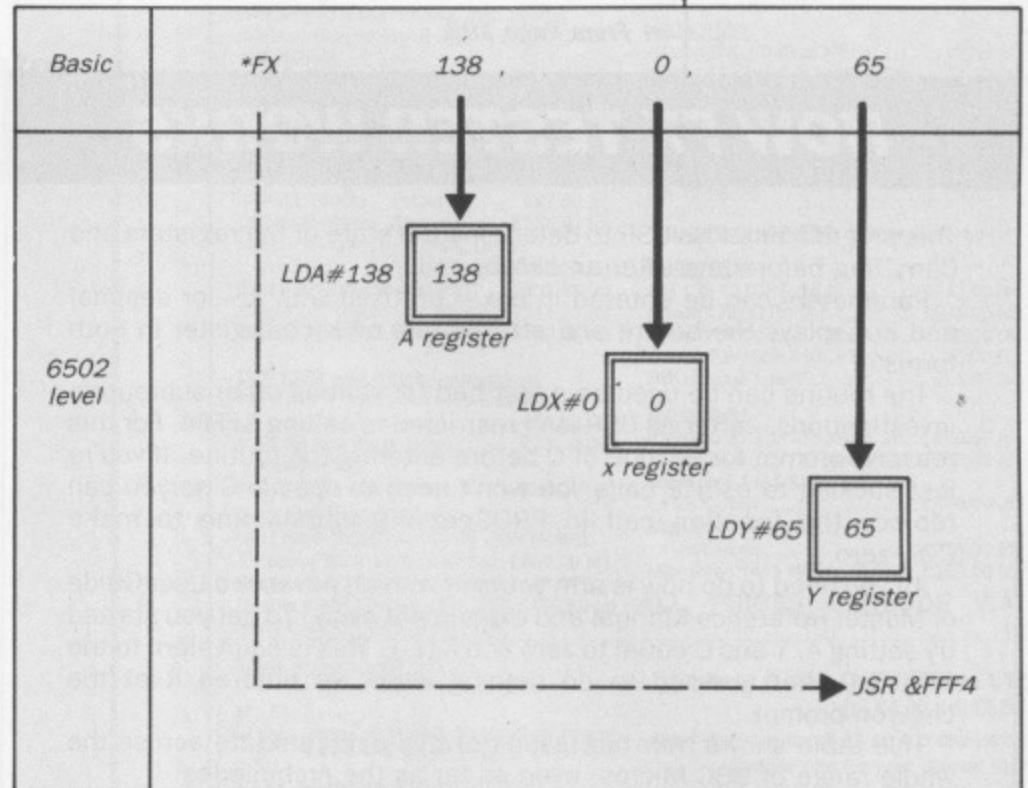


Figure 1: From *FX to assembly language

printed from the buffer at the end – it's been flushed out already.

There's a *FX call that can actually insert a character into a buffer: *FX138. You follow it with two parameters – the X containing the buffer number and the Y holding the Ascii code of the character you want. So to put the character A (Ascii code 65) into the keyboard buffer (buffer 0) we'd use:

```
*FX138,0,65
```

Try it. You'll find that the A appears at the prompt, just as if we'd typed it in. Now try the following mini-program:

```
10 *FX138,0,65
20 *FX138,0,13
```

It puts A followed by a Return into the buffer. When the program ends the effect is to type A followed by Return. This sends the command A to Basic, but A on its own is meaningless, so we get the message *Mistake*.

However, what we put in the buffer for post-program use may be meaningful. Can you work out what the following does, before you run it?

```
10 *FX138,0,42
20 *FX138,0,46
30 *FX138,0,13
```

You can use this technique for some neat tricks. The following example is a program that reincarnates itself after each run. Note the use of B% as a monitor – a resident integer variable that

Turn to Page 110 ▶

SAVE \$\$\$'s SAVE \$\$\$'s SAVE \$\$\$'s SAVE \$\$\$'s SAVE \$\$\$'s SAVE \$\$\$'s

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HOW FX TESTER WORKS

This program employs USR to determine the state of the registers and Carry flag before and after an *osbyte* call.

Parameters can be entered in hex – prefixed with & – or decimal and it displays the before and after states of each register in both forms.

The routine can be used as a test-bed for various other subroutine investigations – after all USR isn't restricted to calling &FFF4. For this reason I prompt for a value of C before entering the routine. If you're just sticking to *osbyte* calls you won't need to specify C so you can replace the function call in PROCget-reg with a line to make C%=zero.

All you need to do now is arm yourself with an Advanced User Guide or Master Reference Manual and experiment away. To get you started try setting A, Y and C equal to zero and X to 1. This is equivalent to the *FX0,1,0 that seemed to do nothing when we entered it at the chevron prompt.

This table shows how the results of this call correlate across the whole range of BBC Micros, even as far as the Archimedes:

Micro	*FX0 result	Osbyte result with A%=0, X%=1 and Y%=0
Model B	OS1.2	1
Model B+	OS2.0	2
Master	OS3.2	3
Compact	OS5.10	5
Archimedes	Arthur 1.2	6

```

10 REM *FX Tester
20 REM by Mike Bibby
30 REM (c) The Micro User
40 MODE 6:PROCinitialise
50 REPEAT CLS:PROCget_reg
60 PRINT "Before osbyte call:"
70 PROCshow_params(reg_string%)
80 PRINT "Equivalent of *FX";A%";";
XX";";Y%
90 result%=USR(osbyte%)
100 PRINT "After osbyte call:"
110 PROCshow_params(result%)
120 PRINT "Press a key to continue";
130 REPEAT UNTIL NOT GET
140 UNTIL FALSE:END
150 DEF PROCinitialise
160 VDU 19,0,4;0;19,1,3;0;
170 VDU 23,1,0;0;0;0;
180 VDU 28,6,24,39,0
190 osbyte%=&FFF4
200 blank$=STRING$(10," ")
210 back$=STRING$(10,CHR$(8))
220 back_up$=CHR$(13)+CHR$(11)
230 @%=5:ENDPROC
240 DEF PROCget_reg:PRINT
250 A%=FNget_reg("A%",255)
260 X%=FNget_reg("X%",255)
270 Y%=FNget_reg("Y%",255)
280 C%=FNget_reg("C%",1)
290 reg_string%=C%*&1000000+Y%*&10000+
XX*&100+A%
300 ENDPROC
310 DEF FNget_reg(reg$,u_limit%)
320 prompt$="Input register "+reg$+bla
nk$+back$
330 finish%=FALSE
340 REPEAT
350 PRINT prompt$;:INPUT regval$
360 IF regval$="" regval%=-1 ELSE regv
al%=EVALregval$
370 IF regval%>=0 AND regval%<=u_limit
% finish%=TRUE
380 IF NOT finish% PRINT back_up$;
390 UNTIL finish%=regval%
400 DEF PROCshow_params(r%)
410 A%=(r%AND&FF)
420 X%=(r%AND&FF00)DIV&100
430 Y%=(r%AND&FF0000)DIV&10000
440 C%=(r%AND&1000000)DIV&1000000
450 PRINTTAB(17)"dec hex"
460 PRINT"A register is ",A%,"A%
470 PRINT"X register is ",X%,"X%
480 PRINT"Y register is ",Y%,"Y%
490 PRINTSPC4"C flag is ",C%,"C%
500 ENDPROC

```

is not cleared to zero when a program is RUN.

```

10 REM *FX138 Example
20 PRINT B%
30 B%=B%+1
40 REM "R"
50 *FX138,0,82
60 REM "U"
70 *FX138,0,85
80 REM "N"
90 *FX138,0,78
100 REM Return
110 *FX138,0,13

```

So far we've used the *FX calls in our programs to get at the *osbyte* routines. However, we don't have to use *FX calls. As the A,X and Y registers are so important in machine code, there's a way of calling machine code subroutines from Basic that determines their values – the USR function.

USR sets A,X and Y to the values of resident integer variables A%, X% and Y% before calling the subroutine specified at the address in its brackets. The following program boils down to *FX138,0,7 (or VDU 7) when you run it:

```

10 REM Using USR
20 A%=138
30 X%=0
40 Y%=7
50 dummy%=USR(&FFF4)

```

Note the use of *dummy%*: USR is a function and returns a value. But in this case we're not interested in the returned value so we just put it in *dummy*.

However, there are times when we're very concerned with what USR(&FFF4) returns. You see, there are lots of *osbyte* calls that send information back in terms of the X and Y registers. USR is designed so that we can extract their values from its result.

*FX Tester, listed in the accompanying panel, employs USR to call any *osbyte* routine, showing the state of the registers before and after.

As we'll see next month, using the *osbyte* calls to read and write information about the operating system – as opposed to using *FX calls, which can only write – allows us to gain real control of our BBC Micro.

In the meantime why not type Tester in, and try out a few of your favourite *FX calls? And if that doesn't keep you busy enough, how about working out why they're called *FX calls?

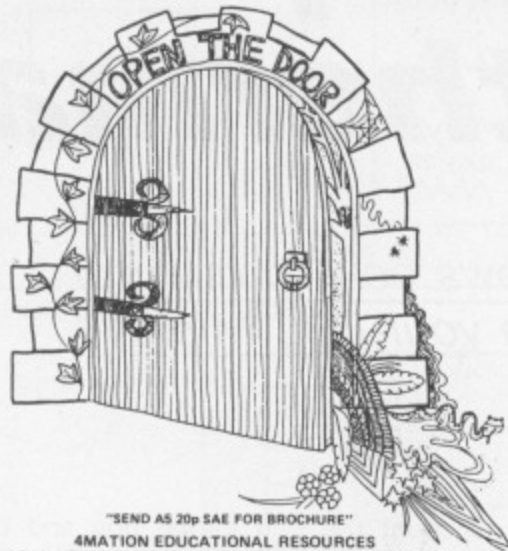
10 = 00	180 = 45FB B	350 = B598 9
20 = 00	190 = F57E 9	360 = 313D 7
30 = 00	200 = 1E9 1	370 = 963E 1
40 = 7A17 7	210 = 6C32 A	380 = 2102 2
50 = 77A3 1	220 = 3122 1	390 = C570 0
60 = AA36 0	230 = 7098 B	400 = 372D 7
70 = 6030 0	240 = C3D9 8	410 = B5C2 8
80 = 069 3	250 = 37BB 0	420 = 540D 9
90 = 28FA 2	260 = C74B 0	430 = 2804 5
100 = 5CF6 E	270 = 556E 6	440 = CF2D C
110 = DF86 1	280 = 898D F	450 = 8F22 8
120 = 72BA 1	290 = E8E0 6	460 = 1CC6 4
130 = 6101 1	300 = ED0F E	470 = 7976 5
140 = DADE 0	310 = 5A9A 5	480 = 623F 3
150 = EC42 5	320 = 5F53 6	490 = B38 F
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170 = 4515 1	340 = BFBA 7	

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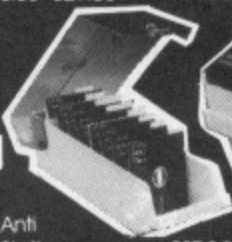
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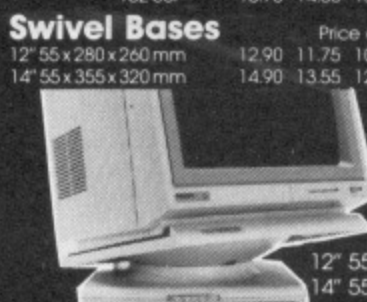
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Telling tips for a weatherman

Mike Cook shows how to monitor rainfall with your BBC Micro

Let's look at better ways of collecting the information

In the May 1988 Body Building we saw how to construct a tipping rain gauge. This month let's look at better ways of collecting the information from the equipment, which used the signal from the tips to trigger a background task which counted the accumulating rainfall.

The problem is that we have to have the micro switched on all the time if we are not going to miss any rain. True, it can be doing some other task, but nevertheless it has to be on all the time.

This will not harm the micro. The worst that can happen is that you might get some burn-in pattern on the monitor – although that needn't be switched on all the time. However, it would be a lot better if we could have some sort of arrangement whereby the micro could periodically interrogate the gauge to get a tip number reading.

There are many ways to do this but, unless we're monitoring a leaky roof, we want the gauge situated some way from the micro.

There is another restriction to bear in mind as well. As this is not the first weather project I have covered, it would be best if it didn't connect to the micro at the same place as some other sensor. This tends to limit our options to either the serial or analogue input port. Let's look at these alternatives and see which is the best solution.

First, whatever method we choose, we will need

to count the rain gauge tips and the counter circuitry will have to be active all the time, so will have to be powered by battery. We can do this with a CMOS counter – I choose CMOS because of its very low current requirement and the fact it can work happily from 4.5 to 12 volts so there is no need for a regulated supply. In fact, the light source in the optical switch will consume the lion's share of the current.

Having counted the tips we have to send the reading to the micro. We could use a UART – Universal Asynchronous Receive Transmitter – to send it in serial form so it could be read by the RS432 port. However, it is not necessary to continually send the count. We could command it to be sent by sending a special code to the receive part of the UART. This would then trigger the transmit signal to return our value. The block diagram of this system is shown in Figure 1.

At first sight this looks an attractive proposition, but it does involve a lot of extra hardware. You will see from the diagram that we need to have + and -5 volts in order to make the appropriate RS432 signals. We also need an oscillator determining the serial baud rate, and this would have to be a crystal device as an RC type would not be stable enough. Finally, using the serial port would mean moving some software from other weather projects, as most of the machine code I write sits in the serial input buffer at page &A00.

So let's look at another solution. Suppose we feed the counter into a digital to analogue converter. The number of tips could then be read by the analogue input port – Figure 2 shows the simplest possible arrangement. The counter is fed into four resistors forming a D/A converter allowing the gauge to gather 16 tips between each interrogation without losing anything. Depending on the size of gauge, this might be all that's needed.

However, to be absolutely sure of not missing a drop, the arrangement in Figure 3 is perhaps more practical: It uses two counters giving a maximum of 256 tips stored between readings. This is fed into a commercial D/A converter and, as the digits are coming from a counter, we can use a cheaper latchless type as shown. However,

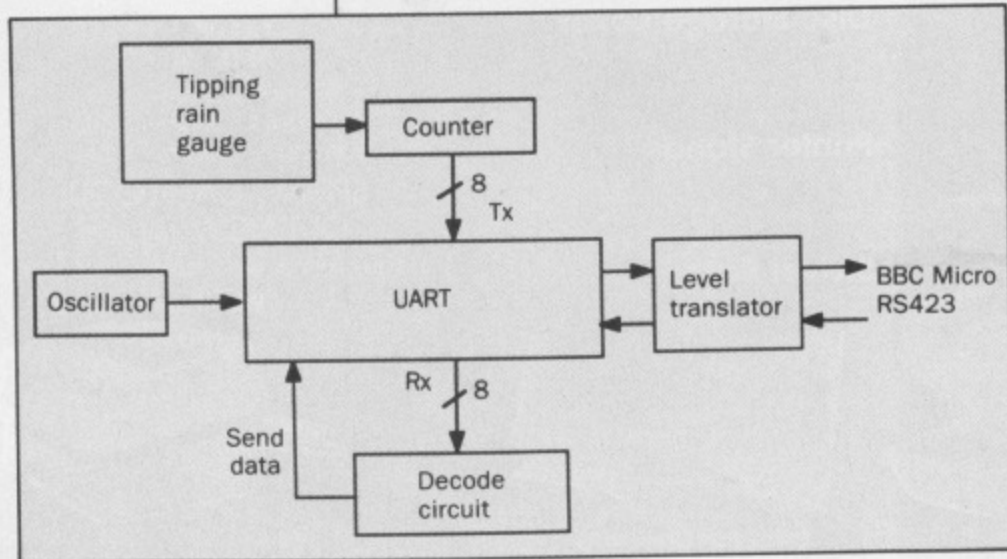


Figure 1: Serial data reader

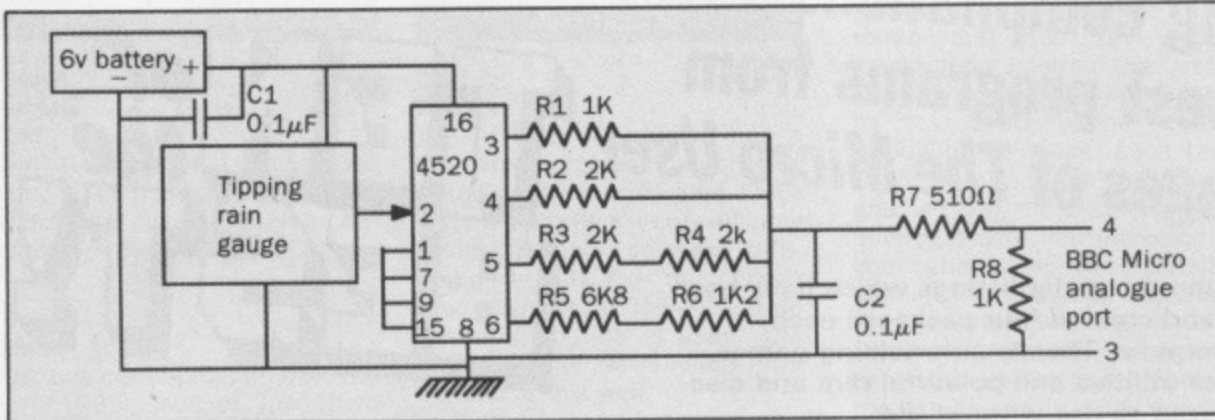


Figure II: Simple D/A counter

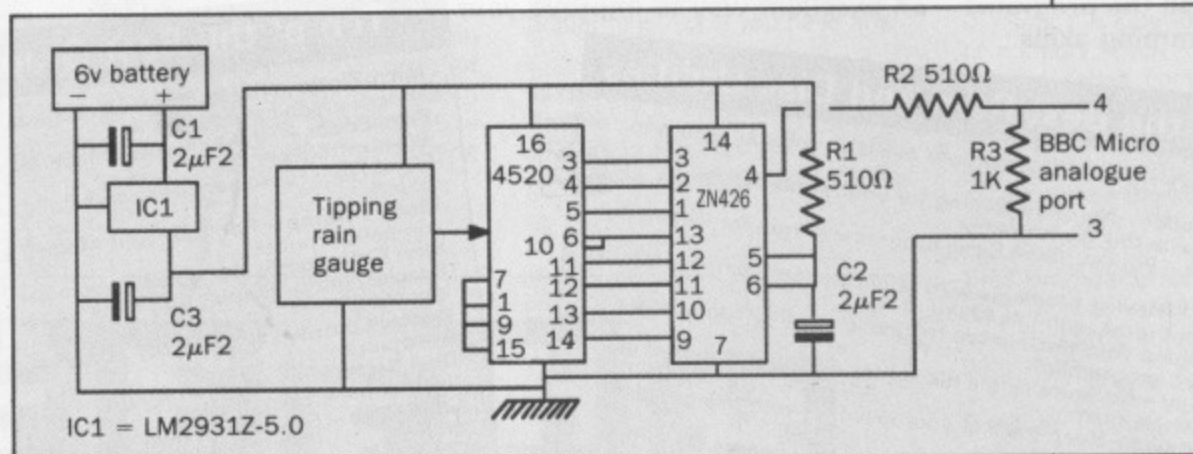


Figure III: D/A Tip counter reader

almost any sort of 8 bit converter could be used.

All the components required to make this circuit are provided in Body Build pack No. 48 which also includes a small printed circuit board and the 15 way D-type connector to attach to the analogue input port.

The port would be read with a statement like the following:

```
TX=ADVAL(4) DIV 64
```

This would give a nominal 10 bit reading and, using a look up table, we can find the number of tips. We could have divided the maximum by 256 to work out the voltage reading given by each tip, but this is not accurate. We need to note the readings for each and then use these calibration values in the program to test which comes closest to the measurements from the gauge when it is in action.

The only problem with this circuit is that if the lead between it and the micro is too long it can suffer from interference pickup or voltage loss in the line. The way round this would be to convert the voltage into a frequency, send this along the line and finally convert it into a voltage again to be read by the analogue input port. This has the disadvantage of being more expensive, but it can be AC coupled into the micro, giving it that little bit of extra protection.

You can buy high precision voltage-to-frequency and frequency-to-voltage chips, but most work over a far wider range than we require and also most can be used for both operations by configuring them differently. Here is an

opportunity for you to experiment with your own solutions. I know that lots of people in education use these articles for projects, and this should make an excellent one.

● Next month we can come out of the rain and warm ourselves by the heat of our own micro.

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We've brought together the most popular listings which have been published over the last year and created four packages each devoted to a particular subject area. There's entertaining games, handy utilities, clever graphics utilities and powerful ram and disc utilities - all ready for you to put to use without the need for any typing in! You can also list and adapt nearly all the programs - an excellent way to improve your programming skills.

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- Ram Arrays** - Extend the memory available for your arrays in Basic.
- Printer Buffer** - No more waiting for your printer to finish printing with this great utility.
- Prommer** - Put your own Basic programs in rom for instant access.
- Disabler** - Having problems with duplicate rom commands? Cancel out roms with this utility.
- MOT** - Keep your discs in top magnetic condition and rescue corrupted programs.
- Disc Copy** - No more single file copies - this utility makes use of the whole memory.
- Disc Catalog** - Keep track of your disc files with this excellent cataloguing program.
- Disc Protect** - Professional disc protection is yours using this excellent utility.
- Dual Catalog** - Get 56 files on one disc surface with this utility.
- Safe Save** - Prevent overwriting a backup file with this clever checking routine.

Disc price: £4.95

Buy all four discs for **£17.80** and save **£2!**

Ten of the Best Graphics Utilities

- MicroWorks** - Create impressive Mode 4 screens with this superb graphics program.
- Pixel Editor** - Fine-tune screen pictures in any mode with this excellent editor.
- Flood Fill** - Fill screen areas with solid colour at remarkable speed.
- Mode 7 Dump** - Print out your Mode 7 screens onto any Epson-compatible printer.
- Slim Characters** - Get 40 characters per line in Modes 2 and 5.
- Special Fonts** - Display 192 fonts on screen with this easy-to-use utility.
- Printer Control** - Modify your printer styles easily from your wordprocessor.
- Dual Screens** - Give your programs the professional look with this double-screen display.
- Characters** - Create your own character sets with this useful utility.
- Charprint** - Use this clever routine to print your own character sets to Epson printers.

Disc price: £4.95

Ten of the Best Games

- Dino** - Ride the gobblosaurus past all the perils in this magnificent fast-action game.
- Hunkie Egg** - Clamber up the ladders and run along the levels to gather up the eggs.
- Diamond Quest** - Collect all the diamonds in this superb arcade adventure.
- Stellar Rescue** - Defeat the powerful gravity to land your spacecraft in one piece.
- Fruit Machine** - Test your skill and luck on the one-armed bandit with this addictive simulation.
- Karate Warrior** - Delve into the mysteries of the martial arts as you aim to get a black belt.
- Maltese Cross** - Try your hand against the computer in this classic domino game.
- Othello** - Entertain yourself for hours with this very popular oriental board game on your micro.
- Witch Hunt** - Help Olive search the maze to find the 42 keys of Transportal.
- Soccer Manager** - Take on the soccer club's top job in this gripping game of skill.

Disc price: £4.95

(Also available on tape for only £3.95)

Ten of the Best Utilities

- Text Compressor** - Use this excellent utility to reduce the space held by your strings.
- Variable Compressor** - Reduce the size of your variables automatically to save space and improve speed.
- Line Compressor** - Save space in your programs by creating multi-statement lines.
- BOS Editor** - Make editing your Basic program easy with this on-screen editor.
- Basdat** - Convert disc files into Basic data statements and add the resultant lines automatically.
- Basic Repairer** - Rescue your programs after the Bad program error with this useful little utility.
- Line Editor** - Use a single-line word processor in your INPUT statements without changing your programs.
- Circles** - Use this fast and powerful routine to quickly draw filled and unfilled circles.
- Events** - Make your programs respond to real-time events with interrupt-driven Basic routines.
- Stripper** - Remove the line numbers from your Basic programs to allow editing within a word processor.

Disc price: £4.95

PLUS

Every package comes with an easy-to-use machine code version of the Get It Right checksum to enable you to check listings you've typed in.

At only **£4.95** each the Ten of the Best compilations represent superb value for money. But you can obtain all four for **£17.80** and save **£2!**

Don't delay - turn to the order form on page 159 to take advantage of this excellent offer.

June 3 to 9

**Combat
Combat2
CZinf**

Combat Zone 1 is a fantasy war game for two to four players. Each controls his own armies in a race to capture the Stormlands.

Dither

With this clever program from the April 1985 issue of *The Micro User* you can interweave pixels to create 27 unique shades of colour.

Keyword

There is so much useful information on Ceefax that it is

June 10 to 16

**DatPtch
DatSrc**

The ATS *DATE routine has a temporary problem in correctly decoding the current date. Once installed, DatPtch – only required for the duration of these difficulties – will give the correct result whenever the ATS date decoding routine is used. The patch will not be required after the end of this year.

**MultiS
Multi-5**

A suite of programs forming an accurate and detailed study of wheels within wheels – the path of a point on a wheel that is rotating inside another turning one.

portfolio of shares with this routine that keeps your investments under control. The Ceefax City Service gives regular updates to its share price pages throughout the day. Each time Folio is run, these pages are grabbed from the broadcasts and interrogated to find the value of your shares at that precise moment. Although it has been written in the form of a game – for those not fortunate enough to have stock market investments – the routine can be relied upon to give accurate, true and up-to-date reports on the state of your actual holdings if you have any.

**TTXprnt
PrntSrc**

TTXprnt is a utility for use with the ATS. Once it's loaded any teletext

patience and very careful thought.

X-15

A superb arcade spectacular featuring sideways-scrolling and hazards like landscapes and alien ships. The game was first published in the April 1985 issue of *The Micro User*.

June 24 to 30

T/SWR00

The start of a repeat of the much acclaimed series explaining the programming techniques involved in using the sideways ram areas of memory. Each module in the 26-part series comprises a text file and a Basic assembler routine as an example of the points raised in the text. The series covers everything you ever wanted to know to enable you to use sideways ram to the full. This first module briefly describes each of the remaining 25 parts and the programs that accompany them.

Forex

Holidaying abroad? Before you go, find out how much foreign currency you will get for your money. Forex will convert between sterling and any of the major foreign currencies. The program automatically uses the current exchange rate from the appropriate Ceefax page to ensure the calculations are accurate no matter when you use the routine. On your return, the same routine will allow you to calculate the value of any remaining foreign currency – assuming you actually manage to bring some back!

**Colour1
Colour2**

Use your Epson FX black and white printer to give you a full colour dump of any screen image! Impossible? Armed with a few different coloured ribbons – readily available – Colour1 will produce superb and stunning full-colour images of your screen displays. Why spend a fortune on colour printers when these programs will produce the same result?

**T/Hang
P/Hang**

Help the family learn to spell with this BBC Micro implementation of the classic game of Hangman.

Rescue

Can you land in hidden cities and replenish their supplies in Stellar Rescue – a classic game from the May 1985 issue of *The Micro User*.

CEEFAX

Guide

B B+ M

Software is currently transmitted for a period of one week. The teachers' notes for the TV series Issues are transmitted from Wednesday to the following Tuesday and all other files are updated on Fridays. There will be periods during the update day when the files are unavailable. The program details given are provisional.

sometimes difficult to find exactly the item you are looking for. Keyword gives you the ability to search the entire Ceefax output for any word or phrase you give it. Enter your chosen reference then sit back. Every Ceefax page containing your chosen keyword will be saved in memory and can be viewed when convenient. The routine will work with any teletext channel, but requires an Acorn teletext adapter. You'll no longer need to consult the teletext index.

**ETFS
Manual**

Use teletext across an Econet network. This Econet Teletext File Server software makes the broadcast teletext services available to any station on the network. A single adapter can now be used to serve the entire system.

**Cur/M
Cur/T
Cur/B**

Many people find the unalterable flash rate of the cursor can cause problems like headaches while they're using word processors. This utility slows the flash rate and reduces the risk of these, making the use of such software far more manageable.

Castle

Can you demolish your opponent's castle in this enthralling battle of the catapults from the March 1985 issue of *The Micro User*.

June 17 to 23

**Folio
F/Info**

Keep track of your personal

page displayed on the screen can be printed. The routine is compatible with almost all makes of printer.

News

Print out your own newspaper. Ceefax carries the most up to date news stories available and you can be hours ahead of your daily paper by using this News program. All the current stories from Ceefax are sent to your printer in a neat and readable fashion within a few minutes. Run the program, and while you have your cup of tea your paper will be prepared and delivered – and there's no newspaper bills to pay.

**Switch
Switch2**

A game to stimulate the brain. Although the principle of switch is simple enough, to solve the puzzle will take ingenuity,

TECHNOMATIC

ARCHIMEDES, BBC COMPUTERS & ECONET REFERRAL CENTRE

17 Burnley Road, London NW10 1ED Tel: 01-208 1177 Fax: 01-452 1500

305 Edgware Road, London W2 Tel: 01-723 0233 Telex: 922800

ARCHIMEDES

300 & 400 SERIES

Archimedes 305 Basic	£699(a)
Archimedes 310 Basic	£775(a)
Archimedes 310M Basic	£835(a)
Archimedes 410 Basic	£1,399(a)
Archimedes 440 Basic	£2,299(a)
Monochrome Monitor*	£50(a)
PC Emulator Software (when purchased with computer)	£60(d)
Colour Monitor*	£195(a)

*Monitor prices applicable only when purchased with the micro.

ADD-ONS

0.5Mb Ram upgrade kit (for 305)	£89(c)
2nd Floppy drive (for 305, 310 & 410)	£125(b)
Econet Module	£43(c)
Backplane for 2 podules	£39(b)
I/O Podule	£79(b)
20Mb Hard Disc + Podule	£499(a)
Acorn Rom podule	£59(c)
CC Rom Podule	£49(d)
Acorn Midi I/O card	£29(c)
IEEE Interface Podule	£283(b)

Full implementation of IEEE std 488 1978 & supp. IEEE std 488A 1980. Full specification on request.

SERIAL LINKS

Arc. to BBC Serial Link (Software for both Arc & BBC)	£25(c)
Arc. to PC/XT (Software for both Arc & PC)	£29(c)
Arc External Drive Adaptor	£32(d)

BOOKS: (no VAT)

Arc. Ref Manual	£29(b)
ARM Assy Lang Prog	£12(d)

SOFTWARE:

PC Emulator	£99(d)
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LANGUAGES:

ANSIC	£95(c)	ISO PASCAL	£95(c)
Prolog X	£199(b)	FORTRAN77	£95(c)
LISP	£199(b)	COMAL	POA

PROGRAMMERS TOOLS:

TWIN Editor	£29(d)
Toolkit Plus Module	£41(d)
Software Dev T/Box	POA
Software Dev Debug T/box	POA

WORDPROCESSORS

First Word	£POA
Graphics Writer	£29(d)
View SKM31 (e)	£49(d)
InterWord (e)	£39(d)
Pipe Dream	£99(c)

DATABASES

Deltabase	£26(d)
Systems DeltaPlus	£60(d)
Alphabase	£41(d)
Viewstore SKM27 (e)	£52(d)

SPREADSHEET

Viewsheet SKM07 (e)	£52(d)
Intersheet (e)	£39(d)
Logistix	£95(c)

(incl Spreadsheet, timesheet, d/base & Graphics)

Matrix 3D Spreadsheet 19k col x 10k row x 100 pages	£159(c)
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GRAPHICS & ART

AutoSketch (ARC)	£79(d)
Gammplot	£30(d)
System Gammplus	£60(c)
Artisan	£32(d)
Artisan Support Disc	£17(d)
Interchart (e)	£25(d)
Clares Buffer Module	£17(d)

Special Offer

FREE £115 inc vat VOUCHER

with every Archimedes model 310, 410 and 440 purchased from us.

This voucher can be redeemed against any future purchase made from us. Additionally we will offer discounts upto 10% on Archimedes software and upto 5% on Archimedes hardware stocked by us to all purchasers of Archimedes computers.

This is a limited period offer so do not miss your opportunity for a bargain not to be repeated.

ACCOUNTING SOFTWARE

Minerva's suite 5 Modules (ea)	£54(d)
Order Processing, SalesLedger, StockManager, Purchase Ledger & Nominal Ledger	

GAMES:

ZARCH	£17(d)
Minotaur	£11(d)

Software packages marked with (e) run under 6502 emulated mode.
Please check on availability of some of the above packages

FILE STORE

Acorn's new file server system	
Filestore E01	£825(a)
Filestore E02	£699(a)
Full details on request	

ECONET ACCESSORIES

Econet Starter Kit	£85(b)	Econet Bridge	£174(b)
Econet Socket Set	£29(c)	Printer Server Rom	£41(d)
File Server Level II	£75(b)	10 Station Lead Set	£26(d)
Master FS Utility Disc	£17.25(d)		

ECOLINK

Ecolink allows you to connect a PC/XT or AT to an econet network. Supplied complete with comprehensive manual, software and cable.
Full spec on request £299(b)

To be launched soon TechnoCad

The CAD system for the Master
This unique CAD system offers a host of innovative features for producing complex drawings, sketches etc.
FREE evaluation discs will be supplied by any educational establishment on request. A handling charge of £3 will be made to private and commercial users.
WATCH THIS SPACE FOR MORE DETAILS

MASTER SERIES

AMB15 Master 128K £356(a)
Includes free Educational/Fun software bundle from BBC Publications range (RRP £40) and a STARdataBASE package worth another £40.

AMC06 Turbo 65C102 Module	£95(b)
ADC08 512 processor	£185(b)

includes MS-DOS and GEM Suite

ADF10 Econet Module	£40(c)	Acorn Rom Cartridge	£134
ADJ22 Ref Manual I	£14(c)	ADJ23 Ref Manual II	£14(c)
View User Guide	£8.50(d)	V/sheet User Guide	£8.50(d)
TRC2 2ROM		TRC4 4ROM Cartridge	£110
Cartridge	£7.50(d)	Master Dust Cover	£4.75(d)
TRC32 32K RAM Cart.	£29(d)		

Acorn 32016 Co Processor	£949(a)
Acorn X25 Gateway	£2175(a)
Acorn IEEE Interface (for B, B+ Master)	£265(b)
Universal CoProc Adapter	£69(b)

Send for detailed list of DOS software for 512

MASTER COMPACT

All Compact systems come complete with 128K of RAM, 640K 3.5" double sided drive and educational software. Additionally we include our Education/Fun software bundle to the package.

SYSTEM 1 Entry system	£310(a)
SYSTEM 2 with 12" Hi Res Mono Monitor	£365 (2xa)
SYSTEM 3 with 14" Med Res Col Monitor	£475 (2xa)
Compact 2nd Drive Kit	£95(c)
Serial Kit	£25(d)
TV Modulator	£26(c)
Mertec Adapter	£35(c)
(upgrades Compact to almost Master level)	
External Drive adapter Cable	£9(d)

UPGRADE KITS

1.20S ROM	£15(d)	ADFS ROM	£26(d)
DNFS ROM	£19(d)	1770 DFS Kit	£43.50(d)
BASIC II ROM	£22.50(d)	Econet Kit	£55(d)

EPROMS/RAMS

2764-25		All prices on application
27128-25 (12.5V Vpp)		
27128-25 (21.0V Vpp)		
6264LP-15		
27256		
27512		

SANYO CRT 70

14" Hi Resolution RGB Monitor
includes lead for BBC

£209

RRP £429 12 months Warranty

CANON PW1080 Printer

includes lead for BBC

£199(a)

12 months Warranty

RAM/ROM EXPANSION

ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2*8K RAMS	£37(c)
ATPL Battery backup kit	£18(d)
ATPL Board for BBC+	£31(c)

TECHNOMATIC

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

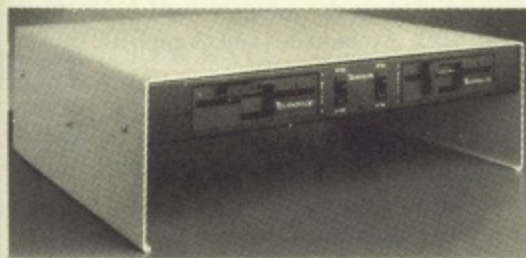
TECHNOMATIC DISC DRIVES



TS 400

A range of high quality high performance drives to meet the needs of all BBC Micro Users.

- All drives fitted with high quality, slim line Mitsubishi drive mechanism and necessary cables.
- *All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times. Our confidence in their quality enables us to offer a **two year parts and labour warranty** on these mechanisms without any extra charge.
- *5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.
- *The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.
- *All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.
- *TECHNOMATIC drives stand out from other drives because of the high quality of construction and use of reliable switchmode power supply units on dual drives.



PD 800P

5.25" Single Drives 40/80 switchable:

TS400 400K/640K £90(b)

PS400 400K/640K with integral mains power supply £104(b)

5.25" Dual Drives 40/80 switchable: TD800 800K/1280K £170(a)

PD800 800K/1280K with integral mains power supply £190(a)

PD800P 800K/1280K with integral mains power supply and monitor stand £209(a)

3.5" 80T DS Drives: TS351 single 400K/640K £67(b)

PS351 single 400K/640K with integral mains power supply £85(b)

TD352 Dual 800K/1280K £126(b)

PD352 Dual 800K/1280K with integral mains power supply £149(b)

Combo Drives (5.25" & 3.5" drives) PD853 with integral psu £165(a)
PD853P with integral psu £179(a)

DISC DRIVE MULTIPLEXER see page 5 of this ad for details

For Master, B, B+ and any DFS/ADFS £65(b)

TDM2 Two computers/one drive unit £115(b)

TDM4 Four computers/one drive unit £115(b)

TECHNOMATIC WINCHESTERS

Technomatic offer the most popular range of Winchester drives for BBC micro systems at competitive prices. The drives are fully compatible with Acorn ADFS system. Fan cooled switch mode power supply ensure efficient and reliable operation. Combination of floppy and winchester drives in our elegant plinth housing provides an ideal solution for need to have large storage and ease of transferring data to floppies.

Technomatic front end utility for the Master supplied with the winchesters at no extra cost provides an easy and efficient file management system. The entire contents of the drive are displayed on the screen on boot up, each file or directory appearing as an icon. The icon type indicates whether directory or file and type of data if latter.

Larger capacity drives available on request.

P20HD TECHNOMATIC 20 Mbyte Winchester Drive £429(a)

P30HD 30Mb Winchester Drive £449(a)

P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM £749(a)

P204HP TECHNOMATIC 20 Mbyte Winchester and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom. £609(a)

P2041HT As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom. £1179(a)

TS10 10 Mbyte Tape Streamer Backup unit with utilities. £599(a)

TFC10 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10. £19(d)

Technomatic Winchesters can be adapted to operate with the SJ Research FileServer by internal modification. However this must be specified at the time of ordering otherwise the drive has to be returned to us for modification.

Adaptor for SJ FileServer £28

WINCHESTER Drive Multiplexer These units let you share a Winchester drive between a number of computers. Full details on request.

TWM2 for two computers. £99 (b)

TWM4 for four Computers. £149 (b)

BULK DISCS

50 5.25" 40 T single sided discs with sleeves in lockable box. £25(b)

50 5.25" 80 T double sided discs with sleeves in lockable box. £32(b)

50 3.5" 80T double sided discs with sleeves in lockable box. £60(b)

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25" Kit with 20 disposable discs £14.00(d)
3.5" Kit with 20 disposable discs £14.75(d)

DISC STORAGE BOXES

DB340 Lockable 40 x 3.5" £8.50(c)

DB550 Lockable 50 x 5.25" £6.50(c)

DB570 Lockable 70 x 5.25" £8.50(c)

DB5100 Lockable 100 x 5.25" £10.50(c)

3M FLOPPY DISCS

5.25" Discs in packs of 10
744 40T SS DD £8.00(d)
745 40T DS DD £9.75(d)
746 80T SS DD £12.00(d)
747 80T DS DD £12.75(d)

3.5" Discs in packs of 10
80T SS DD £13.50(d)
80T DS DD £15.00(d)

(Add £1 for library case packing)



FREE Leatherbound Personal Organiser
with every 50 3M discs

TECHNOMATIC

305 Edgware Road, London W2 Tel: 01-723 0233

PRINTERS

EPSON FX800	£309(a)	EPSON FX1000	£419(a)
EPSON EX800	£395(a)	EPSON EX1000	£539(a)
EPSON LQ1050	£529(a)		
EPSON GQ3500 Laser Printer	£1290(a)		
TAXAN KP815	£179(a)	TAXAN KP915	£350(a)
NATIONAL PANASONIC KXP1081	£149(a)		
NATIONAL PANASONIC KXP1082*	£175(a)		
STAR LC10	£185(a)		
STAR LC10 Colour	£249(a)		
INTEGREX Multicolour Inkjet printer	£519(a)		
BROTHER HR20	£349(a)		
NAT PANASONIC KX P3131	£249(a)		
includes massive buffer of 38K			
JUKI 6100 Daisy wheel printer	£295(a)		
BBC/Master Parallel Lead (1.2m)	£5(d)		
BBC/Master Parallel Lead (2m)	£7(d)		
Compact Parallel Printer Lead (1.2m)	£9(d)		
Archimedes Parallel Printer Lead (2m)	£9(d)		
* Price includes Free Master printer lead and WYSIWYG + ROM			

EPSON LX800

Epson's latest budget printer offers a host of new features all utilising Epson's unrivalled knowhow of printer technology and reliability.

- ★ 180 cps draft/25cps NLQ ★ two modern fonts as std: Sans Serif and ROMAN. NLQ font selection from front panel ★ Tractor and friction feed
- ★ Single sheet guide with auto load switch. Original + 2 copies.
- ★ 3K input buffer with character downloading facility
- ★ Fully compatible with BBC & IBM graphics
- ★ Centronics interface as standard
- ★ Price including BBC master lead **£179(a)**

EPSON LQ500

Epson's budget 24pin letter quality printer provides unrivalled print quality with two built in letter quality fonts and widest repertoire of type styles at low cost. Sans Serif and Roman or draft font can be selected from the front panel. Maximum resolution of 360 x 180 dpi. Friction and tractor as standard. Parallel interface. Designed for low noise operation 55dB(A). Introductory price incl. master lead **£299(a)**

EPSON LQ850

Epson's latest 24pin letter quality printer has been specifically designed for optimum paper handling convenience. Both single sheets and fanfold paper can be loaded simultaneously and a single lever enables the selection of either for printing. Micro adjust feature enables paper feed forward or reverse in increments as fine as 1/180" - ideal for form setting. Auto load of selected paper to printing position. Very fast printing speeds 264cps draft & 88cps LQ. Sans Serif & Roman LQ fonts can be selected from front panel as can the character pitch. LQ850 has been specially insulated to keep the noise level down to 55db(A). Parallel & Serial interface as std. Introductory Price including BBC Master lead **£419(a)**

MODEMS

MIRACLE WS4000 V21/23	£129(b)
MIRACLE WS3000 V21/23	£244(b)
MIRACLE WS3000 V22	£395(b)
MIRACLE WS3000 V22 bis	£509(b)
(All modems are BABT approved)	
BBC Data Cable for WS3000/4000	£10(d)
MIRACLE WS2000V21/23 & BELL stds	£92(c)

PLOTTERS

Hitachi 672XD A3 4 Colour HPGL	£499(a)
Plotmate A4S	£379(a)
Plotmate A3M	£549(a)
Roland 880 A3 Flat bed 8 col	£599(a)
Variety of Plotter pens and accessories in stock.	
Larger Plotters available. Please enquire.	

PRINTER SHARERS & BUFFERS

TSB256 Printer Sharer Buffer

Provides a massive buffer size of 256K and connects three computers to one printer. Autoswitching between computers. Facility to print copies. **£189(b)**

BUFFALO PB Buffer

Parallel buffer for internal fitting to most Epson printers. Simple to instal. **£89(c)**

PB128 (128K)

PERIPHERAL & COMPUTER SHARERS

High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases, all lines fully switched.

	Parallel		Serial
2 Computers to 1 Printer 36v36-2	£25(e)	25v25-2	£25(c)
3 Computers to 1 Printer 36v36-3	£39(e)	25v25-3	£39(c)
4 Computers to 1 Printer 36v36-4	£45(e)	25v25-4	£45(c)
2 Computers 2 Printers		25v25-x	£49(c)
X-over 36v37-x	£49(e)		
BBC Cable Set 3 to 1 (1m ea)	£24(e)		
BBC Cable Set 4 to 1 (1m ea)	£30(e)		

BBC Computer Sharer: TCS26

1 computer to 2 printers fitted with BBC cable **£21(c)**

Paper & Labels

Plain fanfold paper with microperforation:	
2000 sheets 9½ x 11"	£12 (£3.50)
2000 sheets 14½ x 11"	£18.50 (£4.50)
1500 sheets A4 90gsm	£18.00 (£4.00)

Labels/1000

Single Row 3½ x 17/16	£5(d)
Triple Row 27/16 x 17/16	£5(d)

PRINTER STAND

A new style printer stand with easy paper feed and paper separation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**

PROGRAMMING ACCESSORIES/SOFTWARE

Compatible with B, B+ and Master EpromRyter (Epromer II)	
EpromRyter is compatible with BBC Master only. See page 7.	£89(b)
EPROMER II	£89(b)
META ASSEMBLER	£145(b)
PORTAL EPROM EMULATOR 512K	£245(b)
TEAM Disassembler	£145(b)
EPROM ERASERS	
UV1B 6 eproms, safety cutout	£47(b)
UVIT 6 eproms, timer, safety cutout	£59(b)

MONITORS

All Monitors supplied with a suitable lead.

12", 14" and 20" MONITORS

Microvitec 1431 Std Res, 14"	£179(a)
Microvitec 1431AP Std Res + PAL/Aud, 14"	£199(a)
Microvitec 1451 Med Res, 14"	£225(a)
Microvitec 1451AP Med Res + PAL/Aud, 14"	£255(a)
Microvitec 1441 Hi Res, 14"	£359(a)
Philips 8833 14" RGB Med Res, 14", high contrast screen, TTL/Linear Input, Mono/Colour Switch Sound Input. Separate controls for brilliance and contrast. This is the monitor used by Acorn with Archimedes and Compact Computers.	£219(a)
Sanyo CRT 70 14" High Resolution Colour Monitor Compatible with Master, B, Compact, and PC compatibles	£209(a)
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WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

WYSIWYG PLUS is designed to work with the following systems:

BBC Model B	6502 Second Processor,	BBC Master 128	All printers (Except lasers)
BBC Model B+	Turbo coprocessor	BBC Compact	

WYSIWYG PLUS workspace is relocatable.

£21(d)

MAYA TERMINAL EMULATOR

A comms package for the professional user. MAYA emulates DEC VT52, VT100 and Tandberg TDV2215. Special BBC VDU mode allows full access to the BBC VDU driver.

Menu driven software allows the setting up of parameters and function key definitions which can be saved to disc for future use.

Flexible command parser provides a uniform user interface and allows full access to * commands and HELP facilities.

Xmodem and Kermit file transfer protocols are included as standard. Unique feature of MAYA is that Kermit can also be used in 'remote mode', which allows file transfers to be initiated by other computers connected to the BBC. File transfers can also be done with a 'dumb' ASCII protocol. Open architecture allows for expansion and addition of new features. Options currently under development are graphics drivers for Tektronix 4010/4014 emulation, TDGR driver for TDV2215 and a Viewdata patch (provisional version included in the current issue). Registered users will be provided with regular updates and customisation service will also be available to those interested.

The package comprises of a rom, utils disc and a comprehensive manual. It is compatible with Master Models B & B+. It supports DFS, ADFS, NFS and ANFS filing systems.

£49(d)

BLACK QUEEN

A contract bridge program from BBC Publications both for beginners and for club players. Features include rebid and/or reply of any deal just played. Deals can be saved to a disc. Unique feature of Black Queen is its ability to construct deals from standard or classic ones in newspapers etc.

Compatible with Master, B and B+ £13(d)

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Do your letters look like this?

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VU-type, a complete touch typing program produced by BBC/Pitman.

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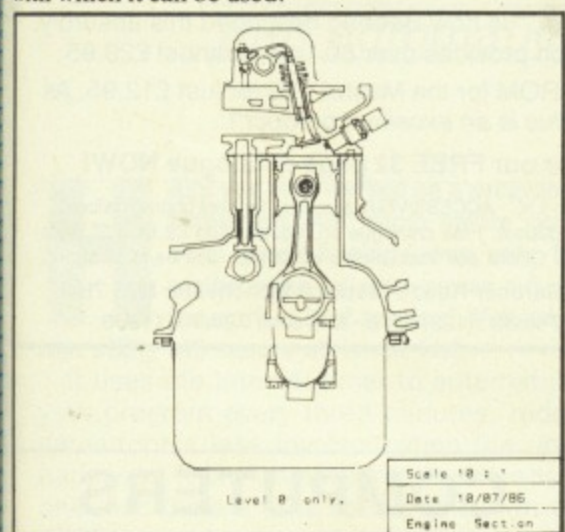
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*Novacad can drive a plotter to produce drawings of highest quality...
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A sophisticated CAD package with unique facilities. Thousands of Novacad packages are being used in widely differing fields ranging from industries for producing engineering drawings to accountants offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing high quality output are making extensive use of Novacad's unique features. Novacad is proving to be an invaluable teaching aid in technical schools simply because of the ease with which it can be used.



Novacad is compatible with all models fitted with Acorn DFS. Hardware requirements can be minimum; single drive and FX80 compatible printer are enough to get started, though its performance is enhanced considerably by use of 6502 2nd processor, dual drive and to a degree with B+ and Master's shadow ram.

The major features offered are:

- ★ Simple and easy to use with logical command sequence.
- ★ A large drawing area (approx 15 screens)
- ★ Unique ability to create complex icons made up of upto 500 lines instead of the usual 15 to 20 pixels, store them in a library and recall them at different scales and orientations.
- ★ Zoom facility.
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- ★ Text entry at any 90° orientation anywhere on the screen.
- ★ Grid scaling and locking, displacement measurements.
- ★ Printer routine for FX80/100 compatible printers
- ★ Cursor control from keyboard/tracker ball/mouse.

Plotter driver generator available as an optional utility, configures a routine for any BBC compatible plotter. Pre configured routines for popular plotters like Epson HI80, Hitachi, Plotmate are included. Drawings can be scaled to maximum plotter size.

NOVACAD T/M Version
NOVACAD T/M + Plotter DG
Plotter Driver Generator

£49(d)
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- *Highly sophisticated & Advanced Programmer
- *All current single rail eproms handled
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The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

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- 2716 2732 2764 27128 27256 27512 27513 27011
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META Ver III ASSEMBLER

"All the good features you would expect to find in a good source code editor are present ... Meta assembler lives in a different world. It is structured to work with any new processor ... as new instruction sets can be added ... as needed ... has a well featured editor with colour highlighting, a sound modular approach." Acorn User October 1986

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc - and 68000 - using native mnemonics for each processor, eg LD A, (HL) for Z80 and MOV A0, \$1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
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- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
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- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF suppression/addition etc.
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- Two 16K Roms, two 80 track discs, A4 ring-bound manual, function-key strip.

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A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request.

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PORTAL EPROM EMULATORS

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- 28 pin header plugs into Eprom socket on target system - status monitored on 13 Leds.
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- Complete with all cables, manual and disc.

PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512).

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TEAM DISASSEMBLER

The third part of the Universal Development System: a Meta labelling disassembler.

Supports 1802, 8080, 8085, #HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc):

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
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G R O U P

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The position involves day to day supervision of projects from their early stages through to launch, including liaison with in-house and third party programmers.

Experience of 8/16 bit micros is essential together with a knowledge of design, programming and quality assurance techniques. It is important that applicants are fully aware of the software market, especially that of games and leisure products, and can evaluate products with this in mind. Salary commensurate with experience.

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Applicants should be familiar with 8 bit micros and have a knowledge of programming in Z80 and 6502 machine code as well as Basic. Experience of 16 bit machines is an advantage but not essential. But a willingness to learn other languages is vital.

The position initially involves product maintenance/conversion work although in due course there will be opportunities to work on exciting new products now being planned. Salary commensurate with experience.

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An assistant is required in our software department to undertake product testing, quality assurance and customer liaison. Experience of day to day use of 8/16 bit micros is essential but programming skills are not necessary. Salary commensurate with experience.

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Basic safety

Gordon Horsington insures against program loss with automatic ease



HAVE you ever worked on a program and then turned off your micro before saving it? Or been programming away only to have a mains spike or even power cut destroy all the work of that session? Well this sideways ram utility will ensure all is not lost.

It uses the interval timer to automatically save your program every three minutes, reducing the catastrophic loss involved when the unexpected happens. This Autosave routine needs at least one disc drive and is compatible with the Acorn 6502 second processor. It must run in the I/O processor's sideways ram – if fitted – or be blown into an eprom and plugged into an empty rom socket in your micro. It only works while you're entering or editing a Basic program.

The utility uses the first &20 bytes of Page &9 – the cassette output buffer – in the I/O processor as workspace. So memory from &900 to &91F must not be used under any circumstances when the autosave is active. If you intend to run any utility that also uses this area you can alter line 100 of the program to change the start address of the workspace. For example, if you choose to use Page &A from &A80 to &A9F as workspace alter line 100 to read:

```
... filename = &A80
```

Remember that any alteration you make to program will upset the Get it Right! checksum. For this reason enter and save the original program – as AUTO – then verify it using the checksums before making any modifications.

Autosave will run with all versions of Basic. Instead of the offset assembly available in Basic II it adds a specially calculated value *sep* every time an absolute address is used – for example in JMP and JSR commands.

When you run the program it saves the rom image as AUTOBJ. You can load this into sideways ram using whatever method is appropriate to your version and then press Control+Break. If you now type *HELP and press Return you will get a list of

the roms fitted which should include:

```
AUTOSAVE
AUTO
```

The source code listed can be divided into two parts. Lines 200 to 1240 create the sideways ram header and command recognition code and lines 1250 to 2540 the autosave utility. You can easily modify the interpreter to add new star commands.

And that's it: If you use the autosave utility every time you edit a Basic program you need never lose all your hard work again, even if disaster strikes.

Turn to Page 124 ►

⚡ You need never lose all your hard work again **⚡**

USING AUTOSAVE

If you type *HELP AUTO your micro will list the syntax of the autosave commands. These are:

```
*AUTOSAVE <filename>
*NOAUTO
```

To use the utility to automatically save your developing program every three minutes in, for example, a standard DFS file called MYPROG in directory A on drive 0 type:

```
*AUTOSAVE :0.A.MYPROG
```

You can switch off the autosave by typing *NOAUTO or pressing Break.

Both the commands can be shortened to a minimum of three characters and a full stop. They can be typed in either upper or lower case and prefixed with an optional M if they clash with the same command in a higher priority rom:

```
*noauto
*noa.
*MNO.
*ano.
```

Each of these commands are equivalent to the *NOAUTO command.

◀ From Page 123

```

10 REM Sideways RAM Autosave
20 REM by Gordon Horsington
30 REM (C) The Micro User
40 REM -----
50 DIM firstbyte &400
60 sep=&8000-firstbyte
70 address=&70:register=&72
80 store=&73:pointer=&F2
90 romnumber=&F4:evntv=&220
100 tubecall=&406:filename=&900
110 block=filename+&0E
120 datreg=&FEE5:gsinit=&FFC2
130 gsread=&FFC5:osfind=&FFCE
140 osargs=&FFDA:osfile=&FFDD
150 osasci=&FFE3:osnewl=&FFE7
160 osword=&FFF1:osbyte=&FFF4
170 oscli=&FFF7
180 FOR LX=0 TO 2 STEP 2
190 PX=firstbyte:[OPT LX
200 BRK:BRK:BRK
210 JMP entry+sep
220 OPT FNB(&82)
230 OPT FNB((offset+sep) MOD256)
240 BRK:OPT FNs("SWR Autosave")
250 .offset
260 BRK
270 OPT FNs("(C) The Micro User")
280 BRK
290 .entry
300 PHA:CMP #9:BNE tryfour
310 TYA:PHA:TXA:PHA:LDX #3
320 .pushstore
330 LDA address,X:PHA
340 DEX:BPL pushstore
350 CLC:JSR gsinit
360 LDX #0:JSR gsread
370 BCC tryextended
380 LDX #(helpmessage+sep) MOD256
390 LDY #(helpmessage+sep) DIV256
400 JSR printstring+sep:BEQ exit
410 .helploop
420 INX:JSR gsread
430 .tryextended
440 CMP #ASC("."):BEQ okextended
450 AND #&DF:CMP helptitle+sep,X
460 BEQ helploop
470 LDA #&FF
480 CMP helptitle+sep,X:BNE exit
490 .okextended

```

```

500 LDX #(helpmsg2+sep) MOD256
510 LDY #(helpmsg2+sep) DIV256
520 JSR printstring+sep:BEQ exit
530 .tryfour
540 CMP #4:BEQ starcommand
550 PLA:RTS
560 .starcommand
570 TYA:PHA:TXA:PHA:LDX #3
580 .pushstack
590 LDA address,X:PHA
600 DEX:BPL pushstack
610 LDX #&FE:STY register
620 TYA:CLC:ADC #3:STA store.
630 .firstchar
640 INX:LDY register
650 LDA (pointer),Y
660 AND #&DF:CMP #ASC("M")
670 BEQ interpret:DEY
680 .interpret
690 INY:INX:LDA newcodes+sep,X
700 BMI found:LDA (pointer),Y
710 CPY store:BMI notdot
720 CMP #&2E:BEQ founddot
730 .notdot
740 AND #&DF:CMP newcodes+sep,X
750 BEQ interpret
760 .another
770 INX:LDA newcodes+sep,X
780 BPL another:CMP #&FF
790 BNE firstchar
800 .exit
810 LDX #0
820 .pullstack
830 PLA:STA address,X
840 INX:CPX #4:BCC pullstack
850 PLA:TAX:PLA:TAY:PLA:RTS
860 .founddot
870 INX:LDA newcodes+sep,X
880 BPL founddot:INY
890 .found
900 CMP #&FF:BEQ exit
910 STA address+1:INX
920 LDA newcodes+sep,X
930 STA address:CLC
940 JSR gsinit:JMP (address)
950 .newcodes
960 OPT FNs("AUTOSAVE")
970 OPT FNB((autosave+sep) DIV256)
980 OPT FNB((autosave+sep) MOD256)
990 OPT FNs("NOAUTO")
1000 OPT FNB((noauto+sep) DIV256)

```

```

1010 OPT FNB((noauto+sep) MOD256)
1020 OPT FNB(&FF)
1030 .helpmessage
1040 OPT FNB(&0D)
1050 OPT FNs("AUTOSAVE")
1060 OPT FNB(&0D)
1070 OPT FNB(&2020)
1080 .helptitle
1090 OPT FNs("AUTO")
1100 OPT FNB(&0DFF)
1110 BRK
1120 .helpmsg2
1130 OPT FNB(&200D)
1140 OPT FNs("*AUTOSAVE <filename>")
1150 OPT FNB(&200D)
1160 OPT FNs("NOAUTO")
1170 OPT FNB(&000D)
1180 .printstring
1190 STX address:STY address+1
1200 LDY #&FF
1210 .printloop
1220 INY:LDA (address),Y
1230 BMI printloop:JSR osasci
1240 BNE printloop:RTS
1250 .noauto
1260 JSR eventsoff+sep
1270 .pullout
1280 LDX #0
1290 .pullstore
1300 PLA:STA address,X
1310 INX:CPX #4
1320 BCC pullstore:PLA
1330 PLA:PLA:LDA #0:RTS
1340 .eventsoff
1350 LDX #9
1360 .nextevent
1370 TXA:PHA
1380 LDA #13:LDY #0:JSR osbyte
1390 PLA:TAX:DEX
1400 BPL nextevent:RTS
1410 .autosave
1420 TYA:PHA:JSR gsread
1430 BCS syntax:LDX #0
1440 .checkloop
1450 JSR gsread:BCS checkdisc
1460 INX:CPX #12:BNE checkloop
1470 .syntax
1480 PLA
1490 LDX #(showsyntax+sep) MOD256
1500 LDY #(showsyntax+sep) DIV256
1510 JSR printstring+sep:BEQ pullout
1520 .checkdisc
1530 LDA #0:TAX:TAY:JSR osargs
1540 CMP #4:BEQ continue:PLA
1550 LDX #(discmsg+sep) MOD256
1560 LDY #(discmsg+sep) DIV256
1570 JSR printstring+sep
1580 BEQ pullout
1590 .continue
1600 JSR eventsoff+sep
1610 PLA:TAY:LDX #&FF
1620 .nameloop
1630 INX:JSR gsread
1640 STA filename,X
1650 BCC nameloop
1660 LDA #&D:STA filename,X
1670 LDA #&A8:LDX #0:LDY #&FF
1680 JSR osbyte
1690 STX address:STY address+1
1700 LDA #&EA:LDX #0:LDY #&FF
1710 JSR osbyte:LDY #&30:STY evntv
1720 LDA #&FF:STA evntv+1:CPX #&FF
1730 BEQ sproc
1740 LDA #(save+sep) MOD256

```

VARIABLES

sep	Assembly address offset.
address	General zero page pointer.
register	Sideways ram interpreter's temporary store for the Y register.
store	Offset used to determine the minimum number of characters accepted by the header code.
pointer	First of two bytes used as a text pointer for processing star commands.
romnumber	Number of the sideways ram/rom socket in which Autosave is running.
evntv	Event vector address.
tubecall	Tube host code subroutine that indicates when the Tube is available.
filename	Address of a copy of the autosave filename.
block	Address of the osfile parameter block used by autosave.
datreg	Data register used to read across the Tube.

Turn to Page 126 ▶



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◀ From Page 124

```

1750 STA (address),Y:INY
1760 LDA #(save+sep) DIV256
1770 STA (address),Y:BNE skipsp
1780 .sproc
1790 LDA #(savesp+sep) MOD256
1800 STA (address),Y:INY
1810 LDA #(savesp+sep) DIV256
1820 STA (address),Y
1830 .skipsp
1840 INY:LDA romnumber
1850 STA (address),Y:JSR time+sep
1860 JMP pullout+sep
1870 .savesp
1880 PHP:PHA:TXA:PHA:TYA:PHA
1890 JSR file+sep
1900 .claimtube
1910 LDA #&C8:JSR tubecall
1920 BCC claimtube:LDA #0
1930 LDX #(tubeaddr+sep) MOD256
1940 LDY #(tubeaddr+sep) DIV256
1950 JSR tubecall:JSR delay+sep
1960 LDA datreg:STA block+14
1970 JSR delay+sep:LDA datreg
1980 STA block+15:LDA #0
1990 LDX #(tubeaddr2+sep) MOD256
2000 LDY #(tubeaddr2+sep) DIV256
2010 JSR tubecall:JSR delay+sep
2020 LDA datreg:STA block+3
2030 STA block+7:STA block+11
2040 LDA #888:JSR tubecall:LDA #0
2050 .common
2060 STA block+4:STA block+5
2070 STA block+8:STA block+9
2080 STA block+12:STA block+13
2090 STA block+16:STA block+17
2100 LDA #0:STA block+2
2110 STA block+6:STA block+10
2120 LDX #block MOD256
2130 LDY #block DIV256
2140 JSR osfile:JSR time+sep
2150 PLA:TAY:PLA:TAX:PLA:PLP
2160 .delay:RTS
2170 .save
2180 PHP:PHA:TXA:PHA:TYA:PHA
2190 JSR file+sep:LDA &12
2200 STA block+14:LDA &13
2210 STA block+15:LDA &1D
2220 STA block+3:STA block+7
2230 STA block+11:LDA #&FF
2240 BNE common
2250 .file
2260 LDA #13:LDX #5
2270 LDY #0:JSR osbyte
2280 LDA #filename MOD256:STA block
2290 LDA #filename DIV256:STA block+1
2300 RTS
2310 .time
2320 LDA #14:LDX #5
2330 LDY #0:JSR osbyte:LDA #4
2340 LDX #(timebase+sep) MOD256
2350 LDY #(timebase+sep) DIV256
2360 JSR osword:RTS
2370 .timebase
2380 OPT FND(&FFFFB969)
2390 OPT FNB(&FF)
2400 .tubeaddr
2410 OPT FND(&00000012)
2420 .tubeaddr2
2430 OPT FND(&0000001D)
2440 .showsyntax
2450 OPT FNB(&07)
2460 OPT FNs("Syntax")
2470 OPT FNw(&203A)
2480 OPT FNs("*AUTOSAVE <filename>")
2490 OPT FNw(&000D)
2500 .discmsg
2510 OPT FNB(&07)
2520 OPT FNs("DFS not active")
2530 OPT FNw(&000D)
2540 .lastbyte
2550 J:NEXT
2560 $&700="SAVE AUTOBJ "+STR$"firstbyt
e+" +STR$"lastbyte+" FFFF8000 FFFF8000"
+CHR$13
2570 XX=0:YX=7:CALL oscli:END
2580 REM -----
2590 DEFFNB(BX):?PX=BX:PX=PX+1:=LX
2600 DEFFNW(WX):!PX=WX:PX=PX+2:=LX
2610 DEFFND(DX):!PX=DX:PX=PX+4:=LX
2620 DEFFNs(S$):$PX=s$:PX=PX+LENS$:=LX

```



10 = 00	390 = DFE4 4	770 = AAEF 3	1150 = 6B55 E	1530 = 8246 4	1910 = 6DBC 6	2290 = DA9 4
20 = 00	400 = AE5F 6	780 = 3F67 A	1160 = 86B3 F	1540 = 90DC 9	1920 = 7D44 9	2300 = 9843 4
30 = 00	410 = 10 4	790 = F27E 2	1170 = 2FD6 8	1550 = AB0C 7	1930 = 45E7 9	2310 = B17 7
40 = 00	420 = 2BA8 0	800 = DC83 C	1180 = 2927 1	1560 = 9392 A	1940 = C557 6	2320 = D832 2
50 = E050 0	430 = 334D 0	810 = EA45 B	1190 = E0C7 8	1570 = 8796 1	1950 = 96E8 D	2330 = 1C55 8
60 = BB81 6	440 = 46B3 2	820 = B225 6	1200 = DC13 6	1580 = B06E 1	1960 = 84B6 1	2340 = 6892 6
70 = 4EF0 7	450 = 9513 7	830 = AF55 1	1210 = 835C F	1590 = 2EE 6	1970 = E9C9 0	2350 = E822 C
80 = A35A 0	460 = EDCF 8	840 = 1192 4	1220 = F96C E	1600 = D2CF F	1980 = 41B4 4	2360 = A48E 0
90 = 91B 1	470 = CBD5 4	850 = B5C7 2	1230 = 367C 4	1610 = E9B1 7	1990 = 4C1C A	2370 = A104 0
100 = 368F 9	480 = 4397 7	860 = C16D D	1240 = 4AD7 F	1620 = 23B0 7	2000 = C47F C	2380 = 3E35 1
110 = 584 8	490 = D79A D	870 = AAEF C	1250 = BAAA F	1630 = 2BA8 3	2010 = 96E8 2	2390 = B539 E
120 = 16D4 B	500 = 8913 4	880 = 2FC9 F	1260 = D2CF 5	1640 = ED01 3	2020 = 65A8 4	2400 = 8909 4
130 = 11C0 8	510 = 9A3 B	890 = DB31 5	1270 = 9D77 3	1650 = 7497 8	2030 = 8A12 1	2410 = E180 C
140 = 5BDE 9	520 = AE5F B	900 = D65A B	1280 = EA45 3	1660 = 4B0B D	2040 = EB73 3	2420 = 1FB0 2
150 = 86C1 C	530 = BB90 6	910 = 9AC3 7	1290 = 78A8 5	1670 = D2DA 4	2050 = 9EB1 5	2430 = 437F B
160 = 2B0B A	540 = 227E 9	920 = 43F9 0	1300 = AF55 F	1680 = 8E7E D	2060 = E981 6	2440 = 8989 6
170 = 7942 4	550 = EC5C E	930 = EFD0 7	1310 = E659 3	1690 = E0C7 0	2070 = 26FA 5	2450 = E4F9 7
180 = AAB9 F	560 = E26B D	940 = 4FBC D	1320 = CDC6 4	1700 = EF88 F	2080 = EC84 A	2460 = D8D3 8
190 = EE10 9	570 = EAD4 E	950 = 7F0 8	1330 = 1072 9	1710 = F1AC 2	2090 = 51A5 0	2470 = CDF0 6
200 = 4D13 9	580 = 916 8	960 = 497D 8	1340 = FD4E A	1720 = 4D32 4	2100 = 6446 C	2480 = 551F C
210 = BB60 8	590 = DFDB A	970 = EB3C 0	1350 = 7B6C 3	1730 = B6 F	2110 = E152 6	2490 = 2FD6 6
220 = B2AD F	600 = 27FD D	980 = AFBF 0	1360 = 2396 3	1740 = 6AFC B	2120 = 896A 6	2500 = 2974 9
230 = BD0C 7	610 = 43DB 0	990 = C9DC 8	1370 = 2B02 B	1750 = 6723 F	2130 = 2161 7	2510 = E4F9 5
240 = 265D A	620 = 2B72 E	1000 = 595C 2	1380 = A09B E	1760 = 8794 3	2140 = E76 4	2520 = A20E 4
250 = 27E3 6	630 = 1B91 2	1010 = 1DDF 0	1390 = 58C3 B	1770 = C7A8 3	2150 = 9ADF 7	2530 = 2FD6 1
260 = E2BF 5	640 = 4C98 B	1020 = B539 A	1400 = 3A1A 5	1780 = F533 9	2160 = 3307 7	2540 = 56BE F
270 = BB8E C	650 = 957B F	1030 = 2B58 A	1410 = 3730 5	1790 = A9E4 0	2170 = 2C12 2	2550 = DA42 E
280 = E2BF 8	660 = 2274 D	1040 = B9F3 4	1420 = 488D 6	1800 = 6723 A	2180 = A5E9 A	2560 = 44B1 7
290 = F1E5 8	670 = 5E8A F	1050 = 497D 3	1430 = 273F 7	1810 = 448C 1	2190 = B320 2	2570 = DE18 1
300 = BE86 9	680 = 17C3 6	1060 = B9F3 5	1440 = 2CA5 2	1820 = 6E87 5	2200 = D937 8	2580 = 0 1
310 = EAD4 E	690 = 1BB2 5	1070 = C1A8 1	1450 = 3A4 B	1830 = 7311 B	2210 = 3C64 1	2590 = D4A 5
320 = C39B 0	700 = AAE9 7	1080 = F861 6	1460 = 7D4C D	1840 = 8680 4	2220 = 3CB 3	2600 = 7C5C 0
330 = DFDB 4	710 = E6FC 4	1090 = 6E70 F	1470 = 5A3C 7	1850 = F3EF 1	2230 = A3C 3	2610 = E8F5 C
340 = ED70 9	720 = BD45 A	1100 = AB98 0	1480 = 4E8A C	1860 = DAB7 1	2240 = 9269 0	2620 = 1F5E D
350 = FB71 A	730 = 15C8 5	1110 = E2BF 7	1490 = 5234 A	1870 = 5265 7	2250 = CEE9 2	
360 = 6A16 A	740 = C978 7	1120 = A189 0	1500 = 885F E	1880 = A5E9 2	2260 = 1F2A 9	
370 = 7762 4	750 = E461 8	1130 = 6B55 0	1510 = 7B55 9	1890 = EF7E 6	2270 = 8AA 9	
380 = 7738 1	760 = 5DD8 D	1140 = 551F A	1520 = 7F8A 7	1900 = 8787 C	2280 = D1B3 8	

Take part in our nationwide search for innovation in action

Last year's Innovation Award was an outstanding success with more than 500 users of the BBC Micro competing for the prestigious accolade.

Entries came from all over the world, from health researchers, engineers, teachers and students – all with remarkable applications which pushed the BBC Micro to its limits and beyond. The press response was enormous with top coverage in hundreds of newspapers throughout the country.

Now you can join our search for the innovations of 1988. And this year the competition is twice the size, with a special section for Archimedes users.

HOW TO ENTER

Tell us what your BBC Micro or Acorn Archimedes is doing that is out of the ordinary. It may be a project with exciting commercial potential, with significant social benefit – or even just for fun. Whether you're an individual, group, school or business, this contest is open to you – there's no restriction.

Your typed entry should not exceed 500 words, and you can also include any supporting illustrative material such as black and white photographs, colour transparencies, diagrams or screen dumps.

Complete the coupon below, attach it to your entry and send it to arrive no later than October 14, 1988.

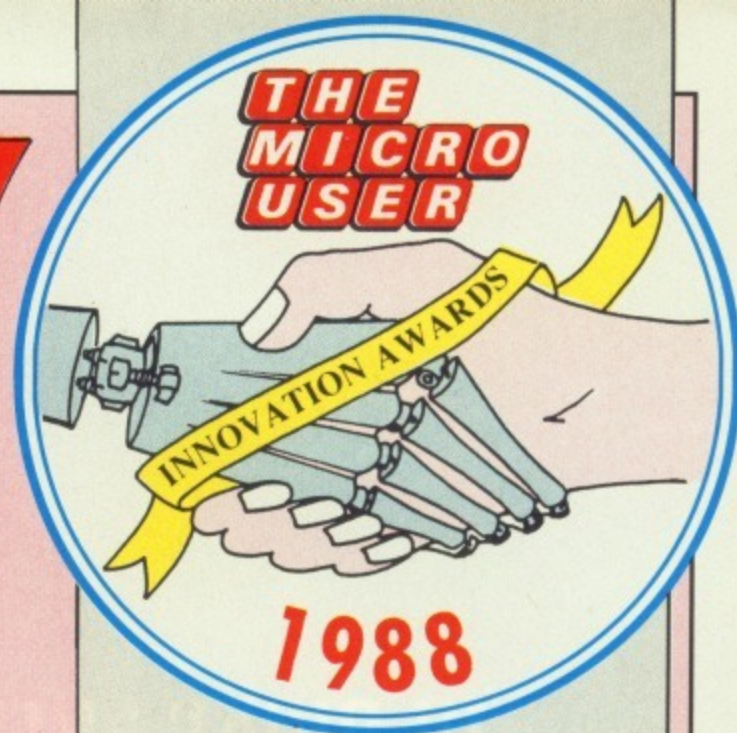
The two winners will be announced at the Electron & BBC Micro User Show at the New Horticultural Hall, Westminster, from November 11 to 13.

THE PRIZES

The winner in the BBC Micro category will receive a magnificent Archimedes, courtesy of Acorn. This 32-bit workhorse is the fastest micro in the world with 512k ram, 512k rom, 800k 3.5in disc drive, mouse and colour monitor. It comes with a Welcome disc containing an excellent painting package, a music editor and much more. Value: £1,034.

In the Archimedes category the prize will be a powerful Brother 1709 printer, supplied by Kelator, Acorn's distributor to the trade. The 1709 can output text in three different modes – draft, near letter quality and letter quality – at speeds of up to 240 cps. The package will also come with unique software to make the most of the Archimedes' special features. Value: £685.

And both winners will receive an impressive plaque in recognition of their achievements.



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 Condition Red
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 Pipeline
 Daxis
 Exile
 Bolo

I WAS talking recently to Tequila, author of Tynesoft's *Saigon* – reviewed on Page 32, and he pointed out that in recent months I have rather neglected snippets of inside information and news about games in production at the various software houses in favour of all-out coverage of existing games. So, to make amends, here goes.

The licensing of official games on TV and films seems to be featured strongly at the moment, with both Superior and Tynesoft producing big name titles. Superior is producing BBC Micro and Electron versions of Palace's hack-and-slay game **Barbarian**, already a hit on other machines.

By the time you read this the game will already have been released, but the photograph in the adverts has been modified – apparently someone objected to the content – and, although the packaging is the same, we BBC Micro owners will also not be getting the poster supplied with the original versions. But I'm sure that won't matter if the game is up to standard.

Tynesoft has three big film-licensed releases on the way. Unfortunately they're strictly under wraps for the moment. Suffice it to say that all are based on fictional characters and stories and all are household names. I hope to be able to give more details-in next month's column.

One title I can mention is **Summer Olympiad**,

Back to the future

Hac Man looks into his crystal ball and tells of some goodies to come

Tynesoft's sequel to *Winter Olympiad 88*. It features five events, including 110m hurdles and totally different skeet shooting. It also has a platform diving event and, as a former diver myself, that's the one I'm particularly looking forward to seeing.

Let's hope it'll be a more accurate simulation than the springboard diving event in Daley Thompson's *Supertest*. Programmed by Kevin Blake, of *Indoor Sports* and *Spy vs Spy* fame, it's set for a mid-July launch and is bound to be

Repton 2 cheats

In the February column I put out a request for help with **Repton 2** – the response was immediate. Paul Hunt and Ian McDermott of Enfield, Middlesex sent me a complete set of maps that had been sent to them by a pen-pal, who turned out to be map wizard Steve James – he sent me a complete set of maps for *XOR* last year.

Unfortunately the size of the game means that it is not possible to reproduce them in these pages. *Repton 2* spans a total of 33 discrete sections across 16 separate levels, which are accessible only by transporter.

However, I am at last able to present what I hope will be consolation enough: A series of pokes to make you invulnerable to more or less everything. Enter Listing I if you have the original stand-alone game on cassette, Listing II if you have the original game on disc, Listing III for the Superior Collection Volume 2 on tape and Listing IV if you have Collection 2 on disc.

These routines were inspired by David Patterson, of Gerrards Cross, Bucks. David sent me a number of pokes that claimed to have these effects. However they did not work with any released version of the game. Can I please stress once again how important it is that you test any routine on an original version of the game before sending it in. If it doesn't work, it's no good.

Listing I: *Repton 2* – Original tape

```

10 REM Repton 2 invulnerability
20 REM original cassette version
30 REM by Hac-Man 1988
40 REM (C) The Micro User
50 :
60 MODE 7:VDU 23,1,0;0;0;0;
70 LX=3:REM no. of lives
80 FOR IX=0 TO 2 STEP 2:PX=&900:COPT
IX
 90 JSR &A00:JSR &A00
100 LDA# &60:STA &4383
110 LDA# &4C:STA &4315:LDA# cont MOD
256:STA &4316:LDA# cont DIV 256:STA &431
7
120 JSR &43A0
130 .cont JSR &A00:JSR &700
140 LDA# &A0:STA &1C7A:LDA# 1:STA &1C
7B:\ infinite lives
150 LDA# LX:STA &1CA5:\ no. of lives
160 LDA# &EA
170 STA &1743:STA &1744:STA &1745:\ i
nvulnerable to meteors
180 STA &1823:STA &1824:STA &1825:\ i
nvulnerable to monsters
190 STA &1A29:STA &1A2A:STA &1A2B:\ i

```

Condition Red codes

IT is always encouraging to see how quickly I receive replies to the pleas for help that I occasionally throw in. I mentioned recently that Darren Hubbard wanted the passwords for Blue Ribbon's **Condition Red**. Steven Robson and the rather shy *Pak* quickly obliged. The passwords for the upper nine screens are:

2: ICARUS	5: SIRIUS	8: ALTAIR
3: QUASAR	6: PULSAR	9: NEBULA
4: ARIANE	7: APOLLO	10: VOSTOK

another hit with fans of sports games.

The title that interests me most comes from Go-Dax, publisher of **Skirmish** – my favourite game so far this year – with the addictive two player-plus-computer element. Some games are one player against the computer, others are two players against each other. Skirmish is both.

Now author Delos D.Harriman – and James Everard have come up with a staggering new concept in multi-player games. Provisionally entitled **Bolo**, it takes this idea an astounding stage further. Up to 16 players – using a BBC Micro each can play at the same time, via the hardware link supplied with the game.

Bolo is a tactical wargame, with buildings, bridges, ammo dumps, forests and all the other features you would expect to find on a battlefield. The aim is to gain absolute control, but with so many opponents – either as individuals or teams – trying to do the same, it certainly isn't easy.

I first saw Bolo at the end of February. In concept, design and implementation, it looked brilliant, and definitely something special for a BBC Micro – and, later in the year, Archimedes – owner to watch out for.

The first of a number of other new titles from Superior is **Repton Thru Time**. In this, the latest

and supposedly last episode in the saga, Repton journeys from prehistoric times, through the Egyptian era, Victorian England and the present day before disappearing into the far-distant future. This should be out as you read this.

Some of you may have heard of **Pipeline**, under the Guildmaster label. It has a Ravenskull feel, but is quite different. You spend much of the game invisible, running through the maze of pipes that fills the screen, hence the name. It is written by two new authors, teenagers Ian Holmes and William Reeve. Featuring screen and character designers, it sounds promising. Look out for it early in July.

Exile promises to be a biggie. Written by Jeremy Smith, of Thrust fame, and Peter "Starship Command" Irvin, it certainly has an impressive pedigree. It is an arcade adventure in the Citadel mould but with continuous scrolling landscape and digitised sound, plus gravity, wind and inertia effects and some revolutionary animation. It should be with us in early August, if all goes well.

Peter Scott is still working on **Daxis**. Although this shoot-'em-up with the feel of a coin-op has long seemed mythical, it is still apparently alive and kicking. I think I shall continue to wait with anticipation, rather than bated breath.

Exile promises to be a biggie ... it certainly has an impressive pedigree

```

nvulnerable to spirits
200 STA &1EE9:STA &1EEA:STA &1EEB:\ i
nvulnerable to boulders
210 STA &1FD6:STA &1FD7:STA &1FD8:\ i
nvulnerable to skulls and boulders
220 JMP &8B5
230 J: NEXT
240 PRINT "Please insert Repton 2 tape
(fully rewound) and hit a key...";AX=G
ET:PRINT
250 PROCload:CALL &900
260 :
270 DEFPROCload
280 !&A00=&208D22A9:!&A04=&8D0AA902
290 !&A08=&0EA90221:!&A0C=&F42004A2
300 !&A10=&A01FA2FF:!&A14=&FFF7200A
310 !&A18=&04A20DA9:!&A1C=&4CFFF44C
320 !&A20=&48080D2E:!&A24=&4898488A
330 !&A28=&2903CAAD:!&A2C=&03CA8DFE
340 !&A30=&AA68A868:!&A34=&21602868
350 ENDPROC
    
```

Listing II: Repton 2 – Original disc

```

10 REM Repton 2 invulnerability
20 REM Original disc version
30 REM by Hac-Man 1988
40 REM (C) The Micro User
50 :
    
```

```

60 MODE 7:VDU 23,1,0;0;0;0;
70 LX=3:REM no. of lives
80 FOR IX=0 TO 2 STEP 2:PX=&900:COPT
IX
90 LDA# &60:STA &9B4:STA &437F
100 LDA# &4C:STA &4315:LDA# cont MOD
256:STA &4316:LDA# cont DIV 256:STA &431
7
110 JSR &43A0
120 .cont JSR &970:JSR &700
130 LDA# &A0:STA &1C7A:LDA# 1:STA &1C
7B:\ infinite lives
140 LDA# LX:STA &1CA5:\ no. of lives
150 LDA# &EA
160 STA &1743:STA &1744:STA &1745:\ i
nvulnerable to meteors
170 STA &1823:STA &1824:STA &1825:\ i
nvulnerable to monsters
180 STA &1A29:STA &1A2A:STA &1A2B:\ i
nvulnerable to spirits
190 STA &1EE9:STA &1EEA:STA &1EEB:\ i
nvulnerable to boulders
200 STA &1FD6:STA &1FD7:STA &1FD8:\ i
nvulnerable to skulls and boulders
210 JMP &8B5
220 J: NEXT
230 PRINT "Please insert Repton 2 disk
and hit a
key...";AX=GET
240 *LOAD D.REPA
    
```

```

250 *LOAD D.REPB
260 CALL &900
    
```

Listing III: Repton 2
– Superior Collection tape

```

10 REM Repton 2 invulnerability
20 REM Superior Collection cassette
30 REM by Hac-Man 1988
40 REM (C) The Micro User
50 :
60 MODE 7:VDU 23,1,0;0;0;0;
70 LX=3:REM no. of lives
80 FOR IX=0 TO 2 STEP 2:PX=&900:COPT
IX
90 JSR &A00
100 LDA# &60:STA &4383
110 LDA# &4C:STA &4315:LDA# cont MOD
256:STA &4316:LDA# cont DIV 256:STA &431
7
120 JSR &43A0
130 .cont LDA# &42:STA &A27:JSR &A00:
JSR &700
140 LDA# &A0:STA &1C7A:LDA# 1:STA &1C
7B:\ infinite lives
150 LDA# LX:STA &1CA5:\ no. of lives
160 LDA# &EA
    
```

Turn to Page 132 ▶

◀ From Page 131

```

170 STA &1743:STA &1744:STA &1745:\ i
nvulnerable to meteors
180 STA &1823:STA &1824:STA &1825:\ i
nvulnerable to monsters
190 STA &1A29:STA &1A2A:STA &1A2B:\ i
nvulnerable to spirits
200 STA &1EE9:STA &1EEA:STA &1EEB:\ i
nvulnerable to boulders
210 STA &1FD6:STA &1FD7:STA &1FD8:\ i
nvulnerable to skulls and boulders
220 JMP &8B5
230 J:NEXT
240 PRINT"Please insert Repton 2 tape
and hit a key...";:AX=GET:PRINT
250 PROCload:CALL &900
260
270 DEFPROCload
280 !&A00=&208D29A9:!&A04=&8D0AA902
290 !&A08=&0EA90221:!&A0C=&F42004A2
300 !&A10=&A01FA2FF:!&A14=&FFF7200A
310 !&A18=&04A20DA9:!&A1C=&4CFFF44C
320 !&A20=&5045522E:!&A24=&414E4F54
330 !&A28=&8A48080D:!&A2C=&AD489848
340 !&A30=&FE2903CA:!&A34=&6803CA8D
350 !&A38=&68AA68A8:!&A3C=&49486028
360 ENDPROC
    
```

Listing IV: Repton 2
— Superior Collection disc

```

10 REM Repton 2 invulnerability
20 REM Superior Collection disc vers
ion
    
```

```

30 REM by Hac-Man 1988
40 REM (C) The Micro User
50 :
60 MODE 7:VDU 23,1,0;0;0;
70 LX=3:REM no. of Lives
80 FOR IX=0 TO 2 STEP 2:PX=&900:COPT
IX
90 LDA# &60:STA &A99:STA &437F
100 LDA# &4C:STA &4315:LDA# cont MOD
256:STA &4316:LDA# cont DIV 256:STA &431
7
110 JSR &43A0
120 .cont JSR &A00:JSR &700
130 LDA# &A0:STA &1C7A:LDA# 1:STA &1C
7B:\ infinite Lives
140 LDA# LX:STA &1CA5:\ no. of Lives
150 LDA# &EA
160 STA &1743:STA &1744:STA &1745:\ i
nvulnerable to meteors
170 STA &1823:STA &1824:STA &1825:\ i
nvulnerable to monsters
180 STA &1A29:STA &1A2A:STA &1A2B:\ i
nvulnerable to spirits
190 STA &1EE9:STA &1EEA:STA &1EEB:\ i
nvulnerable to boulders
200 STA &1FD6:STA &1FD7:STA &1FD8:\ i
nvulnerable to skulls and boulders
210 JMP &8B5
220 J:NEXT
230 PRINT"Please insert Collection 2
disk and hit a key...";:AX=GET
240 *INIT
250 *LOAD REPTON2
260 ?2713=96:CALL 2560:*LOAD D.REPB
270 CALL &900
    
```

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HALMA – AHHH!

Get frustrated, lose your temper – try this game of strategy by Jon Perry

INVENTED in the late 19th century, the game of Halma is the forerunner of the better-known Chinese Checkers. Two or four players take turns moving pieces across a squared board from the corner where they start to the one diagonally opposite. It's simple to learn but takes a lifetime to master.

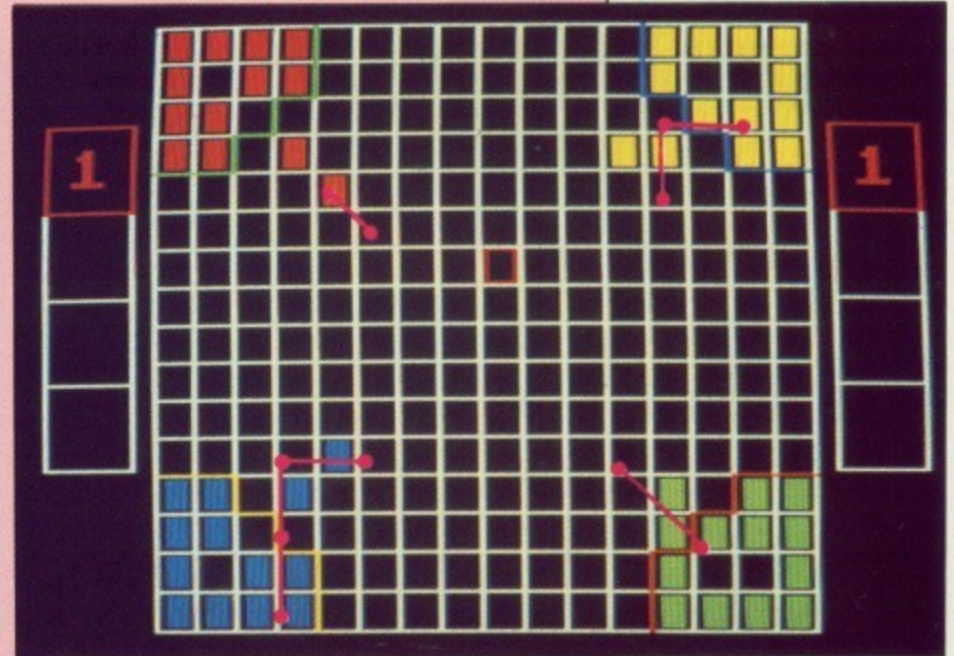
Each player selects a colour and the corner opposite his starting position is bounded in that colour. The winner is the first to get all his pieces to that area.

A piece can step one square or hop any other piece in any direction. To hop, the square on the other side of the piece being jumped must be vacant – as in draughts, but there is no capturing. A series of hops may be combined letting you move a greater distance in one go.

The flashing cursor shows the colour of the next competitor and on your turn position this over the piece you want to move. The spacebar is then pressed to select it and the cursor won't move out of the range where legal moves exist.

Once you're satisfied that you have made the best move, press the spacebar again to deposit the piece. Alternatively, if you don't find a suitable position to go to, you can press Control to change your mind and then select another piece. If you move one space the turn ends there, but you can keep hopping until you decide to stop.

Although essentially very simple, Halma is a fascinating game involving very complex strategy. It's not easy to get your pieces across the centre of the board without providing your opponents with the stepping stones to move their pieces.



Possible next moves for each player

CONTROLS

- Arrow Keys Up, down, left and right
- Shift Speeds up cursor
- Spacebar Select or place piece to be moved
- Control Cancel piece to be moved or end turn after a jump or series of jumps

MAIN PROCEDURES

- db Print double height
- in Initialise variables and envelopes
- sc Draw screen
- co Draw counters
- ga Play game
- mo Move piece
- key Check for keys pressed
- cu Draw cursor
- al Alter position of counters
- s,s2 Generate sound effects
- ch Check to see if any player has won
- win Perform win actions
- ff Play fanfare for the winner
- pl Display and alter current player
- bo Draw lines for players' areas

MAIN VARIABLES

- S() Screen and contents
- pl Current player
- X,Y Cursor co-ordinates
- NP Number of players
- win Player has won flag
- D Range of cursor movement
- X1,Y1 Position of piece to be moved

Listing 1

```

10 REM Halma
20 REM by Jon Perry
30 REM (c) The Micro User
40 MODE7
50 PROCreloc(&1100)
60 ON ERROR MODE7:REPORT:PRINT at Li
ne ";ERL:END
70 MODE2:VDU23;8202;0;0;0;19,8,0;0;19
,9,0;0;19,10,0;0;19,11,0;0;:*FX4,2
80 DIMd 10
90 PROCdb("Players : 2/4 ?",0,10)
100 A=GET-48:IFA<>2 AND A<>4 GOTO100
110 NP=A
120 PROCin:CLS:PROCsc
130 PROCga:PROCwin(win)
140 IFINKEY-74 RUN
150 END
160 DEFPROCin
170 ENVELOPE1,1,20,-15,-15,6,3,3,127,-
1,-1,-20,126,126
180 ENVELOPE2,1,0,0,0,0,0,0,126,-1,0,-
2,126,80
190 ENVELOPE3,1,0,0,0,0,0,0,5,-1,0,-2,
100,80
200 ENVELOPE4,1,0,0,0,0,0,0,5,-1,0,-2,
85,70
210 DIMS(15,15):pl=1:X=7:Y=7:win=0:bx=
192
    
```

Turn to Page 135 ▶

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◀ From Page 133

```

220 IFNP=2:FORI=0T04:FORJ=0T01+I-I DIV
4:S(J,11+I)=1:S(15-J,4-I)=2:NEXT:NEXT
230 IFNP=4:FORI=12T015:FORJ=0T03+(0=(I
DIV 14))*(14-I):S(J,I)=1:S(15-J,I)=3:S(
J,15-I)=4:S(15-J,15-I)=2:NEXT:NEXT
240 F=0
250 ENDPROC
260 DEFPROCsc
270 FORI=192T01088STEP56:MOVEI,120:DRA
WI,1016:MOVE192,I-72:DRAW1088,I-72:NEXT
280 PROCbo:PROCbs
290 PROCco:PROCcbx
300 FORI=1T04:COLOURI+7:PROCdb(STR$(I)
,1,2+I*4):PROCdb(STR$(I),18,2+I*4):NEXT
310 COLOUR7
320 ENDPROC
330 DEFPROCco
340 FORI=0T015:FORJ=0T015
350 IFS(I,J)>0 PROCsq(I,J,S(I,J))
360 NEXT:NEXT
370 ENDPROC
380 DEFPROCsq(x,y,c)
390 GCOL0,c:xx=208+56*x:yy=128+56*y:MO
VExx,yy:MOVExx+28,yy:PLOT85,xx,yy+40:PLO
T85,xx+28,yy+40
400 ENDPROC
410 DEFPROCga
420 PROCcu(X,Y,1)
430 VDU19,8,1;0;
440 COLOUR5
450 REPEAT:PROCmo:PROCch
460 IFwin>0 GOT0480
470 PROCpl:PROCcu(X,Y,0):X=7:Y=7:PROCC
u(X,Y,pl)
480 UNTILwin>0
490 ENDPROC
500 DEFPROCmo
510 *FX15
520 REPEAT
530 PROCkey(0,0,15,15)
540 UNTILINKEY-99
550 IFFNpe<>pl PROCs:GOT0520
560 X1=X:Y1=Y
570 PROCs2
580 REPEAT
590 PROCkey(X1-2,Y1-2,X1+2,Y1+2)
600 UNTILINKEY-99 OR INKEY-2
610 IFINKEY-2:IFF=1:F=0:GOT0710
620 IFINKEY-2:IFF=0:PROCcu(X,Y,0):X=X1
:Y=Y1:GOT0520
630 IFFNpe<>0 PROCs:GOT0580
640 IFF=0:IF(ABS(X-X1)=1 AND ABS(Y-Y1)
=1) OR (ABS(X-X1)=1 AND Y=Y1) OR (ABS(Y-
Y1)=1 AND X=X1):X2=X:Y2=Y:PROCs2:PROCal:
GOT0710
650 IFF=1:IF(ABS(X-X1)=1 AND ABS(Y-Y1)
=1) OR (ABS(X-X1)=1 AND Y=Y1) OR (ABS(Y-
Y1)=1 AND X=X1):PROCs:GOT0580
660 IF(ABS(X-X1)=1 AND ABS(Y-Y1)=2) OR
(ABS(X-X1)=2 AND ABS(Y-Y1)=1):PROCs:GOT
0580
670 IFS((X1+X)/2,(Y1+Y)/2)=0 PROCs:GOT
0580
680 X2=X:Y2=Y
690 PROCs2:PROCal
700 F=1:X1=X2:Y1=Y2:GOT0580
710 ENDPROC
720 DEFPROCkey(xl,yl,xu,yu)
730 IFINKEY-1:m=2 ELSE m=1
740 IFxl<0xl=0
750 IFyl<0yl=0
760 IFyu>15yu=15
770 IFxu>15xu=15
780 PROCcu(X,Y,0)
790 IFINKEY-58:IFY<yu-m+1:Y=Y+m
800 IFINKEY-42:IFY>yl+m-1:Y=Y-m

```

```

810 IFINKEY-26:IFX>xl+m-1:X=X-m
820 IFINKEY-122:IFX<xu-m+1:X=X+m
830 PROCcu(X,Y,pl)
840 ENDPROC
850 DEFPROCcu(cx,cy,c)
860 GCOL0,c:xx=208+56*cx:yy=128+56*cy:
MOVExx,yy:DRAWxx+44,yy:DRAWxx+44,yy+48:D
RAWxx,yy+48:DRAWxx,yy
870 ENDPROC
880 DEFFNpe
890 IFS(X,Y)<>0 =S(X,Y) ELSE =0
900 DEFPROCAl
910 dum=S(X1,Y1):S(X1,Y1)=S(X2,Y2):S(X
2,Y2)=dum
920 PROCsq(X1,Y1,0):PROCsq(X2,Y2,pl)
930 ENDPROC
940 DEFPROCdb(m$,x,y)
950 XX=d MOD256:YY=d DIV256:AX=10
960 CS=CHR$254+CHR$8+CHR$10+CHR$255
970 FORlen=1TOLENm$
980 BS=MIDS(m$,len,1)
990 ?d=ASC(BS):CALL&FFF1
1000 VDU23,254,d?1,d?1,d?2,d?2,d?3,d?3,
d?4,d?4
1010 VDU23,255,d?5,d?5,d?6,d?6,d?7,d?7,
d?8,d?8
1020 PRINTTAB(x+len-1,y)CS:NEXT
1030 ENDPROC
1040 DEFPROCcs
1050 SOUND0,-15,4,2
1060 ENDPROC
1070 DEFPROCcs2
1080 SOUND1,1,50,20
1090 ENDPROC
1100 DEFPROCch
1110 IFNP=2 PROCc2 ELSE PROCc4
1120 ENDPROC
1130 DEFPROCc2
1140 FORp=1T02
1150 win=p

```

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```

1160 FORI=0T04:FORJ=0T01+I-I DIV4
1170 IFp=1 sq=S(15-J,4-I)
1180 IFp=2 sq=S(J,11+I)
1190 IFSq<>p win=0
1200 NEXT:NEXT
1210 IFwin>0:p=3:GOT01230
1220 NEXT
1230 ENDPROC
1240 DEFPROCc4
1250 FORp=1T04
1260 win=p
1270 FORI=12T015:FORJ=0T03+(0=(I DIV 14
))*(14-I)
1280 IFp=1 sq=S(15-J,15-I)
1290 IFp=2 sq=S(J,I)
1300 IFp=3 sq=S(J,15-I)
1310 IFp=4 sq=S(15-J,I)
1320 IFSq<>p win=0
1330 NEXT:NEXT
1340 IFwin>0:p=5:GOT01360
1350 NEXT
1360 ENDPROC
1370 DEFPROCwin(w)
1380 FORI=8T011:VDU19,I,0;0;:NEXT:VDU19
,w+7,w;0;

```

```

1390 pl=w:PROCbs:PROCbx
1400 PROCs2:PROCdb("The winner is:",3,5
):COLOURw:PROCdb("Player "+STR$(w),6,9)
1410 PROCff:COLOUR7
1420 TS="Halma : Written by Jon Perry.
Press Return for another game, or Space
to end..."
1430 REPEAT
1440 PROCdb(LEFT$(TS,18),0,29):TS=MIDS(
TS,2)+LEFT$(TS,1)
1450 UNTILINKEY-99 OR INKEY-74
1460 ENDPROC
1470 DEFPROCff
1480 PX=0:SOUND2,0,0,3:SOUND3,0,0,6
1490 FORIX=0T016:FORDX=3T05
1500 PX=(PX+DX)AND31
1510 SOUND1,2,PX*4,2:SOUND2,3,PX*4,2:SO
UND3,4,PX*4,2
1520 NEXT:NEXT
1530 ENDPROC
1540 DEFPROCpl
1550 VDU19,pl+7,0;0;:pl=pl+1
1560 SOUND1,-12,40,4:SOUND2,-12,52,4:SO
UND3,-15,68+pl*8,4
1570 IFpl=NP+1 pl=1
1580 VDU19,pl+7,pl;0;:PROCbs
1590 PROCbx
1600 ENDPROC
1610 DEFPROCbx
1620 GCOL0,pl:pp=352+(4-pl)*128:FORI=32
T01120STEP1088:MOVEI,pp:DRAWI+128,pp:DRA
WI+128,pp+128:DRAWI,pp+128:DRAWI,pp:NEXT
1630 ENDPROC
1640 DEFPROCbs
1650 GCOL0,7
1660 FORI=352T0864STEP128:MOVE32,I:DRAW
160,I:MOVE1120,I:DRAW1248,I:NEXT
1670 FORI=32T01120STEP1088:MOVEI,352:DR
AWI,864:MOVEI+128,352:DRAWI+128,864:NEXT
1680 ENDPROC
1690 DEFPROCbo
1700 NI=12-NP:by=680+NP*28:IFNP=2 RESTO
RE 1800 ELSE RESTORE 1810
1710 FORI=1TONI:READCS
1720 ox=bx:oy=by
1730 IFCS="Y" by=by+56
1740 IFCS="X" bx=bx+56
1750 GCOL0,2:MOVEox,oy:DRAWbx,by
1760 GCOL0,1:MOVE1280-ox,1136-oy:DRAW12
80-bx,1136-by
1770 IFNP=4:GCOL0,4:MOVE1280-ox,oy:DRAW
1280-bx,by:GCOL0,3:MOVEox,1136-oy:DRAWbx
,1136-by
1780 NEXT
1790 ENDPROC
1800 DATA X,Y,X,Y,X,Y,X,Y,X,Y,Y
1810 DATA X,Y,X,Y,X,Y,X,Y,Y
1820 DEFPROCreloc(Q%):*T.
1830 PX=PAGE:IFPX<=Q% ENDPROC
1840 LX=TOP-PX:PRINTCHR$129CHR$136"ReLo
cating...."
1850 FORMX=0TOLX-1STEP4
1860 QX!MX=PX!M%:NEXT
1870 PAGE=QX:AX=138:XX=0:*FX15
1880 S&100="OLD"+CHR$13+"RUN"+CHR$6+CHR
$13
1890 FORLX=&100T0&108:YX=?LX
1900 ZX=USR&FFF4:NEXT:VDU21
1910 ENDPROC

```

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This listing is included in this month's tape & disc offer. See order form on Page 151.

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10 = 00	300 = C6CE E	600 = E362 A	930 = ED0F 6	1260 = 50C3 7	1590 = 1FE5 5
20 = 00	310 = 898F C	610 = E867 1	940 = A05C 2	1270 = 8BA9 6	1600 = ED0F 2
30 = 00	320 = ED0F 2	620 = 3DFC E	950 = D6BE 7	1280 = 903F 7	1610 = 8E60 1
40 = 8AFC C	330 = DF87 5	630 = F501 0	960 = 38D8 0	1290 = 5BA1 9	1620 = EABB 3
50 = FE6F E	340 = FAF6 7	640 = 8E7E 9	970 = 9EB2 8	1300 = 76A7 8	1630 = ED0F 3
60 = BC2B 9	350 = C435 9	650 = 2C9D A	980 = 95F0 4	1310 = B553 E	1640 = 3F0B E
70 = 331A B	360 = 24BD 7	660 = F4FF 5	990 = BECA B	1320 = 5F17 8	1650 = 63E9 4
80 = ED58 7	370 = ED0F 1	670 = DA7E 6	1000 = 3822 4	1330 = 24BD C	1660 = DA6B C
90 = EDA3 A	380 = B830 E	680 = FD2F 4	1010 = B722 B	1340 = 68CB 2	1670 = 37D3 2
100 = 7171 0	390 = A4E A	690 = D02B F	1020 = B538 D	1350 = 2C83 C	1680 = ED0F 6
110 = B924 2	400 = ED0F 7	700 = 27BD C	1030 = ED0F 8	1360 = ED0F 1	1690 = ECB6 3
120 = 3D01 B	410 = F28D F	710 = ED0F 0	1040 = 1C92 E	1370 = E3ED 2	1700 = 1BC8 D
130 = 895F E	420 = 3DFA 3	720 = 7CC0 9	1050 = C4BA 8	1380 = 1EDE 2	1710 = 1392 6
140 = 58D1 D	430 = 890E D	730 = 2C7E A	1060 = ED0F D	1390 = 4276 3	1720 = 2E1E 4
150 = FD2E 7	440 = A9CD 4	740 = FD3C C	1070 = 57AC 4	1400 = 9607 B	1730 = CA21 A
160 = 206D 6	450 = ECA7 A	750 = CC5B 1	1080 = A027 3	1410 = 3B05 8	1740 = DCBD 6
170 = AE15 A	460 = 3AA7 F	760 = A1E0 3	1090 = ED0F 6	1420 = 63FD F	1750 = C616 C
180 = 196B 3	470 = 3687 5	770 = 64F4 7	1100 = AF60 B	1430 = BFBA C	1760 = 3B30 0
190 = 5341 0	480 = 9FAB D	780 = ECB 6	1110 = F117 2	1440 = B0FC 2	1770 = FF8F D
200 = B149 A	490 = ED0F 4	790 = 5869 F	1120 = ED0F 7	1450 = 266F 1	1780 = 2C83 3
210 = 2062 0	500 = FC88 9	800 = F262 3	1130 = 54DF 8	1460 = ED0F 3	1790 = ED0F E
220 = 1B77 D	510 = A022 F	810 = 547B 3	1140 = 3E11 4	1470 = B15B 3	1800 = FBF 0
230 = 66C8 3	520 = BFBA 6	820 = 503D 1	1150 = 50C3 5	1480 = EE4C D	1810 = E3A1 E
240 = EA97 9	530 = D66A 1	830 = 7011 2	1160 = CA28 5	1490 = 2B6F E	1820 = 939C B
250 = ED0F A	540 = F23 E	840 = ED0F 0	1170 = 6B4 A	1500 = 5F49 7	1830 = 8F78 3
260 = 1D78 0	550 = A830 A	850 = AD7F 1	1180 = 7597 1	1510 = EBA1 0	1840 = 7545 E
270 = 25B4 4	560 = 6C0A F	860 = 90FD 2	1190 = 5F17 A	1520 = 24BD A	1850 = 5769 1
280 = DCA 9	570 = C629 C	870 = ED0F F	1200 = 24BD A	1530 = ED0F F	1860 = E316 C
290 = F901 8	580 = BFBA F	880 = C483 8	1210 = 7F75 0	1540 = B9C4 8	1870 = AF02 1
	590 = 301 D	890 = 78A3 2	1220 = 2C83 9	1550 = 8FA7 B	1880 = 889C 6
		900 = 8986 1	1230 = ED0F 1	1560 = 823D 8	1890 = 7ACF B
		910 = A567 2	1240 = 3419 3	1570 = ED29 5	1900 = 45A 0
		920 = 1BF2 9	1250 = 5ED7 8	1580 = 56A9 8	1910 = ED0F 5

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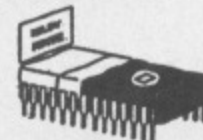
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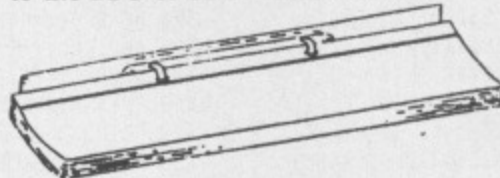
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FEATURE

◀ From Page 23

```

10 REM CodeCatcher
20 REM by Ian Fell
30 REM (c) The Micro User
40 MODE7
50 ON ERROR MODE7:REPORT:PRINT" at ";
ERL:END
60 master=(INKEY-256=253)
70 IF master PROCinit_shadow
80 CLS:PRINT:PRINT:PRINT
90 PROCsetup
100 PROCchoice
110 DIM cnt%26, store%(26,2)
120 FOR AX=0 TO 26:cnt%AX=0:NEXT
130 VDU28,0,23,39,1:CLS
140 PROCdisplay
150 PROCletcount
160 PROCbubble
170 RESTORE 1960
180 FOR DX=1 TO 26:READ a$
190 store%(DX,2)=ASCa$:NEXT
200 PROCreplace
210 PROCguess
220 REPEAT:PROCalter
230 PROCturnabout:UNTIL FALSE:END
240 DEFPROCsetup
250 AX=0:BX=0:CX=0:DX=0:FX=0:GX=0:IX=0
260 JX=0:LX=0:PX=0:QX=0:TX=0:UX=0:VX=0
270 WX=0:XX=0:YX=0:C1%=0:C2%=0

```

```

280 flag%=0:lp1%=0:lp2%=0:recl%=0
290 temp%=0:GS="":TS="":temp$=""
300 col$="":record$="":alph$=""
310 ENDPROC
320 DEFPROCchoice
330 PROCmenu
340 IF GX=1 PROCinput:ENDPROC
350 IF GX=2 PROCunstore:ENDPROC
360 IF GX=3 VDU26:CLS:END
370 ENDPROC
380 DEFPROCmenu
390 PROCscreen("CodeCatcher",2,3)
400 REPEAT:CLS:PRINT
410 PRINT"CHR$134SPC5"1. Type data"
420 PRINT"CHR$134SPC5"2. Read file"
430 PRINT"CHR$134SPC5"3. Quit"
440 GX=FNgetchoice(3,1)
450 ENDPROC
460 DEFPROCscreen(T$,C1%,C2%):VDU26,12
470 C1$=CHR$(144+C1%)
480 C2$=CHR$(128+C2%)
490 PROCline(C1$):PRINT
500 TS=STRINGS((36-LENTS)/2,"")+TS
510 FOR IX=1 TO 2:PRINTC2$CHR$141TS:NE
XT
520 PROCline(C1$):PRINTTAB(0,24);
530 PROCline(C1$):VDU28,0,23,39,5
540 ENDPROC
550 DEFPROCline(col$):PRINT col$;
560 FOR IX=1 TO 38:VDU172:NEXT:ENDPROC
570 DEFNgetchoice(C%,L%):PRINT
580 PRINT"CHR$133SPC5"Enter choice ";

```

```

590 *FX15,1
600 REPEAT GX=GET-48
610 UNTIL GX>=LX AND GX<=CX
620 PRINT GX:=GX
630 DEFPROCinput
640 DIM MX1000,NX1000:CLS
650 PRINTCHR$134"Type message":PRINT
660 REPEAT
670 VX=GET
680 IF VX=127 PROCdel ELSE MX?XX=VX:VD
UVX:XX=XX+1
690 UNTIL VX=13
700 FOR PX=1TOXX:NX?PX=MX?PX:NEXT
710 ENDPROC
720 DEFPROCdel:IF XX=0 VDU7:ENDPROC
730 VDU VX:XX=XX-1:ENDPROC
740 DEFPROCunstore
750 PRINT"CHR$131SPC5"Loading data:"
760 X=OPENIN"message"
770 INPUT#X,XX
780 DIM MXX,NXX
790 FOR YX=1TOXX:MX?YX=BGET#X:NEXT
800 CLOSE#X:PROCcopy:ENDPROC
810 DEFPROCdisplay:PRINT
820 FOR YX=1 TO XX:VDU MX?YX:NEXT
830 PRINT"CHR$134SPC3"DECODING ..."
840 PRINT"this can take some time!";
850 ENDPROC
860 DEFPROCletcount
870 RESTORE 1960
880 FOR AX=1 TO 26:READ temp$
890 store%(AX,1)=ASCtemp$

```

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```

900 FOR Y%=1 TO XX
910 IF M%?Y%=ASCtemp$ cnt%?A%=cnt%?A%+
1
920 NEXT:NEXT:ENDPROC
930 DEFPROCbubble
940 LOCAL lp1%,lp2%,last%
950 last%=25
960 FOR lp1%=1 TO 26:flag%=0
970 FOR lp2%=1 TO 25
980 IF cnt%?lp2%<cnt%?(lp2%+1) PROCswa
p(lp2%,lp2%+1):flag%=1
990 NEXT
1000 last%=last%-1
1010 IF flag%=0 lp1%=26
1020 NEXT:ENDPROC
1030 DEFPROCswap(rec1%,rec2%)
1040 spare%=cnt%?rec1%:temp%=store%(rec
1%,1)
1050 cnt%?rec1%=cnt%?rec2%:store%(rec1
%,1)=store%(rec2%,1)
1060 cnt%?rec2%=spare%:store%(rec2%,1)=
temp%
1070 ENDPROC
1080 DEFPROCguess:IF NOTmaster ENDPROC
1090 *FX112,2
1100 CLS:VDU23;8202;0;0;0;0;26
1110 PROCline(C1%):PRINTTAB(0,22);
1120 PROCline(C1%):PRINT'CHR$133' Sugge
sted codes: Return to toggle"
1130 PRINTTAB(0,24);:PROCline(C1%)
1140 VDU28,0,21,39,1:CLS:PRINT:DX=1
1150 PROCformat
1160 PRINT;cnt%?DX%";G$;
1170 FOR DX=1 TO 26
1180 PROCformat
1190 IF cnt%?DX%<cnt%?(DX-1) PRINT;cnt%
?DX%";G$;:PROCcolour:PRINTCHR$store%(DX
%,1)="'CHR$store%(DX%,2)CHR$135:ELSE PROCc
olour:PRINTCHR$store%(DX%,1)="'CHR$store%
(DX%,2)CHR$135;
1200 NEXT:*FX112,1
1210 ENDPROC
1220 DEFPROCformat
1230 G$=STR$cnt%?DX%:F%=LENG$
1240 G$=STRING$(3-F%," "):ENDPROC
1250 DEFPROCcolour
1260 IF store%(DX%,1)=W% VDU8,129
1270 IF store%(DX%,1)=U% VDU8,129
1280 ENDPROC
1290 DEFPROCreplace
1300 FOR Y%=1TOXX:P%=M%?Y%
1310 PROCchange:NEXT:*FX21
1320 PROCupdate:ENDPROC
1330 DEFPROCchange
1340 FOR Q%=1 TO 26
1350 IF store%(Q%,1)=P% M%?Y%=store%(Q%
%,2)
1360 NEXT:ENDPROC
1370 DEFPROCalter
1380 VDU28,0,23,39,23
1390 VDU23;29194;0;0;0;12
1400 temp$="":PROCOptions
1410 PROCtransfer
1420 FOR Q%=1TO26:IF store%(Q%,2)=W% st
ore%(Q%,2)=42
1430 NEXT:FOR Q%=1TO26:IF store%(Q%,2)=
U% store%(Q%,2)=W%
1440 NEXT:FOR Q%=1TO26:IF store%(Q%,2)=
42 store%(Q%,2)=U%
1450 NEXT:VDU28,0,23,39,1
1460 PROCguess:ENDPROC
1470 DEFPROCOptions
1480 PRINTCHR$133'Back([) End(@) Swap(A
-Z) or Return :";temp$=GET$:PRINT
1490 IF temp$=CHR$13 PROCtoggle:REPEAT
UNTIL GET:PROCtoggle:GOTO1480

```

```

1500 IF temp$="@ PROCTransfer:PROCLast
code:END
1510 IF ASCtemp$<65 OR ASCtemp$>91 VDU7
:GOTO 1480
1520 IF temp$="[" IF LENrecord$>1 PROCb
acktrack:ENDPROC:ELSEIF temp$="[" AND LE
Nrecord$<2 VDU7:GOTO 1480
1530 W%=ASCtemp$
1540 PRINTCHR$133SPC7'Change to what (A
-Z) : ";temp$=GET$:PRINT
1550 U%=ASCtemp$
1560 IF U%<65 OR U%>91 VDU7:GOTO 1480
1570 PRINTCHR$133'Making alterations";
1580 record$=record$+CHR$W%+CHR$U%
1590 ENDPROC
1600 DEFPROCtransfer
1610 FOR Q%=1TO26:store%(Q%,1)=store%(Q
%,2):NEXT
1620 ENDPROC
1630 DEFPROCtoggle:IF NOTmaster VDU7:EN
DPROC
1640 TX=TX+1:IF TX>2 TX=1:VDU23;29194;0
;0;0;:ELSE TX=2:VDU23;8202;0;0;0;
1650 OSCLI'FX113,"+STR$TX
1660 ENDPROC
1670 DEFPROCbacktrack
1680 U%=ASCRIGHT$(record$,1)
1690 record$=LEFT$(record$,LENrecord$-1
)
1700 W%=ASCRIGHT$(record$,1)
1710 record$=LEFT$(record$,LENrecord$-1
)
1720 ENDPROC
1730 DEFPROCcopy

```

```

1740 FORDX=1TOXX:N%?DX%=M%?DX%:NEXT
1750 ENDPROC
1760 DEFPROClastcode
1770 VDU28,0,23,39,1:CLS:PRINT
1780 alph$="ABCDEFGHIJKLMNQRSTUWXYZ"
1790 FOR DX=1TOXX
1800 J%=INSTR(alph$,CHR$N%?DX%)
1810 IF J%>0 PRINT" 'CHR$N%?DX%="CHR$M%
?DX%;:alph$=LEFT$(alph$,J%-1)+MID$(alph$,
J%+1,LENalph$)
1820 NEXT:PRINT'
1830 PRINTCHR$134alph$+' do not appear"
1840 PRINT:ENDPROC
1850 DEFPROCturnabout
1860 FOR -Y%=1TOXX:IF M%?Y%=W% M%?Y%=42
1870 NEXT:FOR Y%=1TOXX:IF M%?Y%=U% M%?Y
%=W%
1880 NEXT:FOR Y%=1TOXX:IF M%?Y%=42 M%?Y
%=U%
1890 NEXT:PROCupdate:ENDPROC
1900 DEFPROCupdate
1910 VDU28,0,23,39,1,12:PRINT
1920 FOR Y%=1TOXX:VDU M%?Y%:NEXT
1930 PRINT'TAB(0,21);:PROCline(C1%)
1940 IF master THEN *FX113,1
1950 ENDPROC
1960 DATA E,T,A,O,N,I,S,H,R,D,L,C,U,F,M
,P,B,W,G,Y,V,K,X,Q,J,Z
1970 DEF PROCinit_shadow
1980 *SHADOW 1
1990 *FX112,2
2000 CLS
2010 *FX112,1
2020 ENDPROC

```



This listing is included in this month's tape & disc offer. See order form on Page 151.

10 = 00	350 = DDA4 4	690 = 1446 C	1030 = F56C 8	1370 = BA37 E	1710 = D232 9
20 = 00	360 = FC6B A	700 = E970 1	1040 = A97B 6	1380 = B2B9 0	1720 = ED0F 5
30 = 00	370 = ED0F 6	710 = ED0F 6	1050 = FD92 3	1390 = 2469 F	1730 = 391 5
40 = 8AFC C	380 = 87FA 6	720 = 20DB 9	1060 = 54FE D	1400 = ED06 F	1740 = ACEC 8
50 = 693D 2	390 = FE13 C	730 = A4BB 3	1070 = ED0F 5	1410 = 1F49 8	1750 = ED0F 1
60 = 6CC9 0	400 = 58F0 0	740 = 9342 F	1080 = 419F F	1420 = 3E6 4	1760 = 5EBC B
70 = 4B8F E	410 = CC98 F	750 = 16FC 2	1090 = E9B6 C	1430 = ED6F 6	1770 = A9AA D
80 = B388 F	420 = B32C 7	760 = 310F E	1100 = 7A4C 9	1440 = 19D3 4	1780 = 2D9C C
90 = 81CC A	430 = 1F33 4	770 = 9092 B	1110 = 60 D	1450 = 24C7 C	1790 = A8DE 2
100 = 2FCE 1	440 = 8B33 3	780 = 1E84 3	1120 = B90D 8	1460 = BC3 B	1800 = 1B49 7
110 = 6FEE 5	450 = ED0F F	790 = 87C9 1	1130 = BC15 4	1470 = BC4C 9	1810 = 5B4 9
120 = FCC2 9	460 = E026 6	800 = 3924 5	1140 = 9BBC F	1480 = DCBB F	1820 = CB7D 6
130 = A747 0	470 = 3F28 2	810 = 1191 8	1150 = 9188 3	1490 = B513 F	1830 = B66 5
140 = 2F83 7	480 = 31B 1	820 = F48D 8	1160 = 2745 D	1500 = D1FD 2	1840 = D333 F
150 = 987D 0	490 = 1A4C 2	830 = 784 B	1170 = C0BB E	1510 = 7130 C	1850 = DB90 A
160 = 9607 3	500 = 94E7 F	840 = 5631 F	1180 = 9188 0	1520 = 5B79 7	1860 = 69DA 1
170 = B9F 4	510 = 51AB 9	850 = ED0F 1	1190 = CE03 1	1530 = FFAA 1	1870 = DF08 8
180 = 489C 2	520 = B2C0 7	860 = 12FE 4	1200 = E557 A	1540 = 405 9	1880 = 708 6
190 = 295F C	530 = DF17 A	870 = B9F 3	1210 = ED0F 7	1550 = 39CD A	1890 = CE78 9
200 = FFF7 4	540 = ED0F 3	880 = 3040 4	1220 = F109 5	1560 = 32BA 0	1900 = F307 6
210 = F9A1 4	550 = 26DC 5	890 = 2784 A	1230 = 7C1D 2	1570 = F898 7	1910 = 376C 1
220 = BEA3 A	560 = C083 B	900 = BC5 5	1240 = 77C4 9	1580 = 8422 F	1920 = 545 A
230 = 70BB 6	570 = 56D7 8	910 = 4ABC 9	1250 = CAE4 4	1590 = ED0F 6	1930 = E2E1 B
240 = 2AA8 8	580 = D9F5 6	920 = BB05 D	1260 = 80D9 9	1600 = 95CA 5	1940 = CC36 F
250 = 118F A	590 = 7CA7 1	930 = F686 2	1270 = 46BE 4	1610 = DBA3 2	1950 = ED0F 8
260 = 2442 6	600 = 6B56 3	940 = 34F A	1280 = ED0F 9	1620 = ED0F 9	1960 = C2AC A
270 = FFCC 4	610 = BBFC A	950 = 8176 4	1290 = 1251 1	1630 = 4A7F 1	1970 = 3C43 8
280 = D5D5 1	620 = CE3D 5	960 = 10E9 F	1300 = B731 F	1640 = 6B44 6	1980 = F352 D
290 = 18FF 2	630 = EA07 2	970 = 8683 1	1310 = 4B1B 4	1650 = 69E5 4	1990 = E9B6 E
300 = 8669 7	640 = 1165 F	980 = C36F A	1320 = BBA7 1	1660 = ED0F 2	2000 = 7A16 6
310 = ED0F 3	650 = 86B1 7	990 = 2C83 1	1330 = A441 5	1670 = 4184 2	2010 = D9D5 C
320 = 4F4F 0	660 = BFBA F	1000 = 369 8	1340 = E489 8	1680 = E3D5 6	2020 = ED0F 1
330 = 6D0D 9	670 = A912 2	1010 = 7A7D E	1350 = 672E 0	1690 = D232 7	
340 = 2202 F	680 = A1B6 0	1020 = E531 4	1360 = E531 C	1700 = AE0C 5	

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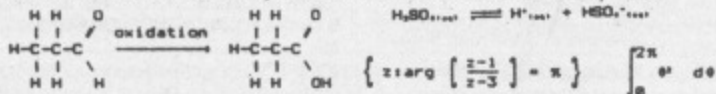
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MICRO HELP



5 Hill Terrace, LLANDUDNO, Gwynedd, LL30 2LS. Telephone (0492) 76925

£10 Prize letter

OWNERS of the Master 128 may be interested in the following routine I have written for use with the Edit text processor. It lists out a Basic program to the printer with a single blank line before every DEF instruction beginning a line and, in assembly language, after every RTS, BRA or JMP instruction which terminates a line.

The instructions can be in upper or lower case and line numbers do not affect it. This produces a listing which is far easier to follow for programming and debugging purposes.

To enter the routine type *EDIT followed by Return, leave a blank line at the beginning and type the commands in the table below – but not the comments which are in italics. You should type

a space at the end of the last line of the routine.

The following global replace commands are needed to set the special codes in the file. Press f5 followed by the command and Return:

```
Z/!:+
W/!:/
V/!;!E
U/!;!H
```

Next save the file as PP and whenever you want to use it press f1 and type:

```
EXEC PP
```

Normally the listing produced by the routine is in condensed mode which I find

makes debugging easier. The line responsible reads .on15, so this can be omitted or altered if required.

The first six lines of the routine are print formatting statements. If lines are added or deleted the number of Zs in the last line must be altered so that there is one more than the number of lines.

When the listing has been printed it is returned to normal except that the blank lines are left. If the routine is called again it deletes and re-inserts them before printing.

The technique could be used to perform other operations on the text by changing the global replace commands. — **Matthew Mason, Bexhill-on-Sea, East Sussex.**

.pl66	Fan-fold paper length	V / ! J	Print spaces as single
.he.fo.en.en	Blank footer and header	V\$* ! J* #DEF/\$&	Blank line before DEF
.on15	Condensed mode	Vrts\$/&\$	Blank line after rts
.nj	No justification	Vjmp*~\$/&\$	Blank line after jmp
.l1255	Max line length	Vbra*~\$/&\$	Blank line after bra
.ccl	Control character *	UPC	Print listing
V\$\$/\$	Delete blank lines	W!!!!!!V ! J/	Return to normal

Teaching the teachers

IN reply to the letter from P. Jones in the December 1987 issue of *The Micro User*: While the person in charge of computer studies in many schools may be a maths teacher, I argue that whichever department is in charge of computers it will confine their use to that department.

But even if the Maths Department is in charge, micros rarely become glorified calculators. On the contrary, many schools use them as valuable learning tools.

The notion that computer studies should not be taught as a subject in its own right is rubbish. In today's highly competitive society com-

puters are essential, and it is only proper for computing to be taught as a separate subject.

I agree that micros can and should be integrated into all parts of the curriculum, but this should not negate computer studies as a separate course.

I also agree that to have a dedicated teacher – qualified in computer studies – would be the most desirable course of action for many schools, but the simple fact is that in an age of rampant government cuts and economies there is often little or no money available to employ such staff.

In my own school, for

instance, computers are already used across the curriculum. BBC Micros are used by, among others: Science, English, Careers, Business Studies, Special Needs, Humanities, CDT and the school library.

I believe that this shows that their use is conducive to the promotion of, at least, all round computer awareness – if not all round computer literacy. This is, after all, our main aim.

I hope that this will provide some comment – or at least the other side of the argument. — **P. Matfield, 6th Form pupil and Library Computer Manager, The Boswells School, Chelmsford.**

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Telesoftware text files

I BOUGHT a Morley Teletext Adapter via your special offer in August 1987 and since then I have been impressed with the facilities available to me, especially the quality of the free telesoftware – a good deal of which has appeared in the pages of *The Micro User* at some time.

Most of this software has accompanying text files for use with the DFS command *TYPE.

I was wondering if you could explain how to create such a text file, as I would be interested in adopting this method of instruction in my future programs. — **Paul Cannon, Farnborough, Hants.**

● Just use a word processor to write your text, set up the page left margin and line length to match the screen mode you want to use, and save the file with an Ascii or spool option. This will create a pure text file that you can *TYPE to screen.

You can use it in conjunction with Mike Bibby's Windows article in the February 1988 issue of *The Micro User*.

Zapper zapped

You had an ADFS/DFS editor utility in your April issue, but when I tried to type it in I found line 410 would not fit in one line as printed. What should I do? — **Jeff Clifford, Wokingham, Berkshire.**

● Unfortunately, unknown to us, the program was written

Turn to Page 144 ►

◀ From Page 143

with the Basic Editor, which allows longer lines. However it can be split like this:

```
410 If file$="ADFS"maxsect
or%15:PROCgetsec(0,0):maxt
rack%=((secmem%252)+(secme
m%253)*256)/16-1
415 If file$="DFS" AX=6:XX
=&70:Y%=0:!!&71=secmem%:CALL
osgbpb:drive%=(secmem%+1)-
48:maxsector%=9:AX=&7E:XX=&
70:Y%=0:CALLosword:maxtrack
%=&70/&19000*40-1
```

Looking for the book

I HAVE been trying for 18 months to acquire a copy of the book *Computing for all the family* by Tony Noble. I have been told that it is out of print and our library seems unable to find a copy.

Do any of your readers know where I can obtain one? It is an ideal starter book and would be very much used by my learners among the residents in the home where I run the computer section. — Miss M.R. Darby, Senior Computer Instructor, St. Michael's Cheshire Home, Axbridge, Somerset, BS26 2DW.

NLQ italics with Epson

IT IS not possible to print italics in NLQ with Epson's new budget price LX-80, and LX-86 printers. So here is a short program to do this task:

```
10 VDU2
20 VDU 1,27,1,120,1,0
30 VDU 1,27,1,69
40 VDU 1,27,1,71
50 VDU 1,27,1,52
60 FOR X%=0 TO 4
70 FOR C%=32 TO 127
80 VDU C%
90 NEXT: NEXT
100 VDU 3
```

Here's how the program works: Line 20 sets it into Draft mode, so it can do italics.

Line 30 sets Emphasised print to add more dots, line 40 sets Double-Strike mode to add even more dots, line 50 sets Italics and you have NLQ Italics. Lines 60 to 100 just print the LX-80/LX-86 character set. — R.J. Speight, Fownhope, Herefordshire.

Compressed sweaters

WHEN using the *Knitwear Designer* program from The Micro User I found the printer routine included gave a full size printout and not a compressed one, so the appearance was slightly untidy.

This can be cured by adding a printer driver to the !BOOT file. Type:

```
*BUILD !BOOT
```

followed by Return then enter:

```
1 VDU2,1,27,1,15,1,3
2 *DIR F
3 CH."PATMENU"
```

This runs on Star SG10 and Panasonic KX-P1081 printers and should work on any Epson-compatible machine. — Steve Ward and Bill McLean, Dunoon Grammar School, Dunoon, Argyll.

Borrowed battles

RAM Wars in the January issue of The Micro User is the most interesting and original game I have seen. I also thought of it as a way to program and play at the same time, and I thoroughly enjoy both.

I have devised a battle program of my own, although I don't know if it works yet since I haven't typed it in. In fact, I'm still typing in another pro-

gram, the machine code checksums, the earlier version of which I missed. Here is my battle program:

```
10 REM JUMPER
20 .Loop
30 ADD #1 target
40 JMZ (target) Loop
50 JMP (target)
60 .target
70 DAT #10
80 END
```

I am not sure whether or not this is correct, but the idea behind it is that it searches for another battle program, and then jumps to it, thus becoming a clone of it in exactly the same place.

It won't get destroyed unless the other battle program destroys itself, forcing a draw.

Unfortunately it is not very long, so may lose for being smaller. Could this be amended by putting useless lines from lines 80 onward to falsely lengthen it? — Stephen Minton (age 13), Rugby, Warwickshire.

● Cunning, Stephen. Ram Wars certainly stirred up a lot of interest. Your fake lines would work, but we call it cheating a bit.

If any other readers have any battle programs, why not let us have them?

Chunky characters

THE characters in Mode 2 are wide and chunky so I decided to plan out all the capital letters and numbers using only three pixels horizontally and

one more to separate them. The only problem with doing this for Modes 2 and 5 is that it takes 600 bytes of storage.

But I've now found a far better way, a routine that only takes up 97 bytes — without the REMs — in Basic. You have to change three operating system bytes. Here's the listing:

```
10 MODE2
20 REM No. of colours
30 ?&360=83
40 REM Characters/line
50 ?&30A=827
60 REM Bytes/character
40 ?&34F=810
50 VDU19,2,2;0;
60 VDU19,1,3;0;
70 VDU19,3,7;0;
```

Different VDU19 commands can produce many interesting results. Remember that you can only use three colours (excluding the background) with this change. — Andrew Gordon, Wheathampstead, St.Albans, Herts.

Mode 2 preview

I HAVE just bought your excellent *Mini Office II* suite of programs and I'm generally very satisfied, but have a minor problem with the graphic module — I get a small gap between each line of a printout. Can you please help me to remedy this?

A tip for other users of the package who have no shadow screen and want to view text in 80 column format: Just

Turn to Page 146 ▶

Architects' sketch

I READ with interest the review in the February edition of The Micro User of the Fernleaf program *Fletcher's Castle*.

Having used the program for a number of years with groups of 11-year-olds, I have always found the program well received by pupils studying Norman England.

They generally use it with enthusiasm and enjoy seeing how their efforts result in the castle being built. Discussion

generated by the program has been considerable, and helps class work in general on motte and bailey castles.

I would agree that, when compared with some programs produced in more recent years, the graphics used lack sophistication, but I have never found that this interferes with the enjoyment of using the program.

Here are the opinions of a group of pupils who have used

Dear Micro User,
We think the Fletcher's Castle Game is brilliant. We used it on the Computers at St Michael's and all our class enjoyed it very much. We did the game (in one lesson) making it in eight days.

Yours
sincerely,
Anna Veal, Sara Lowry,
Corrina Cottrell,
Natalie Dolton and
Joanna Haigh.

Fletcher's Castle recently and completed building the castle in eight days. — M.L. McGuire, St. Michael's Middle School, Wimborne, Dorset.

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these problems only affect a few areas of the country. However if you have any doubts as to the quality of signal available in your area you should contact the BBC Technical Support Service during office hours on 01-927 5040.

TO ORDER PLEASE USE THE FORM ON PAGE 151

◀ From Page 144

save the file in Ascii – not Mini Office II format – exit the suite and put the micro into Mode 3. Then enter:

```
*TYPE filename
```

and the 80 column text file will then be displayed. – **Daniel C. Davies, Camberley, Surrey.**

● We can only assume that your printer is not fully Epson-compatible and the line spacing is not being adjusted correctly.

You will have to delve into the mysteries of your printer manual and see if you can adjust the spacing before entering the graphics module.

A point about your tip is that the total length of the line plus left margin should not exceed 79 characters, otherwise wraparound will spoil the effect.

Pupil power at the keyboard

AFTER Mick Nadals' letter in the May issue of The Micro User, I feel I ought to comment on the state of play with regard to micros at my school.

I have always enjoyed using them and have two micros including a BBC B. Towards the end of my time at primary school they bought a micro and, although using it was fun, we had to do our own work on it and I was in the position of being able to teach teachers.

Things haven't changed at secondary level. Since I have been there – about four years – they have bought about 11 micros. We used these in the first and third years, but after that there was a change which meant that computer studies is no longer taught at secondary level.

The teachers said that the micros will still be used in normal classroom activity, but this is obviously a luxury, and it doesn't happen often.

However, the school continues to get publicity in the local press when it gets new equipment – most recently a cash sum of £18,000 and many old computers donated

by an expanding company.

While the press reports made good of this, I can't help feeling that getting obsolete technology – even as a gift – is a bit of an insult.

Too many people are glad to hear of money being spent on micros, but what is the point when:

- We hardly use them.
- Pupils have to sit three to a micro when they are used.
- The computer studies teacher claims little knowledge of the system.
- Members of the class who aren't confident don't ask the teacher to help: They ask another pupil who knows what he's talking about. – **Tim Gown, Diss, Norfolk.**

Roms clash with games

I HAVE recently installed the Word-Ex and Morley Teletext roms into my Model B micro and now some of my games do not work, unless I remove either, or in some cases both of them.

I then installed a Watford Rom Manager and switched off the offending roms, which I confirmed by typing *HELP. However, the games still would not work.

Can you explain why this does not cure the problem and what can be done about it? – **G. H. Battershall, Upper Colwyn Bay, Clwyd.**

● We haven't had any problems with Word-Ex, but perhaps you should use the Rom Manager to switch itself off too – you'll have to press Break as well to make sure PAGE is set to its proper value. If you've tried all this without success we can only assume that you've somehow damaged your machine while inserting the roms.

April showers

I BUY The Micro User every month and would like to congratulate you on its fine presentation and content. I would like to say a hearty "Ha Ha" – and also strangle – Peter Davidson for his April Fool

Supershift enhanced

£10 Prize letter

THE View utility in the April issue – Supershift by Chris Nixon – is very useful, even for someone who types easily. However, having used it I began to wonder why he had made it to handle so small a number of symbols. It is customary to put a space after all punctuation marks and after both @ and &.

Equally, the symbols % and) are natural word-enders, while Q and u always go together. To increase the value of Supershift in my own work I have therefore added slightly to the program.

The line numbering is not as idiosyncratic as it may appear: The lines were typed into Supershift after I had entered it exactly as it appeared in The Micro User.

```
300LDA char:LDA #11
420CMP #ASC",":BEQ nocaps
421CMP #ASC":":BEQ nocaps
422CMP #ASC":":BEQ nocaps
423CMP #ASC"&":BEQ nocaps
424CMP #ASC"%":BEQ nocaps
425CMP #ASC"@":BEQ nocaps
426CMP #ASC")":BEQ nocaps
427CMP #ASC"q":BEQ kew
428CMP #ASC"Q":BEQ kew
491.kew
492JSR insert:LDA #117
493STA char:JMP exit
640FORLX=1T012
741DATA":
742DATA")"
743DATA"@
744DATA"%
745DATA"q"
746DATA"Q"
```

If the above modifications are typed separately and saved by *SPOOL and LIST instead of SAVE they can be added to Supershift by *EXEC. – **David C Arnold, Nr. Bathford, Avon.**

checksum program – but can it be done?.

Also, I have two model Bs and use a Canon PW-1080A printer for which I would dearly like to have a screen dump routine. Could you tell me if one has ever been published in the magazine?

I tried an Epson routine, as I believe the two printers are quite similar, but this did not work. If a Canon routine is not available would it be possible to adapt an Epson one to suit? – **John Morrell, Lytham St. Annes, Lancs.**

● Unfortunately a real checksum to program converter is impossible. The checksums are not completely unique. Some lines will produce the same one as other lines, so no program could figure out what line produced a given checksum.

The important point about checksums is that tiny differences between lines produce dramatically different checksum values, so incorrect copying is easy to spot.

On your main point, no specific screen dump has been published for that printer. Can any reader assist?

Teletext tuning

IN addition to the points made in my letter in the May 1988 issue of The Micro User you may find it useful to rough tune the Acorn teletext adapter using the tuning display and then fine tune it with a teletext page – noting in particular the stability of the header.

After success the tuning display may show no teletext but that is irrelevant. – **David Richmond, Scarborough, North Yorks.**

● This is good advice for people with manually-tuned Acorn teletext adapters – especially in weak reception areas.

More modern adapters – like the one from Morley – have electronic tuning.

Receiving random data

I WOULD like to know if there is a simple and compact method of receiving data in a

random order from DATA statements.

Usually data is received in the order that it comes after the DATA statement but this can be a nuisance if, for example, you are writing a quite slow game in which you do not want the questions to occur in a particular order. — **Jeremy Mears, Cheltenham, Glos.**

● Ways of dealing with random numbers were described in detail in the first issue of *The Micro User*. In case you haven't got it, or can't find anyone who has, here's a short program to do what you want based on the algorithm given in that article.

```

10 REM Random data
20 READ Q%
30 DIM Q%(Q%)
40 C%=0
50 REPEAT
60 C%=C%+1
70 R%=FNchoose
80 PROCoutput
90 UNTIL C%=Q%
100 END
110 DEF FNchoose
120 REPEAT
130 R%=RND(Q%)+1
140 UNTIL Q%(R%)=0
150 Q%(R%)=1
160 =R%
170 DEF PROCoutput
180 RESTORE 250
190 FOR LX=1 TO R%
200 READ Q$
210 NEXT
220 PRINT Q$
230 ENDPROC
240 DATA 10
250 DATA One
260 DATA Two
270 DATA Three
280 DATA Four
290 DATA Five
300 DATA Six
310 DATA Seven
320 DATA Eight
330 DATA Nine
340 DATA Ten

```

Write protection

FROM time to time we hear about BBC Micro owners complaining of the lack of separately available write protection tabs for floppy discs. I use pieces cut from a roll of black insulating tape and this works perfectly. Don't use red or transparent tape as infra-red notch detectors can see through it. — **M.J. Cawood, Marford, Wrexham, Clwyd.**

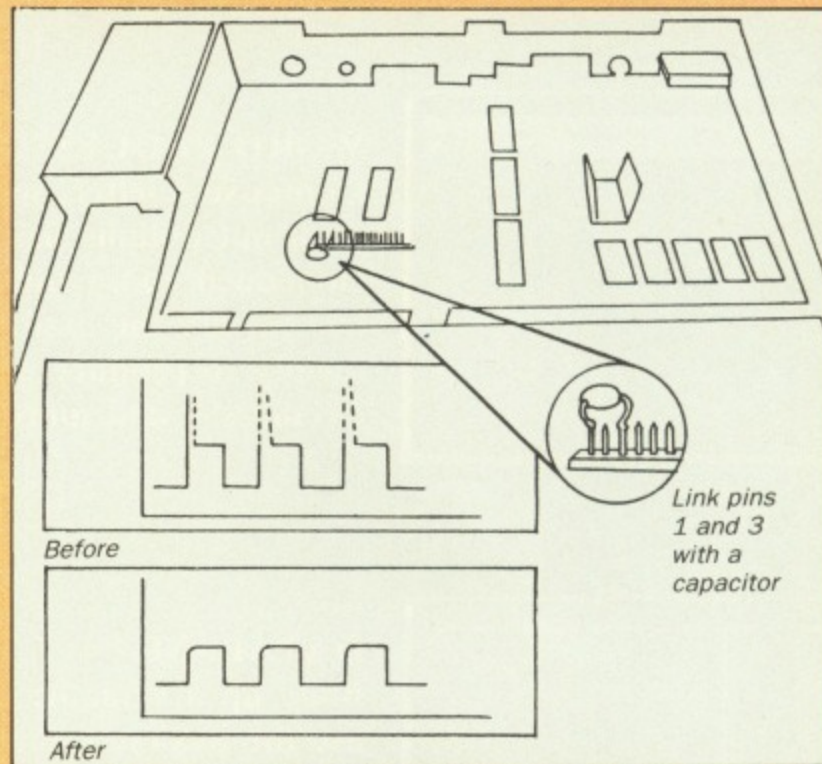
Keyboard clash solved

HAVING bought a Viglen console I had some problems running games, and the cause seemed to be the coiled cable to the keyboard. However, the solution proved to be quite simple.

I measured the signal on the leads with an oscilloscope. It turned out to be 1MHz. The rising edges of the square wave were very steep and there was a cross-talk from this signal to the other leads.

This meant the micro knew that a key was being pressed, but not which one, and so it was going berserk.

The solution was to solder a 1nF capacitor over pins 1 and 3 of the keyboard connector on the Model B board. — **F. Kluivingh, The Netherlands**



£10 Prize letter

Interesting results

I HAVE got one of those awful charge cards which never seem to be paid off. You know the type "Just pay £10 a month and you can buy..." I stopped using it some time ago when I realised just how exorbitant the interest payments really are.

Next thing, my wife asks me: "Haven't you paid that thing off yet? When will it be clear? Why don't you increase the payments so that it clears quicker?"

Then I vaguely remembered David Wilson's routine on loan repayments which was published in a past issue of your magazine.

However rather than go searching through my back issues I cobbled together this quick routine to answer my wife's questions.

I think it works rather well, especially as most, if not all, charge cards have their interest added monthly and not

quarterly. — **Paul Bownes, Anfield, Liverpool.**

```

10 REM Interest
20 MODE 7
30 INPUT "What is the opening balance",X
40 INPUT "What monthly payment is to be paid",P
50 INPUT "What is the APR",I
60 PRINT "What follows is a list of new balance's statements so that you can see the effect of increased payments or changes in the interest rate (APR)"
70 PRINT "Press Space after each statement" until balance is zero"
80 PRINT:PRINT "Press Space now to start"
90 PROCspace:CLS:C=0
100 REPEAT
110 Y=((X-P)*I)/100/12
120 R=X-P+Y:C=C+1
130 IF R<0 R=0
140 IF C<10 S%=3 ELSE S%=2
150 S%=STRING$(S%," ")
160 @X=10:PRINT:S=C;SPC2;
170 @X=131594
180 PRINT "New balance = "
R
190 X=R:PROCspace
200 UNTIL R=0
210 PRINT:PRINT "Press Space for new run"
220 PROCspace:RUN
230 DEF PROCspace
240 REPEAT UNTIL GET=32
250 ENDPROC

```

Sending Email messages

CAN readers of *The Micro User* send messages to you direct using MicroLink or Prestel? Thanks for a great magazine. — **Chris Hunt via Prestel**

● Send your mail to MAG001 on MicroLink or 614568383 on Prestel. Please include the area you live in — like Manchester or Glasgow — so that we can include it if we print your letter.

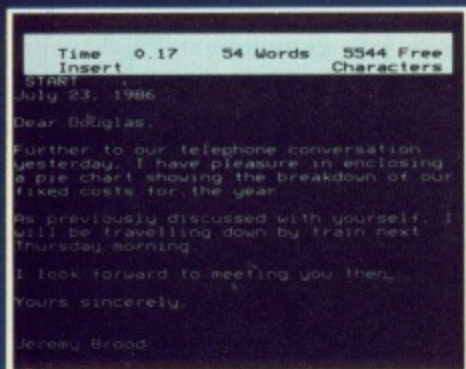
Z88 tips

I HAVE a BBC Master but spend a lot of time travelling away from a mains supply. Now, with a Z88, I have a real answer to on-the-spot computing.

Here are a couple of tips for new users: You must always specify the colon in front of :RAM.—/S.sgn files and, when you've written a Basic program in Pipedream, set the margin — ◊H — to 255.

Yours in haste (to get back to my Z88). — **Rod Borland, Hibberdene, South Africa.**

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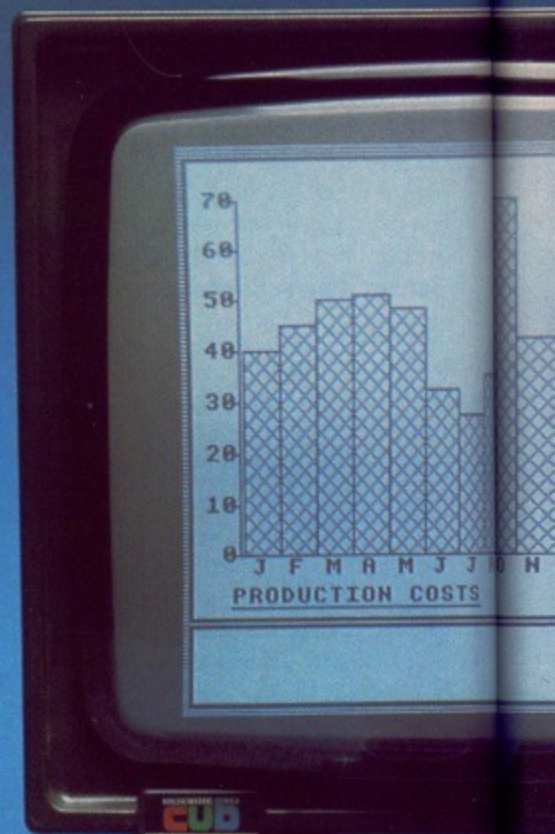
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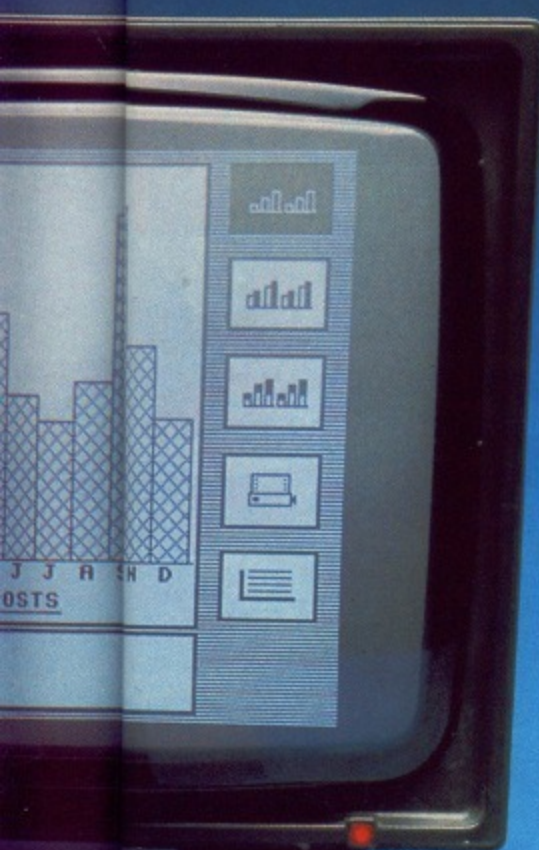
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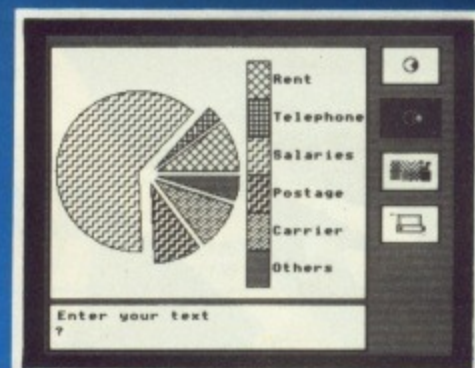
```

Freospace= 3750      Auto
Cell=A1             Text
Contents=           Fixed
  
```

	A	B	C	D
1>	Fixed Costs for 1986			
2		Jan	Feb	Mar
3	Rent	400	400	400
4	Electric	60	50	45
5	Telephone	130	125	115
6	Salaries	2450	2400	2400
7	Cleaning	50	50	50
8	Stationary	55	50	50
9	Postage	375	360	355
10	Carrier	420	380	330
11				
12				
13	TOTALS	3970	3845	3775
14				
15				
16				
17				
18				

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*****
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4 * Sleeper Reservations
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* Hn for HELP
!-R Rcedisplay QQuit
Select 1
  
```

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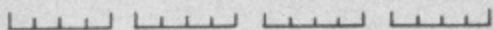
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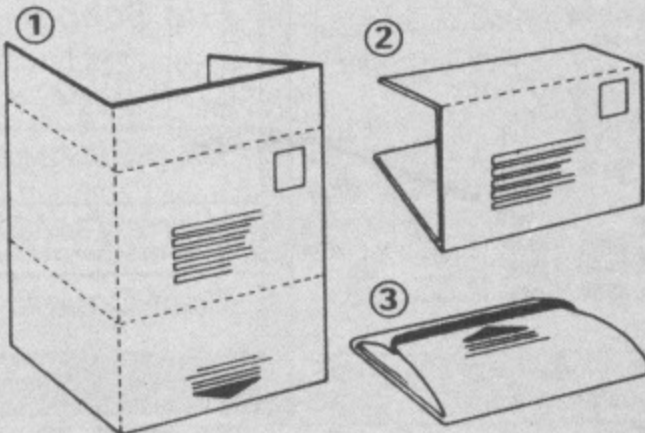
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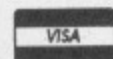
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The PREHISTORIC screens with their caves, mountains and volcanoes, have Repton battling against pterodactyls and dinosaurs to collect edible berries. In EGYPTIAN times, Repton chases around pyramids and sphinxes collecting scrolls and meeting a mummy or two! Amidst the smog and grime of VICTORIAN times, Repton collects gold coins — but can he avoid the police and the gallows? PRESENT DAY Repton has even greater dangers to face as he rushes around the city's jungle of parking meters and skyscrapers, looking for cans of cola. If the gangster's machine gun doesn't get him, the traffic wardens will. Amazingly Repton may make it to the FUTURE. As he zooms through space collecting crystals, the Martians give chase. Will he succeed or disappear forever into the infinite depths of a black hole? Only you can help Repton Thru Time!



THE SCREEN EDITOR

Each copy of Repton Thru Time includes:

- the Repton 3 main program
- the Repton 3 editor and
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(Compatible with the BBC B, B+ and Master Series computers).

The screen pictures show the BBC Micro version of the game.



THE CHARACTER EDITOR

PRIZE COMPETITION

If you complete all 40 screens of Repton Thru Time without using passwords, you can enter our competition. A draw will be made from all the correct entries received to select 25 prize winners. Each will receive an EGYPTIAN REPTON Cuddly Toy and a signed certificate.

Closing date: 30th September, 1988.



REPTON ORIGINAL Cuddly Toy

SPECIAL OFFER — NEW!

A unique range of Repton Cuddly Toys is now available. Each Cuddly Toy is about 24 inches high and has a realistic face and features corresponding to the particular Repton character. They are only available from Superior Software.

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TIME



THE TIME TRAVELLER

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have Repton battling against pterodactyls and dinosaurs to collect edible pixes collecting scrolls and meeting a mummy or two! Amidst the smog and avoid the police and the gallows? PRESENT DAY Repton has even greater dangers and skyscrapers, looking for cans of cola. If the gangster's machine gun take it to the FUTURE. As he zooms through space collecting crystals, the Martians paths of a black hole? Only you can help Repton Thru Time!

Repton Thru Time includes:
 Repton 3 editor and • the 40 new game screens.

Acorn Electron Cassette.....£6.95
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(for Acorn Electron, B+ and Master Series computers).

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