

THE MICRO USER

Volume 5
Number 6
August 1987
£1.25

Top-selling
guide to the
BBC Micro!

MUSIC

All you need to
know about Midi

ARRAYS

Storing data in
sideways ram

UTILITY

Computerise your
address book

COMMS

Exploring online
adventures

ARCADE GAME

Stay alive —
with Survive!

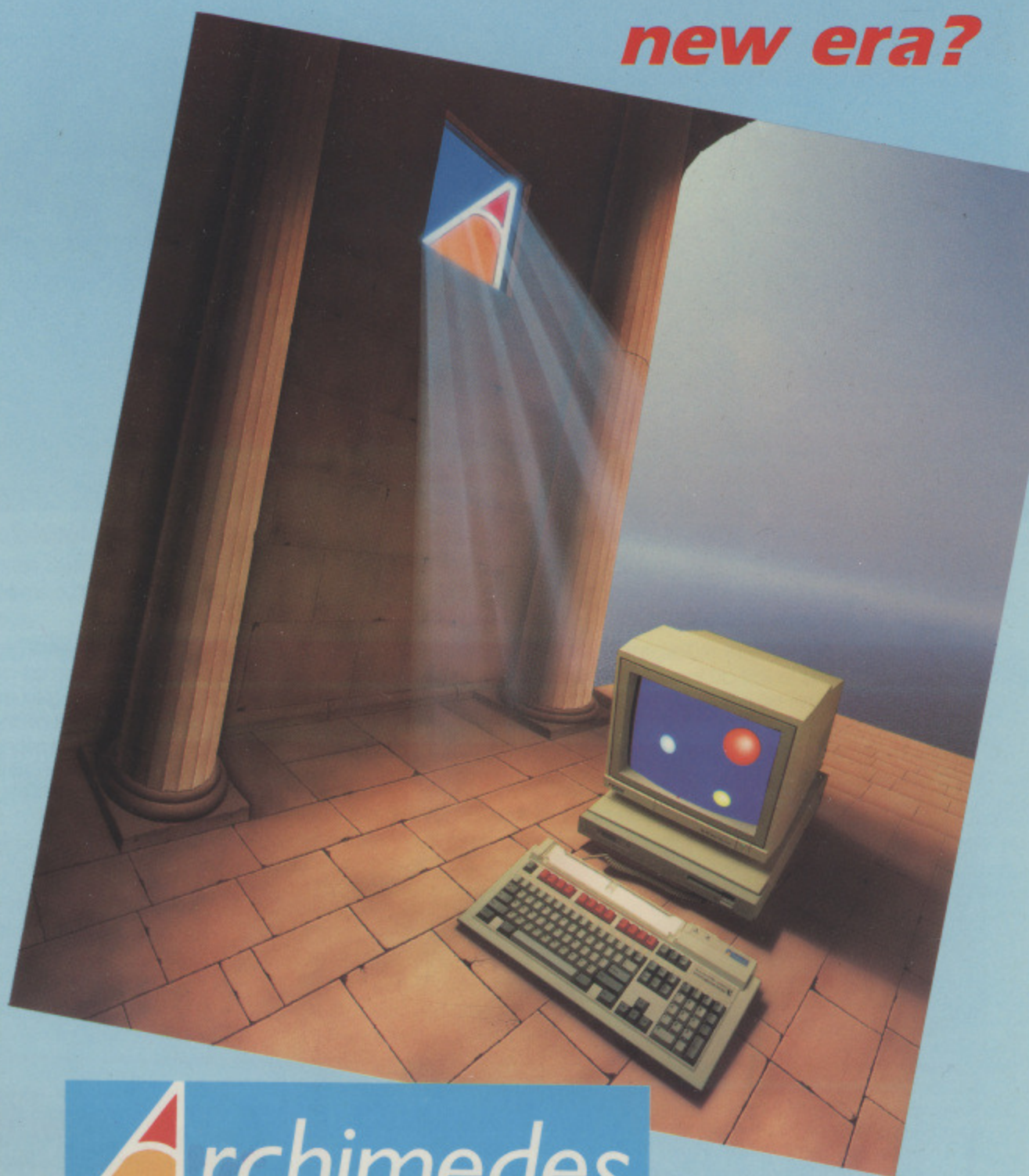
HAC MAN

Sprucing up the
classic Snapper

COMPETITION

Your chance to win
the new Archimedes

*The dawn of a
new era?*



rchimedes

The new BBC Micro unveiled



REPTON

Around the World in 40 Screens



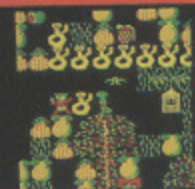
THE ARCTIC

AMERICA



THE ORIENT

THE OCEANS



AFRICA

Repton Returns... to Conquer the World

After the success of Repton 3, we were overwhelmed with requests for us to publish another set of screens for the game. We have now produced 40 new screens which, although enticingly amusing, are even trickier to complete than the original 24 screens of Repton 3.

These new screens feature Repton voyaging around the world. In America, Repton is a sheriff with a penchant for hamburgers and whisky; his job is to jail all the bandits and avenge the Red Indians. The Arctic sees Repton as an eskimo being "hotly" pursued by his igloo by polar bears and penguins. Across to the Orient, and Repton is a kung-fu master amongst the pagodas, home to his igloo by polar bears and penguins. Across to the Orient, and Repton is a kung-fu master amongst the pagodas, rickshaws and Chinese dragons. Repton becomes a deep-sea diver in the Oceans; he searches for pearls around the rotting shipwrecks which are inhabited by dangerous octopuses and squids. Finally, in Africa, Repton reaps his rewards by defeating the tribesmen, caging the parrots, and collecting the apples, bananas and pineapples — whilst watching out for falling coconuts!

Each copy of Around The World in 40 Screens includes:

- the Repton 3 main program,
- the Repton 3 editor, and
- the 40 new game screens.

BBC Micro Cassette	£6.95	Acorn Electron Cassette ..	£6.95
BBC Micro 5 1/4" Disc	£7.95		
BBC Master Compact 3 1/2" Disc	£9.95		

(Compatible with the BBC B, B+ and Master Series computers).
The screen pictures show the BBC Micro version of the game.

THE SCREEN EDITOR

THE CHARACTER EDITOR

PRIZE COMPETITION

If you complete all 40 screens of Around The World, you can enter our competition. Prizes include £200 in cash, with Repton mugs, badges, pens and certificates for runners-up. Closing Date: 31st January, 1988.

FREE REPTON BADGE WITH EVERY GAME SOLD

A colourful Repton badge is included free with every cassette or disc of Around The World in 40 Screens.

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THE NEW AMX MK. III MOUSE. TRAP ONE SOON.

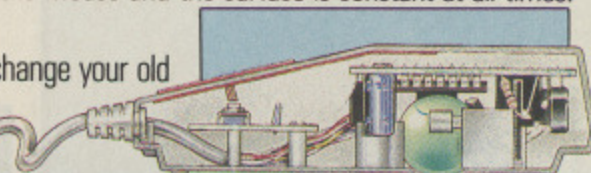


The MK III AMX Mouse is a product of Swiss precision and the result of a world-wide search to find a worthy successor to the AMX Mouse MK II.

The new Mouse has been specifically chosen to be the perfect partner to the ever expanding range of AMX software. The unique patented design includes high resolution D.P.I. and superior ball technology to ensure that contact between the Mouse and the surface is constant at all times.

There's a new shape too, that fits comfortably in the hand.

The AMX Mouse MK III costs only £34.99 or you can join the great "Mouse-Swap". Part exchange your old Mouse for the MK III for only £29.99.



*SUPERART

AMX MOUSE MK III PLUS SUPERART 16K ROM, PLUS DISC £79.99

Acknowledged as the most sophisticated, yet easy to use paint package available for the BBC Micro, it's no wonder over 20,000 have already been sold.

'Superart' features include cut, copy, paste, move, rotate, plus many, many more such as fantastic spray and zoom facilities.

Available for BBC B, B+; Master 128, and Master Compact. Please state which version is required when ordering.

SUPERART (ONLY) £49.99

PICTURE GALLERY 2 x FLIPPY DISC £24.99

Instant art! A collection of fine drawings produced by acclaimed artists using superart.

*STOP PRESS

AMX MOUSE PLUS STOP PRESS 2x16K ROM, 2xDISC £79.99

The most highly acclaimed desktop publishing software available for the BBC Micro. Already thousands of users are producing professional documents, newsletters, flyposters etc. in fact anything where text and graphics are required.

'Stop Press' comes complete with 16 variable typefaces.

Available for the BBC, B+ and Master 128. Please state which version is required when ordering.

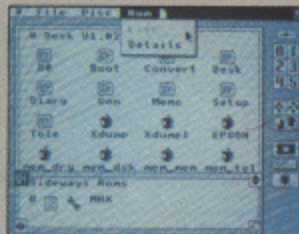
STOP PRESS (ONLY) £49.99

EXTRA! EXTRA! 2 x FLIPPY DISC £24.99

300K fantastic clip art, over 25 fonts and utility software.

*MAX 16K ROM £19.99

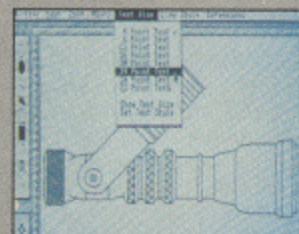
MAX provides an easy to use graphic based front end to your computer's disc filing system including a comprehensive set of disc management operations such as cataloging, copying, deleting and re-naming. You can also run programs from within MAX. Available for the BBC, B+, Master 128 and Master Compact. Please state which version is required.



*AMX DESIGN 32K ROM AND DISC £69.99

A highly sophisticated CAD package which allows the user drawings to be produced such as a simple PCB design up to the most intricate, architectural drawing.

Advanced features include full zoom and macro facilities, 58x58 screen canvas, full supported printer and plotter output. Available for the BBC, B+, Master 128 and Master Compact.



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AMX
SOFTWARE
OFFER!**

The additional AMX Software range that requires the original AMX Art Rom or Super Art Rom including: 3D Zicon normal price £24.99 Database normal price £24.99 XAM normal price £24.99 MindGames normal price £14.99. Total price - £89.96 but now available as a complete package at only £69.99. These superb products are available from all good computer dealers or direct by Cheque, Access or Visa. All prices include VAT and post and packaging.



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TUBELINK ON PRESTEL PAGE 2582182 SUPPORTS THE AMX MOUSE, AND ALL AMS SOFTWARE.

EDUCATION

Superart and stop press are now available under licence for EONET levels 2 and 3. Please apply direct for Educational Discounts.



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

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CONTENTS

Games

23 Survive!

Can you beat the computer in this ultra-fast action game?



Utilities

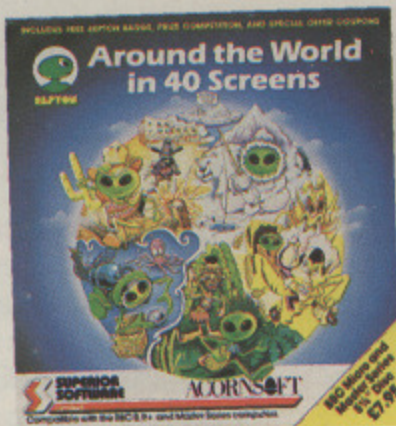
89 Ram Arrays

Running out of memory? Increase your Basic capacity by 8k or more.

119 Address Book

Keep all those useful names on tap with this short but powerful utility.

Reviews



31 Software Scene

Our experts cast a critical eye over the latest games releases.

Education

63 News

Up-to-date reports about ways of using the BBC Micro in education.

67 Write the Book

There's only one thing to do when no book covers your subject.

71 Key

We review a database with graphical power — too good to be true?

73 Letters

Another selection from our mailbag expressing educational views.

Features

7 News

All the latest in the ever-changing world of your BBC Micro.

37 Computing in Action

Don't overspend – calculate how much wallpaper you need to order.

40 Hac Man

Revamp your old Snapper into a great game – plus other hints and tips.

42 MicroLink News

More about Britain's nationwide online database for micros.



45 Gallery

Colourful masterpieces created on the BBC Micro by our readers.

48 Beginners' Comms

Your modem becomes the gateway into a world of mega-adventures.

52 Midi Revealed

Discover the secrets of the music interface and what can be achieved.

57 Problem Solved

More solutions to some of those mind-boggling hardware problems.

82 Programming Adventures

Learn to program in Basic so you can create your own quests.

106 Library

More high quality routines brought together for you to use.

110 Adventures

The heart of The Hobbit dissected – plus a look at The Ket Trilogy.

113 Ceefax

What's coming this month on the BBC's telesoftware pages.

127 Letters

The chance to get your news, views, moans and name into print.

**THE
MICRO
USER**



The Micro User is launching a nationwide search to find the most innovative use of the BBC Micro. The winner of this prestigious new award will receive both an impressive trophy and the superb Acorn Archimedes.

See Page 21 for further details.



The unveiling . . .

We take the wraps off the world's fastest micro and give you a full preview of Acorn's new super computer.

Turn to Page 16 to discover the facts from our team of experts.

NEXT MONTH

ARCHIMEDES

Further revelations about Acorn's wonder machine.

GRAPHICS

Fun with Pentagrams.

SPORT

Soccer Manager type-in game.

**THE
MICRO
USER**

September
issue on
sale
August 5.

WE'RE ABOUT TO CHANGE YOUR VIEW OF WORD PROCESSING

View Professional is the latest addition to the well-known View suite of productivity software.

A highly advanced Word Processor, it also includes spreadsheet and database facilities to form a single, powerful package.

So for example, you could prepare a price list, add it up, create a second column for V.A.T., write a letter around it and send it to a hundred addresses without even switching programs.



Easy to use, View Professional is suitable for the BBC B, B+, Master 128 and Master Compact and costs £99.95. A version for Archimedes will be available later in the year. View it now at your local Acorn dealer.

ACORNSOFT

V I E W P R O F E S S I O N A L

Software packages line up

ACORN managing director Brian Long is under no illusion about the vital role of software support for Archimedes.

"It will take this to exploit the full power of the machine", he told *The Micro User*.

That's why a number of leading software houses have been working secretly for months on packages for the Risc machines.

Grafox is scheduled to release Logistics, a Lotus 1-2-3 clone for the machine in August.

September will see the arrival of AWriter, described as "a completely fresh look at a wordprocessor".

The same month Clares will launch a desktop publishing page make-up package and AMS will unveil electronic publishing software.

Also timed to coincide with the machine going on sale will be Risc versions of Logo from Logotron, telesoftware support and a comms package from BBC Soft, plus the Starglider and Flight Simulator games from Argonaut.

"Developers who have been working with the machine are understandably very excited about the creative possibilities it offers", says Brian Long.

Enter Archimedes — the world's speediest micro

ARCHIMEDES, the world's fastest micro, has been unveiled by Acorn. The covers have finally come off the top secret machine on which the future of the company will rest.

Even the entry level model, the A300, is revealed as being 20 times faster than the BBC Micro and — at half a megabyte — has a memory capacity 15 times greater.

The basic machine carries a £799 price tag but this does not include a monitor. With a monochrome unit, the cost will rise to £849 and for colour £999.

Launched at the same time is the 1Mb A310 costing £875. With a black and white monitor, the price will increase to £925, with colour £1,075.

However these remarkable machines will not go on sale to the general public until September.

But remarkable they truly are.

For the technology involved means that they are currently ticking over "stone cold" at 4 Mips (million instructions per second).

Only the fact that the memory

EVERY Risc machine sold will be registered in order that the purchaser can be offered future enhancements.

"Such is the nature of the technology that 'bits and pieces' can be added at any time", said an Acorn spokesman.

"And we want people to have the opportunity to take advantage of these as they come along".

cannot as yet keep up with the processor power prevents the wonder micro from gearing up to 14 Mips — 70 times faster than the BBC Micro.

Already benchmark tests have shown Archimedes has the technology to outperform the IBM PC AT and Apple Macintosh by a ratio of 20 to one — and it offers five times more power than the VAX 11/750.

It can even take on and beat a GEC 63, a computer that costs more than 20 times as much.

Such is the sophistication of the new computers that add-ons will allow them to emulate other machine

environments, including IBM.

And all this from only four chips which offer not only speed and large memories but outstanding graphics and even stereo sound.

However Archimedes isn't just one computer but an ongoing series of world-beating micros aimed at every conceivable market niche.

And each one will be based on the revolutionary 32-bit Risc chip technology developed by Acorn but now manufactured under licence in the States.

"This is just the beginning", Brian Long, Acorn's managing director told *The Micro User*.

But probably the most apt comment came from Acorn executive Bob Coates.

"We now feel the good old days are here again", he said.

● **For an in-depth review of Archimedes turn to Page 16.**

ACORN'S boffins have designed the Risc machines to encourage third party manufacturers to come up with an exciting new range of peripherals.

For one, the system can take 16 modules — slot in cards — making provision for such devices as modems.

"We've done this with an eye on people like Watford Electronics who have provided such superb support in the past", said a company spokesman.

"I'm sure it won't be long before we'll be seeing some fascinating products from them".

PROGRAMMABLE GRAPHICS

WHAT is claimed to be the world's first programmable graphics package for the BBC Micro, System Gamma, has been launched by Minerva Systems.

And programming skills are not required to use it.

The package is completely definable displaying as many charts on screen as may be required in the form of scatter, histogram, line and pie charts.

These are also definable allowing the user to custo-

mise the screen format.

Once a graph is plotted screens may be saved for customisation by an individual's own programs or by the built in screen editor. Price £49.95 from Minerva Systems (0392 37756)

*First-Class Utility Software & Printers
from the Professionals.*

CJE Micro's Unbeatable in print.

CJE Micro's are an official ACORN approved dealer.

A wide range of accessories and software for ACORN, Amstrad and Atari computers are on display in the CJE Micro's retail showrooms.

Multi-Font NLQ

("Very good package . . .
Saved me over £100")

V. BUNCE, OXFORD. DEC 86.

Upgrade your printer to NLQ with a choice of many fonts. Up to 49 predefined fonts are available on 4 discs, or you can design your own. Multi-font is easy to use and compatible with nearly all software. For prices see below or ring for further details on 0903-213361.

Some of the fonts available are shown here:

THIS IS STANDARD
THIS IS COURIER
THIS IS ITALIC
THIS IS GOTHIC
THIS IS COMPTS
THIS IS BOLD
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CJE Welcome EXPORT and TRADE ORDERS - inquire for delivery costs.

Phone/Credit Card and Official Orders are accepted. Please ring for all the latest information and prices on 0903-213361.

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Fontaid is a must for any Canon or Kaga Taxan owner. 60 predefined fonts are available or you can design your own. A Star NL10/NX15 version is also now available, so inquire for further details.

**"Impressed... Delightful
Simplicity... Easy to use"**

(MICRO USER JUNE 87)

INFORM from CJE Micro's.

This unique sideways RAM information system is quick, versatile and simple.

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*Master Writeprotect/ROM
select switch.*

**"I cannot praise it enough . . . Worth
buying!!"** MICRONET 800116575

This switch system selects RAM protected, RAM unprotected or ROM. Each bank is separately switchable. This is the MOST POWERFUL switch unit available at only £15.00 inc VAT. (p & p £1.00 extra).

CJEmicro's

CJE Micro's (Dept MU8), 78 Brighton Road, Worthing,
W. Sussex BN11 2EN. Tel: 0903-213361.

SOFTWARE PRICE LIST

All prices include VAT, but please add £1.00 for postage/packing and state 40, 80 track or 3 1/2" ADFS when ordering.

MFNLQ £30.00
Font Discs B, C & D each £15.00

Fontaid £30.00
Fontaid with 6264 RAM £36.00
Font Discs A, B, C, D,
EA & Lang each £15.00

Inform £20.00

PRINTERS

Delivery on all printers is free. Ring for a sample printout, specification and the latest prices.

The following Near Letter Quality printers all come with centronics interface, friction and tractor feed.

Panasonic KXP1081 £180.00
Canon PW1080A £270.00
Star NL10 £260.00
Star NX15 £410.00
Star NB24/10 (216cps) £599.00

Juki Daisywheel £330.00
Free delivery on printers

CJE Printer packs

The CJE packs include; Cable, delivery, paper, plug, utility software and booklet. Please ask for further details.

The Printer packs cost £15.00 with printer: e.g. NL10 + pack = £260 + £15 = £275 inc. VAT.

BBC Cable if purchased separately is £8.00. Software on its own: £11.00 + £1 p&p.

Watford DDFS upgrade

A FASTER, more flexible, and friendlier version of the original Watford DDFS board for the BBC Micro has been produced.

Watford (0923 37774) has redesigned the board to give it additional facilities while at the same time making it smaller, ensuring that it fits with all third-party rom boards.

Now it is Acorn ADFS compatible — through a £25 rom — and has appropriate built-in host codes to allow a second processor to be used directly. It will work in both single and double density mode.

The DDFS Mark II is compatible with almost all software and has automatic 40/80 track sensing.

Among a host of other features it has 80 per cent storage increase, it allows a file the full size of the disc, and has an option to double the speed of file handling by switching off error check operations.

Watford says that users with a DDFS of any manufacture can upgrade to the Mark II for £30 if they send in rom and DDFS board. Otherwise, the price is £39.

Twin pack

A COMBINED Z80 second processor and software package for the BBC Micro has been launched by Kreff computer services.

Task Master combines C/PM compatible operating systems with an assembler, monitor, debugging package and Borland International's Turbo Pascal running at 6mhz on a cmos Z80 processor.

The combined package gives Unix like flexibility to the BBC Micro. A CP/N package is also available for the Torch CP/N second processor. Price £325 for the complete package and £130 for the software from Kreff (0248 810748).

First Archimedes software

THE first third-party product to be announced in support of the new Acorn Archimedes has come from Minerva Systems of Exeter.

The firm is promising a "wide product range" for the machine, including three databases.

Minerva (0392 37756) say the first — Deltabase — was originally designed as a testbed for its comprehensive database management system.

The product will be released at a budget price of £24.95, despite the fact that

it offers a higher specification than the company's System Delta for the BBC Micro.

Deltabase makes use of the 40, 80, and 132 column screen modes, operates with more than 8,000 records, allows 256 subsets and requires no technical knowledge from the user.

Soon to follow is System Deltabase which, claims Minerva, makes IBM databases look insignificant. This has up to two billion records and 16 million fields.

Fast data handling, comprehensive searches and mail

labeling generator are other main features of the £69.95 product.

Later in the year, the company promises SuperDelta which features programmability, even by non technical users. For the more advanced, all internal workings will be definable and there will be a soundex facility to find words through their sound. Also coming: a range of add-on utilities and a full accountancy suite.

School administration, timetabling, ancestry finding programs will follow later.

Testing program

UNABLE to find a suitable personnel selection program on the market, Dutch head-hunting firm Search and Selection developed its own.

Now it is marketing the Dianet computer-aided personnel selection package which operates as a local area network on the Master series. The system provides for the simultaneous independent testing of up to 40 people.

Candidates' introduction,

instructions and monitoring during the session can be conducted in a choice of English, French or Dutch.

An examiner can administer tests from his own office, change the mix of questions, monitor the progress of candidates' terminals, watch on screen or print out available results.

Dianet is available from Search and Selection, Oude Houtlei 125, 9000 Gent, The Netherlands.



A GRAPHICS library for use with AMX's Pagemaker on the BBC Micro has been expanded to 20 categories.

The latest additions include history, geography, fashion, reptiles and rock 'n' roll.

Each of the discs in the Pagemaker Graphics Library from Micro Studio (0353 721736) has 30 cutouts.

They can be bought in a variety of combinations, from £2 a disc.

The company has also released Videpak, a three-disc set costing £10, which contains more than 150 compressed pictures on three double sided 80-track discs.

Memory booster

A WAY of producing a longer memory on BBC Micros has been developed at the University of East Anglia.

Overlay Basic, published by Elsevier-Biosoft (0223 68622), comes as an eeprom and utility disc. This allows BBC Basic programs to call

procedures from disc, use and then literally "forget" them.

The main advantage of the package, which is claimed to be easy to patch into BBC Basic, is that it allows very long programs to be run on a BBC Micro.

High technology

ACORN'S outstanding Risc technology will not be confined to the company's new computers.

Currently there are more than 100 companies reported to be working with it on projects ranging from laser printers

through to traffic guidance systems.

"Our research puts us 100 miles apart from the Amstrads of this world", observed one company spokesman.

"We are about jobs in South Wales not South Korea".

NEWS

First with the news

PROVING yet again that you always read the latest news first in *The Micro User*, our prize letter from April has just turned up in a rival publication.

Reader Jim Sharp of Featherstone, West Yorkshire, won our award for discovering a way to save valuable disc space when programming.

He successfully demonstrated how the *SPOOL command can be used to produce compressed screen dumps to disc.

One of the magazines attempting to compete with us in covering the Acorn market ran the same spool tip as hot news in its June issue.

Which was good news for Jim Sharpe who got another £10 for his discovery, but old news for readers of the magazine in question – particularly those who had already seen *The Micro User* two months earlier.



A 64k buffer which can be plugged into any computer using a Centronics printer "and forgotten" is being sold in Britain by Frontier Software.

Manufactured by Supra in the US, the MicroStuffer operates very much as a normal printer buffer. But it is a separate hardware device which leaves all the micro's memory free.

The product is connected between the computer and printer. It automatically buffers any data sent to the printer,

which frees the computer for other work.

Frontier (0423 67140) say MicroStuffer includes a self test which checks the 64k ram on switch-on.

It also has a repeat button which allows the contents of the buffer to be printed more than once – for such things as mail shots.

BUFFER LEAVES MEMORY FREE

Sales manager Dave Fields said: "For the same price as most printer buffer programs, Microstuffer will work with just about any computer, and can be left under your desk and forgotten."

"Attaching it to a BBC Micro should greatly increase your productivity".

Price £49.95.

Form for requesting issue of a default summons

Please read the notes over the page before filling in this form. You will also find it useful to read the booklet "Small Claims in the County Court" which is available from any county court office.

1 Plaintiff's (Person making the claim)
Full name: THE CREDITOR COMPANY LIMITED
Address: CREDITON HOUSE, CREDITON STREET, WESTON, SOSS 2SS (0470)

2 Plaintiff's solicitor
Address: THE LAW FIRM, 175 COUNTY ROAD, WESTON, SOSS 2SS (0470)

3 Defendant's (Person against whom the claim is made)
Name: THE DEBTOR COMPANY LIMITED
Address: THE DEBTOR'S REGISTERED OFFICE, THE DEBTOR'S STREET, THE DEBTOR'S TOWN, THE DEBTOR'S COUNTY AND POSTCODE (0470)

4 What the claim is for
Give brief description of type of claim: Repaid account

5 If the defendant does not live within the district of the court, the plaintiff states that the cause of action arose at: CREDITON HOUSE, CREDITON STREET, WESTON.

6 Particulars of the plaintiff's claim
(1) The Plaintiff's claim is for the price of goods sold and delivered and/or services rendered to the defendant by the Plaintiff at the Defendant's request, as per the following:-

Date	Invoice number	Amount
1.2.87	ABC123	1234.56
	DEF456	125.00
Total		1359.56

(2) The Plaintiff's terms of payment are not monthly.

(3) The Plaintiff's claim is for the price of goods sold and delivered and/or services rendered to the defendant by the Plaintiff at the Defendant's request, as per the following:-

(4) Interest on the above at a rate of 10% from 1.2.87 to 25.5.87 amounts to £38.30.

AND THE PLAINTIFF'S CLAIM:-

(1) The principal sum of £1397.86.

(2) Interest on (1) above at a rate of 10% under s. 48 of the County Courts Act 1984 to date of judgment or earlier payment at a rate of 10%.

(3) Interest on (3) above from 25.5.87 to date of judgment or earlier payment at a rate of 10%.

8 Signed
Plaintiff's solicitor (or see attached form "Particulars of claim")

Small Claims Procedure

Any defended claim for £500 or less will be automatically dealt with by arbitration. If you do not want the claim to be dealt with by arbitration you will have to apply to the court. The court office can give you more details.

9 If the claim exceeds £500 and you would like it to be dealt with by arbitration please tick the box below.

The claim exceeds £500 and I would like it to be dealt with by arbitration ☐

Printed in the UK for HMRSO: D3 8015013 2 0000 1/8/86

N 201 Request for default summons

NEW news editor of Micronet, the viewdata information service, is Ian Burley.

He moves over from the the BBC Microbase and features

editor's desk on the closed user group on Prestel, replacing Dave Rosenbaum, who has become Micronet public relations manager.

The debt collector

SOLICITOR and law lecturer Tom Hervey has begun marketing a system to help legal firms computerise their debt collection departments.

Called Accudebt it runs on a dual disc Master Compact fitted with Wordwise Plus along with a Microperipherals MP-200 with sheet feed.

Hervey has used Basic for the data entry and much of the data storage, and for production of documents involving arrays. These include long lists of invoices, each with separate interest calculation.

Relevant data is then trans-

ferred to Wordwise Plus for further text manipulation leading to creation of the standard letters and certain text-heavy documents.

There are Wordwise Plus files for address data storage and for the diary system.

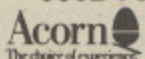
Hervey says the 640k drives allow storage of data on "well over 1,000 matters, along with the programs themselves, on two easily back-upable floppies – something impossible on an IBM".

Accudebt is available from Acculaw (0203 523215) in a package including the Master Compact for £3,000.



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A comparison of three 65C12 assemblers

Feature	ADE +	BBC Basic	MACROM
Number of pseudo-ops	64	4	36
Use of all available RAM	Yes	No	No
Macros	Yes	No	Yes
Relocatable output	Yes	No	No
Linker with libraries	Yes	No	No
High level constructs	Yes	Yes	No
Number of error reports	39+warnings	3+BASIC errs	20
65C00 extended opcodes	All	65C 12 only	65C12 only
Switch off 65C 12 opcodes	Yes	No	No
ROM size	32K	16K	16K
Disassembler	Yes	No	Yes
Label restrictions	No	Yes	Yes

ADE+

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Switch on for a cardigan

READERS of *The Micro User* have been bitten by the knitting bug thanks to a new suite of programs that went on sale last month.

Knitwear Designer was developed from an article in the June issue of *The Micro User* which encouraged people to produce their own money-saving sweater patterns on the BBC Micro.

Since then many have written or phoned to say how much more the package can do with a touch of imagination.

"You don't have to restrict yourself to jumpers", said one. "I've designed some

cardigans and sleeveless pullovers with Knitwear Designer — and even some woollies for my children's teddy bears".

A reader phoned to say: "I've been able to save a lot of money by using the freehand program to produce knitwear in my youngsters' school colours...a lot cheaper than anything in the shops".

Another wrote: "I'm finding Knitwear Designer isn't just for adult woollies — it's possible to make little coats and matinee jackets for babies, and skirts for my little girl".

Details of how to obtain the five-program suite are on Page 15.

MICRO BOOM IN HOLLAND

A THRIVING club for BBC Micro enthusiasts in Holland has just celebrated its first birthday.

Acorn Club Rotterdam was founded to provide serious micro users with a place for the exchange of information about the latest computing techniques.

Members include hobbyists and business users and special evenings are organised to focus on various aspects of their needs.

A Basic for Beginners course was so enthusiastically received that it has been followed by three others — Basic for the More Advanced, Assembler and View Range.

There are now a number of sub-sections within the club, concentrating and spe-

cialising on specific areas of BBC Micro and Master computing.

"One of our more important activities, however, remains our get togethers every Friday evening at which we swap information to help each other broaden our computing skills", secretary Jan van Overeem told *The Micro User*.

"In our first year we have negotiated discounts on software and hardware from the leading Acorn dealer in Rotterdam, and begun publishing a monthly magazine which is free to members.

"If any readers of *The Micro User* want to know more about our activities they should write to me.

"The address is: Robert Kochplaat 313, 3068 JC Rotterdam".

Prestel emulator

THE BBC Micro learns how to squeak with the help of an AMX mouse and a new communications package from Aldoda (01 586 5656).

Squeak, which is a rom and disc based program, gives the BBC Micro Prestel emulation and can be controlled either from the keyboard or by a

mouse. One interesting feature is the ability to access Prestel in either Mode 7 or Mode 1.

When in Mode 1 the frame occupies about 75 per cent of the screen. Price £24.50 for the rom plus disc and £22 for a sideways ram disc based version.

THE GALLUP CHART TOP 20 BBC SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	PRICE
1	1	Grand Prix Construction Set <i>Superior</i>	9.95
2	•	Phantom <i>Tynesoft</i>	7.95
3	•	Hercules <i>Alpha Omega</i>	1.99
4	3	Superior Collection Vol. 1 <i>Superior</i>	9.95
5	2	Superior Collection Vol. 2 <i>Superior</i>	9.95
6	4	Ravenskull <i>Superior</i>	9.95
7	7	Micropower Magic <i>Micropower</i>	7.95
8	6	Repton 3 <i>Superior</i>	9.95
9	12	Mini Office II <i>Database</i>	14.95
10	8	Commonwealth Games <i>Tynesoft</i>	6.95
11	•	Paperboy <i>Elite</i>	9.95
12	5	Big KO <i>Tynesoft</i>	7.95
13	14	Sphere of Destiny <i>Audiogenic</i>	7.95
14	13	Winter Olympics <i>Tynesoft</i>	7.95
15	9	Stryker's Run <i>Superior</i>	9.95
16	•	Konami's Coin-Op Hits <i>Imagine</i>	9.95
17	11	Thunderstruck 2 <i>Audiogenic</i>	7.95
18	•	Dodgy Geezers <i>Melbourne House</i>	8.95
19	19	Colossus 4 Chess <i>CDS</i>	9.95
20	•	Cholo <i>Firebird</i>	14.95

Compiled by Gallup/Microscope

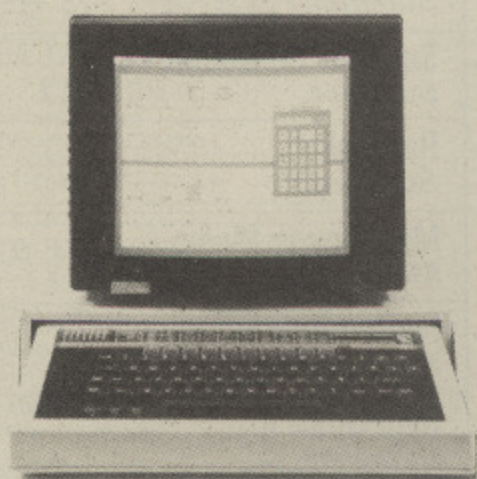
This month's star game is Phantom, which has entered the chart as the second best selling game. Meanwhile, Grand Prix Construction Set stays at number one for a second month.

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to the form
on Page 133**

EUREKA

HAIL Archimedes, the world's fastest micro.

Acorn has jumped back onto centre stage of the computer scene with a family of micros that seems destined to keep the company in the spotlight for years to come.

It has taken a dramatic leap from the world of 8-bit – by-passing the hotly contested 16-bit market – to top the bill in the as yet to be explored wonderful world of 32-bit.

Just as the Acorn's backroom boys provided the company with a relatively unassailable lead – at the time – with the first BBC Micro, so they've done it again with Archimedes.

And they've even managed to edge out mighty IBM in the finishing straight in the 32-bit stakes.

Most of the credit must go to Acorn's research and development team – and the strong nerves of the top management who backed them.

For whereas it was the brilliance of the backroom boys who helped develop the revolutionary Risc chip on which Archimedes is based, it was the Acorn execu-

Archimedes, the world's

fastest micro, has finally

arrived. We tell you all

you want to know about

Acorn's wonder machine

tives who kept on bankrolling them even during financially troubled times.

The end result, however, will reap dividends for years to come.

Archimedes – like the BBC Micro – is a machine ahead of its time. Or rather a family of machines, with successive generations – each one more powerful than the other – to be released over the next few years.

Such is the technology within that even the first models to be unveiled – the A300 series – are faster than any micros ever seen before.

And the power is still almost untapped. For the Risc chip's performance is

currently limited only by the Memc chip, the memory controller which can only handle up to 4Mb for the time being.

A mind-boggling array of advanced features to be found in Archimedes – a 4,096 colour palette with a possible colours on screen at any time, eight channel stereo sound, WIMPs and anti-aliasing, which smooths out the block-like structure of conventional computer graphics. Yet it still retains definite links with its famous predecessor, the BBC Micro.

Whereas there are 21 screen modes, eight are the same as the BBC Micro. And the operating system, Arthur, supports all the old familiar *FX calls together with numerous extensions and entirely new ones.

Acorn has even developed software to allow Archimedes to emulate the BBC Micro's 6502 processor.

It is a machine for the future that hasn't forgotten its roots.

● A team from The Micro User has already met Archimedes – their words and pictures can be found on the next few pages.

WIDE RANGE OF OPTIONS

THE first of the Archimedes family of super micros to be launched is the A300 series.

As the entry level machines, these will go on sale in September under the BBC label.

They will soon be followed by the more expensive and expandable A400 series – provisionally priced from £1,400 to £2,500 – which will carry the Acorn badge.

On the A300 front, there will be two models to choose from – the A305 and the A310, priced from £799.

The A305 offers 0.5 Mb of ram – expandable to 1 Mb – a 1 Mb floppy, 512k of rom and red function keys, while the A310 has 1 Mb of ram.

Both 300 models can be expanded by adding another 1 Mb floppy or 20 Mb Winchester, a two socket backplane and

podules – Acorn's way of describing peripheral modules.

The A400 series will arrive in the form of the top of the range A440 starting at 4 Mb in November, priced at around £2,500.

It will be joined in the first quarter of 1988 by the A410 costing in the region of £1,400. This model is offered with 1 Mb but can be expanded up to 4 Mb.

Substantial discounts are to be offered on volume purchases of all machines for education.

Features common to both series – apart from the 32-bit Risc chips – are that they are 3.5in floppy machines with dramatic sound capabilities – eight separate stereo channels – as well as stunning graphics, offering up to 4,096 colours.

Each consists of a three box system, a

small computer unit (similar in size to the new IBM PS/2), enhanced IBM style keyboard with mouse, choice of monitor options, a BBC style operating system (Arthur), BBC Basic V including Basic Editor, ADFS, window environment in rom with Desktop Manager, 6502 Emulator, printer/serial/ monitor/ stereo sound interfaces, Econet plug-in option, capability of accepting podules (plug-in cards) including I/O, rom and Midi.

Monitor options offered by Acorn itself are a 12in monochrome white screen or a 14in medium resolution colour monitor to show off the 256 colours.

The A400 series – when it arrives – will support much higher resolution on special monitors.

And as for the A500? That's waiting in the wings and is likely to take the form of a scientific workstation.

K!A!

PALETTE

One of the great attractions of the Archimedes is the analogue colour palette which allows any pixel on the screen to be displayed as one of 4,096 different colours.

The original BBC Micro has a digital palette that can be accessed with the VDU19 command. In effect this means that any pixel on the screen can be displayed as any one of eight different colours. This extends to 16 if you can regard "flashing" as a colour.

But have you ever wondered what the extra zeros are for on the end of the VDU19 statement? They are to extend it to control the analogue palette. With the original BBC Micro any one of the three guns on the TV display can be on or off. With the Archimedes each gun can be made to vary its intensity.

In fact there are 16 different levels of brightness that can be produced by each of the red, green and blue guns in the monitor. This enables you to mix the three guns in varying proportions, producing subtle shading and colours.

No longer do programmers have to stick to the gaudy primary and secondary colours. Now a whole host of golds,

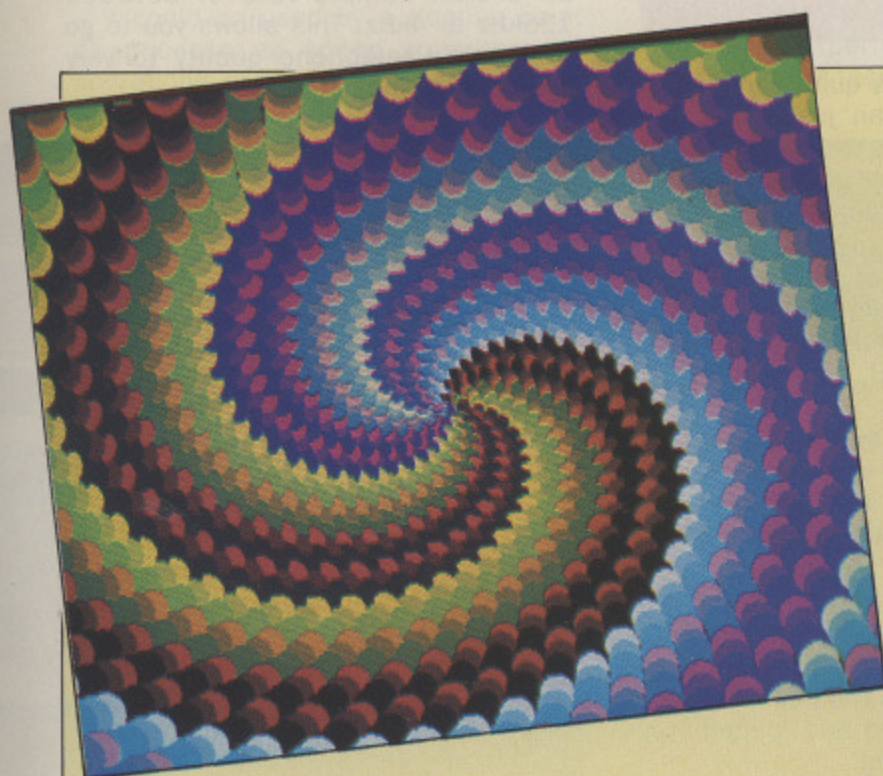
The Archimedes A310

browns and steel blues become possible.

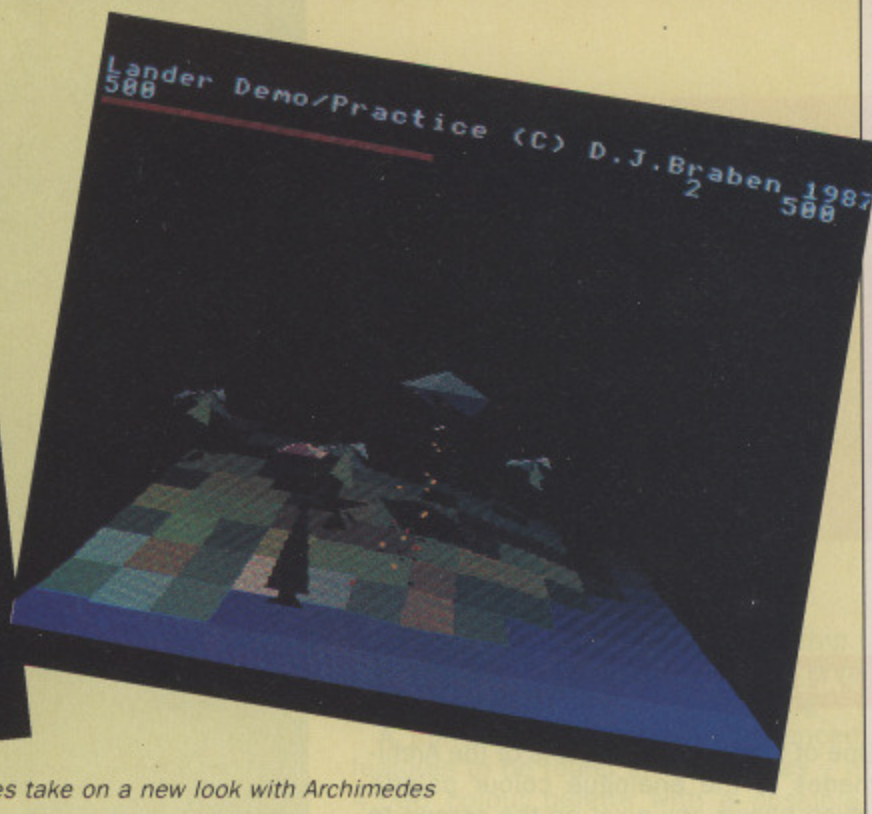
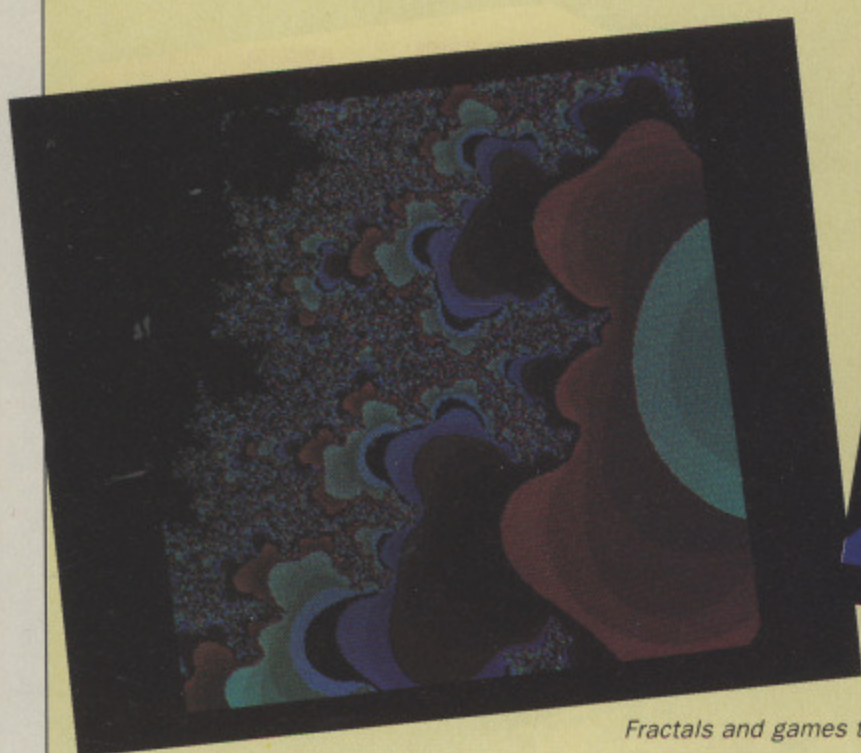
This should mean a great improvement in the appearance of graphics and pictures, with shading and shadows

effectively portrayed as well as more meaningful colours for particular applications.

Turn to Page 18 ►



Amazing effects can be created with Archimedes's superb graphics



Fractals and games take on a new look with Archimedes

◀ From Page 17

GRAPHICS

THE first thing that really stands out on the Archimedes is the graphics – there are 21 modes as seen in Table 1.

The first eight exactly match the old BBC Micro modes to allow software to transfer easily to the new machine. Mode 7 on the BBC Micro is implemented with special hardware whereas on the Archimedes it is simulated.

This is possible due to the great speed of the Risc chip. With at least half a megabyte of memory in the machine

Mode	Resolution	Colours	Text	Ram Use
0	640x256	2	80x32	20k
1	320x256	4	40x32	20k
2	160x256	16	20x32	40k
3	n/a	2	80x25	40k
4	320x256	2	40x32	20k
5	160x256	4	20x32	20k
6	n/a	2	40x25	20k
7	Teletext	Teletext	40x25	80k
8	640x256	4	80x32	40k
9	320x256	16	40x32	40k
10	160x256	256	20x32	80k
11	n/a	4	80x25	40k
12	640x256	16	80x32	80k
13	320x256	256	40x32	80k
14	n/a	16	80x25	80k
15	640x256	256	80x32	160k
16	n/a	16	132x32	132k
17	n/a	16	132x25	132k
Also for multi-sync monitors:				
18	640x512	2	80x64	40k
19	640x512	4	80x64	80k
20	640x512	16	80x64	160k

Table 1: Arthur screen modes

even the most memory-hungry modes do not take up an excessive amount of memory.

Of major interest are modes 10, 13 and 15 which allow eight bits to be assigned to each pixel giving a total of 256 different colours on the screen at the same time. This can be used for

shading or complex palette-switching animation effects, enabling stunning graphics to be created.

The graphics commands implemented are very much the same as the old BBC Micro coupled with Acorn graphics extension commands – in fact similar to those found in the Master. Acorn forward planning has ensured that most of the commands have unused parts that are now fleshed out.

These include predefined shapes, patterning and rapid flood fill effects. Coupled with the speed of the Risc chip, these allow effects created using Basic that were previously only possible with convoluted machine code.

The very high resolution modes 18, 19 and 20 will require a special multi-sync monitor. The reason for this is that the normal TV standard can't cope with so many horizontal lines.

SOUND

THE sound system is quite complex. It can do far more than just mimic the equivalent commands on the BBC Micro, and brings new heights of sophistication to built-in computer sound systems.

There can be up to eight channels assigned to the system and each can be located within a stereo position. The values controlling this range from 1, fully left through 128, centre stage, to 255 fully right.

There is a built-in loudspeaker and a rear jack socket for connection to an external speaker or hi-fi system. The volume can be controlled logarithmically or linearly.

The sound can be derived from waveform look-up tables making it possible to simulate a wide variety of musical and not-so-musical sounds. These are disc based and loaded into memory when required.

This means you are not stuck with the sounds that were developed before the

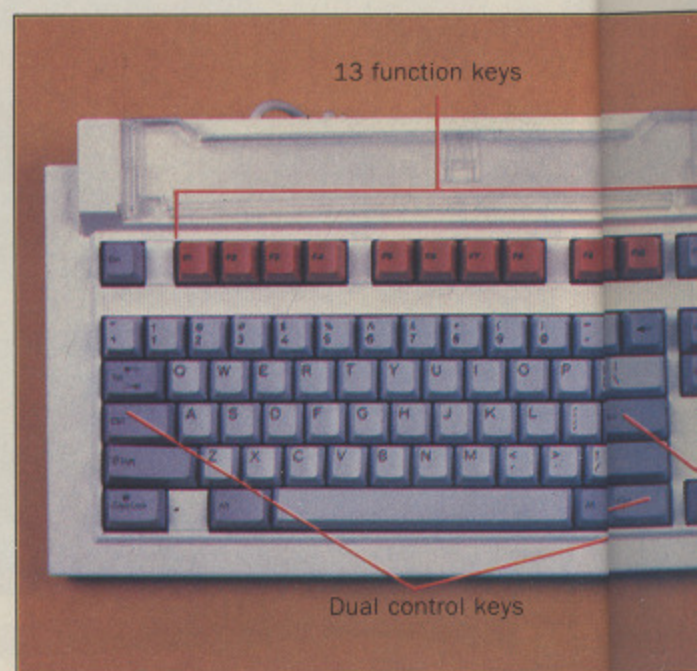
Archimedes was launched. There should be a steadily growing library of instrumental and other sounds available and also programs that allow you to develop your own.

In addition, speech and real sampled sound can be produced. Imagine a game where the jet fighters roaring towards you sound just like the real thing.

Most of the handling of the sound outputs is performed by direct memory access from the peripheral chips, so the amount of processing time that sound generation demands is normally quite low. This will allow complex sounds to be generated while the processor is getting on with something else.

There is even a tuning control on the output to enable the Archimedes to be tuned to the same pitch as real instruments.

The sound buffers can be anything from 16 bytes to 4k and the sample rate from 1µs to 32µs per channel. As there can be up to eight channels this will give an overall sample rate of between 125kHz to 4kHz. This allows you to go from basic telephone quality to very good quality indeed.



The keyboard layout showing some of the new keys

PODULES

A PODULE is a plug-in card allowing all sorts of additional items to be connected to Archimedes. Any interfacing circuits can be built on these Eurocard size boards and slotted into the computer.

Each podule has its own small panel so the line of the computer is not spoiled, reducing risk of developing "spaghetti" hardware with all sorts of modules and wires being connected.

Some versions of the Archimedes will have space for two podules and others room for four. In fact the software can support more than this so don't be surprised to see podule extension boards on the market before very long.

There are basically four types of podule that can be used:

Simple podules: These will provide simple input/output to the Archimedes and use a separate 16-bit I/O data bus controlled by the I/O controller chip.

Perhaps the most important will be the one that emulates the user port, 1MHz bus and analogue input port of the BBC Micro. Others will be for connecting things like a teletext adapter, modem or video digitiser.

Memc podules: These can occupy up to 8k of address space and can be accessed much faster than the simple podules. They are intended for interfaces using larger memory maps, a prime example being a sideways rom podule.

Many sideways roms can be installed on the same podule which would occupy pages in the BBC Micro.

Co-processor podules: While all other podules use a 64-way direct connector, this one uses a 96-way connector, to allow full access to the 32-bit data bus. It is designed to be used by processors that will share the workload of the Risc chip. Note the same term was used to describe the second processors on the Master but here it is quite different.

It could be used by a floating point co-processor to speed up arithmetic operations or by other Risc chips. As

Risc chips are designed to work together it is possible in the future to develop multiprocessor machines with this podule. Normally only one podule slot will be able to have a co-processor connected to it.

External podules: These are fitted outside the main machine and can have up to 32k of address space devoted to them, allowing you to have circuits that are physically too large to be fitted internally into the Archimedes.

All podules must identify themselves to the computer by a series of machine readable locations. This will normally be implemented in a small fuse link prom.

Acorn expects podule manufacturers to register with them to obtain a unique manufacturer's identification number to be placed in this space. Undoubtedly there will be people who will not play by these rules, but those who do can expect to have no trouble with podule compatibility.

WIMPS

ARCHIMEDES contains a complete WIMP management system in the Arthur Operating System. The computer is so fast that the whole desktop environment on the Welcome disc is written in Basic using the Window Manager. Using the facilities you can create windows and icons, move the windows around, rescale them and remove them. A window can lie over or under any other.

Mouse access is just as simple, and you can define up to four different pointers (a simple pointer, a busy-bee symbol or anything else). You can also change the size of the pointer at will. The whole system is very flexible and every serious software producer or user should make use of it.

ARTHUR

THE Arthur Operating System consists mainly of passive routines called by user programs to perform the many operations such as reading the next key from

the keyboard, putting a letter on the screen and so on.

Because of the amazing capabilities of the Archimedes, each one of these apparently simple operations can in fact be tremendously complex. You, as the user, will never see all the details of how pressing the letter X at the keyboard produces a highly ornate X one inch high on the screen.

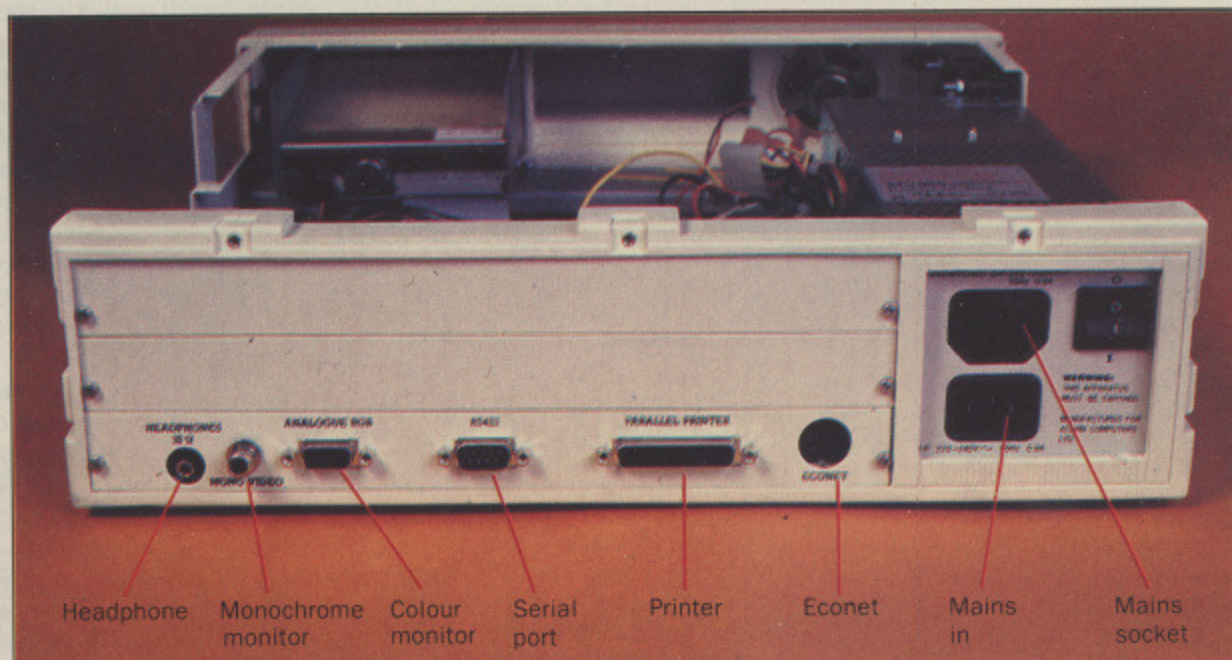
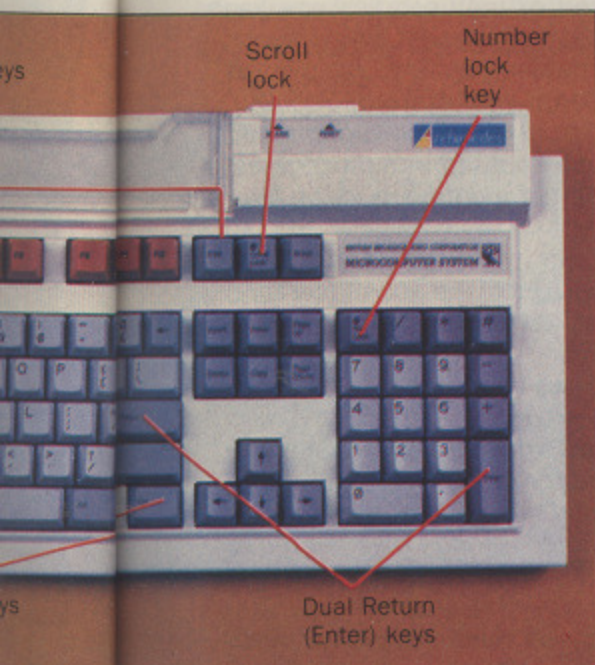
All the standard BBC Micro entries into the operating system, for instance *oswrch* or *osfile*, have been preserved and operate exactly as before. The VDU commands 0-31 are basically unchanged – but some have been extended to take into account the power of the new machine.

VDU17 (COLOUR) and VDU18 (GCOL) now allow 256 colours and colour tints. VDU23 has all the facilities introduced in the Master plus other Archimedes special effects: for example VDU23,17,51 swaps the foreground and background colours, giving the inverse video effect.

The Command Line Interpreter, the part of the operating system which deals with star commands, has undergone the most dramatic changes. In the BBC Micro all the CLI does is recognise (or not) a command and pass it round the roms and filing systems to see if it is a valid command.

The Arthur CLI performs the same function on a superficial level – but there is much more to it. Output from the command (for example the list of files from *CAT) can be re-directed to a text

Turn to Page 20 ►



The back of the main unit showing the sockets



◀ From Page 19

file and if a command requires input then it can be taken from file. You can have string and number variables and there is a *IF statement. The following example produces a catalogue:

```
*SET FRED "HELLO"
*IF FRED="HELLO" THEN CAT
```

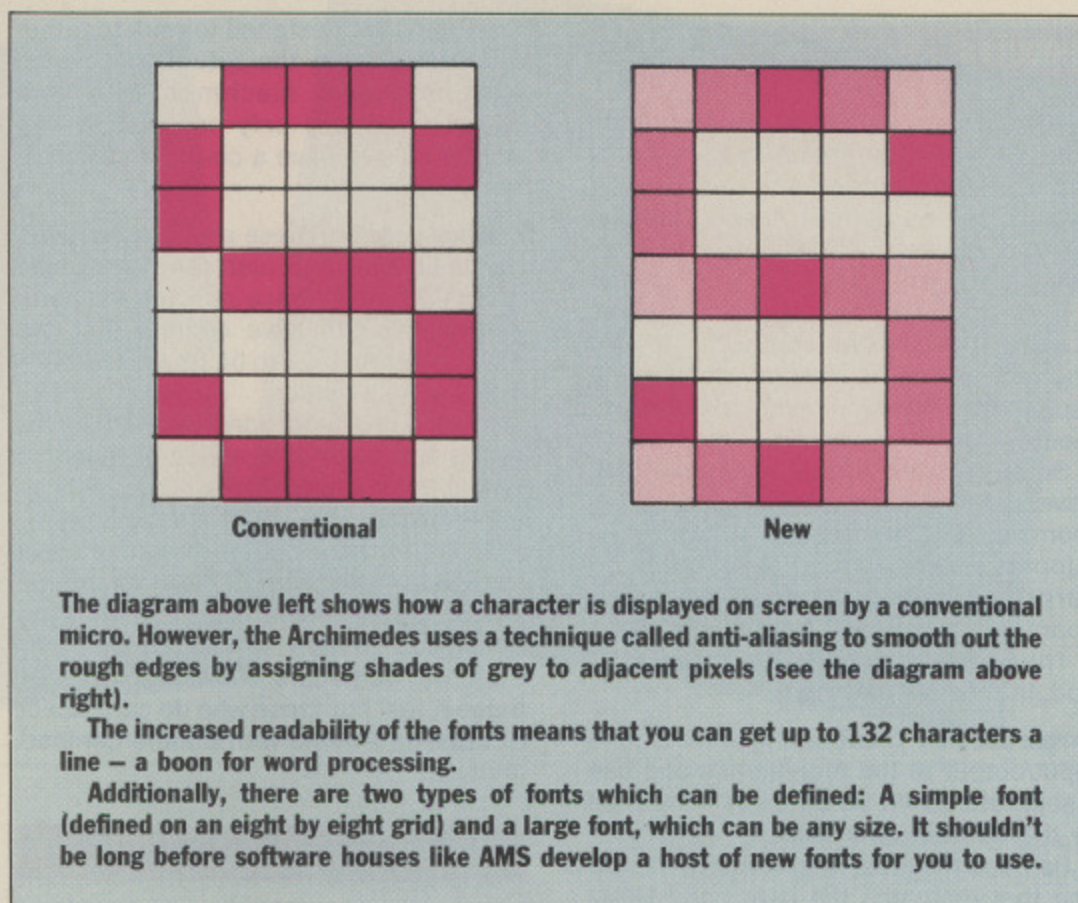
New *osword* commands are available to control such things as the mouse and the screen base address.

The standard filing system provided is the ADFS with many enhancements. Since the Archimedes has a built-in 3.5in drive, discs can be swapped directly from the Compact, or any other BBC Micro (or Electron) using 3.5in drive and ADFS.

The packaged interrupt handling in the form of events is still available. In fact only event 3, analogue conversion complete, is not available. There are no joysticks because you have the mouse instead.

There is no sideways ram facility, but this is not necessary when you have a potential of 64Mb.

Even with 0.5Mb in the basic model you have twice the memory available in a fully expanded BBC Micro (16 sideways roms of 16k each, plus the other 48k).



The diagram above left shows how a character is displayed on screen by a conventional micro. However, the Archimedes uses a technique called anti-aliasing to smooth out the rough edges by assigning shades of grey to adjacent pixels (see the diagram above right).

The increased readability of the fonts means that you can get up to 132 characters a line – a boon for word processing.

Additionally, there are two types of fonts which can be defined: A simple font (defined on an eight by eight grid) and a large font, which can be any size. It shouldn't be long before software houses like AMS develop a host of new fonts for you to use.

However you add your own software modules, which are equivalent to the sideways rams, so language and service software can be added to your machine dynamically.

BASIC V

TO describe the new version of BBC Basic and its programming environment as boring is not an insult – it's a compliment to the skill of the writers in keeping to their specification.

Because so much in the Archimedes is improved and different, the Basic had to

stay the same so people would feel at home. Rest assured that typing a program into the Archimedes looks and feels the same as using a BBC Micro.

But when you get down to the new commands provided, Basic V is anything but boring. Table II provides a list of most of the new ones.

But of course complete upward compatibility is provided. If you have written a program in BBC Basic that only uses standard commands, including operating system commands like *osword*, then that program will run, with no modifications required. If you have it stored on 3.5in ADFS disc you can plug in and just chain it.

The two commands INSTALL and LIBRARY allow you to load procedure and function libraries into memory and access them from the program without having to write them afresh each time. There is also an APPEND command if you want to combine two programs.

In the area of mathematics you can now do matrix calculations in one command, pass arrays into procedures and functions and dimension local arrays. Also both value and variable parameters can be passed into procedures.

Something not mentioned in the User Guide is the fact that Basic V has an assembler for the ARM (Acorn Risc Machine). So watch *The Micro User* for a full rundown on programming in ARM code.

We hope we've succeeded in conveying our excitement about this very worthy successor to the BBC Micro.

The Archimedes's incredible speed and its breathtaking hi-res graphics and sound – coupled with the high degree of compatibility with the BBC Micro – puts all its competitors to shame.

● Watch out next month for more in-depth revelations about this masterpiece of British engineering.

Control Statements

```
IF <condition> THEN
  <multi-line statements>
ELSE
  <multi-line statements>
ENDIF
WHILE <condition>
  <multi-line statements>
ENDWHILE
CASE <expression> OF
  WHEN <list of expressions>
    : <statements>
  <lots of WHEN statements>
  OTHERWISE <statements>
ENDCASE
```

Graphics

```
MOVE [BY] x,y
DRAW [BY] x,y
POINT [BY] x,y
FILL x,y LINE x1,y1,x2,y2
RECTANGLE [FILL] <coordinates>
CIRCLE [FILL] <coordinates>
ELLIPSE [FILL] <coordinates>
ORIGIN
WAIT
MOUSE ON/OFF
MOUSE TO
MOUSE STEP
MOUSE RECTANGLE
MOUSE COLOUR
```

Error Trapping and Debugging

```
ON ERROR LOCAL
LOCAL ERROR
RESTORE ERROR
ERROR <number>,<string>
REPORTS (pseudo variable)
TRACE STEP
TRACE PROC
```

Sound

```
SOUND ON/OFF
VOICES
STEREO
BEAT
BEATS
TEMPO
```

Miscellaneous

```
List variables          LVAR
Assign to part of       LEFT$(), MID$(),
strings                 and RIGHT$()=
Get line from file      =GET$#
Exchange variables      SWAP
Total array elements    =SUM
Shift numbers left      <<<
and right               >>>
Find size of array      =DIM
Find current mode       =MODE
Call system routine     SYS
```

Table II: Some new Basic V instructions

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£1000

Win a BBC Archimedes

HERE's your invitation to join *The Micro User's* search for the most innovative use for a BBC Micro and win the most talked about computer of the moment – the superb new BBC Archimedes plus colour monitor.

The award may be for a BBC Micro that helps handicapped kids, or acts as the nerve centre for some remarkable research project – or it may even be used for fun. What we are looking for is an exciting or unusual idea which other people can take up and develop – one that is helping to push back the frontiers of computing.

**This Risc
computer could
be yours!**



The contest is open to anyone who is using the BBC Micro as a creative tool. The winner could be an individual with flair and imagination. Or a group of friends. Or a school. Or a business. There's no restriction on who can enter.

All you need to do is tell us in not more than 300 words what your BBC Micro is doing that is out of the ordinary. Your entry should be typed and take up no more than one side of A4 paper, but you can also include illustrative material if you wish.

Fill in the form below, attach it to your entry and send it in to arrive no later than October 31, 1987.

The winner of this prestigious award will be announced at the Electron and BBC Micro User Show, opening at the New Horticultural Hall, Westminster, on November 13.

**THE
MICRO
USER**

The super-fast processing power of Archimedes is just what's needed for any serious application, and the eight channels of stereo sound are a boon for musicians everywhere.

With 512k of memory, stunning graphics, and a 3.5in disc drive, the Archimedes is the most coveted micro in Britain today.

Entry form

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Turn your BBC Micro into a teletext receiver!



Join the 3.5 million households who regularly use teletext. The thousands of pages on Ceefax, Oracle and 4-Tel cover everything from programme details and up-to-the-minute news to share prices and football results. But if you have a BBC Micro you can do much more than flash from page to page. With the Morley Teletext Adapter and a normal TV or monitor, you can:

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The Morley Teletext Adapter is simple to install – it plugs straight into the user port. The software is menu-driven with easy-to-follow instructions – it even automatically tunes itself to the required channel.



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The stylish teletext unit, 16k ATS rom, 16k utilities rom (including printer dumps), two manuals and a utilities disc. An optional power supply is available.

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Note: If you use your BBC Micro's auxiliary power socket for your disc drive, or any other external device, you will need a power supply which we can provide for £9.95.

All prices include VAT and P&P.

IMPORTANT: The BBC points out that a teletext adapter, like a TV set, will not work satisfactorily without a good outside aerial. Nor will it function correctly if you experience reception problems such as ghosting.

They emphasise that 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 on 01-927 5040.

TO ORDER TURN TO THE FORM ON PAGE 133

SURVIVE! is a game which achieves that elusive quality of keeping you playing for hours with the promise of just one last go.

The object is to keep moving longer than your opponent without hitting anything. You can play against another player or the computer. No, it isn't a new theme but this version's appeal lies in the computer's playing algorithm, which provides a worthy opponent. You may find it unbeatable at the higher skill levels.

The players are represented by X and O and they move round the Mode 7 screen leaving a coloured trail which must be avoided to survive. It is vital to avoid the border but with practice it is possible for the two trails to cross provided that the X and O are coincident on crossing. In one player mode the computer always plays O.

One machine code routine is used when playing the computer to allow smooth movement while the computer decides where to go next. You'll have hours of fun with this superb game which can be saved directly to disc and it will run on all versions of the BBC Micro.

SURVIVE... if you can!



**By MARTIN
BARR**

PROCEDURES

init	Initialises each game.
dir1	Scans keys for player 1.
dir2	Scans keys for player 2.
hit1	Determines whether player 1 has crashed.
hit2	Determines whether player 2 has crashed.
mov1	Moves player 1.
mov2	Moves player 2.
compdir2	Computers' decision to change direction.
change	Changes computers' direction.
crash	Changes computers' direction if crash imminent.
space	Gets data for PROC-change PROC-crash.
oneortwo	Selects one or two player game.
ass	Assembles the machine code.
skill	Selects skill level.

VARIABLES

sc1%, sc2%	Player 1, 2 scores.
M%	Number of moves in a game.
comp%	TRUE if computer playing.
d1%, d2%	Player 1, 2 direction at next move.
lastd1%, lastd2%	Player 1, 2 direction at last move.
prevd2%	Computer's previous direction.
DL%	Timer set by PROC-skill.
hit1%, hit2%	TRUE if player 1, 2 hit something.
winner\$	Game result.
p1%, p2%	Position of player 1, 2.
X%, O%	Player 1, 2 symbol.
FF%	Always &FF for hit detection.
testm%, testp%, DX%	Used by computer to select direction.
spm%	Machine code located here.
tb, tf, bb, bf	Colour codes for printing results.
pc, nc	Colour codes for graphics.
a, b, c	Assembler labels.
a\$, sk\$	Used in PROC-skill.
d	Loop variable.

```

10 REM Survive
20 REM By Martin Barr
30 REM(c) The Micro User
40 ONERRORGOTO1480
50 MODE7
60 PROC_ass
70 PROC_oneortwo
80 VDU23;8200A;0;0;0;
90 sc1%=0:sc2%=0:d=RND(-TIME)
100 REPEAT
110 PROC_init
120 FORd=0TO2000:NEXT
130 REPEAT
140 SOUND&11,-1,140,1
150 M%=M%+1
160 TIME=0
170 IFcomp% PROC_compdir2:IFd2%<>lastd
2% prevd2%=lastd2%
180 lastd1%=d1%:lastd2%=d2%
190 REPEAT

```

```

200 PROC_dir1
210 IF NOT comp% PROC_dir2
220 UNTIL TIME>DL%
230 IF d1%=-lastd1% THEN d1%=lastd1%
240 IF d2%=-lastd2% THEN d2%=lastd2%
250 PROC_hit1
260 PROC_hit2
270 PROC_mov1
280 PROC_mov2
290 UNTIL hit1% OR hit2%
300 SOUND0,-10,85,2
310 IFhit1% winner$="Player 0 Wins !"
LSE winner$="Player X Wins !"
320 IF(hit1% AND hit2%) winner$=" It's
a draw !"
330 tb=?&7C00-16:IF tb<135 tf=tf+1 ELS
E tf=129
340 bb=?&7FC0-16:IF bb<135 bf=bb+1 ELS
E bf=129
350 PRINTTAB(0,0)CHRS(tb)CHRS(157)CHRS

```

```

(tf)SPC(10)winner$:SPC(12)
360 sc1%=sc1%+ABS(hit2%)
370 sc2%=sc2%+ABS(hit1%)
380 PRINTTAB(0,24)CHRS(bb)CHRS(157)CHR
$(bf)SPC(3)'Player X = ':sc1%;SPC(3)'Pla
yer 0 = ':sc2%;SPC(39-POS);:;&7FE7=32
390 REPEAT UNTIL INKEY-99
400 UNTIL FALSE
410 END
420 DEFPROC_init
430 CLS:pc=0
440 FORd=87C00 TO 87FC0 STEP40
450 REPEAT:nc=RND(7)+144:UNTIL nc<>pc
460 pc=nc:d=nc:NEXT
470 FORd=87C01 TO 87C27:d=&FF:NEXT
480 FORd=87C01 TO 87FC0 STEP40:d=&FF:
NEXT
490 FORd=87FC1 TO 87FFF:d=&FF:NEXT

```

Turn to Page 24 ►

◀ From Page 23

```

500 FORd=87C27 TO 87FFF STEP40:?d=&FF:
NEXT
510 p1%=&7C00+(40*(RND(22)+1))+RND(16)
+1
520 p2%=&7C00+(40*(RND(22)+1))+RND(16)
+22
530 d1%=1:lastd1%=1:hit1%=FALSE:hit2%=
FALSE
540 d2%=-1:lastd2%=-1:prevd2%=-1:FF%=&
FF
550 X%=ASC"X":O%=ASC"O":?p1%=X%:p2%=O
%
560 testm%=0:testp%=0:M%=0
570 ENDPROC
580 DEFPROC_dir1
590 IFINKEY-82THEND1%=-40
600 IFINKEY-98THEND1%=40
610 IFINKEY-2THEND1%=1
620 IFINKEY-65THEND1%=-1
630 ENDPROC
640 DEFPROC_dir2
650 IFINKEY-41THEND2%=-40
660 IFINKEY-89THEND2%=40
670 IFINKEY-104THEND2%=1
680 IFINKEY-103THEND2%=-1
690 ENDPROC
700 DEFPROC_hit1
710 IF?(p1%+d1%)=FF% THENhit1%=TRUE
720 ENDPROC
730 DEFPROC_hit2
740 IF?(p2%+d2%)=FF% THENhit2%=TRUE
750 ENDPROC
760 DEFPROC_mov1
770 ?p1%=FF%:p1%=p1%+d1%:p1%=X%
780 ENDPROC
790 DEFPROC_mov2
800 ?p2%=FF%:p2%=p2%+d2%:p2%=O%
810 ENDPROC
820 DEFPROC_compdir2

```



```

830 IF?(p2%+d2%)=FF% THEN PROC_crash:E
NDPROC
840 IF?(p2%+d2%+d2%)=FF% AND M%>40 THE
N PROC_change:ENDPROC
850 IFM%>50 ENDPROC
860 IFlastd1%<>d1%PROC_change:ENDPROC
870 ENDPROC
880 DEFPROC_change
890 PROC_space
900 IFtestp%=testm% THEN ENDPROC
910 IFtestp%>testm% THENd2%=DX% ELSEd2

```

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

MicroLink

```

%=-DX%
920 ENDPROC
930 DEFPROC_crash
940 PROC_space
950 IFtestp%=1 THENd2%=-DX%:ENDPROC
960 IFtestm%=1 THENd2%=DX%:ENDPROC
970 IF(testp%=2)AND(testm%=2) THENd2%=
prevd2%:ENDPROC
980 IFtestp%=testm% THENd2%=DX%:ENDPRO
C
990 IFtestp%>testm% THENd2%=DX% ELSEd2
%=-DX%:ENDPROC
1000 DEFPROC_space

```

```

1010 ?&70=p2% MOD 256:?&71=p2% DIV 256
1020 ?&72=ABS(d2%)
1030 CALL spm%
1040 testp%=?&73:testm%=?&74:DX%=?&76
1050 ENDPROC
1060 DEFPROC_oneortwo
1070 CLS
1080 FORd=0TO1:PRINTCHR$157CHR$131TAB(1
1,0+d)CHR$141CHR$129* Survive! *:NEXT
1090 PRINT""
1100 PRINTSPC(10)'S'SPC(17)'L'
1110 PRINTSPC(4)'CLOC'CHR$136' o 'CHR$13
7' CTRL'SPC(8)'<CHR$136' o 'CHR$137'>'
1120 PRINTSPC(10)'Z'SPC(17)'J'
1130 PRINTTAB(8,17)CHR$130'One or Two P
layers ? ';
1140 REPEAT UNTIL INKEY-49 OR INKEY-50
1150 IFINKEY-49 comp%=TRUE ELSE comp%=F
ALSE
1160 IFcomp% PRINT'1' ELSE PRINT'2'
1170 PROC_skill
1180 ENDPROC
1190 DEFPROC_ass
1200 DIM spm% 200
1210 FORd=0TO2 STEP2
1220 P%=spm%
1230 OPTd
1240 LDA&70:STA&77:LDA&71:STA&78
1250 LDY#0:STY&73:STY&74
1260 LDX#40:LDA&72:CMPI#1:BEQ a:LDX#1
1270 .a STX&76:.LOOP1 LDA&76:CLC:ADC&77
1280 STA&77:BCC b:INC&78:.b INC&73
1290 LDA(&77),Y:CMPI#&FF:BNE LOOP1
1300 LDA&70:STA&77:LDA&71:STA&78
1310 .LOOP2 LDA&77:SEC:SBC&76:STA&77
1320 BCS c:DEC&78:.c INC&74:LDA(&77),Y
1330 CMPI#&FF:BNE LOOP2
1340 RTS
1350 ]
1360 NEXT
1370 ENDPROC
1380 DEFPROC_skill
1390 PRINTTAB(8)CHR$130'Skill Level (1
-5) ? ';
1400 a$="12345!#$%"+CHR$(34)
1410 REPEAT
1420 *FX15,0
1430 sk$=GET$
1440 UNTIL INSTR(a$,sk$)
1450 sk$=CHR$(ASC(sk$)OR&10)
1460 DLX=3*(5-VAL(sk$))
1470 ENDPROC
1480 IF ERR=17 THEN RUN
1490 MODE 6:REPORT:PRINT' at line'ERL
1500 ENB

```

✓ **Get it
right!**

10 = 00	260 = 6150 9	510 = 5C0F 5
20 = 00	270 = 3984 0	520 = 3CF1 6
30 = 00	280 = 9D7 8	530 = 3633 5
40 = 9A00 0	290 = 8B56 9	540 = 806F 3
50 = 8AFC C	300 = C464 7	550 = 1BF E
60 = 65A5 8	310 = 3C64 B	560 = 86CE 4
70 = 63CA B	320 = AFB8 5	570 = ED0F E
80 = 9877 E	330 = 37A8 8	580 = 1FC3 4
90 = 96D0 2	340 = E364 1	590 = 62BF 1
100 = BFBA 0	350 = 7A0E A	600 = E9A9 4
110 = CF59 E	360 = 318 9	610 = C8B4 C
120 = F35A 1	370 = CAFF 1	620 = 8E53 C
130 = BFBA 8	380 = C77C 4	630 = ED0F 1
140 = 7C3B C	390 = AD81 F	640 = 2FA0 2
150 = AA39 1	400 = 226C 8	650 = 6665 E
160 = 173E B	410 = FD2E 4	660 = AB8B 9
170 = B045 A	420 = 643D 4	670 = 5BB E
180 = 7FA8 F	430 = E882 C	680 = 4CD1 A
190 = BFBA A	440 = CBF4 9	690 = ED0F 2
200 = B4A7 4	450 = 6BA0 3	700 = FA57 E
210 = A421 2	460 = 2BB1 9	710 = 9E8F 0
220 = FF9 D	470 = 8A59 B	720 = ED0F A
230 = F720 6	480 = B99B 8	730 = CA34 8
240 = 352D 3	490 = DE05 B	740 = B3CB 2
250 = 5133 0	500 = 41D2 3	750 = ED0F 1

760 = 92D0 6	1010 = 96F9 7	1260 = F30B 2
770 = 970F F	1020 = B7B0 A	1270 = 6952 0
780 = ED0F 7	1030 = 29F1 9	1280 = 15F5 C
790 = A2B3 7	1040 = 832C 8	1290 = E0C3 C
800 = 3BA5 D	1050 = ED0F 1	1300 = B52D 6
810 = ED0F E	1060 = D008 2	1310 = 7B1B 6
820 = 5C9E 8	1070 = 7A16 5	1320 = 11C8 B
830 = 8ACE 5	1080 = 608F 5	1330 = 19AF 9
840 = 1172 B	1090 = 215B 3	1340 = 9843 0
850 = 8B68 B	1100 = B357 5	1350 = 8B58 F
860 = C1C8 2	1110 = 5E1A 9	1360 = 2C83 F
870 = ED0F 1	1120 = CD12 E	1370 = ED0F 9
880 = C448 A	1130 = 39F6 7	1380 = C863 4
890 = 85EC 2	1140 = 913E D	1390 = A7D8 6
900 = C832 0	1150 = 9274 6	1400 = 26A9 A
910 = 299E 9	1160 = 88 4	1410 = BFBA 7
920 = ED0F 0	1170 = A8E2 5	1420 = 6C86 1
930 = DE81 3	1180 = ED0F C	1430 = DB43 D
940 = 85EC E	1190 = 8F52 5	1440 = 2394 A
950 = 1D52 C	1200 = F55D 3	1450 = A870 F
960 = B889 E	1210 = 9B79 2	1460 = BE50 7
970 = D534 E	1220 = B91A D	1470 = ED0F B
980 = 8BD A	1230 = F328 C	1480 = BEE6 7
990 = D958 F	1240 = B52D C	1490 = 1EB3 F
1000 = E56D C	1250 = 8628 7	1500 = FD2E 2

This listing is included in this
month's tape & disc offer.
See order form on Page 133.

MEGABYTE MIRACLES



Don't miss this amazing special offer from Opus — a choice of powerful 1 or 2 Megabyte disc drives at simply magic prices.

Choose our 1 Megabyte drive for just £109.95 or 2 Megabyte dual drive offering for only £209.95. Our prices even include VAT and FREE delivery! And, if you need an interface, add just £40 to the cost of either of our special offer drives and we'll supply you with one of the best double-density systems on the market — the Opus DDOS.

OPUS DRIVES

Our 5 1/4" drives are double-sided, 80/40 track hardware switchable models representing the very latest in disc drive technology and offering superb performance. They feature reliable direct drive mechanisms, low power consumption and fast track access times and they're backed by our no-quibble 2 year guarantee.

THE OPUS DDOS

Our highly acclaimed DDOS is probably the most advanced double-density disc interface available and if you choose one of our Megabyte bargains we'll slash £20 off the normal retail price — it's yours for just £40.

Our disc interface uses the same disc controller chip as the BBC B+ allowing you to run all leading software titles — just phone for our comprehensive listing.

The Opus DDOS handles tape to disc transfers, Format and Verify utilities are included on ROM and its powerful machine code operating system gives you up to 248 files — the perfect partner for your new Opus disc drive.

Simply post the coupon or call Opus now on **0737 65080** — we'll guarantee delivery within 72 hours. Our Megabyte Miracles offer is available for a limited period only, so call today to avoid disappointment.

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To: Opus Supplies Limited, 55 Ormside Way, Holmesthorpe Industrial Estate, Redhill, Surrey. Please rush me the following: (PRICES INCLUDE VAT AND CARRIAGE — UK Mainland only)

_____ 1 Megabyte (unformatted) System(s) at **£109.95** each
_____ 2 Megabyte (unformatted) System(s) at **£209.95** each
_____ Opus Double Density Disc Interface at **£40.00** each
(Only when purchased with drive) **BBC**

I enclose cheque for £_____ or please debit my credit card account with the amount of £_____

My Access ☐ Visa ☐ no. is:

NAME

ADDRESS

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SOLIDISK MASTER

Solidisk Dual Density Disc Systems:

Solidisk offers two types of disk filing system, with a choice of two Rom types. Both are based on the Western Digital WD1770 chip — the standard not only for the BBC model B, but also the BBC +, Master, Compact and ADFS. Both are fully compatible with Acorn Roms, offering complete solutions to the problems of updating the BBC, based on 1770, 8271, DFS and ADFS systems.

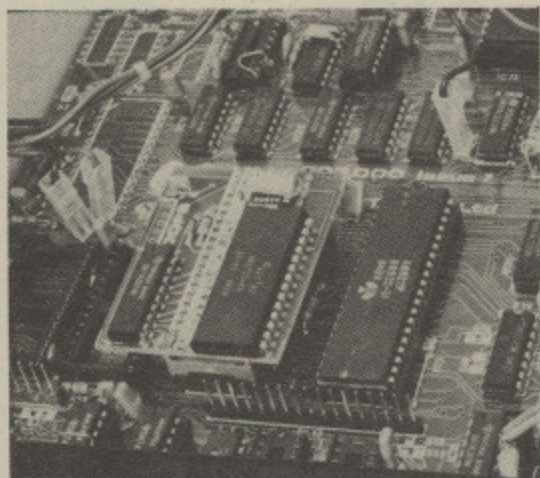
Not only is our range therefore unequalled, but also the features it offers; if you don't believe us, check other makes before you buy.

Which DFS?

WD-1770 DDFS Disk Interface:

If your Beeb has not yet been upgraded to disc, then the DDFS is the right choice. It is certainly the most popular version on the Beeb and easy to fit. Use with Acorn or Solidisk Roms to give compatibility with any 40/80 track drive, with or without PSU.

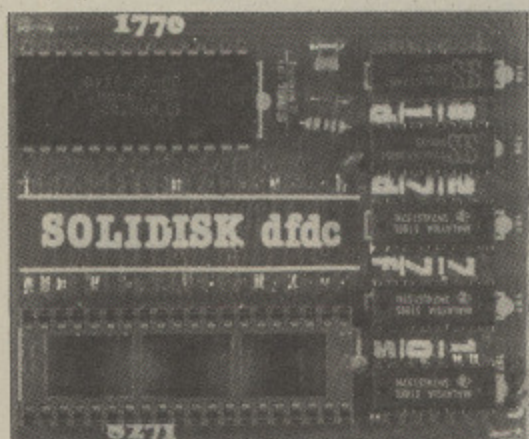
New low price without Rom£35.00
With STL 2.2 ROM (see below)£45.00
With STL 2.1 ROMs (see below)£55.00



WD-1770+8271 DFDC Disk Interface:

If you already have an 8271 based DFS from Acorn, Watford Electronics, Pace, Cumana or Viglen, this is the only way to add the WD-1770 to your system. Fully compatible with the Acorn DNFS1.20 ROM for the 8271 and Acorn ADFS for the 1770. Allows the Acorn chip set to self-erase, keeping memory requirements (and PAGE) at a minimum. For maximum performance, use the STL 2.2 Rom (for both 8271 and 1770). If ADFS is required, use Acorn DNFS1.20 ROM (for your 8271) with the STL 2.1 Romset (for the WD-1770). The last combination will still allow self erasure, and will add single and double density, cross format file copy, ADFS as well as NFS. In other words, everything imaginable with the Beeb.

New low cost DFDC without Rom£40.00
DFDC with STL 2.2 Rom£50.00
Special offers:
DFDC with STL ADFS 2.1 Romset (see below)£55.00
DFDC with STL 2.2 DFS and 2.1 (3 Roms)£63.00



Which ROMs from Solidisk?

STL DFS 2.2 ROM:

Runs with both 8271 and WD-1770 chips from Acorn, Watford and Opus, and 1770 from STL, and offers the following features:

★ 40/80 track software switching ★ unlimited catalogue entries
★ automatic Read after Write for media security ★ runs with Z80, 6502 and Econet ★ more commands than any other DFS including FORMAT in 40/80 track, VERIFY, DZAP, MZAP, RECOVER, RESTORE, WORD, RTRACK, WTRACK, DSTEP, ETC ★ when used with the WD-1770, reads disks in single and double density and IBM format ★ 60 per cent free extra storage space in double density (640K per disk compared with Acorn's 400K) ★ more speed and bigger file size.
Supplied on one 16K Rom with manual

Order as the DFDR2£20.00

PLEASE SPECIFY WE/OPUS/MASTER/COMPACT as applicable.

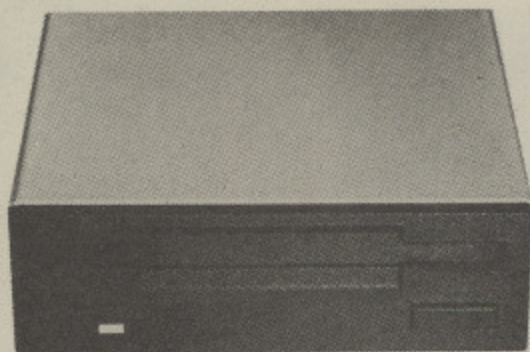
The ADFS 2.1 ROMSET:

This double ROM set has all the commands of the STL DFS 2.2. Rom but runs only with the 1770, not the 8271 system. It has many more besides, including all the commands in the Acorn ADFS Rom.

PLUS: ADFS disk formatter (for 40, 80 and 160 tracks) and VERIFY ★ MVADFS and MVDFA to transfer cross format disks between DFS and ADFS with automatic PAUSE for disk change when using a single drive ★ user specified (1 to 10) number of file channels to keep PAGE to a minimum ★ runs with the Z80, Turbo, 32016 and the new 80186 PC compatible upgrade.

Supplied on two 16K Roms or one 32K with two user manuals.
Order as ADFSROM 2.1£30.00

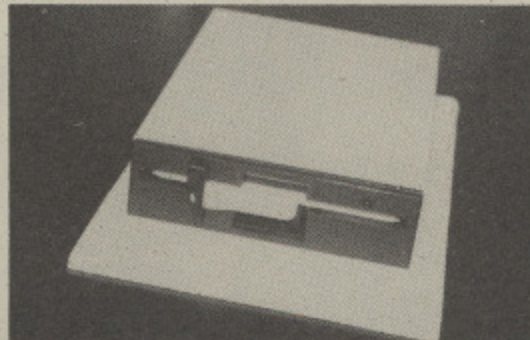
PLEASE SPECIFY WE/OPUS/MASTER/COMPACT/16K OR 32K as applicable.



Solidisk FD35 3.5" Disc Drive:

This is a superb 80 track, double sided, dual density drive, also useable on the ATARI ST. You get up to 640K maximum per disc (800K with the 80186) and at its price, you are guaranteed of extremely good value. Comes with demo disk.

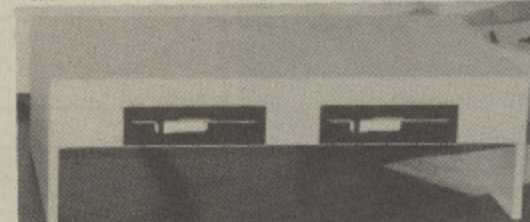
Order as FD35, single drive£100.00
Order as TFD35, twin drive£200.00
Order as ADFS16 for the Compact£113.85
Separate PSU if required (PSU/35)£25.00
Recommended media:
Sony Double Sided, double density, 135 TPI or equivalent (£29 per box of 10).



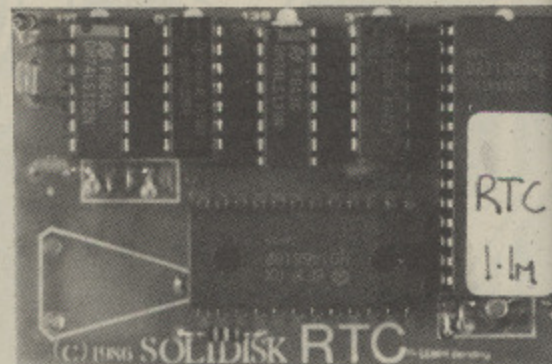
Solidisk FD525 5.25" Disc Drive:

This is a superb 80 track, double sided, dual density drive and very fast. You get up to 640K maximum per disc (800K with the 80186 board). 40/80 manual switch is optional as most Acorn DFS ROMs and Solidisk's have automatic 40/80 track software switch.

Order as DF525, single£119.00
Order as TFD525, twin in a bridge£228.00
Orders as TFD525/CPU, twin in the CPU case with detachable keyboard case for Beeb£239.00
Separate PSU if required (PSU/525)£25.00
40/80 track manual switch optional£2.00



PLEASE SPECIFY SWITCH/MASTER/COMPACT/ELECTRON if applicable.

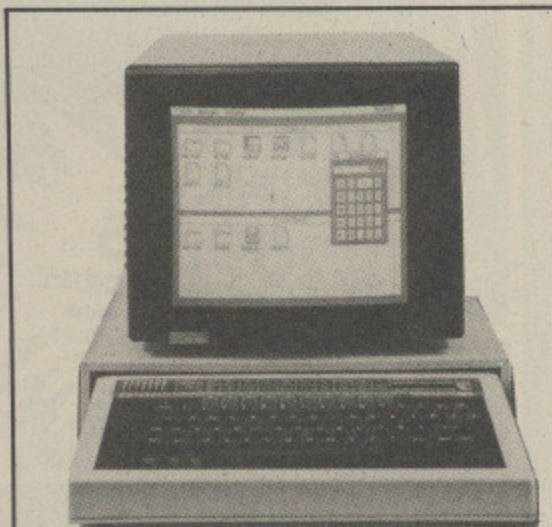


Solidisk Real Time Clock:

The Real Time Clock and Calendar (RTC) can be plugged into any ROM socket on the Beeb with absolutely no other connection to make. It is powered by a rechargeable NICAD battery which should keep the RTC active throughout the Summer holidays.

Star commands include: Alarm, Bell, Boot, Configure, Dalarm, Noclock, Roms, RTC, Settime, Show, Status, Time and Unplug. FX161 and 162, Osword 14 and 15 are similar to the Master 128. It is also compatible with Basic 4's TIMES.

The RTC has many of the autoconfigure features of the MASTER with the same command syntax: Caps/Nocaps, data, delay, Fdrive, File, Ignore, Lang, Loud/Quiet, Mode (0-135), Boot/NoBoot, Dir/Nodir, Time/Notime, Printer, Repeat, Rx, Scroll, Tube, Tx, Tx. If your Beeb has an AMX mouse, the RTC offers a DESKTOP and a CALCULATOR, just like GEM!
Order as RTC£29.00



Secondhand BBC Model B's:

All secondhand BBC Model-B's are guaranteed for 6 months on labour.

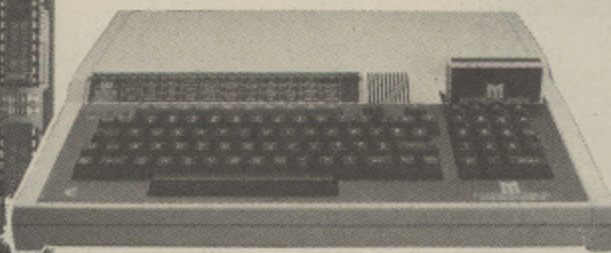
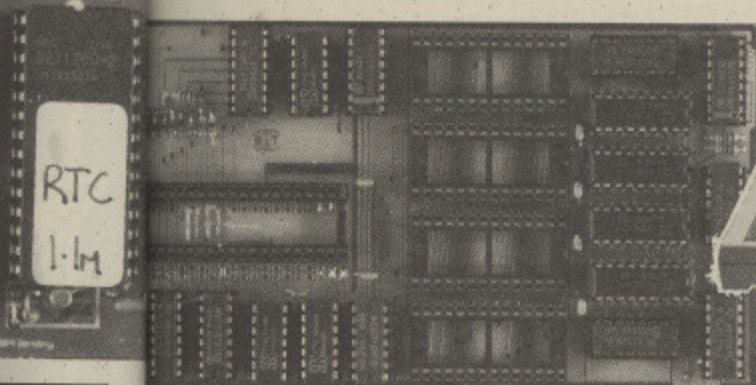
BBC Model-B:	We sell at:	
	basic	with DDFS
Issue-2	160	185
Issue-3	210	235
Issue-4	235	260
Issue-7	275	300

BBC Model-B:	We buy at:	
	basic	with DFS
Issue-2	120	140
Issue-3	157	177
Issue-4	176	196
Issue-7	206	226

Solidisk Masterplan:

'If you want to upgrade your used BBC micro for a new system, then the Solidisk MASTERPLAN offers you the best deal around'. Ring for a quote.

STRISE YOUR BEEB!



MASTER 128

TWOMEG 128

New: The Twomeg 128K board

Solidisk has always been closest to emulate the MASTER 128K. The Twomeg 128K features 64K of Sideways RAM in four banks: 4, 5, 6 and 7, selected by a single latch at &FE30 for both read and write exactly like the Master. The remaining 64K is more versatile and can be used as four more Sideways RAM (12, 13, 14 and 15) or as Shadow RAM and a 24K printer buffer (good news for wordprocessor users).

The new Twomeg 128K will run Computer Concepts Interword, Sheet and Spellmaster, Acorn View 3.1, Viewsheet, Viewstore, Basic etc.

A clever switch write-protects only the 8 banks of Sideways RAM without affecting the Shadow RAM and the Printer Buffer.

Ramdisk is not forgotten, you can have one in ADFS (if you have Solidisk ADFS) or in DFS for both 8271 and 1770 disc controllers.

Four extra ROM sockets are available directly on the Twomeg 128K board, numbered 8, 9, 10 and 11. Four ROM sockets on the Beeb are renumbered to 0, 1, 2 and 3.

Software is supplied on FIVE discs, containing Wordprocessor, Spelling Checker, Database, Macro Basic, Ramdisk, Menu, Manager etc. Software Pack 2 (five discs) is optional and contains many useful utilities for the machine code programmer. Software Pack 3 also optional, contains around 50 of Solidisk Megagames. List of all programs in these software packs is included in the Twomeg 128K User Manual. Fitting is extremely easy: just plug in the board into the CPU socket and push 3 terminals onto S20, S21 and S22. Internal logic produces chip select for the &FE30 latch. Free installation by local experts is available.

Order as 2MEG128£60.00

PLEASE SPECIFY /40 TRACK OR /80 TRACK FOR THE SOFTWARE PACK 1, included in the price.

Optional software Pack 2 or 3 (five discs)£10.00

Detachable Keyboard and CPU case:

This 'three box' casing system will help you to organise your desk and improve comfort. The keyboard features the lowest profile (maximum height of any key is 47mm) and does not skid. Typing angle is 2-3 degrees better. The monitor sits on top of the computer. Pure metal construction provides EMF shielding against phantom keyboard interrupt and accelerates heat dissipation (no messy metal strengthening over plastic). Keyboard lead is 24" long.

Order as K/CPU case, special offer price while stocks last£25.00

Note: Post and packing£6.00



The Fourmeg 32K board:

The Fourmeg 32 is a ROM expansion board on its own with up to 224K of installable firmware. It also is the FASTEST shadow RAM board around (it runs at 4 MHz while others run at 2 MHz, including the MASTER), and the fastest Sideways RAM board. It consumes also less power than any other ROM RAM board through the extensive use of CMOS devices.

The top row of five ROM sockets will take software ROMs, up to 32K each, such as used on the Beeb Plus, the MASTER or the Compact. They are high speed sockets.

The middle row contains 40K of high speed CMOS static RAM chips, acting as a Shadow RAM and a printer buffer or as two banks of Sideways RAM. Write-protection of Sideways RAM is performed by separate Read and Write registers with automatic write-protect when one presses the BREAK key.

The CPU is a 4 MHz, CMOS technology, GTE 65C02, similar to the one on the Turbo board, replacing the existing 6502.

The Fourmeg 32K is also upgradable, once more by the latest CMOS technology: 62256, 32K RAM on a single chip which plugs into one of the high speed ROM sockets.

This board is designed such that one can have everything required on a single, compact and easy to install unit. All the necessary software is in a MANAGER ROM (supplied). Star commands include: Shadow, Ramdisk, Ramoff, Ramdfs, Ramadfs, Ramdrive, Testram, Plus. A complete toolkit to assist programming in Basic is also included: Hardbreak, Join, Keyload, Keysave, Kill, Lvar, Menu, Msearch, Mzap, Page, Printer, Rcat, Number, Report, Rload, Rwipe, Salvage, Status, Sound. One year guarantee.

Order as FOURMEG 32£70.00

Additional 32K chip (optional)£15.00

Software packs 1 to 3 (optional), each of five disc£10.00

The Fourmeg 256K board:

The Solidisk Fourmeg 256 board combines high CPU speed (4MHz GTE 65C02) with large memory size (256K Dynamic RAM, 8K static RAM) and powerful supporting software (32K MANAGER ROM). It offers four ROM sockets featuring high speed and high capacity (up to 64K ROM per socket), 8 shadow RAM banks, 8 Sideways RAM banks or even both.

Order as Fourmeg 256K£135.00

NOTE: NO MORE ROM BOARD TRADE-IN IS ALLOWED AFTER 1ST MAY 87.



Wordwise Plus or Interword Special Deal:

If you buy Wordwise Plus or Interword together with a Twomeg or a Fourmeg board, you get extra special discount!

Wordwise Plus (bundle only)£30.00

Interword (bundle only)£50.00

Special Offers on Sideways RAM boards:

These exceedingly popular systems (40,000 plus units sold) enables the Beeb users to load ROM images into the Beeb, make a 16K printer buffer, use DFS with PAGE at &E00, play Solidisk Megagames, bigger Basic (Vstore), store music and innumerable other uses as supported by a library of 15 software diskettes.

They consist of a base unit plugging into the rightmost ROM socket on the Beeb and an exchangeable RAM card with capacity ranging from 32K (two Sideways RAM banks) to 128K (8 Sideways RAM banks). They are now made available to you at less than half their normal price, all offering extremely good value. One year guarantee, supplied with User Manual and one software disc.

SWR32, 32K RAM, disc No 1£20.00

SWR64, 64K ROM and two 16/32K ROM sockets,£30.00

Disc No 1£30.00

96K Extension, or SWR 32£25.00

SWR128 (new style), 128K RAM, two 16/32£45.00

ROM sockets£45.00

Software Packs 1 to 3, each of five discs, any pack£10.00

Any disc volume 1 to 15 each£2.00

PLEASE SPECIFY /40 TRACK OR /80 TRACK as applicable.

Electron Disc Interface:£50.00

BABT approved Modem plus Linemaster ROM£30.00



EPROM Programmer:

The UVIPROM is the cheapest Eeprom programmer on the market yet the easiest to use, will program 2764 EPROMs in one minute and 27128 in two minutes.

A different version called the UVIPROM32 will program 27256 EPROMs in 4 minutes.

The MULTIPROM is the Deluxe version, combining the capacity of the UVIPROM and the UVIPROM32 and some other features. Use it to program 2764, 27128 (normal and A type), 27256 (12.5V and 21V), 27512, 27513 etc. Textool 28 pin ZIP socket fitted as standard.

UVIPROM plus disc No 10£20.00

UVIPROM32 plus disc No 10£20.00

MULTIPROM plus disc No 10£44.50

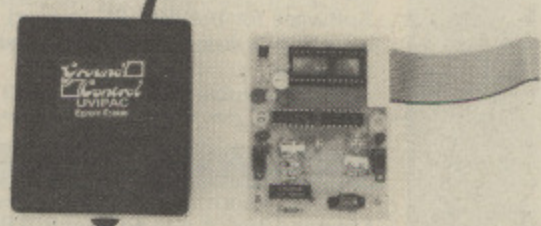
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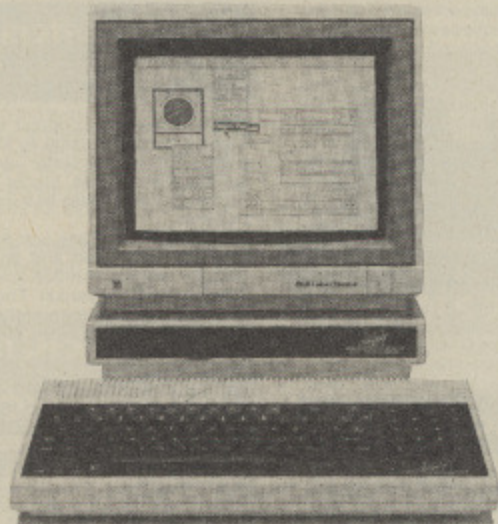
Solidisk will accept return of memory boards up to ONE YEAR old for TRADING-UP. The selling price (below) is the price we sell the same goods at the time of the trade-up transaction.

Age	Trade-up allowance
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As a result of our MASTERPLAN, we have a number of BBC Model B's for sale every day. All are fully inspected, reconditioned if necessary, and guaranteed. All have a new DDFS fitted as standard. We also buy second-hand Beeb for cash. See our price list for details.

System One



System One: COMPACT now with 5.25" drives:

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Available options (all prices include VAT):

- A — Compact 128K with Acorn 14" Colour monitor, CDFS, twin 3.5" drive, one demo disc containing Solidisk Database, Spelling Checker and Megagames (as illustrated): £749.00
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The MP 165 is one of our best selling printers, featuring 165 cps in draft mode, 40-50 cps in NLQ, Epson FX compatibility, friction and tractor feed etc. Normal price is extremely attractive at £260.00 when you consider that the MP 165 is a lot faster than its rivals such as the Star NL-10, the Kaga KP-810, the EPSON LX86 or FX85 etc. We will cut £40 off the normal price and give you a free printer lead if you buy the MP-165 together with a System.

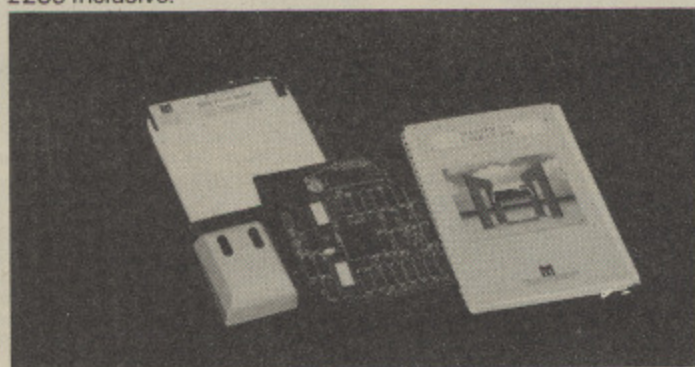
3 PC-UPGRADES: Acorn 80186, Solidisk PC-500 and PC-PLUS

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A PC compatible board is just what you need to take full advantage of it.

Solidisk offers you 3 PC systems:

- 1) The Acorn 80186 Co-processor which will fit into the Master 128K. It has an Intel 80186 CPU running at 10 MHz and 512K of RAM. It comes with 4 software discs, containing DOSPLUS disc operating system and the GEM collection (wordprocessor and painting programs). It costs £228 inclusive.
- 2) The PC-500 which is the same as above but housed in a box and will plug into the TUBE connector of the MASTER or the BBC Model B. The latter must have Solidisk DDFS or DFDC (or Acorn 1770) and Solidisk ADFS 2.1 ROM (or Acorn ADFS 1.4). It costs £239 inclusive.



ACORN 80186

- 3) The PC-PLUS is an PC-500 upgraded to full one Megabyte. It costs £339 inclusive.

Why did we add more memory to the already impressive 512K RAM of the 80186?

Here are two reasons.

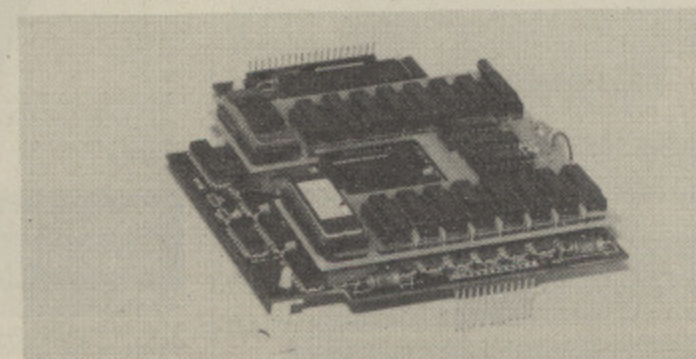
Firstly, more powerful software requires more memory, this often does not fit the 80186.

And secondly, more memory means greater performance.

THE PC-PLUS opens new doors to the 80186. Take DESK TOP PUBLISHING: the PC-PLUS will run Fleet Street Editor while the basic PC-500 won't. Take SPREADSHEET: the PC-PLUS runs ABILITY in RAM — even the 640K IBM can't and it can handle 500K sheets with VP Planner compared with 246K on the PC-1512.

The PC-PLUS and indeed the PC-500 and the 80186 will be supported by Solidisk to the ARM level.

We can offer special prices to educational buyers.



INSIDE THE PC-PLUS

SOLIDISK ADVANCED TELETEXT: SAT-1

Would you like your Teletext receiver to:

- 1) Tune automatically for the best reception?
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- 3) Download free software?
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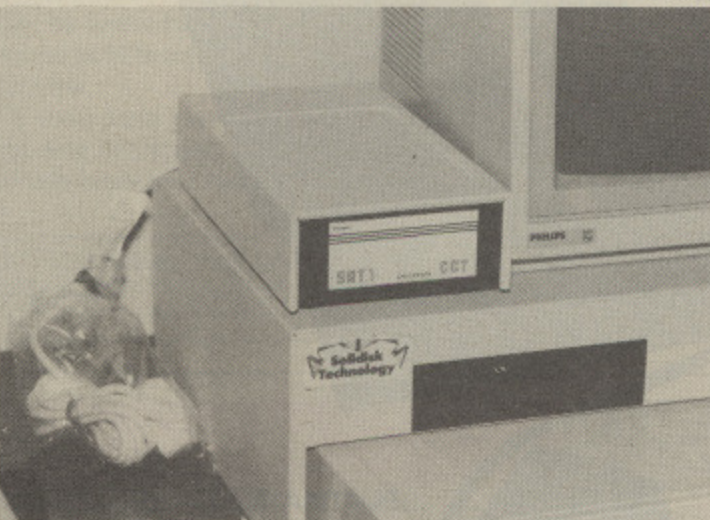
Solidisk Advanced Teletext SAT-1 has IV compatible colour video output to display TV pictures on compatible monitors. It has TV SOUND too. So while it downloads your software, you may watch TV instead.

Solidisk Advanced Teletext SAT-1 works on Amstrad PC, Commodore C64 and 128 and soon on AMIGA A-500, ATARI-ST and the ARM. You only need to buy an appropriate lead and the CCT software for the machine you intend to use the SAT-1 with.

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Price:

SAT-1/BBC with BBC lead and software disk including VAT £100.00
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 Lead and software for any other micro, eg PC1512, C64 and C128, ST 520, A500 etc from £15.00



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The Solidisk MEGA 256K card plugs into the MASTER cartridge slot. And add instantly, 256K bytes of RAM to your MASTER 128K. Need a RAM disk?

Easy.

Just enter *RAMDISK <n> and the number of K bytes you want for your RAM disk. In DFS or in ADFS (or both RAM disks with a little bit of extra finger work). And up to 240K in size.

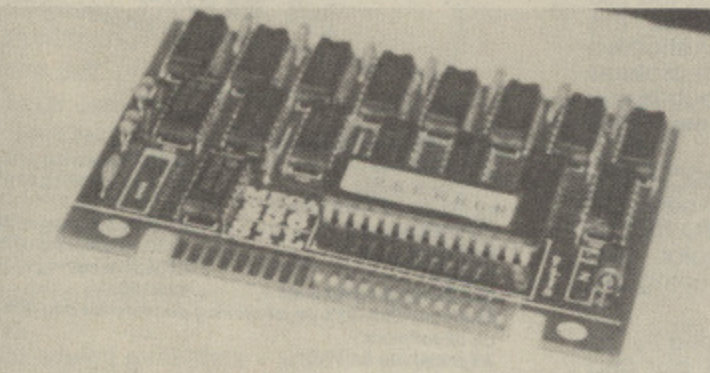
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Equally easy.

Enter *PRINTER and the number of K bytes you want.

Loading ROM images into the extra RAM is just as easy as to the existing Sideways RAM.

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EXTRA DISCOUNT

If you buy a disc drive or a printer or a monitor at the same time you buy a Master or a Compact, you are qualified for SYSTEM DISCOUNT and a free Software Pack 1 (worth £10.00 or more).

Normal Package

Price	System Discount	Reduction
£600-£699	3%	£18-£21
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£900-£999	6%	£54-£60
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Less than 1 KG (eg software, cartridges and books): £2.00

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Please fill and send to:

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Price: P & P: £2/£3/£6/£12

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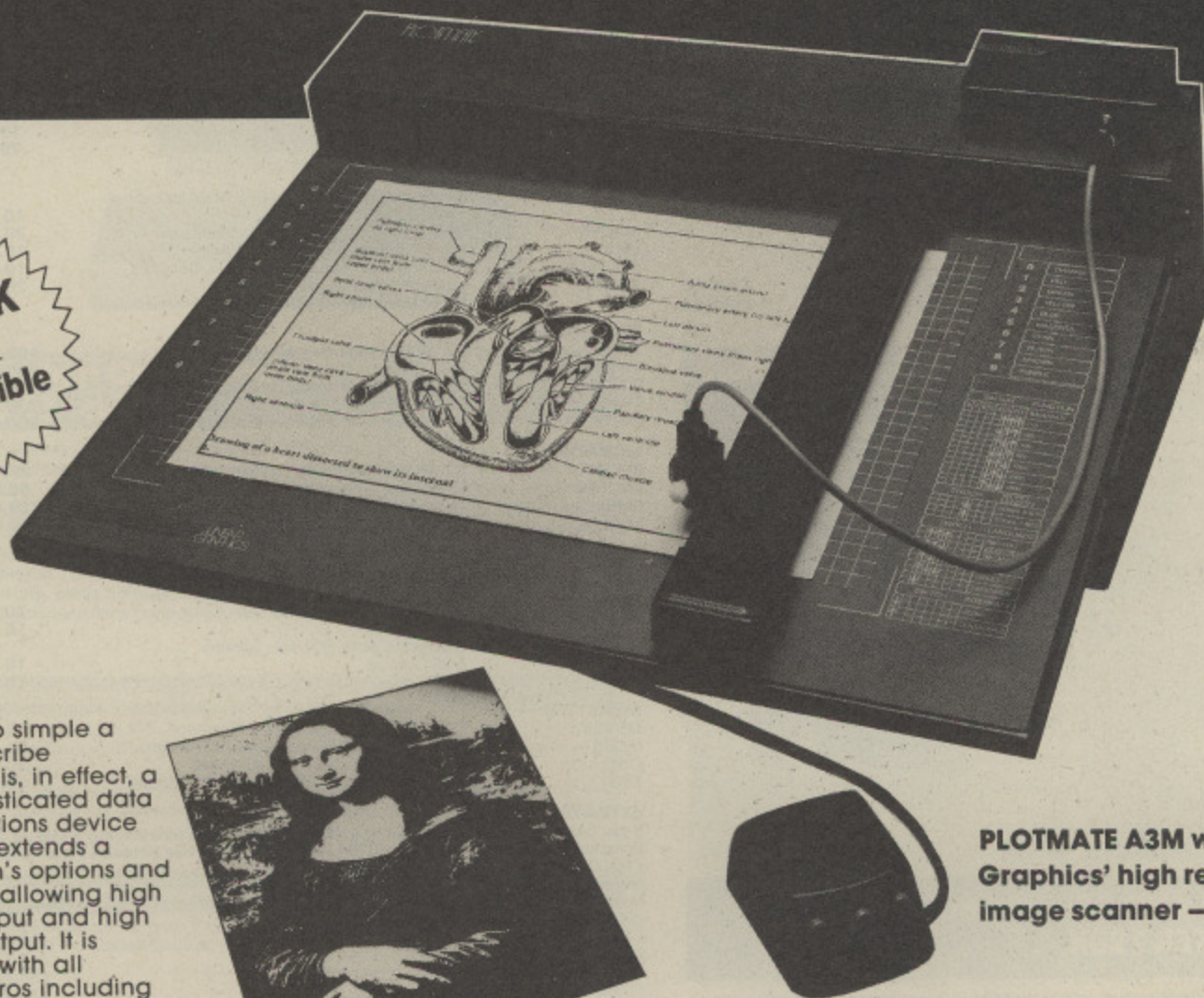
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PLOTMATE A3M with Linear Graphics' high resolution image scanner — LINSCAN.

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The in-built graphics commands of the BBC micro that PLOTMATE understands now encompass the extended graphics commands of the BBC Master such as circle and arc drawing, sector and segment filling, rectangle and parallelogram shading.

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All 'Welcome' disks allow data files produced by the DOMESDAY database to be output in pie, bar and line chart format on the BBC Master.

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Survivors

ON the face of it, Survivors is like Repton with a different scenario, although the idea behind it is more sinister.

The action occurs in the year 2087 after a massive nuclear war has devastated earth. Your job is to find and rescue the cryogenically suspended survivors of the holocaust from the crumbling remains of the Hibernation Dome.

Three specially armoured rescue droids have been sent into the area to help and are under your control.

Each droid has its own special abilities, the first is a high speed tunneling machine, the second a mobile teleport and the third an immensely powerful bulldozer droid for shifting large rockfalls in the area. But it is not going to be easy.

From the moment that the title page weaves on to the screen you get the feeling that you are in for a mindbendingly difficult task.

The screen display gives the power levels of the three robots, score, time remaining, people in that level and most importantly, people saved. Rescuing someone is simple – all

S	G	P	V	O
2	7	8	9	6

you have to do is move over the body with droid two (the teleporter) and they're sent to safety.

The problem lies in finding them and getting to them, without getting trapped yourself. That is not quite as easy as you might think.

More so than with any of the Reptons, you have to think through Survivors very carefully. One wrong move can bring boulders bouncing from every direction – blocking off the escape route you had planned.

With three separate droids to do the various tasks Survivors becomes more of a challenge when you realize they must be used strategically.

Initially you can use the tunneling machine to dig through the rubble, then use the teleporter to pick up the survivors. But soon you will have to start moving rocks around, and that is when the difficulties begin.

Not only do you now find yourself faced with boulder shifting and earth digging – you now have to cope with the old maintenance droids as well. These once peaceful machines, having been damaged by radiation, are now on the loose and a severe threat to any of your droids that touch them.



Unlike most games of this ilk, touching the enemy does not result in instant death, but the loss of power (as displayed on the screen). If the power level of any of the three droids falls to zero you have to start again.

When you eventually get through level one there are another six to come, and judging by the challenge of the first, well...

The game is addictive and aided by well-animated characters and becomes the sort of challenge that you will not want to put away. One minor moan is the sound, which is rather a disappointment. All in all, at this pocket-money price, Survivors represents good value for money and could well knock Repton off his perch.

Mark Smiddy

Konami's Coin-op Hits

S	G	P	V	O
9	9	9	9	9

IT'S here! The much-heralded – indeed near-legendary – BBC version of Green Beret has finally appeared. It comes in the rather surprising form of a compilation, but what a star-studded line-up: Yie-Ar Kung Fu, Mikie and Hyper Sports make up the supporting cast.

All four titles are conversions from the arcade hits of the same names, licenced from coin-op machine giants Konami – hence the name.

The newcomer is certainly very impressive. Worth the wait? Well, it features none of the facilities I've come to expect, such as pause/continue and end game. The number of times I hit that Escape key...

There is also no provision for a high score, either as a table or a single score. If you don't get your new top score on to paper within about three seconds, the screen clears and it's gone for good.

Visually Green Beret is hard to fault, my only possible complaint being that more attention seems to have been paid to background detail than to the foreground – the actual characters lack a certain clarity. But I'm just being petty.

On the positive side, your various adversaries have individual easily-learned colour schemes. Jump knife-first at the soldiers wearing red tunics – or suffer an army boot in the head.

The excellent sound effects – sirens and military-style drum accompaniment – add to the vivid atmosphere. A sure-fire hit.

The second game, Mikie, is best described as cute. To the cheery strains of Hard Day's Night you guide a schoolboy to deliver a love-letter to his girlfriend, while pursued by a teacher, janitor and goosestepping Chinese chef.

The action takes you through classrooms, corridors, locker rooms, and finally out on to the playground where you deliver

your greeting, to a hero's welcome.

Adoration is short-lived, however, as you soon find yourself back in the classroom trying to put together another longer message for the young lady.

The game features a number of snazzy touches including some great sound effects. Author Peter Johnson has, as usual, included pause/continue and similar functions – although the game is so manic that you hardly have time to use them.

Mikie is a fun game, excellently presented but somewhat marred by sprite clashes.

Yie-Ar Kung Fu is a superb karate game released in the wave of "If it moves, hit it" games last year, rivalled only by Way of the Exploding Fist. The ultimate aim is to become a Grand Master of this ancient art.

There are, of course, a number of adversaries out to stop you. Each opponent has his, or her, own weakness: This is for you to discover. Since you have 16 different moves at your disposal, however, the villains won't know what's hit them.

The two female opponents are possibly the most difficult, because they throw things rather than engaging in physical brutality. Their missiles, stars and fans, can cause death in seconds if you're careless. You therefore have to get very close, very quickly.

Control is by keyboard only. Nevertheless, in spite of having so many manoeuvres, you can soon master it. Since it too is written by Peter Johnson, the extra features are, once again, all present and correct.

The last and biggest of the bunch is the arcade sports hit, Hyper Sports. In common with other sports games you take part in a series of track and field events, passing a qualifying standard in each to compete in the next. The game comes in six major parts, each requiring a separate load. This, unfortunately, is its downfall.

Hyper Sports was previously only available on disc, and the cassette loading system seems to have been taken directly from the disc version. Sure, it has a quit facility – just press



Escape. The original disc version just whirled for a few seconds and then presented you with the title page.

On the cassette version, however, you are instructed to rewind the tape to the start and reload virtually the whole game. After accidentally nudging the Escape key once or twice, my natural cheery disposition was starting to rub a little thin.

A small "Do you really want to restart?" safety net could so easily have ironed out the problem. Also, if at any stage you fail to qualify in an event (even the first) you must once again reload from the start.

My only other complaint is that I firmly believe that computer sports games can be implemented without continuous left-right battering of the keyboard or joystick.

If you can put up with these major shortcomings, Hyper Sports is great. From the Chariots of Fire loading music to the brightly coloured graphics, instilling a fierce competitive urge, it is one of the best sports games for the BBC Micro. What a pity that it's also the best reason I've seen yet for buying a disc drive.

A compilation is less likely to sell to someone who already has one or more of the featured titles than is a single game by itself. The recent idea of featuring a previously unreleased game – not to mention the first cassette showing of Hyper Sports – is an excellent one, giving everyone a reason to buy. With such a variety of entertainment on offer, Konami's Coin-Op Hits must be one of the best value-for-money packages around. Stab, kill, kill, kill...

Hac Man

Price: £9.95 (cassette only). Supplier: Imagine, 6 Central Street, Manchester, M2 5NS. Tel: 061-834 3939.

S: Sound
G: Graphics
P: Playability
V: Value for money
O: Overall

Around the World in 40 Screens

S	G	P	V	O
7	9	9	9	8

SINCE the very successful launch of Repton3, Superior has been inundated with letters asking when it would release a new set of screens.

Well, it is my pleasure to announce that they are here, entitled *Around the World in 40 Screens*, consisting of five files, each containing eight mind-bending screens.

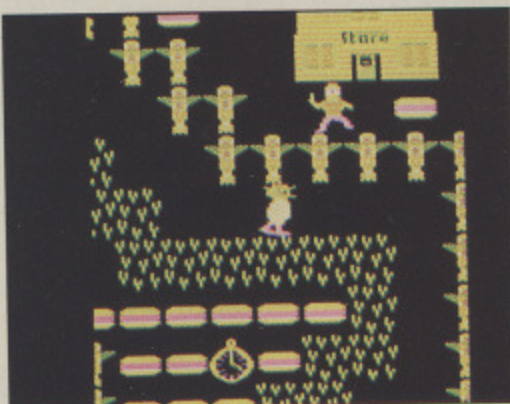
Not only do you get 40 new screens, there is also a copy of Repton3 and its own screen editor.

As the title suggests, each of the five files is based around a different country or environment. The characters all retain their original characteristics: Boulders fall, eggs hatch and monsters chase. But every one of them has been redefined to match its surroundings.

Repton's voyage begins in America: "Clint" Repton has to clear the maze of hamburgers inside the time limit. The boulders have been replaced by wagon wheels, the monsters are now Red Indians and the spirits have changed into bandits who must be lured into jail.

The remaining four files are set in the Arctic, Orient, the ocean depths and darkest Africa. A great deal of time and effort has gone into creating not only a graphical treat, but a series of puzzles that are just as testing as the first collection.

In the original Repton3 you had the opportunity to load a new series of screens if you grew bored with the first set, but

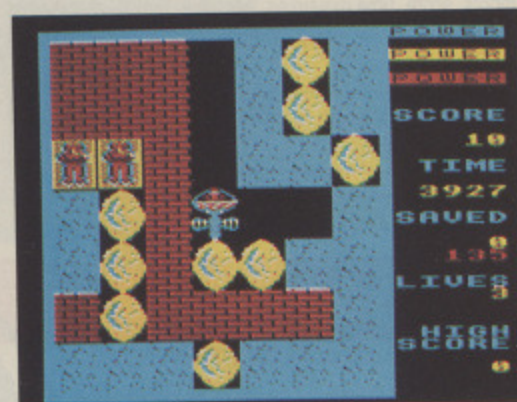
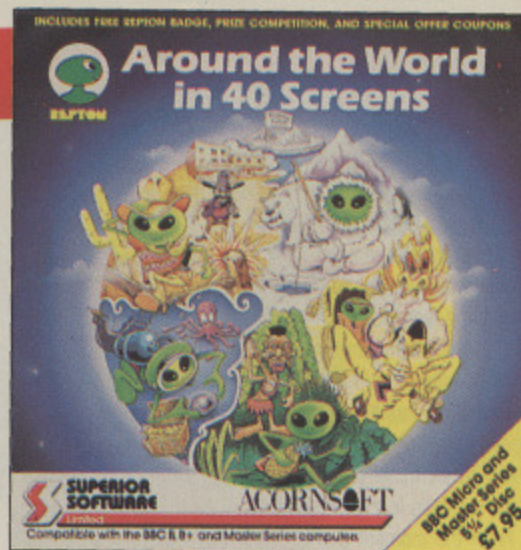


you were still playing with the same old characters. By using a new character-set with each group of screens your attention is held for much longer – it's now far easier to hold the eyelids up at three in the morning.

Unfortunately the vastly different character sets cause a few problems when playing a screen for the first time. When you don't know which character is safe to touch you invariably lose a few lives. The inlay card provides a complete list of the new characters, but I found it easier to spend the first game on each new file just blundering into objects and taking note of the results.

The inherent expandability of Repton3 has been exploited to the full by Superior. If it continues to release extensions such as this one, our little green-skinned buddy could be around for many a year to come.

Jon Revis



Price: £6.95 (cassette) £7.95 (5.25in disc) £9.95 (3.5in disc). Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX. Tel: 0532 459453

Video Pinball

S	G	P	V	O
5	6	8	9	7

IT is good to see more firms getting involved in budget priced software for the BBC micro. Alternative Software has now joined this growth industry with a pin-table simulation.

Just as on a real pintable, the controls are very simple. The spacebar is used for the plunger which pushes the ball on to the table. The speed of the ball can be varied by adjusting the length of time you press the spacebar.

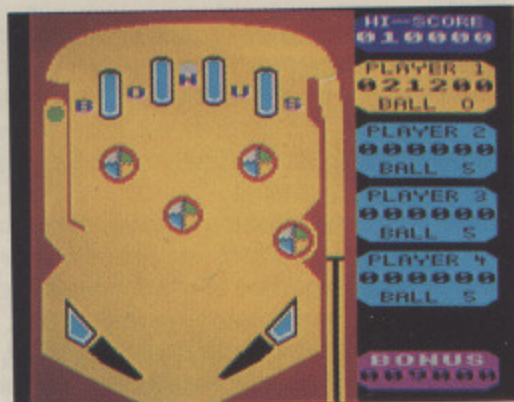
Once in play, the ball bounces off the various obstacles. These not only determine your score, but give rapid changes of speed and direction to the ball.

When the ball falls to the bottom of the table, the Z and ? keys control the left and right flippers to enable you to push the ball back up the table. With subtle use of the flippers, you can aim the ball to the bonus channel at the left of the screen.

Success will cause mayhem to break out as numbers and colours flash everywhere to a background bonanza of sound. You also gain lots of points.

Another aim is to get the ball to pass through each of the channels at the top of the table so that the letters B, O, N, U and S all change colour.

Inevitably, the ball will either fall down one of the drains at the side – you can do nothing about this – or you'll miss a ball with your flippers. In either case you can now move on to



your next ball.

You get five in all and the game is designed for up to four players. Each competitor uses one ball in turn and all are aiming to reach the high score table. The nature of a pintable does not make for exciting animated graphics – Video Pinball has a tidy screen and the simplicity of the action makes for smooth but rapid movement.

BBC players can play at turbo-speed with the Electron version which can be selected at the start of the game.

The choice of colour – white ball on a yellow background – is poor, both with colour and mono vision. Sound effects are good: The bleeps and buzzes have an authentic flavour, but it should be possible to turn them off if required. No method exists within this software although *FX 210,1 before load-



ing will kill all sound.

I have one criticism of the pintable. It is not possible to catch a ball on the flippers to get real control over direction. That apart, Video Pinball is a good simulation and rather addictive. The style of the software is rather dated, but at £1.99 represents good value for money.

Rog Frost

Price: £1.99 (cassette). Supplier: Alternative Software, Unit 3-6, Baileygate Industrial Estate, Pontefract, West Yorkshire.

S: Sound
G: Graphics
P: Playability
V: Value for money
O: Overall

SOFTWARE

Omega Orb

S	G	P	V	O
6	8	8	7	7

OMEGA Orb is the latest arcade/adventure from the prolific Peter Scott, author of Thunderstruck II and the recently re-released Hunkidory. This is certainly from the same stable, although featuring a number of refinements over previous offerings.

You control the title character, a beautifully animated bouncing ball – without doubt the cutest creature I've seen in a long time. I particularly liked the delightful squashy effect when the Orb hits the ground.

The idea of the game seems similar to that of its predecessor, Thunderstruck II – move the Orb through a variety of multicoloured locations, collecting "core pieces" – presumably to rebuild the core. Although I have yet to find it.

A number of other objects litter the landscapes and it's up

to you to work out what to do with them.

Omega Orb is, however, considerably more hectic than Thunderstruck II, because new locations introduce a number of evil-looking creatures with intentions to match.

Contact with any creature reduces it to a cloud of dust, but severely drains your energy. Furthermore, the game has a nasty habit of leaving the dead ex-sprite behind, reducing your energy to death level in seconds. What would you do without your trusty laser gun? Although you can carry only one object at a time, collecting or dropping one is automatic. You simply jump on it – if you have that object you will be dispossessed, and vice versa. If you are carrying a different item it will be exchanged for the new one.

But beware, if you wait more than about a second the new acquisition will be dropped. It is therefore very easy, and annoying, to bounce off with the wrong object, or even empty-handed – but the trick is soon mastered.

Unfortunately I had a pre-release version. However, I liked what I saw – large animated sprites, used not only for



moving creatures but also for many landscape features, allowing you to walk behind the scenery. The plot, as far as I could work it out, was a challenge to both mental and physical reflexes.

Although I found Omega Orb a little too similar to Thunderstruck II, it is nevertheless a game well worth looking out for in its own right.

Martin Reed

The Hacker

S	G	P	V	O
1	3	2	2	2

QUITE a lot of budget software has been released recently, some of which compares favourably with games costing up to three times as much.

Unfortunately, some only serves to give other budget software titles a bad name and in my opinion this game falls into this category.

It is of the platform and ladders genre, having 12 separate screens. A new one appears only when the previous one has been completed, though there is a practice mode which lets you access any screen.

Price: £1.99

Supplier: Firebird Software, 64/76 New Oxford Street, London WC1A 1PS
 Tel: 01-379 6755

Controls and movement are limited to left, right and jump. Progress is timed, but there is a pause facility enabling you to stop and plan your route. Unfortunately, I found that the movements of The Hacker were rather jerky and key response wasn't all I would wish.

The theme is that The Hacker has to pass through a terminal and modem into the telephone network. Then it's on into a central computer mainframe through a second modem.

Any similarity to a real hacker breaking into a real mainframe exists only in the screen titles, with names like On the Data Buses which at least gave me a chuckle, and Terminally Yours, which just about reflected how I felt when playing the game.

The sprites are well drawn, being fairly good representations of rom chips, discs, cassettes and the like, but the

remainder of the graphics are rather basic and the backgrounds plain.

Sound was virtually non-existent being limited to one monotonous tone as the character walks. There are different tones as he falls or dies on landing.

The screens are difficult to complete, but I wouldn't describe them as challenging as there doesn't seem to be any incentive to keep trying.

The Hacker originally appeared about three years ago when software was difficult to find and arcade addicts a bit less demanding. Software houses would do well to remember that standards have improved and games of this quality can be found as simple magazine listings. My overall verdict: Dull and uninspiring.

Beejay

Phantom

S	G	P	V	O
5	8	9	8	7

WHEN I first heard that Tynesoft had released a new game for the BBC memories of Vindaloo came flooding back. They describe Phantom as one of "the new breed of arcade games..." Looks like a version of Gauntlet, but I was wrong.

The cassette inlay depicts two players blasting a rather unpleasant looking, multi-limbed astral misfit.

The scenario is set in the present with the player assuming the role of a professor of astro physics with more than a passing interest in psychic phenomenon.

The game presents a start screen very reminiscent of Future Shock and just as beautifully designed. Score, reactor level, heart rate in beats per minute and electro cardiograph (ECG) displays are in a window at the bottom of the screen.

Press S to start and after a long drawl of nerve shattering corny music we enter Ye Olde Inn viewed from above. To

begin with, it all seems quiet and peaceful, but then we discover that the deceased customers are not too keen on strangers and as soon as you pop your head round the door they start descending like rampant bluebottles.

No problem, just whip out your new ion cannon and start blasting. Zap, the spooks start vanishing in little clouds of ectoplasm. Neat little gadget this, since the beam can knock out several of the little beggars in one shot.

There is a snag though, because if you like to shoot 'em up then you'd better think again. The backpack only has a limited amount of power and once that's gone you'll have to wait until you find another isotope pack.

In Phantom, as in life you only get one chance. Each eye-to-eye contact with ghouls increases your heart rate. Being past his prime 100 bpm is a little too much for the professors old ticker.

To make matters worse your heart rate doesn't settle down from one level to the next. While this is most inconvenient it does add to the fun, and doesn't let you relax for a minute.

The graphics are very good, the characters clear and the



four colours of the Mode 5 display provide an excellent effect. Soundwise the game is reasonable, but not exciting.

There are only really two faults that I could find with Phantom. Firstly the spooks can hit you without you being able to shoot them, though this is not as bad as it sounds. And secondly the game is a bit slow to restart, which is annoying in such an addictive game.

When it comes to the final conflict and you've got rumbles in your attic or creepies in the cellar then – Who yer gonna call? – Tynesoft.

Mark Smiddy

Price: £7.95 (cassette), £12.95 (disc). Supplier: Tynesoft, Addison Industrial Estate, Blaydon on Tyne, Tyne and Wear NE21 4TE. Tel: 091-414 4611.

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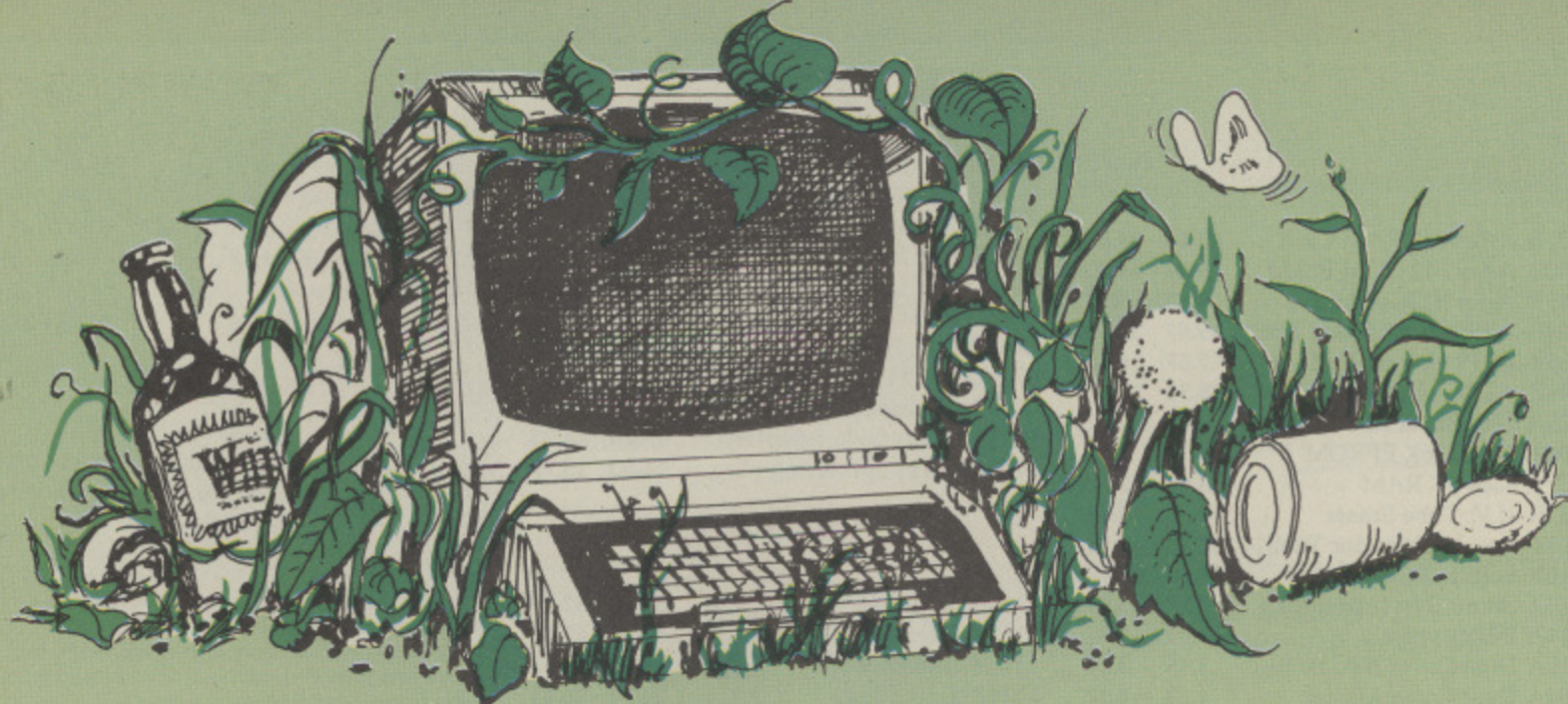
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READING THE PAPER

Barry Woods

smoothes the art

of wallpapering

WHEN buying your micro, did you ever think: "It will even help with the housework?" And since then have you spent many hours trying to justify that very statement?

In response to all those letters pleading for more domestic utilities, we've come up with a program to help you calculate how many rolls of wallpaper you'll need to decorate a room.

To make it even more worthwhile, the program also contains some useful routines for your own programs, like a box highlighted input function and a rounding up function.

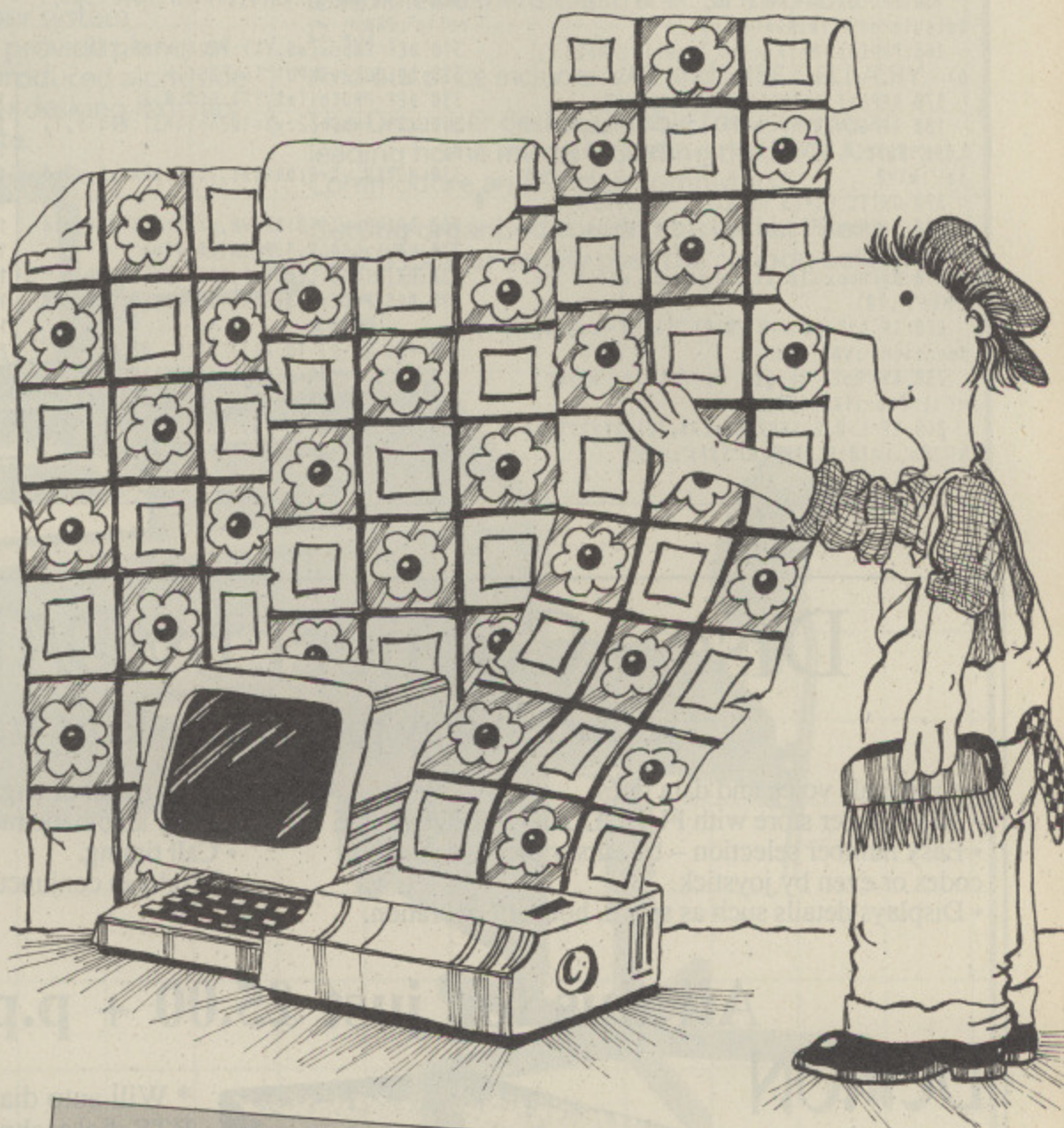
When the program is run an open roll of wallpaper is drawn and you are requested to say if you would like to use metric or imperial measurements. Answer with *M* or *I* and the program will confirm your choice by printing the word.

Next you will be asked the size of the room to decorate, both in length and height. The height is between the skirting board and the ceiling, the length of the walls is the total distance around the room including doors and windows to allow for any wastage.

You will now be asked for the dimensions of the roll of wallpaper. Most rolls sold these days are precut to 10m by 520mm (33ft by 20.5in), so the program will cope with these automatically. Just press Return or enter a different value, when prompted.

The total number of rolls required and how many you will have to buy will now be printed. The total to buy is derived from rounding up the total number of rolls required.

Please note that this is only intended as a rough guide and doesn't take into account pattern matches.

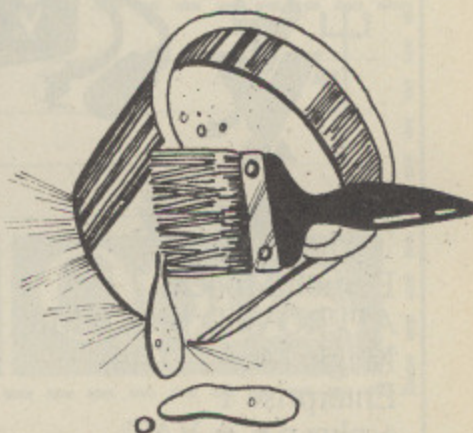


VARIABLES

D Distance around room
H Height of walls
L Length of roll
R Number of rolls needed
W Width of roll
@% Format numbers to 2 decimal places

PROCEDURES

scroll Draw a roll of paper
bx Print left justified text surrounded by a box
plt() Plot one line of the scroll at given position



Turn to Page 38 ►

FEATURE

◀ From Page 37

```

100 REM Computers in ACTION
110 REM Wallpaper Calculator
120 REM by Barry Woods
130 REM (c) The Micro User
140 MODE1:PROCscroll:@X=&20205
150 PROCbx(STRING$(10,"")+"Wallpaper
Calculator"+STRING$(9,""),2)
160 PROCbx("Metric or Imperial M/I?",
6)
170 REPEAT GX=GETAND&DF:COLOUR2
180 IF GX=77 MS="metres":m%=1:PRINT"Me
tric" ELSEIF GX=73 MS="feet":PRINT"Imper
ial":m%=0
190 UNTIL GX=73 OR GX=77:COLOUR3
200 H=FNbox("Input height of room in
"+MS+":",8)
210 D=FNbox("Total length of walls in
"+MS+":",10)
220 IF D=0 OR H=0 PRINT"Silly room d
imensions":VDU7:END
230 AS="Roll length in "+MS+" or Retur
n":L=FNbox(AS,12)
240 IF L>0 ELSEPROCbx(AS,12):IFm%=1PRI
NT"10m":L=10:ELSEPRINT"33ft":L=33

```

```

250 AS="Roll width in "+MS+" or Return
":W=FNbox(AS,14)
260 IF W>0 ELSEPROCbx(AS,14):IFm%=1PRI
NT"520mm":W=.52:ELSEPRINT"20.5in":W=20.5
/12
270 R=(D/W)/(L/H):COLOUR131:COLOUR1
280 IF R>INTR R%=R+1 ELSE R%=R
290 PRINTTAB(5,22)"The room requires "
;R;" rolls."
300 @X=0:PRINTTAB(9,24)"Purchase ";R%;
" rolls":END
310 DEF FNbox(m$,Y%):PROCbx(m$,Y%)
320 COLOUR2:INPUT"T:=ABS(T)
330 DEF PROCbx(m$,Y%):GCOL0,2
340 x%=LENm$*32:y%=1024-Y%*31:VDU19,1,
4;0;
350 MOVE0,y%+8:DRAWx%,y%+8:DRAWx%,y%-4
0
360 DRAW0,y%-40:DRAW0,y%+8:PLOT0,4,-12
370 VDU5:GCOL0,3:PRINTm$:VDU4
380 PRINTTAB(LENm$+1,Y%);:ENDPROC
390 DEF PROCscroll:R%=50:VDU29,100,400
;
400 FOR X=-PI TO PI/2 STEP .08
410 PROCplt(RX*SINX,RX*COSX):NEXT
420 GCOL0,0:PROCplt(RX*SINX,RX*COSX)
430 GCOL0,3:MOVE-16,-50:DRAW100,-250
440 PLOT85,1000,-50:PLOT85,1100,-250

```

```

450 PLOT85,100,-250:GCOL0,3:VDU29,200;
100;
460 FOR X=0 TO PI*1.5 STEP .08
470 PROCplt(RX*SINX,RX*COSX):NEXT
480 VDU29,0;0;:ENDPROC
490 DEF PROCplt(SX,CX):MOVE SX,CX
500 DRAW SX+1000,CX:ENDPROC

```

Get it right!

100 = 0 0	240 = 84B5 1	380 = 9E13 1
110 = 0 0	250 = 688D 0	390 = C5D9 8
120 = 0 0	260 = 965C 9	400 = 9645 6
130 = 0 0	270 = 31B6 2	410 = 4049 D
140 = CE6C C	280 = 596B B	420 = 5180 E
150 = 60DB 6	290 = B34E 9	430 = 833A F
160 = BC76 E	300 = 5683 9	440 = 7405 1
170 = 1184 4	310 = D1E9 E	450 = 3AED B
180 = F9CD 5	320 = 397C E	460 = 7E98 4
190 = DFDA 0	330 = 79F2 9	470 = 4049 D
200 = 7EAF C	340 = 4DE1 D	480 = 39CE 5
210 = CBE8 8	350 = F2F5 6	490 = D8CC 3
220 = 93B7 0	360 = B8BC 6	500 = 3105 F
230 = DEE1 D	370 = 2D15 4	**** END ****

Disc - Connect by DATAPHONE

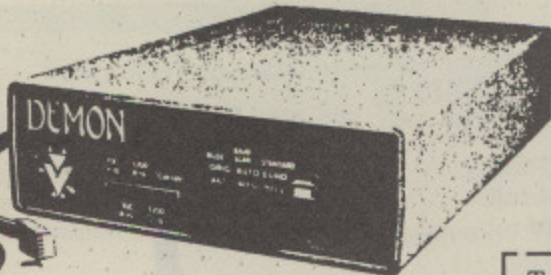
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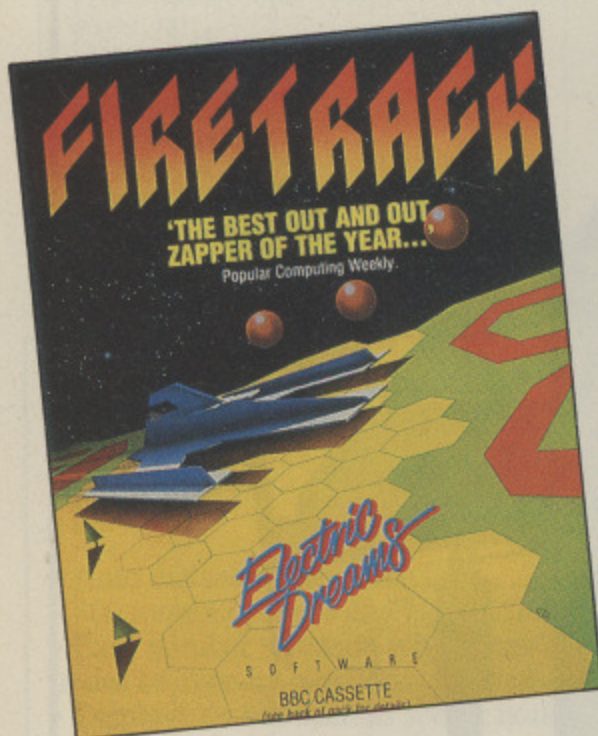
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I'M going to stick out my neck and say that FireTrack from Electric Dreams is probably the best shoot-'em-up ever seen on the BBC Micro. It certainly has an impressive pedigree, coming from Orlando, the author of Arcadians, Zalaga and Frak.

This tip comes from the man himself: When playing the game press keys f0 and f9 down together, then Escape. This defines f9 to jump straight to the last level with a fleet of seven ships, just as keys f6, f7 and f8 start you on levels 1,



WE have to make an apology. It seems a couple of typesetting errors crept into the May and June columns.

In the May issue the password for screen K of Repton 1 should read GIANT CLAM. THE KRAKEN is in fact the correct password for the missing screen L. In lines 60-100 of Listing I and lines 70-100 of Listing III please replace all occurrences of = with £. This will cause the machine code to execute correctly.

The formulae shown in the June issue for dissecting Repton 3 screens had a couple of minus signs missing. The start address for screen n is $(n-1)\&1A4+\&32E0$, correctly shown in the example for screen seven. The start address for character n is obtained from $(n-1)*\&80+\&4000$. Many thanks to all who spotted the errors — just keeping you on your toes.*



Discover the inner secrets of arcade games

2, and 3 respectively.

As reported previously Sphere of Destiny features a built-in cheat mode. It goes as follows. After the game has loaded press the @ key. You will be asked for a password: Type in LAZON-NOMORE. The holes will now be white bonus squares; pressing J will move you to the next level. Press Escape to return to the normal game.

To my mind this cheat makes the game so easy as to be pointless — infinite lives with normal or fewer holes would have been far better; but in any case congratulations to Gary Partis and to Orlando, for giving these options. Let's hope that other top authors will include similar facilities in their games.

Over the last five months we've looked at some of the pokes and modifications that can be made to arcade games making them easier or more playable. This month, as many readers start their summer holidays, we'll look at how old games can be given a facelift and a new lease of life.

To demonstrate, I've chosen Acornsoft's evergreen Snapper. My routine (Listing I) is compatible with the disc and both cassette versions. The program will be able to tell which is which.

If your Snapper really snaps while being pursued by four ghosts it is Mark 1; if it features four stick-men and a smiling blob with a hat you have Mark 2. To the best of my knowledge Snapper 1 was only available on cassette.

The program provides facilities such as extra lives — even infinite lives — at the start of the game; bonus lives at regular intervals; for the masochists among you an option of NO extra life at 15,000 points; and a choice of start screen to allow access to higher levels. All can be selected from a menu before the game starts.

There is a practice mode, allowing you to start at a higher level or with extra lives, which will be of special interest to cassette users. By selecting a higher

start level or extra lives from the menu you can play either this higher level or the normal game, without having to hit Break and reload the program.

Additional facilities for pause/restart, sound on/off, and quit can all be used while the game is running. Included as standard in most modern arcade games, they certainly make a game easier.

When you're using the bonus facility with Mark 1, the computer will bleep when awarding a new life; but the extra Snapper will not be displayed unless you are starting a new sheet and have lost a life.

If you have Mark 2 Snapper on cassette, enter Listing I as shown. If you have the first version of the game you will need to make the following modifications. Add lines:

```
40 *LOAD Snapper E00
50 ENVELOPE 3,1,0,0,1,1,1,126,-4,-1,-
4,126,0.
```

If you have Snapper on disc, you should type in Listing I with the following modifications. Line 145 becomes line 125, add lines:

```
124 ?85683=860:CALL 85663
170 CALL 83400
```

Also enter Listing II and save it to your own blank disc, calling it SNAPDSK. The checksums are for the listings as shown, so type in the upgrade program exactly as given. Make sure what you've done is correct, before making the changes for the different versions.

As Listing I is designed as an addition to Snapper's Basic loader it must be stored in a form that can be merged with the original. So after typing insert a blank tape or disc as appropriate, and type:

```
*SPOOL SNAPUP
LIST
*SPOOL
```




pressing Return after each command. This will save the upgrade in a form similar to that of the Jet Set Willy II upgrade published in the March issue.

To start, load the original Snapper tape from the beginning. When Snap2 has loaded, and the Searching message is displayed, press Escape and stop the tape. For owners of Mark 1 Snapper, type:

```
PAGE=&4000
CHAIN'SNAPPER'
```

before loading the game and then press Escape and stop the tape immediately after the title page has come up. Then type NEW.

Disc users should set PAGE to &6000 and LOAD "SNAPDSK" instead of Shift+Break. Place the original Snapper disc in the drive and type RUN. The game will then load and, after a few seconds, stop with an error message. Don't worry, just hit Break.

In any case, continue by putting your own tape or disc into the player and typing *EXEC SNAPUP. This will load the upgrade into memory exactly as if you had typed it in at the keyboard. Disregard the two Mistake error messages at the start and end — they are not important.

When the upgrade file has finished loading, put the original tape back into the recorder and type GOTO 40. Disc users should simply type RUN.

After the machine code Snapper file has loaded, the amended instruction page will be displayed. When you press a key, the computer will ask if you want to start on a higher level, have extra lives, or use other upgrade facilities. When you've made your choices the game will start.

The code is assembled in an area of memory unused by the main program: pages nine and ten, which are normally used as buffers for the cassette and RS423 systems.

After the last file has loaded, however,

this area is not used again. It can, therefore, be used for storing the additional code. Four small patches link the new code into the main program and we're away.

The variables used in the Basic code are B%, used as a flag for the bonus facility; L% and OL%, for the number of lives (held in memory location &50); S% and OS%, for the start level (held in &3D); and V%, for the version number of the game.

The machine code uses memory locations as follows: &6C as a flag for extra life already awarded — as used in Mark 2 Snapper; &8D and &8E to make a temporary copy of the current score; and &8F which is a counter for the number of extra lives awarded, used only when the bonus facility is in operation.

If you feel that your programming isn't up to tackling this task the upgrade is on the monthly tape and disc.

● Next month we'll look at how to devise your own pokes. Until then, happy snapping.

Listing 1: Snapper upgrade

```
145 PROCupgrade
175 IF VX=1 THEN AX=GET:CALL &3283
1000 DEFPROCupgrade
1010 REM Snapper upgrade
1020 REM by Hac-Man 1987
1030 REM (C) The Micro User
1040 :
1050 IF ?&FDD=2 THEN VX=2 ELSE VX=1:REM
check version number
1060 IF VX=1 THEN inflife=&139E:ret_bon
=&17F4:sound=&1D6D:exec_mc=&32CE:hisc=&4
AA:prapatch=&FCE:keypatch=&142A:bonpatc
h=&17F0:hiscpatch=&329A
1070 IF VX=2 THEN inflife=&1344:ret_bon
=&17AA:exec_mc=&343C:hisc=&4B9:cont=&17B
0:prapatch=&FDA:keypatch=&16DA:bonpatch
=&179C:hiscpatch=&3417
1080 SX=0:LX=2:keyread=&EF1:level=&3D:l
ives=&50:yeslife=&6C:numex=&8F:sc1=&34:s
c2=&35:sc3=&36:tempsc1=&8C:tempsc2=&8D:t
empsc3=&8E:bonint=&15:hidat1=&35D0:hidat
2=&6D0
```

```
1090 BX=0:OSX=SX:OLX=LX:oswrch=&FFEE:os
word=&FFF1:osbyte=&FFF4:oscli=&FFF7
1100 PRINT TAB(15,16);"Q _ Sound off"
1110 PRINT TAB(15,17);"S _ Sound on"
1120 PRINT TAB(15,18);"COPY _ Pause"
1130 PRINT TAB(15,19);"DELETE _ Restart"
```

```
1140 PRINT TAB(15,20);"ESCAPE _ Quit"
1150 PRINT TAB(15,21);"O+SPACE _ Normal
game"
1160 PRINT TAB(15,22);"P+SPACE _ Practi
ce game"
```

```
1170 PRINT TAB(2,23);CHR$&86+CHR$&88+"P
lease press any key to continue":*FX15,0
1180 AX=GET:VDU 28,0,23,39,3,12
```

```
1190 FOR IX=0 TO 1:PRINT TAB(13,IX);CHR
$&8D+CHR$&86+"The Upgrade ":NEXT
1200 VDU 26:PRINT TAB(2,6);"Normal(Y/N)
? ";GX=GET:IF GX<>78 THEN PRINT"Yes":GO
TO 1320
```

```
1210 PRINT"No";TAB(0,8);"Please type th
e screen no.(1-17): ";
```

```
1220 INPUT"AS:IF AS=CHR$(13) OR VAL(AS
)<1 OR VAL(AS)>17 THEN AS="1":PRINT TAB(
34,8);AS
```

```
1230 SX=VAL(AS)-1:REM start level
1240 PRINT"Do you want infinite lives(
Y/N)? ";
```

```
1250 GX=GET:IF GX<>89 THEN PRINT"No" EL
SE PRINT"Yes":!inflife=&003001A9:GOTO 13
20:REM infinite lives
```

```
1260 PRINT TAB(0,11);"Please type the n
o. of lives(1-128): ";
```

```
1270 INPUT"AS:IF AS=CHR$(13) OR VAL(AS
)<1 OR VAL(AS)>128 THEN AS="3":PRINT TAB
(37,11);AS
```

```
1280 LX=VAL(AS)-1:REM no. of lives in r
eserve
```

```
1290 PRINT"Do you want an extra life EV
ERY 15000 points(Y/N)? ";AX=GET:IF AX
<>89 THEN PRINT"No" ELSE PRINT"Yes":BX=1
:GOTO 1320
```

```
1300 PRINT"Do you want NO extra life(Y
/N)? ";AX=GET:IFAX<>89 OR VX=1 THEN PRI
NT"No" ELSE PRINT"Yes":?&17A4=&A9
```

```
1310 :
1320 FOR IX=0 TO 2 STEP 2:PX=&900:[OPTI
%
1330 .start TXA:PHA
```

```
1340 LDX=&96:JSR keyread:BEQ sound_off:
\ check if 'COPY' key pressed
```

```
1350 LDX=0:.loop1 LDA data1,X:CMP#&FF:B
EQ pause:JSR oswrch:INX:JMP loop1:\ loop
to print 'Paused'
```

```
1360 .pause LDX=&A6:JSR keyread:BEQ pau
se:\ check if 'DELETE' key pressed
```

```
1370 LDX=0:.loop2 LDA data2,X:CMP#&FF:B
EQ sound_off:JSR oswrch:INX:JMP loop2:\
loop to erase 'Paused'
```

```
1380 .data2 EQU CHR$(18)+CHR$(0)+CHR$(
0):\ vdu code data to erase 'Paused'
```

Turn to Page 43 ►

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◀ From Page 41

```

1390 .data1 EQU$ CHR$(5)+CHR$(25)+CHR$(
4)+CHR$(208)+CHR$(1)+CHR$(119)+CHR$(2)+
Paused'+CHR$(4)+CHR$(18)+CHR$(0)+CHR$(3)
+CHR$(0FF):\ vdu code data to print 'Pa
used'
1400 .sound_off LDX#&EF:JSR keyread:BEQ
sound_on:\ check if 'Q' key pressed
1410 LDA#&D2:LDX#&FF:LDY#0:JSR osbyte:J
MP escape:\ turn sound off
1420 .sound_on LDX#&AE:JSR keyread:BEQ
escape:\ check if 'S' key pressed
1430 LDA#&D2:LDX#0:LDY#0:JSR osbyte:\ t
urn sound on
1440 .escape LDX#&8F:JSR keyread:BEQ en
d:\ check if 'ESCAPE' key pressed
1450 PLA:TAX:JMP hisc:\ escape key pres
sed,return to high score table
1460 .end PLA:TAX:]:REM get ready to re
turn to game
1470 IF VX=1 THEN [OPTIX:JMP keyread:]
ELSE [OPTIX:LDA#2FF8,X:RTS:]:REM return
(different points in game for different
versions)
1480 :
1490 [OPTIX:.practice LDX#0:STX yeslife
:STX numex:\ reset extra life and no. of
lives flags
1500 .p_check LDX#&C8:JSR keyread:BEQ o
_check:LDX#1:STX toggle:\ check if 'P' k
ey pressed,if so then switch practice mo
de on
1510 .o_check LDX#&C9:JSR keyread:BEQ p
mode:LDX#0:STX toggle:\ check if 'O' key
pressed,if so then switch practice mode
off
1520 .pmode LDX toggle:CPX#0:BEQ omode:
LDX#S:STX level:LDX#L:STX lives:LDX#0:
RTS:\ set practice mode
1530 .omode LDX# 0S:STX level:LDX# 0LX
:STX lives:LDX#0:RTS:\ set ordinary mode
1540 .toggle EQU$ 1:\ flag for practice
mode on/off.
1550 :
1560 .bonus LDX sc2:STX tempsc2:LDX sc3
:STX tempsc3:\ copy score

```

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```

1570 LDX#0:.bonloop LDA tempsc2:SEC:SED
:SBC# bonint:STA tempsc2:LDA tempsc3:SBC
#0:STA tempsc3:CLD:BPL next:\ subtract m
ultiples of 15000 from score
1580 LDA tempsc2:BMI loop_check:BEQ loo
p_check:\ if result <=0 check for extra
life
1590 .next INX:JMP bonloop:\ count numb
er of loops
1600 .loop_check CPX numex:BNE excheck:
\ if number of loops greater than last t
ime make next check on no. of lives
1610 LDA#0:STA yeslife:\ reset 'life al
ready awarded' flag
1620 .no_bonus JMP cont:\ no extra life
return to game
1630 .excheck LDA yeslife:BNE no_bonus:

```

```

\ check if extra life already awarded th
is loop
1640 INC numex:INC lives:LDA#&FF:STA ye
s life:]:REM award extra life
1650 IF VX>1 THEN 1670 ELSE [OPTIX:LDA#
&B4:LDX#3:LDY#&13:JSR sound
1660 .cont LDX#0:STX#37:]
1670 [OPTIX:JMP ret_bon:]:REM returns t
o main game
1680 :
1690 PX=pracpatch
1700 [OPTIX:STY numex:JSR practice:NOP:
]:REM patch for practice mode
1710 PX=keypatch
1720 [OPTIX:JSR start:]:REM patch for k
ey reading routines
1730 IF BX=0 THEN 1760:REM check if bon
us life mode in operation
1740 PX=bonpatch
1750 [OPTIX:JMP bonus:NOP:]:REM patch f
or bonus every 15000 points if selected
1760 PX=hiscpatch
1770 [OPTIX:LDY#0:.setscore LDA hidat1,
Y:STA hidat2,Y:DEY:BNE setscore:JMP exec
_mc:]:REM set up personalised high score
table
1780 NEXT

```

```

1790 REM data for personalised high sco
re table: NOTE _ NAMES MUST BE NO LONGER
THAN 19 CHARACTERS!!
1800 hidat1!&03=&1000:$(hidat1+&0C)="Ac
ornsoft"
1810 hidat1!&06=&2000:$(hidat1+&08)="Ac
ornsoft"
1820 hidat1!&09=&3000:$(hidat1+&0B)="Ac
ornsoft"
1830 hidat1!&0C=&4000:$(hidat1+&0E)="Ac
ornsoft"
1840 hidat1!&0F=&5000:$(hidat1+&11)="Ac
ornsoft"
1850 hidat1!&12=&6000:$(hidat1+&14)="Ac
ornsoft"
1860 hidat1!&15=&7000:$(hidat1+&17)="Ac
ornsoft"
1870 hidat1!&18=&7764:$(hidat1+&1A)="Ha
c-Man"
1880 :
1890 REM data to enable high score tabl
e to be displayed correctly
1900 !&35EB=&C0000100:!&35EF=&07AC0007
1910 !&35F3=&28079829:!&35F7=&870300784
1920 !&35FB=&075C4707:!&35FF=&00074831
1930 !&3603=&20440734:!&3607=&070C3207
1940 ENDPROC

```

✓ Get it
right!

145 = FCD2 2	1180 = 4D05 6	1380 = 18A4 4	1580 = 7606 B	1780 = 2C83 4
175 = 33A5 7	1190 = C8E2 3	1390 = D7EB 4	1590 = 9B5C 0	1790 = 0 4
1000 = 1174 4	1200 = AAF8 4	1400 = B5E 6	1600 = 23A8 1	1800 = 3B13 7
1010 = 0 4	1210 = 7582 F	1410 = 24D3 6	1610 = B586 F	1810 = D404 B
1020 = 0 4	1220 = 7A77 3	1420 = 23B0 C	1620 = BE5D A	1820 = DA3A 3
1030 = 0 4	1230 = A7E6 6	1430 = 3B82 3	1630 = FADE E	1830 = 5843 C
1040 = 9719 7	1240 = 3230 5	1440 = 2610 1	1640 = 826B B	1840 = 46B8 4
1050 = B1D2 1	1250 = 9997 6	1450 = 92D8 B	1650 = 3509 0	1850 = 194A C
1060 = 829 A	1260 = AC41 4	1460 = 7CA6 C	1660 = AEBF 7	1860 = 3910 1
1070 = D8A5 2	1270 = D6DF 7	1470 = B476 0	1670 = 46D 2	1870 = 23E 7
1080 = 8AB5 E	1280 = 79E8 6	1480 = 9719 F	1680 = 9719 E	1880 = 9719 E
1090 = F38D 6	1290 = A673 7	1490 = EBCA 8	1690 = 67C9 6	1890 = 0 E
1100 = B752 B	1300 = 8AF8 F	1500 = A442 6	1700 = 9CE5 9	1900 = 31E5 C
1110 = 2A58 6	1310 = 9719 9	1510 = 4DCD 9	1710 = 598F 5	1910 = 22AC 6
1120 = E460 6	1320 = 323A B	1520 = 10F7 4	1720 = 8FAF 7	1920 = DC79 A
1130 = 9137 C	1330 = A0D F	1530 = A11F 0	1730 = 197F 3	1930 = 15CB D
1140 = 3D5D 4	1340 = 1DB1 8	1540 = 7036 E	1740 = 21D0 6	1940 = ED0F 6
1150 = 8E0A 2	1350 = 3C75 4	1550 = 9719 D	1750 = 3863 E	
1160 = 9E8C 9	1360 = A1B2 6	1560 = E2F7 2	1760 = A14B 4	
1170 = 7E77 6	1370 = 32EE 2	1570 = 4B75 8	1770 = C5F8 6	

Listing II: Snapper disc loader

```

10 REM Snapper Disc Loader
20 REM by Hac-Man 1987
30 REM (C) The Micro User
40 *KEY10 PAGE=&5700:IM ENDIM OLDIM
50 *LOAD snapp
60 *LOAD snapp 2000
70 !&2012=&F02004EE:!&2016=&1904A00A
80 !&201A=&F1F01EC9:!&201E=&6020004C
90 CALL&2000
100 ?&19F5=&56:??&19F6=&FE:??&56FF=0
110 CALL&1972

```

✓ Get it
right!

10 = 0 0	70 = 936 4
20 = 0 0	80 = 4136 1
30 = 0 0	90 = DB86 1
40 = 2E28 8	100 = 7493 D
50 = B0C6 0	110 = 671E 9
60 = 8555 5	



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GALLERY

No. 5

THANKS for the pictures – keep sending them in. This month we feature some works of art by Wyn Chalker, Robert Timothy and Graham Wilson. We don't mind whether it's just one masterpiece or a full gallery that you send – if the pictures are good you'll see them in print. Please send screen dumps on disc or tape with a note saying which mode they use.

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As System 1. With *12" High Res. Monochrome Monitor*

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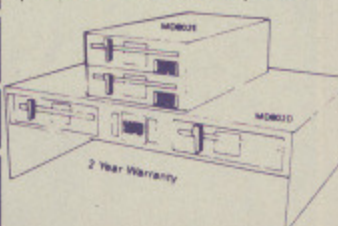
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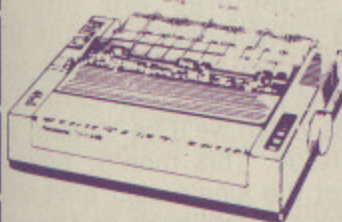
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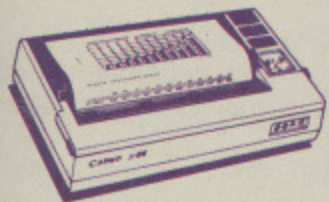
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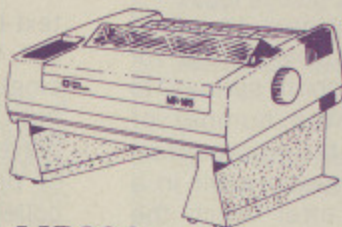
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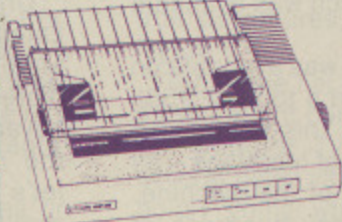


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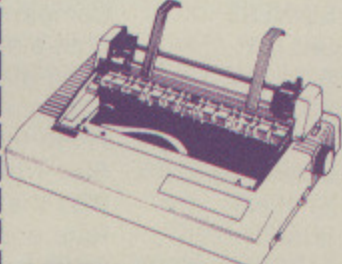
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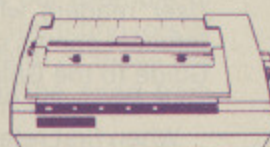
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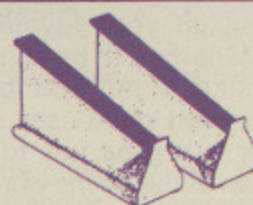
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In Part six of his guide

to communications,

Steve Gold takes a look

at online adventures

Your line to the biggega

IN recent issues of *The Micro User* we've covered the serious side of going online with your BBC Micro and modem. This month we're going to take a look at the fun side of communications – the online world of adventures.

Dialling up your favourite online system, whether it be a single user system like a bulletin board or a feature-packed multi-user system like MicroLink is a good way to begin your exploration of the online world. But what about the fun side of things?

Granted, communication with your electronic neighbour, be s/he in the next street or on the other side of the world is very exciting, but just as you can sit back and have fun with your micro playing the latest game, so you can have fun online, playing an adventure.

Why go online to play adventures? Well, online games are bigger than the

relatively simple adventures you load from disc or tape. On the BBC B for example, most (the Hobbit springs to mind) are limited in the number of locations or choices they can offer. Several game-playing hours result in a completed adventure, after which the thrill of playing palls somewhat.

In the online world things are very different. For a start, the size of the memory of the computer you play on is much larger. I'm sure that many *Micro User* readers will be familiar with the Infocom games such as *The Hitch-Hikers Guide to the Galaxy* which was available on a variety of micros.

When first released it was available on the IBM PC and required a total of 256k of ram to run properly. This is because the game has hundreds of locations – all eating into the memory of the machine.

HHGTH is one of many hundreds of

text-based adventure games for micros but there's another snag to playing single-micro games apart from memory limitations – cost. The avid games-player will often spend many hundreds of pounds amassing a comprehensive collection of games which, once played, simply gather dust in the software collection.

In the online world, however, systems like MicroLink and Telecom Gold let you pay as you use the system. MicroLink has several games available which we'll be looking at in a moment.

Online adventures fall into two categories – single user and multi user. Multi-user games are often said to be more fun, but they do suffer certain disadvantages which we'll be looking at in the next issue. This month, however, let's look at the single user adventures available on systems such as MicroLink

Name	Description		
*TREK	Telecom Gold's own space battle game	MIND	Mastermind
ADMLIFE	Life for an ADM3 terminal	NIM	Ancient game of Nim
ADVENTURE	Adventure (unique and addictive)	NIM2	Another Nim
ADV550	Adventure (advanced version, expanded to 550 pts.)	ONEARM	Care to try your luck on the slot machine?
AUTOBRID	Autobridge (Teach bridge according to Goren)	ONE-QUEEN	Compete against the computer moving a chess queen
BACKGAMMON	Backgammon	OTHELLO	Game of Othello against the computer
BACKGAMN	Another backgammon game	PICA	Pica-Centre (number guessing game)
BIORHYTHM	Make a biorhythm chart	PITS	A new fantasy and exploration game
BLACKJACK	Casino style 21	POETRY	Random poetry
CHECKERS	Game of checkers against the computer	POKER	Poker against computer
CIVILWAR	Civil War simulation against the computer	QUBIC	Game of Tic-Tac-Toe on a 4x4x4 cube
COIN	Coin flipping	QUEST	A very limited game like Adventure (not much fun)
CRAPS	Shoot craps	RESCUE	You command a rescue starship
DIGITS	The computer tries to guess the next number in a sequence	ROMAN	Convert decimal number to Roman numerals
DODGEM	Two sets of pieces race across a board	RUMMY	Play 500-rummy against the computer
ESTIC	Tic-Tac-Toe in Spanish	SCOREFOUR	Score four against the computer
FARMER	Get the farmer, fox, chicken, and grain safely across	SINNERS	Compete against Satan with sinners.
FOOTBALL	Monday night football	SKETCH	Etch-a-sketch for the Tektronic 4010
FROGS	Reverse two sets of pieces	SLALOM	Simulates a slalom run with you as skier
GOLF	Golf for one or more players	SONNET	Random Shakespearean sonnets
GRIDIRON	Play football against the computer	SPLGAM	Fill in the missing letters
GUESS	Guess the computer's number	STARTREK	Star Trek
HANGMAN	Hangman word game	STOCKS	Play the Stock Market
HMRABI	Govern ancient Sumeria	SUMER	Rule ancient Sumeria (a different one)
HORSE	Horse race game	TARGET	Command a gun crew to destroy a fixed target
IQTEST	IQ game of skill	TARGET-M	Command a gun crew to destroy a moving target
KING	Govern the island of Setats Detinu	TICTACTOE	Noughts and Crosses
LEARN21	A variation of the game of nim	TORO	Simulates á bullfight with you as matador
LGOLF	Large game of golf	VEGAS	A regular casino of games from Las Vegas
LIFE	Life (colony generation)	WATCHMAN	You are a watchman patrolling a village
LUNAR	Lunar landing simulation	WHEEL	Roulette for up to seven people
MARKET	Companies compete to sell a product	WUMPUS	Hunt the wumpus
MAZE	A maze generator		

Figure 1: Games waiting to be played on MicroLink and Telecom Gold

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The main advantage of playing a single user game is memory. As we've already seen, despite the many amazing things you can do with a BBC Micro, the limitations of memory mean that BBC adventures are relatively small and, if graphics are included, the game can be played out in a single playing session.

On MicroLink the situation is very different. MicroLink, in common with the other Telecom Gold computers, has literally megabytes of memory to run programs. Once you are online your BBC Micro and modem effectively become a terminal on to the MicroLink mainframe. It's as if you're sitting at the console of a million-pound computer playing an enormous game.

Unfortunately, playing adventures on mainframes is not to be encouraged. Apart from the mainframe owner getting a bit peeved at the relative waste of the computer's resources, the cost per hour of running a mainframe adventure is well beyond most BBC Micro owners' pockets.

On MicroLink, however, several dozen subscribers can be logged-on to the computer at any given time thanks to the benefits of time-sharing of the computer's resources. At a stroke, it brings

STAR-TREK is a program that allows you to play a relatively sophisticated game based on the television program. You are playing against the computer, which is about equally matched. This is a game of chance and strategy where you have a fair chance of winning.

INSTRUCTIONS

To execute: Key **PLAY *TREK**
The program contains built-in instruc-

tions, so only several basic points will be discussed here.

- 1) This game may take over a half hour to play, so this time should be allocated.
 - 2) It may result in "FATAL" termination, so prepare for this reality.
 - 3) Once in the main part of this program, what you type will not print on your micro.
 - 4) You may not type ahead in any part of this program.
- Have fun, captain.

Figure II: *Trek instructions

the per-minute costs down to a sensible level. We'll take this as our example of an online system where you'll find lots of single user games. Several of these are true adventures, as can be seen from Figure I.

Top of the list is a game called *TREK. As you might conclude, this is based on the popular TV series and includes several novel variations on the theme of boldly going where no man has gone before, including shooting up several Klingon battle cruisers. The instructions are shown in Figure II.

By way of contrast, Adventure and ADV550 are true versions of the classic adventure game. Designed to run on the Telecom Gold mainframe, these require the player to notch 330 and 550 points respectively. As your score rises your title (novice, necromancer, and so on) rises to the target of wizard or witch, depending on which sex you have

chosen to be online.

Figure III shows a demonstration of the Adventure game.

The advantage of playing a single user game online is that any mistakes you make will be between you and the computer.

Multi-user games, which we'll be looking at next month, require you to compete against other people as well as the game itself. Inevitably, as with real-life games, they will be more (or less) experienced in online games than you, so the game can become a bit unfair.

By starting your online adventuring in a single user game, you can familiarise yourself with how the games work - their idiosyncracies and often, how the game author's mind works.

● Next month we'll be looking at multi-user games such as MUD and Lap of the Gods.

>PLAY ADV550

WELCOME to 550 pt Adventure. Say "NEWS" to get up-to-date game details. Would you like instructions?

YES

Somewhere nearby is Colossal Cave, where people have found fortunes in treasure and gold, though it is rumoured that some are never seen again. Magic is said to work in the cave. I will be your eyes and hands. Direct me with commands of 1 or 2 words.

Should you get stuck, type "HELP" for general hints. For information on how to end your adventure type "INFO".

If you have any problems, please send MAIL to PAT and TCA-MAPLES.

You are standing at the end of a road before a small brick building. Around you is a forest. A small stream flows out of the building and down a gully.

? GO INSIDE

You are inside a building, a well

house for a large spring. There are some keys on the ground. There is a shiny brass lamp nearby. There is food. There is a bottle of water here.

? GET KEYS, LAMP, FOOD, BOTTLE

Ok. Ok. Ok. Ok.

? HELP

I know of places, actions, and things. Most of my vocabulary describes places and is used to move you. Try words like FOREST, BUILDING, DOWNSTREAM, ENTER, EAST, WEST, NORTH, SOUTH, UP, or DOWN. I know about a few special objects, like a black rod hidden in the cave.

These can be manipulated using some of the action words. Usually you will need to give both the object and action words (in either order), but sometimes I can infer the object from the verb alone.

Some objects also imply verbs; in particular, "INVENTORY" implies "TAKE INVENTORY", which causes me to give you a list of the things you're

carrying (you can say just "INV" instead of "INVENTORY" if you wish).

The objects have side effects; for instance, the rod scares the bird. People having trouble moving just need to try a few more words. Usually people trying unsuccessfully to manipulate an object are attempting something beyond their (or my) capabilities and should try a different tack.

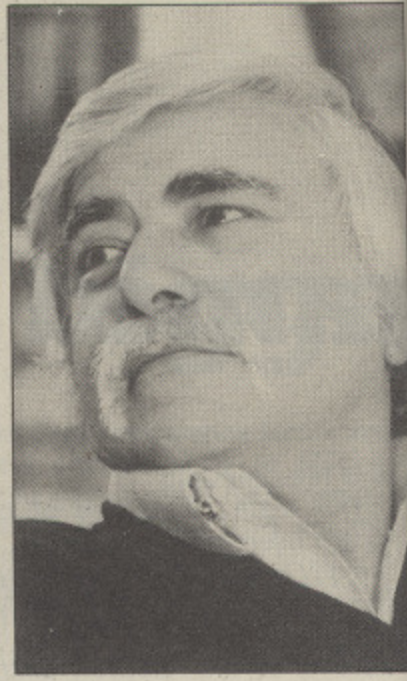
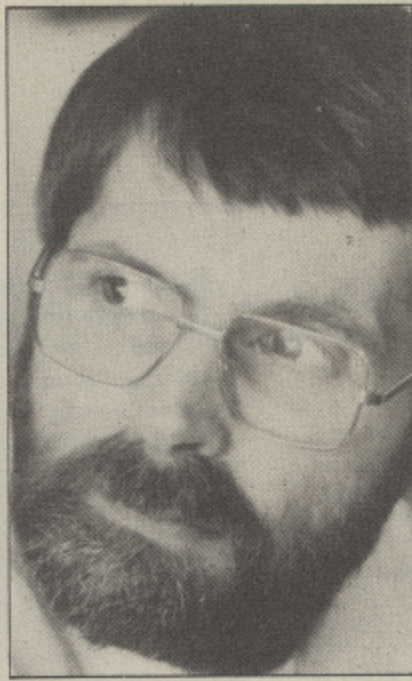
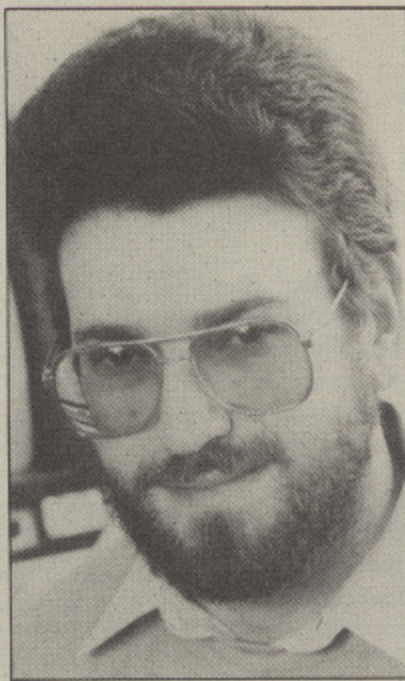
To speed the game you can sometimes move long distances with a single word. For example, "BUILDING" usually gets you to the building from anywhere above ground except when lost in the forest.

Remember that cave passages turn a lot, and that leaving a room to the north does not guarantee entering the next from the south. Good luck.

? HELP

I'm afraid that I can't tell you anything more that would be useful; you'll have to figure out what to do on your own.

Figure III: Sample of Adventure 550



The problem solvers!

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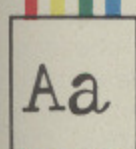
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Music from your micro

ONCE upon a time someone described the computer as a solution looking for a problem. It's still an apt description because new problems arise all the time. One such problem is music and the computer has certainly revolutionised the way it is created and recorded.

Computers give the musician increased flexibility. They can juggle bars and phrases around, alter individual notes without upsetting the rest of the piece and, finally, produce a perfect performance.

Perhaps more importantly, it also allows anyone with an interest in music to get stuck in and do the same. You do not have to be a professional musician — or even a competent one — to take advantage of computer control because, like wordprocessing, the computer can make things easier for you.

Which brings us to Midi — the system which allows us to do all manner of wonderful musical things. But before we see what it can do, let's take a look at what it is and how it came about.

Midi is an acronym for Musical Instrument Digital Interface. As you can probably guess from the name it is a system which allows musical instruments to talk to each other using digital signals.

It was developed by the world's major musical instrument manufacturers such as Sequential, Roland and Yamaha (to name but three) to overcome the problem of interfacing hitherto incompatible pieces of equipment.

Before Midi it was not usually possible to connect together equipment produced by different manufacturers. All companies had their own way of doing things and just as you couldn't put an Escort engine into a Mini — not without difficulty — so you couldn't plug a Yamaha keyboard into a Roland sequencer. This led to the situation where musicians were virtually forced to buy all their equipment from the same company to ensure compatibility — and even then compatibility was not guaranteed.

Companies, too, were reluctant to reveal their production secrets and no one wanted to adopt the standards of another company. Midi solved this problem by setting up a protocol system which each manufacturer could apply in his own way. The important thing was for each instrument to recognise and respond to the same signals.

So much for the history lesson. Now

Ian Waugh takes

the mystery out

of Midi melodies

you know why it was developed, let's see what it is.

In order to control a synthesiser, say, you need to give it certain information. You must tell it when to play a note and when to stop playing it. You may also want to tell it to activate its pitch bend control and you'd need to specify how much bend you wanted and how fast you wanted to apply it.

You may also want to tell it to select a different voice patch. Add a drum machine and you'd need to tell it when to start playing and when to stop. These are the sort of messages with which Midi deals. All are represented as a series of 8 bit numbers which is very handy for computers.

Midi is transmitted from instrument to instrument via cable connecting 5-pin DIN sockets. It only uses three of the connections but rumour has it the other two may be utilised as Midi develops. Messages are transmitted serially rather like the RS423 interface but Midi works at a speed of 31.25 Kbaud.

Parallel operation would be faster and more efficient, but serial is cheaper, which means it doesn't cost the earth to fit it to an instrument. The transmission rate of the system helps offset the speed problem, although faster interfaces are possible. The standard version will be more than adequate for 99 per cent of users. For the moment at least.

There are three types of Midi socket: Midi In, Midi Out and Midi Thru. The In and Out sockets receive and transmit as you would expect and these are found on virtually all Midi-equipped instruments. Many Midi interfaces have more than one Midi Out. The Midi Thru socket is not so universal but is being included on more and more instruments. It transmits a direct copy of the signal arriving at the Midi In socket and is used to daisy chain instruments together. More of this in a moment.

Let's look at a typical Midi set-up without a computer. One of the advantages of Midi for the gig keyboard player

is that it lets him get rid of the mountain of keyboards which usually surround him. It may look flash but it's costly and there's no way he can pose at the front of the stage like the guitarist.

If he plugs the Midi Out of one keyboard into the Midi In of another then whatever he plays on the first will be duplicated on the second. If he plugs the Midi Thru of the second into the Midi In of a third he can play three keyboards at once.

That's fine as far as it goes but what if he only wants to play keyboard two? With Midi it's easy because the Midi spec allows information to be transmitted on up to 16 channels which can be assigned to different instruments.

Keyboard two could be assigned to channel 1 and keyboard three assigned to channel 2 (or any other of the 16 channels). The player would select the transmission channel on his master keyboard accordingly.

Now it may seem a waste to buy all these keyboards if you're only actually going to play the keys on one of them. That's why many manufacturers produce keyboard-less versions of their synthesisers. These are known as expanders and can be used just as successfully with a computer although you can't use them to put notes into the system in real-time (more explanations coming up soon).

The poser can now buy a keyboard to sling round his neck like a guitar. One Midi lead will connect him to a mountain of instruments and he can prance around the stage with more freedom than a guitarist as his keyboard won't produce feedback if he stands in front of his speakers.

The question of channel selection and transmission is, unfortunately, a little more complicated. You knew it would be, didn't you? It is relevant to its use with computers so it needs to be mentioned.

Midi has four different modes of operation and just to complicate matters operation is different for transmitters and receivers. Here we go.

Mode 1 is Omni On/Poly mode, commonly just called Omni mode. A transmitter will transmit all information over one channel. The channel number is usually selectable but if it's not the device will transmit on channel 1. A receiver will receive messages on all channels.

The word Poly in the title refers to the way the instrument responds – in this case it plays polyphonically. This was originally designed as an idiot mode as it lets you plug in and play without a thought to channel assignment.

Mode 2 is Omni On/Mono mode. The transmitters and receivers act exactly as they do in mode 1 but note information is monophonic, that is, only one note will play at a time.

Mode 3 is Omni Off/Poly, usually known just as Poly mode. The transmitter works the same as mode 1 but the receiver no longer accepts information on all channels (Omni is off) but responds only to its designated channel. Poly is on so the instruments respond polyphonically.

Mode 4 is Omni Off/Mono mode, usually referred to as Mono mode. This is rather special and of particular interest to computer users so it's worth giving it special attention as it can appear quite confusing.

In this mode each voice is assigned its own channel number. If the basic channel was set to one then voice 1 would respond to channel 1, voice two to channel 2, and so on. Its main use is with multi-timbral instruments. These are capable of playing more than one sound at once.

A transmitting instrument set to channel 1 in this mode would transmit voice one over channel 1, voice two over channel 2, and so on. Usually, however, the different voices will be controlled by a computer.

The most common multi-timbral synths belong to Casio's CZ series and the most popular is undoubtedly the CZ-101 which is capable of playing four different sounds at once.

The mode is mono so each sound can only play one note at a time but the result is very effective.

The CZ-101 has a RRP of £345 but can usually be found much cheaper. It has mini keys which don't suit everyone and it's big brother, the CZ-1000 with a RRP of £495 has exactly the same specification but it has full-size keys. Multi-timbral keyboards and Midi were made for each other.

The Mono mode concept may be initially difficult to visualise because you can't play four different lines on a single



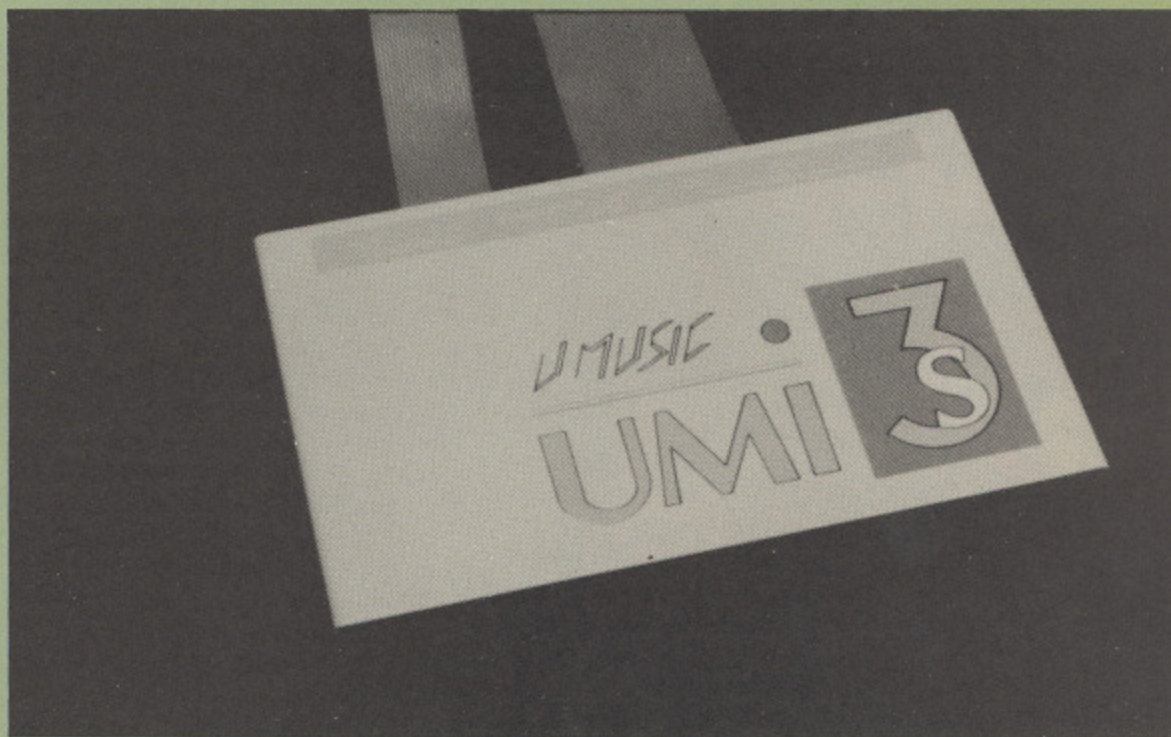
keyboard each with a different voice but that is exactly what you can do with a computer.

Before we see how computers fit into all this, it's worth mentioning the variety of equipment which has Midi sockets. Keyboards were the first and are still the most common but now Midi is being implemented on guitars.

Drum machines and sequencers can control or be controlled by software or each other and now even effects units such as echo and reverb have Midi so each patch change can select its own echo setting. Samplers can usually be controlled from a Midi instrument and now even mixers are being fitted with Midi. These are quite expensive, though, so let's see what we can do with our computer.

To connect a computer to other equipment we need a Midi interface. (Note that we call an interface a Midi interface

Turn to Page 54 ►



U-Music Midi interface

◀ From Page 53

and not just a Midi.) It will plug into the computer and have Midi In, Out and Thru sockets. It may also have a clock or sync socket which is used to control a drum machine or sequencer.

It's as well to remember that Midi signals are digital signals and not audio ones. The data stored in the computer during recording is a series of numbers from 0 to 255 just like any computer program.

Let's assume that we want to build up a 4-part arrangement using the Casio CZ-101. We can do this in much the same way as we would build up a piece of music on a multi-track tape recorder — only using a computer has many advantages. Each music line, normally referred to as a part or a track, is recorded separately. Each part can be assigned a different channel number so they can play with different voices.

There are two ways of entering notes into a Midi system, real-time and step-time. In real-time, the program records the notes as you play them. That means you also record your mistakes. In step-time you enter the notes one at a time. This obviously ensures a perfect recording but it takes longer.

Midi software has lots of little features to help with the recording process. For example, you can play a part slowly then speed it up on playback without affecting the pitch. You can also transpose a part over any range without altering the tempo. This would be impossible on an audio system.

A very helpful facility is the auto note correction feature or quantisation as it is technically known. This lets you stipulate a note duration which will normally be the length of the shortest note in the part. Then when you record in real-time, the system will place each note you play on the nearest exact division of the bar producing a rhythmically perfect piece.

Getting back to our recording, we can

Using
Miditrack



choose an input method to suit our playing ability and the complexity of the part. A metronome will keep time so each part is in sync with the others.

You can mute or switch off various tracks if they interfere with your concentration while recording the other parts.

If you make a mistake you don't have to record the whole part again. Some software has a drop-in facility so you can record over an imperfect section of music. If you only want to alter one note you can call up an editor and do just that. This will likely take you among the bits and bytes of Midi.

That's probably enough features for us to produce our 4-part composition but Midi software can do much more. You can merge parts, enabling you to build up a single part consisting of impossible note groupings.

If your keyboard is velocity sensitive (ie. the harder you hit it, the louder the note) you may have the option of filtering out this feature as it consumes large amounts of memory.

More than that, software is available which enables you to print out music in traditional notation. Voice editing software will help you edit digital synthesisers such as the Casio CZ series and Yamaha's DX synths. These also let you store the voices you create on disc saving a fortune in ram cartridges.

As of writing there are only two companies with Midi products for the BBC Micro: EMR (Electromusic Research) and U-Music (see reviews on Page 44).

EMR has seven programs: the real-time Performer, the step-time Composer, an Editor, VU-Music (produces graphics which vary according to Midi input), a Notator (to print out a Composer score), a DX7 Voice Editor and a Casio CZ Voice Editor. Their Midi interface costs £79.90 and the software ranges from £24.95 to £49.95.

U-Music takes a different tack. Its original product was the UMI-2B, a very professional product at a very professional price — over £500. It is now launching the UMI-3S which builds upon all the good features of the UMI-2B. It's

an all-in-one package consisting of an interface, real and step-time software and a DX Voice Editor. This will cost around £230.

Midi isn't perfect, just in case I gave that impression. In this article there just wasn't room to go into all its possibilities, and this meant leaving out a few of the problems, too.

Unless you delve very deeply into the subject you may not come across any problems at all and there are thousands of musicians who work with Midi every day without any difficulty.

You may like to consider, for example, what happens to the voices in Mono mode (Mode 4) if you apply pitch bend to one of them. Only that one should bend but some instruments will bend them all. This is one of Midi's grey areas.

The musical purist may also like to consider the fact that there is no provision in Midi for slurring notes, that is playing one note then changing to another one without reactivating the attack phase.

Midi only caters for straightforward note on and note off events. This probably won't worry keyboard players as they can't slur notes anyway but most non-percussive instruments can and pity the poor guitarist who can't play a note, bend it and slide up to another one.

Various companies are devoting time to such problems as these and no doubt they will be resolved eventually.

If you want to know more about Midi the best way to learn is to go out and buy an interface and get started. If you want more information you could send for Midi, Music and Micros. This is a small booklet from EMR and costs £1.50 which is refundable with an order.

Alternatively you may like to go the whole hog and buy Midi for Musicians by Craig Anderton at £9.95 from Music Sales. But don't let it put you off. Most Midi software is designed to shield you from the intricacies of the system and the book lays them bare in all their glorious binary detail.

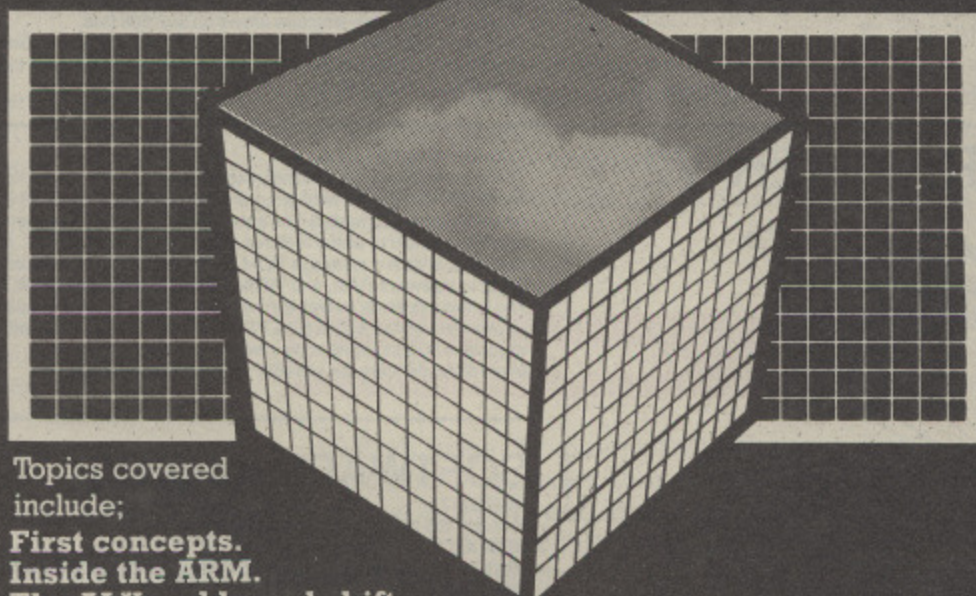
Midi is powerful and it can help make music fun, too. That's important because above all, music should be fun.



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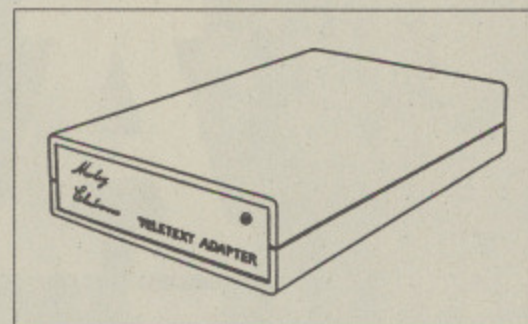
* Easy to follow comprehensive user guides.

* No hardware limitations, it can for example receive virtually unlimited numbers of channels.

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WHAT THE REVIEWERS SAID:

*... In terms of price, performance, future expansion possibilities and those little touches that show thought for the

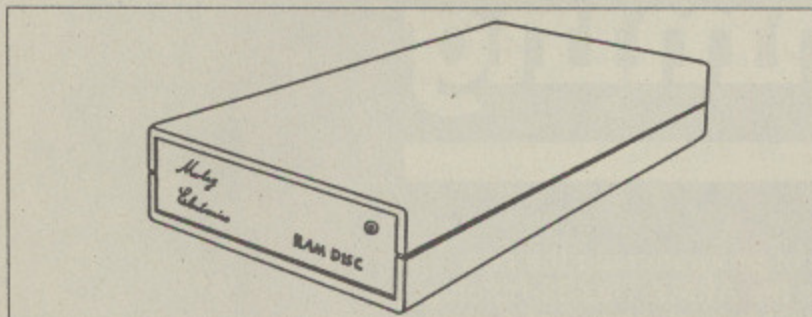


end user I would recommend the Morley unit."—(Acorn User, January, 1986).

*... 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).

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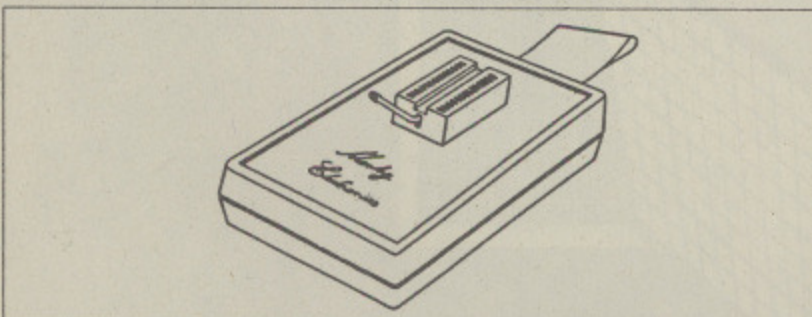
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RAMDISC

programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' * commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.

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Switched on

SINCE I bought my BBC B in 1983 it has hardly ever been off. Not because it is in constant use, but because I have problems switching it back on. Instead of the short beep and the message appearing I get a long whine so I rapidly switch off and then on again.

Is this normal? I have an Opus Challenger and wonder if the DDOS Rom is the problem. — **R. M. Peacock, Bury St. Edmunds.**

● As you have had your computer such a long time then you must have an early one. On these pin 1 of the eproms was left unconnected. Now this is alright most of the time but occasionally you come across an eprom that will only work reliably with this pin connected up to the 5 volt supply. You will find this on pin 28 of the same chip. So a small wire soldered on the underside of the board connecting these two pins together could do the trick.

Frozen out

AFTER performing well for two years, my BBC Micro developed a fault. After a short time, it would freeze and would not answer to any key. The only remedy is to switch off the power with the loss of all text.

At the same time I get strange symptoms such as the VDU display being moved to start midway across the screen. Pressing Break or Control + Break results in a continuous bleeping from the Micro and the continual hunting of the disc drive motor.

I removed all the peripherals leaving just the basic micro but there was no improvement. The inference must be that the fault now lies in the micro itself, whatever may have caused it originally.

The surprising thing is that for a minute or two it behaves perfectly after a rest, and responds to keyboard, cassette or disc. But the improvement is short-lived.

My own deductions lead me to suspect either the 6502A or the VIA 6522 with the odds in favour of the latter. If I am right, there may be two possibilities: Either one of the chips develops an internal fault after a few minutes but recovers after a rest or the chip ceases to function after a breakdown in the voltage supply.

If this is the case, the most likely cause might be a dodgy capacitor either in the power pack itself or associated with the IC. — **C. Martin, Emsworth, Hants.**

● Chips do not go faulty and then recover after a rest — this sort of behaviour only happens sometimes with electrolytic capacitors. The temporary loss of power to a chip will not cause it to go faulty as all the chips would suffer

PROBLEM SOLVED

the same power loss. Therefore replacing chips will not help.

The most likely explanation is a brief loss of power or a glitch. This can be caused by many things. First of all if you are driving a disc with the internal supply of the computer, some drives take excessive switch on surges and could cause such a temporary loss. The problem could be mechanical, a loose connection on the spade connectors supplying power to the board.

Remove all of these and crimp them up tight before replacing. Don't forget the negative five volts connector, normally the purple wire on the left hand edge of the board.

Finally there could be an electrolytic capacitor going faulty in the power supply. Unfortunately this could prove almost impossible to repair, as special high frequency low ESR (effective series resistance) types are needed. These are not stocked by any retailer I know of and are difficult to get hold of from trade sources (Minimum order is usually 100 off).

Ordinary electrolytic capacitors will not work and risk causing overheating in the rest of the circuit. Most Acorn service centres are under instruction not to repair the power supplies but to simply replace them.

Crashing programs

I HAVE an issue 3 model A BBC Micro that has been upgraded to a B. I have made two sideways ram modules which appear to work correctly.

But when I fitted them I found that on power up spurious characters were appearing, some spontaneously others at odd places when keys were touched. This has happened a number of times and has caused my program to crash.

I have been given various hints from other BBC Micro users. One is that as I have the early 30 watt power supply I am getting a power drop, another is that there is incompatibility between Model A components and sideways Ram. I am now stuck, could you please advise me. — **Sgt Robin Gray, Reme, BFPO 41**

● Do your problems disappear when the home made ram is removed? If they do then it is almost certain that they are overloading the system. The old 30 watt black power supply is certainly not helping matters.

You could try replacing IC14 for a

74ALS245 — a cure-all change to increase the drive capacity on the data bus. This is sometimes needed as extra devices cause excessive bus loading.

Broken circuit

I WOULD like to make a small robot that can go forward, backwards left or right. I designed the enclosed circuit but, would it work? — **Paul Carpenter, Yate, Nr. Bristol.**

● Unfortunately there is no point in printing your circuit as it would not work, because current can only flow in one direction through a FET. If you want to control motors look at some of the past Body Building articles: May 1984 was about controlling a stepping motor and November 1985 was about controlling DC motors.

Cooling problems

ON retirement I bought a BBC B with an issue 4 board which has been playing up this past year.

It is now four years old and does not get a lot of use. It is only used for letter writing and playing about with a few utilities.

Some months ago it began to crash after a couple of hundred words and in most cases everything above the cursor is lost. After this short use the computer is extremely hot, particularly at the power supply box but also along the tops of the three long central chips.

Now, whenever the computer is switched on, the top is removed and the cool air from a heater fan is directed inside. Working under these conditions allows the machine to run for as long as is needed.

The only additions I have made is add Wordwise Plus into socket 13 and the 1.2 OS into 15. I would like very much to install items like SWR and discs but feel these will only increase the heat further. Do you think its repairable or has the time come to replace it. — **J.T.C. Frost, Hadleigh, Ipswich, Suffolk.**

● All BBC Micros get hot inside and many users tend to think it is running too hot and often this is not so. In your case however the evidence seems to point to the fact that something is getting too hot and as this has not always been the case there must be a culprit.

First bend the large resistor R14 away from IC6. This would tend to cause heat dependant display faults not crashes but it is worth doing anyway.

Try to improve the ventilation through your machine. Some versions had a very small slot in the back to prevent little fingers getting in — it is also preventing air circulating.

Unfortunately your problem could be almost any chip. However you could try

◀ From Page 57

replacing IC1 the 6502 with another one, or a CMOS version as these don't get hot.

One way of tracking the faulty IC down is to get the computer good and hot and then arrange to blow cold air on one chip at a time, then you can find the one you need to replace. Aerosols are available especially to cool components. Before you buy a replacement make sure that it is that chip and not the rest of the computer cooling down by repeating the experiment several times.

Body building

I HAVE great fun playing with the sound to pattern conversion in the December 1983 issue of *The Micro User* and would like to link it up to control disc lights. The notes that came with the converter say I need body building Pack 4 and 5 to make a solid state relay, but what are these packs and how much are they? — **G. Marshall, Raynes Park, London.**

● The sound to pattern converter body build pack 8 is now no longer available. However all the components are readily available and it is quite an interesting

project. Packs 4 and 5 featured in the September 1983 issue allow you to switch mains voltages from the user port using a solid state relay or optically isolated triac.

Pack 4 is £10 and can switch up to 2.5A and pack 5 is £16 and is rated at 10A. Packs can be ordered from Musbury Consultants together with a photocopy of the original article if required.

Out of control

I AM having problems obtaining Teletext Control Codes via the User Defined Keys.

When I use Shift + f0 to f9 all is well but Control + f0 to f9 gives the codes with four added. So Control + f1 should be 141 (double height) but I get 145. Furthermore Shift + Control + any f keys do nothing. — **L.J. Fowl, Croydon, Surrey.**

● If you want to change the base of the control function keys to 141 you can use a *FX227,141 command. The control-shift function keys give nothing until you specify a base — say 150 — by issuing a *FX226,150 command.

Remember the Control + Shift combination are used to stop the display scrolling so you have to release these keys before the computer will go onto

the next line. Further details of these calls can be found on page 440 of the User Guide.

Up-grading

I HAVE a 40-track double sided disc drive which I bought second hand. It has a switch on the front which is not connected and I would like to upgrade it to 40/80 track using this. Could you tell me if this is possible and how. — **Mark Brann, Folkestone, Kent.**

● It is not possible to convert a 40-track disc drive to an 80-track drive because the read/write head on the 40-track drive is twice as wide as the 80-track drive. The mechanics are also geared towards 40 tracks and you will not be able to get it to half step.

No parity

I HAVE discovered that the BBC Micro will not provide a parity bit when programmed. When I connected a storage scope to the RS423 output the captured waveform showed that no parity bit was being added to the end of the data word



Your technical questions
answered by MIKE COOK

PROBLEM SOLVED

as it is shifted out the ACIA transmit register. Could you please explain this.
— Colin Kippen, Fife, Scotland.

● The ACIA control register is a write-only register, which means that you can't read its contents. This register contains the interrupt control as well as the word format. The BBC Micro constantly changes the way this device generates an interrupt, depending on the state of the buffers.

In order to alter this but not the word format the operating system maintains a copy of what should be in the ACIA's control register in memory. So if you write a new word format directly into the control register the operating system will overwrite this with the old values when the first character is sent.

What you must do then is to access this memory location as if it were the ACIA's control register. This is best done using an OSBYTE&9C call or a *FX156 command.

See the Advanced User Guide for more details.

Number 1

WHEN I switch on my BBC Micro it displays the number one on the screen and continues to print them until the normal

six lines and the expected continuous tone have been completed.

They can be interrupted by pressing any other letter, number, Escape or Break, but they soon start again.

I have disconnected the keyboard and put a continuity meter across the pins of several keys and they all seem to work in the same way. — D. Peters, Royston, Herts.

● The normal solution would be to look for a sticking number one key as you have done with a continuity meter. You have found it to be all right so the fault could be IC2 on the keyboard. This is a 74LS251 data selector and it looks as if pin 1 has a permanent logic zero.

This could be caused by a short to earth elsewhere on the keyboard, but as this IC is not in a socket the only way to test is to cut off pin 1 with a fine pair of side cutters.

Then power-up the computer and test the logic level on pin 8 of IC4, the

74LS30, which should be a logic zero. The keyboard will now work except for keys 1, 2, D, R, 6, U, O, P, { and the up cursor key.

If this happens it is IC2 that is faulty and it should be replaced. However, if pin 8 on IC4 is not a zero then solder back pin 1 and cut pin 3 from IC4.

Then test pin 1 on IC2, it should have a logic one on it. If so then IC4 is faulty and should be replaced. If not there is a short to earth on the keyboard around the tracks on the above mentioned set of keys. Happy hunting.

Weather map

I HAVE just read an article entitled Mini Met Man which appeared in the June 1985 issue of *The Micro User*, could you let me have a list of any other articles relating to the building of a weather station which have appeared over the years.

— G.D. Whitelock, Wokingham.

● So far I have covered the following components for a weather station:

Anemometer — June 1985

Pressure transducers — April 1986

Weather vane — October 1986

Hygrometer — December 1986

Temperature — March 1987

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All this in just

```

Time 0.17 54 Words 5544 Free
Insert Characters
START
July 23, 1986
Dear Douglas,

Further to our telephone conversation
yesterday, I have pleasure in enclosing
a pie chart showing the breakdown of our
fixed costs for the year.

As previously discussed with yourself, I
will be travelling down by train next
Thursday morning.

I look forward to meeting you then.

Yours sincerely,

Jeremy Brood
    
```

WORD PROCESSOR
Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!

```

Used 11 Free 32 Len 127 Rec 1
Surname Wooller
First name Douglas
Address1 Hallwood House
Address2 Hallwood Road
Town Stockport
Post code SK5 4GP
Credit lim 10000
Discount 30

Use +, +, +, v, ESCAPE, (N)ew, (E)dit,
(D)lete, (M)arker, (P)rint
    
```

DATABASE
Build up a versatile card index, use the flexible print out routine, do powerful multi-field sorting, perform all arithmetic functions, link with the word processor – and more!

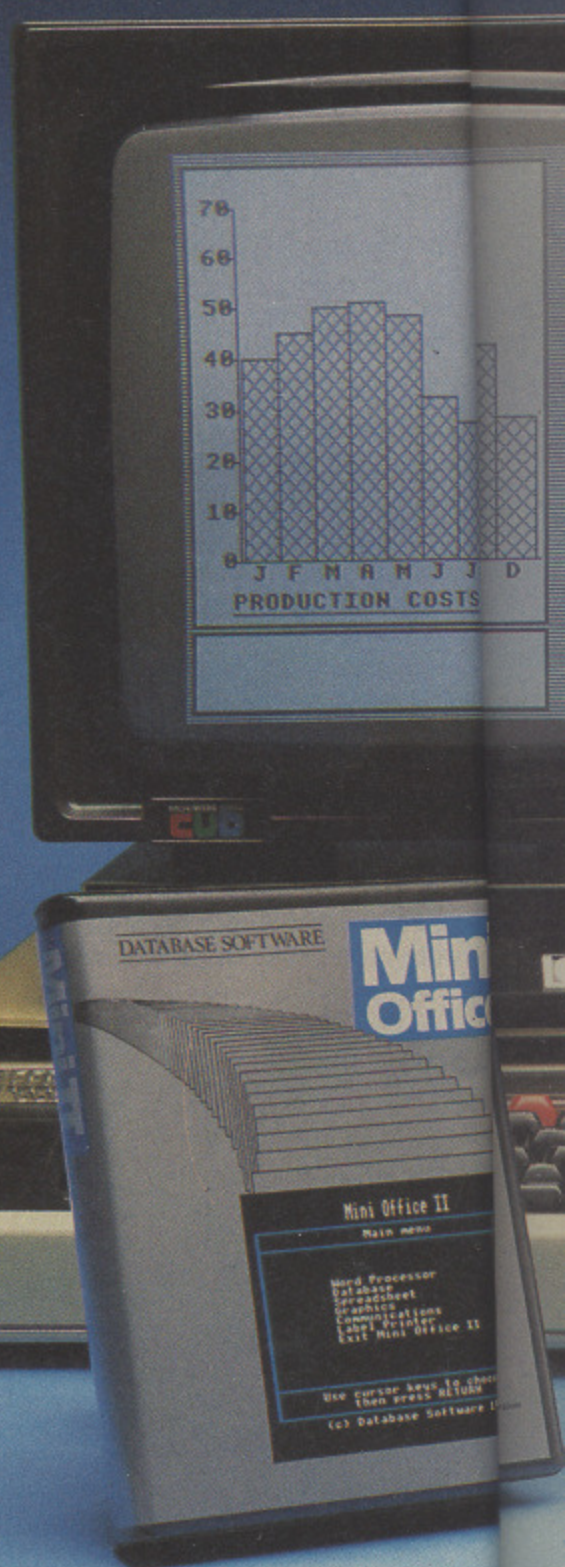
```

Mini Office II Label Printer

#####
# Douglas Wooller #
# Hallwood House #
# Hallwood Road #
# Stockport #
# SK5 4GP #
#####

Use Cursor Keys To Move
* Followed By A Number For Field
ESCAPE To Exit TAB To List Fields
    
```

LABEL PRINTER
Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!



...and at a price

Mini Office II is a comprehensive integrated suite of programs setting a new standard in home and business software.

These sample screenshots illustrate just a few of the wide range of features, many of which are usually only available on software costing hundreds of pounds. Most are easily accessed by using cursor keys to move up and down a list of options and pressing Return to select.

Mini Office II takes over where the original, highly successful Mini Office left off, with numerous extra features, two additional modules, a program to convert existing Mini Office files to Mini Office II format, and a 60 page, easy to follow manual.

And it's at a price everyone can afford!

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- Four 32k roms on one board packed with 128k of super fast machine code.
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- Frees valuable ram space for much more data.
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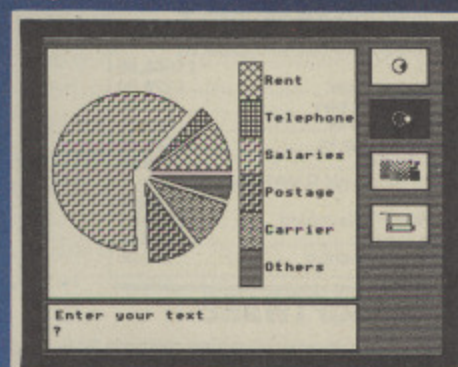
FreeSpace= 3750 Auto
Cell=A1 Text
Contents= Fixed

	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	80	80	80
8	Stationary	55	50	50
9	Postage	375	360	355
10	Carrier	420	380	330
11	TOTALS	3970	3845	3775
12		=====	=====	=====
13				
14				
15				
16				
17				
18				

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NOW AVAILABLE!**

GRAPHICS

Enter data directly or load data from the spreadsheet, produce pie charts, display bar charts side by side or stacked, overlay line graphs – and more!



COMMS MODULE

Using a modem you can access services such as MicroLink and book rail or theatre tickets, send electronic mail, telex and telemessages in a flash – and more!

```

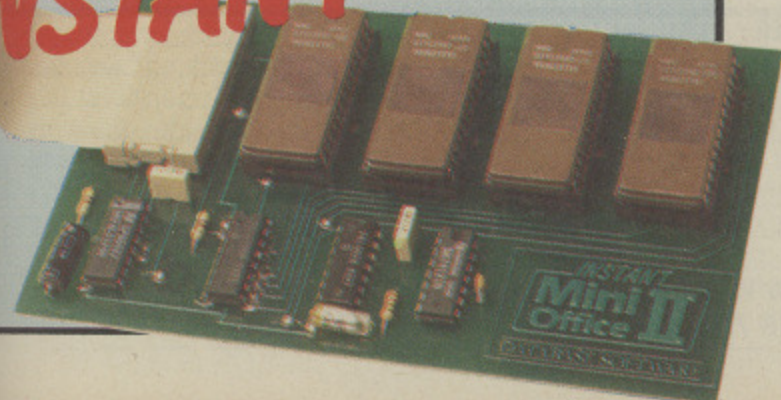
>br
*****
British Rail Service
Tickets / Fares / Timetable
*****
(c) Database Publications

1 * Ticket Bookings
2 * Pullman/Steam Bookings
3 * Seat Reservations
4 * Sleeper Reservations
5 * Pullman Rail
6 * Steam Excursions
7 * Electric Express - Newsletter
8 * Timetable and Fares from May 12th

* Mn for HELP
1-B Redisplay Quit
Select 1
>
    
```

ice that can't be matched!

INSTANT Mini Office II



Mini Office II

BBC B, B+	
Cassette.....	£14.95
5 1/4" disc.....	£16.95
MASTER	
5 1/4" disc.....	£19.95
COMPACT	
3 1/2" disc.....	£21.95
INSTANT MINI OFFICE II	
On rom for full BBC range.....	£59.95

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Extra 3.5in drive for compact	£99.00
PAL TV adaptor for compact	£26.00

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Master ET	£325.00
Master econet module	£43.47
Turbo upgrade	£108.00
64K upgrade kit	£34.74
Master 512K upgrade	£199.00
Z80 2nd processor with software	£346.00

6502 2nd processor	£173.00
10 Mbyte Hard disc with filesaver	£1086.95

30 Mbyte Hard disc with filesaver	£1608.95
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Prestel receiver	£120.00
Eprom cartridges	£13.00
Acorn DNFS kit	£82.60
1770 upgrade kit	£43.42
ADFS ROM	£26.04
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CONCEPT Keyboard	£124.95
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Viewsheet manual	£10.00

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Super Art ROM	£43.43
Database	£21.70
3D Zicon	£21.70
Utilities	£13.00

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Acorn:	
View 2.1	£45.00
View 3.0	£63.00
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ViewSpell	£33.50
Viewsheets	£45.00
Viewstore	£45.00
GXR (please state whether for B or B+)	£23.00
ISO Pascal	£52.00
LISP	£39.00
BCPL	£46.00
Logo	£52.00
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Intersheet	£48.00
Interchart	£28.50
Spellmaster	£46.00
Beebugsoft:	
Toolkit Plus	£33.00
Wordcase	£25.00
ICON master	£29.00
ROMIT	£29.00
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Sleuth ROM	£27.00
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Pace:	
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Citadel	£12.95
Repton 2	£12.95
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FLEA MARKET

All items subject to availability

EPROM programmer	£40.00
Programming software (ROM)	£5.00
EPROM eraser	£24.00
1200/75 Modem + Comm software	£35.00
Torch Light Pen	£25.00
Plannercalc. Torch CPN format	£35.00
Masterplanner. Torch CPN format	£85.00
IBM user manuals (installation/BASIC)	£15.00

MONITORS

Mono:	
Sanyo DM4112	£75.00
Philips green Hi-res 7502	£76.00
Philips amber Hi-res 7522	£82.61
Zenith green Hi-res 1230	£85.00
Zenith amber Hi-res 1220	£85.00
Colour:	
Microvitec std-res 1431	£191.00
Microvitec med-res 1451	£229.00
Microvitec hi-res 1441	£399.00
Philips 8533 RGB Med-res + composite video	£251.00
Monitor cables (state types required)	£3.50
Monitor bridge single height	£14.90
double height	£18.90

PRINTERS

DOT MATRIX

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Epson FX800	£324.75
Epson FX1000	£453.75
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Epson EX1000 (optional colour)	£614.63
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Olivetti DM100 80col NLQ 120cps	£225.00

Olivetti DM280 80col NLQ 160cps	£349.00
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Canon PW1080A NLQ 80col 160 cps	£258.00
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Brother 1109 Par. + Ser. 100cps + NLQ	£209.00
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Brother 1409 Par. + Ser.	£349.00
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Brother 1509 Par. + Ser. 180cps + NLQ	£449.00
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Brother 2024 Par./Ser. NLQ 24pin 160cps	£750.00
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STAR. Full range stocked. Call for prices	
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Star NL 10 serial NLQ 80 col 120cps	£279.00
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Star NX15 NLQ 132 col 120 cps	£330.65
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Star SD10 NLQ 80 col 160 cps	£330.65
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Star SD15 NLQ 132 col 160 cps	£415.65
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Star NB 2415 NLQ 24 pin 216 cps	£645.15
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Star NB15 NLQ 24 pin 300 cps	£806.65
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Citizen 120D parallel 120 cps NLQ 80col	£199.00
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Citizen LSP10 120cps Eps/IBM comp NLQ	£225.00
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Panasonic KX-P 1092	£315.00
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Panasonic KX-P 1592	£405.00
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Micro-P MP165 NLQ	£208.70
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Micro-P MP200 *NEW*	£299.00
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Parallel printer cable BBC	£9.00
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Parallel printer cable IBM, etc from	£15.00
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Sanyo PR3000	£199.00
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Sanyo PR5200	£299.00
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Brother HR10	£239.00
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Brother HR15	£349.00
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Brother HR25	£650.00
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Brother HR35	£825.00
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Juki 6100	£279.75
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Juki 6200	£454.00
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Juki 6300	£694.00
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Juki 2200 typewriter/printer	£238.00
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Star Powertype 165col 18cps	£219.00
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PRINTER ACCESSORIES

Epson FX 80/85 Tractor Unit	£32.00
Epson FX 80/85 Sheet Feeder	£125.00
Epson FX100/105 Sheet Feeder	£139.00
Brother HR sheet feeder	£209.00

Epson MX/RX/FX 80 Ribbons	£3.75
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NEW PC 1512: Prices start at £449 for basic single drive + mono monitor system. Phone for prices of other systems.

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Supercalc	£43.00
SageSoft Popular Accounts Plus	£130.00
Dbase II	£103.00
3 inch discs for PCW's	£3.50

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Opus 5802 400k DS 40/80 track	£109.00
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Opus 5802DB dual 400k DS 40/80 track	£205.00
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Opus 5802D dual 400k DS 40/80 with PSU	£233.91
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Opus Challenger 256k	£179.00
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Opus Challenger 512k	£199.00
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Opus DDOS kit	£52.12
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Pace PSD1P 100k 40T with PSU	£125.00
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Pace PSD3P 400k 40/80T with PSU	£144.00
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Pace PDD3P dual 400k 40/80T with PSU	£260.00
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Akhtar MD802E dual 400K DS 40/80T mounted in monitor stand	£285.00
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Cumana CSX100 100k SS 40T	£99.00
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Cumana CS100 100k SS 40T with PSU	£129.00
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Cumana CS400S 400k DS 40/80T with PSU	£152.00
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Cumana CD800S dual 400k SS 40T with PSU	£295.00
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Cumana CS354 SS 3.5" with PSU	£121.70
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SCARE stories that there will soon be no spare parts for BBC Micros are described as "utter rubbish" by Acorn. One weekly computer magazine reported that Acorn had announced it will stop stocking spares for BBC machines in 1991.

And schools were said to be horrified by a report in *The Guardian* that they face "massive bills for repair and replacement of computers as spares become unavailable".

Acorn communications manager Michael Page told *The Micro User*: "These reports are absolutely untrue and we are pursuing the matter with their source — a local education authority which put out a defamatory letter about Acorn products."

"We have made no announcement about ceasing the supply of components for any of our machines — we even have parts for the Acorn Atom still available. As far as the BBC Micro is concerned, parts will be available for at least another five years after the Master is discontinued and we don't even know when that will be."

"The Master contains all the customised components used on the BBC Micro and non-customised parts are easily attainable — a situation that will remain for some time to come".

Acorn admits there is an active market in second hand BBC Micros and peripherals fuelled by users afraid the spares will dry up. The company told *The Micro User*: "As long as there is a demand for parts we'll keep supplying them".

Safety tutor

THREE new educational programs have been released by Chalksoft for the BBC Micro and Master.

Chick Chase, for the six to nine age group, is an adventure which teaches safety rules. For one to four players, it features four lost chicks which have to be found by taking the safest route to their location. Price £14.95.

Spelling: Your Own Words allows teachers to compile their own word lists and use the computer to do the testing and checking. The disc holds 10 different word-sets, each up to 29 words long, which can be altered at any time.

All important variables which affect the spelling tests can be set and locked. Price £17.25.

Maps and Landscapes No 2 is a companion set to Maps and Land-

Spares supply will not dry up — Acorn

scapes, and again provides material for basic map work. It features demonstrations, games and test-cum-practice programs on contour lines, landscape cross-sections, scales and directions. Price £17.25.

A new catalogue of the company's educational products is available from Chalksoft (0775 69518).

Software selections

NEW from Fernleaf Educational Software are three new packages for the BBC Micro, Master and Master Compact.

Castle Under Attack, for ages nine to 14, is a game of strategy for two groups, one of which takes the role of attacker while the other defends the castle. Price £15.61.

For ages nine to 14 plus, the Norman England resources pack of learning materials comprises a set of four programs, Domesday Village workpack for schools, and a full colour book about the Bayeux Tapestry. Price £59.

Fernleaf (0474 359037) has also released four volumes of educational software selections, price £21.70 each. There are five programs in each volume written for the seven to 13 age range.

3D Logo

THE latest extension module for Logo, software for mixing text and graphics, and a special schools version of Xor are due to be released by Logotron.

Building on conventional turtle graphics, 3D Logo allows the turtle to move in the third dimension — along the Z axis — by adding new commands including pitch, roll and yaw. It provides a powerful tool for exploring 3D shapes and examining Vector and Cartesian geometry in 3D space.

Printworks, a program for producing printed material, allows mixing of text and graphics on the same page. It was developed in Australia and already a best-seller there and in the US.

A special adaptation of the comput-

sive maze game for the educational market, Xor for Schools, is also promised by Logotron (0223 323656).

Accent on eating

THE Centre for World Development Education computer project has produced a program for primary school children which allows them to compare their food intake with what people in other countries eat.

What Do We Eat? is the first program to appear under the CWDE software label.

There are three copyable worksheets in the A5 pack, as well as a 32-page booklet and 40-track disc for the BBC Micro. Price is £12.50 from CWDE Software (01-487 5474).

Email system

A SIMPLE but powerful electronic mail system aimed primarily at schools running Econet systems has been developed by Fatsoft.

Using star commands in a library, it runs on BBC Micro and Master machines in 80 column mode and warns the user if any resident programs will be corrupted.

The package costs £30 from Fatsoft (01-319 3372).

The young farmer

CHILDREN can learn all about farming with the help of the BBC Micro and a new program from Magnolia Soft called Farmer Giles.

The program was tested over a period of three years on children aged 9 to 12, and is designed to supplement a visit to a farm or country show.

The program realistically takes into account varying weather conditions and seasons, and their effect on crop yields. Price £10.95 from Magnolia Soft (0392 213724).

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unit £1125.00
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Video simulation

BBC Enterprises has released the first of its planned series of discs for the interactive video system.

The LV-rom Ecodisk, which forms part of the Domesday project, gives a simulation of real life problem solving in the management of Slapton Ley nature reserve in Devon.

Using a trackerball to scan through the data on the disc every inch of the reserve can be viewed from either the banks of the lake or a helicopter.

And the scene can be changed to portray the reserve in different seasons.

To help in decision making, scientific advice is available on the disc and the results of those decisions can be projected up to 50 years into the future. Price £169 from BBC Enterprises (01-576 0339).

School programs

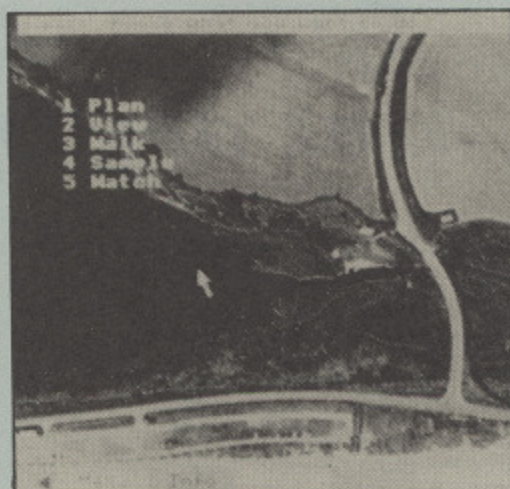
THE curriculum development team based at the Microelectronics Education Development Unit in Lincoln (0522 44713) has launched a massive range of BBC Micro and Master programs for schools and colleges.

There are more than 30 titles in the Medusa library, written for pupils of all ages from infants to sixth-formers and costing from £6 to £20.

Subjects covered include mathematics, English, music and drama, physics, chemistry, geography, computer and business studies, word processing and literacy skills. There are also a number of utilities and books.

Time Quest is an adventure program designed to form the core of a topic on the subject of time. Incorporating high resolution graphics, it challenges children to elude the Time Sprite by solving a number of problems involving time. Price £10.

Sounds Useful is a package consisting of three related programs. Synthesiser allows sounds to be created using a simple graphical display. Ostinato allows children to create, edit and play a repeating musical phrase. Sequencer is a Logo type program with which children can program sequences of phrases cre-



Bird's eye view of Slapton Ley

ated with Ostinato in voices developed with Synthesiser. Price £20.

The Medusa guides provide easy-to-follow instruction on the use of the Acornsoft family of business applications software — View word processor, Viewstore database, Viewsheets spreadsheet and Viewplot graphics package.

Written by experienced teachers of information technology and business studies, the guides cover the syllabus requirements of the RSA Diploma in Computer Literacy and Information Technology and the UCLES Certificate in IT. They are also useful for pupils studying business applications in GCSE Computer Studies and Business and Information Studies. Price £10 each.

Spreadsheets and graphics packages — designed to stimulate the use of content-free software across the curriculum — present sets of 10 applications of Viewsheets and Viewplot in a range of subject areas. Each package includes a disc containing example files. Price £7.50 each.

Panto puzzler

ONE of the founders of Chalksoft, Brian Kerslake, has set up a new software publishing venture called Topologika.

Its first release is Giantkiller, a mathematical game written by Peter Killworth, author of several best-selling titles for Acornsoft.

The player has the task of going to market to buy a pig but ending up climbing a beanstalk, exploring a giant's castle and discovering treasures.

All the puzzles are based on mathematical activities and involve

calculator work, spatial investigations, coordinates, tessellations, topology and mapwork.

The machine code game comes with a save feature, 24-page teacher's guide with detailed maps and full worked solution, 16-page children's guide with worksheets and keycard.

Giantkiller costs £16 for the BBC Micro and Master, £18 for the Master Compact, from Topologika (0487 831153).

Maths for the young

LEADING educational software house LCL has released Primary Maths, the first complete course it has produced for young children.

"The package takes beginners, from four years of age, to secondary school entrance", said LCL's Genevieve Ludinski. "We deliberately only release one new product a year, in order to make sure that each is properly tested".

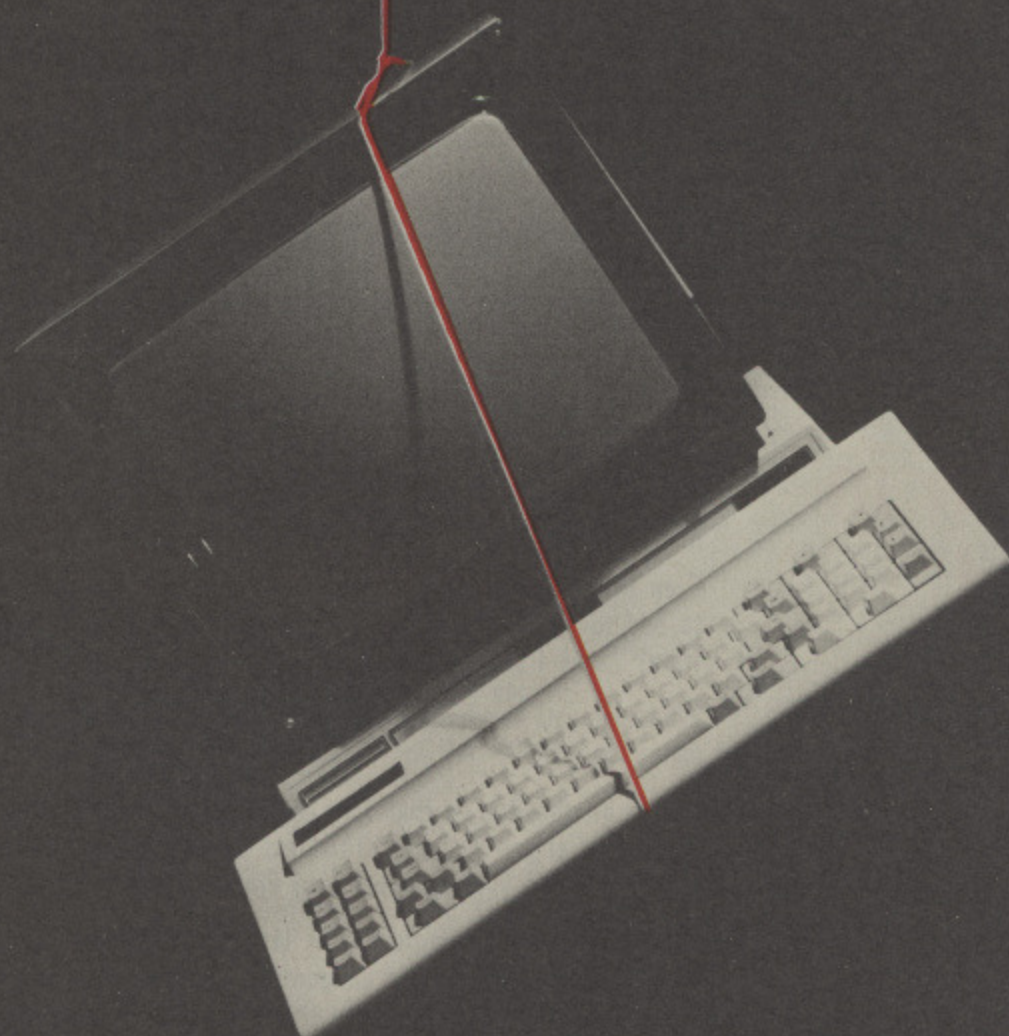
Primary Maths consists of 35 programs divided into 18 lessons and tests. The subjects are taught using full colour, animated graphics and sound. As with all LCL titles, it was produced by practising teachers and computer experts.

Primary Maths costs £24 and is available on cassette and disc for the BBC series of computers from LCL (0491 579345).



Genevieve Ludinski

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For teachers: French on the Run uses multi-choice questions with randomised distractors, all carefully chosen to illustrate linguistic points or points concerning things French. The program is meant for individual assessment, but can be used just as effectively for classroom work. A sealed envelope contains details of how the secret passwords are created.

TO ORDER TURN TO THE FORM ON PAGE 133

EDUCATION THEME

DOING IT BY THE BOOK

WHEN I was asked to establish a Department of Environmental Science and prepare candidates for the A-level examination, I got together a good selection of books on the different aspects of the subject, in order to choose one for student use.

But inquiries of bookshops, libraries and publishers yielded nothing that was at the right level and when I was given my budget, and deducted the cost of even a modicum of specialised apparatus, I realised that I couldn't afford any.

I didn't like the idea of having to cover everything by notes. Handwritten worksheets are bulky and if I prepared them on my yak-driven typewriter they would be full of mistakes. If I passed them to the secretary for retyping, they'd be held up waiting their turn.

It was at this time that Bill, our

John Rodway writes

the definitive text

teacher of computing, fitted word processor chips into a couple of the college's BBC Micros. I saw what students were doing, and said to myself "I can do that."

When I found how easily I could get words into the right order, correct my frequent "mistakes", and get print for photocopying, I decided that my worries were over. I would write my own text book of Environmental Science.

So I bought a Wordwise chip and it wasn't long before I'd prepared a breakdown of the syllabus headings and made two disc copies. On one I put the past questions by topic, duplicating

entries where the material was drawn from more than one section.

The second list detailed the factual and skills content. I entered terms used in past questions, statements from the examiners' comments, and suggestions from colleagues, until I had a fairly detailed catalogue.

The ability to put in new entries without the attendant of margin notes, footnotes, and extra bits of paper was a boon. The block move facility was fully exploited as I worked the list up into an ordered teaching scheme.

As the scheme became more detailed, its length exceeded the memory available. I split it into several files, one for each major syllabus section. Moving material around via a temporary file became a bit more laborious, but it was a lot easier than paper.

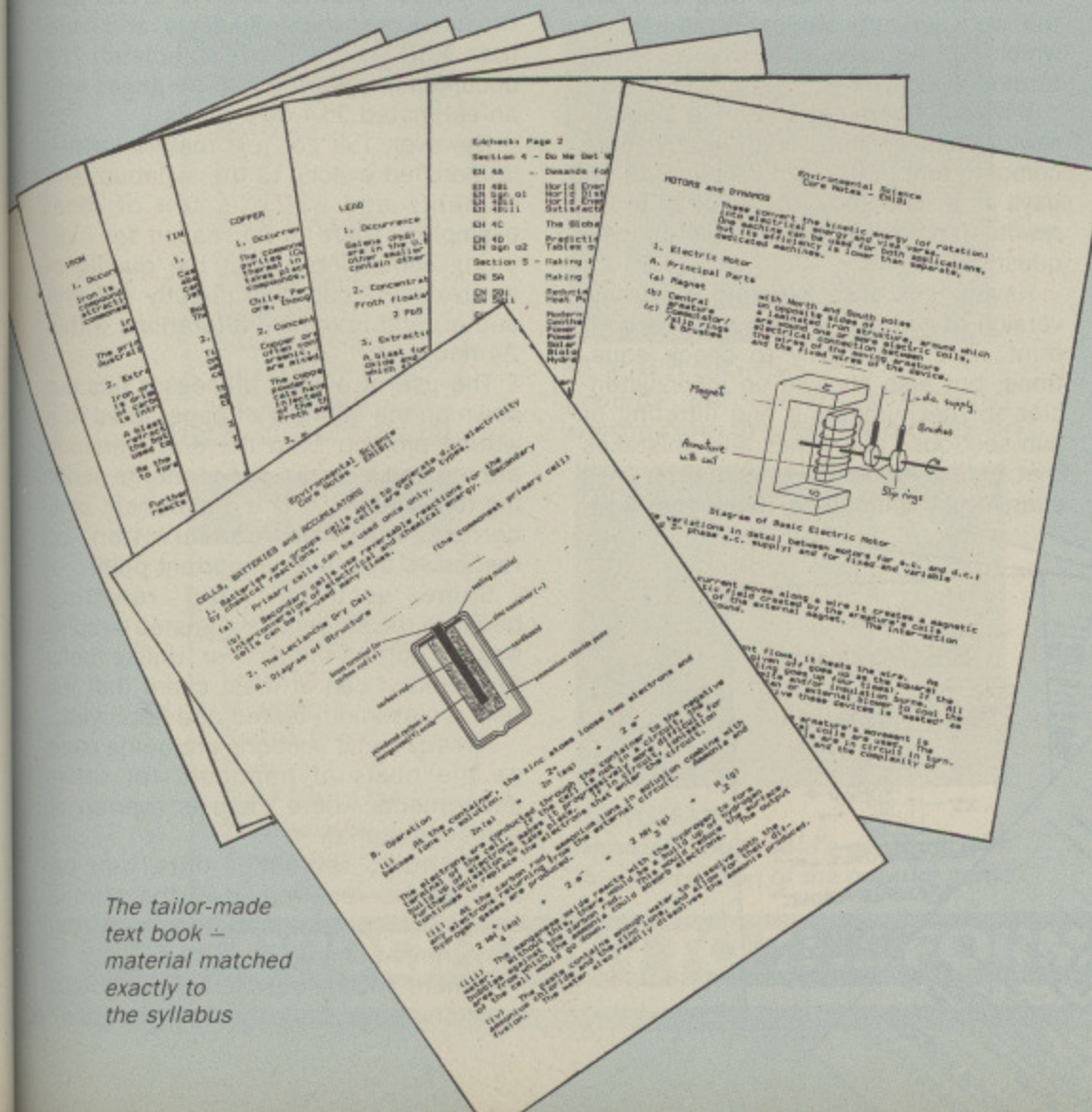
Another advantage of word processing appeared when I came to carry copy. The fully worked out scheme fills an A4 folder. However, the source files all fit on to one floppy disc. It is a lot easier to move the floppy between home and college than carrying a file, especially when cycling.

With the planning stage over, I set about writing a trial section of the students' text. I chose a topic with which I was familiar so I could concentrate on the word processing, I took the text right through from outline scheme to final duplication just to sort out the snags.

I quickly found that a line length of 65 characters left enough space for insertion into a ring-file. Seventy-five lines per page was the maximum that looked good, and which our offset litho machine could be relied upon to print in its entirety.

The importance of making the master copy with a good black ribbon in the matrix printer was brought home by a few well-chosen words from the reprographics assistant.

From these trials, a standardised page layout evolved for headings, sub-headings, and footings. These were incorporated into a file called BLANK, which also contained the embedded commands to set margins, line length, and indentations. Each new document



The tailor-made text book — material matched exactly to the syllabus

Turn to Page 68 ►

EDUCATION THEME

THE
MICRO
USER

◀ From Page 67

starts starts life as a Son/Daughter of BLANK.

Chemical equations required the use of subscripts — which meant long and complicated groups of embedded command codes. But as the length of a single line equation grew, attempts to preview it caused crashes. At first I thought I was inserting incorrect codes, but Wordwise does not like lots of separate printer code calls in one line of text.

To solve the problem, only one OC should be given per cluster of embedded commands. But there was more to be learnt — a cluster of these command codes must not be split across two edit mode screen lines.

When the word processor sends the codes to the printer, it does not recognise any codes after the line break on the second line as being a continuation of the embedded commands from the previous line. They're printed as normal text.

If an individual code does wrap around the end of a line, insert Embedded Command Starts until an undivided command can be made to appear in green on the next line of edit mode screen.

One word of warning. In preview mode, any text that is full of embedded commands clusters is displayed in a jerky way. It doesn't do any harm, but it is a bit disconcerting the first time you see a complex equation stagger across the screen.

Once the production methods had been sorted out, it was just a matter of putting fingers to keys, and printer to paper. I wasn't working against the clock, but it was certainly against the calendar.

My first intake of students arrived just six months after I started to write in earnest. This meant that I always had to keep one major section of the syllabus ahead of them. When they were doing Atmosphere, I was writing Energy. By the

time they were up to Energy I was on to Water, and so on.

My system was to make each sub-section a separate document. As well as a title in English, each was carefully identified by a code derived from the detailed teaching scheme. I tended to have several documents on the go at any one time, each at a different stage of completion.

After a rough version had been written, I would leave it for a few days while working on others. Later I could modify it in the light of what I had added to earlier documents, and what was to follow.

I took great care to see that there was continuity of theme between documents. Cross-references were included, both to previous documents and to those as yet unwritten. Only in a few cases did the text diverge significantly from the plan.

The more I wrote, and saw the results of students using the text in class and as the basis for the homework, the more critical I became of my own handling of words and layout. I tried to arrange that, wherever possible, each document was a multiple of one complete page long, and not more than four sides.

I often juggled text so that each major sub-section started at the top of a page. Keeping to this policy may take slightly more space, but it does help to break the work up into student-sized chunks which can be seen as a whole without turning over.

Where I filled more than a page. I rewrote the section in a slightly more compact form. Little did I realise, in my days as a schoolboy, the value of those rewrite-in-not-more-than-250-words type questions.

Having got a satisfactory electronic version of my document, I made a draft print. This was partly to check equations, but also showed up inconsistencies in the numbering and lettering of sub-sections, and other silly mistakes that hide themselves on screen — it is surprisingly difficult to check your work

on a monitor.

Corrections were made, as were revisions in the light of answering homework questions and working out the marking schemes. The aim was a coherent, comprehensive but concise text with students' out-of-class activities related to the material studied up to that point.

Spelling is not one of my strong points. No matter how I tried, my students were always pointing out typographical errors. Spellcheck was added to my rom board, and has proved its value at reducing the quantity of egg-on-face. It has also helped to ensure consistency with abbreviations, and words that can include an optional hyphen.

With the book finished, the spelling checker has logged up just under 12,000 entries. As the last group of documents were being checked, it started to give No Room messages for certain words.

For those starting with po... it was understandable, what with pollution, pollutant, population, and all their plurals and derivatives.

Re... words like recycle, recovery, and re-use also exceeded the available storage space on the disc. But I hadn't realised that my use of wa..., le..., and di... words was particularly high.

I wonder if it was worth it. It has cost two additional chips, 30 discs, and more than 3,500 hours. I have completed 278 documents, covering 600 A4 pages with an estimated 214,000 words.

However, I've got text material which is matched exactly to the syllabus, and students and which is full of local examples. There is no reason for muttering complaints about the quality of the text, as I can deal directly with the author, and introduce alterations within 24 hours.

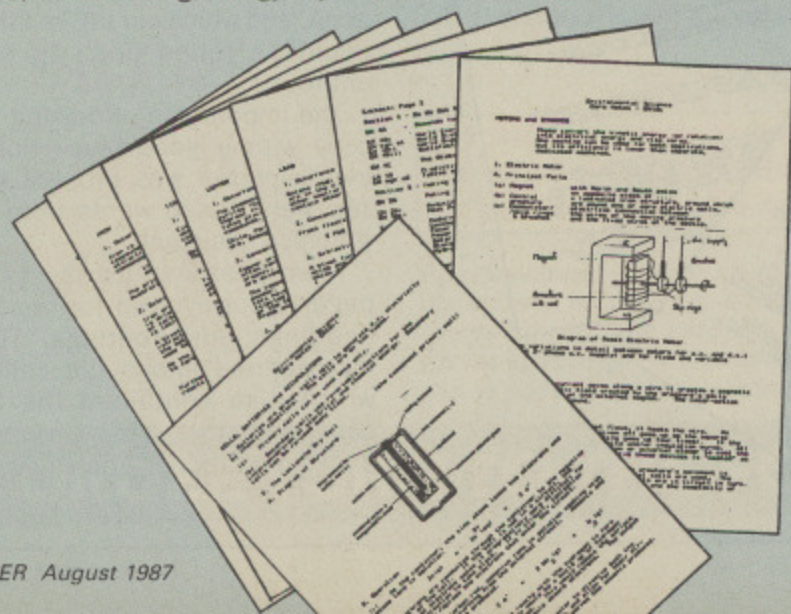
The use of a word processor has cut down on the quantity of paper used in a writing project. Even the draft versions are re-used as scrap paper prior to sending for repulping. For a department concerned with the conservation of resources this is an important point.

Some sections need rewriting because the students suggested simpler ways of putting things over. Unlike many textbooks, I can at least claim that my text is classroom-tested and improved.

Already some sections are being used as the basis of handouts for other departments where there is overlap of subject material.

In future, tables of data can be updated as required, and the text is easily altered as our knowledge of the environment changes.

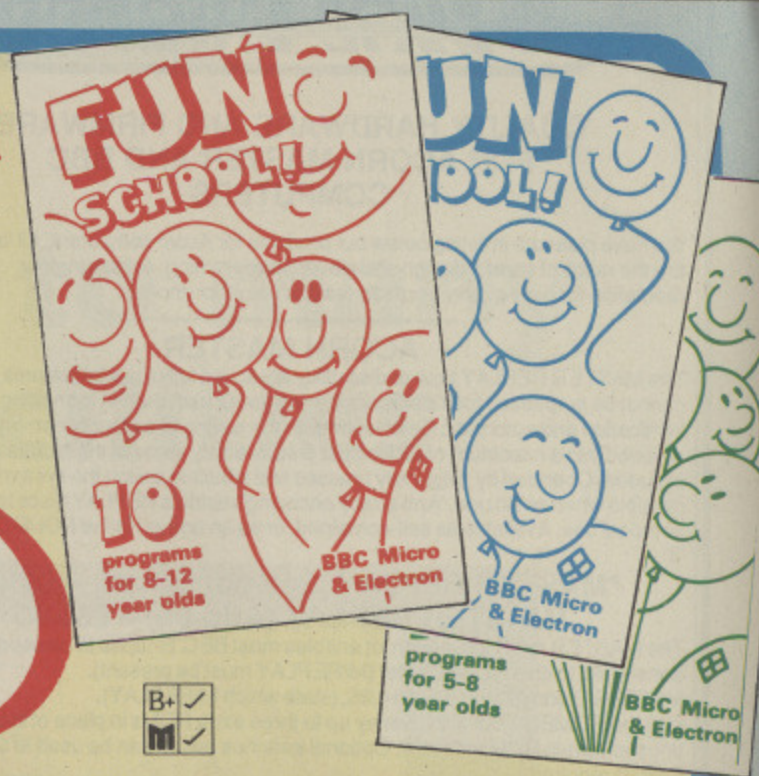
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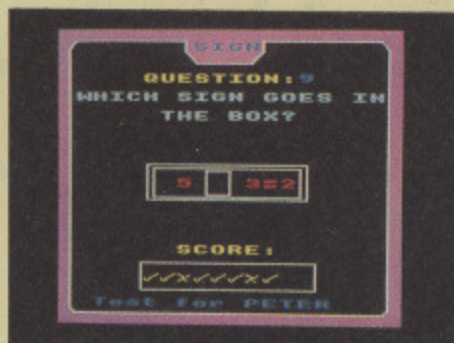


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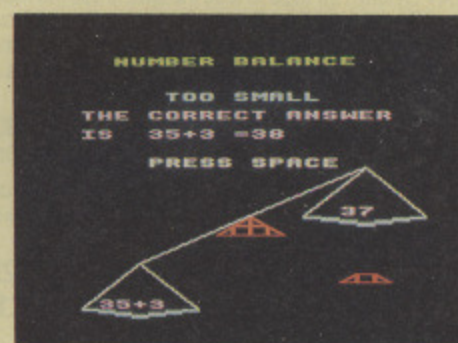
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Castle
Derrick
Fred's Words
Hilo
Maths Test
Mouser
Number Signs
Seawall
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NUMBER SIGNS

Provide the correct arithmetic sign and aim to score ten out of ten

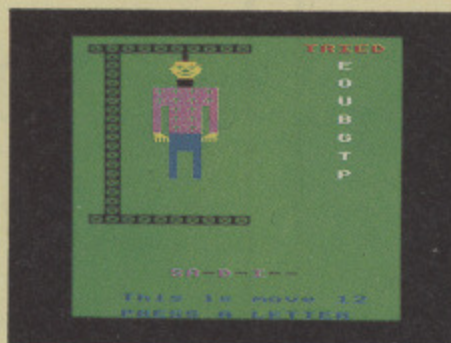


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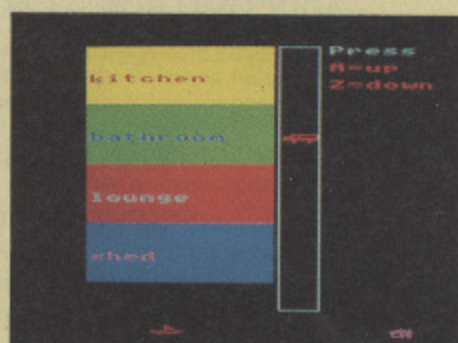
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HANGMAN

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ODD MAN OUT

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TO ORDER TURN TO THE FORM ON PAGE 133



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EDUCATION REVIEW

Product: Key
Price: £4.95
Supplier: GSN Educational Software, 214
Stamford Street, Ashton-under-Lyne,
Lancashire OL6 7LP.
Tel: 061-339 6635

KEY is a remarkable new database developed jointly by ITV Schools and GSN Educational Software. Remarkable not so much for the facilities it offers, which are available on other databases, but because it offers so much in one package.

The database operates on three different levels: The first two take the best features of the database program called GRASS, allowing simple, one field searches and more complex multiple field searches – all within a menu driven environment.

This makes them very easy to use for children of primary school age, possibly lower primary. The program takes the user gently through the menus, prompting all the way.

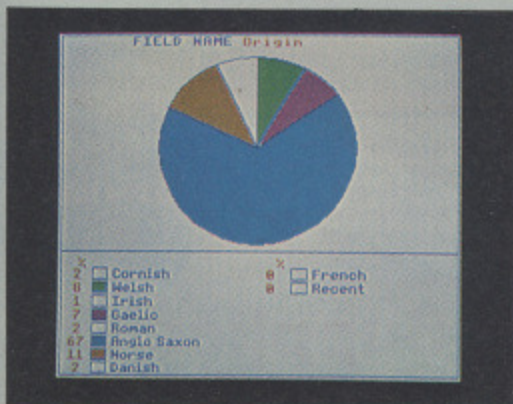
Some of the options you need are rather well hidden and I spent a while trying to reset the search to deal with the whole file rather than the results of the last search, but a careful rereading of the manual provided the answer.

Another criticism is the way in which the software commits you to an activity at certain points; we all like an escape key that will get us out of anything.

The third level of search is command driven, QUEST style, allowing any combination of logical search words. A nice touch here is to set up a complex search through the menu and see it displayed as a command line – a valuable teaching aid.

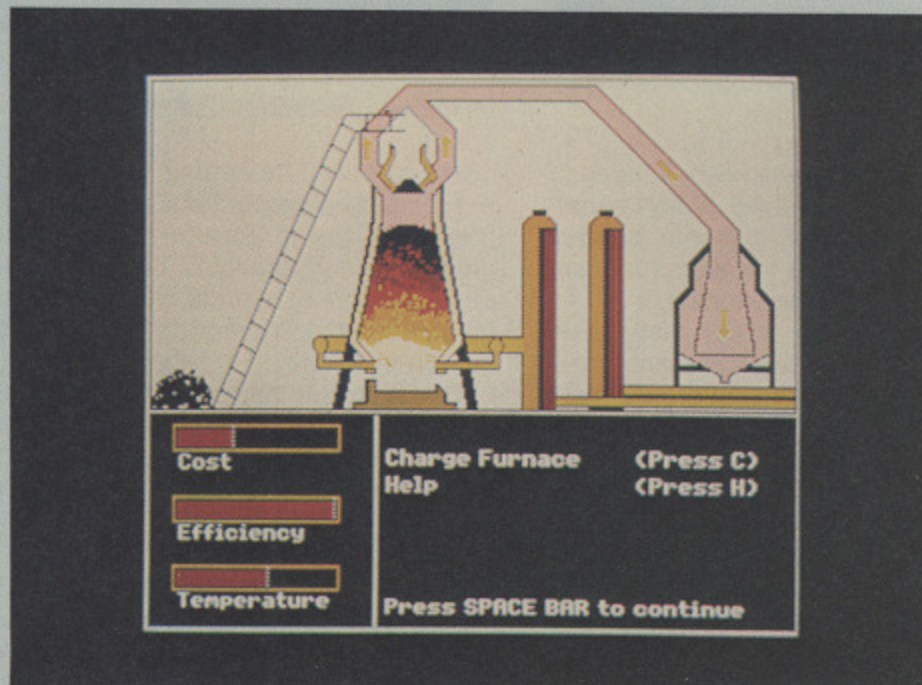
When creating a new data file a wealth of options are available. Along with string and numeric fields there is a set of advanced fields including dependent, tokenised, logical and several other very specific but useful types, all inviting you to do some very clever things.

The real potential of the package is



Place name origins

Key to many facilities



Iron & Steel

revealed in its statistical and graphic capabilities. The statistics menu offers mean, median and standard deviation plus Spearman's rank and chi-square – both powerful tools.

Graphs and charts consist of pie and bar charts, Venn diagrams and scatter-graphs, including line of best fit, but no line graph. All these are very well presented and the printouts (I used an Epson LX86) are a vast improvement on the standard screen dump.

It is the further graphics facilities that seem to promise most but, in practice, may deliver least. The graphics are divided into two parts: Maps and pictures.

Both use the same drawing routine taking input from keyboard, Grafpad or AMX Mouse. Note, for the latter, the AMX rom must be initialised before loading Key.

Pictures may then be drawn and linked to certain records. This sounds like a wonderful idea but, in practice, it takes a deal of time for even a gifted artist to achieve acceptable results with this kind of software, and this is not really very good of its type.

Editing is confined simply to deleting lines and there seems to be no way of

deleting a fill. There also seems to be no way of saving an unfinished picture to be completed later.

Given this, a file on, say, trees could take a child an age to illustrate and still not approach the results they could achieve on paper. But still there are bound to be subjects with graphics simple enough that this would be of use.

Map drawing might seem worthy of the effort because a map can be related to a whole file. Once the map is drawn records can then be given coordinates for that map and their positions displayed.

For instance, using the Placenames datafile available with the package, it is possible to search out all towns with Roman names and plot them on the map.

This adds a spatial aspect missing from most other databases. The problem with this system is simple: The grid referring to the map is not printed on the screen, neither is there a display of the cursor's coordinates while drawing.

Grid references must be estimated and the process of testing each record

EDUCATION REVIEW



Screens from programs using the key



From Page 71

for accuracy would be laborious indeed. This could easily be solved by GSN either through the software or some printed grid – it's a shame to see such an excellent feature go to waste.

It is probably safe to say that these graphics facilities, in their present form, will be of little use to children developing their own files. However, commercially produced files, using better software and expertise, should be able

to make substantial use of the picture option.

Key may well be setting a new standard in what we expect from software. The files produced to go along with it hold great promise. Anglia TV has three due out soon: British birds, sea fish and mammals, and Granada TV is producing one on pond life.

The pictorial aspects should make these databases much more accessible than the screens full of figures many of us are used to. Further, though a little

wishful, this is a package that could take a child from mid-primary to sixth form. And, to cap it all, ITV has added a unique feature that makes the package almost irresistible – the price.

Marshal Anderson

ASSOCIATED PROGRAMS

Product: Placenames

Price: £1.95

Supplier: GSN Educational Software, 214 Stamford Street, Ashton-under-Lyne, Lancashire OL6 7LP.

Tel: 061-339 6635

Product: Iron and Steel

Price: £19.75

Supplier: Mercury Educational Products, PO Box 194, Sevenoaks, Kent TN15 8TZ.

Tel: 0732 883261

Product: Pond Life

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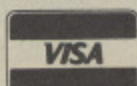
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EDUCATION LETTERS

When to start

IT USED to be Women in Engineering. It still is for that matter but now the cry has gone up: Women in Computing. Everybody seems surprised that girls aren't coming forward into this new growth area. I'm not.

Where are the stereotypes for them to copy? How many women computer studies teachers are there? How many of them are Heads of Departments? How many of them are teaching A Level work? How many of them have been in Industry and have some idea of the demands of the big, bad world?

Where are the TV programmes featuring lady systems analysts? Where are the TV programmes featuring normal reasonably attractive women holding responsible jobs in engineering, science or computing?

I've taught computing in two schools. In both schools when I started the ratio of boys taking the subject to girls was very high. At A level only one girl between the upper and lower sixth in the first school. When I left the ratio was half and half. Interestingly, within weeks of my leaving two of the girls dropped out.

In my present school, the ratio was slightly better than was a female presence in both the upper and the lower sixth. The lower sixth had one of the fair sex among the nine gentlemen. Looking at our provisional lists for next year, the ratio in the coming lower sixth will be almost balanced. We're not absolutely sure of the final numbers yet but it could well end up 50-50 with over 20 students altogether. Furthermore in our new fourth year we'll have marginally more girls studying the subject than boys.

We have no policy on encouraging girls or discouraging them for that matter. The department has three members of staff involved with teaching the subject, two

men and myself. It seems to be enough that there is a woman obviously enjoying computing who, although maybe eccentric, has children, likes animals and who has worked in industry.

My attitude is simply that I don't see why clever women should accept second rate pay or second rate jobs, simply because they are female if they are capable of holding down top-notch jobs and are willing to accept the responsibility and the work.

If we are seriously committed to encouraging girls into computing in anything other than a glorified typist's role then the place to start is in the schools and the need is more women teaching the subject. To meet that need we'll have to encourage specialist training for women teachers interested in returning to work. — **Helen M. Yewlett, Head of Computing Education, Ystalyfera.**

Science line

I WOULD like to inform your readers of a viewdata service we have set up at St. Joseph's Academy Secondary School in South East London. It is called Science Line and is, we believe, the first school-run science based bulletin board. It is also the first school-board in London. Despite our small size we have amassed over 900 pages of news, information and general articles. We have compiled glossaries of most science topics and have established an open forum for scientific discussion, mainly by those in the education field. We feel that in our short existence, the one teacher and four pupils who regularly contribute have achieved our aim of fulfilling the need for a science base, as this is one area

which is missing from Prestel.

Science line is a school-based viewdata system, fully compatible with Prestel terminals (1200/75 band) and is available 24 hours a day on 01-318-3742. — **Darren Marsh, Eltham, London.**

Colour printing

IN the July issue of The Micro User, F. A. Darlington of Birkenhead requested details of a colour Mode 7 dump to a Cannon PJ1080A. I use Dumpmaster from Beebugsoft to do this.

I am currently using AMX Super Art and using Dumpmaster to print the results as the print option in Super Art doesn't work with the PJ1080A.

The only drawback so far is that I have only been able to use the "elastic band" window and this prevents me from printing the larger than screen size pictures that can be created. Have any readers any ideas how I can print the complete picture? — **P.E. Simmonds, London SW14**

Utility programs

IN the June issue of The Micro User, which we receive for our Computer Department library, you have a useful list of roms for the BBC Micro but you didn't mention the CP-Rom produced by Norwich Computer Services, which I find very useful.

May I thank you for the programs you publish, many of which I have found helpful and very impressive. I have recently bought a rom/ram board for my department's machine and seeing your Prommer program I wondered if it could be useful for

Wordwise Plus segment programs. I have managed to cobble together some utility programs for my own use here in school which it would be handy to have on rom rather than on disc.

Once again many thanks. — **T.A. Ford, Head of Economics, Aldenham School, Elstree, Herts.**

● CP-Rom is a utility to use with Wordwise Plus and allows you to handle multi-file documents as if they were one.

Norwich Computers (0603 507057) also produce a rom called Word-Ex, another Wordwise Plus enhancement that gives you many of the features of Interword together with other useful ones.

Unfortunately Prommer is not designed to put Wordwise Plus segments on to rom.

Loading problems

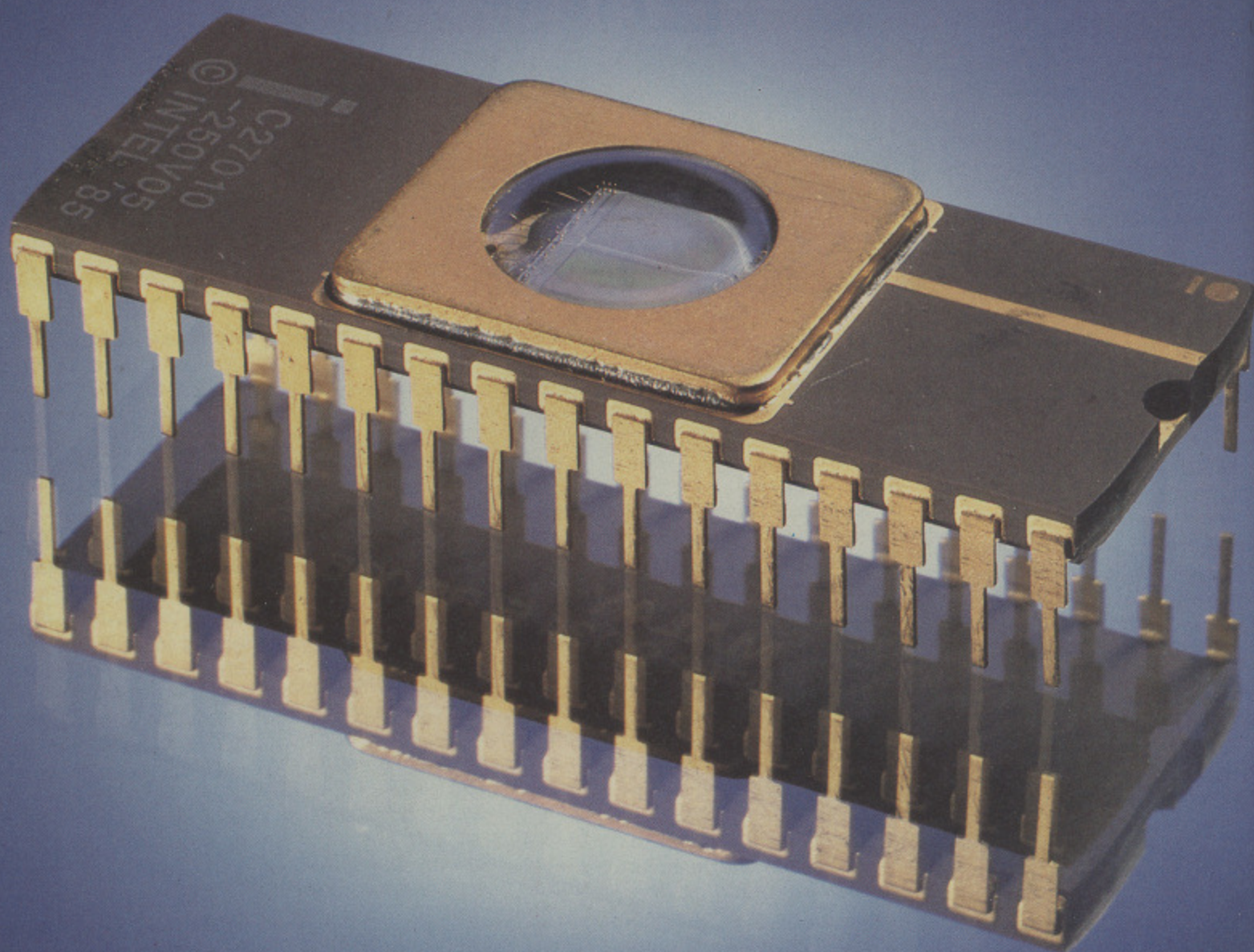
I READ with interest your review of the 'Measure and Tell' package from Clwyd Technics page 70, May 1987. However there was a serious omission from your article: This package will only operate on machines fitted with standard Acorn DFS.

It refuses to load into my machine fitted with double density filing system and displays the unfriendly message "Error 13".

I suspect this is another example of paranoia among software producers attempting to make life rather difficult. — **Julie Sey, Physics Technician, Clarendon School, Trowbridge, Wilts.**

● While it may be software protection it is just as likely to be a non-standard feature of your double density DFS.

As far as we know, Measure and Tell will work with any Acorn standard DFS and not only on ones produced by Acorn.



SPELL *Master* ✓

Spellmaster contains 59,536 separate English words
stored in 131,072 bytes in one chip

- Compatible with all BBC models
- Works with INTER-WORD, WORDWISE PLUS and VIEW
- Checks spelling at up to 10,000 words per minute.
- Checks text as it is entered

SPELL-MASTER ROM

This is the first completely ROM based spelling checker in the world. As a result it out-performs all known spelling checkers on this machine or any other micro-computer. The single 128K EPROM contains over 59,000 separate words and 22K of program.

Compatible with all BBC Micros

Special switching techniques ensure that the 128K ROM appears to the machine as one single 16K ROM - this guarantees that it is completely compatible with the ROM sockets in all versions of the BBC Micro-computer.

Compatible with all the major word processors

SPELL-MASTER has been designed to fully integrate with the most popular word processors on the BBC, WORDWISE and WORDWISE PLUS, VIEW and of course INTER-WORD. While editing in these word processors all that is necessary to control SPELL-MASTER is to press one CTRL key (Usually CTRL-J). This causes a menu to appear listing a variety of options such as 'Check entire text', 'Check word at cursor', 'Continuous check - on/off' etc. Text is checked directly in memory while in the word processor. There are even short-cuts to the menu, for example, pressing CTRL-V in any of the above word processors will start checking the text immediately from the current cursor position. Compare this with the process of checking text in the most highly rated competitive product - VIEWSPELL.

VIEWSPELL	SPELL-MASTER
<ul style="list-style-type: none">• Save text from word processor.• Enter spelling checker.• Load text into spelling checker.• Check the text.• Go back to word processor.• Load marked text.• ...finally, make corrections.	<ul style="list-style-type: none">• Press CTRL-V• make corrections.

Check entire text

In a word processor, SPELL-MASTER can check at up to 10,000 words per minute. Whenever a word is indicated as misspelt the user is given three simple choices. Replace the word with another selected from the dictionary, ignore the word altogether or add it to a user dictionary.

Check as you type

Because the dictionary is ROM based it is possible to check words as they are typed. This feature works with all the above named word processors and does not slow the operation of the word processor at all. Whenever an

incorrect word is entered the computer will beep; the word may then be corrected or simply ignored.

User Dictionaries

SPELL-MASTER supports extensions to the main dictionary in sideways RAM or ROM. This has the advantage that there is no speed degradation when checking against user dictionaries, since there are no disc accesses required at all. Once a word is added to a user dictionary it is treated as if it is present in the main dictionary.

SPELL-MASTER can support a number of separate dictionaries at once, each sideways RAM or ROM holding up to 3000 additional words. Once a dictionary has been created it can be 'burned' into an EPROM to form a permanent extension to the main dictionary.

Provision is made for editing any dictionary extension, for adding or deleting words in bulk, and directly loading or saving user dictionaries from or to sideways RAM.

Additional star commands

These can be issued from any language ROM such as spreadsheets or BASIC (they can even be included into BASIC programs). Some of the 8 commands are:

***CROSSWORD** - Will search the entire dictionary for words that exactly fit the search pattern. For example *CROSS. ##M#U#ER would list ARMOURER, COMMUTER, COMPUTER. It takes about 8 seconds to check against all 59,000 words.

***ANAGRAM** - Will list all the words in the dictionary that contain the same letters as those specified.

***FUZZY** - Will list all words that sound something like the one you are searching for. If you are not sure of the spelling of a word then entering the approximate spelling here will generally list the word you are looking for.

Price: £59.00 incl.

Upgrades

Owners of the older two chip versions of SPELL-MASTER can upgrade to the single chip version for £25.00. However this new version is functionally equivalent and so it should not be necessary to upgrade.

2nd processors

Due to its unique design SPELL-MASTER will not work with word processors running on the 6502 2nd processor, although there are facilities provided for checking long text files.




Computer Concepts



Gaddesden Place, Hemel Hempstead, Herts HP2 6EX Telephone: (0442) 63933

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE

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

305 Edgware Road, London W2 Tel: 01-723 0233

BBC MASTER SERIES

AMB15 MASTER (see page 6 for details of bundled software included in the price)	£395 (a)
AMB12 MASTER ET	£315 (a)
AMCO6 Turbo 65C02 Module	£99 (b)
ADC08 512 Processor	£195 (b)
ADF14 ROM Cartridge	£13 (d)
ADF10 Econet Module	£41 (c)
ADJ22 Ref Manual	£14 (c)
ADJ24 Adv	
Part 1	£14 (c)
BBC Master	£19.50 (c)
Dust Cover	£10 (d)
Viewsheet User Guide	£10 (d)

MASTER ROM/RAM CARTRIDGES

TRC1 Two rom cartridge	£8.95 (d)
TRC4 Four rom cartridge	£11.95 (d)
TRC 32K Cartridge inc RAM	£29.95 (d)

BBC MASTER COMPACT

See page 6 for free bundled software

SYSTEM 1 128K, Single 640K Drive & bundled software.	£299 (a)
SYSTEM 2 System 1 with a 12" Hi Res Monochrome Monitor.	£349 (a)
SYSTEM 3 System 1 with a 14" Med Res RGB Monitor.	£489 (a)
Second Drive Kit.	£99 (c)
Serial Kit.	£29 (d)
T.V. Modulator	£29 (d)
Extension cable for external 5.25" 80T Drive.	£12.50 (d)
Mertec Adaptor (Upgrades to almost master level)	£35 (c)

UPGRADE KITS

1.2 OS ROM	£15 (d)	ADFS ROM	£26 (d)
DNFS ROM	£17.50 (d)	1770 DFS Kit	£43.50 (d)
BASIC II ROM	£22.50 (d)	Econet Kit	£55 (d)

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)		

ACW/CO-PROCESSOR

For full specification see page 5	
32016 Co-processor	£999 (a)
Cambridge Workstation	£3450 (a)
X25 Gateway	£2175 (b)

PANOS/PANDORA Upgrade incl 32000 BASIC FP.	£29 (d)
Co-Processor upgrade to 10 MHz operation for faster processing.	£POA (d)
Time Warp Real Time Clock with utilities for reading time and date in PANOS (for model B and B+ users).	£39 (c)
32016 Instruction Set Manual.	£25 (c)

TELETEXT ADAPTOR

Converts your computer into a teletext receiver.	£95 (b)
BBC Publications rom for enhanced Teletext Utilities.	£7.95 (d)

WINCHESTER DRIVES

P20HD TECHNOMATIC 20 Mbyte Winchester Drive	£529 (a)
P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM	£859 (a)
P204HP TECHNOMATIC 20 Mbyte Winchester and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom.	£769 (a)
P2041HT As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom.	£1295 (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)
Special adaptor for S.J. File Server Enquire for larger capacity Winchester.	£28 (d)
WINCHESTER Drive Multiplexer	
TWM2 for two computers.	£99 (b)
TWM4 for four Computers.	£159 (b)

SECOND PROCESSORS

Universal 2nd Processor Adaptor	£75 (b)
TORCH ZEP100	£229 (a)
MULTIFORM Z80	
TECHNOMATICs multi format Z80 system includes a FREE Pocket Wordstar + MS/DOS Read/Write Utility	£289 (b)

ACORN IEEE INTERFACE

Allows BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard. The interface can link upto 14 compatible devices. Typical applications are in experimental work in academic and industrial labs.

£265 (a)

PRINTERS

EPSON LX800 150 cps, variety of fonts, including NLQ, bit image graphics, IBM char/graphics compatible, centronics interface and tractor feed as standard	£229 (a)
EPSON FX800 An enhanced version of FX85. Call for details.	£329 (a)
EPSON FX1000 An enhanced version of FX105. Call for details.	£449 (a)
EPSON EX800 Colour option for EX800/EX1000.	£409 (a)
EPSON LQ800	£59 (b)
EPSON LQ1000 As LQ800 but wide carriage for 136 columns.	£439 (a)
TAXAN KP815 Enhanced KP810 with 160cps and full IBM compatibility.	£589 (a)
TAXAN KP915 Enhanced KP910 with 180cps and full IBM compatibility.	£269 (a)
	£369 (a)

NATIONAL PANASONIC

KX P1081	£159
STAR NL 10 (Parallel Interface)	£209
STAR NL 10 (Serial Interface)	£279
INTEGREX Multicolour Inkjet printer. Ideally suited for high res colour VDU screen dumps. Quietness & consistent output are major characteristics. BBC Screen dump for Integrex.	£549
BROTHER HR20 A new attractively styled printer from Brother with unusually quiet operation, host of new features, including option to copy current documents. 8K buffer standard expandable to 16K. Parallel & Serial ports as standard.	£525
NAT PANASONIC KX P3131 Daisy wheel printer with 38K buffer, 17 cps, bi-directional, parallel interface	£15.25" D800
JUKI 6100 Daisy wheel printer 15 cps, 2K buffer, switchable 10/12/15 cpi proportional spacing, underlining. Parallel interface.	£349

PLOTTERS

HITACHI 672	£495
LINEAR GRAPHICS Full range of accessories available for plotmate plotters	
A4S PLOTMATE	£370
A4SM PLOTMATE	£450
A3M PLOTMATE	£569
<i>(Enquire re educational prices for the Linear Graphics plotters)</i>	
Parallel Printer Lead (1.2m).	£6.45 40"
Serial Printer Lead (1.2m).	£7.46 80"

PRINTER SHARERS & BUFFERS

BUFFALO PB Buffer Parallel buffer for internal fitting to most Epson printers. Simple to instal. PB128 (128K)	£90
PERIPHERAL & COMPUTER SHARE High quality switches to allow the user to switch between computers, printers, modems etc. shielded metal cases, all lines fully switched.	
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3 Computers to 1 Printer 36v36-3	£69(c)
4 Computers to 1 Printer 36v36-4	£85(c)
2 Computers 2 Printers X-over 36v36-x	£69(c)
BBC Cable set 3 to 1 (1m ea)	£32(d)
BBC Cable set 4 to 1 (1m ea)	£39(d)
BBC Computer Sharer: TCS26 1 computer to 2 printers fitted with BBC cable	£22
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TM Version plus Mouse	£105 (c)
Plotter Driver Generator	£25 (d)
MOUSE	
AMX MOUSE with SUPER ART	£63 (d)
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(utility for the Pagemaker)	£21 (d)
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RB2 Tracker Ball with Icon Master	£59 (c)
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RB2 Tracker Ball with Cursor Control Rom	£59 (c)
(for Master only)	
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
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MIRRORSOFT FLEET STREET EDITOR incl VAT	£39.50 (d)

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ASHTON TATE's DBASE II	£310 (a)
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Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

All software supplied by us is known to operate with the appropriate Acorn Disc filing systems. We cannot comment on their use with other DFS systems.

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VIEW INDEX	£12 (d)
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DOT PRINT PLUS	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
WYSIWYG PLUS	£21 (d)
SPELLMASTER	£49 (d)

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(If you own a WW+ then quote your reg number and pay £39).

WORDEASE	£24 (d)
SPELLCHECK III	£31 (d)
EDWORD II	£43 (c)
SPREADSHEETS	
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INTERSHEET	£39 (d)
INTERCHART	£27 (d)
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For B & B+ 40T or 80T	£14.75 (d)
For Master 80T	£17.30 (d)
For Compact	£19 (d)

MINI OFFICE II ROM Version

For Master, Compact, B+ & B	£48 (c)
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LANGUAGES

META ASSEMBLER	£145 (b)
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MACROM	£33 (d)
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SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
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ACORN GXR GRAPHICS ROM	£24
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PRINTMASTER	£24
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Two Roms + Cassette	£26
ADV TELETEXT UTILITIES ROM	£7.95

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A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom study by moving and colourful displays helping in understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

ASTRONOMY	£11
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PICTURE CRAFT Disc	£17
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MATHS WITH A STORY 2 Cass	£8
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ELECTRIC FIELDS	£10.50
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ADVANCED STUDIES: GEOGRAPHY	Cass £10
INSIDE INFORMATION Prog Cass	£10
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Book	£8

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S.T.:BONDING	Disc £14
S.T.:ELECTROMAGNETIC SPECTRUM	Disc £14
S.T.:ELECTRONICS IN ACTION	Disc £14
S.T.:NEWTON & THE SHUTTLE	Disc £19
S.T.:ECOLOGY	Disc/EC £19
S.T.:POLYMERS	Disc/EC £19
S.T.:CLASSIFICATION & PERIODIC TABLE	Disc £20
S.T.:FOOD & POPULATION	Disc £20
SEC.SCIENCE	
MICROTECHNOLOGY	Cass £7
SEC.SCIENCE:THE MOLE CONCEPT	Disc/Aud/EC £16

GENERAL

VU-TYPE PROFESSIONAL	Disc £19
WHITE KNIGHT MK II (for compact)	Disc £16
BATTLEFIELDS	Cass £8.50
A VOUS LA FRANCE	Cass/EC £17
Book	£5.25
Audio Cassettes	(2) £7.50
Additional charges for discs	£9.00
DEUTSCH DIREKT Disc/aud/EC	£16
Book	£5.95
MODEM MASTER	£11



Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.

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PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces:

8143 RS232	£30 (d)
8148 + RS232 + 8K	£65 (d)
8165 IEEE + Cable	£65 (d)
8132 Apple II	£60 (d)
8177P NLQ for FX80 + /FX100 +	£99 (d)

Parallel & Serial Buffers of various size also available.

FX80/80 + /85 Tractor Attachment	£29 (c)
LX80/86 Tractor Feed	£21 (c)
LQ800 Tractor Feed	£47 (b)
LQ1000 Tractor Feed	£52 (b)
EX800/1000 Colour option	£59 (b)
HI80 HP GL Emulation Rom + Ram	£63 (c)
HI80 Printer Emulation Rom	£38 (c)

SHEET FEEDERS:

8338 LX80	£52 (b)
8333 FX100 + /105	£169 (a)
8331 FX80 + /85	£129 (b)
LQ800	£135 (b)
LQ1000	£179 (b)
EX800	£135 (b)
EX 1000	£309 (b)
FX 800	£135 (b)
FX 1000	£179 (b)

Ribbons:

RX/FX100/100 +, FX105	£7 (d)
RX/FX80/80 +, FX85	£4 (d)
LX80	£4.50 (d)
LQ800	£8.50 (d)
LQ1000	£10 (d)
EX800/1000	£7.50 (d)
HI80 Pen Set (Aqueous/Ball point)	£8.25 (d)

Dust Covers:

FX80	£5.50 (d)
TAXAN/Canon KP810	£6 (d)
FX100	£7.50 (d)
KP910	£7 (d)

HITACHI 672 Plotter

Aqueous Pen Set six pens	£18.50 (d)
Oil Based Pen Set six pens	£25.00 (d)

TAXAN CANON Accessories:

RS232 + 2K interface	£63 (d)
Ribbon, KP810/815/910/915	£6 (d)
Star Printer	
NL10 Sheet Feeder	£52 (b)
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NL10 IBM Type Interface	£39 (c)
NL10 Ribbon	£4.50 (d)

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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 Model B+	Turbo coprocessor
BBC Master 128	All printers (Except lasers)
BBC Compact	

WYSIWYG PLUS workspace is relocatable.

WINDOWMATIC

All users of Acorn's **VIEWSHEET** spreadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in up to 10 separate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although **VIEWSHEET** allows configurations to be saved to the media, it does not have provision for deciphering them.

WINDOWMATIC has been produced with the intention of rectifying these shortcomings and to bring out the very best from **VIEWSHEET**.

WINDOWMATIC provides a quick and easy

way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate graphic representation of the screen and printer output.

The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.

WINDOWMATIC is compatible with BBC Master and BBC B+. A 6502 2nd processor must be fitted to a model B to run Windowmatic. Windowmatic is fully compatible with Turbo and 6502 2nd processor.

The program is supplied on disc with a comprehensive manual.

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"Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, 'the best on the market'." A&B Computing August 1986

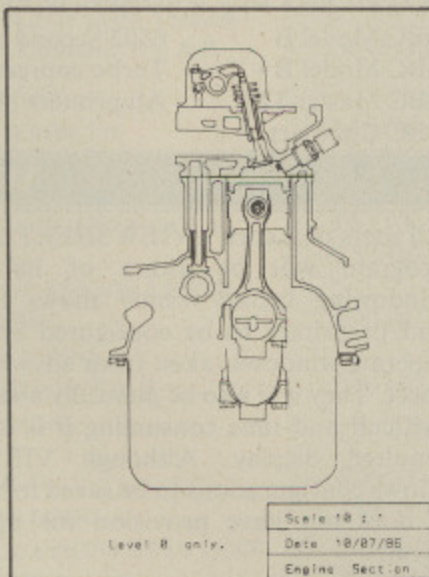
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NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects,

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NOVACAD'S MAJOR FEATURES

- * Simple and easy to use with logical command sequence.
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- * Text entry at any 90° orientation at any position on the screen.
- * Create multi layer drawing with 8 levels available.
- * Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
- * Printer routine for Epson 80 and 136 column printers.
- * A unique optional facility to output to any BBC compatible plotter.
- * Cursor control from keyboard, tracker ball or mouse.



NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.

MINIMUM HARDWARE REQUIREMENTS

- Any BBC range computer with Acorn DFS.
- 40 Track single sided single drive.
- Epson compatible dot matrix printer.

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC+ or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like Epson HI 80, Hitachi 672, Plotmate, Penman and HP GL. This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

ROUTCAD, an optional software package for our Graphics Workstation allows for production of shapes drawn using NOVACAD in 3D on suitable material and is ideal for a range of applications including template making and model building.

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A powerful eprom programmer for use with the BBC Master. It offers the latest 'state of the art' programming techniques to provide fast and efficient operations.

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 1 MHz 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.

The single rail eproms handled by the EpromRyter are:

- 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
- One time eproms P27XXX, 87CXXX etc.
- Also A suffix eproms such as 27XXXXA

EPROMER II

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.

The main features of the programming software are:

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- * Multiple loading for ROM Filing System

Some of the above features apply to Master Computers only

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with any new processor... as new instruction sets can be added... as needed
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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 AO, \$1000 for 68000 etc.
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- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
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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):

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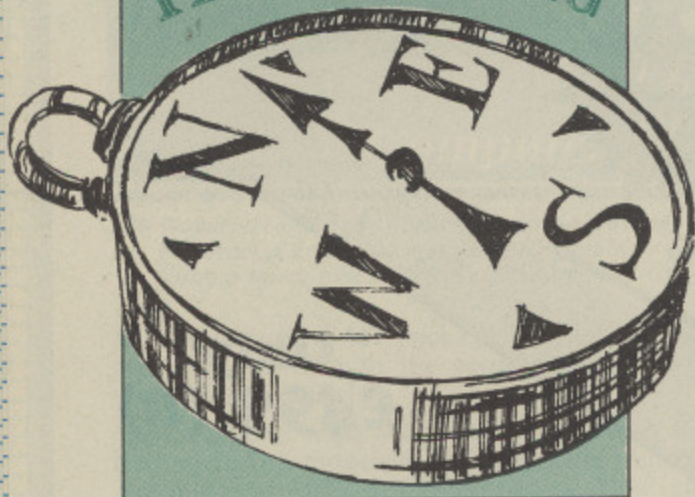
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ADVENTURE PROGRAMMING



Garbage in, garbage out

WRITING a good, saleable adventure is not beyond the realms of possibility. It is good to have a goal to aim at, and in the case of BBC adventures that goal has to be Level 9, purveyors of excellent puzzles to the masses.

I'm not saying that your first adventure will have Pete Austin and company scrambling to sign you, but with care and patience it's possible to produce something that even the Mad Hatter might salute.

Without further ado let's move on to the first step. Or rather, the middle step in our overall scheme — accepting the player's input and checking it. For this we need an input routine and a parser.

According to my Oxford English dictionary a parser resolves a sentence into its component parts and describes them.

The parser is probably the most important part of an adventure, since it provides the all-important link between player and program. It analyses what the player has typed in and converts it to a series of words and numbers that the main program can understand and work with.

Some adventures have parsers of astonishing complexity. You know the sort of thing: *Insert the yellow plug into the green socket and store under the red book next to the cupboard.* Then you type in *Climb wall* and you're told it doesn't know what a wall is.

You can make too much of the parser and any adventure that involves typing a sentence as complex as *Insert the yellow plug...* will require so much twisting of words as to make the game nearly impossible to solve. What would happen if you had typed *Insert the yellow plug into the green socket and store it under the red book next to the shelf?* Adventure impossible probably.

On the other hand the traditional VERB ... NOUN school of parsers has been left behind — it is 10 years old after all — and if a program is so restricted then a lot of time will be spent searching for an exact

In the second part

of his series

Pete Gerrard shows

how to accept the

players' instructions

word in order to solve a problem.

You know that you want to slide the key under the door, but how can you tell the computer in two words? Tricky. For the sake of this program we've settled on a parser that will understand VERB ... NOUN, will take out extraneous noise

words like *a* and *the*, but will also understand something like *Slide the key under the door* or something similar.

A simple sentence will obviously be sorted out faster than a more complex one, but even the most convoluted of inputs is resolved pretty quickly. If you decide to allow multiple inputs, then the time taken per word decreases.

Before starting to take a sentence to pieces, however, we will need something to type it in, and this is where Listing 1 comes in.

This shows us PROCinput, which allows the player to type a maximum of 75 characters, and stops him from typing anything that we don't allow — he can only use A to Z, Space, Return and

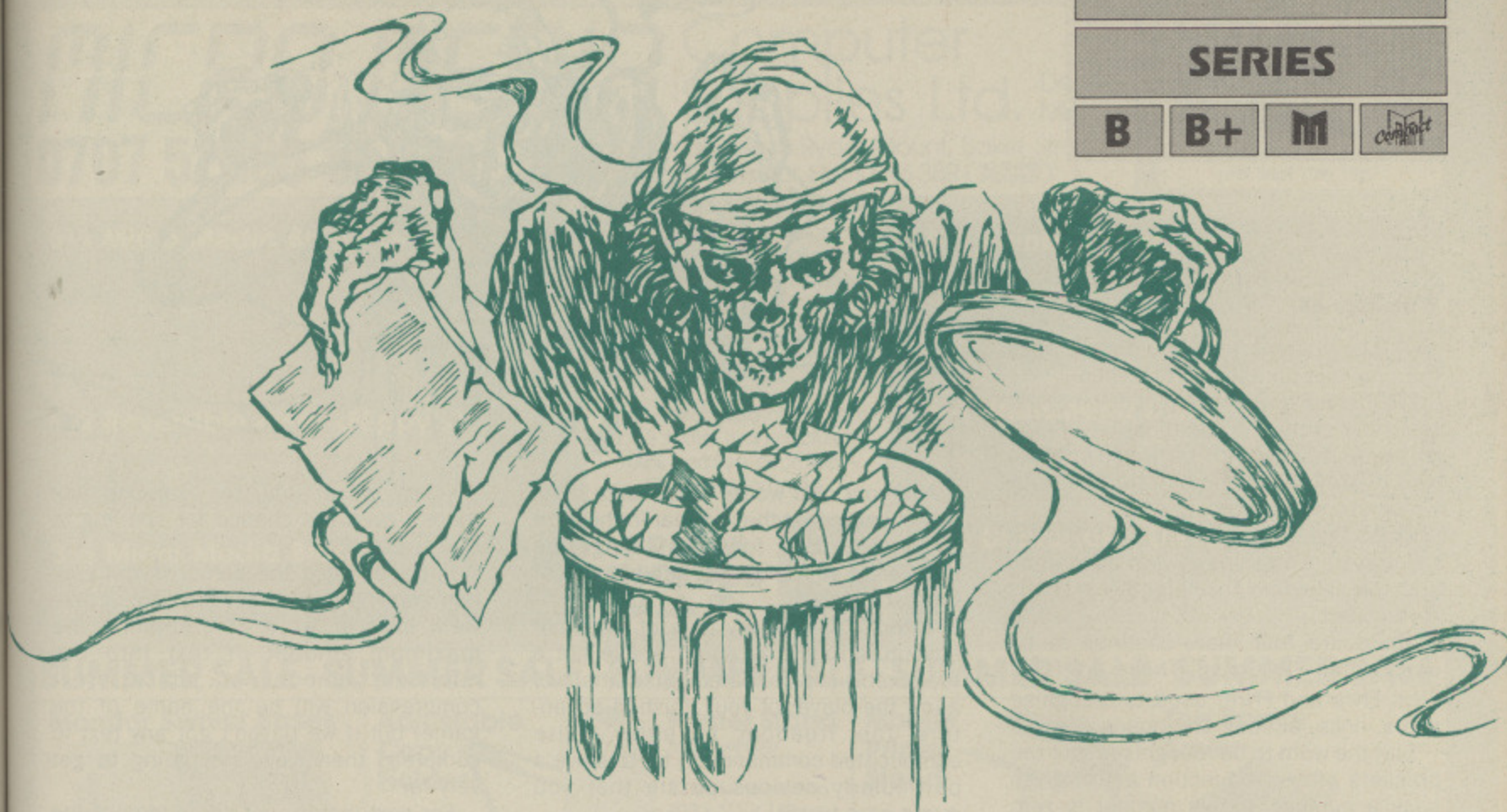
Listing 1

```
0 REM Adventure Game
1 REM by Pete Gerrard
2 REM (c) Micro User
3 REM =====
4 PROCinit
10 REPEAT
20 PRINT?";PROCinput:PRINT cm$
90 UNTIL FALSE
150 DEF PROCinit
151 alf$="ABCDEFGHIJKLMNOPQRSTUVWXYZ
cdefghijklmnopqrstuvwxyz"
152 cm$=STRING$(75," "):cm$=":it$=""
154 ENDPROC
5900 DEF PROCinput
5901 cm$="":LOCAL LX,Z%,a$
5902 REPEAT a$=alf$:LX=LEN cm$
5903 IF LX>0 a$=a$+" "+CHR$(13)+CHR$(127)
5904 IF LX>74 a$=CHR$(13)+CHR$(127)
5905 REPEATZ%=INSTR(a$,GET$):UNTILZ%>0
5906 Z%=ASCID$(a$,Z%):IF Z%>13 VDUIZ%
5907 IF Z%=127 cm$=LEFT$(cm$,LX-1) ELSE
IF Z%>13 cm$=cm$+CHR$(Z%)
5908 IF Z%=44 cm$=cm$+" ":PRINT " ";
5909 UNTIL Z%=13:cm$=FNup(cm$)
5910 IF RIGHT$(cm$,1)<>" " cm$=cm$+" "
5911 PRINT":PROCstrip:ENDPROC
5950 DEF FNup(S$700):LOCAL B$,P%
5951 B$=8700:FOR P%=B$ TO B$+LENSB$-1
5952 IF ?P%>96 ?P%=?P%AND&DF
5953 NEXT:=SB$
```

```
5980 DEF PROCstrip:LOCAL P%,Q%
5981 pk$="":REPEAT w$=FNw(cm$)
5982 IF P%=0 UNTIL TRUE:cm$=pk$:ENDPROC
5983 IF w$="A" OR w$="AN" OR w$="THE" O
R w$="TEH" ELSE pk$=pk$+w$+" "
5984 IF w$="TEH" PRINT"I assume 'teh' m
eans 'the'"
5985 UNTIL FALSE:ENDPROC
5990 DEF FNw(L$):REPEAT Q%=P%+1
5991 P%=INSTR(L$," ",Q%)
5992 w$=MID$(L$,Q%,P%-Q%)
5993 UNTIL w$>" " OR P%=0:=w$
```

✓ Get it right!

0 = 00	5901 = A1CE 7	5952 = E4C 6
1 = 00	5902 = 8DA7 0	5953 = DF3B A
2 = 00	5903 = 7B8B B	5980 = 6F3 6
3 = 00	5904 = 697A 2	5981 = C963 B
4 = DEBB B	5905 = 672E 1	5982 = 9E11 9
10 = BFBA 9	5906 = 7792 4	5983 = 1719 9
20 = B5FC A	5907 = 79D7 8	5984 = 793B 6
90 = 226C E	5908 = 37FA 9	5985 = CAFF 8
150 = 40D7 4	5909 = 6CAC D	5990 = 31E6 1
151 = 120F C	5910 = 4E58 6	5991 = 2822 4
152 = EF91 D	5911 = 094 1	5992 = 6DAF 3
154 = ED0F 8	5950 = C0C0 1	5993 = D146 1
5900 = 4F14 4	5951 = 95FC A	



Delete. At the moment Escape will still work, but worry about that when the program is finished. In addition notice that the line numbers are not continuous so that we can slot different parts of the program in later.

If you don't like line numbers type the program into a word processor without the line numbers and put:

```
*BASIC
AUTO
```

at the top. For full details of this method read the *Basic Process* article in the July issue of *The Micro User*.

Line 5900 is obviously the start of the routine and our sentence will be contained in the string variable *cm\$*, suitably set to null (nothing, empty) in line 5901.

Lines 5902 to 5904 set up variable *a\$* to contain those characters which are allowable depending on various conditions given in Table I.

Then line 5905 keeps looping until the key that is pressed (GET\$) is contained in the variable *a\$*. The function INSTR searches through the first string between the brackets looking for the second string, and puts a number into *Z%* depending on where the second string was found or zero if it wasn't found, see Table I.

Line 5907 removes the last character

typed from *cm\$* if the player has typed Delete and adds it if it's not Return. At line 5908 an extra space is added if the player typed a comma. Although this looks tidy and is, of course, proper convention, it is also vital.

There has to be a space between words otherwise the word splitting routine can't tell where one word ends and the next begins.

Finally, check whether the player typed Return. If so leave the main loop, convert the whole string to upper case (FNup), add a space to the end of the line (for the word splitting routine again). Print up a full stop, strip out any noise words (PROCstrip) and exit this routine.

Now save this program because all the later listings will slot into and around it. The program shown allows you to experiment with inputs to check that what you've done works.

You can extend PROCstrip to make further spelling error checks. Having now got our sentence into *cm\$* it's time to do something about it.

Before we can run or even write our parser we need to decide what format the sentences come in. Reasonably complex sentences can be understood, and this works by breaking the sentence into four components.

We need a verb, since we won't get anywhere without one and must allow

single word entry – *inventory*, *look*, *north* and so on (of course, *north* isn't really a verb but it is used like one in adventure games).

We need to be able to manipulate nouns with our verbs, as in *open door*. As a next stage we would like to cope with things such as *look under the door*, where *under* is grammatically called a preposition, but I call it a link word.

Finally there is *look in the blue cupboard*, where *blue* is technically an adjective, but I call it an action word in the Gerrard Adventure terminology.

A short list of words is needed to test our parser. Lines 100 to 140 in Listing II, set up the arrays containing the data. In the data, the number specifies the number of words following and there are the four groups of words.

Notice how all the directions appear in both verb list and noun list. This is so you can have such things as *run north* or *creep quietly down*.

The words given here crop up in most games, apart from the action words perhaps, which proves that you don't need to know what your adventure is about before starting.

Away you go and type in Listing II, we've given the checksums for this section so you can get it right.

PROCanalyse is very short (only lines 5000-5005). It sets the E% flag (it specifies whether to end or not) then prints up the ? to show that the program is waiting for input.

The input is accepted using PROCinput, and then each phrase (verb – link – action – noun) is extracted (using FNp) and processed in PROCchkp. This is repeated until there are no more phrases to be checked.

Routine FNp scans through the sentence looking for commas and the word

Characters input	Result
0	Allow any letter, but not Return, Delete, space or comma.
1-74	Allow any letter, plus Return, Delete, space and comma.
75	Allow only Return or Delete.

Table I: Allowable inputs

◀ From Page 83

AND. Each time it finds one it gives back the previous phrase to PROCchkp.

PROCchkp is where we get down to the real nitty-gritty, *P\$* contains the phrase to be analysed, and the four variables which are going to contain the four words are set to null.

There is a little check at line 5204 for the players who ask awkward questions. You can also do a check for swear words if you want.

There are four more routines to be used within PROCchkp. These are FNrv, FNrl, FNra and FNrn, used to recognise verbs, links, actions and nouns.

Slot the word to be recognised into the brackets after the function and it gives back a number. If this number is zero then the word is not recognised, otherwise it is the number of the word in the array. For example:

```
PRINT FNrv("TAKE")
```

will print the number 15. Whereas:

```
PRINT FNrv("CHEW")
```

will print zero. Each section of PROCchkp looks at the current word. If it recognises it the next word is taken up, otherwise the same word is passed on to the next section.

Finally if the word is completely unrecognised a suitable message is given.

Line 5212 deserves special attention because it allows the following type of sentence:

Pick up the metal bucket and throw it

In line 5212 the word *it* is replaced by the last mentioned noun, or if there wasn't a previously mentioned noun an appropriate message is delivered.

Most adventures allow you to type abbreviations for words *n* for *north* and *t* for *take*, and this is no exception. Each of the recognition routines compares only the characters that have been supplied by the player.

If the player provides the first three letters, only the first three will be compared. Obviously the player must be very careful when *d* can be either *down* or *drop*. It depends on which word is found first.

We end up having reached the stage where our sentence now consists of at least a verb, possibly a link word, an action word or a noun, or a combination of them.

Save all this program, and test by running. Type in simple sentences at first then go on to the more complex ones. The addition to line 5003 prints out each phrase after it has been analysed so that you can see what the computer has come up with.



Add your own words to the data lists, making sure that they appear in the right group, and don't forget to change the number of words at the beginning of the data blocks.

Without having any idea of what our adventure might be about, we've got a reasonably sophisticated parser that will allow the player of your finished adventure the freedom to enter quite complicated commands to try to solve a particularly devious puzzle that you might care to set.

The player can enter multiple commands and let the computer get on with it, or he can stick to VERB ... NOUN if he wants. Abbreviations are available for

the lazy player (me, for example) and there's even the chance for spelling to be corrected.

But expanding the parser is not your homework this time. In the next article we'll look at ways of cramming the maximum amount of text into the minimum amount of space. Text compression will be the name of the game, but if we haven't got any text to compress then we're not going to get very far.

For next month, get some idea of the adventure scenario (very simply, of course) and we'll see how much we can cram into the BBC Micro without it protesting too much.

Listing II

```
0 REM Adventure Game
1 REM by Pete Gerrard
2 REM (c) Micro User
3 REM =====
4 PROCinit:PROCdata
10 REPEAT
20 PROCanalyse
90 UNTIL FALSE
100 DEF PROCdata
101 READ nv%:DIM vb$(nv%)
102 FOR I%=1 TO nv%:READ vb$(I%):NEXT
103 READ nL%:DIM li$(nL%)
104 FOR I%=1 TO nL%:READ li$(I%):NEXT
105 READ na%:DIM ac$(na%)
106 FOR I%=1 TO na%:READ ac$(I%):NEXT
107 READ nn%:DIM no$(nn%)
108 FOR I%=1 TO nn%:READ no$(I%):NEXT
109 ENDPROC
110 DATA 20,NORTH,SOUTH,EAST,WEST,UP,D
OWN,SCORE,QUIT,INVENTORY,LOOK
111 DATA WAIT,EXIT,OPEN,CLOSE,TAKE,DRO
P,EAT,GO,EXAMINE,JUMP
120 DATA 10,UNDER,OVER,INTO,ONTO,BY,IN
,AT,ON,BY,THROUGH
130 DATA 10,RED,BLUE,YELLOW,GREEN,COLD
,HOT,ROUGH,SMOOTH,CLEAN,DIRTY
140 DATA 10,NORTH,SOUTH,EAST,WEST,UP,D
OWN,DOOR,CUPBOARD,KEY,RING
150 DEF PROCinit
151 aL$="ABCDEFGHIJKLMNPOQRSTUVWXYZab
cdefghijklmnopqrstuvwxyz"
152 cM$=STRING$(75,""):cN$="":it$=""
154 ENDPROC
5000 DEF PROCanalyse:LOCAL P%,Q%,EX
5001 REPEAT EX=FALSE
5002 PRINT"?":PROCinput
5003 REPEAT PROCchkp(FNp):PRINTvb$SPC11
i$SPC1ac$SPC1no$
5004 UNTIL P%=0:UNTIL NOT EX
5005 ENDPROC
5100 DEF FNp:P$=""
5101 REPEAT w$=FNw(cM$):i$=RIGHT$(w$,1)
5102 IF i$="," w$=LEFT$(w$,LENw$-1)
5103 IF w$="AND" ELSEIF w$>" P$=P$+w$+
5104 UNTIL i$="," OR w$="AND" OR P%=0
5105 =P$
5200 DEF PROCchkp(P$)
5201 vb$="":li$="":ac$="":no$=""
5202 IF P$="" ENDPROC
5203 LOCAL P%,Q%,w$=FNw(P$)
5204 IF w$="WHY" OR w$="WHERE" PRINT"fi
nd out for yourself!":EX=TRUE:ENDPROC
5205 F%=FNrv(w$):IF F%=0 PRINT"Sorry,
w$ is not a verb.":EX=TRUE:ENDPROC
5206 vb$=w$:vb%=F%:IF P%=0 ENDPROC
5207 w$=FNw(P$):F%=FNrl(w$)
5208 IF F% li$=w$:li%=F%:IF P%=0 ENDPRO
C
5209 IF F% w$=FNw(P$)
5210 F%=FNra(w$):IF F% ac$=w$:ac%=F%:IF
P%=0 ENDPROC
5211 IF F% w$=FNw(P$)
5212 IF w$<>"IT" it$=w$ ELSEIF it$>" w
$=it$ ELSE PRINT"what is 'it'?":EX=TRUE:
ENDPROC
5213 F%=FNrn(w$):IF F% no$=w$:no%=F%:EN
DPROC
5214 PRINT"Sorry, I don't understand "
w$":EX=TRUE:ENDPROC
5300 DEF FNrv(w$):L%=LENw$:F%=0
5301 FOR I%=1 TO nv%:B$=vb$(I%):K%=LENB
$
5302 IF L%<=K% IF INSTR(B$,w$)=1 F%=I%:
I%=nv%
5303 NEXT=F%
5310 DEF FNrl(w$):L%=LENw$:F%=0
5311 FOR I%=1 TO nL%:B$=li$(I%):K%=LENB
$
5312 IF L%<=K% IF INSTR(B$,w$)=1 F%=I%:
I%=nL%
5313 NEXT=F%
5320 DEF FNra(w$):L%=LENw$:F%=0
5321 FOR I%=1 TO na%:B$=ac$(I%):K%=LENB
$
5322 IF L%<=K% IF INSTR(B$,w$)=1 F%=I%:
```

Turn to Page 86 ▶

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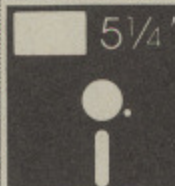
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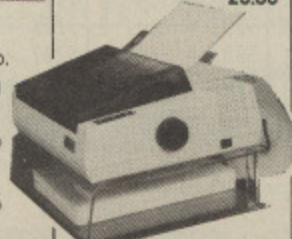
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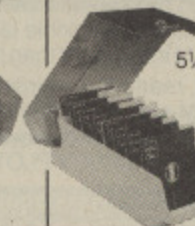
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SERIES

◀ From Page 84

```

I%=na%
5323 NEXT:=FX
5330 DEF FNrn(w$):L%=LENw$:F%=0
5331 FOR I%=1 TO nn%:B$=no$(I%):K%=LENB
$
5332 IF L%<K% IF INSTR(B$,w$)=1 F%=I%:
I%=nn%
5333 NEXT:=FX
5900 DEF PROCinput
5901 cm$="":LOCAL L%,Z%,a$
5902 REPEAT a$=a+f$:L%=LEN cm$
5903 IF L%>0 a$=a+f$, "+CHR$(13)+CHR$(127
5904 IF L%>74 a$=CHR$(13)+CHR$(127
5905 REPEATZ%=INSTR(a$,GETS):UNTILZ%>0
5906 Z%=ASC MIDS(a$,Z%):IF Z%>13 VDUZ%
5907 IF Z%=127 cm$=LEFT$(cm$,L%-1) ELSE
IF Z%>13 cm$=cm$+CHR$(Z%)
5908 IF Z%=44 cm$=cm$+":PRINT ";
5909 UNTIL Z%=13:cm$=FNup(cm$)
5910 IF RIGHT$(cm$,1)<>" " cm$=cm$+" "
5911 PRINT".":PROCstrip:ENDPROC
5950 DEF FNup($8700):LOCAL B%,P%
5951 B%=&700:FOR P%=B% TO B%+LEN$B%-1
5952 IF ?P%>96 ?P%=?P%AND&DF
5953 NEXT:=B%
5980 DEF PROCstrip:LOCAL P%,Q%
5981 pk$="":REPEAT w$=FNw(cm$)

```

```

5982 IF P%=0 UNTIL TRUE:cm$=pk$:ENDPROC
5983 IF w$="A" OR w$="AN" OR w$="THE" O
R w$="TEH" ELSE pk$=pk$+w$+" "
5984 IF w$="TEH" PRINT"I assume 'teh' m
eans 'the'"

```

```

5985 UNTIL FALSE:ENDPROC
5990 DEF FNw(L$):REPEAT Q%=P%+1
5991 P%=INSTR(L$," ",Q%)
5992 w$=MID$(L$,Q%,P%-Q%)
5993 UNTIL w$>" " OR P%=0:=w$

```

✓ Get it right!

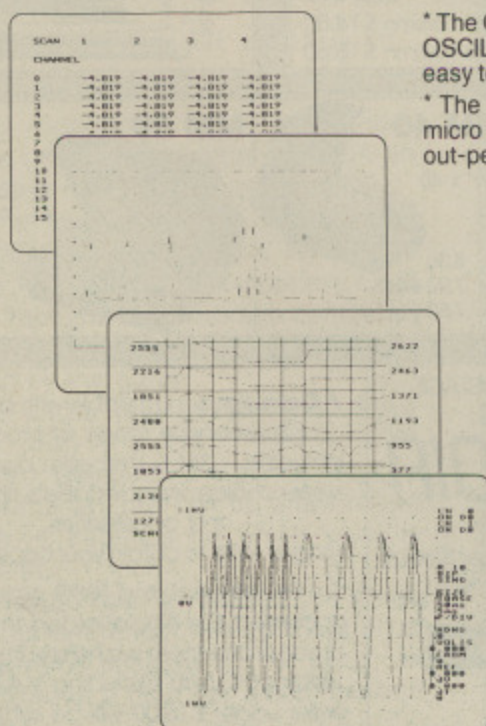
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0 = 00	108 = B667 0	5005 = ED0F 4
1 = 00	109 = ED0F 3	5100 = 82C9 3
2 = 00	110 = 1F2F D	5101 = 2F43 1
3 = 00	111 = 5E58 E	5102 = 12E4 2
4 = B3EF F	120 = 52E0 8	5103 = 96D1 9
10 = BFBA 2	130 = E48 E	5104 = 89AA 6
20 = 9416 C	140 = BDCA C	5105 = EDAD B
90 = 226C 8	150 = 40D7 8	5200 = 2FAD 7
100 = 62DB 5	151 = 120F 8	5201 = BD93 8
101 = 2AB8 F	152 = EF91 0	5202 = A097 9
102 = B79E 4	154 = ED0F 2	5203 = 2891 0
103 = DE05 3	5000 = A0B8 7	5204 = DAC2 3
104 = 609 E	5001 = 93A6 E	5205 = 508B E
105 = 723A 0	5002 = C6CF 2	5206 = 60B5 F
106 = A4E9 A	5003 = F691 9	5207 = A5BE 1
107 = 14F0 A	5004 = 2F14 8	5208 = 61D4 6

5209 = A364 4	5322 = 251 A	5910 = 4E58 C
5210 = BE4 A	5323 = A6D 9	5911 = D94 5
5211 = A364 9	5330 = 32CD 6	5950 = C0C0 5
5212 = C237 F	5331 = 7E5 4	5951 = 95FC E
5213 = 57DB E	5332 = 126F 6	5952 = E4C 2
5214 = 5080 1	5333 = A6D A	5953 = DF3B A
5300 = ABDC F	5900 = 4F14 0	5980 = 6F3 B
5301 = B707 F	5901 = A1CE 7	5981 = C963 D
5302 = 98B5 F	5902 = 8DA7 C	5982 = 9E11 C
5303 = A6D A	5903 = 788B F	5983 = 1719 2
5310 = 1309 7	5904 = 697A 4	5984 = 793B 0
5311 = 152A 8	5905 = 672E 0	5985 = CAFF 3
5312 = 740D 5	5906 = 7792 5	5990 = 31E6 8
5313 = A6D 5	5907 = 79D7 4	5991 = 2822 B
5320 = C773 D	5908 = 37FA D	5992 = 6DAF F
5321 = A7DF 5	5909 = 6CAC 5	5993 = D146 2

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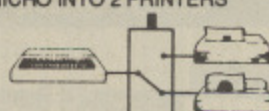
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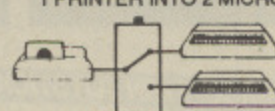
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SAVING IT SIDEWAYS

SIDEWAYS ram has been available for a considerable time, prompted by the excellent paged rom facility of the BBC Micro and as an aid to the development of sideways software.

A less common use is to extend the memory of the standard BBC Micro by storing overlay procedures (see *The Micro User* July 1985), or as storage of data and variables.

A single 16k bank of ram occupies memory locations from &8000 to &BFFF, and can often be written to directly by using the indirection operators (! ? and \$) from Basic.

Reading from sideways ram is not quite so easy since Basic has to be switched out and the ram accessed from machine code. Machine code is also needed for writing to some types of ram (including the Master) and for additional banks of ram.

So we are using machine code for speed and versatility.

The programs offered here use sideways ram to store integer numbers, real numbers and strings (maximum length predefined), in blocks addressed in the same way as arrays in Basic.

Only one block of each type is catered for, but careful subscripting in the main program will easily get round this limitation.

Program I sets up the code required to operate the system, Program II gives the Basic lines to store and recall each type of variable and Program III is a demonstration of sorting using sideways ram.

In Basic arrays, integer numbers each require four bytes of storage, real numbers need five bytes and strings use their length plus two marker bytes. In the sideways store, memory requirements are the same except for strings.

These always take up the same (predefined) amount of memory, but strings of the maximum length are stored without the end marker byte, 13. This is replaced by the code when it is returned to Basic.

To use the programs you must run Program I before the other two. The array sizes are set here, and definitions follow the same pattern as Basic — an array size of 100 will contain 101 variables including the zero address.

String lengths are also fixed at this point, and if you later attempt to use longer strings they will be chopped off by

Peter Vasey shows how to use your sideways ram for data storage

the code. You could, of course, dedicate the ram to one type of variable by setting the other two to zero. For your first run of Program I, set the arrays to 200 of each type, and string length to 20.

The code is assembled from &900 and occupies two pages including the 160 byte string buffer which should be sufficient for most purposes.

This area is usually safe for disc users: Cassette users will be better assembling at &E00 with the programs running at &1000 or higher. You will see that I have introduced dedicated multiplication routines in the code. Although it would be possible to premultiply the subscripts in the Basic procedures, it is much faster and tidier this way — even the string subscript multiplication gives a 25% speed increase.

The ram bank used is set at the start, but you may change this depending on how your particular ram is connected, also different ram boards have different access methods and you'll have to adjust lines 470 to 530 to suit your system.

This will, of course, alter the checksum. The address of this ram number in the machine code is passed forward to the user programs in Z%. This means that multiple ram owners can change the ram bank at will using:

```
?Z%=ramnumber
```

giving themselves even more memory — up to 64k for a normal Master or Compact

The routines are grouped for each type of variable, so if you are only interested in one or two types, you can omit the appropriate group(s), and modify all the programs accordingly — but don't omit the error checking.

If your interest is an adventure with lots of text, you can dispense with the integer and real sections.

Rather than use CALL parameters to pass the values to and from the machine code I have kept the code as simple and

fast as possible by using existing variables which are easily found.

These are Q% for integers, Q for real numbers and O% for the array subscript. I chose these as they are not used as often as other variable names.

You should always define Q (for example Q=0) at the beginning of your program, and *never* use it or the other two anywhere but the calling procedures and functions as listed in Program II, lines 350 to 440.

The integer variables A% to Z% have their own reserved memory in Basic. Consequently Basic runs much faster when using them because it doesn't have to hunt through the variable table to find them.

They are not cleared by RUN, CLEAR or Break, so they can be used to pass values from one program to another. This feature is used here with the variables listed in Table II. If you need to use them elsewhere in your program you must reassign their values to new variables. As an example, you might put in a line at the beginning of your program which reads:

```
stringstore=T%
stringrecall=W%
stringbuffer=M%
```

You should then modify the appropriate procedure and function as follows:

```
DEFPROC($stringbuffer,0%):
CALLstringstore:ENDPROC
DEFFNS(0%):CALLstring
recall:=$stringbuffer
```

This would release M%,T% and W% for use in your program. It will however slow down the variable access time quite a lot. As it stands it is about three times slower than direct access to Basic arrays (still pretty fast), but using long variable names can slow it down by another 30 per cent to 40 per cent.

Although only having one array of each type available may seem to be a drawback, a bit of planning will get round it easily, particularly if you are using more than one bank of ram.

In Program III an offset SET% is used to select the integer array addresses from 100 to 120.

Provided the offset groups don't overlap, or exceed the preset maximum reserved in Program 1, you can have as many groups as you like, each with its own offset.

Program II is a straightforward demonstration of storage and recall. Remember that at the start of any program using the system you must define Q=0. You should also call the clear routine unless using data loaded into ram by a preceding program.

Program III uses a simple bubble sort which is slow but easy to follow. The

FEATURE

◀ From Page 89

main points here are the offset subscripting and the use of a function call within the procedure call in line 350. This line is the equivalent of:

```
ARRAYX(IX+SETX)=ARRAYX(IX+SETX+1)
```

The use of variables COM% and SWAP% is not essential to the sort — they are only for the demonstration to indicate the work the program has done. In fact they slow down the sort by about 10%!

It is worth noting that the sideways ram can only be cleared by direct writing (or switching off the computer unless your ram is battery backed up).

Basic does not touch it normally, so RUN, CLEAR and Break leave the contents intact. This means that a block of data stored by one program can be readily accessed by another program using the same array sizes.

Furthermore, certain types of side-

Store:
PROCI(Integer value,subscript)
PROC(R Real value,subscript)
PROCS(String,subscript)

Recall:
Integer value = FNI(subscript)
Real value = FNR(subscript)
String value = FNS(subscript)

Table I: Ram accessing procedures and functions

ways ram can be filled directly from disc or tape by *LOADing to &8000. You could write a program to feed all your data into ram then save the ram directly to disc or tape using the saver routine from the July 1985 issue of *The Micro User*.

Master users in particular will benefit from their 64k capacity — a sizeable database can be held in ram with consequent rapid access.

I've often wondered why more soft-

Reserved at all
0% Subscript) times and must
Q% Integer variable) not be used
Q Real variable) except as shown
in Program II.
C% Address of ram clear routine.
L% Predefined string length.
M% Address of string buffer.
R% Address of Integer store routine.
S% Address of Real store routine.
T% Address of String store routine.
U% Address of Integer recall routine.
V% Address of Real recall routine.
W% Address of String recall routine.
Z% Address of sideways ram number
in the code.

Table II: Reserved variables

ware isn't released with optional sideways ram enhancements — not only data but pure machine code can be easily accessed. Perhaps the market will respond eventually with a graphic and text megaventure?

Program I

```
100 REM Sideways storage Program I
110 REM Set up code and assign store
120 REM by Peter Vasey
130 REM Zero page usage &70 to &76
140 REM (C) The Micro User 1987
150 REM *****
160 MODE7:PROCreserve:PROCassemble:END
170 DEFPROCreserve
180 INPUT "Size of Integer array ",A
190 int=A+1:intX=&8000:realX=intX+4*in
t
200 PROCsize(realX,"integer")
210 INPUT "Size of Real array ",B
220 real=B+1:strX=realX+5*real
230 PROCsize(strX,"real")
240 INPUT "Size of String array ",C
250 INPUT "Length of Strings ",LX
260 IFLX=0LX=1ELSEIFLX>160VDU7:PRINT "L
length too long. Max = 160:GOTO250
270 str=C+1:endX=strX+str*LX
280 PROCsize(endX,"string")
290 ENDPROC
300 DEFPROCsize(posX,typeS)
310 IFposX>&BFFF:VDU7:PRINT "No room at
"typeS:END
320 PRINT&BFFF-posX;" bytes left"
330 ENDPROC
340 DEFPROCassemble
350 FORPASS=0TO2STEP2
360 PX=&900:qX=&444:oX=&43C:Qpointer=&
4A2
370 [OPTPASS
380 \ NEXT GROUPS NEEDED BY ALL ROUTIN
ES
390 \ This section clears RAM
400 .CX
410 \ Next line sets start for clearan
ce
420 JSRRamaccess:LDA#&80:STAcloop+2:LD
A#0:STAcloop+1:TAX
430 .cloop
440 STA&8000,X:DEX:BNEcloop
450 INCcloop+2:LDYcloop+2:CPY#&C0:BNEc
loop
460 JMP out
470 .ramaccess \ Activate Sideways RAM
```

```
480 LDA&F4:STA&76
490 .ZX LDA#15:STA&FE30:STA&F4
500 RTS
510 .out \ Back to Basic ROM
520 LDA&76:STA&FE30:STA&F4
530 RTS
540 \ NEXT GROUP NEEDED BY NUMBERS ONL
Y
550 .times4 \ multiply by 4
560 ASL&70:ROL&71:ASL&70:ROL&71
570 RTS
580 \ NEXT GROUPS FOR INTEGER NUMBERS
590 .intsubscript
600 LDA#int MOD256:STAdum1-1
610 LDA#int DIV256:STAdum2-1 \ store m
ax size in dummy
620 JSRsize:JSRtimes4
630 CLC:LDA&71:ADC#&80:STA&71 \ add st
art of store
640 LDY#3 \ loop counter for integer m
ovement
650 JMPRamaccess
660 .RX \ Main integer store routine
670 JSRintsubscript
680 .iinloop
690 LDAqX,Y:STA(&70),Y
700 DEY:BPLiinloop
710 JMPout
720 .UX \ Main integer recall routine
730 JSRintsubscript
740 .ioutloop
750 LDA(&70),Y:STAqX,Y
760 DEY:BPLioutloop
770 JMPout
780 \ NEXT GROUPS FOR REAL NUMBERS
790 .realsubscript
800 LDA#real MOD256:STAdum1-1
810 LDA#real DIV256:STAdum2-1 \ Store
max size in dummy
820 JSRsize
830 LDA&71:PHA:LDA&70:PHA \ store temp
orarily
840 JSRtimes4 \ multiply by 4
850 CLC:PLA:ADC&70:STA&70
860 PLA:ADC&71:STA&71 \ add back to gi
ve multiplication by 5
870 CLC:LDA&70:ADC#realXMOD256:STA&70
880 LDA&71:ADC#realXDIV256:STA&71 \ ad
d start of store
```

```
890 CLC:LDAQpointer:ADC#3:STA&73 \ get
real variable address
900 LDAQpointer+1:ADC#0:STA&74:LDY#4 \
loop counter for real movement
910 JMPRamaccess
920 .SX \ Main Real store routine
930 JSRrealsubscript
940 .rinloop
950 LDA(&73),Y:STA(&70),Y:DEY:BPLrinlo
op
960 JMPout
970 .VX \ Main Real recall routine
980 JSRrealsubscript
990 .ROUTloop
1000 LDA(&70),Y:STA(&73),Y:DEY:BPLROUTl
oop
1010 JMPout
1020 \ NEXT GROUPS FOR STRINGS
1030 .stringsubscript
1040 LDA#str MOD256:STAdum1-1
1050 LDA#str DIV256:STAdum2-1 \ store m
ax size in dummy
1060 JSRsize
1070 LDA#LX:STA&72 \ get max. length of
string
1080 \ Fast multiply 2 bytes x 1 byte
1090 \ Both bytes positive. Needed beca
use
1100 \ preset string length (LX) varies
1110 LDA#0:STA&73:STA&74:STA&75
1120 LDY#8
1130 .fmloop
1140 ROR&72:BCCfzero
1150 LDA&74:CLC:ADC&70:STA&74
1160 LDA&75:ADC&71:STA&75
1170 .fzero
1180 ROR&75:ROR&74:ROR&73
1190 DEY:BNEfmloop
1200 LDA&73:ADC#(strX-1)MOD256:STA&70
1210 LDA&74:ADC#(strX-1)DIV256:STA&71 \
add start of store less 1
1220 LDY#LX \ loop counter for string m
ovement
1230 JMPRamaccess
1240 .TX \ Main String store routine
1250 JSRstringsubscript
1260 .sinloop
```

Turn to Page 93 ▶

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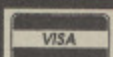
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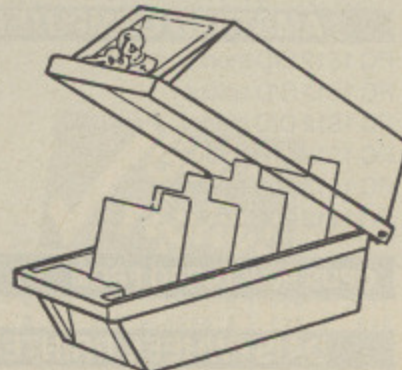
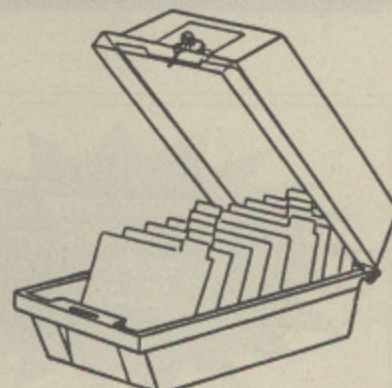
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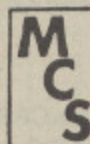
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THE SOFTWARE

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

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

THE HARDWARE

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From Page 90

```

1270 LDAM%-1,Y:STA(&70),Y:DEY:BNE$inloop
1280 JMPout
1290 .WX \ Main String recall routine
1300 JSRstringsubscript
1310 LDA#13:STAM%,Y
1320 .Soutloop
1330 LDA(&70),Y:STAM%-1,Y:DEY:BNE$outloop
1340 JMPout
1350 \ ERROR CHECKING
1360 \ Check subscript for out of range
1370 .size
1380 LDAo%+3:ORAo%+2:BNEerror
1390 LDAo%:STA&70:CMPO%&FF:.dum1 \ dummy
byte 1
1400 LDAo%+1:STA&71:SBCO%&FF:.dum2 \ dummy
byte 2
1410 BCSerror:RTS

```



100 =	00	580 =	03	1060 =	C6A5 A
110 =	00	590 =	800E C	1070 =	1423 3
120 =	00	600 =	B85C 6	1080 =	03
130 =	00	610 =	88B4 5	1090 =	03
140 =	00	620 =	43E2 8	1100 =	03
150 =	00	630 =	E484 3	1110 =	70E6 6
160 =	CDF F	640 =	D4E3 0	1120 =	1A9F 3
170 =	E941 6	650 =	FBC1 4	1130 =	7218 5
180 =	514C F	660 =	78CB 1	1140 =	2143 8
190 =	137 5	670 =	CF8B 3	1150 =	4DED 0
200 =	A7A9 0	680 =	16EE 8	1160 =	476 4
210 =	EFC0 6	690 =	6176 1	1170 =	C8C5 1
220 =	9D7C E	700 =	77F4 4	1180 =	30D1 0
230 =	482D 9	710 =	D7DE 2	1190 =	A5BB 1
240 =	6770 E	720 =	FD5B 0	1200 =	63AA C
250 =	2939 0	730 =	CF8B 2	1210 =	9238 B
260 =	8F9B 4	740 =	1485 6	1220 =	4757 D
270 =	61F8 E	750 =	5826 6	1230 =	FBC1 8
280 =	DA4B 7	760 =	7202 6	1240 =	CA6B 3
290 =	ED0F 4	770 =	D7DE E	1250 =	328F C
300 =	1062 A	780 =	0 E	1260 =	D2DB 1
310 =	ABFA 8	790 =	FCCC F	1270 =	79C 7
320 =	48C6 A	800 =	E03E 0	1280 =	D7DE B
330 =	ED0F 7	810 =	3149 F	1290 =	933B 6
340 =	98E9 1	820 =	C6A5 B	1300 =	328F 1
350 =	4A5B 3	830 =	8B66 9	1310 =	EFE3 9
360 =	A83F 3	840 =	607D 3	1320 =	B84D 4
370 =	C8B2 9	850 =	1B6D 5	1330 =	C6D E
380 =	0 9	860 =	60DD 5	1340 =	D7DE 6
390 =	0 9	870 =	776B 7	1350 =	0 6
400 =	B19F D	880 =	43D B	1360 =	0 6
410 =	0 D	890 =	405D B	1370 =	C0DE D
420 =	264E 5	900 =	E665 2	1380 =	E29D C
430 =	869C E	910 =	FBC1 C	1390 =	3F92 C
440 =	F20 9	920 =	4FFB C	1400 =	CEA3 2
450 =	965B F	930 =	C0E7 9	1410 =	FB18 A
460 =	5668 8	940 =	6ABA 4	1420 =	4B7C 7
470 =	40FB 3	950 =	47D6 7	1430 =	E2BF 1
480 =	7027 A	960 =	D7DE 9	1440 =	2F5A 5
490 =	A77B 8	970 =	A40B 1	1450 =	E2BF 7
500 =	9843 2	980 =	C0E7 C	1460 =	1799 C
510 =	9927 B	990 =	FF9E 5	1470 =	8B58 E
520 =	DD9E A	1000 =	BADE 7	1480 =	C500 2
530 =	9843 6	1010 =	D7DE D	1490 =	7962 C
540 =	0 6	1020 =	0 D	1500 =	88 D
550 =	67E 5	1030 =	E77E 8	1510 =	ED0F C
560 =	DF6E 8	1040 =	33E1 7	1520 =	CDB6 F
570 =	9843 3	1050 =	1557 4	1530 =	51CB 5

```

1420 .error \ Uses BASIC error trap to
report subscript error
1430 BRK
1440 OPT FNEQUS(CHRS&FF+CHRS7+'SUBSCRIP
T')
1450 BRK
1460 .MX \ Start of string buffer
1470 J
1480 PX=PX+165
1490 [OPTPASS:]
1500 NEXT:ZX=ZX+1
1510 ENDPROC
1520 DEFFNEQUS(A$)
1530 SPX=AS:PX=PX+LENAS:=PASS

```

Program II

```

100 REM Sideways storage Program II
110 REM Test and demonstration
120 REM By Peter Vasey
130 REM (C) The Micro User 1987
140 REM *****
150 REMINDER! 0%, Q% and Q are reserv
ed at all times.
160 REM C%, L%, M%, R%, S%, T%, U%, V%, W%, Z%
170 REM are all used to pass constants
180 REM forward from Program I.
190 REM *****
200 IF(!CX AND&FFFF)<>&2120:VDU7:PRINT
"CODE NOT INSTALLED":END
210 Q=0:CALLCX
220 FORAX=0TO5
230 REM TEST INTEGER STORAGE
240 INPUT"INTEGER ",IX:PROCI(IX,AX)
250 PRINTFNI(AX)
260 REM TEST REAL STORAGE
270 INPUT"REAL ",A:PROCR(A,AX)
280 PRINTFNR(AX)
290 REM TEST STRING STORAGE
300 INPUTLINE"STRING ",AS
310 IFLENAS>LX:VDU7:PRINT"Too Long":GOTO300
320 PROCS(AS,AX)
330 PRINTFNS(AX)
340 NEXT:END
350 REM STORE PROCEDURES
360 REM (I)NTEGER, (R)EAL, (S)TRING
370 DEFPROCI(Q%,O%):CALLRX:ENDPROC
380 DEFPROCR(Q%,O%):CALLSX:ENDPROC
390 DEFPROCS(SM%,O%):CALLTX:ENDPROC
400 REM RECALL FUNCTIONS
410 REM (I)NTEGER, (R)EAL, (S)TRING
420 DEFFNI(O%):CALLUX:=Q%
430 DEFFNR(O%):CALLVX:=Q
440 DEFFNS(O%):CALLWX:=SM%

```



100 =	00	220 =	E5AA B	340 =	F510 7
110 =	00	230 =	0 B	350 =	0 7
120 =	00	240 =	5A7D 4	360 =	0 7
130 =	00	250 =	1D2C 9	370 =	E725 B
140 =	00	260 =	0 9	380 =	31D1 A
150 =	00	270 =	33FF 7	390 =	38F5 4
160 =	00	280 =	F589 B	400 =	0 4
170 =	00	290 =	0 B	410 =	0 4
180 =	00	300 =	29CD B	420 =	80B6 0
190 =	00	310 =	E1DE 0	430 =	935B F
200 =	53C4 4	320 =	9CFF D	440 =	5989 E
210 =	80F9 D	330 =	5FD8 3		

Program III

```

100 REM Sideways storage Program III
110 REM Sort demonstration
120 REM By Peter Vasey
130 REM (C) The Micro User 1987
140 REM *****
150 REMINDER! 0% Q% and Q are reserved
160 REM *****
170 MODE7
180 IF(!CX AND&FFFF)<>&2120:VDU7:PRINT
"CODE NOT INSTALLED":END
190 Q=0:CALLCX
200 SETX=100:REM SUBSCRIPT OFFSET
210 REM LOAD RANDOM INTEGERS INTO STOR
E
220 PRINT"LOADING 20 RANDOM NUMBERS"
230 FORAX=0TO19
240 BX=RND(10000):PRINTBX
250 PROCI(BX,AX+SETX)
260 NEXT
270 PRINT"NUMBERS LOADED, NOW SORTING"
280 REM SORT STORE (SIMPLE BUBBLE SORT
)
290 COMX=0:SWAPX=0:TIME=0
300 FORJX=1TO19
310 FORIX=0TO19-JX
320 COMX=COMX+1
330 IFFNI(IX+SETX)<=FNI(IX+SETX+1)THEN
380
340 TEMPX=FNI(IX+SETX)
350 PROCI(FNI(IX+SETX+1),IX+SETX)
360 PROCI(TEMPX,IX+SETX+1)
370 SWAPX=SWAPX+1
380 NEXT:NEXT
390 TIM=TIME
400 REM PRINT SORTED STORE
410 *FX15,0
420 VDU7:PRINT"NUMBERS SORTED - HIT A
KEY":A=GET
430 FORAX=0TO19
440 PRINTFNI(AX+SETX):NEXT
450 PRINT";COMX;" COMPARISONS, ";SWAPX
;" SWAPS IN ";TIM/100;" SECS"
460 END
470 DEFFPROCI(Q%,O%):CALLRX:ENDPROC
480 DEFFNI(O%):CALLUX:=Q%

```



100 =	00	230 =	6C35 4	360 =	3EE7 0
110 =	00	240 =	DB29 8	370 =	E98 C
120 =	00	250 =	ABA 1	380 =	24BD 8
130 =	00	260 =	2C83 1	390 =	BE72 7
140 =	00	270 =	650F 5	400 =	0 7
150 =	00	280 =	0 5	410 =	6C86 F
160 =	00	290 =	E759 E	420 =	4166 D
170 =	8AFC C	300 =	51AE 1	430 =	6C35 9
180 =	53C4 B	310 =	C76 C	440 =	BE8D C
190 =	80F9 8	320 =	8F1C 6	450 =	CB31 4
200 =	E2B5 F	330 =	C6B4 8	460 =	FD2E 4
210 =	0 F	340 =	778B E	470 =	E725 B
220 =	E915 B	350 =	D874 8	480 =	80B6 3

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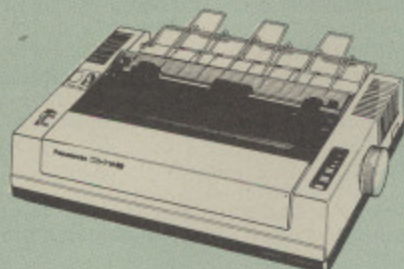
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Panasonic KX-P3131 Daisy-Wheel Printer

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	£195
Tractor Feed	£90
Spare Ribbon	£3.00

Acorn-Olivetti JP101 Ink Jet Printer

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

£59
JP101 accepts 9 1/2" standard fan fold paper or single A4 sheets. Tractor & Friction feed supplied as standard - print speed 50 cps.

Pack of 4 refills **£10**

Screen Dump ROM for JP101 **£10**

Anti-Glare VDU Screen

This extremely effective, easy to install, 12" VDU screen eliminates harmful glare, improves contrast on colour monitors. A must for all wordprocessor users.

£12

Printer Stand Type-YU-S25



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.

£34



We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

MICROVITEC 14"

- 1431 - Medium resolution as used on the BBC television computer programme **£175**
- 1451 - High 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**
- Dust Cover for Microvitecs **£5.50**

KAGA-TAXAN 12"

- KAGA KX1201G Hi-res Green Monitor **£85**
- KAGA KX1202G Long persistence Hi-Res Green Monitor **£93**
- KAGA KX1203A Ultra-Hi-Res Amber Monitor **£93**
- KAGA Super Vision 2 Type 620 Hi-res RGB Colour monitor. Ideal for Wordprocessing **£269**
- Kaga Super Vision 3, Type 625 Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£319**

STAR BUY

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

ONLY £209

ZENITH

"Test Bureau Recommended for use in Education"

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

- Green (New Design) Hi-res **£69**
- Amber (New Design) Hi-res **£74**

LEADS

- BNC Lead for Zenith or Philips **£3**
- Skart Monitor Lead **£5**
- RGB lead for KAGA **£3**

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

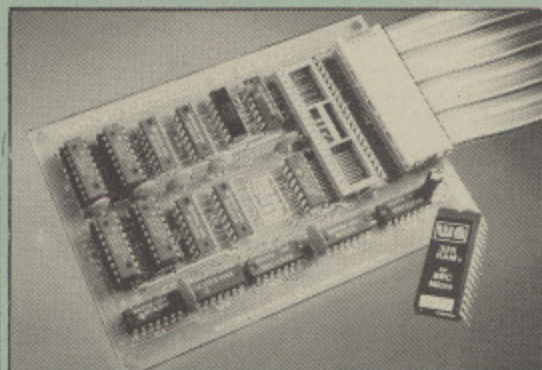
SWIVEL BASES for Video Monitors

By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress. Front adjustable without removing the monitor.

- for 12" Monitors **£10** (carr. £2.50)
- for 14" Monitors **£14** (carr. £2.50)

32K

SHADOW RAM- Printer Buffer Expansion Board



A MUST FOR WORD PROCESSING

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

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

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

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

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

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

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

See next page for SPECIAL OFFER

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

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

at Only **£89** (carr £2)

Continued

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer 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.

Superb Value at **£5.95** (No VAT)

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 four years, and has gained a large following amongst serious 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. Our highly sophisticated DFS is fully compatible with Acorn DFS).

PRICES

- Complete Disc Interface Kit including DFS ROM and fitting instructions **£59**
- Acorn's 0.90 DFS Kit complete **£57**
- DFS Manual (Comprehensive) (no VAT) **£6.95**
(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).
- Watford's sophisticated DFS ROM only **£16**
- We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only **£12**
- DNFS ROM only **£17** ● ADFS ROM only **£25**
- Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.

NEW WATFORD's Mk II Double Density DFS INTERFACE

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

Added features include:

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

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

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

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your Existing Single Density DFS for our DDFS for only **£25.00**

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

NEW

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 **£149** (carr £2)

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

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

£5.95 (Book No VAT)

DISC ALBUMS

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

£4

FLOPPY HEAD CLEANER KIT

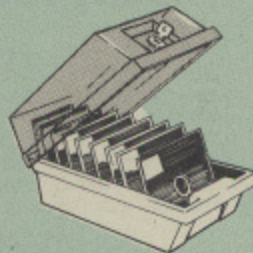
The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3 1/2" & 5 1/4", please specify.

£8

ANTISTATIC LOCKABLE DISC STORAGE UNITS

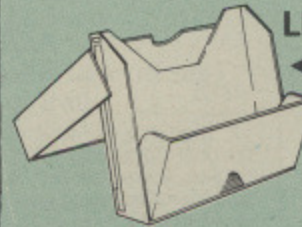
Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- M35 – holds upto 50 5 1/4" discs **£8**
- M85 – holds upto 95 5 1/4" discs **£10**
- M50 – holds 50 3 1/2" Discs **£10**



PLASTIC LIBRARY CASES

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



DX-08: This extremely handy unit holds upto 8 5 1/4" Disc while in use. Only **£2.00**



DUST COVERS (For our Disc Drives)

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

SPECIAL DISC DRIVE/DDFS OFFER

Type CLS400



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

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)

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 drives are of Japanese manufacture. 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.

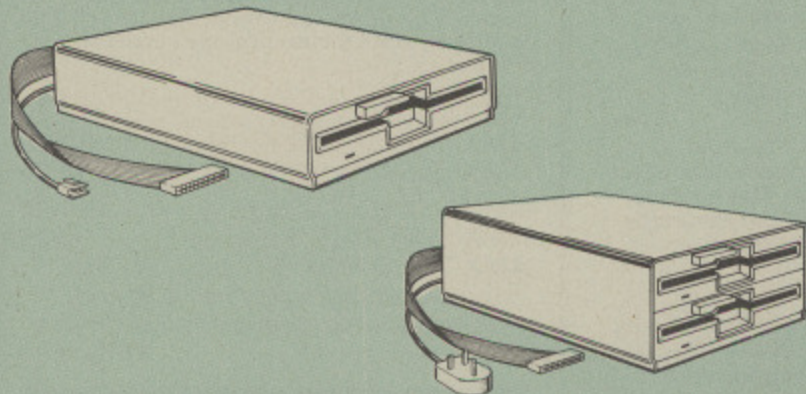
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct 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 for single drives is for a single drive in a standard single case. Single drive 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 10th 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 £95		CS 200 £108	
400K (720K)	CLS400S £96	CLD 400 £180	CS 400S £109	CD400 £200
800K (1.44M)		CLD 800S £183		CD 800S £204

● 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 drive, Less power supply unit, Single 400K, Switchable (40-80 track).

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	£10
● 10 x 5 1/4" D/S D/D 40 Track Diskettes	£12
● 10 x 5 1/4" S/S D/D 80 Track Diskettes	£15
● 10 x 5 1/4" D/S D/D 80 Track Diskettes	£15
● 10 x 5 1/4" 1.6M D/S D/D High Density Discs for IBM XT and AT	£30
● 10 x 3 1/2" S/S D/D 40/80 track Discs	£18
● 10 x 3 1/2" D/D D/D 40/80 track Discs	£22

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

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

DON'T SETTLE FOR LESS, BUY THE BEST

● 10 x M3 3 1/2" D/S D/D 80 Track Discs	£20
● 10 x M4 5 1/4" S/S D/D 40 Track Discs	£9
● 10 x M5 5 1/4" D/S D/D 40 Track Discs	£11
● 10 x M7 5 1/4" D/S D/D 80 Track Discs	£14
● 3" Double Sided Discs	£3 each

Special BULK OFFER on 5 1/4" DISCS

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

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£46	£49	£72
● With Sleeves	£49	£52	£75

ACORN WINCHESTER DRIVES

Suitable for direct connection, via the 1MHz bus, to any BBC running ADFS. These Acorn Winchester disc drives are fast and extremely reliable. Each Winchester comes complete with the Level III Econet File Server software.

10 Megabytes £1050; 30 Megabytes £1549

WATFORD'S WINCHESTER DRIVES

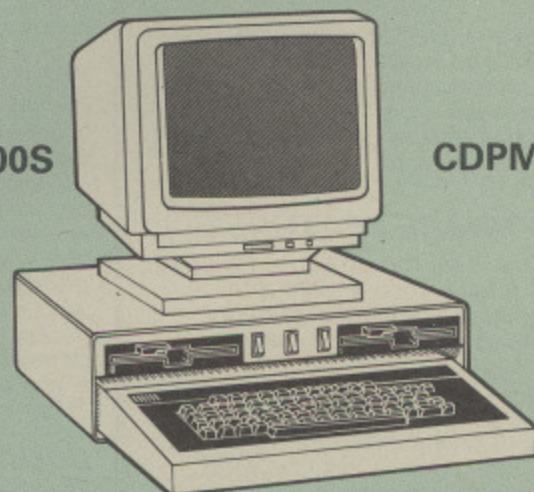
● 10 Megabyte Winchester with ADFS	£399
● 20 Megabytes with ADFS	£549
● 40 Megabytes with ADFS	£999

WINCHESTER WORKSTATION

20 Megabyte Winchester, plus a Tape Streamer and a 400K Floppy Drive all housed in a plinth with cooling fan £1499

CDP 800S

CDPM 800S



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

CDP 800S for BBC Micro £210

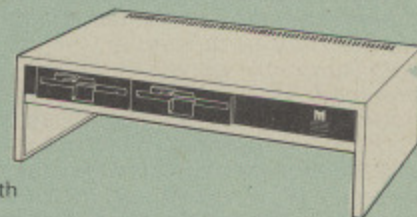
CDPM 800S for Master £225

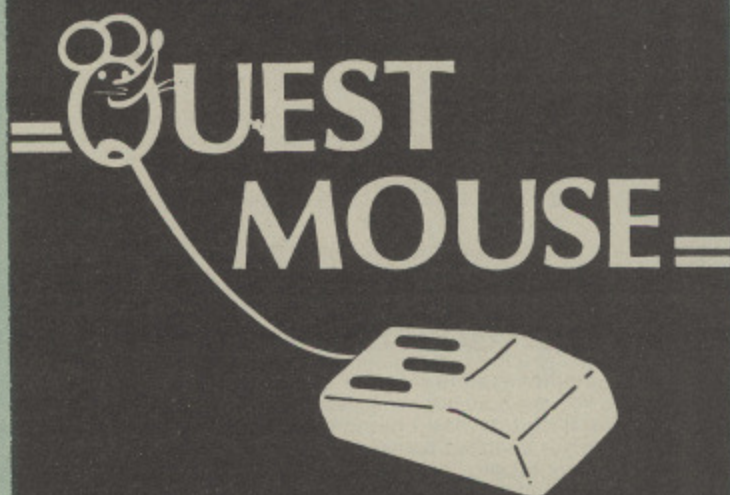
(Securicor Carr. £7)

ACORN'S Twin 800K Disc Drives

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

RRP £250 Our Price: Only £199 (carr £7)





QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and is smooth and easy to use on most work surfaces. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that programs such as AMX Pagemaker etc, will work with it.

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

QUEST PAINT

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

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

SOFTWARE FEATURES

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

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

Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package
With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87
"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."
"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87
"Quest Mouse and Quest Paint can hold their heads high in the market..."

A&B Computing June '87
"... Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, 'this is a very special mouse driven drawing package...'"

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

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

QUEST MOUSE & QUEST PAINT £59
QUEST MOUSE ONLY £35
QUEST PAINT SOFTWARE £34
QUEST FONT DISC £12

N.B.

1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 24 text FONTS for use within Quest Mouse.
P.S. There is no need to worry about any of your existing AMX mouse software. The Quest Mouse is totally AMX compatible so it will work with any of the AMX range of software.

All prices in this advert are exclusive of VAT.

MARK II LIGHT PEN + PENPAL 2

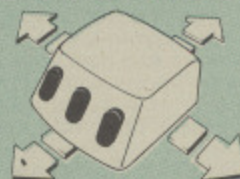
The Watford Electronics Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. Penpal II, Watford Electronics' sophisticated light pen software is also supplied free on cassette or disc (please specify). This is a highly sophisticated drawing package enabling you to gain the maximum benefit from your Light Pen. The software is used to edit Mode 2 full colour screens using lines, patterns and you own designs. Screens may be saved to cassette or disc.

Price Only £18



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

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £63 (carr £1.50)
(Please specify for BBC or Master Computer)

We are giving away, absolutely FREE, our popular Colour Art software package worth £15 with every AMX Mouse package purchased from us.

AMX MAT	£5
AMX MOUSE ONLY	£35
AMX DESK Package	£19.00
AMX UTILITY Package	£11.00
AMX SUPERART Package	£39
AMX PAGE-MAKER Pack - A desk-top publishing software. It Works with keyboard, joystick and a mouse	Only: £32

We are giving away, absolutely FREE, PAGE-FONTS, a disc containing over 20 fonts, with every purchase of AMX PAGE-MAKER from us.

PAGE-FONTS Over 20 fonts for use with

AMX PAGE-MAKER	£9.50
EXTRA EXTRA	£19
AMX DESIGN (ROM)	£69
AMX 3D ZICON Disc	£19
AMX Database Disc	£19
AMX XAM Educational	£19
AMX MAX A gem of desktop (ROM)	£17

RB2 MARCONI TRACKER BALL

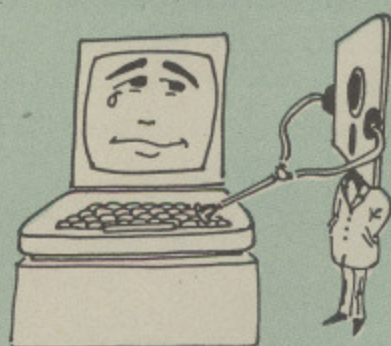
This popular unit is supplied complete with software.
Price: £59

FLEET STREET EDITOR

Software pack £35

Admin Xtra Disc Utility	£14.95
Walt Disney Disc Utility	£14.95
Fonts N Graphics Disc Utility	£14.95

DIAGNOSTICS DISC



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

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb: RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

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

Only £20.00

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Cassette). 4 primary level maths programs £10.95
- Maths with a Story 2 (Cassette). 4 further maths programs £10.95
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs £19.95
- WAVES: Science Topics (Disc) CSC O Level Physics program. £14.95
- RELATIONSHIP: Science (Disc) O Level Biology program. £14.95
- BONDING: Science (Disc) O Level Chemistry program. £14.95
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. £14.95
- ELECTRONICS IN ACTION (Disc) O Level program £14.95
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. £20
- ECOLOGY (Disc) O Level program. £20
- POLYMERS (Disc) O Level program. £20
- Classification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. £20
- FOOD & POPULATION (Disc) O Level program. £20
- MICROTكنولوجيا (Cassette) O Level program. £6.95
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. £17
- DEUTSCH DIREKT! (Disc & Audio Cassette) £20
- Modem Master (Disc) £11.25
- ADVANCED TELETXT SYSTEM £6.90
- PERIOD TABLE SOFTWARE £20
- USING YOUR COMPUTER (Cassette) 8-12 age £24

TED

The Teletext Editor Package for serious users

TED is the brand new package from Watford Electronics for the editing and creation of teletext (Mode 7) screens and displays. TED is ideal for anyone wanting to create their own Mode 7 pictures (such as game title pages), designing animated displays for shop windows, exhibitions, classrooms, etc. TED is also probably the most powerful Prestel screen editor you will ever come across.

Supplied on a special 32k package, full facilities are provided for manipulating the screen, including easy to use pixel manipulation; line, column and block buffering and copying; left and right margins; large text in a variety of different fonts (contained within the ROM device); various borders and effects templates (contained within the ROM device); line and column insertion and deletion; easy to use graphics line drawing. Those are some of the features of editor itself. In addition to this, TED contains routines for taking a number of Teletext screens and creating them into an animated sequence, with user selectable display times, repeats on a group of shows, various entry methods (how the picture is put onto the screen), routing selection (both predefined and keyboard specific), chaining of other shows, etc. Scrolls treat the Teletext sequence as a very long page with a window onto it. Supplied complete with a comprehensive manual. There are many more facilities not mentioned here, so write in for a comprehensive leaflet; you'll wonder how you managed without TED.

Price: £35

ROM-SPELL

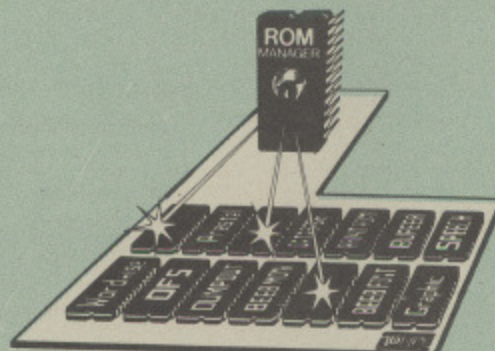
"way ahead of any competition"



Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual. NOT compatible with 1770 DFS. (Please state 40 or 80 track disc)

Price still only: £25

ROM MANAGER



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

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

ONLY £20

NEW

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sophisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

Introductory price: Only £89 (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degradation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

BEEBMON

The most powerful machine code monitor for the BBC Micro £24.

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.

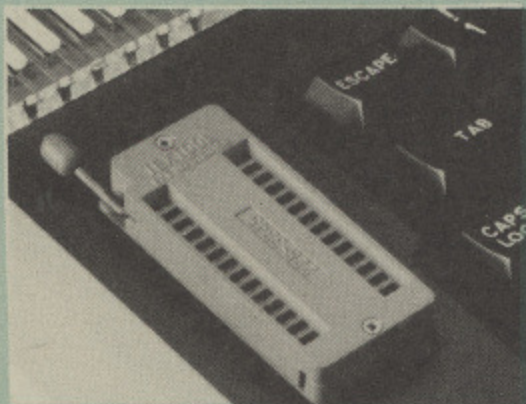
Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip.

Amazing value at only
Desk Top £10 (carr. £2)
Angle poise £14 (carr. £3)

All prices in this advert are exclusive of VAT.

Continued

SIDEWAYS ZIF SOCKET



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

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

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

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

- BBC, B+ and Master compatible.

ONLY £15 (carr £2)

Low Profile CARTRIDGE SYSTEM

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

● Complete System	£11
● Spare Cartridges	£2.50
● Spare Rack	£1.50

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

Key points to note about this new addition to the Watford range of products are:

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

Only: £29 (carr £2)

Optional extras

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

**All prices in this advert are
exclusive of VAT.**

16K DISC RAM

Unlike other RAM boards, this revolutionary, battery backed up, write protectable 16K sideways RAM board allows you to run from disc every sideways ROM available.

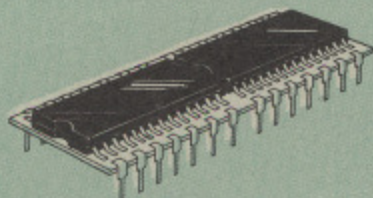
Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £32 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM



This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. **Compatible with BBC B Plus.** Like our other 16K RAM Modules, this unit is very simple to fit.

Only £28 (carr 2)

Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.

Do you require:

- Sideways RAM for the B+? Choose 3.
- A small, basic module? Choose 3.
- A sideways RAM module for a ROM board? Choose 1 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose (1) or 2.
- Write protect for RAM (makes ROM look like RAM)? Choose (1) or 2.
- Read protect (allows recovery from crashes)? Choose 1.

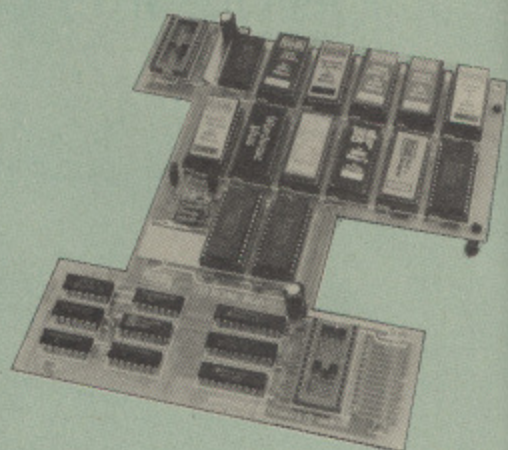
Key:

- 1) 16k Sideways RAM Module
- 2) 16k Disc RAM
- 3) Solid State 16k Sideways RAM
- 4) Options in brackets indicate optional extras.

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



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

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

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

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

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

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

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

Only: £8

NEW

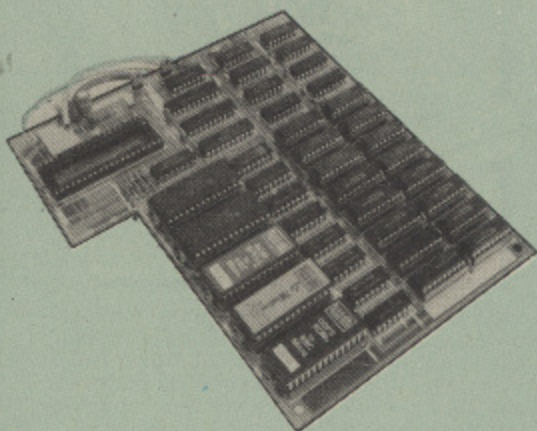
USER PORT SPLITTER UNIT

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

Excellent Value at £15

Watford ROM/RAM CARD

A must for all serious users



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, Epm Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

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

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

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

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

Please write in for further details.

INTRODUCTORY PRICES:

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

OPTIONAL EXTRAS:

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

Le Modem



The MODEM from Watford

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

The features that make Le MODEM such good value are:

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

SPECIAL OFFER

Price: **£74**
(carr £3)

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

Nightingale Modem

SPECIAL PRICE to our Customers

£85

(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

- Nightingale Modem without software Only £75
- COMMSTAR ROM package only £29
(P&P on modem £3.00)
- Auto Dial Utilities Disc £9.50

APOLLO

The NEW Modem from Watford

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

Just look at these features:

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

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

Only: **£75** (Carr £3)
(Write in for full specification)

BT TELEPHONE CONNECTORS for Modems

LJU 1/4A Mini Line Master	£4.50
LJU 1/6A Mini Line Slave	£3.00
LJU 2/4A Line Master	£4.00
LJU 2/6A Line Slave	£2.50
LJU 3/4A Flush Master	£3.95
LJU 3/6A Flush Slave	£2.75
LJU 10/3A Dual Splitter	£5.50
4 Way BT Plug	£0.75

Versatile BEEB SPEECH SYNTHESISER Unit



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

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

SPECIAL PRICE £32 (carr £2)

Continued

COMPUTER CONCEPT'S ROMS

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

Wordwise

£24

Wordwise plus

WORDWISE PLUS £40

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

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

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

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

Only £24

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

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £47

Inter SHEET ONLY £37

INTER-CHART

ONLY: £26

Inter-WORD

Only: £39

INTERBASE £59

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1 £37

VIEW 3.0 ROM £54

VIEW PROFESSIONAL £85

HI-VIEW £36
(for use with 6502 2nd Processor)

VIEW Printer Driver Generator £9
Please specify Disc or Cassette)

VIEWSHEET (Acornsoft) £37

VIEWSTORE £37

VIEWSPELL with 80 track disc £29

VIEWPLOT Disc £22
(Please specify for Master 128 or Compact)

VIEW-INDEX £12

OVERVIEW Packs 1 & 2 for the Master £85

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc) £10
Juki & Brother HR15 (Disc) £10
Silver Reed Printers (Disc) £10

Micros in Business (Disc)
An introduction to Business software
for the BBC Micro from Acorn £43

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit £29
Adv 1770 DFS for Mast/Compact £29
Adv 1770 DFS for BBC/BBC+ £29
Adv Disc Investigator £24
Adv. Control Panel £29

MINI OFFICE II

Disc Version £14.50
ROM Version £48.00

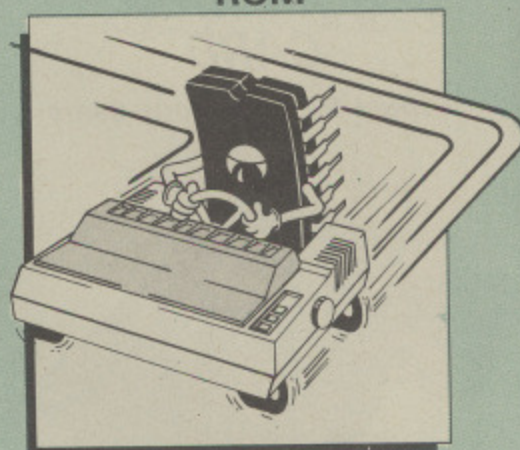
REPLICA 3

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

£13 (40 or 80 track)

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

VIEW PRINTER DRIVER ROM



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

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, Hi80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

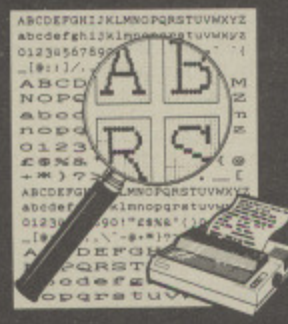
Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

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

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

Price: Only £33

EPSON NLQ ROM for the BBC Micro



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

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM £7

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics. Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

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

The Micro User Feb. 1985.

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

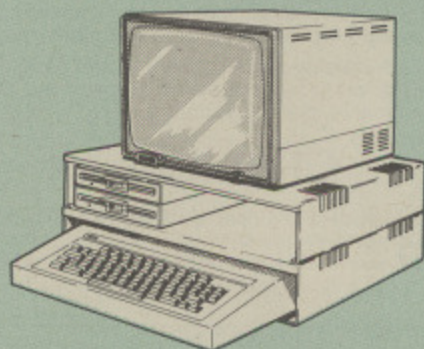
For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1080, Mannesman Tally and compatibles.

Only: £25

(Write in for further details on all above ROMS)

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.

SINGLEBBCPLINTH	£11 (carr. £1.50)
DOUBLEBBCPLINTH	£20 (carr. £2.00)
PRINTERPLINTH	£10 (carr. £1.50)
SINGLEMASTERPLINTH	£14 (carr. £1.50)
DOUBLEMASTERPLINTH	£25 (carr. £2.00)

THE NLQ DESIGNER

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

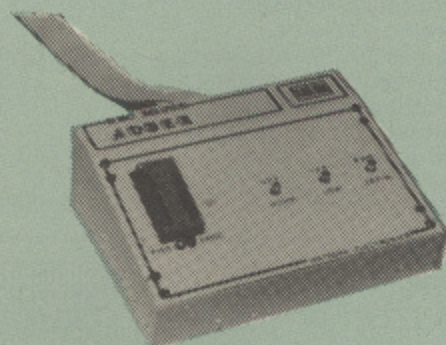
A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.

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

● NLQ Designer ROM & FONT Disc

£25

ADDER



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

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

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

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- Automatic processing to handle a list of files to program into the EPROM.
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- 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).

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- ERASER EB - Standard version erases up to 16chips. £28 (carr £2)
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- Spare UV tubes. £9



ARIES CORNER

Aries B-32 Shadow RAM Card

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

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

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

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

Price: B-32 **£80** (carr. £2)

Aries B-12 Sideways ROM Board

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

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

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

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

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

ARIES B-488 IEEE-488 INTERFACE UNIT

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

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Badger Micros (Devon), Badger's Hill, Southerton, Ottery-St. Mary, Devon EX11 1SE. Tel: 0395 68516.

Beebug Retail, Dolphin Place, Holywell Hill, St. Albans.

Cambridge Computer Store, 4 Emmanuel St., Cambridge CB1 1NE. Tel: 0223 358264.

Cirkit Distribution Ltd, Park Lane, Broxbourne, Herts.

C.J.E. Micros, 78 Brighton Road, Worthing, West Sussex. Tel: 0903 213361.

Farnell Electronics, Canal Road, LEEDS LS12 2TU. Tel: 0532 636311.

HCCS, 575-583 Durham Road, Low Fell, Gateshead, Nr. Newcastle Upon Tyne. Tel: 091 4870760.

Mancomp Ltd, Printworks Lane, Levenshulme, Manchester. Tel: 061-224 1888-9888.

Microman Computers, Rainford Industrial Estate, Mill Lane, Rainford, St. Helens

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*Absolute Electronics, Rewal House, 208-210 La Trobe Street, Melbourne, 3000, Victoria, Australia. Tel: (03) 663 2411.

Alpha Computer Co, Shop 314 Chi Fu Commercial Centre, Chi Fu Fa Yuen, Hong Kong. Tel: 5-506592.

Computer Distribution Company, Parklaan, 47, B09300 Aalst, Belgium.

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Scientex P.V.B.S., Zilvermidstraat 2, B-2000 Antwerpen, Belgium. Tel: 03 233 59 06

Techno-matic Data, Holbergsgade 19, 1057 København K, Denmark

*Velobyte, Scheaedyksadyk 5a-6a, 3011 EB Rotterdam, Holland. Tel: (010) 413 8197/414 5171.

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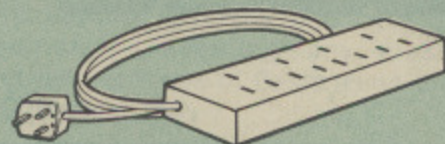
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MicroLink
72-MAG030

Compiled by Steve Turnbull

THEY say variety is the spice of life. Well we certainly have a variety this month – an edit window for programmers, a printer online check to help ensure your program is idiot proof, a space-saving character flip routine and a way of getting the date into your Wordwise Plus letters.

Remember that when you write in with your routines there's no point in us publishing ones which require specialised hardware or firmware as they only appeal to a small number of our readers. So ensure your routine works on a wide range of BBC Micros – and keep them flooding in.

Title: Edit Window
Language: 6502/Basic
Author: Nigel Blount

When programming, the most annoying problems involve keeping particular lines on screen while doing something else, like checking a different line, or doing some calculations.

The routine allows you to use a special six line edit window at the bottom of the screen at the press of Control+@, then to switch back to the original position.

Once typed in and run the program creates a machine code routine in Page &9 and saves it as EW, allowing you to run it easily with *EW.

When the code is run it installs itself by intercepting the event vector

and activating the character entering buffer event.

When Control+@ is pressed the bottom six lines of characters are saved in Page &C, the current cursor position is saved and the six line window is defined.

You can LIST and carry out calculations in this window without affecting the rest of the screen.

Pressing Control+@ again, puts all the saved characters back on screen, removes the window and resets the old cursor position.

This utility is only useful for Basic during program editing.

Send your routines – with full details of the language it is written in and the hardware/software requirements – on disc or tape to:

Steve Turnbull, Library, The Micro User, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Remember to enclose a stamped addressed envelope for the return of your media. Five blank discs will be sent to the authors of any routines published.

```

100 REM * Edit Window *
110 PROCinit:PROCassem
120 *SAVE EW 900+100
130 CALL code:END
140 DEF PROCinit
150 code=&900
160 evntv=&220
170 cursor=&318
180 scmode=&355
190 scrbuf=&C00
200 osnewl=&FFE7
210 oswrch=&FFEE
220 osbyte=&FFF4
230 ENDPROC
240 DEF PROCassem
250 FOR LX=0 TO 2 STEP 2
260 PX=code:COPT LX
270 .init
280 LDA #start MOD256
290 STA evntv
300 LDA #start DIV256
310 STA evntv+1
320 LDX #2
330 LDY #0
340 STY ipflg
350 STY pgrss
360 LDA #14
370 JSR osbyte
380 RTS
390 .start
400 CMP #2
410 BNE nok
420 CPY #0
430 BNE nok
440 LDA ipflg
450 BEQ ok
460 .nok
470 RTS

480 .ok
490 LDA #&FF
500 STA ipflg
510 LDA scmode
520 CMP #7
530 BEQ go
540 JMP mess
550 .go
560 LDA pgrss
570 BPL clear
580 LDA #30
590 JSR oswrch
600 LDX #0
610 STX pgrss
620 .rlp
630 LDA scrbuf,X
640 JSR oswrch
650 INX
660 CPX #239
670 BNE rlp
680 LDA #26
690 JSR oswrch
700 LDA #31
710 JSR oswrch
720 LDA xposn
730 JSR oswrch
740 LDA yposn
750 JSR oswrch
760 .way_out
770 LDA #0
780 STA ipflg
790 RTS
800 .clear
810 LDA cursor
820 STA xposn
830 LDA cursor+1
840 STA yposn
850 LDX #0

860 .wlp
870 LDA store,X
880 JSR oswrch
890 INX
900 CPX #6
910 BNE wlp
920 LDX #&FF
930 STX pgrss
940 INX
950 .clp
960 STX index
970 LDA #135
980 JSR osbyte
990 TXA
1000 LDX index
1010 STA scrbuf,X
1020 CPX #239
1030 BEQ skp
1040 LDA #9
1050 JSR oswrch
1060 INX
1070 BNE clp
1080 .skp
1090 LDA #12
1100 JSR oswrch
1110 JMP way_out
1120 .index BRK:.pgrss BRK
1130 .xposn BRK:.yposn BRK
1140 .ipflg BRK:.store:]
1150 !PX=&2718001C:PX=PX+4
1160 !PX=&00001E13:PX=PX+2
1170 COPT LX
1180 .mess BRK:BRK:]
1190 $PX='Not in MODE 7'
1200 PX=PX+LENSPX+1:PX=0
1210 NEXT:ENDPROC

```


Title: Printer Check
Language: Basic
Author: Brian Jaques

Many programs require the use of a printer, but often they do not check to see if the printer is actually connected.

These two routines PROCprinter and FNprinter together make a system to check that the printer is connected and prompt the user to connect it if it isn't.

In FNprinter the printer output buffer is switched on and a space is sent to it followed by a delete — most printers allow you to delete characters from their buffers. Then there is a tenth of a second wait and the output buffer is checked by ADVAL(-4) to see if it has 63 spaces in it, which means it is empty.

The function gives back a value of TRUE or FALSE which can be put into a variable, or as in lines 140 and 180 used directly in a place where a comparison is being made.

The routine PROCprinter checks if the printer is connected. If it is it exits at line 240. If it is not connected it goes into the REPEAT...UNTIL loop which keeps clearing the buffer, prompting the user to connect the printer and waiting for five seconds before testing the printer again.

```
100 REM * Printer Check *
110 PROCprinter
120 END
130 DEF PROCprinter
140 IF FNprinter:ENDPROC
150 REPEAT *FX15
160 PRINT "Connect printer now!"
170 VDU 7:PROCwait(500)
180 UNTIL FNprinter:ENDPROC
190 DEF FNprinter
200 VDU 2,1,32,1,127,3
210 PROCwait(10)
220 =(ADVAL(-4)=63)
230 DEF PROCwait(T%):T%=TIME+T%
240 REPEAT UNTIL TIME>T%:ENDPROC
```

Title: Character Flip
Language: 6502/Basic
Author: Paul Leach

It is sometimes handy to flip a character through the X or Y axis (or both), especially when all the available characters have been used. For example, a character defined as a man walking left can be flipped to become a man walking right. The

machine code routine below, *flip*, does this very rapidly.

In lines 840 to 890 each of the BRK instructions reserves one byte of memory — avoiding any clash between versions of Basic using the EQU command.

```
100 REM * Character Flip *
110 PROCinit:PROCassem
120 MODE 4:PROCtest:END
130 DEF PROCinit
140 DIM code 256
150 oswrch=&FFEE
160 osword=&FFF1
170 osbyte=&FFF4
180 ENDPROC
190 DEF PROCassem
200 FOR LX=0 TO 2 STEP 2
210 PX=code:[OPT LX]
220 .flip
230 STA char
240 STX XorY
250 JSR getchar
260 LDA XorY
270 AND #1
280 BEQ skp1
290 JSR flipx
300 .skp1
310 LDA XorY
320 AND #2
330 BEQ skp2
340 JSR flipy
350 .skp2
360 JSR redefine
370 RTS
380 .getchar
390 LDX #char MOD 256
400 LDY #char DIV 256
410 LDA #10
420 JSR osword
430 RTS
440 .flipx
450 LDX #7
460 .xlp1
470 LDA defn,X
480 STA temp
490 LDY #8
500 .xlp2
510 ROL temp
520 ROR A
530 DEY
540 BNE xlp2
550 STA defn,X
560 DEX
570 BPL xlp1
580 RTS
590 .flipy
600 LDX #3
610 LDY #4
620 .y1p
630 LDA defn,Y
640 PHA
650 LDA defn,Y
660 STA defn,X
670 PLA
680 STA defn,Y
690 INY
700 DEX
710 BPL y1p
720 RTS
730 .redefine
740 LDY #0
750 LDA #23
760 JSR oswrch
770 .rlp
780 LDA char,Y
790 JSR oswrch
800 INY
810 CPY #9
820 BNE rlp
830 RTS
840 .char BRK
850 .defn
860 BRK:BRK:BRK:BRK
870 BRK:BRK:BRK:BRK
880 .temp BRK
890 .XorY BRK
900 J:NEXT:ENDPROC
910 DEF PROCtest
920 X%=-1:REPEAT
930 VDU 8&FF17;0;&303;&303;&FF;
940 A%=255:X%=X%+1
950 CALL flip:VDU A%
960 PRINT:IF GET
970 UNTIL FALSE:ENDPROC
```

Title: Small Screen
Language: Basic
Author: Andrew Moulden

The two short procedures given below re-program the 6845 CRTC (Cathode Ray Tube Controller) chip to get rid of the sometimes irritating black bars between lines in Modes 3 and 6.

Just run the program and then select between f0 and f1 to switch screens.

```
100 REM * SMALL SCREEN *
110 MODE 3:REM OR 6
120 VDU 19,0,4;0;
130 PRINT "f0 - Small / ";
140 PRINT "f1 - Normal"
150 *KEY0PROCsmall:M
160 *KEY1PROCnormal:M
170 END
180 DEF PROCsmall
190 VDU 23;9,7;0;0;0;
200 VDU 23;4,38;0;0;0;
210 VDU 23;7,31;0;0;0;
220 ENDP
230 DEF PROCnormal
240 VDU 23;9,9;0;0;0;
250 VDU 23;4,30;0;0;0;
260 VDU 23;7,27;0;0;0;
270 ENDP
```


Title: Date Print
Language: Wordwise Plus/Master
Author: Tim Arrowsmith

The VIEW word processor on the Master allows you to automatically insert the date or time using !D or !T respectively. Other word processors like Mini Office II and Wordwise Plus allow you to insert operating system commands into text as embedded commands. But using *TIME means that not only the date but also the time goes into a letter.

But Wordwise Plus has segment programs which can be called from text, so it should be possible to write a program to call osword 14 to load the date and time into ram, and then pull the necessary characters (either for the date, or for the time) out into a string variable.

But there is one problem - osword 14 has a parameter with three options, and you cannot poke data into ram with Wordwise Plus so the parameter cannot be set.

However there is a way around the

problem. By setting the variable B% to the parameter value, and then setting X% and Y% to point to the position in memory of B% we can actually bypass the problem. This is what the second to fifth lines of the segment program below do.

Once the cell has been made we can extract the characters from memory using the ? operator. At the end of the segment program D\$ contains the necessary characters.

Unfortunately there is a discrepancy between my Wordwise Plus rom and the manual which states that you can call a segment program while text is being printed out (which works) and that using the command DOLINE you can insert lines into the output - which doesn't work.

Ideally we should have a

DOLINE D\$

at the end of the program but this

doesn't work. Luckily there is another embedded command PS which means Print String, so at the position that we want the date to be inserted in the text we put the following sequence:

IGseg 0IGps D\$IW

Where the IG means use the green code and IW is the white code and we assume that the program is in segment zero.

```
REM ** WW+ Dates **
B%=0
A%=14
X%=&08
Y%=&04
CALL &FFF1
D$=""
X%=&408
REPEAT
D$=D$+CHR$?X%
X%=X%+1
UNTIL X%=&415
```

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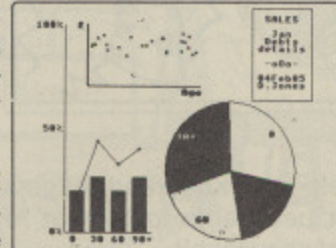
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Through Misty Mountains to Hobbit's secrets

THANKS to help from Koenraad Rutgers, I have at last been able to look at my disc version of the Hobbit.

Even so I had to make do with text most of the time. I have seen the opening picture, but that's all. Still, it was worth it, and I have been having fun. The heart of my explorations have been the linked mazes — the Misty Mountains and the Goblins' tunnels.

Although The Hobbit is pretty long in the tooth now, readers still write in for help, so it's time to lay bare the inner secrets of these two areas.

Hidden in a secret valley in the Misty Mountains is a golden key. I never found any real use for it, apart from it being two per cent of the score. There's much to be said for leaving it until you are on the way home after killing the dragon. Press on instead into the caverns for the ring.

However, here is the shortest route to the golden key from the start of the Misty Mountains. One move East from

Rivendell, you go N, NE, N, SE, D, D, D, D, E, (take key), U, W, and N to bring you back to the starting point.

There are two ways of entering the Goblins' caves, depending on whether you want to use the front or back door. I've mentioned this before, but for the sake of new readers I'll repeat myself: Adding "SOFTLY" to every move in the caves seems to reduce the chances of being captured.

The quick way to the front door (again starting from the Misty Mountains) is E and N, then D. The location description doesn't always show if the insignificant crack has been opened or not, so try going down anyway. If you can't, just stick around and someone will open it.

Whether it's a bug in my version, or one of those irritating random factors that some programmers think are clever I don't know; but sometimes on moving E from Rivendell I find that the "Hard dangerous path in the Misty Mountains" has only three exits (N, W and S) instead of

four (E, N, W and S).

If that happens, move West and enter SAY TO ELROND "READ MAP". This should trigger the appearance of that vital East exit. If this doesn't work when you move E again you will have to quit and restart. The same applies if you're captured too often after escaping from the Goblins' dungeon.

The back door to the Goblins' domain can be found by going E, E and E to Beorn's Hall, then NW and D into the large cavern. This is a trap. In spite of the multiple exits only three are genuine.

Up takes you back out, NE takes you close to the Goblins' dungeon and the rest take you to the big torchlit cavern where you are likely to be captured. If you want, to make the Goblins' task easy, type OPEN DOOR and SE and imprison yourself.

A visit to the Goblins' dungeon is obligatory at some point for Thorin to get his grandad's key, so let's deal with that location and the quickest way to get the ring. Once in the dungeon, dig to uncover the trap door. By that time Thorin will have turned up and be sitting down and singing about gold or doing something equally half-witted.

To shut him up and keep him out of mischief, type GIVE SWORD TO THORIN, SAY TO THORIN "BREAK TRAP DOOR", (I had to repeat this request more than a dozen times once), SAY TO THORIN "DROP SWORD". He'll then grab the key.

Next you must enter TAKE SWORD, (vital — it's a lamp), SAY TO THORIN

Helpline

Jonathan Ormond and Stuart Booth offer help to D.R. Hunt in **Circus Adventure**: Examine the pile of rope to discover it's a safety net. The clown will help you erect it by the cage.

Where the petrol and snorkel are concerned: Once the generator has been started, you can syphon petrol from it using the snorkel.

To open the maintenance wagon door, you need the metal bar from the other end of the tightrope. Finally, the clown will follow you if you wear the costume.

Here's help for Paul Gough in **Spiderman**: — There are three places where gas is released (two in the dome). With a single gem only, one outlet has to be plugged with beeswax; ask Dr. Strange's astral projection for help by banging your head until he relents.

In the other two cases REMEMBER NIGHTMARE will provide the energy. Need beeswax? Wave the fan outside the dome with the mesh.

The Elf has delivered help for Mark Hilton who couldn't proceed in **Ghost Town**. He writes as follows: The key to shoeing the horse is in the jail, the key to the jail is in the stable; the solution is magnetic. When the horse is shod mount and say the right word. I'd guess Giddyap.

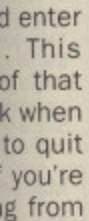
Matthew Ward is stuck in the black maze in **Castle of Riddles**: Spectrum or Rainbow will let him out.

He also wants to know about the wooden rod in **Twin Kingdom Valley**: It can be found by going down the grating, and is in the passage just before the twisty maze. Wave it in the end game to bridge a chasm.

Problem Corner

Vincent Poli would like to know how to become worthy to pass N in the oak panelled room that has the chest with the hour glass in it in **Old Father Time**. Can someone help, please.

Henry Dol of The Netherlands has problems in **Quondam** — who hasn't? He's in the kitchen and can't get rid of the goblin: What's the answer?



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Temple of Vran — the sequel — is harder, though again the first puzzle is nice and easy. Here, careful mapping and exploration are essential or it will be a long time before you find the right combination of things and places that

◀ From Page 111

will take you deep into the game.

By this time, I was beginning to wonder about the joys of combat: It's a personal matter, but I prefer my adventures to be cerebral rather than gladiatorial.

The Final Mission escalates the difficulty: Careful thought and manipulation of objects are essential here. In the early mapping moves, be prepared to die frequently!

Indeed, it was a long time before I bought my freedom; the penny (or something) that dropped took a great deal of courage — probably because normally I'm not at all superstitious. I must admit I'd give this set of adventures a four star rating.

I enjoyed meeting people at the London show: Readers may like to know that there's a chance of Superior producing an adventure compilation. Look out for a review of the new adventure Oxbridge by Tynesoft next month.

Until then, happy adventuring. ■

Hall of Fame

GRATEFUL thanks to Fred Ingram for excellent maps of **Countdown to Doom**, **Kingdom of Hamil**, **Philosophers Quest** and **Castle of Riddles**.

Duncan Page aged 10 took three hours to solve Micro Power's Imogen. He sent me a solution.

Ian Rainey's **Castle Quest** solution continued:

To get out of prison, pick up the stool, and move beneath the torch and, while jumping, throw the stool upwards to knock the torch down. Stand on the stool to get onto the porch above the door, and from there throw the torch at the bed: The guard will run in and you can then jump down, grab the stool and leave.

Store the stool and (using jump

and up) climb the ladder just left of the prison. When the guard goes past come down pick up your objects and kill the guard with the sword. You can now go back up the ladder safely.

At the top turn right, go to the edge of the wall and down the ladder there. At the bottom, go left to the large gap and store your sword. Jump off the edge and land above where you picked up the torch.

Make sure that the line under the stored objects is under the sword before jumping off to the right. Recover the sword and kill the guards (beware, they move quickly), then collect the aqualung on the left of the screen.

To be concluded.

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How to join:
See Page 51

CEEFAX

Guide

July 3 to 9

Index1/2 COMPILE a full printed Ceefax
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ETFS Use Teletext across an Econet
Manual network. This 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.

PerCent Calculate mark-up rates and profit margins. As any retailer will know, to add VAT to the selling price of an item is not a simple case of adding on 15%. Similarly, the relationship between the percentage markup and the percentage profit is not as straightforward as it may seem. "PerCent" offers an explanation and performs the necessary calculations.

DualScr1 Animated displays can be
DualScr2 achieved by storing two screen images in memory at the same time. Switching between them saves the time taken to create the second display. "DualScr" gives you the routines needed to achieve this in screen modes 2, 4, 5 or 6.

T/OSB25 Part 25 of our BBC assembler
B/OSB25 and machine-code guide. This leads you through the workings of the inbuilt BBC micro 6502 assembler in a series of around 26 parts.

July 10 to 16

Solar Calculate the position of the
SolInfo sun in the sky from any point on the globe at any hour of

Software is currently transmitted for a period of one week. Downloading can take place from Friday evening to the following Thursday evening. As the updating takes place on a Friday, we do not advise attempting to download software between 9am and 7pm on Fridays. The program details given are provisional.

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T/OSB26 The final part of our course
B/OSB26 guiding you through the intricacies of machine-code programming.

T/ATS09 Using these routines, it is
B/ATS09 easy to discover a lot of useful information about any particular Ceefax page. Teletext receivers can be told not to display a particular page, or not to display the header row. They must also respond slightly differently if the page is a news-flash or a sub-title. ATS09 looks at how such information is sent to the decoder, and how to interpret it.

ViewRlr

Lining up text is easy with this popular machine-code program from the pages of *The Micro User*. It provides View with a cursor on its ruler line.

July 17 to 23

EvDump EvText

An event-driven machine-code screen-to-printer dump, enabling screens to be printed from a running program.

SD

A single-density MODE7 screen-to-printer dump. Choose between white or black background. (Epson MX80 compatible).

DD

A slower, but clearer, double-density MODE7 screen-to-printer dump.

Drv/Src Drv/Obj

A View printer driver utility providing such features as underlining with the early Epson MX80's which do not have this feature as standard.

JoyTest

Make sure your joysticks are working correctly. This routine will operate with any item using the A-to-D converter socket. An on-screen trace is displayed reflecting the movements of the joystick or other device.

Bank Instr

Keep track of your bank balance without having to wait for a statement to be sent. Enter the transactions as they occur. The computer will produce a statement, including Standing Orders, any time you wish.

BOS

This on-screen Basic editor from the pages of *The Micro User* will help with the tedium of tracking down programming errors or mis-typed listings.

◀ From Page 113

July 24 to 30

- T/ATS10** Continuing our series for Basic programmers wishing to use teletext broadcasts in their own programs, part 10 looks at how to detect the presence of a teletext adapter, and whether it is receiving a signal or not.
- B/ATS10** A computer version of the game of Solitaire.
- Sol1** Turn your micro into an advanced calculator. This package implements all the features of the more expensive calculators, as well as speech, definable program memories, ready to use conversion factors, and many more.
- Sol2**
- Cal/Inf**
- Calc1**
- Calc2**
- Spool7** Convert any Mode 7 screen, including teletext pages, into a text-only file suitable for

Dino

dumping directly to any printer, or to be loaded into a word-processor for further manipulation.

A superb pre-historic romp from the pages of *The Micro User*.

KeyEcho
Talking
DemoKey
Speller

accounts, it can be modified to suit most purposes.

Let your micro speak. This machine-code routine will read to you each key as it is pressed. An ideal program for those with sight difficulties, for children who have not yet mastered letter recognition, or for the times when you don't want to take your eyes off the document you are copying. A spelling test game is also included. (Requires the Acorn speech system).

A View wordprocessor printer driver for Juki printers, allowing owners of such machines to use the additional facilities of their printers within any View document.

Collect the eggs in this ladders and levels game from the pages of *The Micro User*.

July 31 to August 6

TVdiary
TVprogs

Keep a record of the TV programmes you want to watch or record. This software will offer you the Ceefax TV listings for you to make your selections. Programmes are sorted into date and time order, and any overlapping presentations are indicated. A schedule for you to set your video-recorder is also listed.

Account

A program to help with the financial organisation of clubs and societies. Originally written for use with church

Juki

Hunkie
Egg

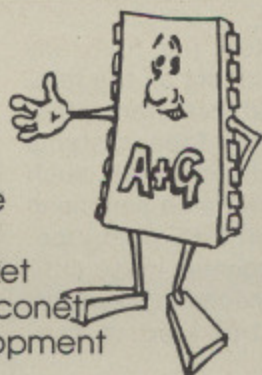
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SEPTEMBER 1986: Pear Picker, avoid Plastered Patrick in your attempts to become a professional fruit picker. Basic Events, control events from Basic. Learner, teach your word processor to remember those key sentences. View Preview, a useful program to preview pages of View files. VDU19, programs to demonstrate the illusion of animation. **BONUS PROGRAMS:** Rockfall and Any Questions (Mathematics and General studies).

OCTOBER: Witch Hunt, search for the 42 keys of Transportal. Coloured Lights, an educational program to explain the GCOL effects. Mode 7 Dumps, screen dumps for Epson compatible or Olivetti Inkjet printers. Text Compressor, a clever utility to get long messages into short memory. Auto Run, star run Basic programs. Weather Vane, the program to complement the Body Building wind direction project. **BONUS PROGRAMS:** Quasimodo's Quest and Any Questions? (Music and Computer Studies).

NOVEMBER: Maltese Cross, play this superb domino simulation. Life, the generation game to produce colourful patterns. Star Print, a clever routine to give easy access to print styles. View Ruler, a handy program to provide View with a cursor on its ruler line. Shadows, an educational program to throw some light on the subject. Dual Screens, a routine to store

two screens in memory at once. BOS Editor, a superb on-screen editor for Basic programs. Body Building, three programs for your pressure sensitive devices. **PLUS three more files for Any Questions (Office practice, DIY, and Tables).**

DECEMBER: Santa's Sleigh, help Santa in his gift warehouse - but watch out for the monster spider. Christmas Box, a superb game of logic to test the old grey matter. Tables, take the tedium out of multiplication tests with this short but effective routine. Flood Fill, a versatile fast fill routine. Scroller, a machine code program to provide fast scrolling in any direction. Speech, a software utility to get your micro to talk back to you. Break Recover, hold on to variables when Break is pressed. Body Building, software for the relative humidity measure. **PLUS Two more files for Any Questions (Arithmetic and Home Economics).**

JANUARY 1987: Ayo, the game of Africa, needing strategy and foresight. Flying Fingers, put your typing to the test in this fast arcade style test. Function keys, access 16 function keys while retaining full cursor editing. Disassembler, handles all 6502 and CMOS 65C02 instructions. ADFS Menu, step your way quickly through the hierarchical menu system. Tweetie, illustration of some of your micro's superb graphics capabilities. Body Building, the program for your BBC Micro drumkit. **PLUS Two more files**

for Any Questions.

FEBRUARY: Rhondo, a fast-action shooting gallery spectacular. 6502 Games, a demonstration of collision detection routines. Choice, develop your child's decision making skills. Map test, grid reference game Date Stamp, save time when filing. List Hold, stop that scrolling screen. Wordwise Plus Index, indexing plus file description. Compressor, variable name compressor. Body Building, super fast A to D converter and multi channel oscilloscope. **Plus Save a life, the life-saving tutorial.**

MARCH: Dino, ride the gobblosaurus in this prehistoric romp. Birthday Mystery, discover the implement of a serious crime. Half-Life, a radio-active random decay simulation. Compressor II, create multi-statement lines. Teletext Carousel, a utility for the Morley Teletext Adapter. Hac Man, the Jet Set Willy II Upgrade. Command Clashes, rom problem solved. Body Building, software for temperature measurement. 6502 Games, collision detection demonstration. Library, three useful routines.

APRIL: Hunkie Egg, collect the eggs in our fast action Easter game. Biomorphs, create creatures with this fascinating simulation. Disc Protection, a utility to stop piracy disc. Counting, the program for the DIY keyboard. 6502 Games, make your sprites follow the leader. **Plus**

four more routines from the Library.

MAY: Ducks Dinner, help Daffy Duck get his dinner and avoid the poison skulls. Ludo, an excellent implementation of the popular family game. Interactive Programs, incorporate the wealth of teletext into your programs. Disc Cataloguer, find misplaced files fast. Sid and the Beetle, a simple teaching aid for logical thinking. 6502 Games, programs to get sprites moving in a window. **Plus four more routines from the Library.**

JUNE: Prof McBrolly, pit your wits against the goblins in this race against time. Checksums, type in listings in confidence. Raglan, design your own patterns to any size. Prommer, run your own programs from rom. Button, double the firepower of your Compact. Cansim, a Canadian agricultural simulation. Body Building, the software to drive your video digitiser. **Plus four more routines from the Library.**

JULY: Diamond Quest, dodge boulders to collect the jewels. Espionage, infiltrate an enemy base. Printer Buffer, work while you print. Super Line Editor, powerful Basic line editor. Encrypt, a disc-based utility. Basic Repair, cancel those Bad program errors. Basdat, bytes to Basic - a unique data creation program. Logo-Tank, train your imagination and visual memory. Computers in Action, verify your payslip. ***Reply, add new star commands. Plus more routines**

from the Library.

AUGUST: Survive! Fast action beat the computer or two player game. Address Book, short and powerful utility. Ram Arrays, increase your Basic capacity by 8k or more. Computing in Action, wallpaper calculator. Midi Revealed, the secrets of the music interface. Midi Interfaces, connect your micro to the best sound equipment. Key, review of database with graphical power. Hac Man, revamps Snapper. Programming Adventures, more on how to create your own quests. Gallery, more superb colour pictures. **Plus more routines from the Library.**

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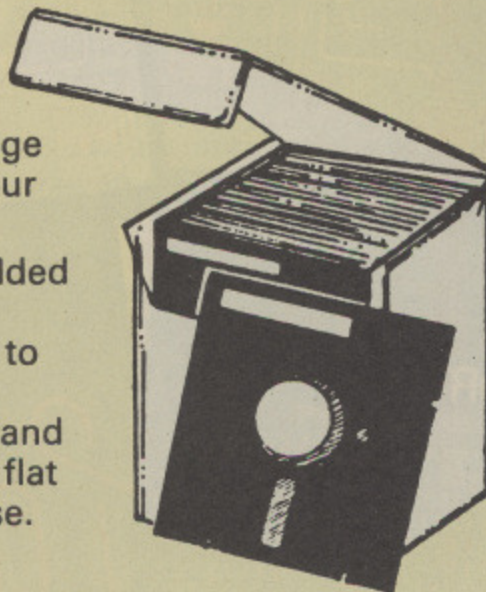
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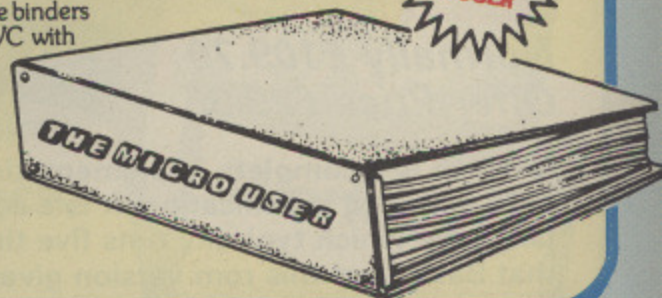
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TO ORDER TURN TO THE FORM ON PAGE 133

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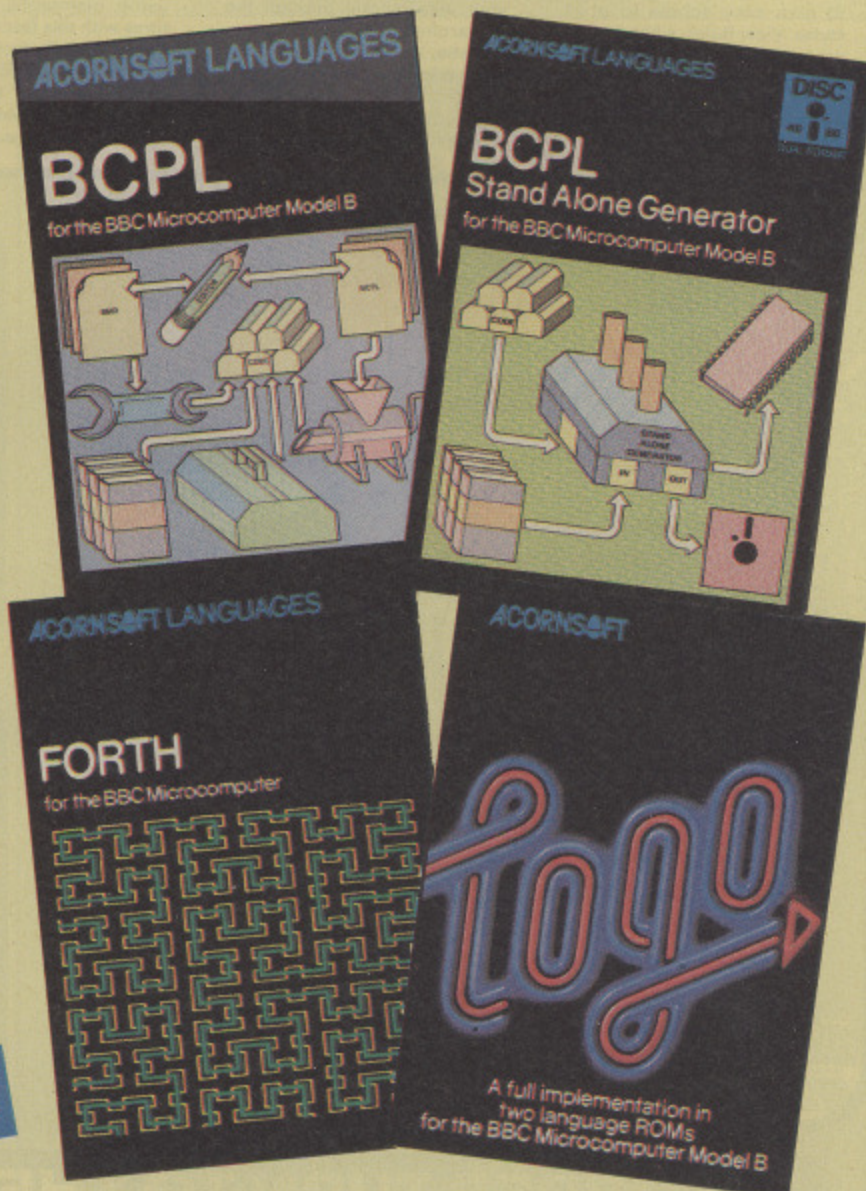
LANGUAGES

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● BCPL is the most flexible of modern structured languages and is the easiest to learn. It is particularly good at handling Input and Output, and is perfect for writing utilities, screen editors, control systems – even games software. The package includes a language rom, a disc containing compiler, screen editor, 6502 Assembler, utilities – and a 450 page User Guide.

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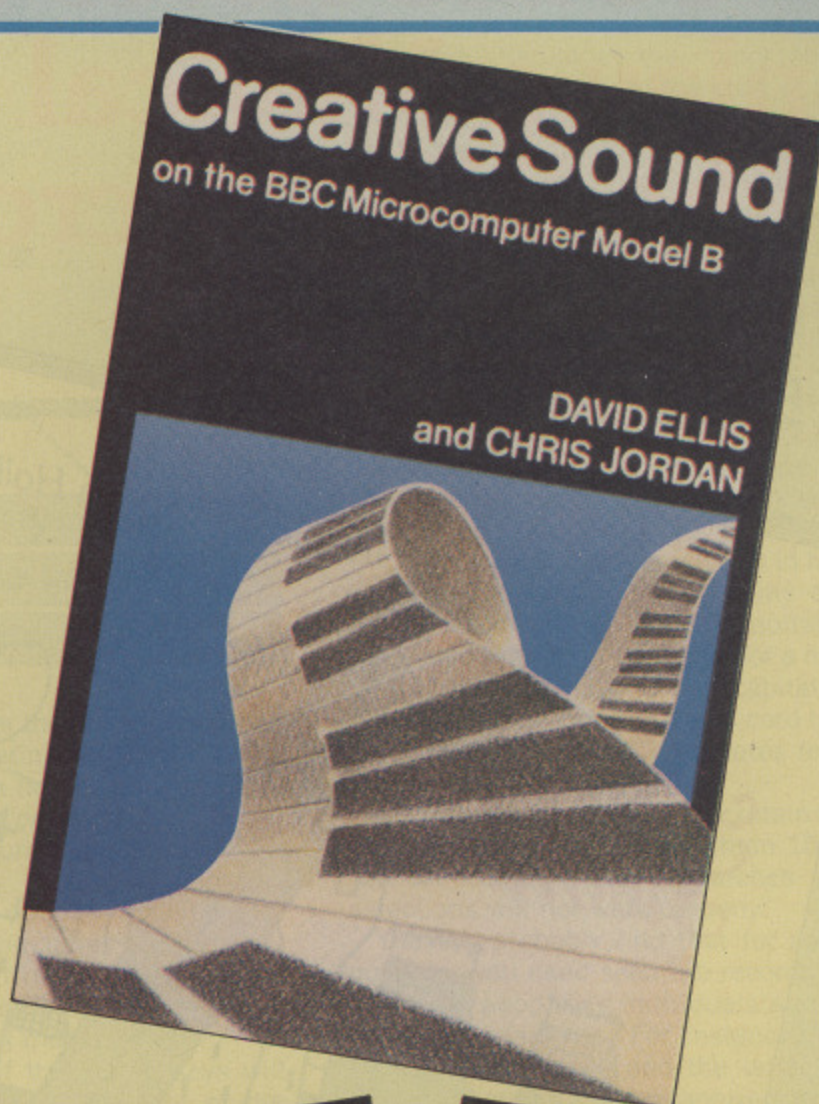
Creative Sound is a beautifully presented 320 page book, packed with everything you need to know about music on the BBC Micro.

The authors are musician, composer and programmer David Ellis, and Chris Jordan, who designed the BBC Micro's sound system as well as the Acorn Music 500 and 5000.

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EDUCATION

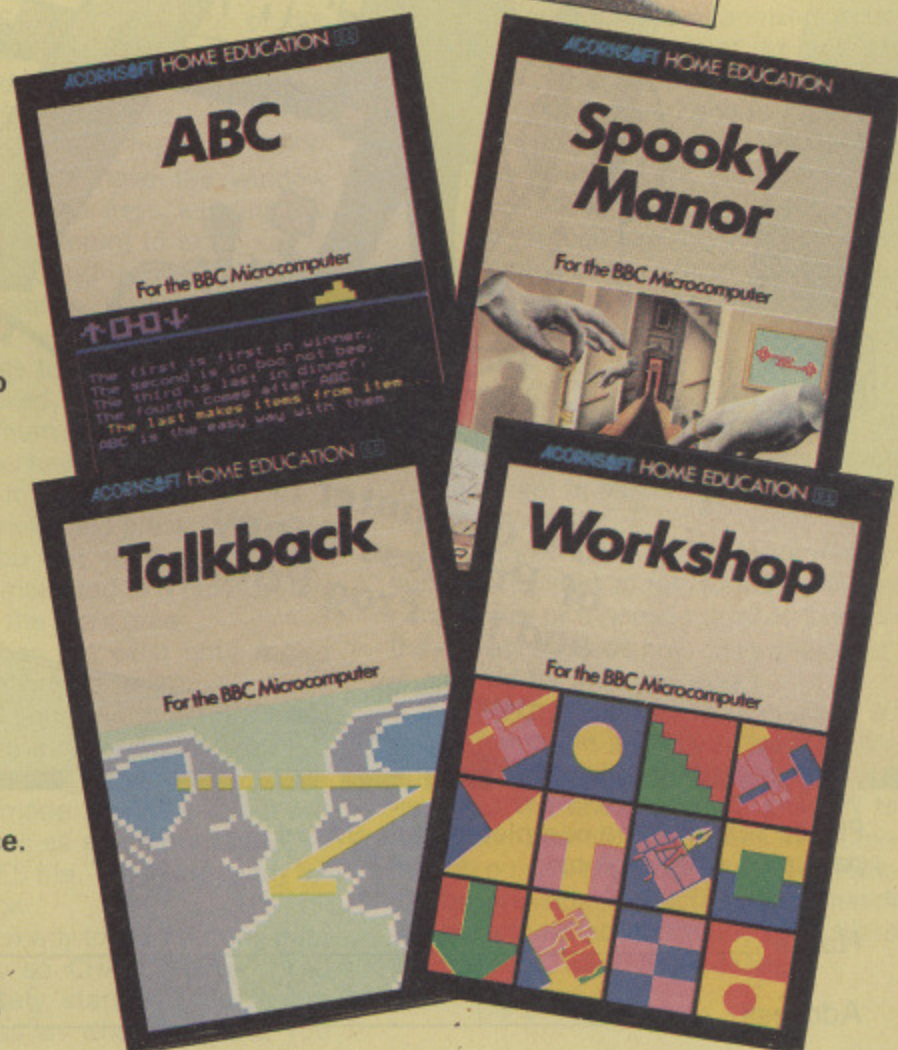
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TO ORDER TURN TO THE FORM ON PAGE 133

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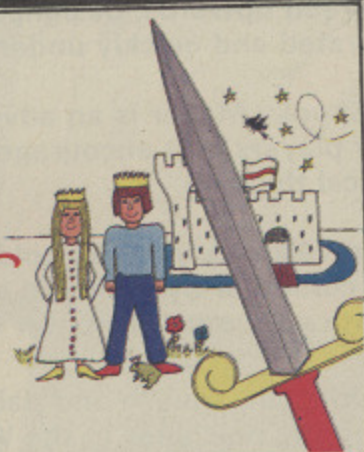
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MU8

You've got them on your list...



ARE you still sending after-Christmas cards to people you neglected to put on a list last December? Is your sister-in-law no longer speaking to you because you have once again forgotten her birthday? Has your scraps-of-paper address-keeping system finally broken down?

Help is at hand, even for the computer-wary, with the programs described here. With them you can keep on disc all your important information on friends, family and business contacts. The programs allow you to design your own screen and present this information in index card form.

You can add, delete and update entries and use fragments of information as the basis for a search. You can select sets of entries having something in common (for example surname, Christmas card list, birth month), then either print the names and addresses on to labels or save them back to disc in a form readable by word processor.

The two complementary programs are Design and Addrbk.

Think of the entire set of address information on disc as a box of index cards. It consists of a set of records, each corresponding to an index card and every record is made up of several fields — spaces for individual items of information to be written on the card, such as name, birthday or one line of address.

Note that just as on an index card, not every field needs to be completed: Fields may be left empty.

Type in and save Design and Addrbk, using the checksums to ensure you have made no mistakes. When you are satisfied the programs are correct, copy them both on to a freshly formatted disc.

First run the Design program to create your screen format. The current field is indicated by a cross and by the status information at the bottom of the screen. Design starts up with field zero active: This is always "Record" and the window length is fixed.

There are two modes of operation: label and field. The format allows you to alter the field label while the latter allows you to move both label and window together, or the window only, or to alter the size of the field window.

If no word in the status part of the screen is highlighted, you are in label

Bruce Goatly shows you how to keep your friends

mode and can alter the name of the field by typing and deleting as normal. While in label mode, the next or previous field can be selected by pressing f0 or f1. If in doubt, press Return, which exits field mode.

There are three options in field mode: You can move the label and window together, move the window only, or lengthen or shorten the window. All are entered from label mode.

Pressing one of the cursor keys will highlight CURSORS at the foot of the screen and allow you to move both the label and window together around the screen. Press Return to exit.

By pressing Copy you highlight COPY/CRS and can then move the window around with the cursor keys, keeping the label fixed. Press Return to exit.

Pressing Tab highlights TAB,<>. Using the < and > keys shortens or lengthens the window. There are a couple of things to note: The length for field zero is fixed, and once a window exists its minimum length is 1 — in other words, once you have created a field you cannot delete it.

To create a new field press f0 in label mode until you get to the first non-existent field, indicated by a cross at the bottom left of the work area.

This field does not exist until it has been assigned a field length with Copy and >, even if you have given it a label and moved it to a desirable location.

To exit the program press Escape while in label mode: The new layout will be saved to disc as an empty ADDRESS file and a BOXES file. These are ready for use with Addrbk.

Now you are ready to start putting data into your file, so CHAIN"Addrbk". You can immediately start to type in the name, address or whatever data you wish: Press f2 and the data is saved to disc.

A new record number will appear at the top of the screen — you don't need to remember the number — to reassure you that the record has been saved to disc.

UTILITY

B**B+****M**

Pressing Return or the cursor down key moves the cursor to the start of the next field and the cursor up key moves you to the start of the previous field. The order of the fields is determined by the order you created the fields in Design.

For editing purposes you will find that the Delete key works in word processor fashion, and the Copy key can be used to insert a space at the cursor position, leaving the cursor at the space just made.

Typing over a mistake will correct it — it's rather like being in overtype as opposed to insert mode in a word processor.

It is important to be consistent in how you enter the information in any one field. For example always use capital or lowercase letters for names — not a mixture of the two: always use capital or lower case Y for the Christmas card list, always use an oblique (/) in dates (or a full stop, or whatever).

It's also important to omit or retain the leading zero in months less than 10. If you are not consistent, searches and selections will not work properly.

You will probably find that for some purposes you need separate records for the same people as individuals and as couples or families: For instance, the former for birthdays and the latter for family Christmas cards or anniversaries.

To save retyping most of the details, get the original card, make the changes you need to the screen and re-save it to the file with f2. Pressing f4 will clear the current field window and pressing f5 will clear them all.

Before you can use a record you must find it — think of the box of index cards. To do this type in a small piece of information (the target) in the appropriate field, leave the cursor in that window, and press f0.

The program will then search through the ADDRESS file and try to find a match for the target in each record, but only in the target's field.

The target could be a forename or surname (or part of the surname) in the name field, or a house name or town on the correct address line. Only one target is allowed for any one search.

If a match is found, the screen will fill with information and the message Continue search? (Y/N) will appear. If the record is the one you want, press N to finish the search and retain the information on screen; otherwise, keep looking by pressing Y. Each further match will be offered as it is found until there are no more, when the message:

End of file - press <Space>

appears. Press space and the information will be cleared from the screen. To terminate a search prematurely press Escape and the program will restart.

Turn to Page 120 ►

◀ From Page 119

Eventually you will want to print your information, so after setting up the search target and getting the printer ready to print, press f6. The names and addresses of selected records will be printed out, in a format suitable for labels 1.5 inches apart.

You can also create an Ascii file of information — just set up the search target as before and press f7. Instead of being printed out, the names and addresses of selected records will be transferred to another file (called SELECT) on the same disc, in a form suitable for reading by a word processor such as Wordwise, View (using READ) or Mini Office II.

This is useful if your labels are not exactly 1.5 inches apart. You can make fine adjustments to the spacing, or you can organise a mail merge facility for form letters.

Once your address disc gets fairly full you may encounter a Disc full or Can't extend error message when transferring records. At that stage you should consider starting a new disc. The maximum number of records the file can hold depends on the disc system you have,

but with single-density systems a 40 track disc will hold about 400 records, and an 80 track disc about 800.

Double density systems vary in

their capacities.

Finally, after every session when you have made changes to the ADDRESS file, copy it to another disc.

Listing 1

```
100 REM Screen Designer
110 REM by Bruce Goatly
120 REM (c) Micro User
130 mode=1:ON ERROR GOTO370
140 MODE7:VDU23,1,0;0;0;0;
150 MODEmode:max=79-40*mode:PROCsu
160 IFnobx EORoad VDU7:PRINT"Disc mus
t contain both "bx" and "ADDRESS files
, or neither file.:PROCclo:END
170 IFnobx PROCsvars ELSEPROCrvs
180 IFnr<>VDU7:PRINT"Use fresh ADDRES
S file only.:PROCclo:END
190 PROCps:b=0:REPEAT:PROCcrs
200 REPEAT:VDU4,23,1,0;0;0;0;:*FX21
210 ORX=RX:oSX=S:oTX=T:oUX=U:AX=FNi
220 IFAX>31IFAX<1281Fb>0 PROCpt:PROCp4
230 IFAX=9IFb>0 PROCadff
240 IFAX=135IFV>0 PROCmovf
250 IFAX>135IFAX<140 PROCmovlf
260 UNTILAX=27ORAX=148ORAX=149
270 lx?b=RX:ly?b=S:bx?b=T:by?b=U:L?
b=VX:LS(b)=T$
280 IFAX=1481FV>0IFb<mf b=b+1:IFL?b=0
IFb-1>N HX=HX+2
290 IFAX=149IFb>0 b=b-1
```

```
300 VDU5:MOVE(32+16*(mode=0))*(RX-1),(
32-SX)*32-4:PRINTcrs$
310 UNTILAX=27:N=-1:REPEATN=N+1
320 UNTILL?N=0 ORN=mf+1:N=N-1
330 XX=OPENOUTbx$:YX=OPENOUT"ADDRESS"
340 BPUT#YX,N:FORD=1TO5:BPUT#YX,0:NEXT
350 FORD=0TON:BPUT#YX,L?d:NEXT
360 FORD=0TON:BPUT#XX,lx?d:BPUT#XX,ly?
d:BPUT#XX,bx?d:BPUT#XX,by?d:PRINT#YX,LS(
d):NEXT
370 PROCclo:MODE7
380 IFAX<>27REPORT:PRINT @ ";ERL
390 END
400 DEFPROCsu:mf=35:DIMlx mf,ly mf
410 DIM bx mf,by mf,l mf,LS(mf)
420 VDU23,1,0;0;0;0;:VDU23,254,8,8,8,8
7F,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8
,888,822,888
430 crs$=CHR$254:shd$=CHR$255
440 IFmode=1 VDU19,3,4;0;:COLOUR131:CO
LOUR2
450 VDU28,0,21,max,0:CLS:VDU26:GCOL3,1
460 e=mode+1:*FX4,1
470 nobx=FALSE:*FX229,1
480 noad=FALSE:*FX225,148
490 IFmode=1 bx$="BOXES"ELSEbx$="BOXES
0"
```

Turn to Page 123 ▶

SOLID STATE & MECHANICAL DESK TOP DATA SWITCHES FULL TWELVE MONTHS GUARANTEE

"PRINTERSHARER" Several Micros to one Printer
"PRINTERCHANGER" One Micro to several Printers
"PRINTERCROSSOVER" Two Micros to two Printers

FOR LONG CABLES

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Model	Pins	Way	Price
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BPS3C ABOVE WITH INTERLINKS			£75
BPS6	26 (BBC)	6	£110
BPS6C ABOVE WITH INTERLINKS			£140
APS2	36	2	£75
APS3	36	3	£85
IPS2	25D(IBM)	2	£70
IPS3	24D(IBM)	3	£80

PARALLEL PRINTERCHANGER

Model	Pins	Way	Price
BPC3	26 (BBC)	3 way	£60
APC2	36	2	£75
APC3	36	3	£85
IPC2	24D(IBM)	2	£70
IPC3	25D(IBM)	3	£80

PARALLEL PRINTERCROSSOVER

Model	Pins	Way	Price
BPX	26 (BBC)	2-2	£70
APX	36	2-2	£95
IPX	25D(IBM)	2-2	£85

SOLID STATE AUTOMATIC

Model	Pins	Way	Price
APS2A	Parallel 36 pin	2 way	£105
APS3A	Parallel 36 pin	3 way	£115
APS4A	Parallel 36 pin	4 way	£150
IPS2A	Parallel 25D (IBM)	2 way	£100
IPS3A	Parallel 25D (IBM)	3 way	£110

SERIAL PRINTERSHARER/CHANGER

Model	Pins	Way	Price
SR232	25D-PCB	2 way	£55
SR233	25D-PCB	3 way	£65
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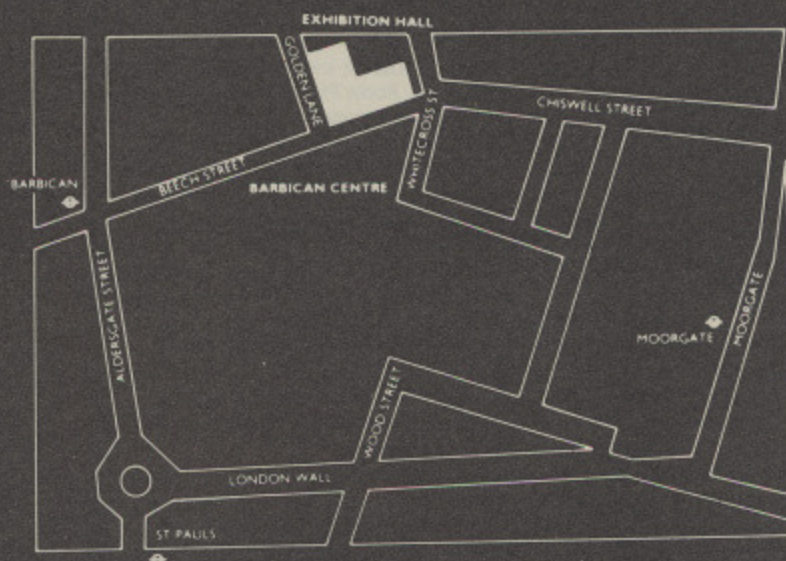
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* Delete as necessary

MU2

◀ From Page 120

```

500 XX=OPENUPbx$:IFX%=0nobx=TRUE
510 YX=OPENUP"ADDRESS":IFY%=0noad=TRUE
520 ENDPROC
530 DEFPROCsvars:N=0:LS(0)="Record"
540 ?l=4:?lx=1:?ly=1:?bx=8:?by=1
550 FORb=1TOmf:LS(b)="":l?b=0:lx?b=1
560 ly?b=21:bx?b=2:by?b=21:NEXT
570 nr=0:H%=5:ENDPROC
580 DEFPROCrvars
590 N=BGET#YX:nr=BGET#YX+256*BGET#YX
600 H%=-1:PTR#YX=6:FORb=0TON:l?b=BGET#
YX:H%=H%+l?b+2:NEXT
610 FORb=N+1TOmf:l?b=0:lx?b=1:ly?b=21:
bx?b=2:by?b=21:NEXT
620 FORb=0TON:INPUT#YX,LS(b):lx?b=BGET
#XX:ly?b=BGET#XX:bx?b=BGET#XX:by?b=BGET#
XX:NEXT
630 CLOSE#0:ENDPROC
640 DEFPROCps
650 FORb=0TON:PRINTTAB(lx?b,ly?b)LS(b)
TAB(bx?b,by?b)STRINGS(l?b,shd$):NEXT
660 COLOUR128
670 PRINTTAB(0,22)"Field no."TAB(13,22)
"Label:"TAB(0,24)"Field length"TAB(max
DIV2,24)"Record length"
680 PRINTTAB(0,27)"CURSORS move both"

```



100 = 0 0	510 = 7B6C 9	920 = B66D C
110 = 0 0	520 = ED0F 9	930 = BFBA 7
120 = 0 0	530 = 9553 E	940 = 96E 7
130 = 9606 6	540 = B704 A	950 = 4324 D
140 = A8DF 1	550 = 609B 4	960 = C3FC 7
150 = B8FE 4	560 = 1B3D E	970 = E8B3 3
160 = A911 A	570 = 8A2A 9	980 = CF3F 2
170 = 2317 A	580 = 1E5 7	990 = 2BB5 0
180 = 1CFE 0	590 = 94A 9	1000 = C7E2 9
190 = 17FD 0	600 = E82B E	1010 = A8B9 B
200 = AB1A B	610 = 9247 6	1020 = 1466 8
210 = 6E99 B	620 = 4199 7	1030 = 5C13 0
220 = 6DA0 7	630 = F1F8 E	1040 = C3FC 0
230 = ADD3 E	640 = 5A1A 3	1050 = A8CA 7
240 = E0DD 9	650 = B71F 9	1060 = 9168 8
250 = 1FC8 B	660 = A76B 1	1070 = 71E7 E
260 = B2A6 2	670 = F0EC F	1080 = ED0F 2
270 = CADF 0	680 = 9305 9	1090 = FCDD D
280 = 57E3 5	690 = F6C6 8	1100 = 40CE 0
290 = 15A 7	700 = BD0C B	1110 = B489 6
300 = 755B 3	710 = 678E 6	1120 = ED0F 2
310 = B688 D	720 = ED0F 4	1130 = 2C8D 7
320 = 7247 7	730 = 8649 4	1140 = D210 1
330 = 2EAF E	740 = B264 C	1150 = 2BB5 B
340 = EF3D F	750 = 1C7D 4	1160 = 5A26 1
350 = FAC0 9	760 = 510B 9	1170 = 1422 3
360 = EDCE D	770 = 2ABB F	1180 = A1D8 5
370 = 49D0 8	780 = 678E F	1190 = 13E 3
380 = 2646 1	790 = ED0F 4	1200 = C3FC 2
390 = FD2E C	800 = 2AFD 5	1210 = B66A C
400 = F4F 1	810 = F857 F	1220 = ABD7 A
410 = FE4D 9	820 = 5533 7	1230 = 4C0B D
420 = 7D83 3	830 = C252 8	1240 = 294B B
430 = 25A0 4	840 = 91D 4	1250 = E916 7
440 = 9455 4	850 = ED0F 5	1260 = ED0F E
450 = CD8A D	860 = 6239 D	1270 = 5733 9
460 = F56C 4	870 = D9B7 D	1280 = 4C0 F
470 = F6C9 0	880 = 3A9D 5	1290 = 3EE7 9
480 = 373F 4	890 = 678E 2	1300 = 8AF4 B
490 = AEA9 F	900 = ED0F A	1310 = 44E8 D
500 = 40A2 D	910 = 116E A	1320 = 9CA2 8

```

AB(max DIV2,27)"COPY,CRS move window"
690 PRINTTAB(0,28)"TAB,<> size window"
TAB(max DIV2,28)"RETURN fix size/posn"
700 PRINTTAB(0,29)"f0 next field"TAB(m
ax DIV2,29)"f1 previous field"TAB(0,30)"
ESCAPE leave program and file fields";
710 IFmode=1COLOUR131
720 ENDPROC
730 DEFPROCcrs
740 RX=lx?b:SX=ly?b:TX=bx?b:UX=by?b:VX
=l?b:TS=LS(b)
750 VDU4,23,1,0;0;0;0;
760 PRINTTAB(RX-1,SX)crs$:COLOUR128:CO
LOURmode+1:PRINTTAB(10,22);b;"TAB(20,2
2)TSSTRING$(max-18-LENTS," ")
770 PRINTTAB(13,24);VX;"TAB((max DIV
2)+14,24);H%";
780 IFmode=1COLOUR131
790 ENDPROC
800 DEFPROCpt
810 IFAX<>127 IF19+LENTS=max ENDPROC
820 IFAX=127IFLENTS>0 TS=LEFT$(TS,LENT
S-1):IFSX=UXTX=TX-1
830 IFAX<>127IFSX=UX:IFTX+VX<max TS=TS
+CHR$(TX+1)
840 IFAX<>127IFSX<>UX:IFRX+LENTS<max T
S=TS+CHR$(RX)
850 ENDPROC
860 DEFPROCp4
870 PRINTTAB(RX-1,SX)crs$TS"TAB(TX,U
X)STRING$(VX,shd$)"
880 COLOUR128:COLOURmode+1:PRINTTAB(20
,22)TS"TAB(13,24);VX;"TAB((max DIV2)
+14,24);H%";
890 IFmode=1COLOUR131
900 ENDPROC
910 DEFPROCadjf
920 a$="TAB,<>":T1=0:T2=28:PROCinv
930 REPEAT
940 IFINKEY-103IFVX>1VX=VX-1:H%=H%-1:P
ROCp4
950 IFINKEY-104IFTX+VX<max VX=VX+1:H%
H%+1:PROCp4
960 UNTILINKEY-74:PROCinv:ENDPROC
970 DEFPROCmovf
980 a$="COPY,CRS":T1=max DIV2:T2=27:PR
OCinv
990 VDU5:REPEAT
1000 IFINKEY-26IFTX>1 TX=TX-1:PROCemov
1010 IFINKEY-122IFTX+VX<max TX=TX+1:PR
OCemov
1020 IFINKEY-58IFUX>1 UX=UX-1:PROCemov
1030 IFINKEY-42IFUX<21 UX=UX+1:PROCemov
1040 UNTILINKEY-74:PROCinv:ENDPROC
1050 DEFPROCcmov
1060 PROCmp5(oRX,32-oSX,oTX,32-oUX):PRO
Cmp5(RX,32-SX,TX,32-UX)
1070 oRX=RX:oSX=SX:oTX=TX:oUX=UX
1080 ENDPROC
1090 DEFPROCmp5(rX,sX,tX,uX)
1100 MOVE(32+16*(mode=0))*(rX-1),sX*32-
4:PRINTcrs$TS
1110 MOVE(32+16*(mode=0))*tX,uX*32-4:PR
INTSTRINGS(VX,shd$)
1120 ENDPROC
1130 DEFPROCnovlf
1140 a$="CURSORS":T1=0:T2=27:PROCinv
1150 VDU5:REPEAT
1160 IFINKEY-26IFRX>1IFTX>1 RX=RX-1:TX=
TX-1:PROCemov
1170 IFINKEY-122IFRX+LENTS<max IFTX+VX<
max RX=RX+1:TX=TX+1:PROCemov
1180 IFINKEY-58IFSX>1IFUX>1 SX=SX-1:UX=
UX-1:PROCemov
1190 IFINKEY-42IFSX<21IFUX<21 SX=SX+1:U
X=UX+1:PROCemov
1200 UNTILINKEY-74:PROCinv:ENDPROC

```

```

1210 DEFPROCclo:CLOSE#0
1220 VDU23,1,1;0;0;0;:FX4,0
1230 *FX229,0
1240 *FX225,1
1250 *FX12,0
1260 ENDPROC
1270 DEFPROCinv
1280 VDU4,23,1,0;0;0;0;:COLOUR(128+e):C
OLOUR(mode+1-e)
1290 PRINTTAB(T1,T2)a$:COLOURmode+1:COL
OUR(128+3*mode)
1300 e=e EOR(mode+1):ENDPROC
1310 DEFFNI:REPEAT a=GET
1320 UNTILA>31 ORa=9 OR a=27:=a

```

Listing II

```

10 REM Address Book
20 REM By Bruce Goatly
30 REM (c) Micro User
40 A=0:FX3
50 MODE1:VDU19,2,0;0;0;:ONERRORGOTO240
60 PROCsu
70 REPEAT:b=1:PROCnw(b):REPEAT
80 VDU23,1,1;0;0;0;
90 A=FNip
100 IF(A>31AND(A<127)ANDPOS<(b)VDUA:GO
TO220
110 VDU23,1,0;0;0;0;
120 IFA=127PROCdel ELSEIFA=135PROCins
130 IFA=136ANDPOS>0VDU8ELSEIFA=137ANDP
OS<(b)VDU9
140 IFA=138ORA=13b=b+1+N*(b=N):PROCnw(
b)
150 IFA=139b=b-1-N*(b=1):PROCnw(b)
160 IF(A>147AND(A<152)ORA>153THENX=OPEN
UP"ADDRESS"
170 IFA=148ANDnr>0PROCfind ELSEIFA=149
PROCupd
180 IFA=150PROCadd ELSEIFA=151PROCdelr
190 IFA=152VDU28,bx(b),by(b),bx(b)+l(b
)-1,by(b),12:PROCnw(b) ELSEIFA=153PROCbb
200 IFA=154ANDnr>0PROCsel ELSEIFA=155A
NDnr>0PROCspl
210 IF(A>147AND(A<152)ORA>153THENCLOSE#
X
220 UNTILA=27OR(A>147AND(A<152)OR(A>152
AND(A<156)
230 UNTILA=27
240 CLOSE#0
250 *FX4,0
260 *FX225,1
270 *FX12,0
280 *FX229,0
290 MODE7
300 IFA<>27REPORT:PRINT" at Line ";ERL
310 END
320 DEFPROCfind
330 *FX229,0
340 ONERRORCLOSE#0:RUN
350 t$=FNrb:f=FALSE:t$=FNtrim(t$):IfTs
="GOTO480
360 r=0:st=5:Ifb>1:FORX%=1TOb-1:st=st+
l(X%)+2:NEXT
370 REPEAT:REPEATr=r+1
380 PTR#X=FNptr:INPUT#X,del$:Ifdel%GOT
O410
390 PTR#X=FNptr+st:INPUT#X,s$
400 IFINSTR(s$,t$)>0THENf=TRUE
410 UNTILr=nr ORf
420 PTR#X=FNptr
430 Iff ANDNOTsel INPUT#X,dummy$:PROCnw
(0):PRINT;LEFT$( " ",4-LENSTRsr);r;:FO
RX%=1TON:INPUT#X,s$:PROCnw(X%):PRINTs$;:
NEXT

```

Turn to Page 124 ▶

From Page 123

```

440 IFf ANDNOTsel PROCmess("Continue s
earch? (Y/N)");YnN":f=(f-1)DIV2
450 IFf ANDsel PROCpr:f=FALSE
460 UNTILr=nr ORf
470 IFf=0 PROCmess("End of file -- Pre
ss <SPACE>.");":PROCbb
480 *FX229,1
490 ONERRORGOTO240
500 ENDPROC
510 DEFFNtrin(TS)
520 REPEAT:IFRIGHT$(TS,1)=" TS=LEFT$(
TS,(LENTS)-1)
530 UNTILT$="ORRIGHT$(TS,1)<>" :TS
540 DEFPROCmess(a$,b$):VDU7,26:PRINTT
B(20-(LENA$)/2,29)a$;
550 REPEATf=INSTR(b$,GET$):UNTILf>0:CO
LOUR130:PRINTTAB(20-(LENA$)/2,29)STRINGS
(LENA$, " ):COLOUR128
560 ENDPROC
570 DEFPROCdelr:IFf=0 ENDPROC
580 PROCmess("DELETE - are you sure? (
Y/N)");YnN":IFf>2ENDPROC
590 PTR#X=3:BPUT#X,r MOD256:BPUT#X,r D
IV256
600 PTR#X=FNptr:IFdr%=0 PRINT#X,&FFFF
ELSEPRINT#X,dr%
610 dr%=r:r=f:PROCbb:ENDPROC
620 DEFPROCadd
630 t$=FNrb:t$=FNtrim(t$):IFT$="PROCm
ess("Empty record? NOT saved. Press <SPA
CE>.");":PROCnw(0):ENDPROC
640 PROCchk
650 IFdr%=0r=nr+1:nr=r:PTR#X=1:BPUT#X,
nr MOD256:BPUT#X,nr DIV256:ELSEPROCupt
660 PROCnw(0):PRINT;LEFT$( " ,4-LENS
TR$);r;
670 PROCpr
680 ENDPROC
690 DEFPROCupt:r=dr%:PTR#X=FNptr:INPUT
#X,dr%:IFdr%=&FFFF dr%=0
700 PTR#X=3:BPUT#X,dr%MOD256:BPUT#X,dr
%DIV256:ENDPROC
710 DEFPROCupd:IFf=0 ENDPROC
720 PROCpr:ENDPROC
730 DEFPROCpr:PTR#X=FNptr:PRINT#X,0:F0
Rb=1TON:PROCnw(b):t$=FNrb:PRINT#X,t$:NEX
T:ENDPROC
740 DEFFNptr=os+lr*(r-1)
750 DEFPROCsu
760 VDU19,2,4,0;:COLOUR130:CLS
770 *FX225,148
780 *FX11,0
790 *FX4,1
800 *FX229,1
810 *OPT1,0
820 PROCchk
830 X=OPENUP"ADDRESS"
840 N=BGET#X:nr=BGET#X+256*BGET#X
850 dr%=BGET#X+256*BGET#X
860 dummy=BGET#X:lr=5
870 DIM L(N):FORX%=0TON:L(X%)=BGET#X:I
FX%=0NEXTELSElr=lr+(X%)+2:NEXT
880 DIM LS(N):FORX%=0TON:INPUT#X,LS(X%
):NEXT:os=PTR#X
890 COLOUR131
900 F=-1:PRINTTAB(1,23)FNf;" find ";F
Nf;" update ";FNf;" add ";FNf;" delete"
910 PRINTTAB(1,24)FNf;" clear window
";FNf;" clear all windows"
920 PRINTTAB(1,25)FNf;" select & print
";FNf;" select to disc"
930 COLOUR128
940 Y=OPENUP"BOXES"
950 DIMLx(N),Ly(N),bx(N),by(N):COLOUR1
31:COLOUR0

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960 FORX%=0TON:Lx(X%)=BGET#Y:Ly(X%)=BG
ET#Y:bx(X%)=BGET#Y:by(X%)=BGET#Y
970 PRINTTAB(Lx(X%),Ly(X%))LS(X%);:NEX
T
980 CLOSE#X:CLOSE#Y
990 COLOUR128:COLOUR3
1000 PROCbb:f=FALSE:sel=FALSE:spl=FALSE
1010 ENDPROC
1020 DEFPROCbb
1030 FORX%=0TON:VDU28,bx(X%),by(X%),bx(
X%)+L(X%)-1,by(X%),12,28,bx(X%),by(X%),b
x(X%)+L(X%),by(X%):NEXT
1040 ENDPROC
1050 DEFFNip
1060 REPEATB=GET:UNTILB=13ORB=27OR(B>31
ANDB<128)OR(B>134ANDB<140)OR(B>147ANDB<1
56)
1070 =B
1080 DEFPROCnw(b):VDU28,bx(b),by(b),bx(
b)+L(b),by(b),30:ENDPROC
1090 DEFPROCdel
1100 IFPOS=0ENDPROC
1110 t$=FNrb
1120 t$=LEFT$(t$,pos-1)+RIGHT$(t$,(LENT
S)-pos)+ "
1130 VDU30
1140 PRINTt$;:VDU31,pos-1,0
1150 ENDPROC
1160 DEFPROCins
1170 IFPOS=L(b) ENDPROC
1180 t$=FNrb
1190 t$=LEFT$(t$,L(b)-1)
1200 t$=LEFT$(t$,pos)+ " +RIGHT$(t$,(LE
NTS)-pos)
1210 VDU30
1220 PRINTt$;:VDU31,pos,0
1230 ENDPROC
1240 DEFFNrb
1250 pos=POS:T$="":VDU30:AX=135
1260 FORX%=0TOL(b)-1:T$=T$+CHR$((USR&F
FF4)AND&FF00)DIV&100):VDU9:NEXT
1270 =T$
1280 DEFPROCsel
1290 sel=TRUE:r=0
1300 PROCfind:sel=FALSE
1310 COLOUR130:VDU26:PRINTTAB(12,27)STR
INGS(20," ):COLOUR128
1320 ENDPROC
1330 DEFPROCpr
1340 IFNOTspl THEN*FX3,10
1350 L=0:INPUT#X,dummy%:INPUT#X,u$:PROC
p(u$):L=L+1
1360 INPUT#X,u$:IFb=2PROCp(" "+LEFT
$(u$,2))
1370 PROCp(CHR$13)
1380 FORX%=1TO4:INPUT#X,u$:u$=FNtrim(u$
):IFu$="NEXTELSEPROCp(u$+CHR$13):L=L+1:
NEXT
1390 INPUT#X,u$:PROCp(u$):INPUT#X,u$:PR
OCp(" "+u$+CHR$13):L=L+1
1400 INPUT#X,u$:PROCp(u$+CHR$13):L=L+1
1410 FORX%=L TO8:PROCp(CHR$13):NEXT
1420 IFNOTspl THEN*FX3
1430 r1=r1+1:VDU26:PRINTTAB(12,27)"Reco
rds found: ";r1;
1440 ENDPROC
1450 DEFPROCspl
1460 r1=0:sel=TRUE:spl=TRUE:*SAVE SELEC
T 1900 1901 0 0
1470 Y=OPENUP"SELECT":PROCfind:CLOSE#Y
1480 COLOUR130:VDU26:PRINTTAB(12,27)STR
INGS(20," ):COLOUR128
1490 sel=FALSE:spl=FALSE
1500 ENDPROC
1510 DEFFnf:F=F+1:=CHR$17+CHR$129+CHR$1
7+CHR$3+"f"+STR$F+CHR$17+CHR$131+CHR$17+
CHR$0

```

```

1520 DEFPROCchk
1530 Y=OPENUP"SELECT":IFf<>0THENCLOSE#Y
:*DEL.SELECT
1540 ENDPROC
1550 DEFPROCp(u$)
1560 FORZ%=1TOLENU$
1570 IFspl THENBPUT#Y,ASCNIDS(u$,Z%,1)
ELSE PRINTMIDS(u$,Z%,1);
1580 NEXT
1590 ENDPROC

```



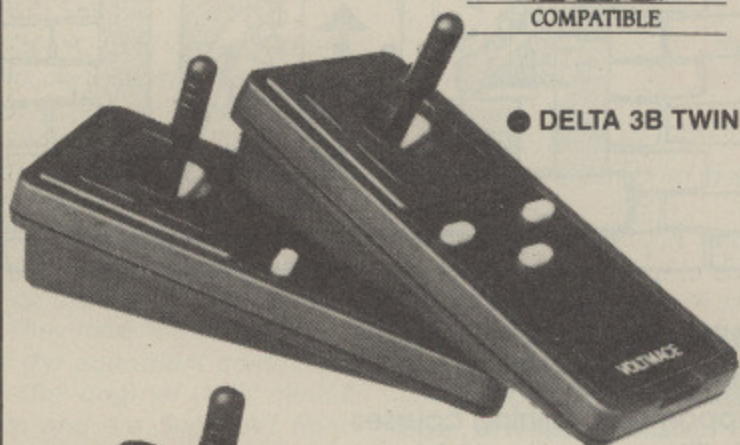
10 =	0 0	540 =	320B 9	1070 =	1B4F 5
20 =	0 0	550 =	2361 4	1080 =	1D2E 3
30 =	0 0	560 =	ED0F 6	1090 =	7AE3 1
40 =	1686 6	570 =	D87B 5	1100 =	B4D3 F
50 =	7C09 3	580 =	2D61 B	1110 =	9463 9
60 =	FE0A 8	590 =	9183 7	1120 =	8832 4
70 =	9E00 4	600 =	63B9 F	1130 =	EA95 9
80 =	59B7 2	610 =	D6ED F	1140 =	118A C
90 =	2F 6	620 =	232A 9	1150 =	ED0F A
100 =	503 6	630 =	3835 F	1160 =	796 A
110 =	1E64 9	640 =	EF50 1	1170 =	A053 4
120 =	C066 0	650 =	C38E 1	1180 =	9463 5
130 =	F5DF 8	660 =	19B8 D	1190 =	3C 1
140 =	D611 2	670 =	DBBE E	1200 =	A6BD 3
150 =	9C67 F	680 =	ED0F F	1210 =	EA95 4
160 =	DA49 B	690 =	79B6 D	1220 =	AD73 E
170 =	287B 4	700 =	6F27 4	1230 =	ED0F E
180 =	3B8C F	710 =	F50C C	1240 =	D206 6
190 =	681 3	720 =	8899 5	1250 =	7ACA D
200 =	80BD 7	730 =	7EBE D	1260 =	D6C4 2
210 =	C5DD 4	740 =	DEA8 5	1270 =	2169 F
220 =	E008 3	750 =	6F8F F	1280 =	BC10 6
230 =	A4B3 8	760 =	B4BE 7	1290 =	2F33 4
240 =	9EE3 F	770 =	3BDB 0	1300 =	56A8 3
250 =	F3A2 E	780 =	B046 A	1310 =	34C 9
260 =	294B 3	790 =	E383 C	1320 =	ED0F C
270 =	E916 2	800 =	5C2A 7	1330 =	9C7A 8
280 =	4C0B F	810 =	1F1E 8	1340 =	F31A 6
290 =	8AFC C	820 =	EF50 F	1350 =	EBE9 5
300 =	E483 B	830 =	B44 A	1360 =	89BD 6
310 =	FD2E D	840 =	260F 5	1370 =	DF31 A
320 =	EE94 A	850 =	A91F E	1380 =	116E F
330 =	4C0B 7	860 =	3C73 0	1390 =	187E 8
340 =	DF8B 9	870 =	97B9 2	1400 =	2CFA 3
350 =	345F 5	880 =	F3BC D	1410 =	DE8A 3
360 =	2AE6 F	890 =	573 D	1420 =	4E2D D
370 =	7B21 4	900 =	D541 9	1430 =	40DE A
380 =	5153 E	910 =	7AA6 F	1440 =	ED0F 5
390 =	A06A 6	920 =	F38C 8	1450 =	4096 E
400 =	3C99 D	930 =	A76B 8	1460 =	E1D2 6
410 =	BA37 1	940 =	7B83 A	1470 =	3B67 7
420 =	5662 3	950 =	F070 0	1480 =	34C 2
430 =	2F18 D	960 =	FFE4 9	1490 =	AEA E
440 =	B208 5	970 =	1D5F 5	1500 =	ED0F 2
450 =	EEDB 2	980 =	A17B 5	1510 =	B8B9 3
460 =	BA37 D	990 =	24B3 A	1520 =	F9C8 8
470 =	C6BA A	1000 =	4EA2 B	1530 =	6B90 C
480 =	5C2A 3	1010 =	ED0F 8	1540 =	ED0F 4
490 =	4699 E	1020 =	3D1B 7	1550 =	5202 A
500 =	ED0F 9	1030 =	E79 6	1560 =	24BF 5
510 =	3577 6	1040 =	ED0F 7	1570 =	47F3 C
520 =	B641 7	1050 =	3FFC 1	1580 =	2C83 D
530 =	DBB1 9	1060 =	7679 F	1590 =	ED0F 5

This listing is included in this month's tape & disc offer. See order form on Page 133.

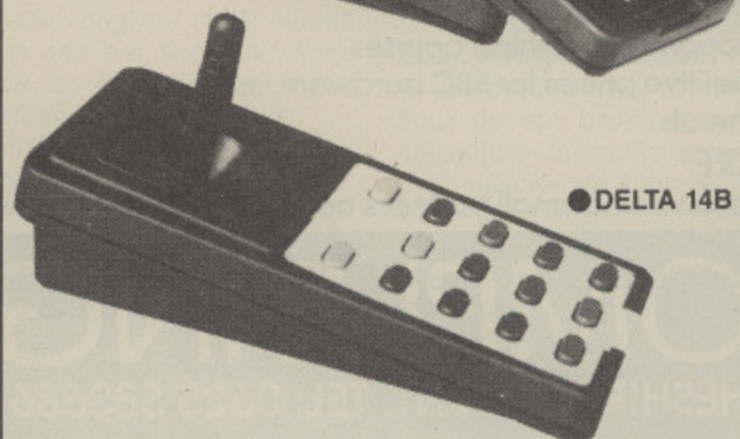
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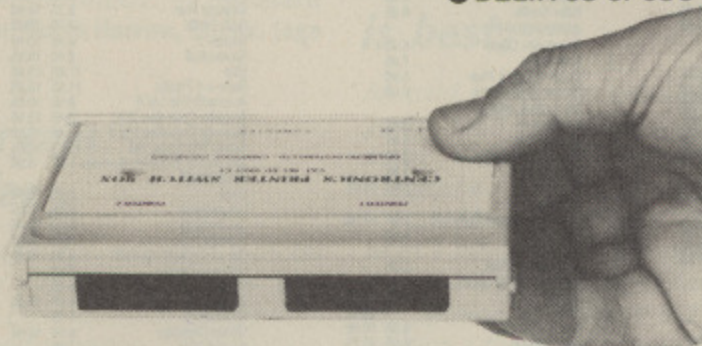
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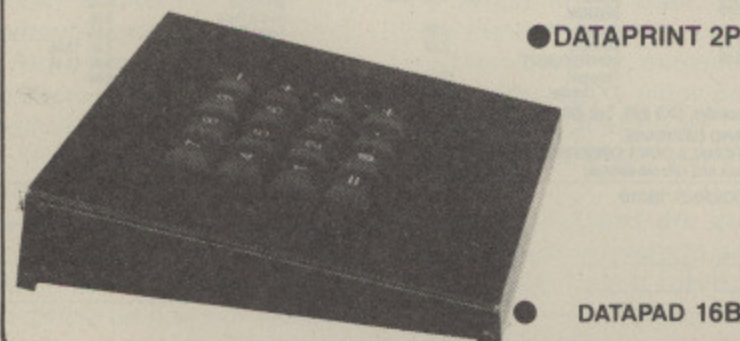
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LETTERS

£10 Prize letter

I THINK that other readers who own Pagemaker may be interested to know the star commands that Pagemaker has available. These star commands are not shown on typing *HELP PAGEMAKER and can only be found by examining the Pagemaker roms.

They have the same syntax as the equivalent commands in the original AMX mouse rom and the Super Art Rom. The commands and their functions are as follows:

*pMOUSE Selects mouse or keyboard for input.

*pMP Moves the pointer around the screen in the direction the user selects using the selected input device.

*pSP Re-displays the pointer after it has been hidden using *pHP.

*pHP Removes the pointer from the screen.

*pSE Selects the icon used for the pointer.

*pDE Covers the screen in a pattern of alternate black and white dots.

*pDF Loads user defined icons.

*pIC Displays an icon on the screen.

*pWI Draws a window on the screen.

*pJOYSTICK Selects the joystick for input. — **Richard Koten, North Harrow, Middx. (age 14)**

Bargain offer

I bought through your special offer the Teletext adapter and I am absolutely delighted with its performance. It is the best money I have ever spent on computer related equipment.

Although the 4-TEL BBC Telesoftware offering is abysmally limited can you publish, in The Micro User, a method that will allow it to be downloaded to a Master.

On the subject of the Master can you also publish an article on how the Terminal Emulator can be used with a modem. The half page of information in the Welcome

Pagemaker's star commands

Guide is extremely brief to say the least.

I greatly enjoy The Micro User and look forward to each issue. Keep up the high professional standard of articles and presentation. Your effort is appreciated. — **D Wallace Edgar, Greenock, Scotland.**

● Unfortunately, Channel Four do not broadcast the catalogue information with the telesoftware files so the ATS rom cannot download them by simply pressing f5. They intend to broadcast the information soon but at present you need to know the load and execution addresses and the page number. You then use the osword call detailed on page 40 of the ATS guide to download the file.

The module ATS06, which has been broadcast by Ceefax, allows you to download any file easily. The ATS series will be broadcast again soon and the part you want will probably appear in September.

Hac Man is best

An avid reader for nearly two years, I am writing to tell you what I think about your magazine.

Hac Man is brilliant, and what I have been waiting for. It is the best feature by far in my opinion and it's the first section I flick to when I open the latest Micro User as it falls through my letter box.

Adventures is extremely useful, because I enjoy computerised adventures, although I'm not too good at them.

The letter pages are great as they allow readers to send in routines, or to approve/disapprove about something. Problem Solved is good for those niggly problems that you just can't figure out what

is wrong yet don't want to bring in the repair man.

I enjoy the Gallery, looking at other readers pieces of art always amazes me, as I can't draw to save my life, let alone be set loose on a computer.

Other contents I like are: News, Games (although I don't type any in), Utilities, and Library.

After all this praise I have a complaint. Software Scene used to be an extremely good section of The Micro User, the reviews were well written and helped me to chose which games to buy.

The five ratings at the end, which were out of 10 were good, and nearly always reliable. But now, although the reviews are still good, there is only one overall mark out of five, which isn't anywhere near as good as before, so please, please, pretty please with sugar on top, bring back the old style of rating!

Apart from this little fault, The Micro User is easily the best magazine for the BBC Micro range, and I will keep on reading it till I'm 100 (if I live that long, after the excitement if this letter is printed) — **Paul Howieson, Portsmouth, Hants.**

● Yes we agree. So we've changed back this issue — now you don't have to have any complaints.

Continental keyboard

IN reply to Mr Sharman's letter and the answer given by Mike Cook in the May issue of your magazine, may we draw your attention to the fact that our club provides AZERTY keyboards and a French rom for BBC Micro and Master?

The micro keyboard then becomes a real AZERTY one, and the rom, called Key-rom, enables French characters to be printed on-screen, not with Interword, but with the View

Win a tenner

● Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Writers of the most interesting letters receive a £10 prize.

family, in Basic.

As BBC Micro's are used in some Belgian schools, teachers did ask for a keyboard conversion and that is why one of our members designed this new facility.

Anyone interested may write to us and will receive more information about the Key-Rom — **Georges Wathlet, AUCB Secretary, Acorn User Club Belgium ASBL, Rue des Clematites, 9 bte 1, B-1080 Bruxelles, Belgium.**

Finding the switch

A.B.LEAN asked if it is possible to program a Taxan printer to take smaller paper. Your reply was accurate, but neglected the fact that on the Taxan/Kaga series there is a switch which will disable the paper out alarm.

It is found by lifting up the brown lid and removing the paper. The switch is on the right hand side near the tractor feed. If the switch is set to "cut sheet" there is no alarm, and if it is set to "others", the alarm is re-enabled.

Finally, I would like to make some points about Paul Howieson's letter of useful tips for beginners. I can understand the usefulness of *FX210,1 as some games do not have a "sound off" facility.

As the other commands are only options for a basic pro-

LETTERS

◀ From Page 127

gram, I will take them in that situation. Firstly, disabling Escape using *FX14,6 (or even *FX229,1) is not necessary, and if anything a hindrance when you are beginning Basic, as I can imagine the frustration of a beginner when he can't Escape from a program running, but with errors.

Secondly, even after programming for seven years now, on a BBC Micro, I still get extremely irate when I try to copy a line, and find the cursors disabled. In fact, *FX4,1 does not actually disable the keys, merely enables them to be programmed like the red function keys.

Lastly, programming the Break key to OLD then LIST the program is always a bad move, for the following reason:

If you press Break to interrupt a program, and have an automatic LIST you lose the values of ERR and ERL which are otherwise preserved — a hint worth noting.

I end this letter by saying that I agree with S. Gray's point about the assistants. This has been proved to me perfectly through an unintelligent man taking my order for Toolkit Plus — I have now been waiting over three months for that chip.

I do like the new style of listing. — **John Herbert, aged 14, Garston, Watford.**

Break the code

I WAS looking forward to your DISCLOCK program but was very disappointed by this unbreakable code.

Just press Escape during the loading and then LIST and up comes the protected program. *FX200,3 inserted in the !BOOT and L make no difference. How can this be resolved? — **D.S. Harris, Godmanchester.**

● You have to be pretty quick with the fingers to get this to work but the solution is very simple. Change line 730 of Listing II (Disc-Key) to this:

```
730 BPL loadloop:LDA#124
:JSR&FFF4:LDA basicflag
```

Holiday saver

YOUR readers may be interested in an idea I used last year to help me enjoy my holiday. One of the things I dislike most is writing postcards, so I used Mini Office II to help.

Before I departed I set up a database file of my friends' names and used the label printer to print them out on sticky labels. Then I printed out an equal number of labels with the following text on them:

```
Having a great/lousy time.
Weather sunny/raining/dull.
Hotel excellent/good/poor.
Food scrumptious/eatable/
we just use the chip shop.
Locals are friendly/hostile.
```

It was then just a matter of fixing two stickers and a stamp to the cards, deleting the appropriate words and signing them. I hope this time saving idea will enable your

readers to enjoy their holidays rather than waste them writing cards. — **Iain Jones, Clwyd.**

Cry for help

I WOULD refer to your new Checksum Program and the instructions on how to use the program.

You state when setting up the function key xxxx is the usual page setting. As I am a complete novice in the use of a computer would you kindly explain what a page setting is. — **F.A. Aylward, Llyngwrl, Gwynedd.**

● The way to find out the page setting on the computer type the following:

```
PRINT "PAGE
```

The numbers and letters that you get then replace the xxxx. You must remember to put in the & symbol as shown.

Disc utility poser

FIRSTLY congratulations to John Macrae and thank you for the disc utility program in your May issue. It is really the program I have been waiting for. It is certainly time someone produced a program to organise, catalogue, search and in general sort out the pile of discs one accumulates. Mr. Macrae has put together an excellent program.

I have however noticed two problems with the program: in search mode there does not appear to be a routine that will allow a repeat and a return to the menu. I suggest that line 355 be inserted as follows:

```
355XS=GETS:IFXS="M"CH."$.C
ATLOG":ELSEIFXS<>"R"GOTO3
55
```

and then a change to line 870 to read:

```
870VDU30:PRINT""SPC4CHR
$130SPC2"DISC FILENAME":VDU
3:PRINTTAB(7,24)CHR$131SPC3
"R" TO REPEAT"CHR$130SPC2"
"M" TO MAIN MENU"
```

The discs searched number does not equal the number of discs on record. It prints out a

£10 Prize letter

number which is one (1) less than it should be. I have amended line 350 to read 'Print ?&8C' rather than &8D, which has improved matters.

I am still unable, however, to fathom out the greatest problem. The number of the disc found does not agree with the number as catalogued. For example if the following appears on screen:

```
DISC      FILENAME
043      LUDO
```

The actual disc would be number 44 as shown by the "Print a catalogue" mode. Could you please help with this one — I'm stuck.

As far as I can tell (having checked and rechecked at least six times) it has been typed correctly.

Awaiting your comments. — **D.S.L. Grimsell, Thornbury, Bristol.**

● We have passed you letter over to John, but in the meantime, does any one else have the solution?

A Basic teaser

I WRITE regarding Andrew Vewer's utility LEARN from the September 1986 issue of The Micro User.

Having at last typed it in, I find that it functions perfectly in the basic BBC but will not work across the tube no matter how I fiddle with the addresses for code and character-buffer.

Indeed, if I simply try to run the Basic listing in the second processor, I get the Index at line 330 error. All is fine on the parent BBC Micro.

Any ideas? — **Faser Hadden, Ipswich, Suffolk.**

● The program won't assemble as given on the second processor because the machine code is assembled over the Basic itself, PAGE down the Tube is set to &800. But even if you can assemble it it won't run because it tries to intercept the event vector.

The simple (and correct) solution is to assemble it in the I/O processor but change line 960 to:

```
960PRINT"SAVE LRN FFFF0C
00+"STR$(PX-code)
```

Then using *LRN the code is loaded and run in the front end even if you are working in the second processor.

Back to debugging

I SUGGEST that you write an article or short series on debugging Basic programs, because you get so many letters from people who have made mistakes typing in the listings — I have the same problem.

Suggestions are, what to look for when a 'No such variable at 50' appears and the likes, or about the different types of debugging, if there are any different methods from going through the whole program line by line.

So come on, help us poor programmers who can't debug properly or give up half way through. — **Simon Kingsley, Chelmsford, Essex.**

● We did run just such an article back in the April 1983 issue of The Micro User. But

LETTERS

£10 Prize letter

YOU will no doubt have your own uses for my reverse paper tip in the May issue of The Micro User. It can be useful when you print things like lists in multiple columns across a page. The enclosed list helps me to translate quickly strings of decimal VDU print commands.

It is only necessary to end each column of text with the appropriate dimensioned reverse paper command, followed by the left-hand-margin function VDU 1,27,1,108,1,n (where n can take any value up to 78,93, or 133, depending on the print size - Pica, Elite or Compressed).

For example, VDU 1,27,108,1,4 at the beginning of a program will provide a left hand margin of five character spaces for the first column (the computer count starts from 0).

For a column length of 42 lines, using compressed print size, and a column width of 39 text characters, the necessary line would be:

```
FOR R=1 TO 6:VDU1,27,1,106,
252:NEXT:VDU1,27,1,108,48
```

placed at the end of the first column of text.

This will reverse the paper 42 lines each 1/6th inch and recommence printing each subsequent line at the 49th character place across the

Decimals revealed

Dec.No. Function

- 7 Bleeper bleeps.
- 8 Back-spaces one character.
- 9 Moves to next horizontal tab.
- 10 Advances paper one line.
- 11 Moves to next vertical tab setting.
- 12 Form feed to top of next page.
- 13 Return cursor to left hand side.
- 14 Enlarged print for one line only.
- 15 Compressed print turned on.
- 18 Compressed print turned off.
- 20 Cancels one line enlarged only.
- 24 Erase the line in printer buffer.
- 33 Master select command.
- 35 Cancel most significant bit command.
- 37 Switch character generators.
- 38 Download characters into ram.
- 42 8 pin graphic master select command.
- 45 Turns underline on or off.
- 47 Select vertical tab channel.
- 48 Set line-spacing 1/8th inch.
- 49 Set line-spacing 7/72th inch.
- 50 Set line-spacing 1/6th inch.
- 51 Set line-spacing n/216th inch.
- 52 Alternate type font (high cgm).
- 53 Normal type font (low cgm).
- 54 Expand print codes 128/159.
- 55 Cancel codes 128/159 expansion.
- 56 Turn off paper out warning.
- 57 Turn on paper out warning.
- 58 Load rom characters into ram.
- 60 Unidirectional one line only.
- 61 Set MSB 0 (low character gen).
- 62 Set MSB 1 (high character gen).
- 64 Reset to default conditions.

Dec.No. Function

- 65 Set line spacing n/72 (n max=85).
- 66 Set vertical tab stops (n max=16).
- 67 Set Form length in lines/inches.
- 68 Set horizontal tab stops (n max=32).
- 69 Enhanced (bold) print on.
- 70 Enhanced (bold) print off.
- 71 Double strike on.
- 72 Double strike off.
- 73 Make control codes printable.
- 74 Advance paper n/216 (n max=255).
- 75 Graphics normal density.
- 76 Graphics double density.
- 77 Turns Elite on and Pica off.
- 78 Skip perforation on.
- 79 Skip perforation off.
- 80 Turns Pica on and Elite off.
- 81 Sets right hand margin.
- 82 Full international character set.
- 83 Super/subscript on.
- 84 Super/subscript off.
- 85 Unidirectional always on/off.
- 87 Enlarged always on/off.
- 89 Graphics double density and speed.
- 90 Graphics quadruple density.
- 94 9 pin graphics
- 98 Set vertical tabs in channel n.
- 105 Immediate printing on/off.
- 106 Reverse paper n/216 (n max=255).
- 108 Sets left hand margin n.
- 112 Turns proportional print on/off.
- 115 Half-speed printing on/off.
- 120 Turns NLQ on/off.
- 127 Delete and replace one character by next.

page, that is leaving a five space margin between the first and second columns.

Similarly, the same reverse and margin line at the end of

the second column of text, but with 92 instead of 48 as the last parameter, will reverse the paper and print the third column beginning at

character place 93, again with a five space margin between columns.

— John Henson, Dundonald, Kilmarnock.

Saving programs

I HAVE a tip for typing in programs. You can use a word processor like the one in Mini Office II and either type in the program with line numbers or leave them out and put AUTO on the first line.

Then save it as an Ascii file and leave the processor and return to Basic. Then load the program with *EXEC and save

it under a different filename.

If you want to return a Basic program to the word processor you load the program, save it using *SPOOL and list so the computer will put any text appearing on the screen into a file.

When the listing ends remember to type *SPOOL to close the file. You can now load it into your word processor.

I also have a program for full screen explosions, it runs strips of colours up the screen.

```
10 FOR X=0 TO 10000
20 VDU 19,0,X,0;0;0;
30 NEXT X
```

The 10000 can be replaced by any other number to adjust the length of time the program runs. This program will not work in Mode 7. — Sean Farrell, Kircaldy, Fife (age 12).

Best of both worlds

CHRIS Nixon's View synchronized Ruler Cursor printed in the November 1986 issue of The Micro User and amended March 1987 requires that cursor editing be disabled in command mode.

This is because in spite of the check for = at the start of

the current line, indicating the command state, which bypasses the active part of the routine, pressing the Copy key somehow reactivates the routine with a spurious attempt to duplicate the cursor on the top line of the command screen.

As was discovered by Dr. Waterfield View turns cursor editing back on at every return to the command state. It does this because cursor editing is disabled in text mode.

The call *FX237 can be used to read the cursor editing status and thus indicate which mode View is

Turn to Page 130

LETTERS

◀ From Page 129

in. The answer can be used to bypass the routine when in the command mode and so allow cursor editing, followed shortly by the best of both worlds.

This is done immediately after checking that View is the current rom, after BNE exit in line 230. The check for = can be discarded so the code does not get any longer. The changes to the Basic assembler are as follows:

```
190 RTS
230 LDA #8000:BNEexit
232 LDA #2237:LDX #0:LDY #&FF
234 JSR &FFF4:CPX #0:BEQexit
236 LDA #134
```

You'll need to delete lines 260, 270, 272, 274 and 350.
— D.J. Pitt, Brentwood, Essex.

A tax slip

In the article "Check up on the taxman" published in the July issue of The Micro User there were some errors.

Overall it would be unwise of your readers to rely on the accuracy of the routine for checking their PAYE tax deductions. For the majority the routine will be in error by pence only, but for those whose taxable pay averages over about £340 per week, the error could be quite large.
— G.O. Lawton, Inland Revenue.

Correcting a bug

YES, there is a bug in Viewspell when you run it on the Master 128 as pointed out by Erika Stephen and Rory McCloy in the June issue of The Micro User. The program will hang up when adding words to a user dictionary using ADFS on the Master.

The problem lies at location &979E in the rom where a set carry bit instruction is required before the following subtract with carry is executed. It is fortuitous that the carry bit is already set at this point when used on the Model B and in DFS mode.

It is possible to correct the

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a pro-

gram, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

error by a machine code patch after loading the rom image into sideays ram. This needs skill in machine code, however. If patching is not practical, the only course is to use DFS for Viewspell. — David Davies, Stevenage, Herts.

CEEFAX notes

JOHN Woodthorpe has not got it quite right about the CEEFAX program AUNOTE in the June issue of The Micro User. By deleting:

```
IF sta2$="NOTES"
```

In line 950 you invite the computer to try to download programs intended for other computers. Teachers' notes are not machine specific. By replacing the above with:

```
IF (sta$="BBC" OR sta$="A
NY") IF sta2$<>"NOTES"
```

All suitable programs will be downloaded and the dreaded teacher's notes left behind. — E. Mark Jolliffe, Cromer, Norfolk.

Dial the world

Could I make a plug for your advertisers to show their Microlink/Telecom Gold ID's in future issues. From here in New Zealand the Dialcom network is a cost effective and convenient means of communicating with overseas companies such as yourself. I am pleased that you have made yourselves accessible in this way, though somewhat puzzled why your advertisers have not been quick to do likewise.

Thank you for your time and

help. — Julian Kendall, Napier, New Zealand.

Darwin revisited

YOU have stopped evolution in your listing: Biomorph by Mike Cook, (pp. 18-19) The Micro User, April 1987. L.1270 gives error variable, L.1280 IF!!!!???. This is obviously wrong.

Let me have the correct lines — N. Scotter, Carlisle, Cumbria.

● As we frequently have to repeat, an error message does not always indicate the line that the error is in. A No such variable error shows that either you've spelt the variable wrong in the line given or you've spelt it wrong somewhere else in the program. Line 1280 demonstrates a technique that experienced programmers know about.

Reducing graphics

I RECENTLY bought a disc copy of Mini Office II and am very pleased with all the facilities.

Is it possible to reduce the size of the graphics printout to say 6cm x 7cm? I have tried setting up my Epson LX-86 in the Condensed Mode but the Mini Office II program overrides the command.

It is a pity the Graphics program does not provide a Print Display Options as in the word processing program. I can almost hear you saying what does he want — blood? — T.W. Tinkler, Huddersfield, W. Yorks.

● You can use Control+S to save the Mode 4 screen when a display is complete. It can

then be *LOADed and you can use a rom such as Dumpout 3 from Watford Electronics to dump it in the required form.

A coding hiccup

I HAVE been working through your excellent series in The Micro User on machine code, which has now, sadly, ended. In the article in the February 1987 issue (Vol.4 No.12), I have met a problem in Program VI.

The program works satisfactorily and prints 10 asterisks, but when I change number to 0 as suggested in the text, I get only one asterisk. Shouldn't it be 255? I have tried other values of number with the following, predictable, results:

n = 0 or 1	1 asterisk
n = 2 to 255	n asterisks,
n = 256 or more	Byte at line xxx

I should be grateful if you would explain the seemingly anomalous result when number = 0.

I should also be grateful if you would resume the machine code series. It was set to a level which just suits the relative novice and was a model of clarity.

One topic that might be covered is multiplication, with the complications of ROR, ASL and so on, followed by division and then perhaps an explanation of the stack. — G.D. Alliban, Swindon, Wilts.

● The sections of the program between lines 90 and 130 represent the following:

```
Print N asterisks
Set counter to 0
Loop to here
Print an asterisk
Increase the counter
Compare counter to N
If counter is more than N
jump to the loop
```

If you follow this through you can see that it doesn't matter what N is set to initially you always print one asterisk before the comparison is done.

While the machine code series is complete, we will feature specific articles on the subject at a later date.

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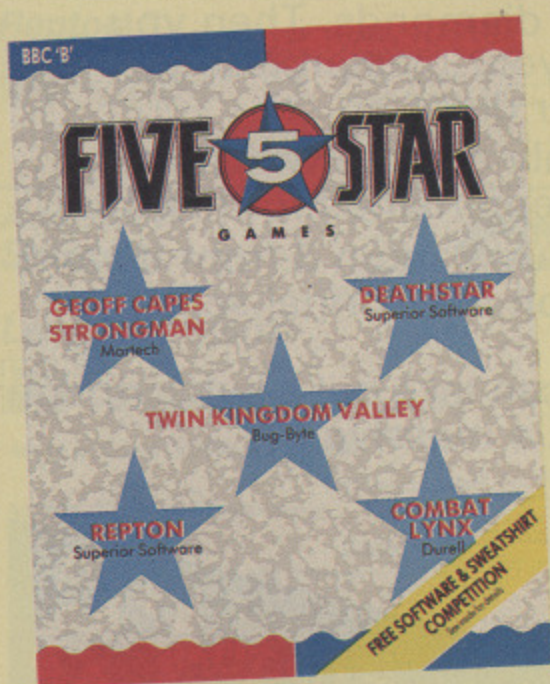
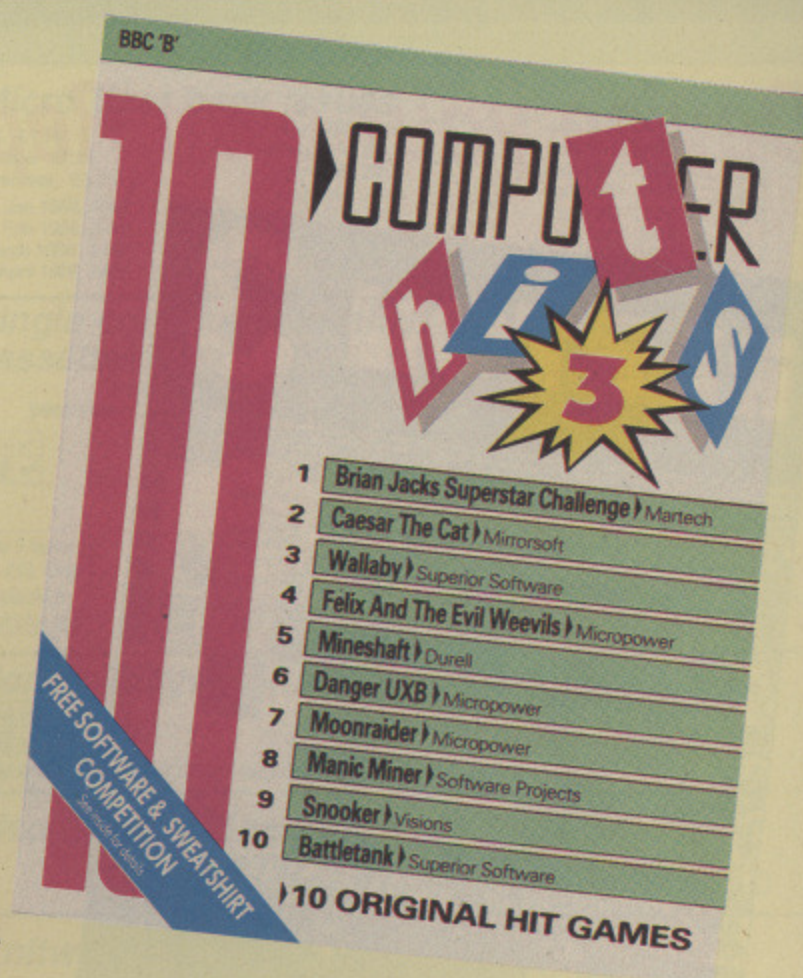
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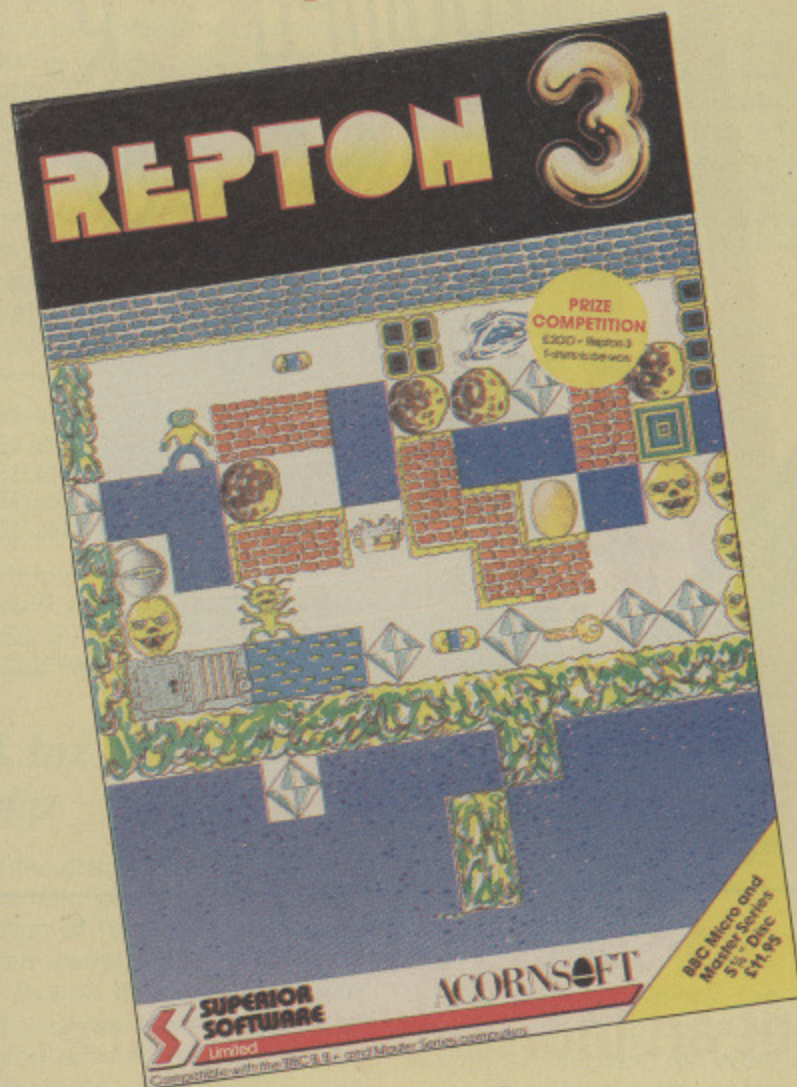
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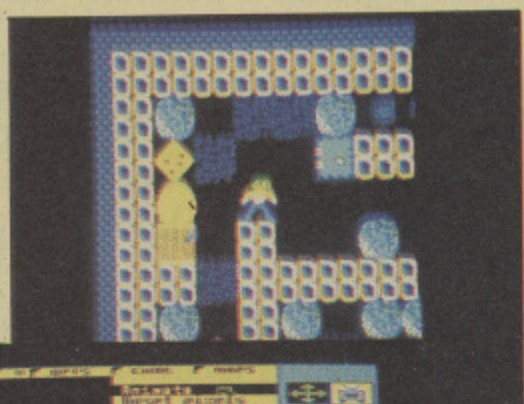
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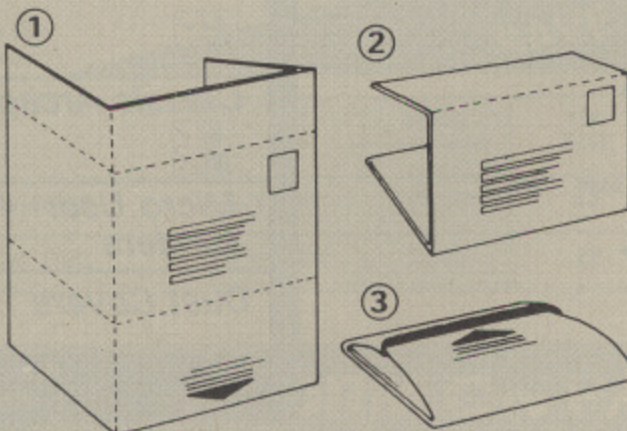
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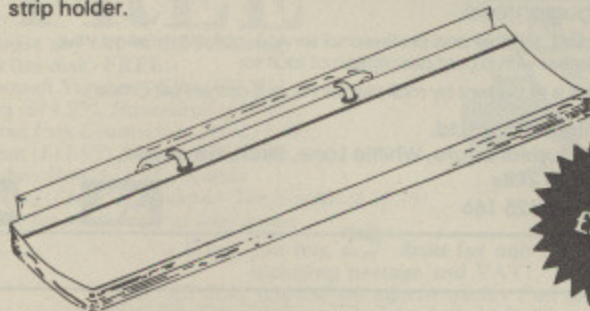
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- * Emphasize <On/Off>
- * Condensed <On/Off>
- * Speed <U/B> (Uni or Bi directional print)
- * Centre <On/Off>
- * Proportion <On/Off>
- * Margin <Left> (<Right>+Width)
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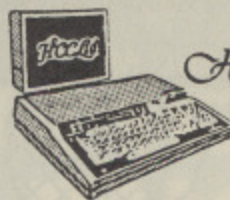
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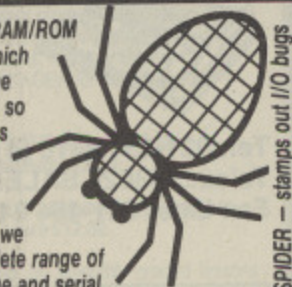
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ADVERTISERS' INDEX

4Mation Educational Resources.....	70	Linear Graphics.....	30
21st Software.....	126	Malvern Software.....	137
A&G Electronics.....	114	Manor Court Supplies.....	91
Acorn.....	6	Mansfield Computers.....	138
Acorn User Show.....	122	Micro Aid.....	136
Advanced Memory Systems.....	3	Micro Help.....	137
Apex Software.....	137	MicroLink.....	51
B&S Computing.....	11	Microman Computers.....	12
Beebug.....	34-36	Micro Media.....	85
Brasscourt.....	136	Micronet.....	65
C&F Associates.....	70	Microsol.....	92
Calderdata.....	138	Midcomm International.....	136
Care Electronics.....	88	Minerva Systems.....	109
Centec.....	108	Minic Business Services.....	120
Chiltern Communications.....	135	Morley Electronics.....	56
CJE Micros.....	8	Nebulae.....	137
CLP.....	135	Opus Suplies.....	25,39
Copper Mill Computers.....	14	Oriole.....	138
Compuack.....	136	P&H Electronics.....	44
Computeraccount (UK).....	62	Paul Fray.....	138
Computer Concepts.....	55,74,75	Permanent Memory Systems.....	92
Computer Repairs.....	135	Pineapple Software.....	88
Contex Computing.....	136	Portobello Trading.....	138
C P Microsystems.....	109	Premier Software.....	135
Database Software.....	60,61,66	Selec Software.....	121
Dataphone Ltd.....	38	Silicon City.....	136
Datastore.....	50	Software bargains.....	87
Delta Computers.....	91	Solidisk Technology.....	26-29
Design Consultancy.....	86	Superior Software.....	2,140
Direct Disk Supplies.....	72	System Software.....	11
Flora Electronics.....	114,136	Taxan.....	58,59
Fosse Systems.....	91	Technomatic.....	76-81
Holloway Computer Corporation.....	137	Trafford Computing.....	26
J&J Microchips.....	109	Twillstar Computers Ltd.....	46,47
Keyzone Computer Products.....	120	Viglen.....	139
		Vine Micros.....	70
		Voltmace.....	125
		Watford Electronics.....	94-105
		Weserve.....	121

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2. Master Reference manual part 1 (for a BBC B or B plus you will require the Acorn ADFS ROM and utilities available at an extra cost).
3. Winchester user guide.
4. Additional utilities on the winchester including formatter, verifier, ADFS menu and backup program.

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COMPATIBILITY?

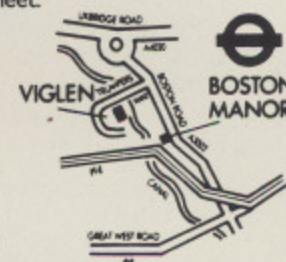
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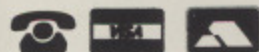
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CODENAME: DROID

Stryker's Run - Part 2



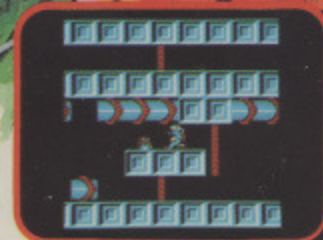
The Dramatic Loading Screen



Climbing up a rope
(SURFACE DEFENCE)



Flying with a jet-pack
(ANCIENT SHRINE)



The elusive "Herbert" Droid
(CREW'S QUARTERS)



Crawling under a crane
(MISSILE FACTORY)

Commander John Stryker is back in CODENAME: DROID

Stryker's Run was one of our most successful releases of 1986. It stayed at the top of the BBC Micro software charts for six weeks and received several glowing reviews: "The graphics are stunning . . . This should be in every collection" enthused A & B Computing.

Now CODENAME: DROID presents a new challenge for Commander John Stryker. He has been commissioned by the Allied Nations to undertake another perilous mission in their continuing struggle against the warmongering Volgans.

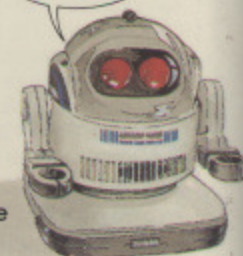
His task is to locate and seize the Volgans' latest weapon: a new spacecraft (codenamed the Z11) which is equipped with the revolutionary matter/anti-matter warp drive facility. Stryker must land on the mysterious planet Volga, penetrate the Volgans' underground defence systems, find the spacecraft and requisition it.

As Stryker descends below the planetary surface, he will pass through 4 different zones of Volgan activity:-

- The Surface Defence — an array of steel girders, ropes and chains lies coldly between the crusted white rock walls.
- The Ancient Shrine — a stone-walled temple bedecked with hideous gargoyles and rustling chandeliers.
- The Crew's Quarters — the Volgans' relaxation area: tables and chairs are arranged invitingly amongst the essential ventilation pipes.
- The Missile Factory — clinical pseudo-metallic walls surround the missiles, bombs, and computers of the evil Volgan race.

Your character in the game can jump, run, kneel, crawl, climb up and down ropes, fire his laser blaster and drop mines. He can also fly for short distances using his jet-pack, and access information via his wrist terminal computer.

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