A Database Publication

THE MICRO USER

Volume 4
Number 9
November 1986
£1.25

Top-selling guide to the BBC Micro!

THE MICRO USER NEWS

Acorn: It's back in the black at last

EDUCATION MICRO USER

Making the most of databases in schools

BUSINESS MICRO USER

Custom software: Is it really viable?

Tame your printer!

2 full length games

- Screen animation
- One-finger joystick
- View text ruler
- On-screen editing

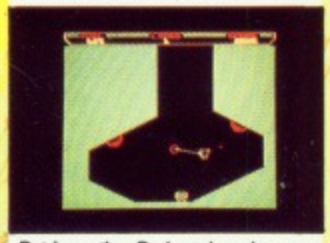
REVIEWS: Dotprint-Plus • Artroom • Galaforce

ALREADY A NUMBER 1 BEST SELLER

THRUST

COMPATIBLE WITH THE BBC B, B+ AND MASTER SERIES

The first mission — destroy the reactor for a bonus score.



Retrieve the Pod and make your escape.

Collect the fuel and steer clear of the limpet guns.

Shoot the activator to open the sliding entrance door.

REVIEWS OF THRUST ALREADY PUBLISHED
Zzap! 64: "The most enjoyable game we've played for ages . . ." — A ZZAP! SIZZLER.
Computer & Video Games: "Thrust is a simple but totally addictive game . . ." — A C+VG HIT!

BBC MICRO
ELECTRON

Now available for the BBC Micro and Electron

The Commodore-64 version of Thrust (published by Firebird Software) shot immediately to No.1 in the software charts and was greeted with rave reviews throughout the computer press. Equally addictive and just as enjoyable, the BBC Micro and Electron versions of the game are set to emulate this performance.

Thrust is simple, fun-to-play, yet totally realistic and intensely challenging. Your mission is to visit 24 planets in turn collecting the Klystron Pods and, if possible, destroying each planet's reactor system. Your spaceship and the pods, which are heavier than the spaceship, move authentically subject to the laws of gravity, inertia and momentum — indeed the game's author, Jeremy Smith holds a First-Class Honours degree in Physics! Careful planning of your manoeuvres is essential in order to prevent the pods swinging out of control and dragging your spaceship to destruction.

To add to the challenge, the planets have different gravity rates and, as you progress through the game, some have "reverse gravity" or "invisible landscapes". They are defended by automatic limpet guns strategically placed to protect the pods and fuel tanks — the only source of replenishment for your limited fuel supply. The smooth screen-scrolling, which is exemplary, and the realistic action gives the player a fascinating feeling of floating through space.

PRICE: £7.95 (cassette), £11.95 (BBC disc)

COMPETITION COMPETITION COMPETITION COMPETITION

If you complete the mission by collecting the pods from all 24 planets, you can enter our competition. The prizes include the beautiful trophy (pictured on the right), **£250** cash, and 3 copies of the captivating book **"The New Atlas of the Universe"** by Patrick Moore. Closing date: 31st January, 1987.

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EVERY WILD IMAGINATION NEEDS A LITTLE SELF CONTROL.

As a BBC Micro user, you enjoy some pretty sophisticated equipment.

So it's a pity if you are still missing that sophisticated, positive control your equipment deserves.

There's not much joy in a joystick, and keyboards can be all fingers and thumbs. Frustrating, especially when your imagination is much faster than your fingers!

What you need is an AMX Mouse.

Already thousands of BBC Micro users have adopted an AMX Mouse and wouldn't be without it.

We didn't claim it was 'the best input device'. The press said it for us.

In fact it has received outstanding critical acclaim, and no wonder!

The AMX Mouse brings to BBC Model B, B+ and Master 128 users, the same freedom and versatility which has, up to now, been the exclusive province of much more expensive computers.

In fact, it's no surprise that nearly all the new 16 bit 'State of the Art' computers now come with a mouse as standard. Proof, if proof were needed, that the Mouse is here to stay.

The AMS range of Mouse software includes, AMX Art, AMX Utilities, AMX Pagemaker, AMX Super Art/Rom, AMX Paintpot, AMX Desk, AMX Data Base, AMX 3D Zicon, AMX XAM.

There is also a growing list of programs available from other leading software houses, which utilize the Mouse, including, Colour Art from Watford, Mini Office II from Database, Novocad from Technomatic, Icon Master from Beebug, Compas Starter CAD system from British Thornton, CAD Soft from CAD Soft, Solidesk from Solidisk, and Mode 7 Art from Tubelink and of course View and Wordwise are also compatible, many more titles will be available soon.

Now there are three great ways for you to get into a perfect Mouse Environment!

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TUBELINK on Prestel page *2582182# supports the AMX Mouse and ALL AMS software.

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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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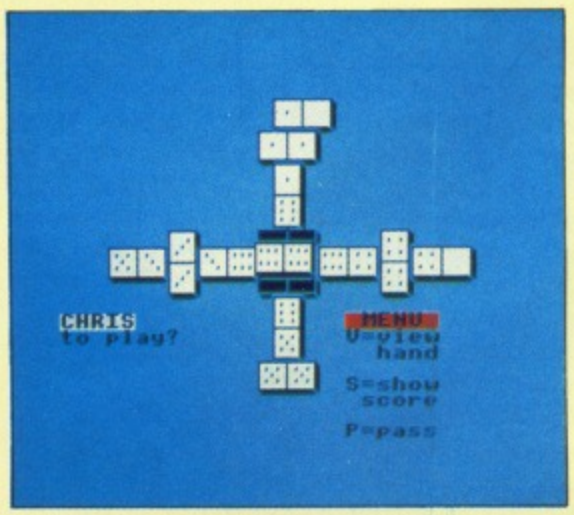

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Software solutions cannot always be found on the High Street. We argue the case for and against products being custom-built.

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YOU CAN USE ANY SCREEN

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PERFECTING THE IMAGE

THE MICRO USER NEWS

November 1986

Compact boost for show

ALL the signs point to another record-breaking turnout when the Electron & BBC Micro User Show returns to London this month.

The success of the latest members of the Acorn family – the Master series and Compact – has given a new impetus to the event which takes place at the Royal Horticultural Hall, Westminster, November 7 to 9.

All the vast range of add-ons and software produced for the new machines will be on display.

And leading manufacturers and suppliers who will be present have assured *The Micro User* there will be no shortage of entirely new products for all the Acorn micros.

These and pre-Christmas bargains galore will fill more than 100 stands at the show which last time attracted more than 16,000 visitors and exhibitors did a record £1.2 million worth of business.

New releases for the Compact and Master 128 include the Max 16k rom from Advanced Memory Systems.

Described as "a graphic front end for your disc filing system" it also runs on the BBC Micro and BBC Plus and will cost £19.95.

Care Electronics is launching a new ram in cartridge format to plug into the Master.

It will be non-volatile

Turn to Page 9

Acorn's back in the black

AFTER two years in the grip of severe financial problems, Acorn is in the black again and looking forward to a new era of prosperity.

It made an operating profit of £298,000 in the first six months of this year after losing £25 million in 1985.

The upswing in the company's fortunes – exclusively forecast in *The Micro User* as far back as June – has amazed industry observers who were writing Acorn off a year ago.

But that was before the Olivetti rescue buy-out and re-organisation under new managing director Brian Long took effect.

What makes the recovery more remarkable is that it has been achieved despite heavy spending on new product launches like those of the Master series and Compact, and without cutting back on research and development which accounts for a third of all Acorn's costs.

Turnaround

As chairman Alex Uboldi put it: "We haven't sacrificed a single element of our longer term policy to achieve the turnaround ahead of schedule".

Brian Long points to the success of the Master series as a major contributor to the recovery, along with continuing innovation and enhancements for existing users.

"Acorn's commitment to continuity sets us apart from our competitors and ensures the sort of loyalty from our customers that is inherent in our success", he said.

Specialisation

"The current trend is likely to continue since the company's three-tier strategy of high technology, specialisation in 'niche' markets and strong OEM connection is paying off".

Long and his colleagues are optimistic that the Compact will be a great success in the growing European educational computing market.

The machine will be sold in Italy – under the Olivetti label – and also in Spain, France, Germany and the Scandinavian countries.

A further boost comes from the production under licence in America of Acorn's reduced instruction-set architecture – Risc – chip.

Other OEMs are expected to latch onto the

Long: 'Trend is likely to continue'

chip which is designed for developers who need plenty of ram and interrupt handling at low cost.

Now MicroLink goes into Europe

BBC Micro users can now have instant access to more than 600 European databases, thanks to a new permanent electronic link to Luxembourg.

It has been set up by MicroLink, the UK's fastest growing electronic mail service, in conjunction with the EEC's Directorate General for Information Market & Innovation.

And the move comes only weeks after the system achieved a similar world first – a transatlantic connection with the giant American database Mnematics.

The European venture provides a direct link between the main MicroLink computer and that of Euronet/Diane, which is part of a far-reaching project by the European Commission to create a "Common Market of Information."

Databases that now become available to MicroLink subscribers via the European link contain information from many sources not available through any other on line host.

They range from information on research projects, reports and organisations to an on line directory to help find the right hardware and software.

Among the facilities on offer is a multilingual terminology databank of scientific and technical terms.

Containing more than 380,000 words and phrases and over 90,000 abbreviations it is being updated at the rate of 2,000 new items a month.

"Our latest link-up will prove invaluable in opening up new business opportunities in Europe", said Derek Meakin, head of MicroLink.

Computers by Post

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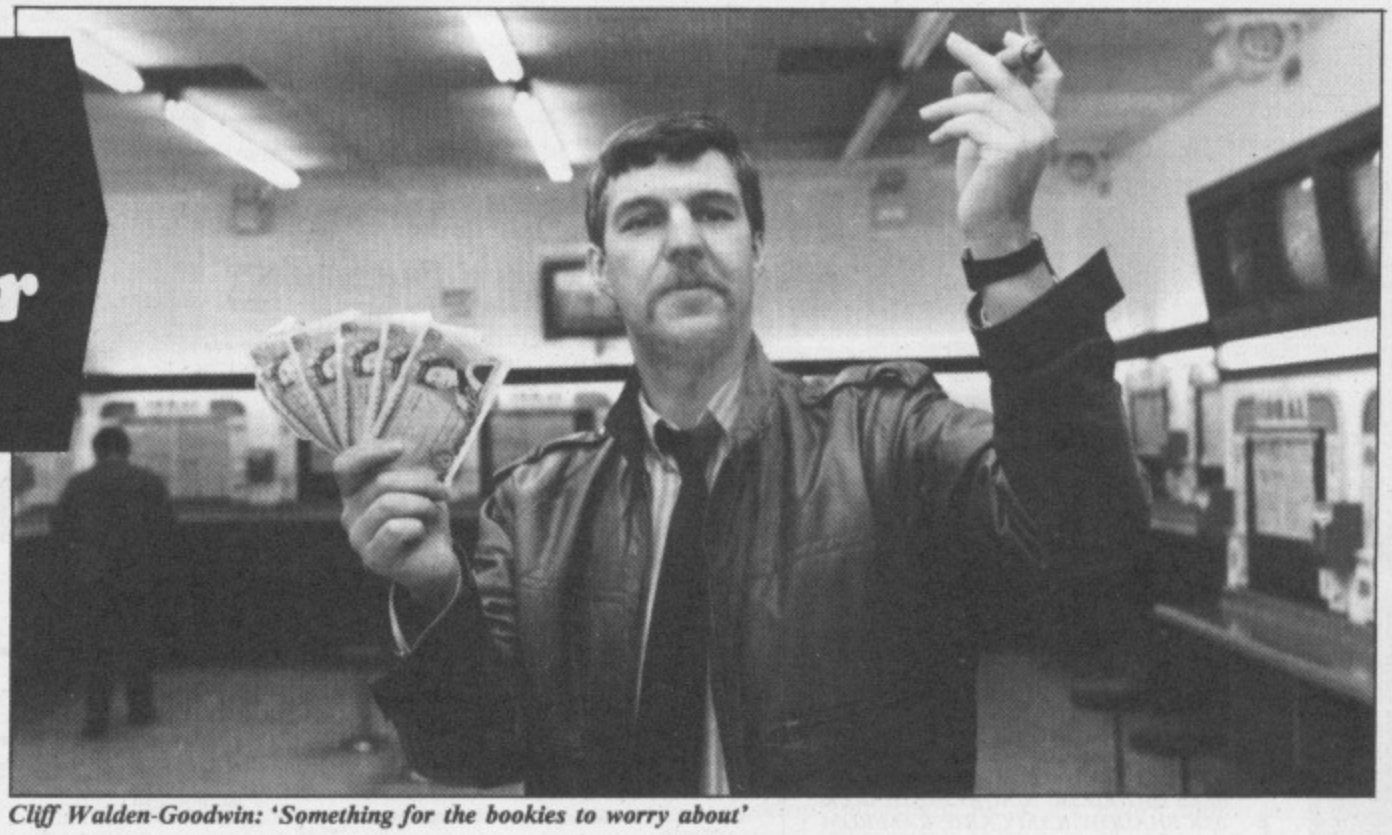
Micro User 11/86

Have a flutter on your micro



Cliff Walden-Goodwin: 'Something for the bookies to worry about'

A PROGRAM for the BBC Micro is likely to send bookmakers running for cover once it is released.

For it claims to have an 85 per cent success rate in picking winners of horse races.

KBS Interactive Software – the company behind the package – insists that the bookies are in for a caning from BBC Micro owners.

"We really believe that this will give them something very serious to worry about", said KBS boss Cliff Walden-Goodwin.

The software house believes it is on to a winner because of its expertise in rule based systems.

Having applied these to such diverse areas as programs to diagnose plant disease and car faults, KBS decided to turn its attention to the Sport of Kings.

In all, there are 96 rules forming the basis of its alleged betting coup. Users are asked to provide data ranging from the locations of the meeting to the previous day's ante post price forecast.

Once this is completed, the micro will predict the winner. Or if it hasn't enough information to guarantee which horse will be first past the post, it provides two or three selections to enable the punter to hedge his bet.

Cliff Walden-Goodwin says his company developed the program with the aid of a well-known professional gambler who lives "just outside Newcastle".

But if the program can in fact pick the winners why is he preparing to let everyone else get in on such a lucrative secret – even if the company is going to charge around £100 for the privilege?

"I've always liked a bit of a flutter myself", said ex-newspaperman Cliff. "So it will give me great satisfaction to see the bookies taken to the cleaners for a change.

"And don't worry, I intend to use the system myself."

Logotron picked for Compact

LOGOTRON has secured the rights to have its Compact version of Logo included as standard with the newly-released Acorn machine in preference to Acornsoft Logo.

Managing director Mike Hayward told *The Micro User*: "Logotron Logo has been widely supported by MEP regional offices and is highly recommended by local education authorities.

"It already has 75 per cent of the school market."

A version of Logo for the Master 512, running under MS-DOS, is in the pipeline. It should be available before Christmas at a price "somewhere around £60 – with educational discounts available on request".

"Until now, Logo has been confined to the classroom with Basic being the language of home computing," Hayward continued.

"I expect to see a fundamental change in Logo's position in the home computing stakes over the next two years."

BBC Basic for the IBM PC

NOW IBM PC and compatible owners can experience the true power of BBC Basic, following the release of an advanced emulator for the PC from M-TEC.

The firm has launched BBC Basic (86) for 8086 and 8088-based PC machines, running under MS-DOS.

This raises the possibility of the Master 512 being able to run BBC Basic programs from within DOS plus.

Unlike previous implementations of the language for other machines, M-TEC's version offers advanced features including multi-lined named procedures and an in-line assembler using standard mnemonics.

And it has the ability to read and write serial random and indexed disc files, a full screen editor and access to the BBC Basic VDU commands, graphics and sound channels. The price is £95.

M-TEC is so confident about BBC Basic (86) that they claim any differences between their version and Acorn's is due purely to the hardware limitations of the IBM PC.

More 3.5in drives

FOLLOWING its success with supplying 5.25in disc drives for BBC Micro users, a top manufacturer is adding 3.5in drives to its range.

Designated the BBC 435 series, the 80 track drives from Midwich Thame are capable of up to 640k formatted data storage while measuring only 200 by 195 by 40mm in size.

The firm says the new units "offer all the advantages of the new 3.5in drive technology".

The drives are available in several configurations, both with and without an integral power supply unit.

Prices range from £112.95 for a single drive without PSU, to £242.95 for a dual unit with integral PSU.

Also just released is a range of high specification colour and monochrome monitors from the firm.

Prices start at £289 for colour and £99 for monochrome with several convenience features fitted as standard.

A to B upgrade kits back

From Page 7

and provide an extra 16k of memory at a cost of between £60 and £70.

Vulcan Electronics will be selling its new Microswitch joystick for the Master at a special show price of £11.95.

Software for the Compact will be launched by BBC Publications.

White Knight Mk 12 is a chess game priced £14.95, and Figures of Fun is a junior maths education pack priced £19.95.

Twillstar will have a new dot matrix printer on offer at a special show price of £229.

The Teco is fully Epson and IBM compatible and prints at 180cps and 35cps NLQ.

Chestnut Software is launching a new series of BBC Micro educational packages based on the Mystery Squad books.

A range of coloured printer paper will be launched by HSV Computers. Matching envelopes are available in the five pastel shades of green, pink, blue, primrose and peach.

And even the old original BBC Model A isn't forgotten. Amten will be selling A to B upgrade kits for £20.

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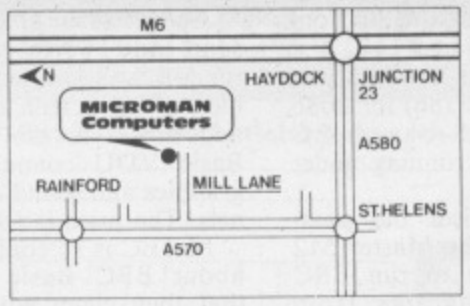


Compact finds its 'missing link'

A MAJOR criticism levelled against the new Compact – that it lacks a user port – has been answered.

Resource of Doncaster has come up with an emulator which will allow the micro to perform all the control functions for which a user port is vital.

It is available now in the form of a cable which costs £14.95.

"We were one of 24 firms chosen by Acorn to provide support for the Compact", explained Mick Evans of Resource.

"As one of our main lines is the Beginners Buggy, we appreciated the lack of a user port more than most".

So the task to produce the emulator was handed over to the technicians at Resource, the organisation that was formerly an MEP Centre.

It was because of Resource's connection with the MEP that it had links with Acorn.

"So that's why we were one of the firms chosen to look at the Compact before it was launched," says Mick Evans.

Resource is currently supported by four local authorities – Humberside, Sheffield, Barnsley and Doncaster – but intends to set up as a company in its own right.

"We hope the success of the emulator will enable us to achieve this in the near future", says Mick Evans.

SUPERFILE FOR THE MASTER

PC POWER is now available on the Master 512 thanks to Southdata which, after the success of Superfile, its PC database management software, has released a similar version for the Master running under DOS plus.

It represents a relatively low-cost enhancement aimed at business users who want to run commercial PC software packages without buying a complete new set of equipment.

Among the first users is Dyfed County Council which is developing a DOS Plus schools administration system for its 26 comprehensive schools, each of which has a BBC Master.

Max follows the mice

A SOFTWARE package called Max – The Desktop has been launched by Advanced Memory Systems of Warrington.

Providing a graphic extension to the disc filing system, the product is compatible with the BBC B, B+, B+128 and the Master 128 machines.

Max provides a front-end Wimp environment with a wide range of disc operations.

Files can be selected from the catalog window and manipulated to execute Basic and machine code programs, display detail, be deleted and renamed, locked or unlocked and copied between drives.

A menu of the sideways roms is shown in a window and details such as rom name, type and length can be displayed.

There is a control panel for the selection of screen colours, keyboard delay and repeat rates, time and the mode entered on leaving Max.

Help is on-hand where a specific error has occurred and general information is available about the use of Max at other times.

The company already produces AMX Mouse and AMX Pagemaker for the BBC Micro and is seeking to strengthen its position in the market with this latest development.

"We see the field of desktop publishing as a natural progression from mice and Max is the latest in our range", said Nick Pearson, managing director of AMS. "It's a huge market and we intend to stay right at its forefront".

Supplied on one 16k Eprom and accompanied by a manual and reference card, Max – The Desktop costs £19.95.

Designed to please

THE distinctive design of the new Compact resulted from an association between Acorn and design consultants David Morgan Associates.

David Bell, BBC products manager at Acorn, said: "We turned to David Morgan Associates because they had already designed our Communicator system.

"This was an opportunity to expand the case style which had proved highly acceptable to a commercial market and create a family of products.

"Design objectives, while working within the confines of cost and time limitations, were to produce a product which was aesthetically comfortable in the office, home or school environment and which would complement its surroundings".

200 want to be a millionaire

WHEN Nazir Jessa, managing director of Watford Electronics, started his hunt for an apprentice millionaire he had no idea what he had let himself in for.

So far he has received more than 200 applications for the post to make someone a fortune.

And – unfortunately for Nazir – most of them have been by phone and his switchboard has been jammed. So now he will only accept applications in writing.

Youngster

Nazir is looking for a youngster who is computer literate – and who can demonstrate ideas.

And he promises that whoever he employs could become a millionaire within five years if they prove their worth.

Each applicant must forward a marketable idea – either hardware or software for the BBC range – to Nazir.

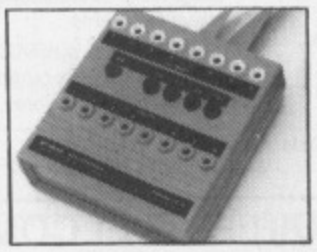
They should also enclose a letter stating why they feel they would best qualify to become an apprentice millionaire, addressed to his headquarters at 250 Lower High Street, Watford WD1 2AN

"I've had people of all ages contacting me, and some of them have come up with some very good ideas", said Nazir.

"I know I'm going to have a tough time choosing the winner".

Starting 'em young

DORSET based Phobox Electronics has released an interface designed to be the first step for young BBC Micro users into the world of computer control.



Connect 1 can drive motors, lamps, relays and buzzers up to one amp and is already in use in Dorset schools.

Providing eight outputs, buffered from the printer port, it can transfer eight switched inputs – coming from anything that closes a pair of contacts or switches a transistor on – to the user port.

Power can be borrowed from the auxillary outlet or taken from an external source of from 3 to 18 volts.

The price is £35.

Three years ago

ANOTHER look back at what *The Micro User* covered just 36 months ago – a lifetime in the fast changing world of computers. This was the issue for November 1983:

Acorn launch the BBC Micro on to the fiercely competitive educational market in the USA in the face of dire warnings from many quarters that it may be a recipe for disaster. But the company believes it is well on course to reach its target figure of $40 million – ten per cent of the total market – in the first year.

★ ★ ★

Company bosses Hermann Hauser and Chris Curry make stock market history when 10 per cent of the company's shares was put on sale. The biggest flotation the Unlisted Securities Market has ever known, it capitalises the whole company at £134.8 million.

★ ★ ★

A vast new market could soon be opening up for the BBC Micro – the Republic of China. This is the confident prediction of Wong International, the Hong Kong company which manufactures the BBC Micros destined for Australia and the Far East.

★ ★ ★

Problems have arisen with Acornsoft's new chess packages. Some 500 have been delivered with a minor and rather elusive bug. "You could play the game thousands of times without coming across the bug", insists a company spokesman.

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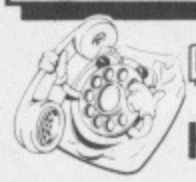

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- ★ EPROM plug in and go.
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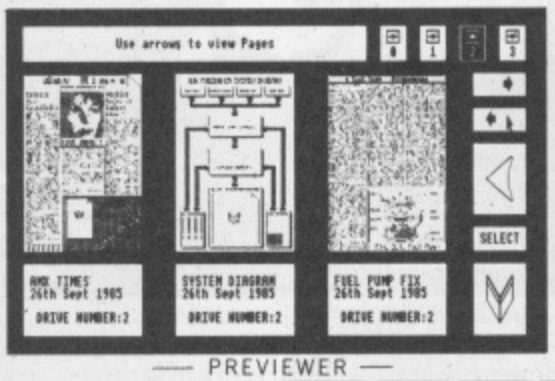
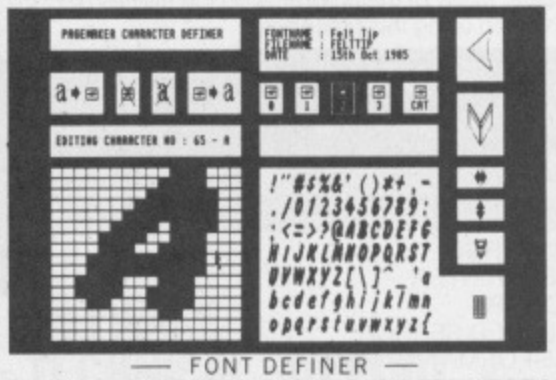


— PREVIEWER —



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Ask for our UTILITIES DATA SHEET if you want more information.

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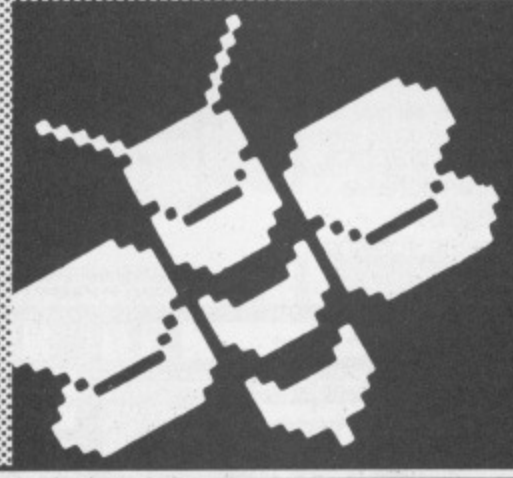

MACROM £40 £35 DISC

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MACROM is a fast full featured MACRO ASSEMBLER ROM that allows the use of macros, which are loaded from a macro library stored on disc. Assembly can be from disc to memory, disc to disc, memory to memory or memory to disc, thus allowing the use of very long source code up to the length of your disc. MACROM source code is tokenized and thus takes up far less room in memory or on disc than most assemblers.

- Operate in any mode
- Tokenized source code
- Assembles 6502 & 65C02 codes
- Automatically loads macros from library on disc
- Automatically loads subroutines from disc
- Macro library supplied plus demo files
- Chain program sections into main code
- Many different assembly options
- Converts BBC assembler code into MACROM source code
- Very fast & very flexible

In a comparison with ADE, MACROM was able to assemble a program to disc in 1 min 24 secs compared to 5 minutes with ADE and the source code took up 30% less room on the disc.

Ask for a data sheet today

RAMROD £40 ROM £35 DISC

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RAMROD is the ultimate in toolkit ROMs and is fully compatible with the whole BBC range from Model B through to the MASTER 128 and including both 6502 and TURBO co-processors. RAMROD adds 54 new commands to your computer. Areas covered are DISC (DFS & ADFS), GENERAL (memory commands etc.), ROM (including sideways RAM) and TUBE.

RAMROD provides commands to dump memory or a disassembly of memory to a printer. Editors can display the screen in 40 or 80 column mode.

DISC
Edit discs and search for ASCII or HEX sequences.

GENERAL
Edit, search, disassemble, compare, dump to printer and relocate ANY area of memory including the SHADOW screen. List vectors in use, load and save function keys even on MASTER etc.

In addition to the above you can move between ROM/RAM banks using (CTRL) Cursor Keys when in either memory or disassembly mode PLUS you can switch between memory editor and disassembler by pressing (CTRL)(TAB).

ROM
Includes commands for listing, loading, saving, wiping, swapping, ROM images. PLUS formatting and titling RAM banks for the ROM filing system and saving programs in RFS format.

TUBE
Provides the same memory commands as GENERAL plus SHIFT and COMPARE memory across the TUBE both ways.

We cannot do justice to RAMROD in the space here so please ask us to send you a fuller data sheet - RING NOW!

NEW PRODUCTS
Watch out for a fabulous new product which will be released during SEPTEMBER for the MASTER and its compatibles.

This is a high quality art package called ARTROOM but it offers many features not provided elsewhere. It is a full screen package and is written by the authors of FLEET STREET EDITOR so you know that it will be good.

Ask for a data sheet NOW!

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80 ____ 80 TRACK
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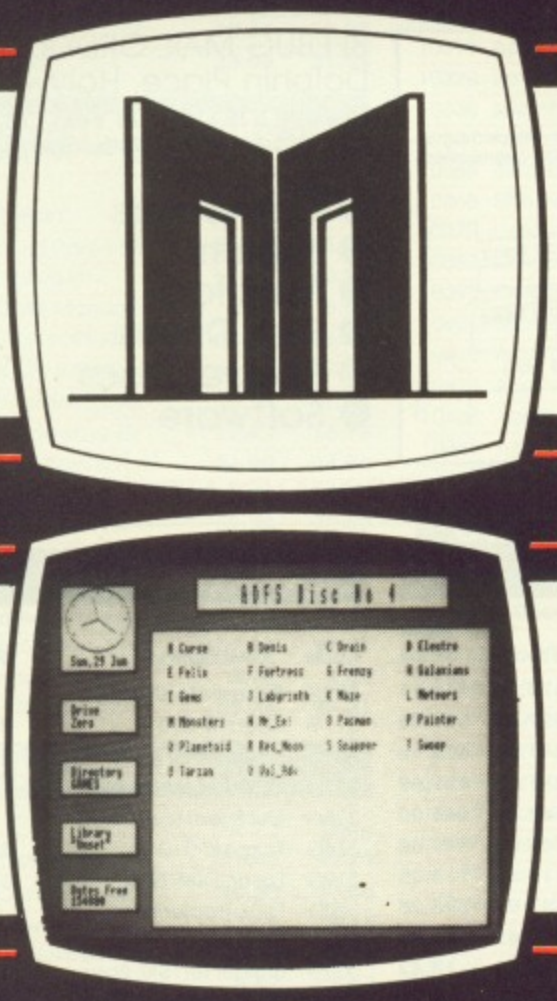

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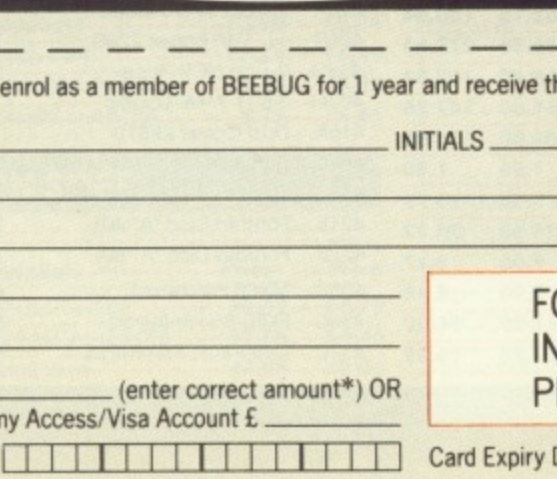

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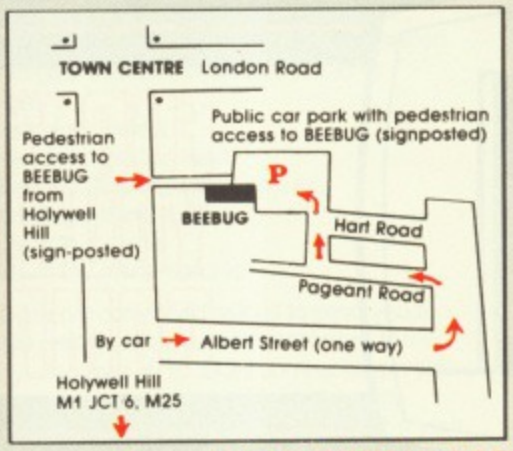

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240C	M128 Manual 1 ADJ22	14.95	14.20
241C	M128 Manual 2 ADJ23	14.95	14.20
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222F	Disc Starter Pack	163.00	154.85
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650B	Memorex discs SSDD 40	15.50	14.73
651B	Memorex Discs DSDD 80	25.50	24.22
652A	Memorex Disc Cleaner	9.65	9.17
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320D	FX85 Tractor Feed	32.20	30.59
321D	FX85 Sheet Feeder	130.00	123.50
300G	Brother HR15XL Para	350.75	333.21
301G	Brother HR15XL Ser.	350.75	333.21
310G	Juki 6100 Daisywheel	362.25	344.14
309F	Ibico LTR1 NLQ	105.16	99.90
303G	Canon PJ1080A col.	520.00	494.00
308G	Epson JX 80 colour	520.00	494.00
318G	Epson HI 80 Plotter	368.00	349.60
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408A	Canon/Taxan Ribbon	5.63	5.35
409A	Black Cart PJ1080A	7.19	6.83
410A	Colour Cart PJ1080A	9.99	9.49
413A	LX 80 Ribbon	4.60	4.37
414A	Ibico Ink Roller	4.60	4.37
415A	Epson JX80 Ribbon	16.22	15.40
418A	Juki 6100 S/S Ribbon	1.55	1.47
406D	11"*9.5" Paper 2000	14.03	13.33
453G	2-part NCR Paper	23.00	21.85
407C	3.5""1 7/16" Labels	5.63	5.35
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550A	1.0m Mon. Lead RGB	5.75	5.46
535H	Supervision III RGB	379.50	360.52
555A	Supervision Mon.Lead	7.00	6.65
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216A	Watford DFS Manual	6.95	6.60
219B	Watford 1.43 DFS Kit	62.00	58.90
702A	Watford 32K RAM Card	66.12	62.82
709D	Watford Eprom Eraser	33.35	31.68
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1003A	Acornsoft Lisp Rom	41.40	39.33
1004B	Acornsoft BCPL	50.03	47.52
1005B	Acornsoft Comal	41.97	39.88
1006B	Acornsoft Logo	50.71	48.18
1007C	Acornsoft ISO Pascal	50.71	48.18
1013B	View Print/Drive T.	8.62	8.19
1014B	View PrintDrive Disk	9.77	9.29
1015B	Acornsoft Revs Disc	17.08	16.22
1016B	Acorns Aviator Disc	17.08	16.22
1017B	Acornsoft GXR B	25.43	24.16
1018B	Acornsoft GXR B+	25.43	24.16
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1021A	Acorn Viewindex Disc	14.37	13.66
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1028B	Pascal Generator	32.78	31.14
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1030B	Acornsoft ViewPlot	25.30	24.03
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1032B	Revs 4 Tracks Tape	9.32	8.85
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1114B	Interchart	29.90	28.41
1115B	Speech System TTS	30.99	29.44
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A classic from Robico

Product: Myorem
Price: £9.95 (cassette) £12.95 (disc)
Supplier: Robico Software, 3 Fairland Close, Llantrisant. Mid Glamorgan CF7 8QH. Tel: 0443 227354

A NEW adventure from Robico is now something I look forward to eagerly. This final part of the Rick Hanson Trilogy can only enhance an already high reputation with discerning adventurers.

The Robico parser, which is clearly under continuous development (and apparently owes one refinement to yours truly!), can deal with multiple input even better than before.

The game includes the Oops option which allows you to undo your last move – as long as you are still alive, that is.

There is a competition entry form supplied with each game for those who manage to complete the adventure. The closing date is April 30, 1987 and the prize is £100. It won't be a pushover to complete Myorem, I can promise you!

The start is a beauty. There you are bound and gagged, tied to an execution post, unable to do or say anything. If you hang around long enough, up rolls the firing squad to shoot you. It took a bit of thought to get myself out of that mess.

The first real problem is quite a complicated chain involving repeated manipulation of objects before you can leap off into the culvert and find your way into the jungle.

The descriptions are very full and detailed and the jungle scenes have an excellent touch. From time to time birds and animals cross your path – and vanish in fright.

Myorem has my kind of humour, though I thought the fact that I have the athletic agility of a large gnu (wildebeest to you) was a close secret known only to my nearest and dearest!

Frustration at the puzzles has once again been matched with hearty guffaws at the humour. I particularly like the way that mistakes in play cause reality

to intrude in a devastatingly painful manner.

In view of the need to keep mum about the plot, the only other thing I'll say is Buy It!

Mad Hatter

Atmosphere	9
Complexity	9
Presentation	9
Value for money	9
Overall	9

Stryker is a stunner

Program: Stryker's Run
Price: £9.95 (cassette) £11.95 (disc) £14.95 (Compact 3.5in disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX. Tel: 0532 459453

ALLIED intelligence has got hold of the plans for the enemy's next offensive. These plans must be taken to Allied HQ immediately so that a counter attack can be launched. You, Commander John Stryker, have been given this daunting task.

Having redefined the control keys to your favourite six you are ready to take up the challenge. You can run left and right, jump and duck, and fire your pistol or throw a grenade.

Your route is quite simple – just turn to your right and keep moving. Stryker remains in the centre of the screen while the background scrolls past to the left.

The scrolling action may not be faultless but it's better than many I have seen. All characters are drawn in full colour with a black line around them, very cartoon-like.

Throughout your journey you will meet allied soldiers dressed in green. These chaps will often march forwards and knock off one or two enemy soldiers, thus making life a little easier for you.

When facing an enemy soldier your best course of action is to fire then duck to avoid the return shot.

The path you must travel is strewn with land mines, which you can jump over or detonate with a well-placed grenade. I recommend the first option as you will need every grenade you can lay your hands on later in the game.

The biggest hazards you will encounter are the enemy helicopter gunships which can unload a veritable shower of grenades. These are very difficult to avoid and usually account for the majority of your lives lost during a game.

At various points on your journey

you will stumble upon abandoned aircraft which can be "borrowed" and used to give the enemy a little of his own medicine. One word of warning – many of these machines are defective in some way.

The 32k version of Stryker's Run is an absolute stunner. I just wish that I could afford a Master as the flip side of the cassette contains a 128k super version!

Jon Revis

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

Get your pulse racing

Program: US Drag Racing
Price: £6.95
Supplier: Tynesoft, Addison Industrial Estate, Blaydon, Tyne and Wear NE21 4TE. Tel: 091-414 4611

THE scene is the Clifton Center, Arizona. Your dragster is ready on the track and so is that of your opponent Pete Piston. Out comes the track marshall who waves you forward. Your support team of mechanics gives you the required push and Pete's crew does the same for him. Then comes the instruction to start engines. You build up the revs, slip her into gear and you're off, hurtling down the track in hot pursuit of Pete.

Your aim is to beat Pete to the winning post one quarter of a mile down the track. Success will up your rating from novice to rookie and you can then try your skill against Tex Turbo.

Beat him and you become a pro and face Clint Clutch, and then on to Sam Servo who is demonically fast. If you get past him, you're a faster driver than me.

Your accelerator pedal consists of the greater than and less than keys. These must be hit alternately as fast as you can. The spacebar serves as the gear change and as far as I can discover you can only change up through the gears.

If you go into top gear too early, the car's lack of torque will mean a loss of acceleration and certain defeat. It all means that you need not only really nifty fingers, but also a good sense of timing.

As is so often the case in this type of game, both cars stay still and together in the centre of the screen while the background, in this case white lines, scrolls past.

The display gives no indication of who is winning, which means it is essential to read the distance indicators as well as your rev counter and speedometer. It's a game that will keep your eyes and fingers busy.

Sadly, winning a single race may not be enough. You take part in three races against each opponent and you only win if your fastest time is better than his.

The graphics are neat and tidy, as they should be with so little on-screen movement. My favourite feature is the parachute that slows you down at the end of the race.

The sound gives you a good idea of the speed you are travelling, but is rather unimaginative.

My main concern is that this type of game is bad for keyboards it is almost impossible to avoid hammering the poor keys.

Rog Frost

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

Ordeal of Ordanoids

Program: The Last of the Free
Price: £7.95
Supplier : Audiogenic, 12 Chiltern Enterprise Centre, Station Road, Theale, Berks RG7 4AA. Tel: 0734 303663

FOR many years the Ordanoid droids toiled to maintain the machinery left on distant planets by colonists from Earth. Then scientists developed a superior design of robot called the Proleoid, but instead of supervising the work of the Ordanoids they started to destroy them.

Clement is the sole remaining Ordanoid and he must make a last ditch attempt to find the planet's teleport system and warn Earth of the Proleoid problem.

The Last of the Free is a ladders and levels game in which you control Clement on his courageous mission.

The backgrounds used are graphically simple but complex in construction. As well as the electrified floors and sliding barriers you must also negotiate the numerous Proleoid droids which infest the rooms. These are drawn in more detail than the backgrounds and are well animated.

Some of the droids which move in mid air have flat heads, and these can be used as lifts if you time your jump correctly and then walk at the same speed as the droid.

The status display at the bottom of the screen gives information regarding energy level, lives remaining, what you are carrying and scores. Controlling Clement is simple – left, right and jump will get you around quite nicely.

As you play the game you will notice that you are initially confined to two or three screens as your progress to the higher levels is blocked by various doors.

A picture of the necessary key is drawn on each door, a great help as you can only carry one item at a time. You begin the game with five lives. There are no time bonuses or penalties so you can take as long as you wish to pick a route through a screen.

The Last of the Free is graphically simple but the routes through the screens are cunning. It will never be a blockbuster but it should still keep the kids amused for days.

Carol Barrow

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

Not currying flavour

Program: Vindaloo
Price: £7.95
Supplier: Tynesoft, Addison Industrial Estate, Blaydon, Tyne and Wear NE21 4TE Tel: 091-414 4611

HOW on earth can you make a game out of a curry? The clue lies in the last three letters of the title, and your aim is to become "flushed" with success.

The storyline concerns Raj, who runs an Indian take-away, but has eaten one curry too many and is now in urgent need of relief. The vital facility he requires is deep in the cellar under the shop and your job is to guide him to it.

Finding the route is not too difficult. You start at the top of each screen and work your way to the bottom. Your controls are just left and right – you fall from one floor to the next.

To make the journey you have to cross bridges which vanish quickly and, in some cases, unpredictably. You also have to cope with lifts. You can fall on to them while they are moving downwards, but you will lose a life if you fall on to a lift which is rising to meet you.

Apart from having to judge the moving platforms, you have to steer Raj through collections of animals that bounce up and down on elastic threads. Fortunately they move in a well-ordered manner and you soon learn how to avoid them.

If you load the game but don't start playing it straight away you'll get a display of each of the 20 rooms in turn. It is well worth the time looking through all of the screens so that you can learn the hazards before you are plunged into them.

You will also be able to enjoy the good quality scenery, the pleasing plinky-plonk sounds and the humour in the room names.

Vindaloo is a good idea and most of the programming is good, but playing it proved something of a disappointment.

It could be that Raj, who looks like an Egyptian mummy with a rucksack, flickers horribly, or it could be that the dissolving pathways just have me beat.

Or perhaps it is that the whole game is too slow – Raj moves at the right speed, but you have to spend too long waiting for the bridges, lifts or elasticated animals to be in the correct places. Whatever it is, Tynesoft's Vindaloo is not for me.

Rog Frost

Sound	7
Graphics	7
Playability	4
Value for money	3
Overall	5

Force to reckon with

Program: Galaforce
Price: £7.95 (cassette) £11.95 (disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX. Tel: 0532 459453

WAR has been declared upon the aliens of the Megallanic galaxy. As one of the federation's more experienced pilots you have been enlisted to fly with the elite Galaforce. Have you got what it takes to defeat the Magellan hordes single handed?

Galaforce is an arcade game which bears a strong resemblance to that classic Zalaga – swirling clouds of aliens just begging to be zapped. Zalaga owners should not be put off by this as the game has much more variety and the animation is fractionally better.

Some very nice multi-channel music accompanies both the demo screen and the demise of your spacecraft. The graphics are a delight – all spacecraft are represented by huge colourful sprites with the action occurring against a twinkling starscape.

Control of your ship is via keyboard or joystick. Movement is possible horizontally, vertically and diagonally, though you are restricted to the bottom quarter of the screen.

The game is divided into 48 separate zones, each consisting of six waves of aliens.

Zone 1 serves to break you in gently – the aliens tend to give in without a fight. The end of zone 2 sees the arrival of the motherships.

Close examination of the swarm of attacking aliens reveals that several of the little devils are releasing more fighters into the upper atmosphere! The destruction of these motherships must therefore be your main priority.

Zone 4 brings on the heavy brigade. Taking on a traditional space invaders formation a heavily armed bomber attacks you from behind a moving shield of other ships.

Each of the defending ships must be hit 5 times before it is destroyed and the bomber must be struck 10 times!

This seemingly impossible screen can be mastered with more than a little perseverance. You are then given time to recover as the next few screens are similar to those already encountered.

Galaforce is a game to get the adrenalin flowing, the kind of game you continue playing when you close your eyes in bed at night – it should carry a government health warning!

Jon Revis

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

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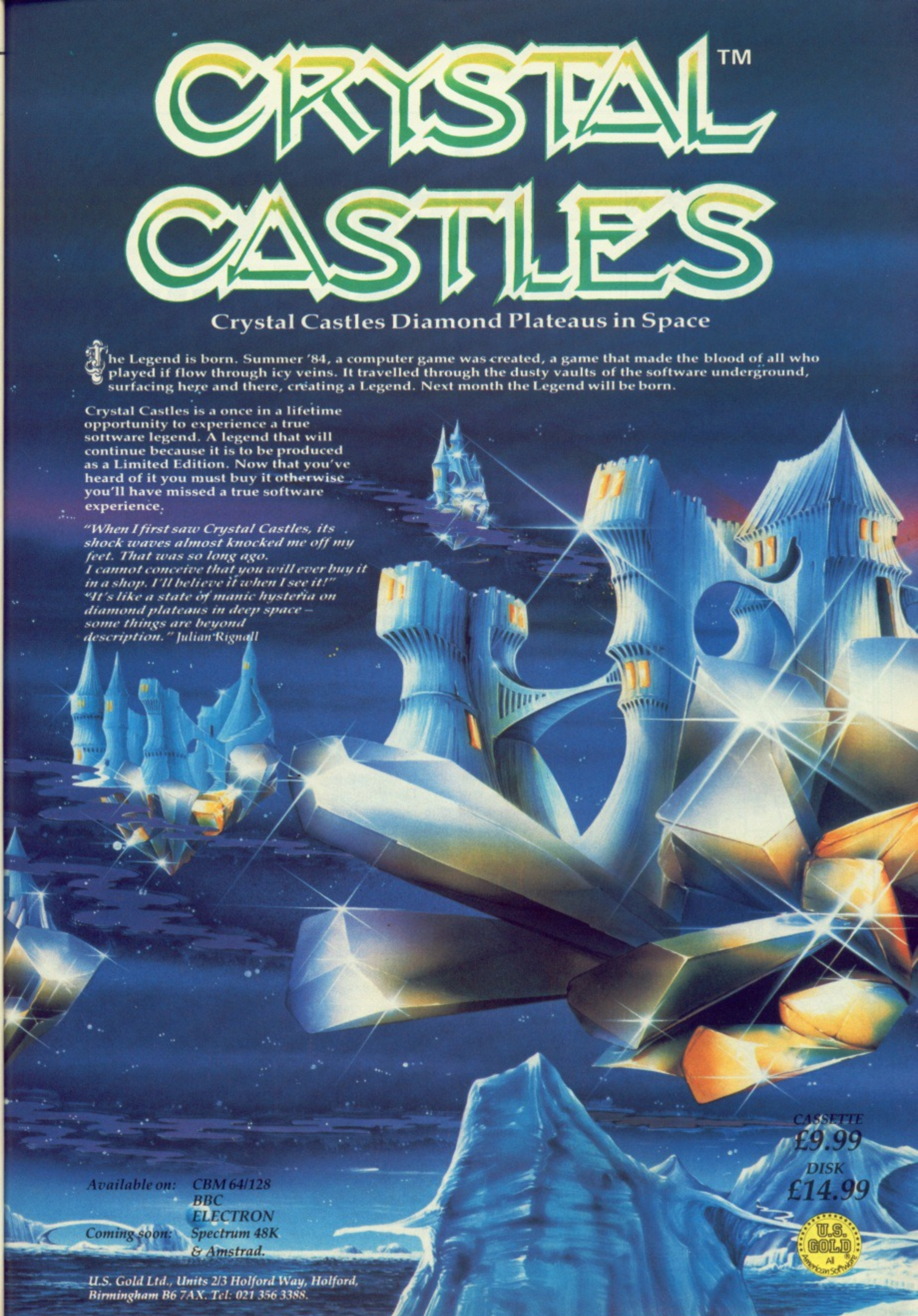

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Teleport – and survive!

GENERAL advice this month covers the matters of teleportation and self-preservation in adventure games. Teleportation is, for example, a feature of Level 9's Middle Earth trilogy. It helps speedy movement around the dungeon – or wherever you are – once you have finally worked out how to solve a particular puzzle.

Remember you are often playing against a move-counter where a lit lamp is concerned, so the fewer moves the better. Teleportation was used in a small way in Colossal Adventure, somewhat more in Adventure Quest and even more in Dungeon Adventure.

To my mind no adventurer's collection is even half complete without the Middle Earth Trilogy. Adventure Quest is fascinating and Dungeon Adventure is possibly my favourite Level 9 game.

So how do you detect whether a teleport system is there? The simplest way is to read the clue sheet – this pre-supposes that the software house is sensible and supplies clues in one form or another.

A word of warning though. I was talking to Pete Austin's dad a while back and do you know what he told me? Someone sent off for a clue sheet, sat down and played the game with clues permanently at the ready, and then complained that the game was too easy. I could hardly believe it.

Clue sheets are meant as an absolute last resort for ordinary gamers. I find they are also a way of saving the sanity of reviewers who have to try and complete adventures in no time at all.

Of course a good adventure writer incorporates clues into his game – hollow voices saying a word like PLUGH or some writing on a wall like XYZZY are always clues of some kind.

The sensible thing is to make a note of the word or words, then try to use them in different locations – for instance right at the start, or at least at the place where you are meant to store the treasure – and see what happens.

In Adventure Quest the teleport locations were marked out in a different way. A white dot was the clue to where you ended up and a black spot was the clue to a teleport entrance.

Dungeon Adventure had coloured columns to stand on, but you also had to wear something and say something, which eventually gave me a very wide range of movement indeed. A mithril collar was very fetching!

For self-preservation saving before doing something new can be invaluable, and I make no apology for mentioning this again.

It is particularly useful when you are testing out a teleportation system or when you come across some new equipment – always take precautions at such times.

You may find a special use for this equipment immediately, or at least get a hint of what will happen in the future if you do it in another location. On the other hand it could look quite innocuous, but contain some nasty surprises.

For example, when I found the armour in Red Moon I decided to wear it at once. I soon discovered that I needed to wear something else underneath it if I were to survive the experience.

Now if I had taken the armour at face value, and if a second-rate software house rather than Level 9 had written the game, it probably would have given me no problem at all.

As it is a medieval warrior would never have worn armour without padding underneath. Thus Pete Austin was being consistent, as well as quite authentic, in requiring the padded shirt to be worn under the armour before it could be used safely.

If I hadn't saved my position just before trying on the armour I would have had to go back to an even earlier

position, or else I would have been forced to discard the armour and carry on in my weakened state.

One option would have meant that a number of moves were wasted – the other choice involved a quite unacceptable loss of strength as the price for continuing straight on from that position. So remember it's better to be saved than sorry.

Three comments from people who won disc versions of The Hobbit in the competition run in the July 1985 issue of *The Micro User:*

I. Stephenson, who has a 1770 Solidisk disc interface hasn't seen the game yet. He writes: "As a computer consultant for one of the UK's leading software houses, I'm amazed that anyone should be so naive as to think that this sort of protection – accessing the 8271 directly – prevents piracy. Instead it restricts the market place dramatically."

Iain Roddick, with an Acorn DFS, has occasional bugs in his Hobbit too – a total crash and sometimes garbage in the communication window. It makes me wonder about overheating problems.

Richard Barnes felt it was a bit stiff to need two 40 track discs for the pictures and save files, and that creating the pictures was a real bind. (Not half as much as when you still can't see them).

The request for help in Bug Byte's Twin Kingdom Valley a couple of months ago made me look at the game again.

It really is good and I shall use it as a classic example in due course. Everyone should have it now that it is only £3. It is a better adventure than some at several times the price.

Superb solutions to Hampstead were sent to me by Stuart Booth, Michael Mulholland and N.J.Sharratt who included a list of favourite adventures. If they are typical of the quality of readers' work in solving adventures, I'm deeply impressed.

May I remind anyone asking for help that an sae is essential if you want a personal reply. Other queries will be answered in the column as time and space permits.

I've been robbed – literally. I was sent an adventure game on tape for evaluation, which had a game on one side and an introduction on the other.

I'm afraid I can't remember the title. I couldn't get the game to load and sent it back to the editorial office. Only there was this GPO mail-bag robbery – seriously, and it has disappeared. So if

you sent in a game during early June that corresponds to my vague description at least you know what happened to it.

If you care to try again with better recording levels I'll be happy to add it to the games awaiting evaluation.

See you next month. Until then, happy adventuring. ■

PROBLEM CORNER

Carl Noffki is well into Acornsoft's **Philosophers Quest** and is stuck. So am I as far as an answer goes. It's so long since I played the game that I have to confess I don't remember either the solicitor's office or the jewelled platypus.

I played it before starting the mapping procedures that I now use, so can any reader help?

As far as I recollect the solicitor's office had something to do with a will – you had to drop it or something. I'd be really grateful for a proper map of the completed game.

Helen Thewliss is also stuck in Philosophers Quest – she runs out of matches in the whale and albatross. She can't seem to avoid carrying too much when she gets to the whale.

Also she can't find anything in the philosopher's library, nor her way out of the maze, or the whale or her way to the solicitor. Finally what do the stars mean? Help please.

Dominic Sandbrook needs to know how to open the Morona gate in **Bored of the Rings.** Try taking the pepper to the gate and dropping it.

J. Holden of Wigan can't rescue Pippin from the willow or get past the barrow-wight in **Lord of the Rings.** I think Tom Bombadil is the answer to the first situation, he certainly is in the book and in the beginners' version of the game. Find Tom and take him to the willow to free Pippin.

In **The Fellowship of the Ring** Tom also sorts out the barrow-wight, but the Melbourne House implementation doesn't always follow the book.

Why not see if the pot plant can be used to stone the barrow-wight in some way – maybe gardener Sam could do it. I'll be glad to hear from anyone who knows the answer.

In Acornsoft's **Castle of Riddles** A. D. Marter can't drop the bomb and get through the giant's shooting gallery. I don't know this game – advice from a reader, please.

He can't get going in **The Labyrinths of La Coshe** either – again, I've not got this one so solutions are welcomed.

Can anyone let me have maps of Scott Adams Adventures? In **Pyramid of Doom** Peter Aumayr can only get into four rooms. He's also stuck in **Pirate Adventure** – where is the key to open the first door on the island? He can't get past the boulder in **Space Odyssey,** either.

J.W.Hargreaves has problems in two games I don't know. In **Countdown to Doom** he's stuck in the dome – is this a maze? In **The Hulk** he's being squashed by high gravity. Solutions welcomed from successful adventurers.

Nick Southgate has troubles in Adventure International's **Gremlins** – how does he get at the snow plough and destroy the controls, and when and how does he use the flash on the camera?

He's kindly sent me help sheets for **Blue Dragon** and **The Staff of Law** – thanks Nick, they'll come in extremely useful.

From Page 23

HELPLINE

A couple of readers are stuck in parts of The Hobbit – David Macfarlane is in the goblin's dungeon. The escape trick is to wait for Gandalf or Thorin and SAY TO GANDALF/THORIN 'CARRY ME' – then tell him to go through the window.

I found movement in the goblin cave area was easiest if I added QUIETLY each time.

Andrew Hassall also has some Hobbit problems. To cross the black river get the rope, throw it across and pull a boat back.

To make Bard kill the dragon ask him nicely to shoot it. The key to the secret entrance to the dragon's lair is in the goblin's dungeon under the trapdoor. Get Gandalf to break it open. Thorin grabs it, but don't worry.

The purpose of Gollum's riddles is to trap unwary adventurers. Have no truck with Gollum at all, just creep around there quietly till you come across the ring and then scarper.

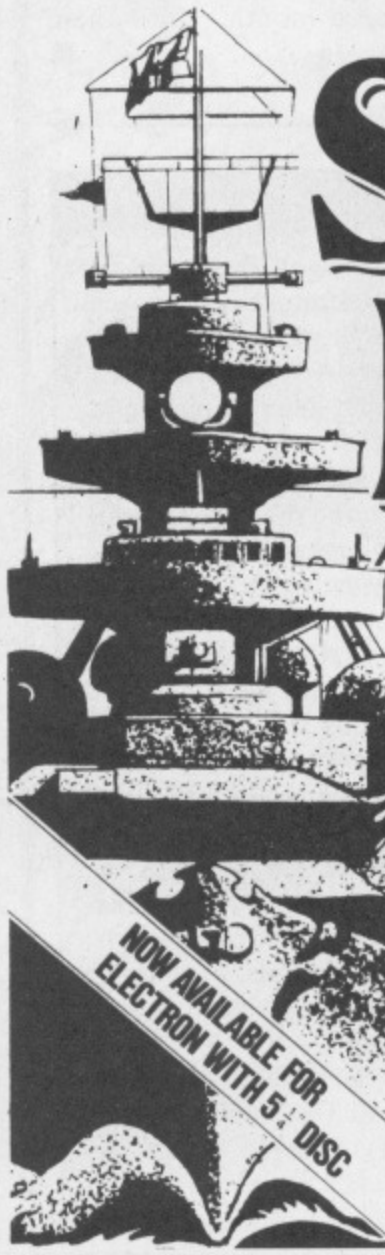
Andrew also gives some useful advice: To get the large key, wait till day dawns. Ask Elrond to read the map. Hang around and you'll get a feed too.

The ring can drop off your finger, then the baddies can see you again. To get out of the elf's prison just wait a while.

To get past the magic door WEAR RING EXAMINE DOOR AND WAIT.

To get out of the Elf King's palace put Thorin in the barrel, throw the barrel down the trapdoor and jump on to it.

Andrew rates The Hobbit as excellent.



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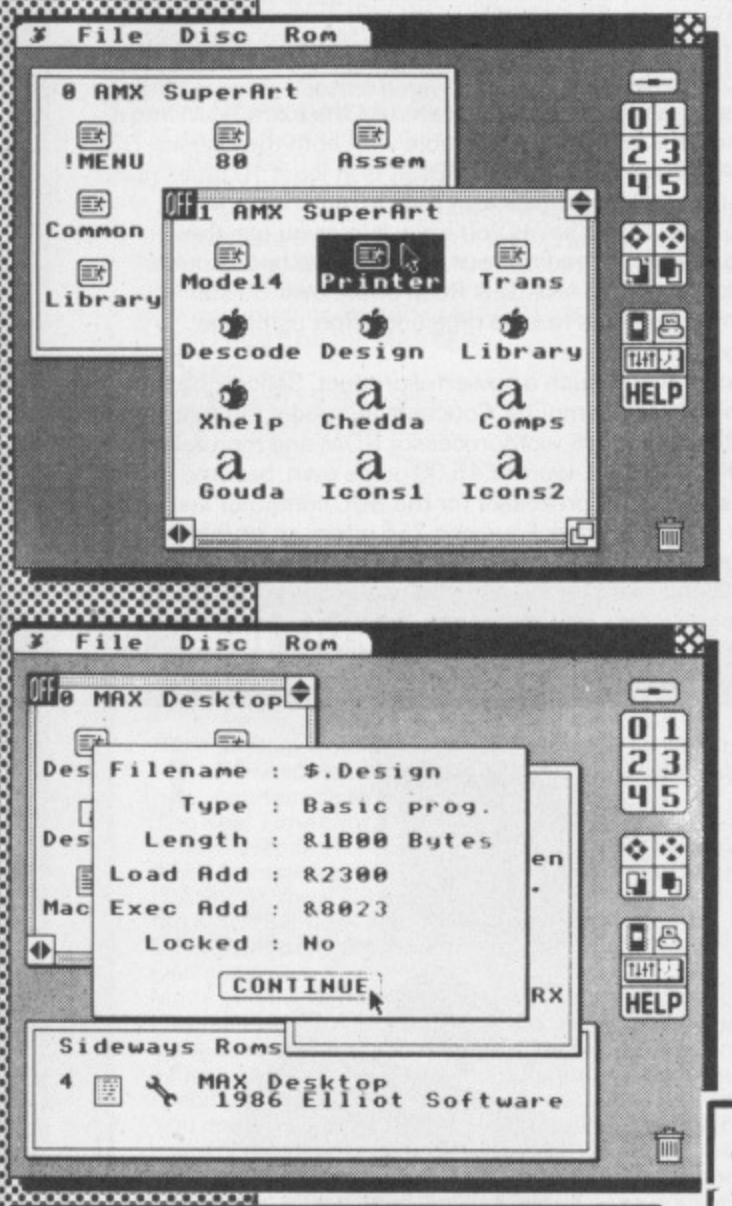

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The BBC Micro at 4MHz easily surpasses the new MASTER 128K on benchmarks.

For example, it runs the benchmark using Basic 4 in only half the time taken on the MASTER 128K.

If you have too many ROMs to plug in at once, the Fourmeg 256 offers TWO ways out. First, it includes additional high capacity (and fast) ROM sockets. Moreover, two or four normal ROM images can be stored in one high capacity ROM chip (by "Vertical Paging") — so more can be made immediately available at your fingertips.

Secondly, ROM images can be stored on discs and loaded into any one of the eight Sideways RAM banks available.

If you need more room in "languages" such as VIEW or BASIC, you may use any of the eight SHADOW RAM banks. No user memory is then lost to the screen, whatever the screen mode (while machine coded programs can access RAM right up to &FC00!).

Two frequent uses of the extra memory are as a RAMDISK or a printer buffer.

Star commands in the ROM can turn the extra RAM into a silicon DISK of 200K, compatible with both the Solidisk DFS and ADFS formats. The RAMDISK is at least 10 times faster than physical disc drives as it has no moving parts.

The printer buffer saves you time, it lets you use the computer while feeding your printer in the background.

In addition, the MANAGER ROM offers over 30 star command utilities to save time and effort using the computer.

To complement such a powerful product, Solidisk has arranged with Computer Concepts to bundle the famous WORDWISE PLUS wordprocessor ROM and manuals. This excellent product, worth £45.00 on its own, became the best selling wordprocessor for the BBC computer last year.

All in all, the Solidisk Fourmeg 256 offers an unmatched combination of speed, power and built-in facilities, while still having room for even further expansion. It is the most logical next step for the owners of any Sideways ROM board or of Solidisk Sideways RAM, who can trade in their present boards for the excellent Fourmeg 256.

Yes! I want to take you up on your special summer offer

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☑ £135.00 instead of the normal price (175), I will send you my old ROM board when I have been satisfied with your Fourmeg 256.

☑ £165.00 instead of the normal price, I already have your DFS installed in my BBC.

☑ I also allow £3.00 for First Class Post.

If for any reason I am not entirely satisfied with your product, I will return it before 15 days and have all my money back (except postage if applicable)".

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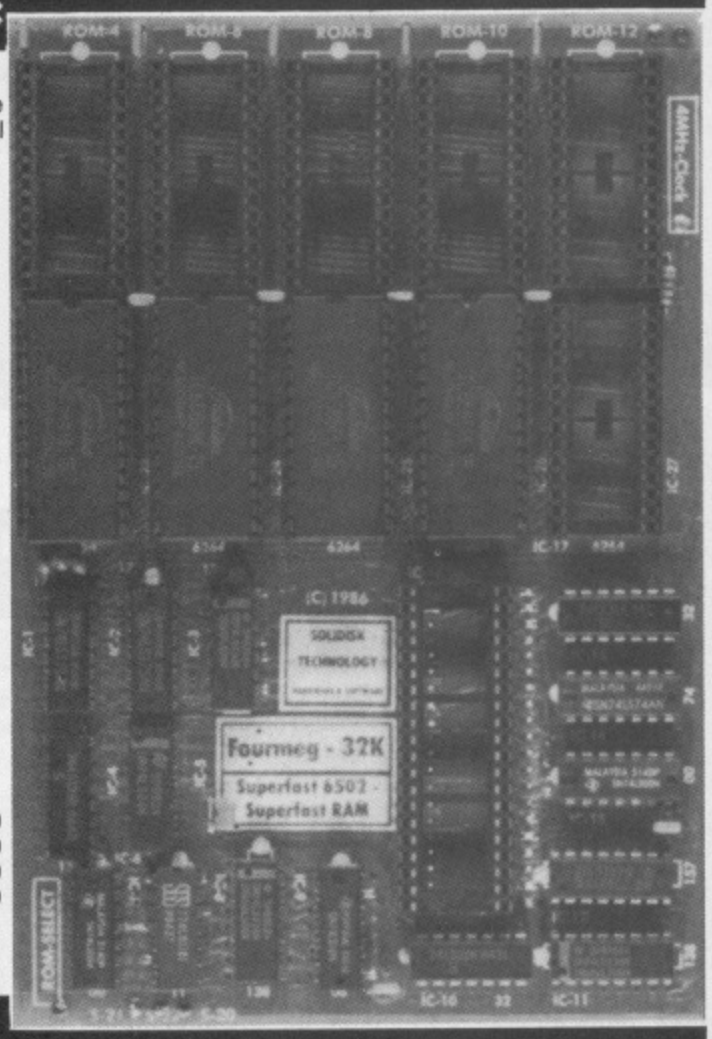
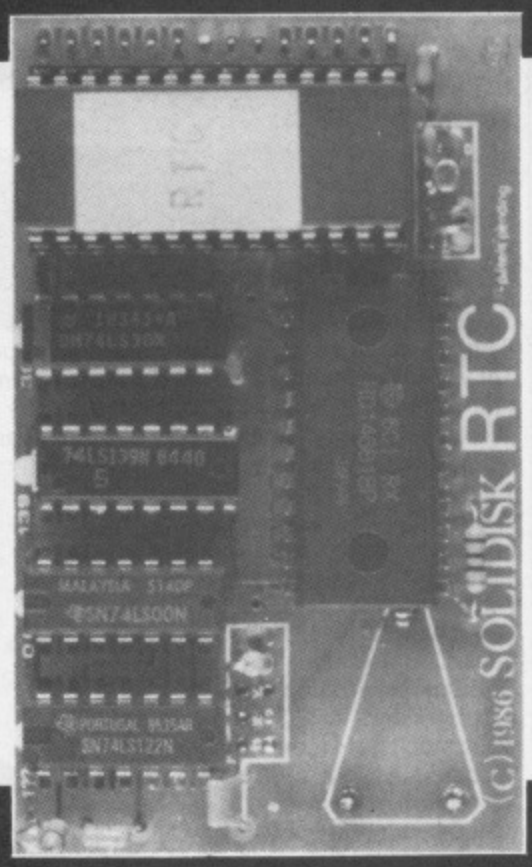
Shadow, Sideways ROM and Sideways RAM All-In-One for £50:



This board, the TWOMEG-32K, is specifically designed with the SCHOOL BEEB in mind so that one could have everything one wanted on a single, compact and extremely easy to install unit. All the necessary software is in a MANAGER ROM (supplied).
The top row of FIVE ROM sockets will take software ROMs, up to 32K each such as used on the BBC Plus and MASTER 128.
The middle row contains 32K of additional CMOS, low power RAM, acting as SHADOW RAM or as two banks of SIDEWAYS RAM.
The empty 40 pin socket will receive either the normal 2MHz CPU or the optional enhanced, faster 4MHz CMOS 65C02 (the board will be then called the FOURMEG-32K).
The TWOMEG-32K combined the usual functions of a Sideways ROM board — offering storage for up to 160K on board and 64K on the Beeb itself (a total 224K out of 256K possible) and a SHADOW RAM compatible with major 'language ROMs' such as BASIC, VIEW, WORDWISE, INTERWORD, VIEW-SHEET, VIEW-STORE etc.
When Shadow RAM is in use, a small 8K of Sideways RAM is available for loading ROM images or a small printer buffer. When SHADOW RAM is not in use, the entire 32K additional RAM can be used as TWO banks of SIDEWAYS RAM or as a RAM DISC (available only with Solidisk DFS or ADFS).
The MANAGER ROM also contains a powerful TOOLKIT to assist PROGRAMMING IN BASIC.
The attraction of the TWOMEG-32K board comes from its versatility, its convenient software in ROM and its low price tag. Furthermore, the board can be fitted with a CMOS 65C02 capable for example of running the new BASIC 4 (some 30% faster than BASIC 2 and also more accurate) or upgraded to FOURMEG speed, comparable to the TURBO board on the MASTER.

TWOMEG-32K	£50.00
65C02 (2MHz) for the above	£10.00
Or upgrade to FOURMEG	£25.00
FOURMEG-32K	£70.00

Real Time Clock & Desk:



The Real Time Clock and Calendar (RTC) can be plugged into any ROM socket on the BBC Model B with absolutely no other connection to make.
The Real Time Clock is powered by a rechargeable battery which should keep the RTC active throughout the Summer Holidays.
Apart from giving the Time and Date, through *TIME or TIME$ (BASIC 4), the RTC has many of the AUTO-CONFIGURE features of the MASTER 128K with the same command syntax, a friendly DESKTOP program for use with the AMX MOUSE, a DIARY and a Calculator.
Many additional commands are background commands, leaving your computer free to run your program. They set the time, display the clock in any screen mode, bleep at specified time, interrupt and show a message when you have an appointment, perform a specified task at specified time etc.
You can even 'Clock Boot' your computer directly into the DESKTOP, using the MOUSE you can operate the computer without touching the keyboard (ATARI-ST style) until you 'click' on a language ROM or an application program. You can pop down the pocket size calculator, change the time and edit your DIARY (instead of using a word processor).
The Real Time Clock will add fun and convenience to the every day use of your BEEB.

Order as CLOCK £29.00

In Brief:

The range of Solidisk Add-Ons for the Beeb is quite extensive. For example: TWOMEG-32K . . . £50.00, FOURMEG-32K . . . £70.00, SWR64 with S/W pack 1 . . . £60.00, SWR128 (new style) with S/W pack 1 . . . £80.00, FOURMEG-256K with WORDWISE PLUS . . . £175.00, DDFS (1770) . . . £35.00, DFDC (1770+8271) . . . £40.00, DFS 2.2 ROM . . . £15.00, ADFS 2.1 ROM set . . . £30.00, 3½ inch (80 track double sided) drive . . . £90.00, 5¼ inch drive . . . £109.00, 20MB Winchester with PSU . . . £745, Linemaster communication ROM . . . £10.00, Insight intelligent disassembler ROM . . . £15.00, Solimon machine code monitor ROM . . . £10.00, Toolkit ROM . . . £10.00, S/W pack (1 to 3) of 5 discs . . . £10.00, 2764 EPROM . . . £1.00 each, 27128 . . . £3.00, 27256 . . . £6.00, EPROM programmer for 2764/27128 . . . £19.00, EPROM programmer for 27256 . . . £21.00, EPROM Eraser . . . £20.00.

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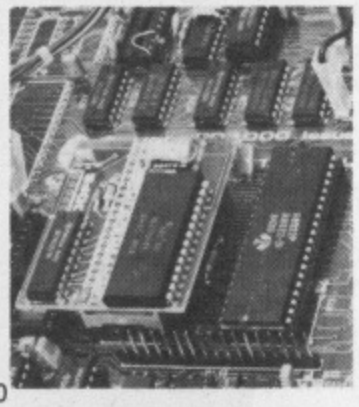
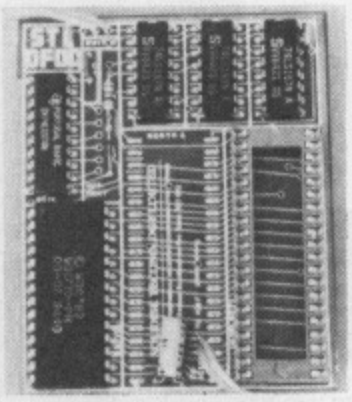
SOLIDISK BUDGET DISC SYSTEMS

Double density disc interface



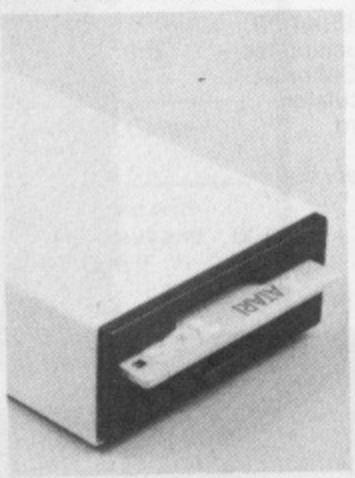
Solidisk very popular Double Density Disc Filing System (DDFS) is based on the WD-1770 floppy disc controller, the same chip used on the Beeb-Plus and the Master series, totally hardware compatible with Acorn 1770 DFS and ADFS ROMs. The DDFS is suitable for virtually any type of floppy disc drives, 3½" and 5¼", 40 track and 80 track, single and double-sided with or without power supply unit. New low price without DFS ROM £35.00
(order as XR/DDFS)

1770+8271, dual floppy disc controller interface



Solidisk DFDC (1770+8271) is the best seller in disc upgrades for Model B's already fitted with an INTEL 8271 chip (Acorn, Watford, Pace, Viglen, Cumana etc). It plugs into the 8271 socket with the latter relocated on the DFDC itself. This is the most convenient way of adding the modern and powerful 1770 without sacrificing the 8271 chip. The DFDC is fully hardware compatible with both Acorn DNFS 1.2 and ADFS ROMs, as well as Solidisk DFS 2.2 and ADFS 2.1 ROMs. The Acorn DNFS 1.2 is recommended for use jointly with the Solidisk ADFS 2.1 as both systems 'self-frugalise' to keep PAGE at the lowest value. We recommend the DFS 2.2 ROM alone if ADFS is not required. New low price without DFS ROM £40.00
(order as XR/DFDC)

Low cost 3 ½ inch disc drives



The new generation of THIRD HEIGHT 3 and a half inch Floppy Disc Drives offers unprecedented value for money. They feature Double-sided, 80 track per side mechanism offering up to 640K per disc in double density and ADFS. Low power, large capacity, extremely quiet mechanism, robust media and LOWER PRICE than 5 and ¼ drives make them irresistable. They are also the newly adopted Acorn disc standard. Cased, all leads. One year guarantee.
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FREE demonstration diskett (double sided) in DFS format while stock lasts (containing a Database, a Word-processor and a selection of games and disc utilities). Separate power supply for BBC Model B, issue 2 or Electron is available at £25.00.
Order as 3.5/PSU.

Special leads

A Special set of leads to connect TWO drives in ANY combination of 5¼ and 3½ drives is available separately at only £15.00 or only £8.00 surcharge if supplied in lieu of standard leads. Order as SPECIAL LEADS.

Advanced disc filing system ROM-set (two 16k EPROMS) version 2.1

The finest product yet for any BBC computer fitted with the 1770 Floppy Disc Controller (Model B, Plus and Master 128K and Electron) encompassing many Master 128K specifications. The list of features is so extensive that it would require a lot more space to describe it. In brief, it has ALL the features of the 2.2 DFS ROM except device drivers for the INTEL-8271 chip, full ADFS implementation comparable to the MASTER 128K. Plus ADFS-FORMAT (FORM40, FORM80 and FORM160) and VERIFY. Plus MVDFS and MVADFS to transfer files between DFS and ADFS formats with automatic PAUSE for disc change rendering possible to operate with a single drive. Low PAGE value. Compatible with 6502, Z80, 32016, 80186 (Master version) Second Processor. Two manuals.
Normally £30.00 but if order with DDFS or DFDC only £20.00
Please mention computer model when ordering. Order as ROMS2.1S. Also available on a single 32K EPROM as ROM2.1/32.

Single and double density disc filing system ROM version 2.2

The most powerful and versatile DFS ROM available for the BBC model B, the BBC Plus and the Master 128K. Suitable for both 8271 and 1770 Floppy Disc Controller. Double density allows up to 60% increase over conventional format or 640K storage per (80 track double-sided) disc. Extensive features include 40 and 80 track software switch, unlimited filenames in catalogue (as opposed to Acorn 31), automatic Read after Write. It works with Z80, 6502 second processors and Econet and also is very fast on comparative review benchmarks. Built-in commands include FORMAT (F40 and F80), VERIFY, DZAP, MZAP, RECOVER, RESTORE, WORD, RTRACK, WTRACK etc... Also, ENABLE M allows IBM PC discs to be read or written to. Extensive User Manual covers many technical details. Supplied on 16K EPROM.
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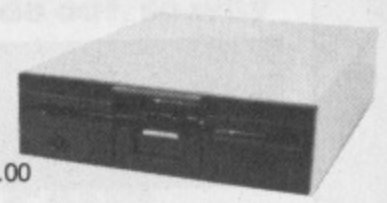
Also available are NEC or MITSUBISHI 5 and ¼ inch, 80 track, double-sided drives at a very attractive price. Cased in matching cream colour, all leads. Only £109.00



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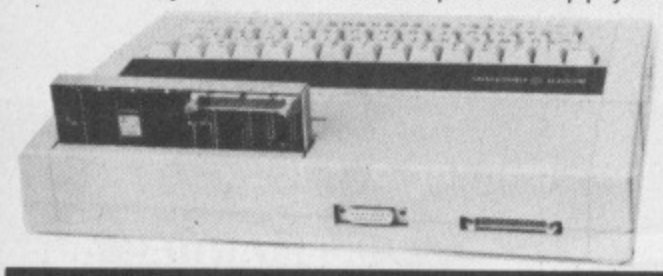
Electron Disc Interface:

This unit (EFS) plugs into the PLUS-1 Expansion and allows connection of a twin disc drive system and a Winchester. The Disc Interface is based on the same WD1770 chip as used on the Beeb.
The Electron Disc Filing System software in ROM (32K) is a version of the Solidisk ADFS 2.1 thus offers a large degree of compatibility with Beeb software. The system is capable of both Beeb DFS format (single and double density) and ADFS format as used on the Acorn PLUS-3.
The unit also has a 16K of Sideways RAM which can be used to load ROM images. The unit is guaranteed for one full year but we warn the users that the built-in Sideways RAM is UNRELIABLE hence the reduced price of only:
.....£50.00.
Use a disc system with built-in power supply unit.



Old Style SWR32 and 128K:

This exceedingly popular system (30,000 plus units sold) enables the Beeb user to load one or two ROM images into the Beeb, make a 16K printer buffer, use DFS with PAGE at &E00, play games, run bigger BASIC, store music and inumerable other uses as supported by a library of 15 software diskettes.
The SWR32 system consists of a BASE UNIT which plugs into the rightmost ROM socket on the BBC board and a (exchangeable) RAM CARD. The RAM CARD also has extension socket for a piggy-back memory board capable of bringing the extra memory to 128K bytes of RAM.
This system is now superseded by the new FOURMEG series and therefore offered at a knock-down price of ONLY £20.00 for a complete unit, excluding software. The 96k add-on piggy-back memory board is also greatly reduced.
Order as SWR32 .....£20.00
Order as SWR128 (SWR32 with 96K extension) .£50.00
NB: Manual supplied but software (not strictly required) not included.
The supportive software is a series of 15 diskettes, available on either 40 or 80 track DFS diskettes. You can buy any number of VOLUMES although we recommend you buy by PACK of FIVE volumes. PACK 1 (volumes 1 to 5) contains general applications such as MENU, PRINTER, DFS0E00, SILEXICON etc. PACK 2 contains programming applications (SOLIMON, SOLITRACE, TELETEXT EDITOR, SPRITES, DFS and ADFS etc). PACK 3 contains exclusively computer games. Each diskette is priced at only £2.00, software PACK is £10.00 for 5 diskettes.
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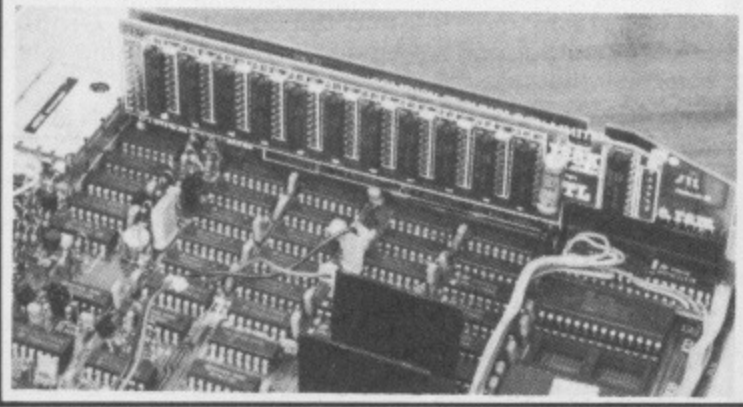
Order as SOFT/PACK 1 or 2 or 3 .....£10.00



Secondhand Refurbished Beebs:

As a result of the Solidisk MASTERPLAN, we have to dispose regularly of SECONDHAND, refurbished, complete with Double Density DISC INTERFACE, thoroughly checked and fully guaranteed (Labour only) BBC Model B's. Price vary with issues and ages, commencing from £150.00. Please ring for brochure.

In Brief:

The range of Solidisk Add-Ons for the Beeb is quite extensive. For example: TWOMEG-32K . . . £50.00, FOURMEG-32K . . . £70.00, SWR64 with S/W pack 1 . . . £60.00, SWR128 (new style) with S/W pack 1 . . . £80.00, FOURMEG-256K with WORDWISE PLUS . . . £175.00, DDFS (1770) . . . £35.00, DFDC (1770+8271) . . . £40.00, DFS 2.2 ROM . . . £15.00, ADFS 2.1 ROM set . . . £30.00, 3½ inch (80 track double sided) drive . . . £90.00, 5¼ inch drive . . . £109.00, 20MB Winchester with PSU . . . £745.00, Linemaster communication ROM . . . £10.00, Insight intelligent disassembler ROM . . . £15.00, Solimon machine code monitor ROM . . . £10.00, Toolkit ROM . . . £10.00, S/W pack (1 to 3) of 5 discs . . . £10.00, 2764 EPROM . . . £1.00 each, 27128 . . . £3.00, 27256 . . . £6.00, EPROM programmer for 2764/27128 . . . £19.00, EPROM programmer for 27256 . . . £21.00, EPROM Eraser . . . £20.00.

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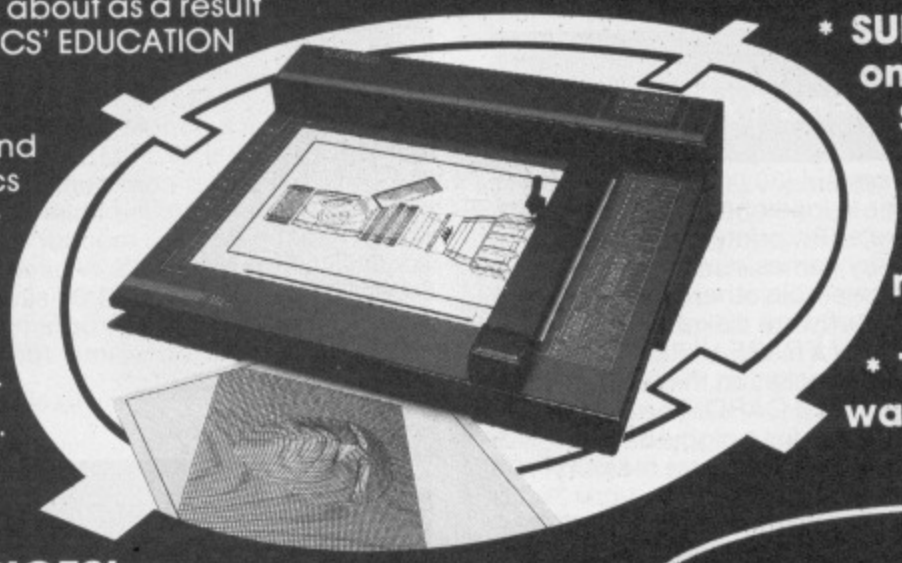

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MU 11

EDUCATION MICRO USER

No school should be without a database

Philip Andrews on the importance of acquiring new skills

SEVERAL months ago an article appeared in the Times Educational Supplement about using databases in schools. It was written by a head of English, and I started to read his offering with much enthusiasm.

Unfortunately I was to be most disappointed, and more than a little saddened as I read on and realised just how much he had failed to see the rich educational possibilities for using a database in the classroom. The article was solely concerned with how he, as a head of department, could use a database for the departmental administration.

It has been said that a business only needs three pieces of software – a word processor, a database and a spreadsheet. I am beginning to realise that this is to some extent also true of a school, only I would rephrase the statement slightly to read, "No school should be without a word processor, a database and a spreadsheet".

There are many educational word processors available for schools, and they do meet the needs of the classroom. There are few, if any, cheap educational spreadsheets worth having which does limit this philosophy somewhat. And until recently there have been few databases designed for use in the classroom.

Why should a database be such an essential software package to use with the children? Let's first take a look at the changing nature of information and the curriculum.

At one time education was concerned very much with imparting facts to the children. Now the winds of change are gently blowing so that the facts themselves are becoming far less important, and the skills required for finding out information from different sources are being developed.

As time goes by, more and more information will be stored on and accessed from a computer and there is a need for children to learn to use such data. A whole new set of information handling strategies need to be learned.

We have all acquired such skills. We know, for example, that to find a specific article in *The Micro User* the easiest way is to look at the contents first and this will tell us which page to turn to.

A common strategy for organising information in book form is to sort it into some order first. A dictionary carries every entry in alphabetic order, the Observer Book of Wild Flowers is organised by the family of the flower and so on. To help find a particular flower there is also an alphabetical index at the end of the book.

We are all well used to these techniques, and expect a database to have similar facilities.

It is quite feasible for a database on the BBC Micro to carry all the textual information held in, say, the Observer Book of Wild Flowers. Thus a child can ask a question, or a series of questions, of the data file and be presented with information on one or more flowers.

The order in which the flowers are stored in the file is irrelevant. The alphabetic index or the family groupings in the book are only there to serve as an easy way to find your way round the book.

With a database, the skill is in asking the

→

Rich pickings in Europe

ACORN and its partner Olivetti are expected to face an uphill battle in the European education market.

These are the findings of a recent report from leading market analysts Intelligent Electronics.

Company researchers claim that the main problem for British computer manufacturers attempting to cross the Channel lies in the chauvinistic attitude of the European states.

"The fact is that most national computer literacy projects favour domestic suppliers", says the report.

However, rich pickings await Acorn if it is successful.

Intelligent Electronics predicts that by 1990 there will be some three million micros installed in the European education system – two million more than the present figure.

According to the report, the French currently have the largest installed base of school computers with 287,000 followed by the UK with 262,000 and West Germany with 143,000.

The market with the greatest growth potential is reported to be Spain/Italy. From its current school user base of 118,000, the Intelligent Electronics research team claim it will grow to 585,000 by 1990.

At this time, concludes the report, it will overtake the UK as Europe's second largest education user base.

Spain and Italy have been named by Acorn as prime targets for the new Compact, along with France, Germany and Scandinavia.

Instant applications

THE recently released rom version of Mini Office II will prove an invaluable aid in the new GCSE syllabus, according to a leading educationalist.

"Instant Mini Office II has taken the needs of the new-style examinations into account and is going to make life a lot easier for both pupil and teacher", said John Redgate, until recently the information and technology officer at Salford Education Authority resources centre.

"This is the nearest to a true professional applications package that I've ever come across for the BBC Micro, offering users the feel of the power available on much greater machines at a decent price.

"Its flexibility, efficiency and convenience provide a fully integrated package for anyone involved with computers and education. It makes the BBC Micro more functional and worthwhile and I can't see anybody in their right mind ruling it out."

Priced at £59.95 Instant Mini Office II offers six modules – word processor, database, spreadsheet, graphics, label printing and communications – contained in four chips on one board.

Interactive adventure

INTERACTIVE games playing becomes accessible to pupils and teachers alike through Logotron's new adventure games generator for its Pendown word processing program.

Running on the BBC Micro, it combines word processing with simple programming commands to bring a new dimension to creative writing.

Text produced on the child-centred Pendown program can be combined with simple instructions to create interactive games for others to play.

The games generator features a programming language utilising various simple commands including if, then, take, drop, score, carry and print.

The system comes on a disc containing the generator, reader, manual and sample game Sheer Luck Holmes. Price £15.

"Such ideas require a different approach from the traditional ways of handling information"

right questions so that only the information you are seeking is presented. You don't need it "processed" into alphabetical order, even though some databases will do this.

Also the beauty of a database from a teacher's point of view is that the information provided in the data file can be tailored to the needs of the individual child. With the Observer's Book you are presented with a whole page of text whether you like it or not, and have to read through it all to find the particular bit of information you require.

With a computer data file it is possible to structure the data in a quite different way. For each flower, you could not only pick out certain key headings such as its colour, you could also provide different levels of descriptive information, even to the extent of tailoring the language in each level to suit different reading abilities of the children in your class.

The display could be formatted so that only one of these levels of information would be presented at any one time on the screen. Here we have a flexibility quite beyond the scope of a book.

A similar idea would be to provide within the record for each flower a summary of the information about that flower.

Such ideas require a different approach from the traditional ways of handling information and open up new possibilities in the classroom.

The cry from the heart of most teachers is that they do not have the time to put all this information on to a database.

This is true, but spread over a period of time it is surprising how large a data file can be built up with seemingly little effort. Exchanging and amending other teachers' or schools' data files can soon build up a useful classroom resource.

And what about using the children themselves? A good educational database should be designed so that it is easy for them to input and edit their own information. This opens up new horizons in the classroom.

How many children engaged in project work do their best to simply copy chunks of data from an appropriate source into their own folder, giving the data or their work little thought? If the information has to be gathered and collated to put it on to a database, the children are forced to think more carefully about the information they are collecting, and a whole range of language, mathematical and information skills is involved.

It is always assumed that a database must contain factual data. There is no reason why a data file should not be imaginary, just as a library contains both fiction and non-fiction books.

For example the scenario could be that the Earth is about to be destroyed through some natural catastrophe and the population must be evacuated to another planet. The problem-solving exercise could be to use the database to decide on the best planet. Each group could be given a particular role to play, ecologist, geologist and so on.

There is tremendous scope for a whole series of activities that could spring from such an exercise. The creation of the planet data files themselves could be an exercise for groups of children. Within a year group, each class could prepare a series of planet data files that the other classes could then use.

Another important area of use for a educational database is concerned with graphing. Many children still spend hours drawing graphs in the classroom, producing elaborate diagrams that they do not understand as well as the teacher often assumes.

What is more important is not the actual ability to draw a graph, but to understand the figures that it is trying to represent.

Once we leave school, how often do any of us need to draw a graph? On the other hand we are constantly bombarded with graphs in books, newspapers and on the television which we are expected to understand.

The use of a sound graphs pack attached to a database can help children with their understanding of graphs and statistics.

This leads into another use for the database: That of a tool for investigating relationships. Many subject areas can use a database for this.

A subject such as English could use it for looking at patterns of letters, words or phrases. A historian could be looking for patterns and relationships in census material. A biologist could be investigating the colours of wild flowers. A rich area if exploited fully.

What about foreign languages? Often teachers in these subjects bemoan the lack of good software. A database that has facilities to use accents and special characters would allow data files to be created in foreign languages. Again the potential here is tremendous.

Many teachers are frightened of databases, not openly so but with many misgivings; will the data be saved, will it work as I want it to, have I the time to put the data in, what if the disc is full, and so on?

Frankly, a database is a complex program. It will take time to become familiar with it, to explore all its features, and to find the areas in the curriculum where it can be used as an effective tool. However, it will be time well spent.

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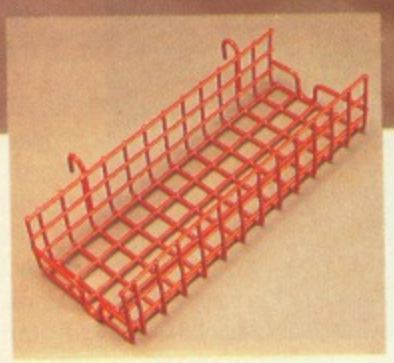

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Hilo
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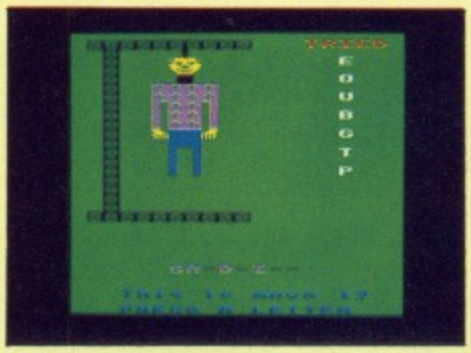
Dog Duck Corn
Guessing
Hangman
Maths Hike
Nim
Odd Man Out
Pelmanism
Towers of Hanoi



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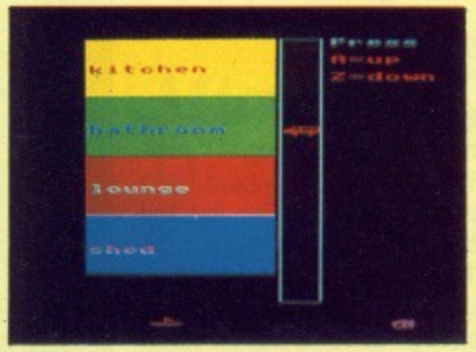

ODD MAN OUT
Find the word that does not fit – before your time runs out

TO ORDER TURN TO THE FORM ON PAGE 159

Aid for disabled

A NEW aid to the use of BBC computers by the disabled has been invented by Cleveland ITEC electronics supervisor Peter Backhouse.

His macro key switches are designed for use with software specially written for the handicapped. Currently up to four keys can be used at once.

Linda Martin Cleveland Unit, with 4 year old Philip Bramley who has cerebal palsy

Each key weighs approximately 6oz and costs £4.77. Interface boxes cost £4.55 and the analog port adapter £2.72.

Cleveland ITEC, sponsored by Cleveland County Council's planning committee, is currently producing up to 10 keys a week.

Disabled patients as young as four at Middlesbrough General Hospital are finding the keys give them more freedom in experimenting and working with micros.

Compact tutorials

THE entire range of Kosmos Software's educational programs – 19 in all – has been re-issued on 3.5in disc for the Compact.

Titles include the highly successful foreign language learning aids The French Mistress, The German Master and The Spanish Tutor – sales of which have exceeded 50,000 worldwide.

Two additions to the range,

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SOFTWARE

For project work it's a class above the rest

Program: Dinosaur Discovery
Price: £16
Supplier: 4mation, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ. Tel: 0271 45566

DINOSAUR DISCOVERY is the first 4mation package which has not been produced "in house". The program, written by six teachers, was originally published in Australia by Jacaranda. 4mation consider it to be the best adventure to come out of the continent – high praise indeed.

The adventure begins away from the computer with the children reading the diary of a professor who discovered a hidden cache of dinosaur eggs and constructed apparatus to hatch them. His first experiment was unsuccessful and he died tragically before completing his experiments, though his diary gives details of his work and pointers to his mistakes.

Having read the diary – designed to look like a hand-written exercise book – it is possible to locate an egg and incubate it to produce a baby brontosaurus.

The diary contains many important clues , and careful analysis of the information is the essential first stage in planning a successful course of action. The children I tested it with usually took about an hour to discuss and assess the data contained in the diary. This should be done in private so that later groups are not influenced by the deliberations of earlier explorers.

It was an extremely popular activity and I was impressed by the amount of useful information that the children were able to glean.

At the beginning of each quest the children find themselves in a shed containing a number of items such as a torch and axe. Each is useful in a particular location, but they can't carry them all. The shed may be visited at any time to change the items being carried.

The map of the immediate vicinity is displayed when they leave the shed, and more of the map is revealed as they explore further afield. In total, the map consists of 14 locations, 8 providing essential information or objects to be collected. In different parts of the environment there are tasks to be carried out and problems to be solved before the quest can be completed.

All the necessary information is either on the screen or in the diary. Actions are entered using single key entry of the word's initial letter, but the whole word appears on the screen. The graphics are clear and attractive, with superb animation. Watch out for the brontosaurus, the sinking boat, the egg-hatching device and multi-coloured explosions.

The children particularly liked the fact that no two adventures are the same. Fourteen random elements are built into the adventure and six are of critical importance to its eventual solution.

You must collect a dinosaur egg and crystals of the right colours from the mine, discover the incubation temperature, date, and safest time to cross the straits from the books in the museum, and find the three-letter code to the laboratory door combination lock from the tombstone in the desert.

Crossing the straits is impossible unless you find the map, but that is only accurate if you set off at the correct time, otherwise the current markings suddenly disappear and change, leading to inevitable disaster.

There are three randomly generated sections of the maps. These consist of a complex line maze in the swamp, a cavern-type tunnel, and a grid labyrinth in the mine. All are traversed by use of the cursor keys. The children found the mine to be a particular challenge. It is the source of dinosaur eggs and crystals, but the torch only illuminates that portion of the maze that is in close proximity to the explorer.

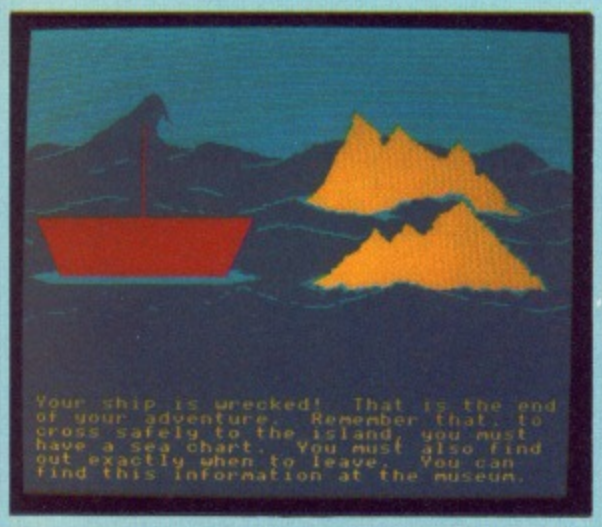
A mapping grid would be a useful addition to the package because the children often lose their bearings and become confused over which sections of the mine have already been explored.

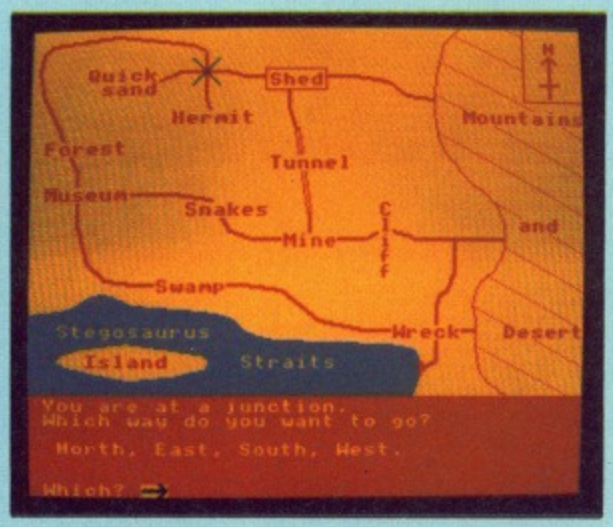
Collection of the information and objects is further complicated by other random elements. For example, the professor's gravestone, containing the three-letter code, can be hidden anywhere in the Eastern Desert. It is invisible until you are within three kilometres of the burial place, and the group must devise an effective search strategy to find it.

A quest can be saved at the end of each session so that these factors will remain constant for their next "turn". Children quickly realised that accurate record-keeping was vital, and many based their records' design on the format of the diary.

The children were also greatly surprised to discover an inconsistency concerning the safest time to cross Stegosaurus Straits. The advice of the hermit conflicted with the information provided in the museum and they had to assess the probable accuracy of both sources. Listening to the discussions was fascinating, but so far the written word has usually triumphed.

Dinosaur Discovery was originally intended to be a language adventure and then





are five word puzzles at different locations: an 8 by 8 word square, an alphabetical sorting problem, word decoding, a Hangman game and unscrambling three anagrams. It is impossible to fail any of the puzzles because of excellent error-trapping, and none are essential to successful completion of the adventure.

I found that a group size of three or four children was ideal because children working alone sometimes found it too difficult. Listening to a group in action clearly demonstrated the effectiveness of collective decision-making when faced with undertaking a complex task.

In general, discussions on the possible implications of entries in the diary minimised mistakes of interpretation. Information evaluation and joint decisions about equipment choice or route planning showed greater logic. Analysis of potentially hazardous situations, and decisions on the best way to cope with them, were also more realistic when done by the group.

The package consists of a disc containing the Dinosaur Discovery software and utility program, a 28-page teacher's manual, two copies of the diary, a set of labels for saved Quest discs and five master sheets for photocopying a project book front cover design, an "Investigator's note sheet", mapping grids for the whole area and Stegosaurus Straits, and a certificate to be awarded to children who complete the adventure.

The utility program prints out extra copies of the July high tide table for Stegosaurus Straits. This can be on-screen or dumped to a printer.

The teacher's manual is excellent. It contains full details of the adventure, notes on using the software in the classroom, a map and information on the locations and even an adult's guide for those who don't have time to solve the problems.

There are follow-up ideas for the major curriculum areas of language, drama, art, craft and design, mathematics and science, but it lacks a flowchart to identify inter-relationships between areas. All 224 words used for the five word games are included, together with three listings: a letter frequency analyser for any text file, a demonstration program for finding three-letter combinations and a coded message creator that uses "shift" values.

This package certainly fits in with the philosophy inherent in other 4mation products. From the teacher's viewpoint it is ideal for integrated project work, whether on its own or as part of a larger topic. It contains a wealth of ideas for preparatory and follow-up activities away from the computer, and can be used as a stimulus to the child's imagination in areas across the curriculum.

The package uses the computer effectively to provide experience of problem-solving through social interaction, and this experience could not be easily provided by the use of other media.

But what of the children's viewpoint? They loved every minute of it. As I saw the interest, motivation and excitement generated by this package, together with the quality of the follow-up activities, it made me wish yet again that I had another half dozen BBC Micros in the classroom.

4mation have produced another excellent classroom asset.

Jim McHugh

The Welsh Tutor and The Italian Tutor, will be released before Christmas.

Other Kosmos titles now available for the Compact include geography learning aid Identify Europe, and the three programs in the Answer Back series which combine machine code games with quizzes on general knowledge or sport.

There are 12 different titles available in the Factfile 500 series with multiple choice questions covering subjects including arithmetic, spelling, natural history, English, science, first aid, England, Scotland, sport and general knowledge.

Compact version foreign language learning aid discs cost £19.95 each, Answer Back series £12.95 each, Factfile 500 £8.45 each, and Identify Europe £10.95.

Popular Pagemaker

THE publishing package AMX Pagemaker is proving to be a big hit in the schools magazine market, with more than 4,000 already sold.

"We're well on the way to breaking all our targets for the AMX Pagemaker, but sales to the education sector are proving to be particularly strong", said Nick Pearson, boss of its creators, Advanced Memory Systems of Warrington.

AMX Pagemaker combines a low cost typesetter, graphics and word processor on two roms and two discs.

It lends itself to letters, posters, menus – in fact anything that needs to be created on A4 size paper – making it ideal for use in schools publications.

The price is £49.95.

Micro music

HELP for children creating their own music is given with the BBC Micro-linked Music Master program released by AB European Marketing.

A microphone below the mouthpiece of a recorder picks up the notes which are reproduced on the screen of the

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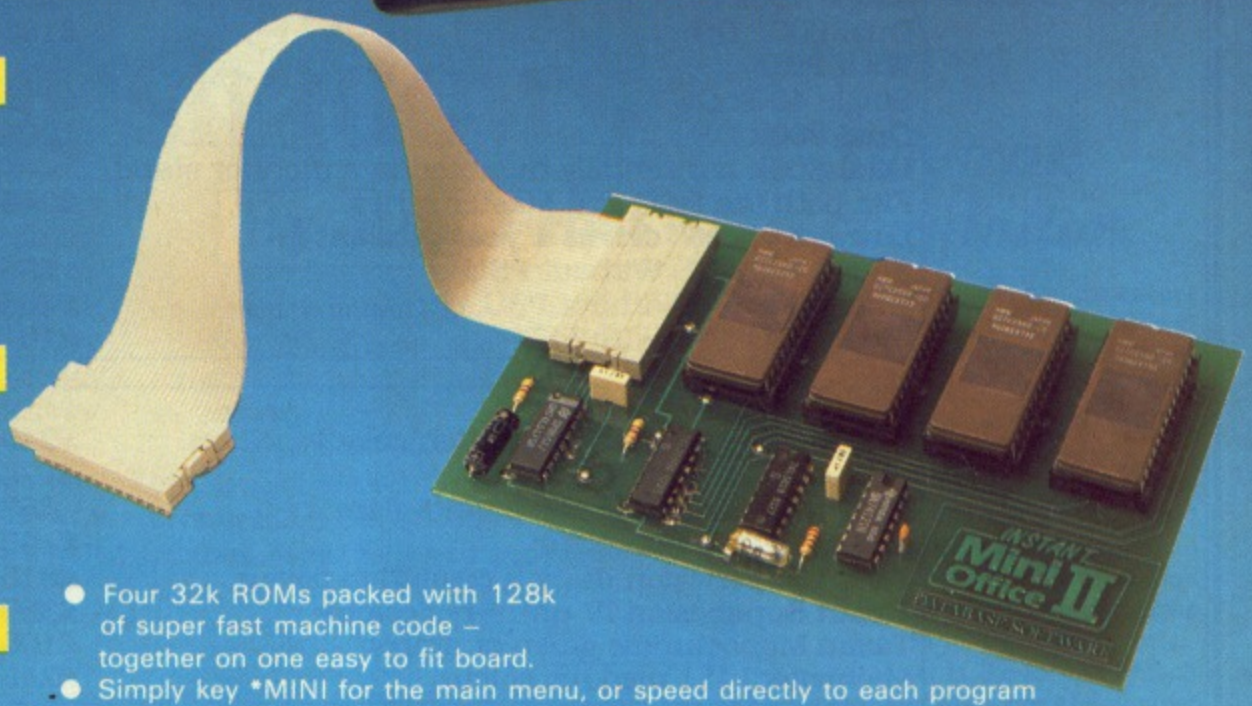

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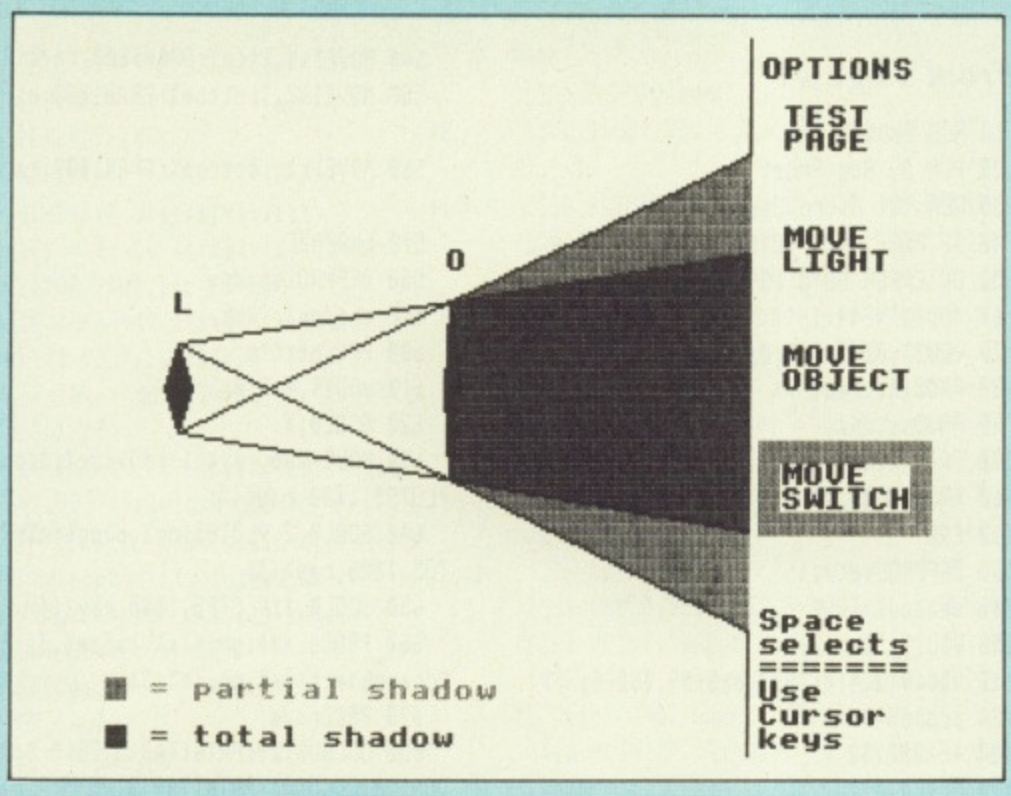

Casting shadows

By Rog Frost

SEPTEMBER 1986 saw the start of courses leading to the new GCSE examination. Such courses have far more emphasis on understanding and skills than the old GCE and CSE. As far as the sciences are concerned, pupils will need to be able to design their own experiments, set them up and draw sensible conclusions from them.

This program aims to help with that process, and covers shadows – a topic which can cause some problems at home and school because of the need for a darkened room.

You may often have wondered why some shadows are sharp, but others blurred. By on-screen manipulation of the sizes and positions of a lamp and an object which throws a shadow it should be possible to find the answer.

The session is completed with a very short test. If some answers are incorrect then more investigations can be carried out and the test retaken. You will learn something about shadows and, more importantly, how to structure an investigation. ■

PROCEDURES

instruct	Presents on-screen instructions for users.
setupa	Sets up the screen and variables for each user.
setupb	Dimensions arrays and initialises 'once only' variables
menu	On-screen menu for selection of options.
drawlight	Draws the light – correct position, size and colour.
drawobject	Draws the object – correct position, size and colour.
screen	Draws the screen on to which the shadows are cast.
object	Accepts keyboard input to alter position or size of object.
light	Accepts keyboard input to alter position or size of light.
points	Calculates the positions at which the rays will hit the screen.
rays	Draws in the rays.
shadow	Draws the areas of total and partial shadow.
test	Displays the test on-screen and accepts pupil answers.

VARIABLES

Variables containing l such as *lsize%* refer to the light.
Those containing o refer to the object. If a variable name has o as a prefix it refers to an old value used for unplotting.
Other variables have been given names which are as meaningful as possible.

ARRAYS

X%(5),Y%(5)	Co-ordinates of position where answers must be placed in the test.
word$(10)	The list of possible words used in the test.
correct$(5)	The correct answers for the test.
ray%(4)	The positions where rays hit the screen.

BBC Micro.

The tutoring system is in four parts. In Learn the Note fingering patterns display one note at a time, success being indicated by a repeat of the note correctly played.

Listen to a Tune has a whole page of musical notation displayed on the screen. The cursor on each note plots the progress of any one of eight tunes selected from the Music Master library.

Learn a Tune displays music with recorder fingering, a cursor showing the note to be played.

Finally there is Play Your Own Tune. The tune played is shown on the screen, stored and is then available for replay or print out.

Price £49.50.

Saharan simulation

YOUNG people can experience the dramatic struggle for survival in famine-threatened areas of Africa through a new educational program for the BBC Micro.

Published by Longman on behalf of the Centre for World Development Education, Sand Harvest is a role play simulation of the life and death situations portrayed in TV news reports.

It is set in the former French colony of Mali, one of a number of nations on the edge of the Sahara desert suffering from long-term drought and food shortages.

The student can play one of three roles – nomad, villager or government officer – each of which has different problems and resources.

Consequences of decisions they make, based on their own circumstances and a number of variables such as weather, are collated and reported.

Sand Harvest has a flexible management system allowing teachers to vary the way in which the simulation runs.

The package includes disc, an organiser's manual and handbooks for nomads, villagers and government officers, along with role play cards designed to help students identify with their chosen character within the simulation.

A detailed information sheet about life in Mali is also included. Price £25.

Real-time performance

EIGHT tracks of music in real-time can be recorded with The Performer, released for the BBC Micro by Proteus Computing.

The package allows the computer to play different Midi compatible instruments at the same time and includes a Midi interface. It costs £129.95, disc only.

Job prospects

LONG-TERM unemployed youngsters and adults in the North West are being helped to find jobs through developing software and components for use with the BBC Micro.

A project team based at Lancaster University has been working closely with staff and profoundly physically and mentally handicapped children at a special school near Carnforth.

They have developed a range of BBC Micro software packages and devices which have been individually tailored to the needs of children at the school aged from 3 to 19.

The team includes a supervisor, technician, eight part-time programmers and a clerical assistant paid for under the Manpower Services Commission's community programme.

The Head of Bleasdale House School, Patricia Daye, said: "New technology, adapted to the individual needs of the children, has opened up a whole new world of exploration.

"Now they can participate in and learn from a world of sounds and visual effects which provide them with simple challenges and rewards associated with normal play.

"The most rewarding feature of this project is the way it brings together different parts of the community. Young unemployed people come into contact with our children and close bonds are formed between them.

"As a result of their involvement our children are helping young people find permanent jobs".

Jim Yendley, the MSC regional employment manager, said the project was now acknowledged as one of the most

→

From Page 41

```
 10 REM SHADOW FAX
 20 REM By Rog Frost
 30 REM (c) Micro User
 40 IF PAGE>&E00 GOTO1660
 50 ON ERROR GOTO 1590
 60 MODE1:*FX4,1
 70 VDU23;8202;0;0;0;
 80 PROCinstruct
 90 PROCsetupa
100 PROCsetupb
110 PROCmenu
120 END
130 DEFPROCsetupa
140 shadow%=TRUE
150 VDU29,10;512;
160 VDU19,2,4;0;19,1,6;0;19,3,2;0;
170 score%=0
180 *FX202,32
190 MOVE0,0
200 ENDPROC
210 DEFPROCsetupb
220 DIMray%(4),X%(5),Y%(5),word$(10
),correct$(5)
230 FORN%=1TO10:READword$(N%):NEXT
240 FORN%=1TO5:READX%(N%),Y%(N%),co
rrect$(N%)
250 NEXT
260 lsize%=100:lx%=20:osize%=300:ox
%=700
270 pos%=1
280 *FX11,0
290 ENDPROC
300 DEFPROCdrawlight(lx%,lsize%,col%)
310 GCOL0,col%
320 ltop%=lsize%:lbottom%=-lsize%
330 MOVElx%,ltop%:MOVElx%-20,0:PLOT
85,lx%+20,0:PLOT85,lx%,lbottom%
340 VDU5:MOVElx%-10,lsize%+70:PRINT
"L":VDU4
350 ENDPROC
360 DEFPROCdrawobject(ox%,osize%,col%)
370 GCOL0,col%
380 otop%=osize%:obottom%=-osize%
390 MOVEox%,otop%:MOVEox%-10,0:PLOT
85,ox%+10,0:PLOT85,ox%,obottom%
400 VDU5:MOVEox%-10,osize%+70:PRINT
"O":VDU4
410 ENDPROC
420 DEFPROCscreen
430 GCOL0,3
440 MOVE1000,512:DRAW1000,-512
450 ENDPROC
460 DEFPROCpoints
470 ray%(2)=(1000-lx%)*(otop%-ltop%
)/(ox%-lx%)+ltop%
480 ray%(4)=(1000-lx%)*(obottom%-lt
op%)/(ox%-lx%)+ltop%
490 ray%(1)=(1000-lx%)*(otop%-lbott
om%)/(ox%-lx%)+lbottom%
500 ray%(3)=(1000-lx%)*(obottom%-lb
ottom%)/(ox%-lx%)+lbottom%
510 ENDPROC
520 DEFPROCrays
530 MOVElx%,ltop%:DRAW1000,ray%(4)
540 MOVElx%,ltop%:DRAW1000,ray%(2)
550 MOVElx%,lbottom%:DRAW1000,ray%(
3)
560 MOVElx%,lbottom%:DRAW1000,ray%(
1)
570 ENDPROC
580 DEFPROCshadow
590 shadow%=TRUE
600 PROCpoints
610 VDU19,0,7;0;
620 GCOL0,1
630 MOVE1000,ray%(1):MOVEox%,otop%:
PLOT85,1000,ray%(2)
640 GCOL0,2:PLOT85,ox%,obottom%:PLO
T85,1000,ray%(3)
650 GCOL0,1:PLOT85,1000,ray%(4)
660 PROCdrawlight(lx%,lsize%,3):PRO
Cdrawobject(ox%,osize%,3)
670 PROCrays
680 COLOUR129:PRINTTAB(2,28)" ":COL
OUR128:COLOUR1:PRINTTAB(3,28)" = part
ial shadow"
690 COLOUR130:PRINTTAB(2,30)" ":COL
OUR128:COLOUR2:PRINTTAB(3,30)" = tota
l shadow"
700 *fx15
710 REPEATUNTILGET=32:PROCmenu
720 ENDPROC
730 DEFPROCmenu
740 IF shadow%=TRUE VDU19,0,0;0;:GC
OL0,128:CLG:PROCdrawlight(lx%,lsize%,
3):PROCdrawobject(ox%,osize%,3):PROCs
creen:shadow%=FALSE
750 COLOUR128:COLOUR3
760 *FX15,0
770 *FX138,0,32
780 PRINTTAB(32,2)"OPTIONS"
790 PRINTTAB(33,4)"TEST"TAB(33,5)"P
AGE"
800 PRINTTAB(33,9)"MOVE"TAB(33,10)"
LIGHT"
810 PRINTTAB(33,14)"MOVE"TAB(33,15)
"OBJECT"
820 PRINTTAB(33,19)"MOVE"TAB(33,20)
"SWITCH"
830 PRINTTAB(32,25)"Space"TAB(32,26
)"selects"TAB(32,27)"======="TAB(32,2
8)"Use"TAB(32,29)"Cursor"TAB(32,30)"k
eys"
840 REPEAT
850 key%=GET
860 IF key%=32 oldpos%=pos%:pos%=po
s%+5
870 IF pos%>21 pos%=6
880 COLOUR128:PRINTTAB(32,oldpos%-3
)"        "TAB(32,oldpos%-2)" "TAB(39
,oldpos%-2)" "TAB(32,oldpos%-1)" "TAB
(39,oldpos%-1)" "TAB(32,oldpos%)"   "
890 COLOUR129:PRINTTAB(32,pos%-3)"
      "TAB(32,pos%-2)" "TAB(39,pos%-
2)" "TAB(32,pos%-1)" "TAB(39,pos%-1)"
 "TAB(32,pos%)"        "
900 UNTILkey%<>32
910 IF pos%=6 PROCtest
920 IF pos%=11 PROClight
930 IF pos%=16 PROCobject
```

```
 940 IF pos%=21 PROCshadow
 950 ENDPROC
 960 DEFPROClight
 970 REPEAT
 980 olx%=lx%:olsize%=lsize%
 990 IF INKEY-58 lsize%=lsize%+20:IF
lsize%>300 VDU7:lsize%=300
1000 IF INKEY-42 lsize%=lsize%-20:IF
lsize%<20 VDU7:lsize%=20
1010 IF INKEY-26 lx%=lx%-20:IF lx%<2
0 VDU7:lx%=20
1020 IF INKEY-122 lx%=lx%+20:IF lx%>
(ox%-60) VDU7:lx%=(ox%-60)
1030 IF olx%<>lx% OR olsize%<>lsize%
PROCdrawlight(olx%,olsize%,0)
1040 PROCdrawlight(lx%,lsize%,3)
1050 UNTILINKEY(0)=32
1060 PROCmenu
1070 ENDPROC
1080 DEFPROCobject
1090 REPEAT
1100 oox%=ox%:oosize%=osize%
1110 IF INKEY-58 osize%=osize%+20:IF
osize%>300 VDU7:osize%=300
1120 IF INKEY-42 osize%=osize%-20:IF
osize%<20 VDU7:osize%=20
1130 IF INKEY-26 ox%=ox%-20:IF ox%<(
lx%+60) VDU7:ox%=(lx%+60)
1140 IF INKEY-122 ox%=ox%+20:IF ox%>
970 VDU7:ox%=970
1150  IF oox%<>ox% OR oosize%<>osize
% PROCdrawobject(oox%,oosize%,0)
1160 PROCdrawobject(ox%,osize%,3)
1170 UNTILINKEY(0)=32
1180 PROCmenu
1190 ENDPROC
1200 DEFPROCinstruct:VDU19,0,4;0;
1210 PRINTTAB(11,1)"SHADOW INVESTIGA
TION"TAB(11,2)"**********"
1220 VDU28,0,31,39,3
1230 PRINT''"To investigate shadows
you may move a"''"light, an object to
 cast the shadow"''"and a switch to t
urn the light on."
1240 PRINT'"You may also alter the s
ize of the light"'"and the object."
1250 PRINT''"Use Space to move the m
enu selection"''"box, then use the Cu
rsor keys to"
1260 PRINT'"move the light or the ob
ject or to"''"alter their sizes."
1270 PRINTTAB(7,27)"Press Space to c
ontinue"
1280 REPEATUNTILGET=32:CLS
1290 PRINT''"Your aim is to find out
 why some shadows"'"have sharp edges
and other shadows"''"are very blurred
, with a lot of"''"partial shadow."
1300 PRINT''"At any time you may att
empt a short"''"test by selecting the
 'Take Test'"''"option. If you do not
 score well"''"more investigations wi
ll help."
1310 PRINTTAB(7,27)"Press Space to c
ontinue"
1320 REPEATUNTILGET=32:VDU26:CLS:END
PROC
1330 DEFPROCtest
1340 VDU20:VDU19,0,4;0;:COLOUR128:CL
S
1350 PRINTTAB(11,1)"SHADOW INVESTIGA
TION"TAB(11,2)"**********";
VDU28,0,31,27,3
1360 PRINT''"To produce a shadow whic
h is"''"sharp, either the light must"'
"be (1)      or the (2)      "''"betwe
en the light and the"''"object must b
e big."
1370 PRINT''"Blurred shadows result f
rom"''"a large (3)      or the"''"(4)
      being (5)     "''"the light."
1380 VDU28,29,26,39,3:COLOUR129:CLS
1390 PRINT''"WORDS"
1400 PRINT''"A..shadow"''"B..small"''
"C..big"''"D..near"''"E..distance"
1410 PRINT"F..light"''"G..object"''"
H..sun"''"I..rays"''"J..colour"
1420 VDU26:COLOUR128
1430 PRINTTAB(0,22)"==========
==========="
1440 COLOUR128
1450 FORN%=1TO5
1460 PRINTTAB(0,26)"Select letter of
 word for"''"position ";N%;
1470 INPUT" ";letter$
1480 IF ASC(letter$)<65 OR ASC(lette
r$)>75 THEN PRINTTAB(0,26);SPC(120):G
OTO1460
1490 COLOUR129
1500 PRINTTAB(X%(N%),Y%(N%))word$(AS
C(letter$)-64)
1510 IFword$(ASC(letter$)-64)=correc
t$(N%) score%=score%+1
1520 COLOUR128
1530 PRINTTAB(0,26);SPC(120)
1540 NEXT
1550 PRINTTAB(0,26)"You got ";score%
;" words correct."
1560 IF score%<5 PRINTTAB(0,28)"Pres
s space to continue investigating.":R
EPEATUNTILGET=32:PROCsetupa:PROCmenu:
ENDPROC
1570 IF score%=5 PRINTTAB(0,28)"You
understand shadows."''"Press space fo
r next person to start.":REPEATUNTILG
ET=32:CLEAR:RUN
1580 ENDPROC
1590 REM ERROR HANDLER
1600 *FX12
1610 MODE6
1620 REPORT:PRINT" at line ";ERL
1630 END
1640 DATAshadow,small,big,near,dista
nce,light,object,sun,rays,colour
1650 DATA3,8,small,19,8,distance,8,1
6,light,0,18,object,15,18,near
1660 REM DOWN LOAD MEMORY FOR DISC S
YSTEMS
1670 *TAPE
1680 FOR I%=0 TO TOP-PAGE STEP 4:I%!
&E00=I%!PAGE:NEXT:?&13=?&13-(PAGE-&E0
0)DIV256:PAGE=&E00:RUN
```

successful community programme schemes in the region.

"Not only is it providing valuable work for unemployed young people with knowledge of computers and electronics, leading in many cases to permanent jobs, but it is of tremendously high community benefit", he said.

Already programmers who have worked on the BBC Micro-based scheme – all taken from among the long-term unemployed and given 12 months work supported by MSC – have moved on to permanent jobs.

Currently the MSC is funding another 11 job places on the project.

Tax benefits

WHAT would be the most unlikely organisation to produce a pack of work for schools?

Surely the Inland Revenue must be in the running for any prize here, with a just-published information pack for schools and colleges.

The pack contains a set of free leaflets introducing the tax system as it affects the school leaver.

Also free is a Tutor's pack which provides the text for lessons showing how PAYE works. With it comes a pack of forms and tax tables to use to illustrate the session and charts showing government income and expenditure.

Also in the pack are leaflets demonstrating PAYE from the employer's angle and explaining how the tax office network is organised.

A Student's pack contains sets of the forms in the Tutor's pack which can be used in the classroom.

To supplement this material there are 16 project sheets containing simple illustrated texts and exercises. These cover a range of subjects – history, maths, life skills and government.

There is a time chart depicting the history of taxes from the Vikings to the present day.

There is also a book called the Story of Tax which gives an original and exciting treatment of a subject which embraces social, economic and political history.

The book provides insight

into how the lives of people in all walks of life were affected by the taxation policies of monarchs and governments. Reproductions of original documents and exercises encourage the student to explore wider issues.

To try and take some of the mystery out of the necessary evil of form-filling the Inland Revenue have thoughtfully included 15 Forms booklets for exercise work.

To make this resource complete there is a 30 minute video about the taxman in the '80s, and a computer program called Tax-ed.

It's easy to operate and students can work through it at their own pace.

It starts with a simple explanation of the need for taxation as a source of government income and proceeds through how tax allowances and codes are calculated to the method of working out income tax payable.

The program is a modular one. An introduction and explanation of the four actions necessary to operate the program leads to a menu.

This gives a choice of modules so that the complete program may be given over a number of sessions. The presentation makes use of the BBC Micro's teletext characters and graphics.

Moving graphics illustrate the text and students are able to watch a payslip building up.

Comparisons are made for instance, between a single and married persons' tax, regular and fluctuating earnings, weekly and monthly pay. Simple exercises allow the student to experiment with rates of pay and different tax codes.

The program comes with a user guide. The style and content are aimed at 14-16 year olds but it could equally well be used for adult education.

This package is very comprehensive and at £15 including video (VHS or Beta) and the computer program makes the package well worth sending for.

Epilogue

A CONTENDER for the most original use for a BBC Micro must be the primary school which has programmed it with various hymn tunes to accompany the morning assembly because it has no pianist. ■

Keep your letters coming in – the education pages are here to reflect your interests. We want to hear your tips, ideas, experiences and suggestions. Send your contributions to:
Peter Davidson, Education Editor, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

Checking, not cheating

HERE is a short routine which I have written for your younger readers who wish to check or cheat with their maths homework. This program solves simultaneous equations. If you type in the six parameters for the equations the computer will tell you the X and Y values. – **J. Roper, Meopham, Kent.**

P.S. Thank you for a very interesting magazine, I have every issue from issue 1.

```
  10 *FX144,255,1
  20 MODE4
  30 VDU23;8202;0;0;0;19,1,2;0;
  40 PRINT"ax+by=c"
  50 PRINT"-  -  -"
  60 PRINT"dx+ey=f"
  70 PRINT"-  -  -"
  80 PRINT"The underlined letters a
re all variables"
  90INPUT"a",a,"b",b,"c",c,"d",d,"e
",e,"f",f
 100 c=c*-1
 110 f=f*-1
 120 X=((b*f)-(c*e))/((a*e)-(b*d))
 130 Y=(.c*d)-(a*f))/((a*e)-(b*d))
 140 PRINT' "x is ";X
 150 PRINT"y is ";Y
```

● We hope our younger readers only use this for checking – not cheating.

Compleat correction

THE editorial insertion of the word American *in Jean Hutchins' article on Computer Aid for Dyslexics in the September issue of* The Micro User *is most unfortunate. The program is as English as Isaac Walton's The Compleat Angler and is based on extensive research in the North East of England.*

The author of the program, Cathy Nicol and the programmer, Phil Bennington are teachers and my role was to advise on and to help research the grading of words. I also helped to design the format of the "fruit machine" game element.

The feedback we have received from users and from experts suggests that the Compleat Speller is one of the best spelling programs available. We have also obtained evidence of impressive gains resulting from its regular use.

After our long hours of work you can imagine how disappointing it was for us to see the program referred to as it was. Jean Hutchins has sent me a copy of her article and was as surprised as I was to see the word American *inserted. Very few teachers or parents would consider using an American program, as the volcabulary and the spelling would be different.*

I wonder whether you might print a compleat apology? – **D. V. Moseley, The University of Newcastle Upon Tyne.**

● It seems that somewhere along the line someone thought that the way the Compleat was spelt indicated an American program. We apologise for any misunderstanding.

Any questions?

MY dad showed me the Any Questions program in the September issue of The Micro User. *He showed me how to load it and put in questions. I thought it was good but some of the questions were pretty hard. It did help me learn things I didn't know like German words I've just started to learn at school.*

My little sister is just learning her tables so I thought it was a good idea to make up a tables test using the Any Questions program. I did the 8 times table with four answers for each question.

She easily learned how to put the right letter. She did the test five times and chose funny names. She could tell if she was learning the table because her score got better each time.

I'm going to use it with my other homework and I've sent a copy of the tables test on a disc for you to see. – **Drw Cannon (age 11), Marple, Stockport.**

● Thanks, Drw. We have included your questions on this month's disc and tape together with questions about Office Practice and Do it Yourself. We are sending your disc back with a copy of all this month's programs on it.

IT – not just programming

I HAVE just read the letter on page 50 of the September Micro User *from S. Foy of Chester. I also teach similar groups of students and I expect that we are not the only two who teach the uses of the computer, rather than pure programming. Information Technology as I teach it is:*

● *WORDPROCESSING: Not to secretarial students but to bricklayers.*

● *SPREADSHEETS: Not to accountants, but to motor vehicle apprentices.*

● *GRAPHICS: Black and white printouts or colour adverts on a monitor.*

● *DATABASES: Both for data extraction, and build it yourself.*

● *INPUT/OUTPUT: Mouse, tablet and pen, bar code reader, sensors with interfaces, printer, XY plotter, stepper motors.*

I would certainly like to see more articles on these lines, but as we represent a very small part of your readership, I appreciate your dilemma. However I welcome the Education section, and wish it well. – **Mike King, Aylesford, Kent.**

● Thank you for your letter. We intend to cover as many aspects of IT as we can, and it's from letters like this that we find out what our readers want.

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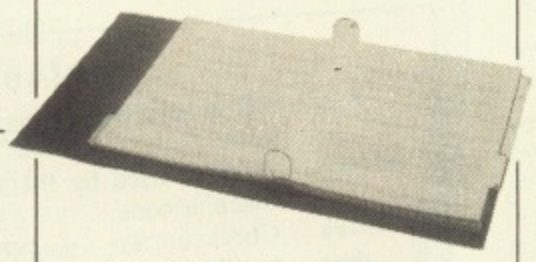

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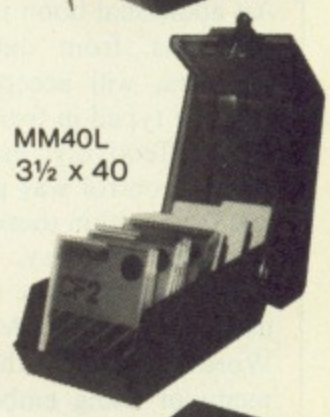

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Star of the command performance

JONATHAN TEMPLE shows you how to make the most of your printer

AS anyone who has a printer will be well aware, one of the problems of using these peripherals is the difficulty of remembering the control codes which affect the various features of the printer.

As a result, many people do not really use the full potential of their printer. They may be neglecting whole sets of typestyles for instance, solely because of the difficulty of interpreting the manual.

Obviously, some way of making printer commands more user-friendly would be advantageous, and this is what Listing I aims to do.

The program allows readily understood star commands, such as *ITALICS and *EMPHASISED, to control the various features of a printer. An additional boon is that many utility programs, from databases to disassemblers, will accept star commands (usually typed in from the main menu). This effectively means that where printer control was previously impossible from within these programs, it now becomes very easy.

For example, the commands can be used from within Mini Office II and Wordwise Plus, either from the main menu or using embedded commands. This means the embedded command OS"ITALICS" (Wordwise Plus) or *ITALICS (Mini Office II) would give italic text.

To use the commands, you will first need to type in Listing I, but please save it before trying to run it! Once saved, type RUN, and if you have made any errors in the actual machine code a short checksum routine will report them.

Once everything runs smoothly, you can use the command printed by the program to save the finished machine code. From then on, all you will need to do before using the commands is type *PRINTER (for discs) or *RUN PRINTER (for tapes). To test some of the possible styles, type in and run Listing II. The output should be similar to that shown on the opposite page.

The code is de-activated on pressing Break, so you will need to type "CALL &900" before you can use it again. It may be an idea to program function key 10 (the Break key) with:

```
*KEY10 CALL&900|M
```

The commands that can be used are shown in the data lines, from line 1000 onwards. Most are self-explanatory once you know that the preceding "E"s stand for End, so for instance *ECONDENSED is end condensed type.

*FULL and *HALF may not be immediately obvious but refer to FX-80 printer speeds – half speed is quieter. *BRITISH and *AMERICAN are used to swap between FX-80 character sets: the American set is useful for assembly language programmers, as hash characters are correctly printed.

All the commands can be abbreviated to a minimum of two letters, so *EM and *IT could be used instead of *EMPHASISED and *ITALICS. Similarly, *EE and *EI could be used for ending emphasised type and italic type respectively.

As an extra point, if the commands do not seem to be working from within another program (especially those using BPUT and BGET cassette files, such as the original Wordwise) it may be that that this program is using the two pages of memory used by the commands routine for its own purposes, so overwriting the code.

If this is the case, you will need to move the routine, by changing the value of *base* in line 50. A good idea for the more ambitious might be to convert the program to run in sideways ram, but otherwise the best idea is probably to raise PAGE by &200 bytes (two pages) and assemble the code in the space gained by doing this.

You could also try storing the code from &B00 onwards, so taking up &B00–&CFF, although you will not be able to use the function keys or any user-definable characters.

The commands available from the

PROCEDURES

assemble	Assembles the necessary machine code and, if the variable *check* is set, uses a checksum routine to see whether the program has been entered correctly.
read	Reads in the printer commands from the data lines at line 1000 onwards.

VARIABLES

base	Set in line 50 to be the start address of the machine code.
address	Address used by PROCassemble to assemble the machine code.
check	Checksum flag – see PROCassemble.
pass	Loop variable for two-pass assembly.
oldvec	Set to the address of the machine's usual CLI in the OS.
printer	Set to the value of oswrch (&FFEE) which in this case is used to send characters to the printer.
osbyte	Set to the value of osbyte (&FFF4), which is the machine code equivalent of Basic's *FX command.
T%,N%	Used in PROCassemble for calculating the checksum; also used in PROCread as the address in memory for the next command data.
table	Address in memory from which the new printer commands are stored.
A$	Holds printer data, as read from DATA lines.

program are currently configured for the Epson FX-80 range and compatible printers. However, the program has been designed to make it easier for you to add new commands, or change existing ones. The format for each command is the command string followed by the printer codes, each separated by commas.

Emphasised type is obtained using VDU 1,27,1,69 on the Epson FX-80. However, *EMPHASISED is stored in the program's data lines as just EMPHASISED,69. This is because the first escape code (the 27) and all preceding 1's are inserted automatically by the program. An additional point is that commands you add yourself must not be shorter than four letters.

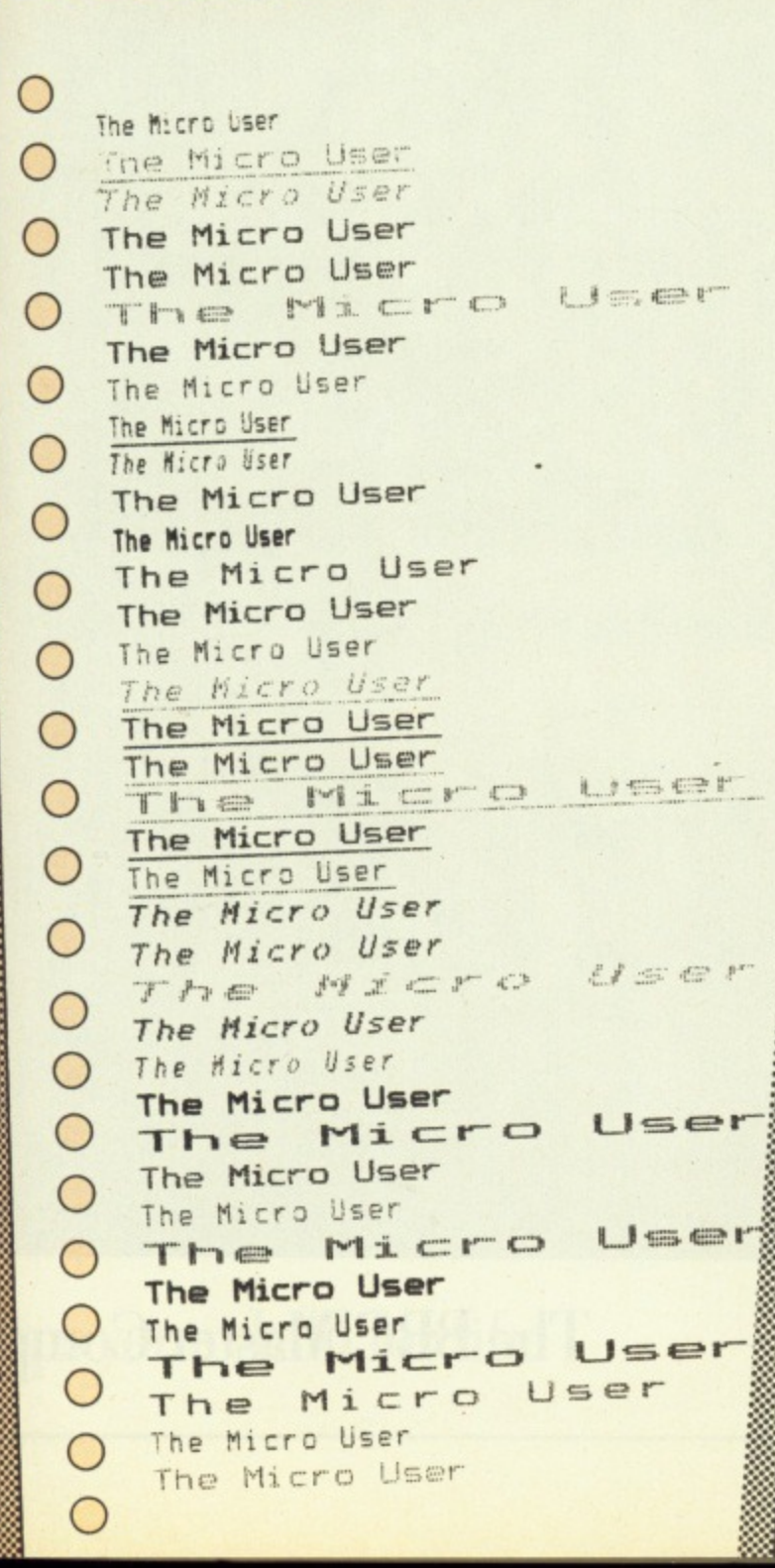
However, certain control codes on some printers (for instance the Condensed Mode cancel on the FX-80) do not require the leading escape code, and for these you should insert a 255 to tell the program not to insert the 27. So VDU 1,18 would be put in the data lines as 255,18.

Also, when adding new commands, remember that extra ones may make the routine longer than the two pages of memory it currently uses.

The program works by intercepting the oscli vector (CLIV) at &208, checking the entered command against the command list and, if a match is found, outputting the necessary control codes to the printer. Otherwise the routine passes control back to the standard CLI in the OS.

The technique of intercepting the oscli vector and adding new star commands is now well documented and for those interested a fuller explanation of the technique was given by Peter Walker in the April 1985 issue of *The Micro User.* ■

Full listing starts on Page 127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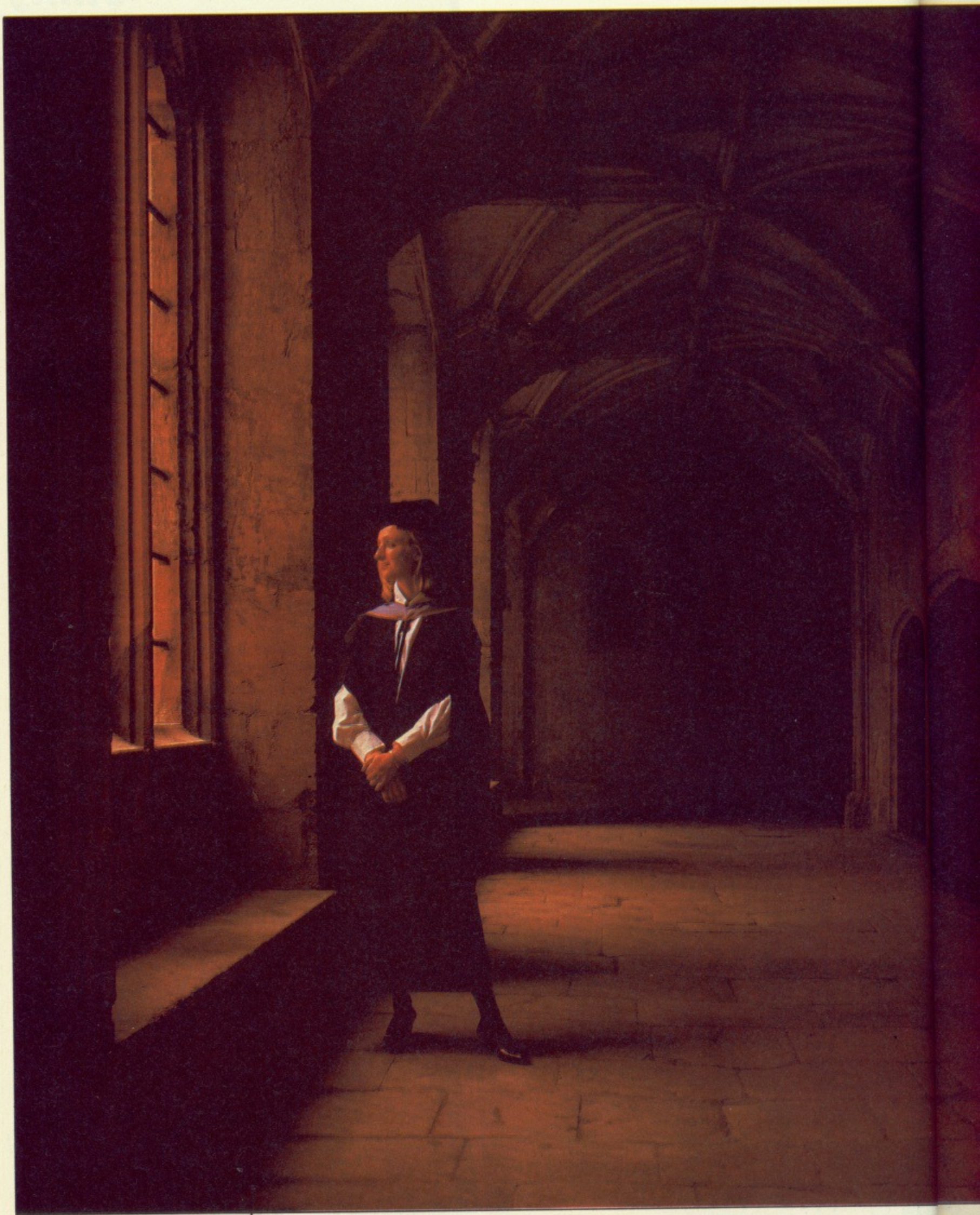

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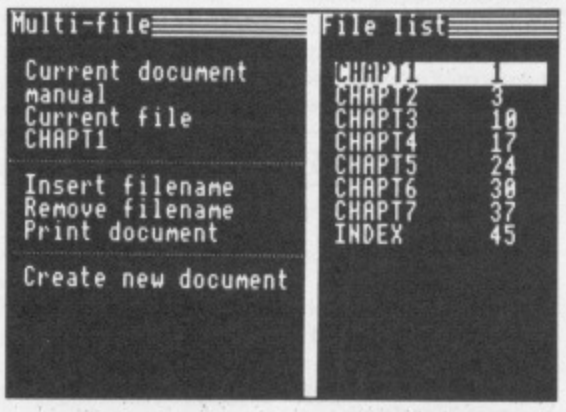

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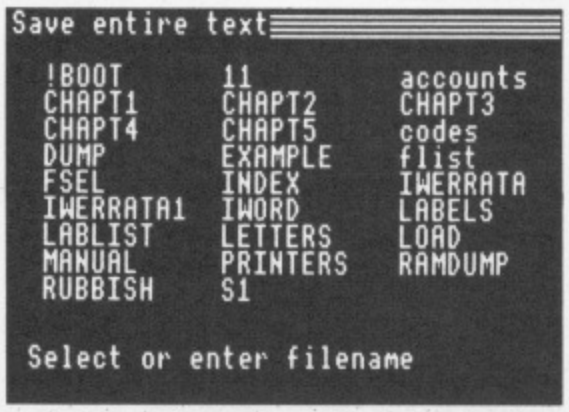

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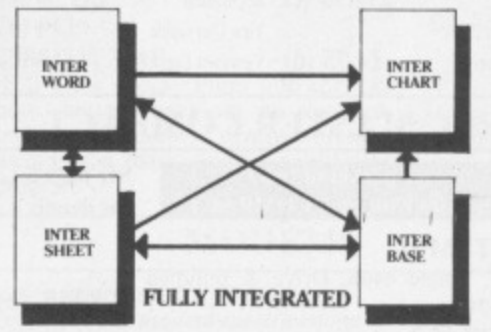

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MIRACLE WS4000 V21/23 — **£149 (b)**

MIRACLE WS3000 V21/23 — **£295 (b)**

MIRACLE WS3000 V22 — **£495 (b)**

MIRACLE WS3000 V22 bis — **£650 (b)**

WS3022 1200/1200 fd NEW — **£395 (b)**

WS3024 2400/2400 fd — **£570 (b)**

BBC Data Cable for WS3000 — **£7 (d)**

GEC DATACHAT Modem V23
1200/75, 75/1200 & 1200/1200 pseudo f.d. line powered, complete with software suitable for connecting to Prestel, Micronet, Telecom Gold and many bbs. **Special offer price** — **£39 (b)**

PROGRAMMING ACCESSORIES/SOFTWARE

See page 8 for detailed specification

Compatible with B, B+ and Master

EPROMER II with disc based software and rom image — **£99 (b)**

META ASSEMBLER — **£145 (b)**

PORTAL EPROM EMULATOR 256K — **£185 (b)**

PORTAL EPROM EMULATOR 512K — **£285 (b)**

TEAM Disassembler — **£145 (b)**

EPROM ERASERS
UV1B 6 eproms, safety cutout — **£47 (b)**

UV1T 6 eproms, timer, safety cutout — **£59 (b)**

CAD/DRAWING PACKAGES

NOVACAD CAD Package for B, B+ & MASTER (See page 9 for specification)

LEADING SUPPLIER TO THE BBC MARKET ESTABLISHED OVER 15 YEARS

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

BASIC Version	**£79 (d)**
Tracker Ball/Mouse Version (TM)	**£99 (d)**
TM Version plus Tracker Ball	**£129 (c)**
TM Version plus Mouse	**£115 (c)**
Plotter Driver Generator	**£28 (d)**
MOUSE	
AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	**£67 (d)**
Super Art	**£43 (d)**
PAGEMAKER	**£43 (d)**
3D ZICON	**£21 (d)**
PAINTPOT	**£21 (d)**
DATABASE	**£21 (d)**
RB2 TRACKER BALL RB2 Tracker Ball with Icon Master (for B, B+ & Master)	**£59 (c)**
RB2 Tracker Ball with Cursor Control Rom (for Master only)	**£59 (c)**
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	**£47 (c)**
Cursor Control Rom for Master	**£12.50 (d)**
MIRRORSOFT FLEET STREET EDITOR incl VAT	**£39.50 (d)**

SOFTWARE CP/M SOFTWARE

for Acorn, Torch & Multiform Z80 Processors

MICROPRO's Wordstar Professional	**£310 (a)**
ASHTON TATE's DBASE II	**£310 (a)**
SUPERCALC II	**£195 (a)**

Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

BBC SOFTWARE/ FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE
Acorn's database with display in any mode in spreadsheet or user defined card format and powerful sort facilities. Max file size 4Mb — **£37 (d)**

STARdataBASE
A fast machine code, true random access database. Upto 4000 records/file, 69 fields. Fully menu driven, user defined record layout, very fast searches thru keysearch facility. Mailmerging from VIEW and WW. — **£49 (d)**

MASTERFILE II
Highly popular economically priced database. 17 fields per record, file size limited by drive capacity only. (40T or 80T) — **£17 (d)**

WORD PROCESSORS

VIEW 2.1 — **£37 (d)**

VIEW 3.0
New version of VIEW compatible with B+ complete with a printer driver generator. — **£56 (c)**

Hi-VIEW
Disc based version of VIEW 2.1 for use with 6502 2nd processor allowing upto 47K of memory for text. — **£36 (d)**

VIEWSPELL
Acorn's new rom based spelling checking utility with a 70,000 word dictionary on 80T disc. Additional/specialised dictionaries can be created. Facilities also include wild card search for words. — **£29 (d)**

VIEW INDEX — **£12 (d)**

VIEW PRINTER DRIVER GENERATOR
A utility to generate a View printer driver to suit any printer. Screen driver allows viewing of text exactly as it will appear on paper. — **£9 (d)**

DOT PRINT PLUS
Full details on page 5 NLQ rom for Epson FX/RX, MX and GLP. — **£28 (d)**

WORDWISE — **£24 (d)**

WORDWISE PLUS — **£38 (d)**

INTERWORD
(If you own a WW+ then quote your reg number and pay £10 less). — **£49 (d)**

WORDEASE
A 16K rom based utility for WW+ — **£24 (d)**

SPELLCHECK III
A 16K rom based spellcheck program for View and WW. Contains 2000 words on the rom and 6000 (expandable to 17000) words on a disc. — **£31 (d)**

EDWORD II — **£43 (c)**

SPREADSHEETS

VIEWSHEET
Acorn's spreadsheet provides 255 cols and 255 rows and will operate in any mode. Fully compatible with VIEW and 6502 2nd processor. — **£37 (d)**

VIEWPLOT
A disc based plotting program. (To be released soon). — **£22 (d)**

INTERSHEET
The new spreadsheet from Computer Concepts with many advanced features like 105 col mode, holding several spreadsheets in memory at a time etc. — **£39 (d)**

INTERCHART
Graphics package for Intersheet — **£27 (d)**

ULTRACALC
BBC Publications very popular and well proven spreadsheet rom includes graphics utility disc. — **£52 (d)**

QUICKCALC
A disc based economically priced spreadsheet package (40 or 80T Disc). — **£14.50(d)**

MINI OFFICE II
A suite of inexpensive but extensive word processor, database and spreadsheet packages. (40T or 80T) — **£14.75(d)**

LANGUAGES

META ASSEMBLER
Multi processor Assembler full details on page 8 — **£145 (c)**

TEAM DISASSEMBLER — **£145 (b)**

ACORN 6502 DEV. PACKAGE
A macro assembler with utilities for developing large programs in assy lang. Requires 6502 2nd processor — **£43 (d)**

MACROM
A very fast full featured macro assembler rom from 6502 and 65C02 codes, allows use of macros from library disc. Assembly can be disc to memory, memory to memory, memory to disc and disc to disc thus allowing very long source code upto the length of disc in use. About 3 times as fast as ADE and 30% more economical in memory. — **£33 (d)**

ACORN MICRO PROLOG
Logic programming language used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more friendly. — **£62 (d)**

ISO-PASCAL
Acorn's full implementation of International Std Pascal on 2x16K roms. — **£48 (d)**

ISO PASCAL STAND ALONE GENERATOR — **£30 (d)**

OXFORD PASCAL
A fast P-code compiler and stand alone utility (40 or 80T). — **£36 (d)**

BCPL — **£46 (d)**

BCPL CALCULATIONS
Supports floating point, fixed point and fast integer calculations on BCPL — **£17.50 (d)**

BCPL STAND ALONE GENERATOR — **£39 (d)**

ACORN LOGO — **£46 (d)**

LOGOTRON LOGO — **£55 (d)**

BBC PUBLICATIONS OPEN LOGO — **£59 (d)**

ACORN LISP ROM — **£39 (d)**

ACORN FORTH ROM — **£39 (d)**

ACORN COMAL ROM — **£43 (d)**

MICROTEXT
A frame based authoring system from NPL for interactive computer tutoring. Disc based — **£52 (d)**

MICROTEXT PLUS
Extended Features incl extra memory, control of external devices etc. Rom based. — **£229 (d)**

COMMUNICATIONS

TERMULATOR
Advanced terminal emulator which includes VT52/100, Tektronics 4010, teletype emulations. — **£25 (d)**

COMMSTAR
A highly popular communication rom suitable for all general purpose applications (specify B or Master) — **£28 (d)**

COMMUNICATOR
A full 80 col VT100 emulation program with easy to follow screen menus. — **£49 (d)**

DATABEEB
A variety of facilities for use with WS2000 Modem — **£26 (d)**

DS1 DISC
Special utilities for use with WS2000 — **£10 (d)**

UTILITIES

ACCELERATOR	**£49 (d)**
ACORN BASIC EDITOR	**£22 (d)**
MONITOR (BBC Pub)	**£34 (d)**
BROM PLUS	**£26.50 (d)**
SLEUTH	**£23 (d)**
TOOLKIT PLUS	**£31 (d)**
TOOLBOX 2 (BBC Pub) Manual	**£9.50 (d)**
Cassette	**£9 (d)**
EXMON II	**£23 (d)**
HELP II	**£25 (d)**
ACORN GXR GRAPHICS ROM specify B or B+	**£22 (d)**
PRINTMASTER	**£24 (d)**
DUMPMASTER supports about 40 printers	**£26 (d)**
FONTWISE PLUS	**£17 (d)**
HERSHEY FONT CHARACTER GENERATOR	**£18 (d)**
ICON MASTER	**£29 (d)**
BILLBOARD	**£18 (d)**
STUDIO EIGHT	**£19 (d)**
MOVIE MAKER Two Roms + Cassette	**£26 (d)**
CC SPEECH ROM	**£28 (d)**
CC SPEECH ROM to Text Rom	**£34 (d)**
ACORN SPEECH ROM	**£15 (d)**
ADV TELETEXT UTILITIES ROM	**£7.95 (d)**

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(b) £2.50
(c) £1.50
(d) £1.00

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

ASTRONOMY:
9-12 years. Phases of moon, eclipses, seasons etc. Includes a game. **Disc £11 (d)**

COMPUTERS AT WORK:
The Work Game illustrates two of the most important computer applications: Robotics & IT. Incl. a database prog, word processing tutorial and a robotic control prog. **Aud/EC/disc £16 (c)**

PICTURE CRAFT
An inexhaustible, versatile and flexible suite of programs to design shapes & patterns, paint them and convert them into pictures, puzzles and games. **Disc £17 (d)**

DRAWSTICK
8 year upwards for creating pictures, charts, maps etc. Pictures created can be used in your own programs. Sufficiently sophisticated for use by adults. **Cass £8 (d)**

INTRODUCING GEOGRAPHY
9-13 years. Four exciting graphical adventures include river navigation, flying, mountain climbing and desert crossing. **Disc £16 (d)**

MATHS WITH A STORY 1
Four primary level programs incl symmetry, co-ordinates and probability for children of wide ranging abilities. **Cass £8 (d)**

MATHS WITH A STORY 2
Similar programs as 1 but covered from a different angle. **Cass £8 (d)**

NUMBER GAMES:
6 programs designed to stimulate the mind of an active child of 8 years and upward. **Cass/EC £7.50(d)**

USING YOUR COMPUTER
8/12 years. Introduction to computers using synchronised audio techniques. Total of 80mins of audio & 14 progs. **Cass £24 (c)**

WORD PLAY
An elegant but simple introduction to word processing using animal shapes for editing functions. Fun manual for the children. **Cass £10 (d)**

WORD MOVER
A simple text editor. **Cass £8 (d)**

SECONDARY LEARNING

ADVANCED LEVEL STUDIES: STATISTICS
6 progs covering central concepts and principles. Topics include Discrete Data & Binomial Distribution. Eont. Data & Normal Data Distribution. Hypothesis Testing & Confidence intervals, Central Limit theorem & Estimation, Simulations, Correlations and Regressions. **Disc £23 (d)**

ADVANCED STUDIES: GEOGRAPHY
4 progs covering social geography: Traffic & Town planning, drainage & basin management and planning for industry. **Cass £10 (d)**

INSIDE INFORMATION
Designed to introduce IT to young adults. Suitable for use in sec. schools, ITeCs & Adult Educ. Centres. **Prog Cass £10 (d) Audio Cass £5 (d) Book £8 (d)**

OPEN LOGO
Open University Logo incl two 16K roms and two manuals. **£55 (c)**

SCIENCE TOPICS (ST)

S.T.: WAVES
A Physics program allows display of waveforms and shows changes caused by different parameters. **Disc £14 (d)**

S.T.: RELATIONSHIPS
A Biology program giving a sophisticated simulation exercise based on data from W.H.O. **Disc £14 (d)**

S.T.: BONDING
A Chemistry program to reinforce & strengthen the concept of bonding of elements. Transfer and sharing of electrons are both shown graphically. **Disc £14 (d)**

S.T.: ELECTROMAGNETIC SPECTRUM
A graphical adventure prog to test your knowledge of the electromagnetic spectrum. **Disc £14 (d)**

S.T.: ELECTRONICS IN ACTION
Program about using computers for control. Control is achieved by using 6502 assy lang. Prog editor is supplied. **Disc £14 (d)**

S.T.: NEWTON & THE SHUTTLE
A interactive prog in 3 parts covering launch to recapture of a satellite to test the knowledge of Newtonian mech. **Disc £19 (d)**

S.T.: ECOLOGY
Simulation program managing a nature reserve to meet a host of individual needs. **Disc/EC £19 (d)**

S.T.: POLYMERS
Students run a manufacturing co. and have to choose best materials for their products and compete with a rival co. run by the computer. **Disc/EC £19 (d)**

S.T.: CLASSIFICATION & PERIODIC TABLE
A database program for producing different classifications of chemical information and presented in any format. **Disc £20 (d)**

S.T.: FOOD & POPULATION
Simulation in space of biological aspects of nutrition and food production logistics. **Disc £20 (d)**

SEC. SCIENCE: MICROTECHNOLOGY
Fundamental concepts of electronics Logic & Resistor Tutors, Servo Cct simulation & a cct design program. **Cass £7 (d)**

SEC. SCIENCE: THE MOLE CONCEPT
A computer sync. audio program explains definitions of atomic & molecular masses and depicts molar equations. **Disc/Aud/EC £16 (c)**

SEC. SC.: UNIFORMLY ACCELERATED MOTION:
Illustrates basic eqns., uniform accln, under gravity and an idea of terminal velocity. **Disc/AUD/EC £16 (d)**

VU-TYPE
The popular 'Sight & Sound' touch typing tutor with alterable settings. **Disc/EC £15 (d)**

GENERAL

GAME CORE
Provides information and intelligence routines for writing board games. **Cass £9 (d)**

VU TYPE PROFESSIONAL
An enhanced and expanded version of Vu Type with 63 Pitman approved exercise. **Disc £19 (d)**

WHITE KNIGHT MK II **Disc £16 (d)**
(Specify if for Master).

BATTLEFIELDS **Cass £8.50 (d)**

DEUTSCH DIREKT
Disc based vocabulary learning prog with audio cassette to help with pronounciation. **Disc/aud/EC £16 (c) Book £5.95 (d)**

A VOUS LA FRANCE
A home study aid for anyone learning French. **Cass/EC £12 (d) Book £5.25 (d)**

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.

PRINTER ACCESSORIES

EPSON ACCESSORIES:
Interfaces:
8143 RS232 ..... £28 (d)
8148 + RS232 + 8K ..... £75 (d)
8165 IEEE + Cable ..... £65 (d)
8148 RS232 + 2K ..... £57 (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 ..... £37 (c)
FX80/80 + Paper Roll Holder ..... £17 (c)
LX80 Tractor Feed ..... £20 (c)
LQ800 Tractor Feed ..... £44 (b)

SHEET FEEDERS:
8338 LX80 ..... £49 (b)
8333 FX100 + /105 ..... £169 (a)
8331 FX80 + /85 ..... £129 (b)
8330 RX80 + ... £129 (b)
LQ800 ..... £129 (d)

Ribbons:
RX/FX100/100 + . FX105 ..... £10 (d)
RX/FX80/80 + , FX85 ..... £5 (d)
LX80 ..... £4.50 (d)
LQ800 ..... £10 (d)
H180 Pen Set (Aqueous/Ball point) ..... £7.50 (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 buffer ..... £78 (d)
Ribbon ..... £6 (d)

JUKI 6100
RS232 Interfaces ..... £65 (d)
Tractor Feed ..... £129 (a)
Ribbon (Carbon) ..... £2.00 (d)
Spare Daisy Wheel ..... £14 (d)
Sheet Feeder ..... £182 (a)

BROTHER HR15
Daisy Wheel ..... £18 (d)
Tractor Feed ..... £90 (a)
Ribbon (Carbon/Nylon) ..... £3.00 (d)
Sheet Feeder ..... £182 (d)
Keyboard ..... £135 (a)

Printer Leads:
BBC Parallel Lead (1.2m) ..... £10 (d)
BBC Serial Lead (1.2m) ..... £6 (d)

Other lengths can be supplied on order:
IBM Parallel Lead (2m) ..... £12 (d)

PAPER & LABELS
Plain Fanfold paper with micro perforations:
2000 sheets 9½" × 11" ..... £13 (b)
2000 sheets 14½" × 11" £18.50 (£4.50)

Labels/1000:
Single Row 3½ × 1 7/16" ..... £5.25 (d)
Triple Row 27/16" × 17/16" ..... £5 (d)

BBC SPARE PARTS

All Prices are Retail ex-VAT carriage code (d).

BBC & Misc:
Keyboards ..... £52 (b)
Powers Supply £52 (b)
Keyswitch £1.75
Video ULA £18
Serial ULA £14
DNFS £18
UHF MOD £4.50
6502A CPU £6.50
65CO2 CPU £12
6522 VIA £3.50
6522A VIA £5.50
LM324 ..... £0.45

74ALS 245 ..... £5
88LS120 ..... £3.00

BBC PLUS:
PAL16REN £13.50
64K × 4 DRAM ... £8.50
6512A £12.50
SAA5050 ..... £9.00
6845SP £6.50
UPD7002 ..... £5.00
DS3691 ..... £3.50
7438 ..... £0.40
74LSOO £0.24
74LSO4 ..... £0.24

74LS10 ..... £0.24
74LS123 ..... £0.80
74LS163 ..... £0.75
74LS244 ..... £0.80
74LS245 ..... £1.10
74LS373 ..... £0.90
74LS393 ..... £1.00

BBC MASTER:
1-Mbit ROM £39
MSI CHROMA IC £13.50
65SC12P-2 ..... £12.50

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ACW443 CAMBRIDGE WORKSTATION

A complete self-contained workstation with:.

* NS32016 8MHz Main Processor & 32081 FP processor.
* 20 Mbyte Winchester and one 80T Ds floppy drive.
* A detachable keyboard Hi Res RGB Monitor.
* 4Mbyte of on board Ram as standard.
* Languages supplied include: Fortran 77, Pascal, C, Cambridge LISP, 32016 Assembler & 32bit BASIC.
* Utilities on the operating system to cross link programs between different languages, utilities for porting programs to mainframes.
* **Phone for detailed leaflet.**

32016 CO-PROCESSOR

A second processor that brings genuine 'Mainframe' power to the BBC Computer.

* Interfaces with the BBC through the tube connector.
* NS32016 6MHz CPU & 32081 FP processor.
* 1Mbyte Ram as standard.
* Packaged software includes all the languages and utilities supplied with the ACW Work Station.
* **Phone for detailed leaflet.**

CPU/FP Upgrade Kit (non-Acorn) for the Co Processor for 8Mhz operation to enable use of ADFS with the floppy drives is available. It can be fitted at no extra charge if ordered with the Co Processor.

A list of software available for the 32 bit processors is available on request.

512 CO-PROCESSOR

Brings professional software to the BBC Master.

* 10 Mhz 80186 *DOS PLUS.
* GEM Write & GEM Draw.
* 'WIMP' Environment with high quality Mouse.
* Runs many 'IBM' programs — even 'Flight Simulator'!
* Convert to/from IBM/BBC data.

DOTPRINT PLUS

A uniquely versatile NLQ ROM for the BBC Micro.

* Built-in character font generator.
* Built-in view printer driver.
* Supports microspacing for professional justification in View & with disc in Wordwise/Plus.
* True bold print as well as double width.
* 12 character pitch as standard.
* Fully variable pitch and line spacing.
* Suitable for fully **'EPSON'** compatible printers with quad-density graphics.
* **DOTPRINT PLUS** for EPSON FX/RX and compatibles.
* **DOTPRINT DUAL** for EPSON MX range.

MICROJUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

NORMALLY JUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

Notice how MICROJUSTIFICATION eliminates 'stretched' spaces between words.

For price details see page 1.

compact
BRITISH BROADCASTING CORPORATION
MASTER SERIES MICROCOMPUTER

THE FAMILY COMPUTER

Now available from stock

This low cost high tech computer ha developed specially as a computer fo home use.

SPECIFICATION

128K RAM, ADFS Filing system BBC Basic version 4, MASTER styl keyboard, a single 640K 3.5" doubl sided drive. RGB/Mono Monitor a an optional extra.

Bundled software pack includes: Desk Top Prog with note pad & calculator, VIEW 3.0, Card Index, & LOGOTRON. A set of excitin games and graphic demos.

EPSON LQ800/1000

Uses top quality 24 pin dot-matrix technology.

* Superb 'letter quality' at 67cps.
* Fast clear draft quality at 200cps.
* LQ/Draft modes selectable from front panel.
* Variety of fonts, usable in both draft & LQ modes.
* Optional 'personality' modules for Diablo and IBM emulation.
* Optional Font modules.
* Friction feed.
* Hi Res bit image graphics with hex density.
* 7K buffer, both serial and parallel interfaces as standard.

EPSON HI-80

* A4 with 4 colour precision plotting.
* Low cost while maintaining precision.
* Variety of pens available.
* Ideal for overhead transparencies.
* Powerful software commands allow complex plots.
* Superb line/bar/pie charts simply produced.

STAR NL10

A 80 col 120 cps printer with fine NLQ at 30 cp offers novel and innovative features. There are n dip switches to set, full control from the fron console. Plug in interface cartridge simplifie adaptation to different computers. Friction & Tractor feed as standards. Epson Compatibl Graphics.

NATIONAL PANASONIC KX P1080

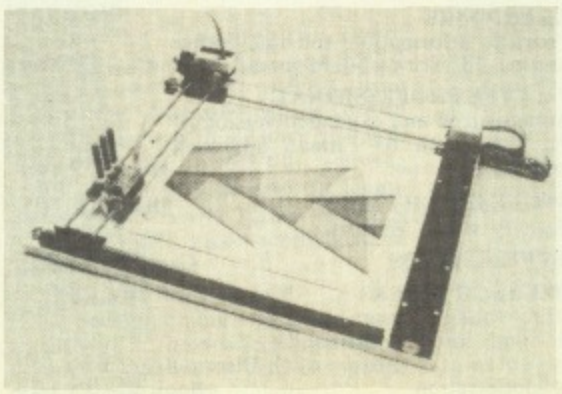
A high performance low cost printer with fu character pitch feature 10, 12, 15 & 17 cpi and pro portional spacing in both draft and NLQ mode. 8 column, 100 cps draft and 20 cps in NLQ. Parall interface and Friction and Tractor feeds a standard. Epson Compatible Graphics.

HITACHI 672

* A3 four colour precision plotter.
* Serial and parallel ports as standard.
* Produces 'OHP' transparencies as well as plain paper.
* 'HP' graphics language or single character commands.

GRAPHICS WORKSTATION

A A3 pen plotter with 0.1mm resolution allows graphs, charts, architectural drawings to be plotted using the 9 predefined plotting instructions or by using a CAD package. The pen mount allows a variety of pen types including drawing pens to be used or the following range of accessories to be fitted.



OPTICAL SENSOR

This converts the plotter into a input device and offers a new range of applications: Scan or digitise a picture or a drawing to display or store. Traverse mazes and investigate methods of artificial intelligence. Reliably read bar codes.

DRILL/ROUTER

This will drill holes, machine moulds and cu complex 3-D shapes in a range of suitable materials to a depth of 16mm. Driver software is supplied on disc and an optional application program is available to interface the drill/router to our NOVACAD package.

SCRIBER

The sharp pointed scriber may be used to etch fin line drawings on surfaces such as scraperboard wax coated copper etc. Full details on request. Se page 1 for price.

All accessories available separately if required.

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& Econet
Referral Centre

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(b) £2.50
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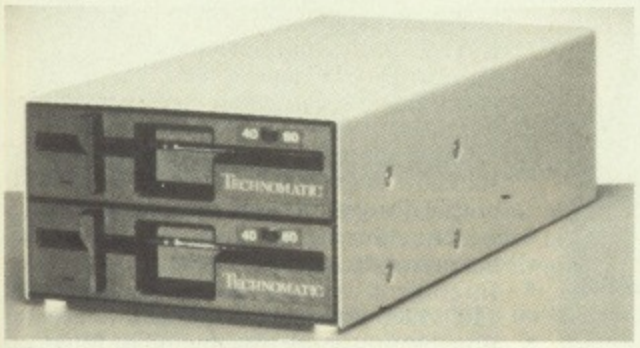
(d) £1.00

TS 400



PD 800

PD 800 P

P2041 HT

DISC DRIVES

TECHNOMATIC offers a wide range of high quality, high performance drives to meet all needs of BBC micro users. Please see our detailed and competitive price list on page 2.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering very fast track access and head settling times.

*5.25″ floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*The plinth version drives provide for a neat and compact system installation giving it a more professional look.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with suitably fused 13A moulded plug.

WINCHESTER DRIVES

Mass storage 20 Mbyte drives are available in the following versions:

* P20HD Stand alone.
* P204HP With a single floppy housed in a plinth version case.
* P214TS Top of the range with a 10 Mbyte back up streamer and a single floppy housed in a plinth type casing and supplied with backup utilities.
* TS10 A stand alone 10Mbyte streamer for those who are already equipped with a Winchester and a floppy drive. Utilities for backup can only be loaded from a floppy.

All models are fully compatible with Acorn's ADFS system and include a mains psu and the necessary cable connections.

ALL TECHNOMATIC DRIVES CARRY A TWO YEAR WARRANTY AS STANDARD (Effective 01.08.86)

DISC DRIVE MULTIPLEXER

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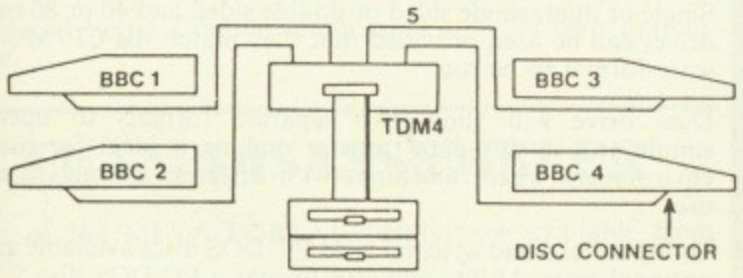

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3M are the worlds largest producer of magnetic media and are acknowledged as leaders in magnetic media technology. Every single 3M Floppy Disc carries a written lifetime guarantee that it will perform reliably. Not only do 3M offer a highest quality product but also a very competitive price. Please see page 2 for details. 3M Floppy Discs are supplied in sturdy storage boxes each containing 10 discs.

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MODEMS

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* A cost effective intelligent modem that offers the best value for money bringing the world of data communication within easy reach.
* Plain English commands make it simple to use, even for the first time user.
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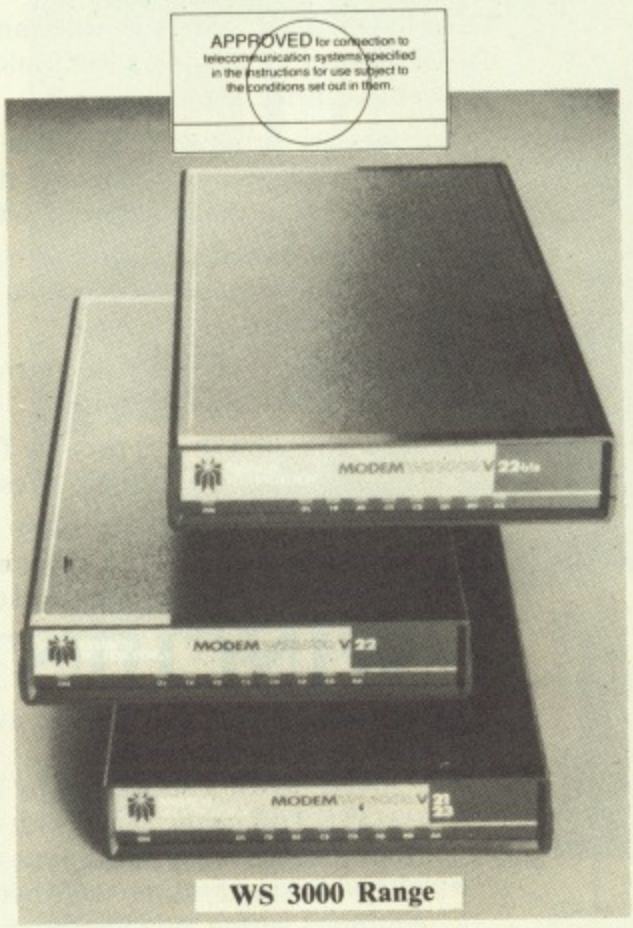
MIRACLE WS2000

* A comprehensive manually switched 'World Standard' modem.
* Competitively price with a capability to be upgraded for various options.
* BT approved for V21/V23, 300/300, 1200/75 and 1200/1200 half duplex.
* Includes BEL103/113/108 standards for use outside UK.

Optional extras include (Not BT approved).
* SK1 chip set for computer control.
* User port cable.
* Auto dial Board.
* Auto Answer Board.
* DS1 disc for auto dial facilities on Commstar.



WS 3000 Range

Miracle have introduced two new models in the WS3000 series for users who require a modem for a specific use. Model WS3022 provides 1200/1200 baud full duplex operation whilst only WS3024 provides 2400/2400 baud fd only.

Please see page 2 for prices

MIRACLE WS3000 RANGE

* A professional range of intelligent modems with full BABT approval.
* Auto Answer and Auto Dial facilities installed as standard.
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* Plain English command structure simplifies the use of the modem.
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* A line sharing facility to differentiate between data and voice calls.
* Intelligent speed buffering converts 1200/1200 terminals to 1200/75
* Equalisation mode for line noise filtering.
* Internal battery back up for storing 63 names, numbers and default settings.
* Upgrade path for 1200/1200 and 2400/2400 and security encryption.
* Applications in the field of graphics and text access, high speed telex, user to user, and user to main frame.

SPECIFICATIONS

WS4000 V2123:	*CCITT V21/V23. *300/300, 600 and 1200 half duplex, 1200/75.
WS3000 V2123:	*CCITT V21/V23/Bell 103. 300/300, 600 and 1200/75
WS3000 V22:	*As V2123 and also 1200/1200 full duplex.
WS3000 V22 bis:	*As V22 and also 2400/2400

MULTIFORM Z80

includes a FREE Pocket Wordstar package

A unique Z80 2nd Processor with a 'MULTI FORMAT' capability.

"A wide selection of programs were installed and tested without problems. The task of transfering and installing the programs for the system was greatly eased by the flexibility of the multiformat approach and the implementation of the terminal emulators. ***Ed Brown Acorn User Oct 86.*****"**

Please see page 1 for prices

* It is capable of running most CP/M 2.2 format applications programs on the BBC.
* Connects to the BBC via 1MHz bus, no restriction on the cable length. OS/M operating system on rom.
* Integral mains psu and 64K on board ram.
* 28 different formats including Acorn Z80, RML 380Z & 480Z, EPSON QX, Amstrad, Osborne etc, supplied on the library disc with the utility to create additional formats.
* Emulates the two of the most commonly used CP/M terminals, HAZELTINE 1500 and ADM-3a in addition to the Acorn VDU making installation of most of the software packages easy.
* Utility to inter convert ASCII text wordprocessed on a standard BBC and under OS/M or CP/M .
* Multiform is fully compatible with Acorn's 8271 and 1770 DFS on models B, B plus and the Master.
* Single density dfs allows single density CP/M format use. Double density dfs allows both single and double density CP/M formats to be used.
* Single or dual, single sided or double sided and 40 or 80 track drives can be used provided that they match the CP/M software format to be run.
* Dual drive will allow two separate formats to operate simultaneously for data transfer making it ideal for use in environment where machines with different formats are in use.
* Utility to read and write on IBM PC DOS discs available as an optional extra. Utility will also format a PC DOS disc.
* Multiform Z80 is supplied with a OS/M operating system rom, System disc and a Library disc. Please specify the DFS type and the drive format when ordering.

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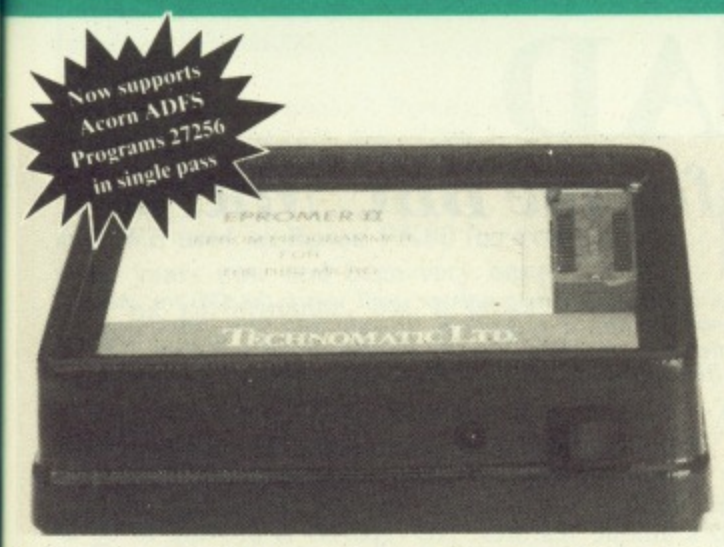
EPROMER II

Eprom Programmer for the BBC Micro Series



Epromer is supplied with a integral mains psu, all the necessary cables, a manual and software on disc. Disc also contains the rom image for use with sideways ram. Rom based software is available as an optional extra if required.
Epromer is fully compatible with Acorn DFS on the BBC B, B+ and the MASTER. Please see page 2 for price.

* A sophisticated Eprom Programmer that uses the latest Eprom Programming technology to simplify the use of the programmer and at the same time allowing the programmer the full control of the programming process.
* It handles the full range of popular single rail Eproms up to 27256.
* Powerful menu driven software makes the programming of eproms simple and efficient.
* Selectable programming voltage 25/21/12.5V.
* Two programming option, standard and algorithmic for eproms capable of high speed programming. 27128 can be programmed in just over 2 mins.
* Single address to full eprom address selectable for any of the epromer function ie blank check/read/burn/verify.
* Full screen editor with input in hex or ASCII.
* Software interface for special programming requirements eg programming alternate bytes etc.
* Many other useful utilities included.

Please send for full specification sheet.

META Version III

The only package in the micro market that will assemble such a list of processors and cost so little.

All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach.

Acorn User October 1986

META Ver. III is supplied on two 16K roms and two discs with total code in excess of 70K. An A4 size 55 page manual written in easy to follow style makes the operation of Meta simple to follow. Meta supports over 40 different processor families including the 16bit 68000. Appropriate standard mnemonics are used for each type of processor.

Major features are:

* Fully nestable macro facilities, nestable conditional entry (IF/ELSE/ENDIF).
* Modular Source Code (including parameter passing).
* Local & global labels are to 32 bits and can have upto 31 chars.
* A complete set of arithmetic instructions to 32 bit precision.
* Object code may be sent in 30 different ways DURING ASSEMBLY to disc files, RS232 port or emulators. All popular formats are included.
* A full array of Directives (over 50) incl DS.X, DC.X, EQUX, FCB etc.

Built-in Editor with all the features of a good wordprocessor like search, search/replace, delete/copy blocks, loading text at cursor etc are included, coloured highlighting distinguishes between assembler statements, comments and current cursor line.
A special Serial Communicator area with its own options page.

TEAM DISASSEMBLER

Part of the META/PORTAL family now available from stock.

Please send for our detailed leaflets on the above products.

PORTAL EPROM EMULATOR

* Portal eprom Emulator directly emulates all 27xxx (NMOS & CMOS) eproms in real time with 150 nS access time on any target system.
* Transferring of code into PORTAL is handled by META at the rate of 4Kb/s.
* All PORTAL operations are controlled by META Directives.
* PORTAL allows the code to be updated/altered within seconds and eliminates the time required for programming and erasing eproms.
* Various options are available for sending code ie use of two portals for 16 bit data bus with sequential PORTAL skipping.
* Upto 4 PORTALS can be connected to the same BBC lead.
* Each PORTAL has a lead terminating into a 28 pin dil header for plugging into target systems eprom socket.

PORTAL 128 will emulate 2716, 2732, 2764 and 27128.
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NOVACAD

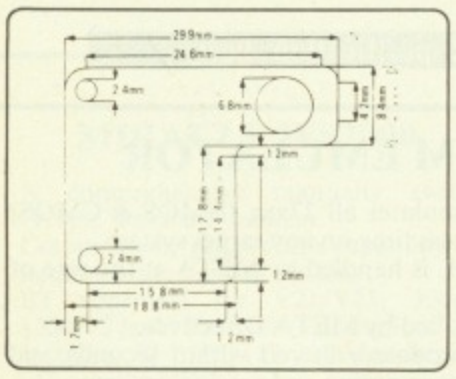
Computer Aided Draughting for the BBC Micro

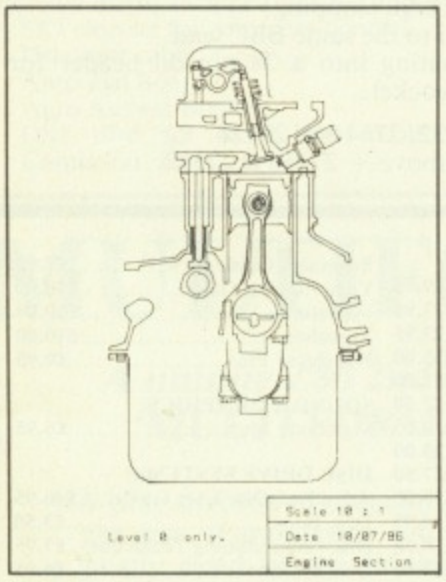
"The Novacad system is a thoughtfully designed piece of software requiring a minimum of manual bashing so that real results are possible with just a few hours work."

"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**

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

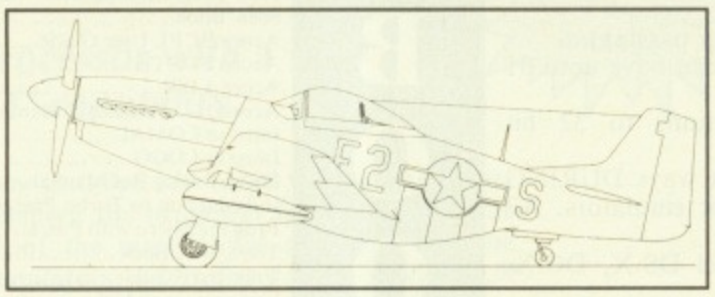
NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.

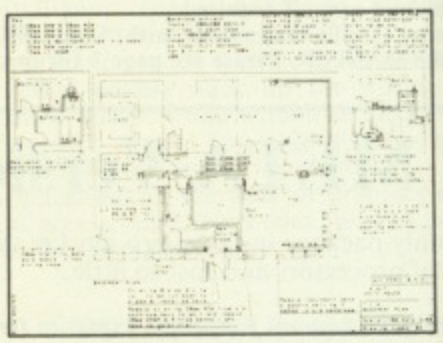


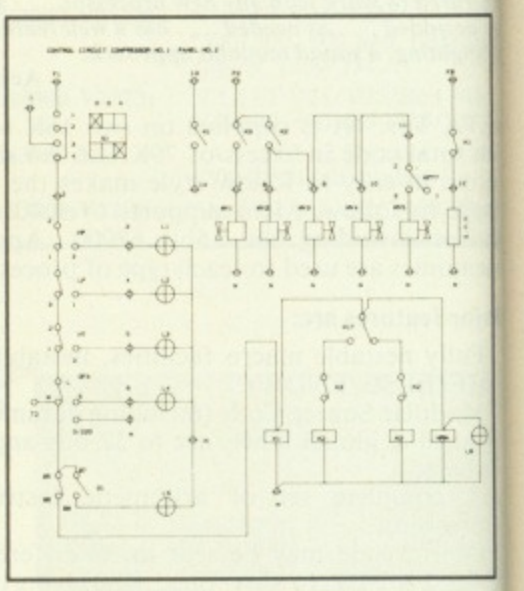


The major features of NOVACAD are:

* Simple and easy to use with logical command sequence.
* A large drawing area (approx 15 screens).
* The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
* A zoom facility allowing magnification of up to 20 times to insert finer details.
* Block copy of shapes on the screen for repetitive use.
* 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 facility to output to any BBC compatible plotter.







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, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will have additional user memory for more complex drawings.
6502 second processor will also increase the drawing speed.

NOVACAD is available in two versions

*BASIC version for cursor control from the keyboard.

*T/M version for cursor control from the keyboard, Tracker Ball or a Mouse.

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.

NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.

Product: Dotprint-Plus
Price: £32.20
Supplier: Technomatic, 17 Burnley Road, London NW10 1ED. Tel: 01-208 1177

NLQ without having to buy a new printer

MIKE MAHON explores an inexpensive alternative

I HAVE used an Epson FX80 for over three years now and been very happy with its performance, but it lacks a facility which is now commonly offered on newer dot matrix printers.

This is an NLQ – near letter quality – font which produces a much better quality type face than a standard matrix printer.

To get this higher quality print would usually mean buying either a new printer or an NLQ add-on board, both of which would be expensive, so I was particularly interested in reviewing this eprom which produces the effect of an NLQ font in software.

It is designed to be used in a paged ROM socket but not in paged RAM nor in sockets 14 or 15. *HELP shows some of the commands – see Figure I.

The eprom needs to be initialised with the command *BIP. Dotprint needs one page – 256 bytes – of memory as workspace and by default this will be at &A00, although you can change this. There is also the option to load a different predefined font into RAM.

To confirm that the eprom is active a message such as "DOTPRINT PLUS using workspace at &0A00" is given. *NOBIP restores standard printing and gives the message "Normal printing restored".

The printer character set now matches the characters on the keyboard, with the £ sign as character number 96. As you can see in Figure II the font set is more legible with nicely rounded characters compared with the standard angular print font.

```
DOTPRINT-PLUS 1.24

(C) by Patrick Sedgwick, 1985, 1986
(distributed by Technomatic Ltd)
Each keyword may be prefixed with D

BIP      MJY
CODES    VPD
FED
```

Figure I: Help page

The normal setting for DotPrint Plus is elite – 12 characters per inch – rather than the more usual pica – 10 characters per inch – though this is easily changed.

There are also a number of characters extra to the normal set, which will prove useful to anyone who needs the special characters from languages such as French, German and Spanish – see Figure III.

The basic NLQ font may be modified by underlining – including spaces – and printing bold and double width characters. The codes for this and changing line spacing are shown in Figure IV.

If the characters in the eprom do not suit you, it is possible to define a new font set. The font editor is entered with the command *FED. The first thing the software does is to create a 6k long disc file, BIPIMGS, with a copy of the eprom character set. Individual characters can then be defined.

The editing screen – see Figure V – gives an idea of how DotPrint Plus works by printing two interleaving rows each eight dots high. An X marks a dot to be printed.

Due to a limitation with Epson graphics printing, the column following an X cannot be printed and these are marked with a small x in the editor.

A common use for this ROM will be

```
Dotprint-Plus Character Set
!"#$%&'()*+,-./0123456789:;<=>?@
ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_£
abcdefghijklmnopqrstuvwxyz{¦}~

Normal Epson Character Set
!"#$%&'()*+,-./0123456789:;<=>?@
ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
abcdefghijklmnopqrstuvwxyz{¦}~
```

Figure II: Characters compared

```
âêîôûñà¡¿Ñ¤èåçùßÆœØø•ÄÖÜäöüÉé¥©
```

Figure III: Dotprint's extra characters

Code	Function
130	pica (10 cpi)
131	elite (12 cpi)
132	underlining on
133	underlining off
134	bold print on
135	bold print off
136,n	insert n/240" after each character
137	proportional spacing on
138	proportional spacing off
139	double-width on
140	double-width off
141,n	set line-feeds to n/72"

Figure IV: Dotprint's control codes

From Page 61

in combination with a word processor to produce good quality printing. A printer driver file is supplied for the View word processor. The command *VPD saves a printer driver file, BIPDVR, to disc.

When text is justified the left and right margins are lined up by inserting extra space characters between words. When whole space characters are used the spacing will vary in size and this can make the text distracting to read.

Microspacing, a technique allowed by this printer driver, puts fractions of a space character between words, leading to more even spacing.

You don't need to have a word processor which supports microspacing to have microspacing. The command *MJY can produce the same effect.

To use this facility two Ascii files need to be created, one with the text unjustified and one with it justified. Dotprint-Plus will then produce the desired effect.

Unfortunately the price to pay for this improved quality of printing is speed. Printing is slower as each line is printed at least twice.

For example the time taken to print this review was 95 seconds with standard FX80 characters and 500 seconds with DotPrint Plus.

Even with an NLQ printer there will be a considerable difference between a standard and NLQ mode. For comparison, an LX80 took 110 seconds in the standard print mode and 385 in the NLQ mode.

Documentation consists of a small 16 page A5 booklet, which is adequate rather than extensive.

So if you have an Epson printer without an NLQ font, there is no need to buy a new printer just for the NLQ, when you can get comparable performance for a reasonable price with DotPrint Plus. ■

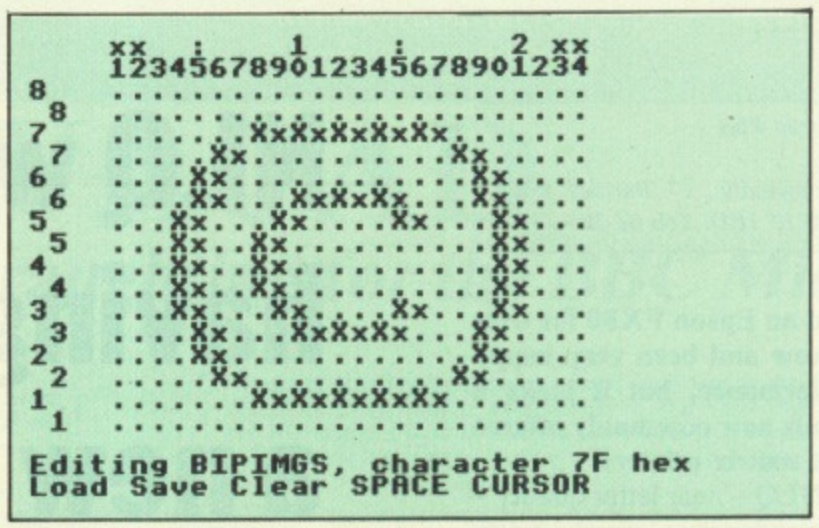


Figure V: Load menu

CHALICE
SOFTWARE/HARDWARE

MEGA-ROM

67 Powerful commands on this 16K Rom.
A comprehensive BASIC toolkit, friendly and thorough Rom management, utilities for the disk user including format, verify, repair, editor & search routines.

"Overall a good selection of numerous utilities and a recommended buy at around £35" **MICRO USER – JUNE 1986.**

NOW ONLY £29.95

ROM MASTER

New improved version of our powerful Rom management system.

Now with even more commands to control your errant Roms. This Rom will keep others turned off even through CTRL BREAK. Over 20 commands including the ability to encrypt & de-crypt files to keep them secure from prying eyes.

PRICE £14.95

■ VECTOR 1 ♦

TAPE TO DISK UTILITY
FEATURES

+ Once only purchase
+ Can save to any disk
+ Very user friendly, help pages on disk
+ 40/80 Format
+ No awkward ROMs, can be used on any machine
+ Can load to all available RAM &400-&7FFF
= Simply the best tape to disk utility available

Vector 1 versions compatible with Acorn, Opus, UDM, Cumana, BBC+ & Watford (Not 1-42, 1-43 DFS's.)

■ VECTOR 2 ♦

DISK UTILITY
Features

+ 40/80 Format
+ User friendly, menu driven
+ Contains powerful features such as a disk sector editor, Disk Compare, format, verify and track repair
= The most powerful disk utility available

VECTOR 1 & VECTOR 2 now compatible with BBC+ and Master series.

NEW IMPROVED VERSION (1.40)
Send £2.00 with old disk for upgrade.
Prices: £12.00 each for Vector 1 or Vector 2 £23 for both.

SCYTHE TOOLKIT **£21.95**
(Send for full details)

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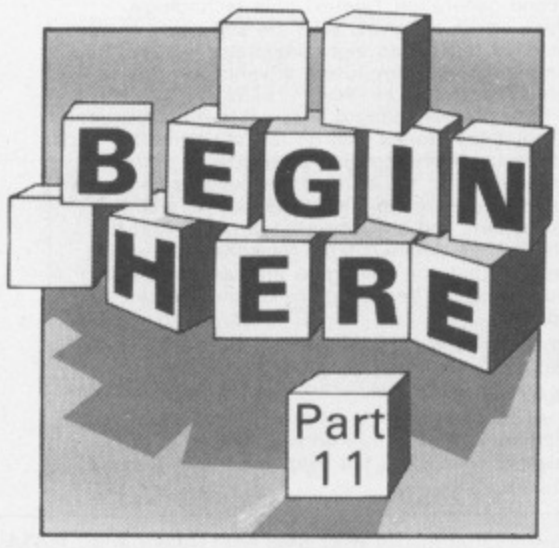
'IP 'IP ARRAY



By PETE BIBBY

LAST time we saw how we could use arrays to hold numbers and strings. There's more on arrays this month as we deal with the data held in Table I.

With what you remember from the October issue you should have no difficulty in understanding Program I.

Name	Age	Height
Pete	36	175
Noreen	21	160
Colin	42	170
John	30	180

Table I: Names and data

Line 20 sets aside space for an array of five elements, ranging from *name$(0)* to *name$(4)*. The FOR...NEXT loop between lines 30 and 60 takes strings from the keyboard and puts them into successive elements of *name$()*. As usual I've ignored the first element of the array, *name$(0)*.

```
 10 REM Program I
 20 DIM name$(4)
 30 FOR loop=1 TO 4
 40 PRINT "Give me a name"
 50 INPUT name$(loop)
 60 NEXT loop
 70 FOR loop=1 TO 500
 80 NEXT loop
 90 FOR loop=4 TO 1 STEP -1
100 PRINT name$(loop)
110 NEXT loop
```

You may wonder what the loop of lines 70 and 80 is doing. The short answer is nothing. It's just a delay loop which the micro whips round 500 times before carrying on to the next line.

The idea is to give you a rest between entering data and the wonders that follow.

element	1	2	3	4
content	Pete	Noreen	Colin	John

Figure I:* name$() *and its contents

By this point the array has been filled and, if you've used the set of names in Table I, it can be illustrated by Figure I. Now the final FOR . . . NEXT loop comes into play and the names are printed out in reverse order:

```
John
Colin
Noreen
Pete
```

And order is the operative word. This is because the array doesn't just hold data in the form of names, it holds them in an order. It's easy to see that *name$(1)* comes before *name$(2)* and so on. So as well as storing a lot of data, the way the array is numbered makes a list of the data as well.

Program II also creates a list of data held in an array. This time it's the ages from Table I that are entered and they're held in the array *age()*.

```
 10 REM Program II
 20 DIM age(4)
 30 FOR loop=1 TO 4
 40 PRINT "Give me an age"
 50 INPUT age(loop)
 60 NEXT loop
 70 total=0
 80 FOR loop=1 TO 4
 90 total=total+age(loop)
100 NEXT loop
110 average=total/(loop-1)
120 PRINT
130 PRINT "The average age is ";ave
rage
```

element	1	2	3	4
content	36	21	42	30

Figure II:* age() *and its contents

By the time the program has reached line 70, four elements of the array *age()* will have been given values to hold. Figure II shows how they are stored. Now, rather than just print them out in reverse order, the program goes on to calculate the average age of the four people in our table.

Line 70 initialises the numeric variable *total*. This is used inside the following FOR...NEXT loop to keep a running total of the ages held in each element of *age()*. When the program drops out of the loop the average age is calculated and stored in *average*. After 120 prints a blank line, 130 displays the result.

Incidentally can you explain why *total* is divided by *(loop–1)* and not *loop*? If not, think back to FOR . . . NEXT loops.

While Program II isn't the most exciting program in the world it does show how easy it is to use data once it's held in an array. It shouldn't be too hard to see how it could be modified to calculate other statistics such as the mode or standard deviation or the total age.

The point is that data in an array is easily processed. As we go deeper into Basic we'll see how powerful arrays can be. In the meantime have a look at Program III.

```
 10 REM Program III
 20 DIM height(4)
 30 FOR loop=1 TO 4
 40 PRINT "Give me a height"
 50 INPUT height(loop)
 60 NEXT loop
 70 PRINT "Which height do you want
? 1/2/3/4"
 80 INPUT number
 90 PRINT "The height is ";height(n
umber)
```

element	1	2	3	4
content	175	160	170	180

Figure III:* height() *and its contents

By now the first six lines should look chillingly familiar. The only real

→

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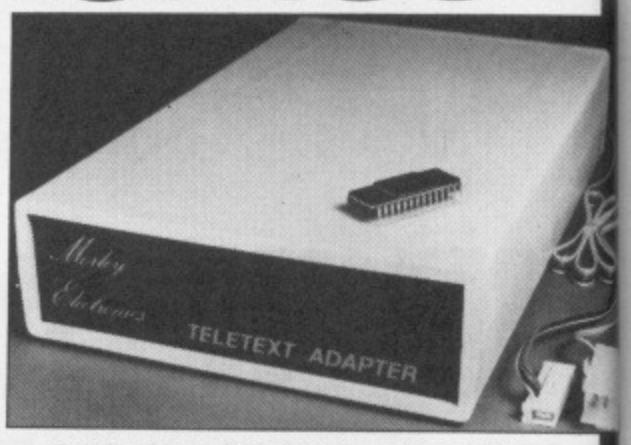

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From Page 63

difference from the previous programs is that the array *height()* is used to hold – surprise, surprise! – the height of the members of Table I.

The interesting bit comes when we get to line 70. This asks you to input a number to which the micro will reply with the corresponding height. So entering 1 will give Pete's height, 2 will give Noreen's and so on.

This is achieved by line 90 which uses the value of *number* as a subscript of the array *height()*. So when number is, say, 3, line 90 effectively becomes:

```
90 PRINT "The height is ";height(3)
```

And – as we can see from Figure III – since *height(3)* contains 170 the screen displays:

```
The height is 170
```

which is Colin's height.

In many ways the program is a bit bare. Really it should remind you who the numbers stand for. After all, did you know that 1 "points" to Pete without looking at the table? We'll remedy that shortly.

For the moment the point to grasp is that now the subscript, the number or variable inside the brackets of an array element, is being used as a pointer. By varying the pointer we access a different element of the array. So, a pointer of 2 gives Noreen's height – held in *height(2)* – while 4 selects John's height.

If you think about it, by using the subscript as a pointer we can select any element of an array that we want. And we can use the same pointer to select data from several different arrays as you'll see if you run Program IV.

```
  10 REM Program IV
  20 DIM name$(4),age(4),height(4)
  30 FOR loop=1 TO 4
  40 PRINT "Give me a name"
  50 INPUT name$(loop)
  60 NEXT loop
  70 PRINT
  80 FOR loop=1 TO 4
  90 PRINT "Give me "name$(loop)"'s
age"
 100 INPUT age(loop)
 110 PRINT "Give me "name$(loop)"'s
height"
 120 INPUT height(loop)
 130 PRINT
 140 NEXT loop
```

pointer / array	1	2	3	4
name$()	Pete	Noreen	Colin	John
age ()	36	21	42	30
height ()	175	100	170	180

Figure IV: The three parallel arrays

This still deals with the data from Table I but now it handles it all using three arrays. These, our familiar *name$()*, *age()* and *height()*, are declared in line 20, one DIM dimensioning all three arrays.

The FOR . . . NEXT loop immediately following this reads the four names into *name$()*, one after the other. The next FOR . . . NEXT loop then uses *name$()* to indicate the person whose age and height is required. Notice that *loop* is being used as a pointer, selecting each element of *age()* and *height()* in turn. And having established all three arrays in memory, the program stops.

Now try entering:

```
PRINT name$(2),age(2),height(2)
```

and see what happens. You get all the data on Noreen. Similarly, using a subscript of 1 as a pointer in the three arrays retrieves Pete's details while 3 and 4 inform you about Colin and John respectively.

Notice that if we want to extract all the details about a person from our three arrays, the **same** pointer is used as a subscript. All the elements subscripted 1 refer to Pete, 2 to Noreen and so on.

This hasn't just happened, it's because of the way we've entered the data into the arrays. We've made use of the ordering property that we came across earlier. Figure IV shows how the subscripts of the three arrays act as pointers.

When separate arrays are constructed in this way, with corresponding elements holding data about the same subject, then these arrays are called parallel arrays. And they can come in useful for solving all sorts of programming problems.

For the moment let's just consider the problem of retrieving data from a set of parallel arrays. Program V, an extension of Program IV, shows how it's done.

Lines 10 to 140 establish our three parallel arrays in the usual manner. Notice that it's up to you to enter the right figures. If you respond with Noreen's height and age in response to Peter's prompt and so on, information obtained from the arrays will be misleading.

Lines 160 to 200 form a menu, giving you a choice as to whose details will be plucked from the parallel arrays. Each name has a number opposite it and you enter the number of your choice. This is an improvement on Program III where you had to remember who had been allocated which number.

```
  10 REM Program V
  20 DIM name$(4),age(4),height(4)
  30 FOR loop=1 TO 4
  40 PRINT "Give me a name"
  50 INPUT name$(loop)
  60 NEXT loop
  70 PRINT
  80 FOR loop=1 TO 4
  90 PRINT "Give me "name$(loop)"'s
age"
 100 INPUT age(loop)
 110 PRINT "Give me "name$(loop)"'s
height"
 120 INPUT height(loop)
 130 PRINT
 140 NEXT loop
 150 PRINT
 160 PRINT "Do you want details of:"
 170 PRINT "Pete.....1"
 180 PRINT "Noreen...2"
 190 PRINT "Colin....3"
 200 PRINT "John.....4"
 210 INPUT pointer
 220 PRINT name$(pointer)"'s age is
";age(pointer)" and height is ";heigh
t(pointer)
```

Once you've chosen, the number is stored in *pointer* which, as you might guess, is used as a subscript in each of the arrays in turn. This results in line 220 printing out all the details of your choice and then halting.

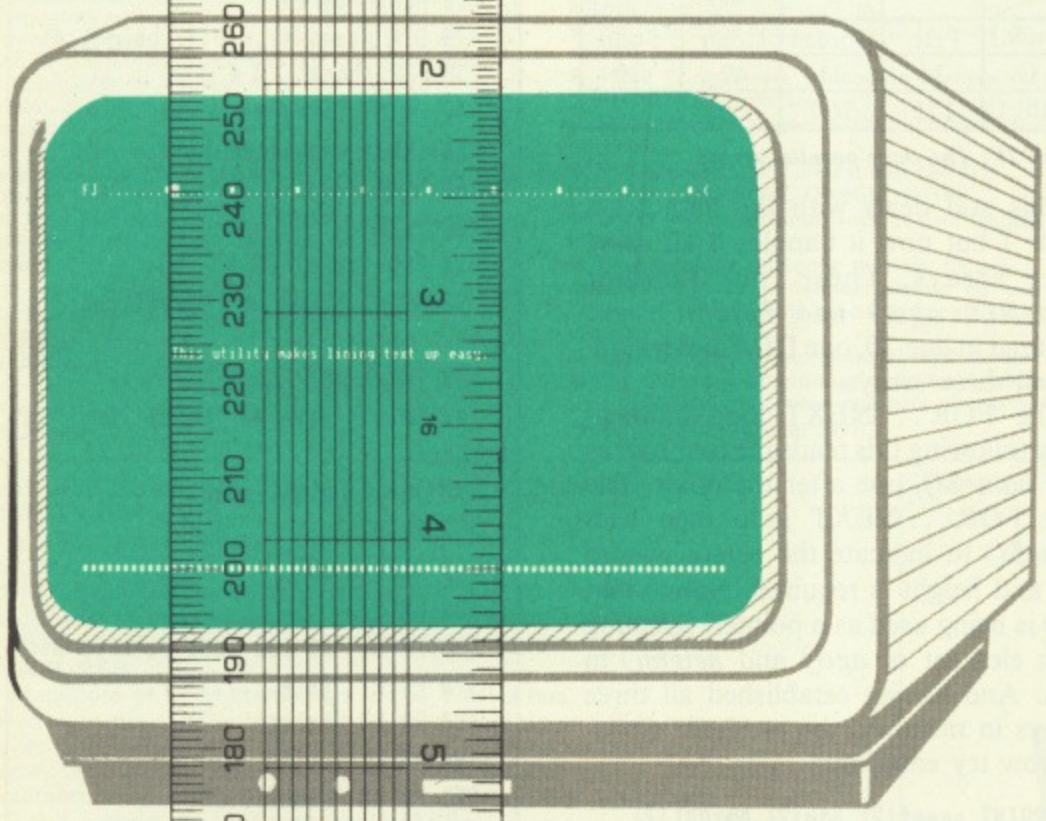
See if you can change the program so it gives you the details of two members of *name$* before it stops.

And that's where we stop for the present. Between now and next time, try creating and interrogating your own arrays, exploring what happens not just when things go right but also when they go wrong.

What's the result of using a pointer to an element that doesn't exist? Can you have a numeric array element as a pointer, using it as the subscript in another array?

Try it for yourself. You learn programming by programming, not reading about it.

● *And that should keep you occupied until next time when we continue our exploration of arrays by entering a whole new dimension.*



WORK TO RULE

Any program can be improved, says CHRIS NIXON, and proves it by showing what Ruler can do for Acornsoft's View word processor

OF the many commercial word processors available for the BBC Micro today, View, Wordwise and Mini Office II still prove to be the most popular, Wordwise and Mini Office II for their speed, ease of use and large document size, and View for its more true-to-life on-screen representation of your work.

However, there are always improvements that can be made to any program, and Ruler is one such improvement for View.

Its sole purpose in life is to move a duplicate of the editing cursor along the ruler at the top of the page while you type, inverting each ruler character as it passes over it. This feature is already incorporated into the word processors for some larger business machines and is an invaluable aid for positioning text exactly as desired on the screen.

There are two constraints that apply when using the program. Firstly, cursor editing is disabled unless in text mode. This is because unpredictable effects occur when attempting to Copy characters. Cursor editing may be re-enabled with *FX4, which will be active until Ruler is *RUN again.

Also, pressing Break will de-activate Ruler, but typing CALL &C00 from Basic, or *RUN RULER from Basic or View, will re-start it. If you are lucky enough to possess a Master 128, you can type *GO C00 directly from View, thereby preserving your text.

Type in the program remembering, as always with machine code, to save it before running. When run, the code is assembled and saved as RULER. The assembler directives EQUB, EQUW and EQUD as used in Basic II are simulated using Basic's indirection operators ? and ! to allow assembly on machines with Basic I.

You can now call the machine code routine from within View or Basic with *RUN RULER, or *RULER if you are sure you have no such command in any sideways rom. If you are in Basic when you do this, don't worry if nothing seems to happen. Ruler will not operate unless you are in View. Simply type *WORD followed by Return then Escape and all will be well.

The program works by intercepting all calls to osrdch through which all keyboard access is channelled. This is an effective way of only moving the duplicate cursor when needed.

Ruler does this when first *RUN by re-diverting the osrdch vector at

&210,&211 (through which all calls to osrdch pass) to point to its own main routine, and saving the old contents in spare vector 1 (&230). Thereafter, every time a key is pressed the following actions take place:

1: Push all registers on to the stack.
2: Check to see if View is the current language by testing for a capital V in sideways rom location &8009, and a zero byte terminator in location &800D. The chances that another language will have a four character title beginning with V are pretty small. If not in View, go to (8)
3: Save a record of the current cursor position with osbyte 134 (read text cursor position), and turn off the cursor to prevent annoying flicker as Ruler operates.
4: Test character at the start of the current line to see if it is an equals sign. This is done by performing an osbyte 135 (read character at text cursor position). If an equals is found, we are in command mode and must go to (7).
5: Replace old ruler character in normal colours.
6: Using the horizontal position of the cursor when it was saved, read the ruler character at that horizontal position and print it inverted.
7: Re-activate cursor and restore old text cursor position.
8: Pull all registers from the stack and JMP to the saved vector at &230.

Ruler is completely un-crashable by repeated *RUNning, as it first checks the vector at &210 to see if it has already been re-diverted, or is still pointing into the operating system.

The program Ruler works in all modes except 7, in which case typing may continue as normal without the second cursor. The object code is less than 256 bytes long and so fits nicely into the area of memory reserved in model Bs for user-defined characters, which are not normally accessible from View anyway.

The program will therefore work with all models of the BBC Micro and Electron, including the B+ and Master 128 which use this area for Econet workspace. Obviously this means that users of the B+ and Master as Econet stations would have to disconnect their machine from the net whilst using Ruler.

```
10 REM ************************
20 REM *   VIEW Synchronised   *
30 REM *     Ruler Cursor      *
40 REM *          by           *
50 REM *     Chris Nixon       *
60 REM *  (c) The Micro User   *
70 REM ************************
80 REM
90 MODE7
100 xpos=&90:ypos=&91:oldx=&92
110 FORPASS=0TO3STEP3
120 P%=&C00
130 [OPT PASS
140 LDA &211:BPL skip:STA &231
150 LDA &210:STA &230
160 LDA #ruler MOD 256:STA &210
170 LDA #ruler DIV 256:STA &211
180 .skip
190 LDA #4:LDX #2:LDY #0:JMP &FFF4
200 .ruler
210 PHP:PHA:TXA:PHA:TYA:PHA
220 LDA &8009:CMP #ASC"V":BNE exit
230 LDA &800D:BNE exit:LDA #134
240 JSR &FFF4:STX xpos:STY ypos
250 LDA #0:STA codes+2:JSR cursor
260 LDX #0:LDY ypos:JSRtab:LDA #135
270 JSR &FFF4:CPX#ASC"=":BEQrestore
280 LDX oldx:LDY #0:JSRtab:JSR read
290 JSR &FFEE:LDX xpos:LDY#0:JSRtab
300 LDA #135:JSR &FFF4:TXA:PHA
310 LDX #0:JSR colour:LDX #135
320 JSR colour:PLA:JSR &FFEE:LDX #7
330 JSR colour:LDX #128:JSR colour
340 LDA xpos:STA oldx
350 .restore
360 LDA #1:STA codes+2:JSR cursor
370 LDX xpos:LDY ypos:JSR tab
380 .exit
390 PLA:TAY:PLA:TAX:PLA:PLP
400 JMP (&230)
410 .tab
420 LDA #31:JSR &FFEE:TXA:JSR &FFEE
430 TYA:JMP &FFEE
440 .colour
450 LDA #17:JSR &FFEE:TXA:JMP &FFEE
460 .read
470 LDA#135:JSR&FFF4:TXA:BEQinverse
480 BMI inverse:RTS
490 .inverse
500 LDX #0:JSR colour:LDX #135
510 JSR colour:LDA#135:JSR&FFF4:TXA
520 PHA:LDX #7:JSR colour:LDX #128
530 JSR colour:PLA:RTS
540 .cursor
550 LDX #0
560 .csrloop
570 LDA codes,X:BMI exitcsr
580 JSR &FFEE:INX:JMP csrloop
590 .exitcsr
600 RTS
610 .codes
620 OPT FNequw(&0117):OPT FNequd(0)
630 OPT FNequd(0):OPT FNequb(&FF)
640 ]
650 NEXT
660 *SAVE RULER C00+100
670 END
680 DEF FNequb(N%)
690 ?P%=N%:P%=P%+1
700 =PASS
710 DEF FNequw(N%)
720 ?P%=N% MOD 256:P%=P%+1
730 ?P%=N% DIV 256:P%=P%+1
740 =PASS
750 DEF FNequd(N%)
760 !P%=N%:P%=P%+4
770 =PASS
```

PROBLEM

I HAVE installed in my BBC Micro the Acorn Speech System. I have been having increasing trouble in trying to load a game, The Way of the Exploding Fist. I cannot get past the screen display, where the loading format changes to just a long block.

Is it possible this game is not loading because of the speech system? – Paul Jefferies, Orpington.

SOLVED

The Acorn speech system does stop some games working because the writers use the system VIA to control the keyboard. With the speech system fitted the operating system monitors and alters that section of the system VIA, thus disrupting the game. The easiest way to remove the system is to unplug it. However, you could cut a track and place a switch in the chip enable line of the speech chip.

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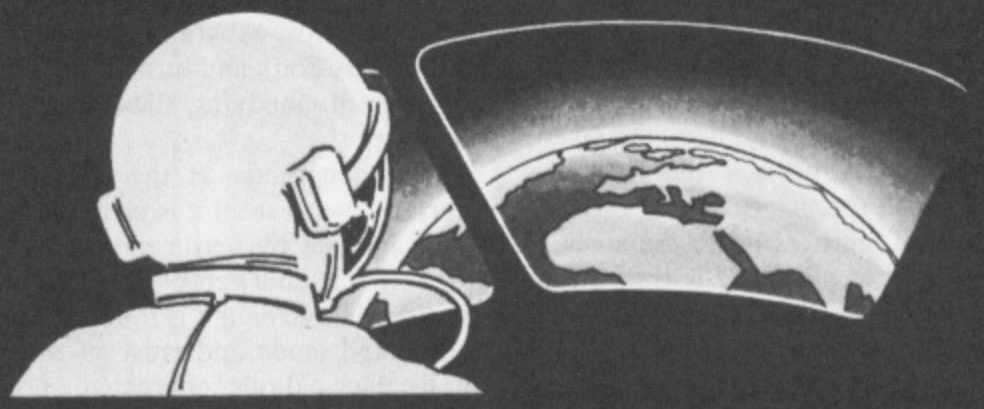

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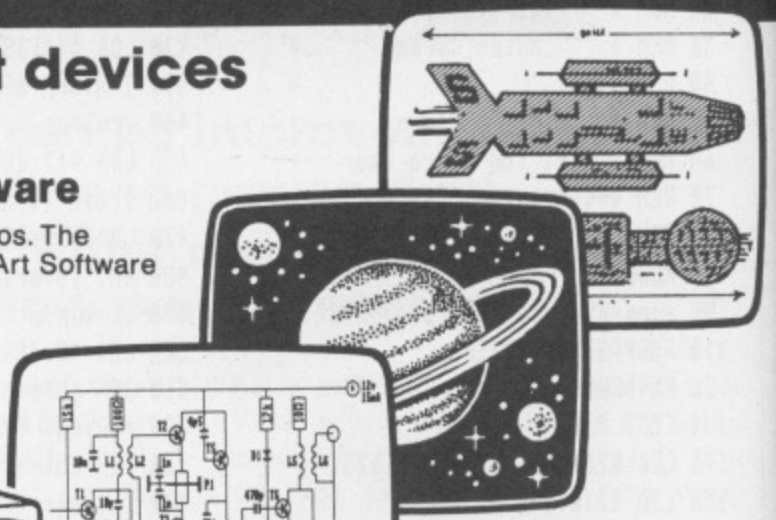

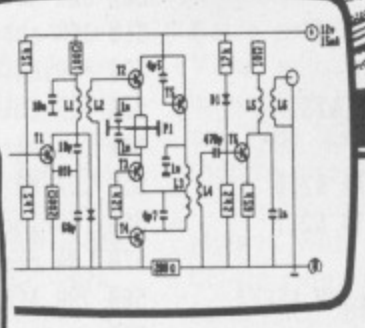

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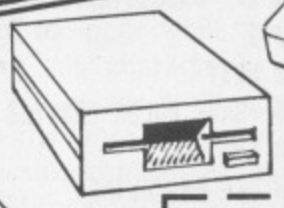

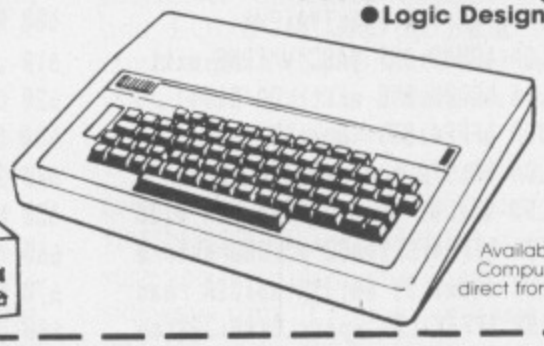

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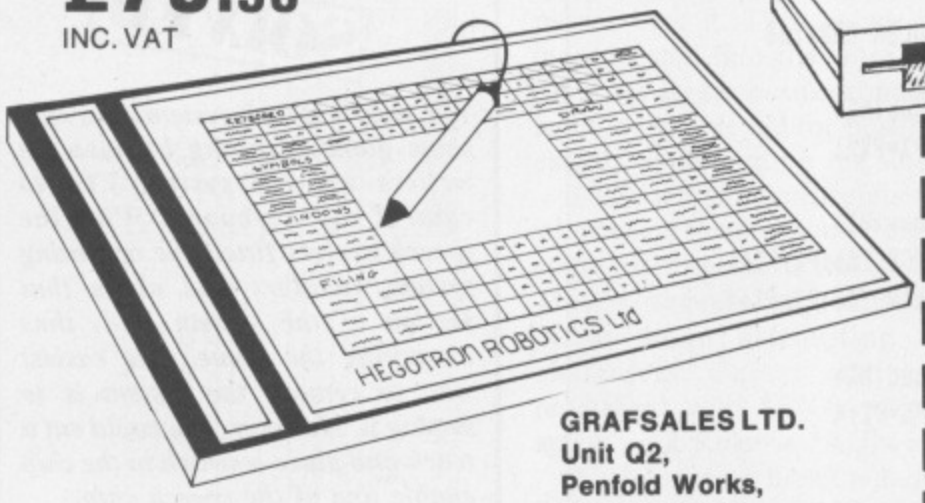

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Please supply me with _____ GRAFPAD2(s) for my *BBC B ☐
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Play the game of LIFE

with ROLAND WADDILOVE

LIFE is a fascinating program which simulates the growth of a colony of cells. Invented around 1970 by John Conway of Cambridge University it's basically a pattern generating program.

Initially the screen is blank and, using the program's editor, you have to set up the first generation of the colony. The cursor keys move the cursor, and cells can be placed anywhere on the screen by pressing Copy and deleted by pressing Delete.

If you've never played Life before try placing a straight line of about 10 cells and press Return to show you've finished. Now watch what happens. The patterns generated are based on four simple rules:

- A cell with two or three neighbours will survive to the next generation.
- A cell with less than two neighbours will die of starvation.
- A cell with four or more neighbours will die from overcrowding.
- A new cell is born in any space surrounded by three cells.

Any new cells born are plotted in yellow, while mature ones are blue. Those that are dying of overcrowding or starvation turn red.

These rules mean you have to be careful when setting up the colony – you may find that some patterns die out very quickly while others last for several hundred generations. It's up to you.

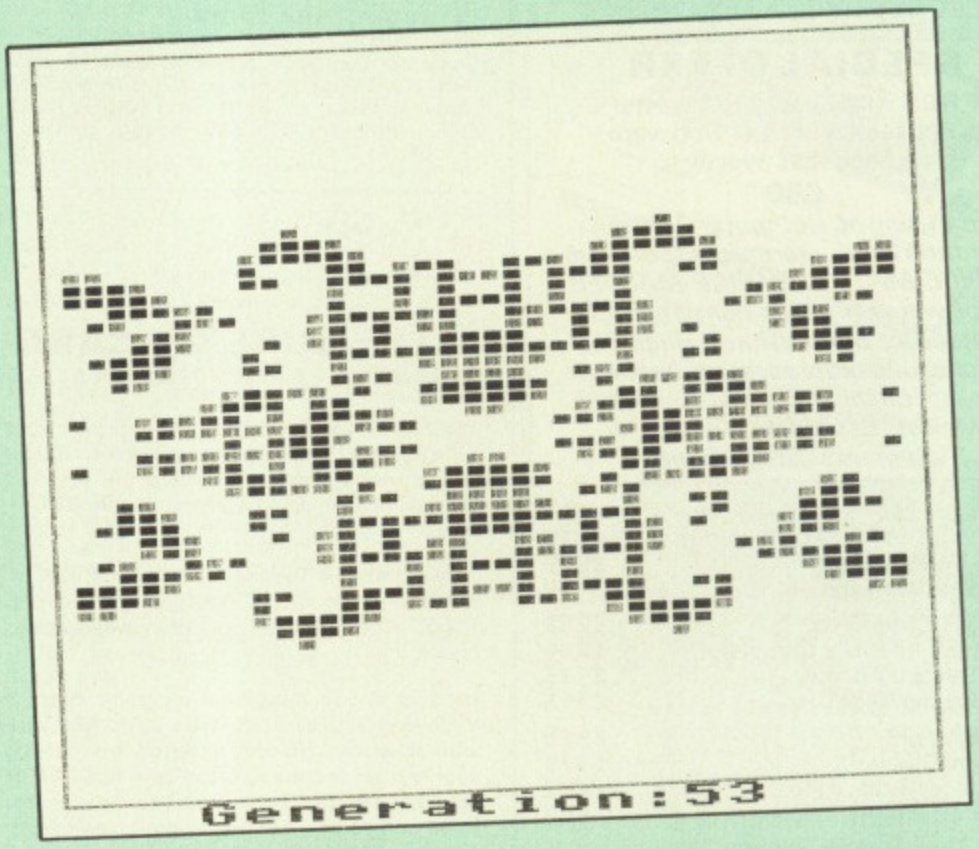
When the main program is running you can hold down Return to start afresh with a new colony. To make it more interesting there are options to tamper with the rules of Life. These generate different patterns.

The editor is a simple Basic program, but Life itself is pure machine code for reasons of speed.

There are around 2,500 cell positions on the screen each with eight neighbours, so with each generation the program must scan 20,000 cell positions and redraw up to 2,500 cells. This takes about one second.

Blank positions can't be ignored since a new cell may be born if there are three neighbours.

To achieve a reasonable speed the machine code is quite complex with its own plot routines, ignoring the operating system altogether. Look at the assembler section to see how it works. ■



PROCEDURES

assemble	Assembles machine code.
design	Designs first generation.
info	Prints instructions.
cheat	Selects cheat option.

VARIABLES

G%	Generation number.
X%,Y%	Cursor position.
K%	Key pressed.

Full listing starts on Page 132

Watford Electronics

Jessa House, 250 Lower High Street, Watford WD1 2AN, England
Tel: Watford (0923) 37774/40588 Tlx: 8956095 WATFRD Fax: 01 950 8989

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FREE with every BBC Master purchased from us, Software Packages worth

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● LX80 Tractor Feed Attachment	**£20**
● EPSON LX80 Single Sheet Feeder	**£49**
● EPSON LX86 Printer	**£229**
● BROTHER M1409 Printer	**£285**
● SEIKOSHA GP50A & GP50S	**£49**
● Centronics Printer Cable to interface all the above Printers to BBC	**£6**

(Securicor carriage charge on printers £7)

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Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	**£27**	RS232 + 2K Buffer	**£55**
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COMPACT with colour monitor	**£599**

INTRODUCTORY OFFER
As an introductory offer, we are offering the Computer Concept's INTERWORD ROM and Gemini's OFFICE MATE and OFFICE MASTER software packages (worth £80) ABSOLUTELY FREE with every COMPACT bought from us in October.

NEW LAUNCH

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.

Eureka provides the user with around 58K of free memory in BASIC, VIEW and WORDWISE PLUS. 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 with absolutely NO loss of speed in accessing your text or program. Eureka card has 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by the Eureka software supplied in a sideways ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually all circumstances.

Eureka board plugs in to the 6502 socket and has NO messy flying leads. It is compatible with other products from Watford, such as our Solderless ROM Board and out ROM/RAM Card.

To make sure that Eureka stays unique to Watford Electronics, Eureka's method of operation is the subject of a Patent Application. Please note that the Eureka Card is compatible ONLY with the BBC Micro Model B. It CANNOT be used with the BBC B+ or with the BBC Master series. Eureka cannot be used at the same time as a second processor and no advantage would be gained by doing so. Second processors can be used with Eureka fitted, provided that Eureka is not in operation at the same time.
Please write in for further details.

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

Official ACORN Distributor

CENTRONICS GLP & Brother M1009 (NLQ) Printers

A major price break-through in NLQ Printers from Watford.

At last, a full feature Epson compatible NLQ printer at a price that everyone can afford. Due to Watford's bulk purchasing power and low margins we can now offer this incredible printer deal direct from the manufacturers to our customers.

The Centronics GLP printer which is manufactured by BROTHER (and also marketed by them under their own brand name M1009), features a Near Letter Quality (NLQ) mode using a 23 by 18 dot matrix for each NLQ character (this is the same as is used by the very popular Kaga Taxan printers). The NLQ Font Rom supplied is Watford's own Professional NLQ ROM for the GLP/M1009.

Single, double and quadruple density graphics modes as well as four character widths and super/sub script printing are also supported, along with many other facilities normally found on printers costing twice as much.

Handles upto 9" wide paper. Friction feed standard, tractor feed optional extra.

GLP is bidirectional logic seeking. Has a 9 needle print head. 50 CPS. Parallel interface only.

Special Offer **£95** *(carr £5)*
Tractor Feed Attachment **£7**

Centronics GLP Mk2 (Brother M1109) NLQ Printer

100 CPS, (25 in NLQ mode), Bi-directional, logic seeking, Friction feed, tractor feed optional extra, 2K Buffer. Has both Centronics parallel and RS232 both as standard. Simply at the flick of a DIP switch, the Mk2 printer swaps between full IBM or Epson compatibility.

Launch Price: **£139** (carr. £5)
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BROTHER HR-15XL

(NEW IMPROVED FAST HR-15XL)
The new improved Brother HR15XL is a very high quality and very fast daisy-wheel printer for serious use. Notable features of this printer include a 3k buffer, 20cps, bi-directional proportional spacing, Centronics interface standard, (RS232 optional).

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KAGA KP810
NLQ PRINTER

This rugged printer is made by Canon of Japan and is the same as Canon PW1080. It is fully Epson FX80 compatible and offers superb NLQ printing.

Our Price: ONLY ***£215*** (£7 carr.)

Kaga RS232 Interface	**£49**
Kaga RS232 Interface + 2K Buffer	**£69**
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KAGA KP910 Printer

Similar to the KP810 but has 17" wide carriage for wide print. Gives 156 columns of normal print or 256 columns in condensed mode. Ideal for printing out spreadsheets.

ONLY **£349** (£7 carr.)

PRINTER LEAD

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

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Compact's Special Centronics Lead	**£9**
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Type	Ribbons	Dust Covers
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GP80	**£4.50**	**£4.00**
GP100/GP250	**£5.95**	**£3.95**
Centronics GLP	**£4.00**	**£3.75**
KAGA KP810	**£5.25**	**£4.75**
CANON PW1080	**£5.25**	**£4.75**
Panasonic KX1080	**£7.75**	**£4.75**
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Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

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Carriage on 1,000 Sheets £1.50

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(On continuous fanfold backing sheet)

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Pack of 4 refills **£10**

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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.

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N.B. Carriage on Monitors **£7** (securicor)

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A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in at our retail shop to discuss your particular requirement and a demonstration.

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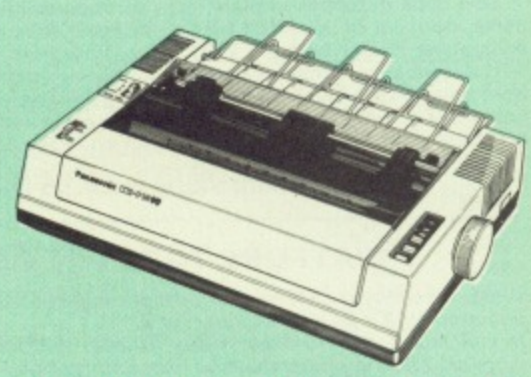
BBC Master 128K Micro, View wordprocessor, Viewsheet, Basic Editor, Terminal Emulator, Twin 800K 40/80 track double sided Disc Drives, Zenith Hi-Res green monitor, Brother HR15XL professional quality Daisy Wheel printer, Gemini Database, Spreadsheet, Beebplot Graphics, Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, and Stock Control packages on disc with manuals.

Only £949

Panasonic KX-P1080

FREE BBC Micro Cable



From the prodigious Japanese Stable of Panasonic comes this fabulous new NLQ Dot Matrix Printer

Available NOW at a superbly realistic price, the KX-P1080 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy 100 cps of clear Draft text backs up the crisp 20 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

The draft text is implemented with a 9 × 9 matrix, with Near Letter Quality effected by means of an 18 × 18 matrix.

As an extra special bonus to all Watford customers purchasing the KX-P1080 NLQ Printer, we are currently providing not only 1,000 sheets of fanfold paper completely FREE of charge but also a printer lead to connect the marvellous KX-P1080 to a BBC Micro, absolutely FREE. These gifts alone are worth £15.

Introductory Price: **£155** (carr. £7)

(FREE with every KX-P1080 printer purchased this month, 1000 sheets of Fanfold Paper, and a Printer Cable for the BBC Micro)

Continued

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The red LED Indicator on the Mk II pen, lights up when valid video data is available. Your program can have access to this signal allowing computer verification of target for high res drawing. The conveniently located switch on the pen body allows the computer to ignore any stray signals. Supplied complete with the sophisticated PEN-PAL Software on Cassette or Disc. Please specify.

Mark II Light Pen **£17**

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 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)

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for three 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. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).

PRICES

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(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. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

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Watford Electronics DDFS PLUS for the BBC B Plus

The Watford DDFS Plus, written specifically for the BBC B Plus Microcomputer, replaces the 1770 DFS from Acorn. It not only provides BOTH, single and double density operations in DFS mode, but the DDFS Plus also permits the use of an extended catalogue, giving 62 files per catalogue. It also incorporates all those excellent features of the popular Watford DFSs, and more.

N.B. SRAM and Tube functions not duplicated.

DDFS PLUS (for BBC Plus) **£30**
(Price includes comprehensive manual)

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.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

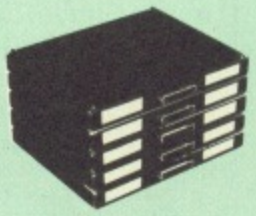
Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

DISC ALBUMS £4

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

STAK-PAK



The unique computer program filing and storage system. Made of tough black plastic, these compact drawer sections hold two cassettes each and lock together vertically to form miniature cabinets of any height. Each drawer section has two C12 Data Cassettes with labels plus external index card.

Five twin Packs incl.
10 Cassettes Only: **£5**

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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.

£8

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- M35 - holds upto 50 discs **£8**
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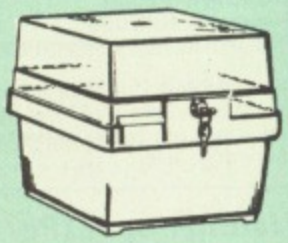
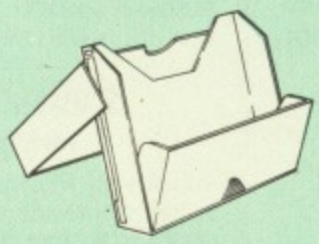




PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE
holds 10 Discs. **£2.00**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

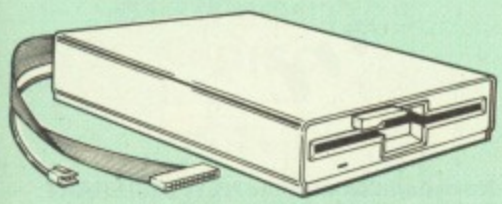
The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). Both are of Japanese manufacture.

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 in 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 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 5¼" Disc Drives are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £99	
400K (720K)	CLS400S £97	CLD400 £165	CS 400S £110	CD400 £189
800K (1.44M)		CLD 800S £183		CD 800S £205

● TWIN Disc Drive Case, complete with Power Supply & Cables **£35**
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).

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£10**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£12**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£17**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£17**
- *Hi-Density 1.6M D/S D/D for IBM* **£32**

- *10 × 3½" S/S D/D 40/80 track Discs* **£20**
- *10 × 3½" D/D D/D 40/80 track Discs* **£27**

TOP QUALITY 5¼" 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 ×* **M4** *S-S D/D 40 Track Discs* **£9**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£11**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£15**

- **3"** *Double Sided Discs* **£4** *each*

Special BULK OFFER on 5¼" DISCS

(Supplied packed in plastic storage Units)
(Lifetime warranty on Discs)

Type	Description	Pack of 20	Pack of 50
M4	Single/Side Double/Density 48TPI	£16	£40
M5	Double/Side Double/Density 48TPI	£20	£52
M7	Double/Side Double/Density 96TPI	£27	£65

BULK PACK DISCS in lots of 100

Type	S/S 80T	D/S 80T
● Without Sleeves	£49	£74
● With Sleeves	£50	£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**

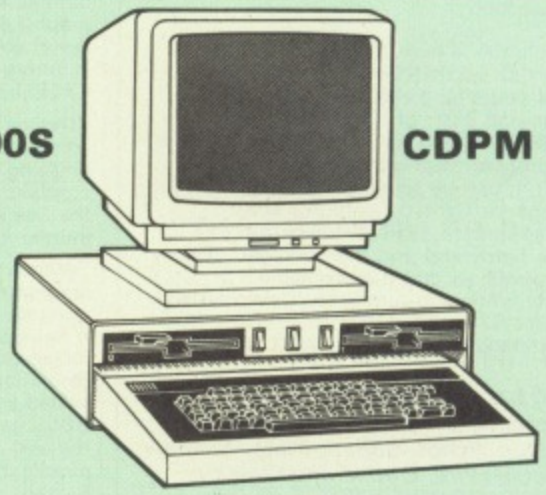
WATFORD's WINCHESTER DRIVES

- 20 Megabytes with ADFS **£635**
- 40 Megabytes with ADFS **£999**

WINCHESTER WORKSTATION

20 Megabyte Winchester, plus a Tape Strimmer 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 £235

CDPM 800S for Master £245
(Securicor Carr. £7)

Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:
- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00
(Hi-View compatible)

THE NLQ DESIGNER

(The First & still the Best)

KAGA KP810/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted. Now BBC Master compatible.

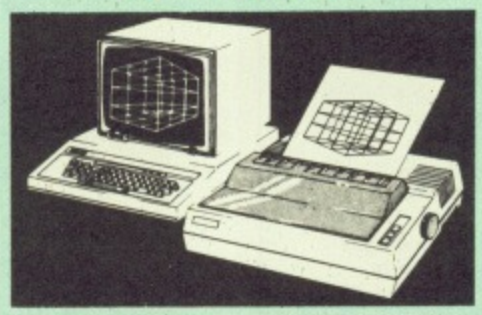
A 40 or 80 track (please specify) FONT Disc containing 9 Fonts, (Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print, Gothic and Greek is now supplied FREE with every package.

(P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write in for further details).

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 all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

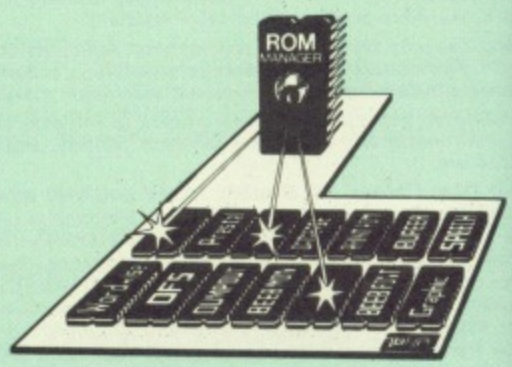
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed 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, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



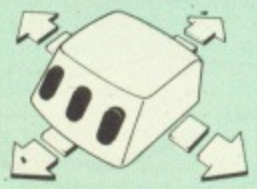
Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

SPECIAL OFFER £18

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £65 (carr £1.50)

We are giving away, absolutely **FREE,** our popular Colour Art software package worth **£15** with every AMX Mouse packaged purchased from us.

AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.00**
AMX SUPERART Package	**£42**
AMX PAGE-MAKER Pack Best desk-top publishing software. Works with keyboard, joystick and AMX Mouse	**£39**
AMX 3D ZICON Disc	**£20**
AMX Database Disc	**£20**
AMX XAM Educational	**£20**
AMX MAX: A gem of desktop (ROM)	**£17**

RB2 MARCONI TRACKER BALL

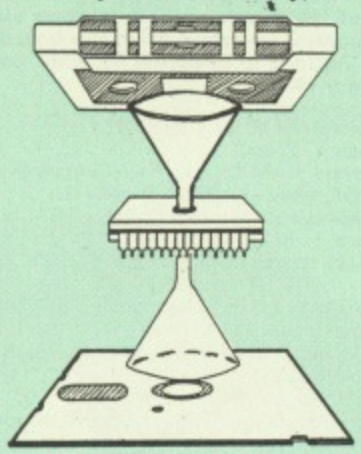
This popular unit is supplied complete with software. Price: **£50**

FLEET STREET EDITOR

Software pack **£35**

TRANSFEROM

(Tape to Disc Utility)



Not compatible with 1770 DFS.

This advanced and sophisticated utility ROM for the BBC Micro has the following features:

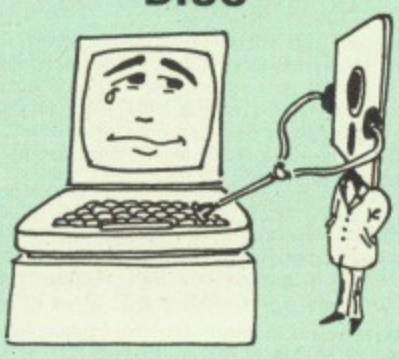
- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

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

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8
P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £35**

Please specify 40 or 80 track disc when ordering.

ROM-SPELL

"way ahead of any competition"

ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

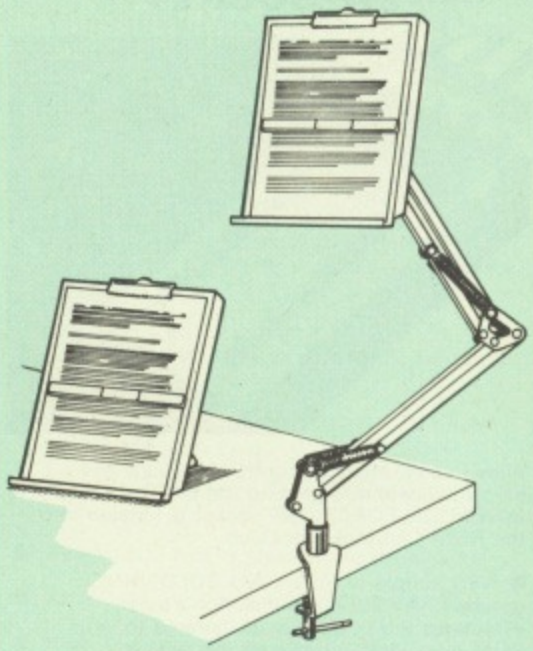
Compatible with: View, Wordwise & Wordwise +.

Don't settle for less, Buy the best.

£25

(Not compatible with 1770 DFS)
(Please state 40 or 80 track disc)

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 desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** *(carr. £3)*

All prices in this advert are exclusive of VAT.

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)

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24.**

DISASSEMBLER ROM

ONLY **£16**

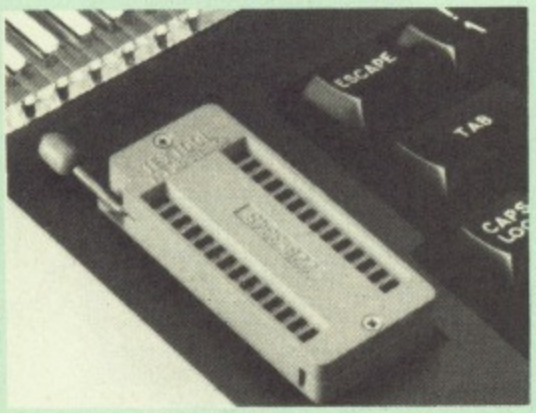
THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

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	**£12**
Spare Cartridges	**£2.50**
Spare Rack	**£1.50**

16K Sideways RAM Modules

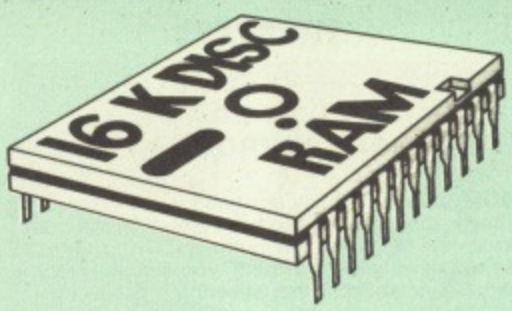
This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range 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**



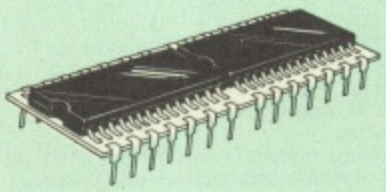
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

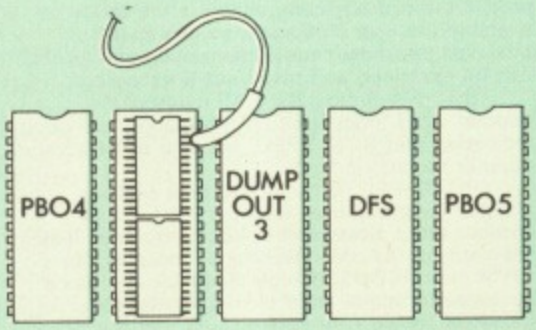
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto 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: £30 (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.

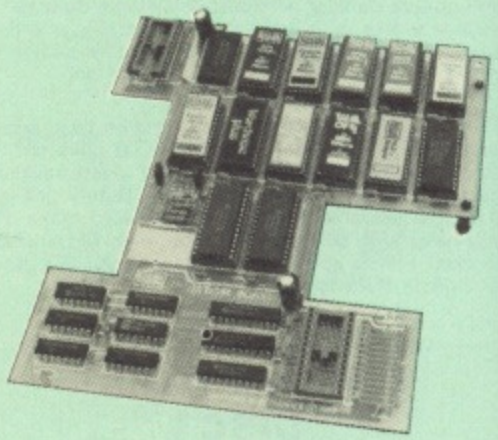
Only **£28** (carr 2)
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

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 a BBC B? Choose 1, 2 or 3.
- 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.
- An easy to use utilities disc? Choose 1, 2 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

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. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

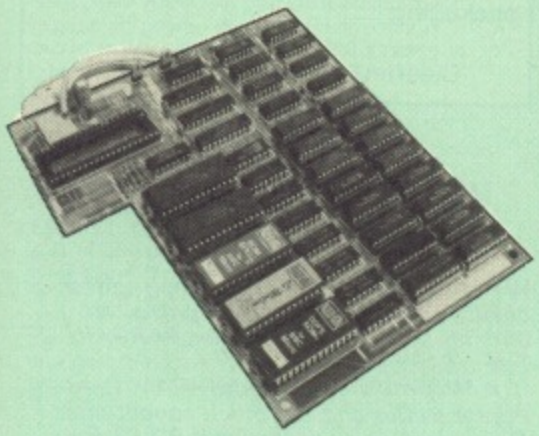
Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- 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 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- 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)

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, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

- *ROM/RAM card with 32k dynamic RAM £43*
- *ROM/RAM card with 64k dynamic RAM £59*
- *ROM/RAM card with a massive 128k dynamic RAM £89*

(carriage on ROM/RAM Card £3)

OPTIONAL EXTRAS:

- *16k plug-in Static RAM kit £6*
- *Battery backup £3*
- *Read and Write protect switches ..... £2 each*

Complete ROM/RAM board (all options installed) £99

- *16k Dynamic RAM for Upgrade £7.50*

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 TELESOFTWARE 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 as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *FREE 3 months subscription to MicroLink.*
- *BT Approval applied for.*

Price: **£89** (carr £3)

PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus.

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£99 (carr £3)

APPROVED

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

Nightingale Modem without software	**Only £87**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board (non BABT)	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

APOLLO

APPROVED

The NEW Modem from Wtford

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.

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!

Special Launch Price: **£75**
(Carr £3)
(Write in for full specification)

BT TELEPHONE CONNECTORS

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	**£27**
Graphics ROM	**£23**
Disc Doctor ROM	**£24**
TERMI	**£27**
COMMUNICATOR	**£49**
SPEECH ROM	**£26**
Printmaster	**£24**

Wordwise **£25**

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

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET £40

INTER-CHART ONLY: £26

Inter-WORD

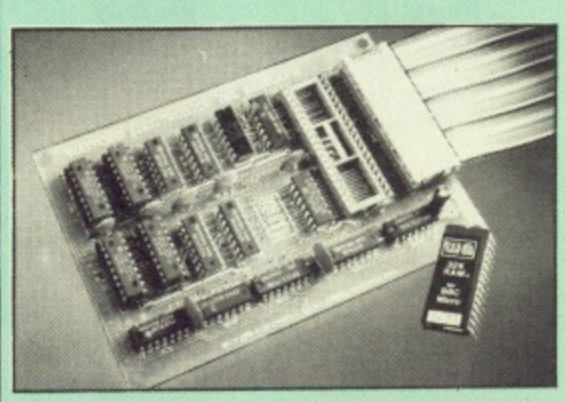
Only: £46

Special Discount price for the existing Wordwise Plus owners. Simply quote your reg. number and pay.

Only: **£39**

All Prices Exclusive of VAT

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+ 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.
- Ensure COMPATIBILITY with a vast range of hardware (including our ROM board, the ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, Music 500's AMPLE). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable and has the power consumption of a couple of ROMs!
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages, and a comprehensive manual is supplied free.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only: £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

SPECIAL OFFER
Acorn's Speech Synthesiser Package

Complete with manual in its original packaging

Clearance price Only: **£19**

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K Shadow RAM Card – Printer Buffer and the much sought after, Computer Concepts' Inter-WORD, (a very powerful package) All this at an astounding price of:

Only £75 (carr £2)

DATAGEM

Gemini's popular Database package

Only: £34

VIEW

VIEW WORDPROCESSOR 2.1 ..... **£37**

VIEW 3.0 ROM

Price: Only **£56**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£36

VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL	**£29**
VIEWPLOT Disc	**£22**
VIEW-INDEX	**£14**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER HR15 PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

ARIES CORNER

Aries Computers was the first company to commercially market what is now known as SHADOW RAM. As part of it's continued expansion policy, Watford Electronics is proud to announce that the Aries range is now available exclusively from Watford Electronics and their dealers.

The Aries range, designed by experts offers you the solution to your upgrade nightmares. All the Aries products are compatible with double density disc controllers, modems, second processors, ECONET, hard discs, EPROM programmers and of course, other members of the Aries family and most of the much wider Watford family (some products advertised here perform identical functions and hence cannot be used together). Several major companies now test all their products to ensure compatibility with the Aries B20 & B32.

In quality of construction, the Aries range sits alongside the Watford range in setting a standard against which others are judged. Custom made connectors eliminate the damage to the BBC machine caused by inferior products.

Aries B-32 Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20; the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

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 and many othr 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 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 B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) socket may be fitted to the board to enhance this mode of operation.

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 an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM are advertised elsewhere in our advert.

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.

Aries B-488 Unit: **£238** (Carr £3)

THE ARIES RANGE HARDWARE REQUIREMENTS

Aries B-32 – BBC B, MOS 1.20, hardware plugs into CPU socket.
Aries B-12 – BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234/33383

النور

ARABIC ROM for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols, Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

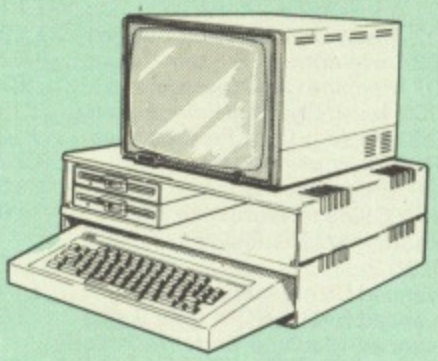
20, 40 and 80 column operation. Compatible with ASMO (449). English/Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

£85

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH ..... **£11** (carr. £1.50)
DOUBLE BBC PLINTH ..... **£20** (carr. £2.00)
PRINTER PLINTH ..... **£10** (carr. £1.50)
SINGLE MASTER PLINTH ..... **£14** (carr £1.50)
DOUBLE MASTER PLINTH ..... **£25** (carr £2.00)

OFFICE MATE

The popular Database, Spreadsheet, Beebplot and Wordprocessor on Disc
£10

OFFICE MASTER

The popular Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements and Stock Control
£21

Money Management

This disc based software allows individual transactions to be stored and retrieved for upto 5 Bank a/c and 5 Loan accounts.

Price: Only **£11**

L.B.O. Rom
Life & Business Organiser

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

Price only: £17

D D D Suite
Integrated Software System

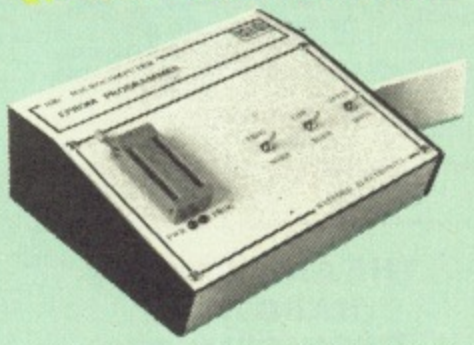
-BASE **£12**
-CALC **£12**
-PLOT **£12**
COMBO PACK All 3 together **£26**

Continued

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro) £7.95
40 Best machine Code Routines £7.95
6502 Assembly Language Program £19.95
6502 Application £11.95
6502 Assembly Lang. Subroutines ... £19.95
6502 Development System £7.50
6502 Machine Code for Humans £7.95
68000 Assembly Lang. Programming .. £19.95
68000 Machine Code Programming £13.00
68000 Programming the £22.95
6809, Programming the £16.95
A User Guide to Wordwise Plus £9.95
A Young persons Guide to BBC Basic £5.95
Advanced Disc User Guide £14.95
Advanced BASIC ROM User Guide £9.95
Advanced Machine Code Technique for BBC £7.95
Advanced Programming for BBC £6.95
Advanced User Guide for BBC £13.50
Advanced Graphics with BBC £9.95
Assembly Language Programming on BBC Micro £11.50
Advanced Programming Techniques for the BBC Micro £8.95
Adventure into BBC BASIC £6.95
Applied Assembly Lang. for BBC £9.95
Assembler Routines for the 6502 ..... £7.95
Assembly Language Programming FOR the BBC Micro £9.95
Assembly Language Programming on the BBC & Electron £8.95
Basic Programming on the BBC Micro £6.95
Basic ROM User Guide £11.95
Basic User Guide for BBC Micro £10.00
BBC B+ User Guide £14.95
BBC BASIC £5.95
BBC Forth £7.50
BBC Hardware Projects £8.95
BBC Machine Code Portfolio £7.95
BBC MAster 128 High Flyer £10.95
BBC Micro Advanced Ref. Guide £10.95
BBC Micro Advanced Programming £10.00
BBC Micro Book BASIC Sound & Graphics £7.95
BBC Micro ROM Book £9.95
BBC Micro Disc Companion £8.95
BBC User Guide £10.00
BCPL User Guide £14
Complete FORTH £6.95
CP/M - 86 User's Guide £19.95
CP/M Bible £16.50
CP/M Handbook with MPM £9.95
CP/M Plus Handbook £13.95
CP/M Soul of £16.50
CP/M The software BUS £8.95
Creative Animation & Graphics £7.95
Creative graphics on BBC Micro £7.50
Disc Drive Projects for Micros £5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC £6.95
Disc Programming Techniques £9.95
Discovering BBC Micro Machine Code £6.95
Disc System for the BBC Micro £6.95
Exploring FORTH £6.95
FORTH on the BBC Micro £7.50
Functional Forth for the BBC Micro £5.95
Games BBC Micro Play £6.95
Graphs & Charts on BBC Micro £7.50
Hackers Handbook £4.95
Hackers Handbook - New £6.95
Handbook of Procedure & Functions for the BBC Micro £6.95
Interfacing & Robotics on BBC £15.95
Interfacing Your BBC Micro £8.95
Into View £4.50
Introduction to COMAL £9.50
Introduction to LOGO £6.95
Introducing 'C' £9.95
Introducing CP/M on the BBC Micro Z80 2nd Processor £9.95
Introducing LOGO £5.95
Introduction to FORTH £8.95
Introduction to PASCAL £17.95
ISO -PASCAL Reference Manual £9.95
Let your BBC teach u to program £5.45
LISP 2nd Edition £14.95
LISP, A Beginners Guide to £10.95
LISP the Language of Artificial Intelligence £9.95
Logo Programming £9.95
Mysteries of DISC DRIVES and DFS REVEALED **£5.95**
Mastering CP/M £17.95
Mastering the Disc Drive £7.95
Master Advance Reference Manual .. £19.95
Master Reference Manual Part 1 ..... £14.95
Master Reference Manual Part 2 ..... £14.95
Micronet Handbook £6.95
Programming the 6502 ..... £16.95
Programming the Z80 ..... £19.95
Sensing & Control Projects for BBC £5.95
S-PASCAL on BBC Micro £7.50
Structured Basic £7.95
Structured Prog. with BBC BASIC £6.50
Termulator Manual £4.95
The Complete FORTH £6.95
The Complete Programmer £5.95
The Epson FX/KAGA PRINTER Commands REVEALED **£5.95**
Turtle Graphics on BBC Micro £7.50
Using Floppy Discs with BBC Micro £5.95
View 3.0 User Guide £10
View Guide £4.50
Viewsheet User Guide £10
Viewstore User Guide £10
Using BBC Basic £4.95
Wordprocessing BBC Beginners Guide ... £7.95
Wordstar & CP/M made easy £7.45
Wordwise Plus Guide £9.95
Z80 Applications £15.95
Z80 Assembly Language Programming £19.95
Z80 Reference Guide £9.95

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

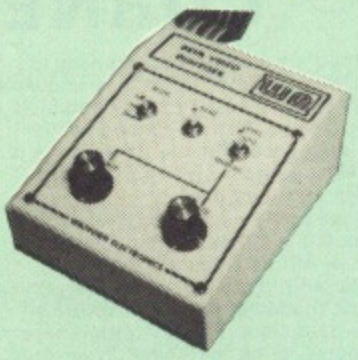
SPECIAL OFFER £69 (£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

BEEB VIDEO DIGITISER



Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£110 (Carr. £3)

(Price includes: Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)
A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£129.00** (carr. £3)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£16
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc/Tape	£7

ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

Price: **£2**

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources which put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£6.99**

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front.

Locks supplied with two keys. Price **£13** (£2 carr.)

28 pin ZIF SOCKET (Textool) **£6.95**

28pin DIL HEADER PLUG

SOLDER type	£1.50
IDC CRIMP type	£1.95

SPARES for BBC Micro

Keyboard	£46	Keystrip	£2
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Power Supply	£59	Keyswitch	£1.50

Replacement FLEXIBLE KEYBOARD CONNECTOR

£3

8way DIP SWITCH **£0.85**

CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug to 5 pin DIN Plug + 1 Jack Plug	£2.00
to 3 pin DIN Plug + 1 Jack Plug	£2.00
to 7 pin DIN Plug	£2.50
to 3 Jack Plugs	£2.00
6 pin DIN to 6 pin DIN Plug (RGB)	£2.50

DISC DRIVE POWER LEADS
Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

DISC DRIVE INTERFACE LEADS
BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
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Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	80p	200p
BBC Power Plug 6 way	80p	–
Disc Drive Plug 4 way	75p	–
6 way Power Connector	80p	95p

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Akhter House, Perry Road, HARLOW, Essex

Beebug Retail, Dolphin Place, Holywell Hill, St. Albans.

Cirkit Distribution Ltd,
Park Lane, Broxbourne, Herts.

C.J.E. Micros, 78 Brighton Road, Worthing, West Sussex. Tel: 0903 213361.

Gemini Marketing Ltd,
Exmouth, Devon

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

Peartree Computers Ltd, St. Georges Street, Huntingdon Cambs.

Verospeed Ltd, Boyatt Wood, Eastleigh, Hants.

OVERSEAS DEALERS

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.

Lendac Data Systems, Unit 31, IDA Enterprise Centre, Pearce Street, Dublin 12. Tel: 710796.

Scientex P.V.B.S., Zilversmidstraat 2, B-2000 Antwerpen, Belgium, Tel: 03 233 59 06

Techno-matic Data, Holbergsgade 19, 1057 Kobenhavn K, Denmark

Velobyte, Scheaedyksadyk 5a-6a, 3011 EB Rotterdam, Holland, Tel: (010) 413 8197/414 5171.

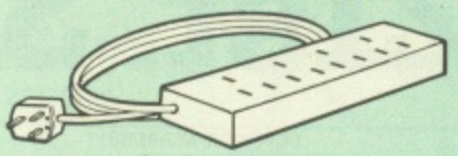
Viking Tecno, Vestergade 12.1, 9620 Aalestrup, Denmark, Tel: 08 642522

Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

£42 (carr. £4)

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets.
Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug. **£9.50** (carr £1.50)

ACORN MUSIC 500

BBC B, B+ & Master Compatible.

(We have inspected a Music 5000 unit and to our surprise we found it to be the same as Music 500 unit. Only the front panel and the software are different. Can anyone help us to solve the mystery?)

£72 *(carr £4)*

Software Disc 'Mu-500' has 13 tunes **Only: £6**

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BUSINESS MICRO USER

Have micro, will travel!

By FRANCES ROCHE

MY computer's down! That all too familiar cry from some desperate travel agent trying to book five flights at once could have been ours – but thankfully the BBC Micro came into our lives first.

Ski Les Alpes is a small company operating from an office in London's West End and specialising in luxury winter holidays.

Imagine if you can hundreds of pieces of paper piled high, all the phones ringing and people demanding brochures and booking holidays, the piles of paper to be deciphered at the end of the day ever increasing. This was life before the BBC Micro.

Whole days were taken up typing all but identical travel details where perhaps only the names and departure dates differed, so you can begin to appreciate how much we needed a computer/word processor.

Being small makes us extremely versatile and unlike some of the larger companies we can afford to bend over backwards to ensure that everyone has what they want, when they want it.

Before leaving, each client receives his travel plans, resort details and directions on how to find the resort should he be driving. These are all personalised as in the weeks prior to a client's departure we ensure that we become familiar with his likes and dislikes.

Last year every client had a file which, depending who filed it, was put in alphabetical, resort or some other order. There were times when a file was not seen for days because it had been placed inside another.

The obvious answer was to invest in a computer – but less obvious was which one. We all had limited knowledge of word processors but no computer background, so we were looking for the simplest machine as a matter of necessity.

Inquiries were sent flying around friends and colleagues and everyone urged us to get a BBC Micro. They reasoned that with no experience and no thoughts of going on a course we needed a machine we could master in the shortest possible time. Other points in its favour were proven reliability and price.

When the BBC Micro arrived – with Wordwise – it appeared to be a very workable machine, and it didn't take us too long to understand the word processing side of it.

The difference it made was immense. We were now able to put travel details on to a disc and just change names, departure times and so on, saving several hours a day.

The next step was to computerise the mailing list. Having only Wordwise meant that we had to put it in alphabetical order ourselves, but at least it was a step in the right direction.

It was very satisfying to be able to send off our brochures at the push of a PRINT button, but there was still the chore of double checking every name as there was no order to the list.

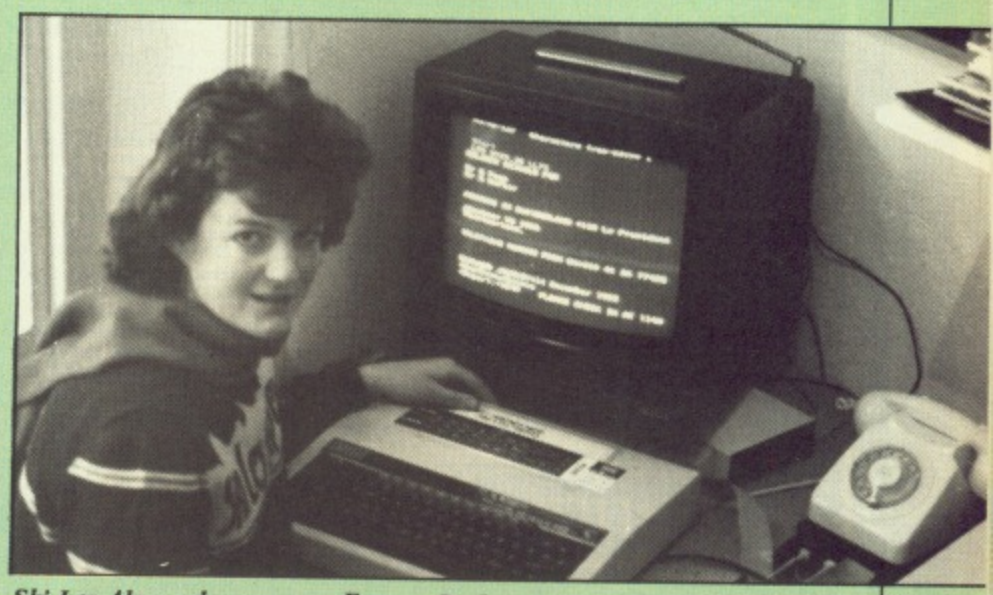
But miraculous things have happened this year. We decided to expand by 150 per cent, a leap which would have remained a dream but for the BBC. We felt that with the back-up from the computer and with more sophisticated software we could handle the expansion smoothly.

We bought the Datagem package which included Wordwise Plus, Datagem and Mailmerge. And by following the instructions carefully we inserted all the relevant parts into their allotted spaces inside the computer.

That seemed easy. However, the next step – designing and setting up a file – wasn't quite as simple. We took turns in digesting the information in the manual, which seemed aimed at the expert rather than the beginner. Eventually we decided to just set up a template and see how it went.

All the relevant questions appeared on the screen and we dutifully fed in the required information until we came to File length. There was a slight pause while we

→



Ski Les Alpes sales manager Frances Roche

From Page 83

scrambled through both books to find out what bytes were!

After an unsuccessful search we entered 100,000, which the computer did not dispute and we were permitted to continue. Ecstatically we closed the file and congratulated ourselves on a great achievement.

Feeding several hundred names into a computer is not one of the most amusing ways to spend your time, but this was diligently performed. There were great sighs of relief as the first disc was filled and it was time to test the Sort capability.

After eliminating all the extra fields we wanted to sort our entries alphabetically. Pressing "*, sort, Return" produced an outcry from the computer – horrendous noise accompanied by a most definite statement: DISC FULL. No one had informed us that if you do not leave enough space on the disc it is impossible to sort!

Nearing a nervous breakdown we telephoned the Help line. A voice which sounded as concerned as any Alcoholics Anonymous adviser's answered and immediately calmed us down, assuring us that the BBC Micro was our friend.

Eventually, feeling restored to our former confidence, we continued with the programming. The advice worked instantly and we soon had an up-to-date, computerised mailing list.

This season in our office there is relief instead of horror at the thought of sending out the brochure. Instead of everyone stalking around in sour mood, incensed at the prospect of typing out hundreds of different names yet again, there is an air of calm.

We even had time to spoil ourselves by buying a Winter Sports program. It has provided hours of challenging amusement for everyone and helped us get into a skiing frame of mind – something that would have been impossible before as there was never a spare moment for frivolities.

In conclusion I must say the BBC Micro is extremely user-friendly, though as amateurs we felt the manuals were written by professionals for professionals. But we are thrilled with our computer and have just added Le Modem and a Brother printer to our growing list of equipment.

We are thoroughly looking forward to the coming season, and with the support of the BBC Micro we know that we shall be able to manage our expansion without cutting out the all-important personal touch.

Above all it is a joy to know that we shall never have to say to a client "Sorry, we can't book that holiday – our computer's down".

Frances Roche is sales manager for Ski Les Alpes.

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CJE micro's

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For Canon & Taxan Kaga users we recommend FONTAID in preference to Multi-Font NLQ.

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EXAMPLE OF MFNLQ FONTS

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Additional disc 'A' gives an extra 11 fonts including:-
Greek/Maths, Plain, Hand & (Elite, Condensed, & Super Condensed).

Now included is a facility to issue '*' commands within a VIEW document.
To download new fonts within VIEW documents, the FONTAID ROM needs to be fitted in the BBC. (All other FONTAID facilities are available on both the FONTAID ROM & DISC). Fonts are always downloaded from Disc.

Fontaid is recommended to Canon & Taxan Kaga owners in preference to Multi-Font NLQ. As downloadable NLQ is a built-in facility of the Printer, full access to all the printers control codes is still allowed. The resolution of the FONTAID NLQ is also slightly higher than that of Multi-Font NLQ.

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CJE micro's

Functions, figures and formulae

In Part 7 of his series on spreadsheets, NIGEL PETERS takes a first look at creating templates

LAST month we looked at the New Spreadsheet and Alter Screen Display options of Mini Office II. Using them we found we could start a spreadsheet from scratch and even alter the appearance of one that was already in memory. We did this by selecting various items from the menus of choices that Mini Office II so obligingly gives us. This month we'll be investigating other ways of manipulating our spreadsheets, this time using the red function keys that you'll find at the top of the keyboard.

Before I start, however, I must point out yet again that although I'm talking about the Mini Office II spreadsheet, most of what I say will apply to other spreadsheet programs. The keystrokes may be different and some things may be menu choices rather than function key options but the actual operations are much of a muchness. In fact, Mini Office II contains all the most basic and fundamental spreadsheet functions. And now to the function keys and what we can do with them.

We've come across two of them already. The first was key *f0*. If you can remember right back to the beginning of the series you'll recall I made great play of the different types of data we could have in a spreadsheet. In all there are three – figures, text and formulae.

The figures provide the raw material of the spreadsheet while the text is used to label it so we mere humans can follow what's happening. We can enter both at the keyboard and the program will take the data and place it into the active cell. It automatically tells the difference between numbers and labels and deals with them accordingly. If you don't believe me, try using the spreadsheet to multiply a label by 2! See what happens.

When we get to formulae, however, the program has to be told that there's a formula coming. After all, A2+B3 could just be text, couldn't it? The spreadsheet would be perfectly justified in "thinking" that, as the formula starts with a letter, A. To tell the program that it is a formula, that the contents of cell A2 are to be added to B3, we have to press *f0* and then type away. When we press Return, the formula is tucked away in the active cell. Things now go back to normal with the program expecting text or numbers to follow unless an *f0* tells it something different.

While this is the case with Mini Office II, it isn't always the case with other spreadsheets. Some are clever enough to differentiate between figures, formulae and labels by themselves. Others have to be told what everything is as it's entered. As you can see, Mini Office II is a compromise. It's your choice, but I feel that a spreadsheet that can't distinguish between letters and numbers can't be all that clever and I'd avoid it.

We've also come across another function key before, *f5*. This allowed text and numbers to be copied from one cell to another. It's done by making the cell to be copied the active cell, pressing *f5* to inform the micro that you want a copy, making the receiving cell the active cell and pressing Copy. It's far simpler to do than to read or write about.

However, *f5* isn't just concerned with figures and labels, it's also used to copy a formula (or parts of it) from one cell to another. This time there are three ways that it can be copied.

The first is *absolutely* – in which case the formula is copied unchanged from one cell to the other. *Relative* copying is the second method. Here the action of the formula is copied into the receiving cell. So if the formula in cell C1 was A1+B1, copying this relatively into cell C2 would result in the formula A2+B2 in C2. In both cases the formula takes the sum of the two cells on the left. The third method combines absolute and relative methods, enabling you to produce "hybrid" formulae at will and so save a lot of typing.

If you want to know more about relative and absolute copying, take a look my article in the August 1986 issue of *Business Micro User* where it was covered in depth. You'll find that other spreadsheets have other ways of copying, some much more sophisticated and powerful than Mini Office II.

And that leaves us with eight more function keys to explore. Happily they're all fairly straightforward and easy to use. Take key *f3* for instance. By now you'll probably be used to roaming over the spreadsheet using the cursor keys to make one cell after another active. It can be a bit slow, though. It takes a fair amount of time to plough all the way from cell A1 to, say, F19. Things are made easier by pressing *f3* when the program responds with:

```
Goto Cell?
```

allowing you to enter the cell name of your choice. So, if you enter G4 and press Return, G4 becomes the active cell. Don't worry if the screen clears while this is done. It may be disconcerting but no information is lost!

Now that we're at cell G4 we may want to put some information into it, say the total number of hours overtime we've worked. If you're like me you'll

→

From Page 87

probably have it scribbled down on a piece of paper somewhere, in a list like:

```
Monday   3
Tuesday  2
Saturday 4
```

Since G4 is to hold the total hours worked, this means I've got to add up the figures and enter the result into the spreadsheet. And if you're as good at mental arithmetic as I am, you'll use paper, not your head.

Surely, though, this is a bit daft. After all, we've got a spreadsheet in front of us, a program that's designed to handle figures. And here we are using paper or adding numbers in our heads. It seems silly. And it is.

To remedy this, most spreadsheets have a calculator function which does the maths for you. With Mini Office II you just press *f2* and type in the sum. In this case the status window shows:

```
Calculator:
G4=3+2+4
```

and pressing Return transfers the result – 9 – to the active cell.

Being fickle creatures we don't always want to put things into cells, we want to empty them as well, so spreadsheets have an "erase" option. In Mini Office II we do this by moving the cursor to the cell whose contents we want to destroy and pressing *f1*. We are now prompted:

```
Empty cell (Y/N):
```

and answering Y clears the cell with the status area message:

```
contents=*EMPTY*
```

confirming the destruction.

So now using *f3*, *f2*, and *f1* we can go to the cell of our choice, work out what we want to put in it and then

```
.......A.......B.......C.......D.......E.......F
1        Expenses claim             Amounts
2
3        Miles at 2p        200.00  400.00
4
5        Miles at 3p        100.00  300.00
6                                   ******
7                                   700.00
8
9        Refreshments       400.00  400.00
10                                  ******
11                           Total   1.1E3
12
13
14       Amount claimed      11.00  pounds
15
16
17       Nigel Peters         Date
18
```

Figure I: How spreadsheets save time with expenses

get rid of it if we change our minds. All useful stuff which you can bear in mind as you contemplate the intricacies of the spreadsheet shown in Figure I.

This purports to be one of my expenses claims, figuring out mileage at two rates and adding on the refreshment figures. I leave it to you to find the incredibly complicated formulae involved in the calculations! While that shouldn't strain your brain too much, the spreadsheet does illustrate a few points. If you doubt that, have a look at cell E11.

By my calculations – on paper, not in my head – 400 and 700 make 1100. So what's the 1.1E3 that appears? The answer is that it's 1100, only in exponential notation which multiplies a decimal by a power of ten. Put briefly the E shows that exponential notation is being used and the figure after it shows which power of ten to multiply the decimal by. As it's 3 the first number, 1.1, is multiplied by 10 to the power 3 or 10*10*10 or 1000 – they're all the same thing. And 1.1 by 1000 is our old friend 1100. If you have doubts try typing:

```
PRINT 1.1E3
```

into your micro in immediate mode for confirmation. And if you want to know more about exponential forms of numbers, take a look at Chris Barton's Maths Workout in the March 1984 issue of our sister magazine *Electron User*.

Going back to the spreadsheet, have a look at the labels used. Can you see anything strange about them? They're not just confined to one column, they spread over into two or more. Now if you've tried this, you'll probably have come across an annoying beep as the maximum column width was reached. The spreadsheet won't accept any more letters. So how have I done it in Figure I?

The answer is that I've used another of the function keys. This time it's *f8*. Once you've pressed it you can enter as much text as you like and the spreadsheet will accept it. Once Return is pressed, the text is entered at the active cell, spilling over into as many cells as necessary. Be wary though, any data in these other cells is overwritten. It's an operation that's best carried out at the beginning of a spreadsheet. It does make the spreadsheet easier to read but that won't make up for inadvertantly destroying part of it!

When you've been entering data into a spreadsheet, have you noticed that when you press Return the cursor stays at the same cell? Sometimes it can be useful to alter this. Suppose, as is common, we're typing in long rows or columns of numbers. It can be quite frustrating to enter a number, move the cursor to the next cell, enter another number, move the cursor in the same direction and so on. It makes life a lot easier if the cursor automatically moves to the next cell. And this can be arranged.

What we do is press *f9*. As we keep pressing it, the options Right, Down, Left, Up and a blank space (meaning *off* – the default condition) appear in the status area. Whichever word appears determines the direction that the cursor moves after Return is pressed. Selecting Down means that after an entry is made into one cell, the cursor automatically travels to the one

below. This is a blessing when entering long columns of numbers.

Not that you have to do that with our example spreadsheet. It's very simple but you can see that if I had to claim a lot of expenses, it might be useful to save the spreadsheet and use the same layout everytime. All that would be needed would be the fresh figures in column D. And this brings us to the last of the function keys we'll deal with, *f6*. Pressing this has the prompt:

```
Zero boxes (Y/N):
```

appearing. Pressing Y results in the spreadsheet shown in Figure II

What's happened is that all the cells containing figures have been emptied. However the labels and the formulae remain intact, the cells containing formulae showing 0.00. What we've done is wiped the spreadsheet clean of its raw data but left its structure intact for new figures. And by keeping a copy of the empty spreadsheet skeleton on tape or disc we can do this over and over again saving a lot of time and trouble.

In effect we've created a template that we can fill with our own data. And while this template is almost ludicrously simple, it's not hard to imagine templates for things such as profit and loss accounts or complicated cost calculations and how much time they'll save.

● *And that's where we end this time. More on function keys next month.*

```
.......A.......B.......C.......D.......E.......F
1        Expenses claim            Amounts
2
3        Miles at 2p                  0.00
4
5        Miles at 3p                  0.00
6                                   ******
7                                    0.00
8
9        Refreshments                 0.00
10                                  ******
11                          Total    0.00
12
13
14       Amount claimed      0.00  pounds
15
16
17       Nigel Peters        Date
18
```

Figure II: The spreadsheet template

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The computer and modem in the administrative trailer ensure that even when the show goes on the road there is constant communication with headquarters and with booking agencies in the town ahead.

"Using the Racal Vodata system and MicroLink we can do business just as efficiently as any permanently-based entertainment, like theatres for instance", says Ian Butson, administrative director of the circus.

"With 12 shows a week and up to 3,500 people at each under our Big Top, you can imagine what a difference PSS, telex and E-mail have made to running our operations.

"We are on the road from March to November and again over the Christmas/New Year season so you can see why I believe very strongly in the value of computer communications as a business resource".

Technology aids race relations

AS community relations officer for Hillingdon, the third largest London borough, Charan Rai has a big job on his hands.

His main function is to see that, in accordance with the Race Relations Act of 1976, there is no race or colour discrimination by employers in his area.

The size of his task can be seen from Hillingdon's 230,000 population and its concentration of large-scale employers such as Heathrow Airport – 50,000 work there – British Airways, Rank Xerox, EMI, Heinz and Express Dairies.

Fortunately, Indian-born Mr Rai has MicroLink's electronic mail and telex facilities to help keep him in touch with the many firms, union branches, central and local government departments he has to deal with.

Large numbers of the general public also come to him with questions.

Says Mr Rai: "Hillingdon has a large, racially diverse population living in an area that encompasses the extremes of run-down tower blocks and the stockbroker belt.

"But we have excellent community relations here, and we intend to keep things that way.

"We are greatly helped in this respect by our computerised case record system and by other new technology advances such as MicroLink".

Transatlantic link

MICROLINK has made history with the first ever interactive transatlantic computer hook-up.

With the aid of a communications satellite, MicroLink and giant American database Mnematics have set up a complex electronic gateway enabling the exchange of messages between micros in all parts of the US and UK.

It allows MicroLink subscribers not only to send messages to America, but also to take advantage of a vast array of services offered.

Stock market watchers can access instant information on share movements from Dow Jones, and there are over 40 sections for doctors, dentists, lawyers, writers and other special interest groups.

Leading news agency Associated Press supplies a 24-hour-a-day global information service.

Wildlife lifeline

THANKS to MicroLink, UK birdwatchers were able to follow the progress of a unique Japanese wildlife fund-raising event.

The 24-hour Birdathon was held to raise money to buy land for a breeding preserve for Japanese cranes.

Organisers hoped for five million yen through sponsorship of 16 teams who spent a full day and night scouring the Japanese countryside for different species of birds.

Taking part was MicroLink subscriber Yuichi Ishikawa. Armed with a mobile phone, acoustic coupler and portable micro, he was able to send regular reports to the MicroLink computer.

Phones' wasted weeks

A NEW survey by Britis Telecom has revealed tha the average businessma wastes the equivalent of on week a year failing t communicate by telephone

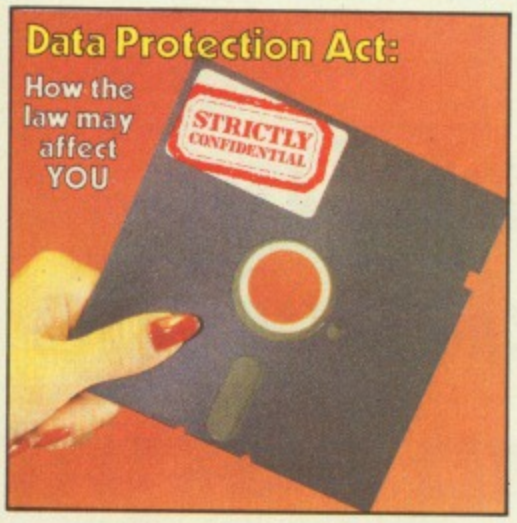
Statistics show that one i five messages left is eithe misinterpreted or lost, an four out of five calls find the number engaged or the othe person unavailable.

As a result more and more business people are turning to electronic mail as a means of ensuring their messages reach their destinations – and the fastest growing of these systems in the UK is MicroLink.

According to the BT survey the average business person makes 2,500 calls a year, two-thirds of them to individuals who, for some reason, are unavailable at the time.

YOUR chance to join MicroLink – turn to Page 105

ADVANCED TECHNOLOGICAL RESEARCH



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Working backwards from output

JO STORK argues the case for custom-built systems

A FEW months ago I wrote of my belief that the database is the most versatile, and hence the most useful, single product a commercial micro user can purchase. That article also mentioned a client we had gained, Startup Ltd.

Unfortunately the company's first computer installation was an unmitigated disaster from the moment of signing the order for it.

Being inexperienced in matters data processing, the proprietor of this organisation had been supplied with overpriced kit which was running inefficient programs riddled with more bugs than a tramp's vest and unnecessary operating complexities.

Adding to his woes was the fact that the training had been almost non-existent and the business had grown to the point where even if everything had gone right from the start, the system would still have been grossly under-configured.

Startup Ltd. is an example of where using the database module of an all-in-one system could save a huge amount of systems development time, particularly in those situations where an off-the-shelf package is unsuitable. This month we'll see how this can be achieved and the benefits it provides.

Reading most advertisements for software, in this or any other computer journal, you could be forgiven for thinking that the aim of business systems is to save time, do complicated sums, sort data or perform a wide variety of clever routines. This is most misleading since these are merely the means to an end. This end should be to give the organisation more information with less effort, for more efficient management.

The user really needs to ask: "What information do I need?" This approach is known as output or report driven. You work the analysis, design and programming backwards from the final list of required reports.

Consequently most of my time with a client is spent in precisely determining the information that he requires to run his organisation efficiently and then discussing in equal detail the form in which it must be presented. Not until this is complete do I begin to consider the software that will be employed and the hardware on which it will run.

It therefore took several meetings with Startup Ltd.'s bosses before I understood what the system we were to provide had to achieve. The list consisted of nine major and three minor reports, all of which needed to be available on both screen and printer. Furthermore there were two other reports which were to be available on-screen only to the proprietor and/or his financial director.

Since I have an aversion to writing over two dozen basically identical programs, a reluctance to risk losing my staff by asking them to do likewise and a need to keep charges down if we wish to gain orders, the obvious solution was to use a report writer of some sort.

The benefit of a report writer is that once you are familiar with the syntax it takes no more than 15 minutes to produce each report, no matter how complex, since all that is required is to:

- Pick the fields that are to be listed
- Arrange them into order
- Insert spaces as needed to improve clarity
- Insert a few printer control codes to arrange the pitch, character style and so on.

You can even get it to fit pre-printed stationery, such as invoices, if necessary. Sending the report to the screen is even easier, since it does not require the printer control code phase. If the report writer is capable of simple arithmetic such as producing totals then so much the better, since as we shall see this further reduces the number of programs we need to write, or the number of files that must be held on what might be a limited capacity disc system.

The example below is in date order, but it would have only required a one line change in the reporting program to present it in source/creditor or analysis order. If report writer commands are sufficiently simple the sort is left out of the program and you can choose the sequence in which the output will be presented. There is a considerable advantage in adopting this report driven approach, since it provides an immediate definition of the fields that you are going to need.

Assume you require the report shown in Figure I.

Even from this simple layout we can see how, ignoring the fact that the computer's internal data representation may differ somewhat, the fields have the following characteristics:

File	Type	Length
Source/creditor	Text	20 Characters
Date	Date	8 Characters
Revenue	Real	9 Characters
Expenditure	Real	9 Characters
Vat	Real	8 Characters
Margin	Real	5 Characters
Analysis code	Text	3 Characters

Some 26 reports later, the list we produced for Startup Ltd. had grown to 82 different output fields,

Source creditor	Date	Revenue	Expend	VAT	Margin	Analysis
D.Lillee	14/10/86	£127.50		£19.12	8.6	TRV
D.Amiss	15/10/86		£29.95	−£4.49		CMP
G.Chappell	15/10/86	£64.00		£9.60	11.3	SAL
G.Boycott	16/10/86	£82.99		−£12.45	−2.7	RAW
P.Allott	18/10/86	£40.00		£6.00	9.3	TRV
D.Underwood	19/10/86		£49.99	£7.49		RAW
Totals		£314.49	£69.94	£25.27		

Figure I: Sample report

and we were ready for the next phase – the source of the data in the reports.

In the main, information on a report can come from only one of three locations by the time it is printed or displayed – the keyboard, a file or the product of some computation.

The only exceptions to these are special cases such as a date which can come from the system date entered when booting the system. Obviously in the case of data coming from a file, it must have been stored there earlier as the result of one of the other processes.

This phase is therefore nothing more than working through the list of report fields and identifying their source. Using the example above this produces the following report field list:

Field Name	Source
Source/creditor	File
Date	System
Revenue	File
Expenditure	File
Vat	File
Margin	Computed
Analysis code	File

Since this method of approaching system design can be regarded as working backwards from the output, the next phase is obviously concerned with how the 111 items we now had listed as coming from the Startup Ltd.'s filing system reach the disc.

Unless the computer is completely unsuitable for business, there is no reason why the same piece of data should be held on two separate files. It is much more sensible to hold it once only and to open the file containing it whenever this information is needed.

Consequently, as far as the disc is concerned there are now only two possible sources – the keyboard or the product of some computation.

This therefore results in our producing a second list, containing just the fields in the report field list identified as having come from the file. Using our limited example, this new list now looks as follows:-

Field Name	Source
Source/creditor	Keyboard
Revenue	Computed
Expenditure	Computed
Vat	Computed
Analysis code	Keyboard

With the source of data identified, the Startup Ltd. list showed 42 items as coming from the keyboard and 69 were computed, but we could not assume however that this was all the data entry that would be required. Obviously some of the computed fields require at least one keyboard field as part of their primary data.

Consequently this phase is in two parts, of which only the first is complete. We therefore went back through all the computed fields to identify what further data entry is necessary. In the case of our example this produces the additional list of fields shown below.

Field Name	Computed from
Revenue	Quantity * Price
Expenditure	Quantity * Cost
Vat	either Revenue * 0.15 or Expenditure * 0.15
Ratio	Revenue÷Production Cost

This produces a complete data entry list for this report as follows:

Field Name	Source
Source/creditor	Keyboard
Analysis code	Keyboard
Quantity	Keyboard
Price	Keyboard
Cost	Keyboard
Production cost	Keyboard

As a result of a process such as this the number of data entry fields that Startup Ltd. needed grew from 42 to 58.

With this work done, we now had four main Startup Ltd. lists available to us consisting of the 26 reports, the 82 fields to be output, the 111 fields to be held on file and the 58 fields to be entered from the keyboard.

The next task was therefore to group these fields, which obviously overlapped considerably since many were to be entered straight off the keyboard, into either records on a file or into a helpful form/template on the screen.

Provided the principle of like with like is adopted, this usually is no great intellectual strain. As far as files are concerned, this means store everything to do with sales in one record, everything to with purchases on

→

From Page 95

another, everything to do with profits on a third and so on.

It has been shown repeatedly that the clearer and more logical you can make the input screens, the less likely the operator is to make errors which later could prove troublesome to identify and correct. This is irrespective of any editing and data checking which you may provide by way of range limitation, valid character provision and the like.

Therefore in the case of the data entry, I keep to the same approach of clustering associated fields but this time try to make the screen look as much like the source document as possible.

This means that if data from an invoice which has been received needs entry then the screen presented to the operator looks like an invoice; if data to produce the journal or daybook needs entry then the screen looks like the journal and so on.

Once again, the objection to writing bespoke programs arises and so rather than producing eight data entry programs for Startup Ltd. we used a template creator to handle the screen input. The time taken to produce a mask is about the same as for a report.

It should have become obvious by now that provided the arithmetic required is not too complex, the techniques and requirements that have been outlined are well within the capabilities of the better databases.

They all contain the following functions:

- A layout generator for creating the input mask
- A file creator
- File sorting facilities
- Data entry/deletion/modification routines
- File selecting facilities
- File merging facilities
- A layout generator for creating the screen reports
- A layout generator for creating the printed reports

This is all you need for the majority of commercial programs, with the probable exception of some arithmetic facility. Consequently you can see why a very significant amount of development time can be saved using databases.

When you consider that it costs a couple of hundred pounds per day for a consultant's services, any time that can be saved is well worth having, even if the database itself may cost as much as three days work.

Where a database may impose limitations on the systems designer is not just in the arithmetic it can handle, but also its ability to access more than a single file simultaneously. Consequently, having used this standard software for everything possible and practical, in the heart of most systems we produce are usually a couple of programs to provide the specific tailoring requirements our client's request.

An example of this was the calculation of the standard cost which in the case of Startup Ltd. was a complex combination of factors based on discounts available from suppliers, production batch sizes, wage costs, overheads and costs of sales. Apart from the calculations themselves, this part of the application also needed five files to be accessed simultaneously. Much the same situation occurred in those situations where the analysis code was used.

Consequently, a further essential of any database we use is a standard Ascii file input/output facility to allow creation of files which a program written in Basic or some other high level language can handle.

Many databases will output Ascii, but not all permit the database to read into it a file which was produced by anything other than its own software. Such input is vital if the report writing facilities of the database are to output files which one of our programs created.

You cannot have failed to notice how late in the system production process the actual programming takes place. The main systems production sequence is:

- Output design
- Input design
- Program design

whereas the operator uses the sequence:

- Input – employing only database software
- Programs – employing some bespoke software
- Programs – employing mainly database software
- Output – employing only database software

During the design/programming process the operations handbook was written and modified as needed. Regular progress meetings were arranged with the Startup Ltd. management in order get supplementary questions answered and to keep them appraised of progress.

The latter is important, since when you have allocated four months to complete a system and over half the time passes before anything of their special requirements can be shown, the more naive users frequently begin to wonder whether the completion date is a joke or a reality.

Whenever possible I commence user training by making the senior management thoroughly familiar with the system's operation.

This has two benefits. Firstly they become directly involved with the system creation process and therefore understand far better the operations the more junior staff are going to carry out on their behalf. Secondly, using the experience gained in actually driving what by then should be a 97.5 per cent finished package they can request any changes shown to be needed in the system before it is too late.

Startup Ltd. was a considerably larger organisation than most that use a micro, so the cost of the system solution we put forward is much higher than most readers of *The Micro User* will ever contemplate. Nevertheless the savings of approximately 50 per cent in software development costs, using this approach of designing it round a database, is achievable on most systems where an off-the-shelf package is unsuitable.

Creating the system using our own programs throughout, even when modifying earlier programs,

→

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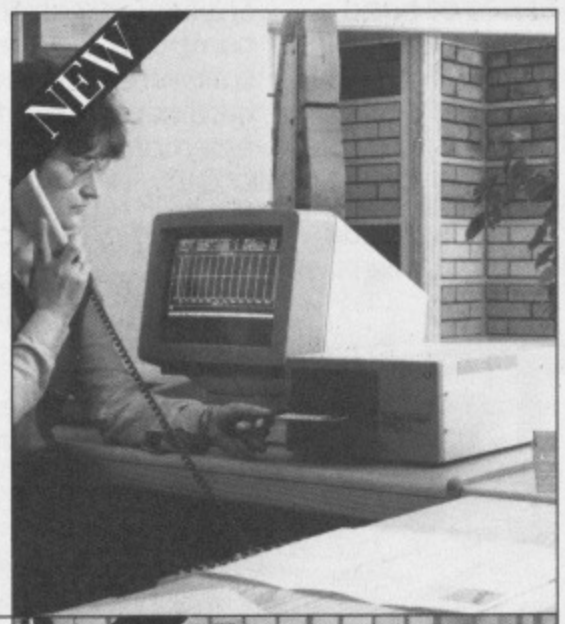

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From Page 96

costed out at £8,300. There was no way that Startup Ltd. would have paid this despite it being a minute percentage of their profits. We charged them £4,000 and showed a very healthy profit, and that was after paying, (and including in this total), £495 to purchase the all-in-one package.

What was more, our client had gained an integrated spreadsheet, wordprocessor and graphics module, with all the added facilities mentioned in the earlier article. This price compared with £2,900 for a package designed for their specific industry, but which after assessment was seen to be infinitely more sour a fruit than just a lemon.

What was equally impressive was that using three high performance micros we could replace an ageing mini computer for 60 per cent of the cost of another mini. Nowadays lashing three micros into a single integrated system is more a problem of fighting your way through the jargon and hog-wash than of actually getting the machines to talk to each other.

Our total system solution for Startup Ltd., including all the ancillary costs, was £26,000. A mini system with bespoke software would have given them a bill nearer £50,000.

We gained a further advantage with this approach since with three of everything, Startup Ltd. did not have all their eggs in a single hardware basket. If a mini develops an electronic migraine then all data processing stops, whereas the odds on all three micros developing silicon psychoses are too small to consider and some work will always be possible. Have you ever calculated the cost of down time? I assure you it is frightening.

In conclusion I do not retract a single word I have written about selecting well-proven commercial packages rather than re-inventing the wheel by spending time in unnecessary programming.

Nevertheless it cannot be denied that there are situations for which the products available in the High Street are not entirely suitable. The halfway house between writing the whole application for yourself and employing an unsuitable package is to make a database do the bulk of the work and only use your own time for the special procedures which made the requirement unique.

Keep this in mind the next time you cannot find what you require in your favourite software shop. ■

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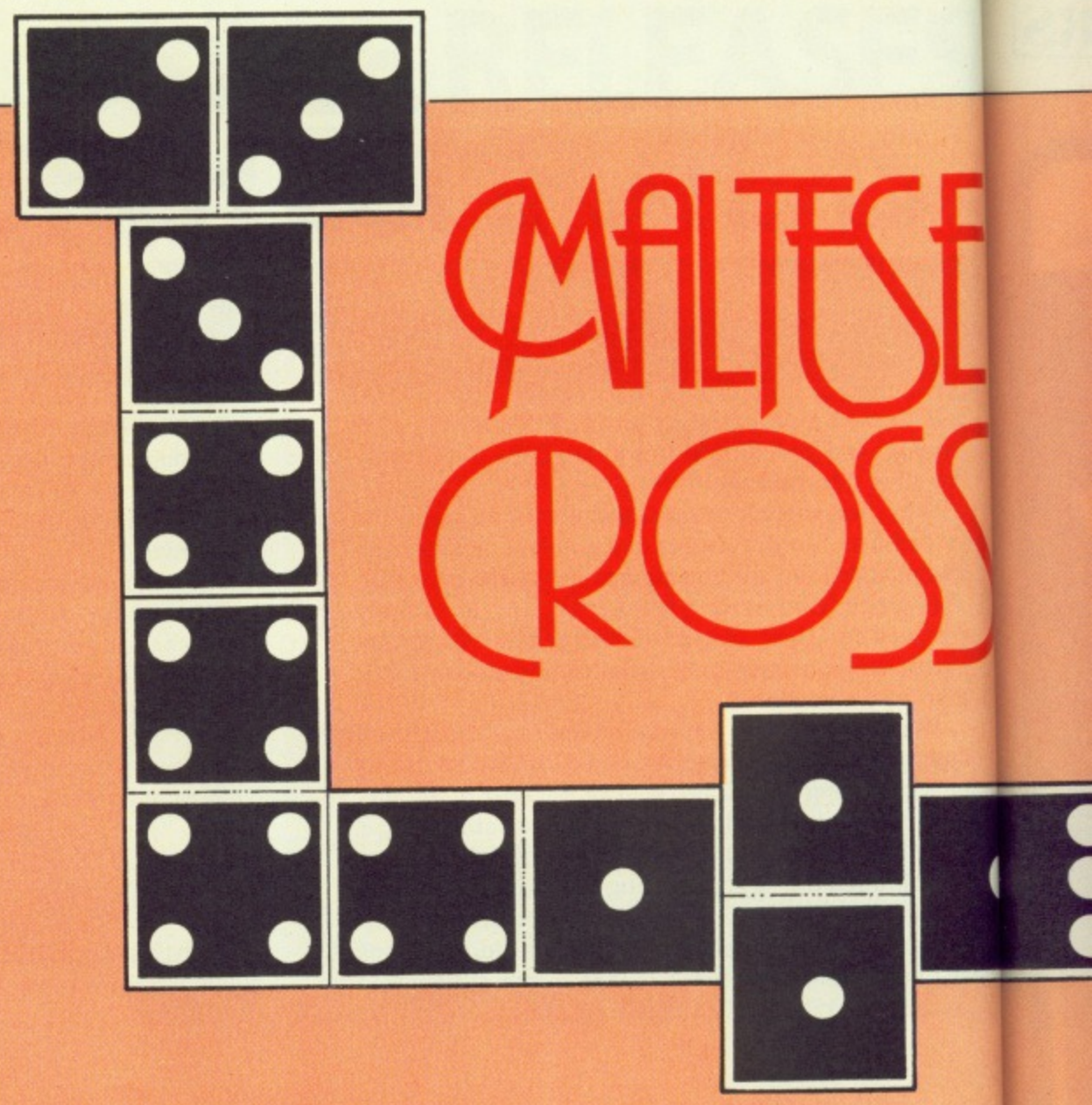


MALTESE CROSS

MALTESE Cross is a popular domino game that you may already know. The rules are simple and it can be played solo, against the computer, or with up to four players.

A demonstration is also possible and from this a few tactics of play can be learnt.

The game is suitable for all ages, and comes as a welcome change from the fast action type or those needing complicated keyboard manoeuvres.

During play the program tells you when and why a particular domino is not allowed, so if you don't already know the rules you soon will.

You start by entering the number of players (1-4), and then give each player's name (up to eight characters). If the computer is to play a hand type BBC for the first three letters for the player's name.

For a demonstration the computer can be set to play itself by stating that two players called BBC1 and BBC2 are to play.

The computer will then deal out the dominoes so that each player has an equal number, maximum 12, reserving at least two. These are placed face down when the game starts.

All players, except the BBC, are given the opportunity to view their own dominoes and everyone else must look away from the screen as these are jotted down on a piece of paper.

If you are playing against the computer this is not necessary as at anytime throughout the game you can view the state of your hand.

The object is to be left with as few spots as possible at the end of the round, which stops as soon as a player runs out of dominoes or if each player passes in sequence.

Each player's total number of spots will then be added up, displayed and points awarded.

The rules are quite simple:

The player who has the highest double – usually the double six – starts off. As this is a compulsory move the computer plays it straight away by placing it in the middle of the screen on top of the two face down dominoes.

It then prompts for the next player in sequence to make his move by keying in the two values of his playing piece.

Alternatively he can choose from the menu to see the scores, reveal his current hand, or pass the play to the next player.

Dominoes must be played on to one of the four arms of the cross, which may be in any direction N, S, E or W and all four arms of the cross must be in position before any doubles can be played.

No domino can be played unless the double of the linking number has already been played. For instance if the

By DAVID WALE

3:6 domino can link on to an arm using the 3 end, the 3:3 must have already been played for this to be allowed.

Finally, dominoes must be able to fit on the screen (not usually a problem).

The computer places any legal move on the correct arm and in the correct position. All illegal moves are reported with the reason given as to why they were rejected.

If a choice is involved, the domino will be placed on the shortest arm to provide an even distribution of pieces.

Occasionally the domino can link on both its numbers, so the computer asks which end to link, as this could affect the outcome of the game. In such a case just type in the linking value.

The program uses all available memory in Mode 1, so be very careful when typing in the listing. You must copy it exactly, being careful not to introduce unnecessary spaces.

This makes the program a little difficult to read and follow, but in the end you will find the quality of the game well worth the effort.

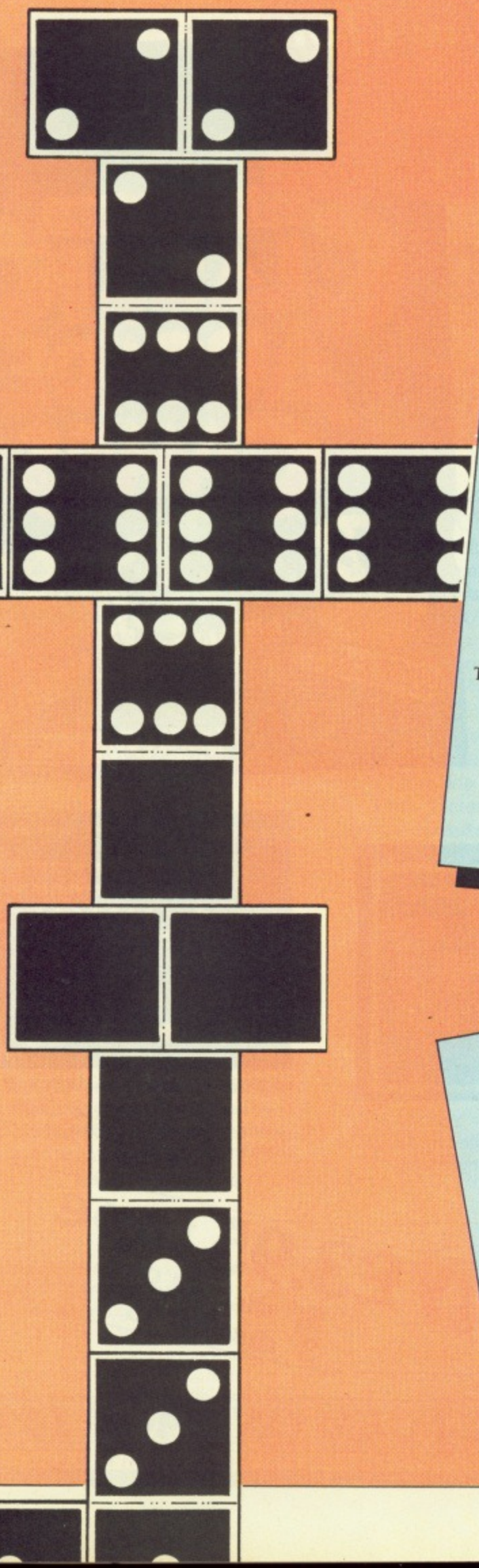
The program can be regarded as being in two parts. Part one displays an opening title page, then uses the downloader routine (loaded on function key *f0* in line 40) to move the entire program to PAGE=&E00 if not there already.

It also deletes the title procedure and all unnecessary lines to make enough room in the memory to run part two – the actual game.

As part of the program is deleted when you run it, you must save the final version before running it.

The size of the spots on the dominoes defined in the program will give the best display for most TVs. If you prefer to have the spots larger change line 1780 to read:

```
1780PLOT69,X,Y:PLOT69,X,Y-4:PLOT69,X
+4,Y:PLOT69,X+4,Y-4:NEXT:ENDPROC
```



PROCEDURES

play	Controls the turn of each player until one is out or all players pass.
an(I,R)	Converts domino values I,R to DOM% array.
dval (K)	Converts array K to the domino values.
link (K)	Returns a one letter string; Top, Left, Right, Bottom to signal which arm can link to value K.
dea	Deals dominoes.
hand	Displays current player's hand.
screen	Clears and sets screen for a new round.
menu	Displays menu.
scores	Displays scores.
err (K)	Prints invalid domino message determined by K.
pts	Adds up each player's remaining spots and awards points.
II	Positions domino for display.
d(XX,YY,P$)	Draws domino at XX,YY in orientation P$ (H or V).
f(D1,D2)	Flips domino over to match the linking end.
dot (K,P$)	Plots dot pattern for K value in P$ orientation (H or V).
p	In BBC play, updates best domino to play.
lead	Finds domino with best follow on for BBC hand.
wgt	Calculates a playing weight for each BBC playable piece.
TD(X,Y,XX,YY)	Draws display domino in position and size of parameters.
VDOM	Positions spots for vertical display dominoes.
HDOM	Positions spots for horizontal display dominoes.
CTS(X,Y)	Plots display dominoes spots at position X,Y.
titles	Draws title screen.

VARIABLES

LK1$, LK2$	Signal if ends of domino can be linked and to where.
C%(1-4)	Number of pieces on each arm.
DOM%(1-28)	State of play of each piece.
P%	Number of players.
S(1-4)	Players' scores.
PLR	Current player.
N$(1-4)	Players' names.
NG	Flag for players' passes.
D1,D2	Values of selected domino.
TV,LV,RV,BV	Top, left, right, and bottom arm linking values.
TX,LX,RX,BX	Top, left, right, and bottom arm current X screen coordinate.
TY,LY,RY,BY	Top, left, right, and bottom current Y screen coordinate.

Full listing starts on Page 128

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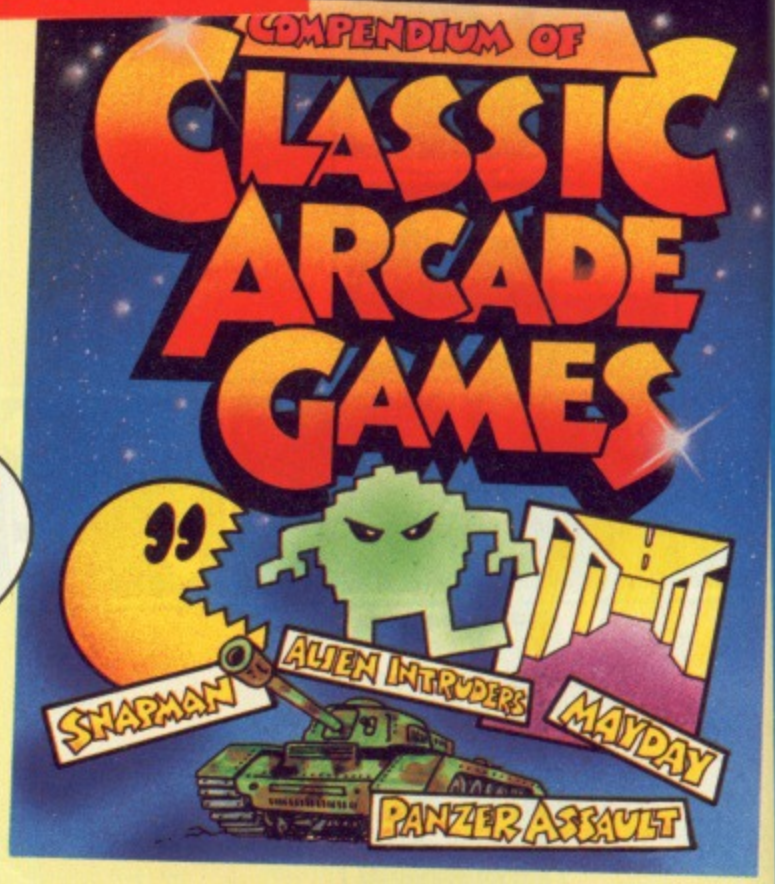

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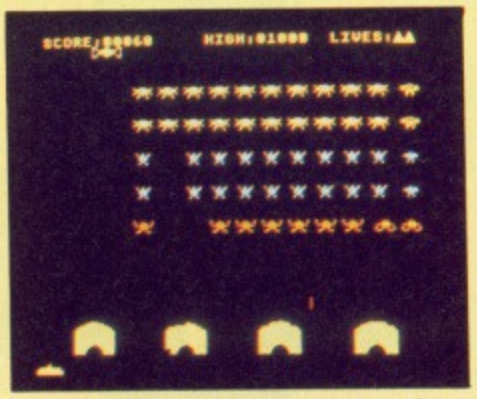

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TO ORDER TURN TO THE FORM ON PAGE 159

Put the BOS in charge of your programs

By CHRIS NIXON

DO your fingers often ache from too much use of the cursor and Copy keys? Do your programs seem to run amok after editing? Well, your problems are solved because you can now be the BOS with this compact on-screen editor for the Basic programs.

If you have ever been in the middle of editing a line with the Copy key and the line you were on has just scrolled off the screen, or if you have ever wanted to be able to list backwards through a program, then BOS (Basic On Screen editor) is your answer.

BOS is a full on-screen editor, allowing you to scroll backwards and forwards through a program looking for the line you want to edit. When you reach it you can move the cursor, inserting and deleting at will, while the rest of the line shunts backwards and forwards, automatically keeping step with you.

If BOS is present in your BBC Micro (it will co-exist with most lengths of Basic programs) typing *LINE followed by a line number enters the editor with the specified line displayed on screen ready for editing.

If you just type *LINE with no following number BOS will default to the first line of your program.

If you supply a non-existent line number as the parameter BOS searches for the next smallest number or defaults to the first line of the program – for example, if the first line number is 100 and you type *LINE 2, BOS will place you at line 100.

How is it done? First of all I should say that BOS uses conditional assembly to cater for both Basic I and II. However once assembled BOS is not transferable between the two Basics.

Secondly the program has to co-exist with a Basic program without interfering with it in any way. To achieve this on BBC Micros with disc interfaces fitted I have used locations &900-&CFF.

The only side effects of this are the loss of function keys and user-defined characters. On tape-based machines I have used the first four pages of the Basic program area &E00-&1200, as pages &900 and &A00 are used as the cassette input/output buffers.

BOS uses several Basic ROM routines shown in Table I where possible to save space. The only notable exception to this is scanning backwards through a Basic program when the up arrow is pressed, looking for the preceding line.

This is more difficult than it first seems because, contrary to my first assumption, you can't simply go backwards and stop at the first carriage return character (&0D) you come to, assuming it marks the start of the preceding line, because both the high and low bytes of the line number and the line length byte can be &0D.

To overcome this problem I first used the Basic ROM routine for finding a line by setting up a non-existent ever-decrementing line number, and testing it with this routine until an existing one was stumbled across.

Needless to say, the further away from PAGE the current line happened to be at the time, the more sluggish this method became.

So I eventually decided to write my own routine, which searches from PAGE forwards until it finds the line directly before the current line. This brought me precariously close to the end of my available memory.

Another meaty problem was discovered when I first attempted to copy a line from a Basic program into a buffer for editing. I soon found that there is no ROM routine for de-tokenising a line. The only similar routine is one that prints A as a character or token, but only on the screen.

I managed to use this routine by re-vectoring OSWRCH to point to my editing buffer instead of the screen, and then replace the old vector afterwards. Although long-winded, it is the only solution I have to date. Improvements will be gratefully accepted.

The third main problem was memory space. There are only four mostly unused pages available to disc-based BBC Micros, &900-&CFF, and none in tape-based machines.

By deciding that tape users would have to set PAGE to &1200 for editing with BOS and therefore lose 1k, and by drastically cutting down on-screen messages, the program was shortened to 1023 bytes, with just one to spare.

The program also had to be flexible enough to permit users to access the BBC Micro's own editing facilities as well, so I implemented *LINE line number to enter BOS at the desired line, and Escape to re-enter Basic.

The program assembles the code from &900 to &D00 – &E00 to &1200 on tape based machines – and saves the object code as BOS. To load the editor at any time type *RUN BOS and you

		Basic I	Basic II
getlna	Get tokenised line number at PTRA.	&97AE	&97DF
ptoken	Print A as character or token.	&B53A	&B50E
plnum0	Print line number in INTA (no spaces).	&98F1	&991F
plnum5	Print line number in A (field width 5).	&98F5	&9923
cston	Convert string to a number.	&AC5A	&AC34
schlin	Search for a Basic line.	&9942	&9970
inslin	Insert tokenised line in Basic program.	&BCAA	&BC8D
tline0	Tokenise line (all line numbers).	&88D3	&8951

Table I: Basic ROM routines and their entry points used by BOS

From Page 103

are ready to load in and edit your Basic programs.

Unfortunately BOS cannot reside in the same area on tape-based BBC Micros as this is the cassette input/output buffer, and would result in BOS being corrupted upon the next load or save.

Therefore the first thing that the program does is to prompt you with the question "Disc or cassette?". If the answer to this is C for cassette it assembles the code from &E00 to &1200 the program having already relocated itself to &1200 to allow for this.

It then saves the code to tape as BOS, with a load address of &E00 and an end address of &11FF. This means that you must have Page set to &1200 or higher if you are using tapes while editing your Basic programs with BOS.

Operation is the same for both disc and tape versions. Once BOS has been *RUN, the screen changes to Mode 7 and the message Ok appears at the top of the screen. BOS is now ready to use.

To edit a Basic line type *LINE. BOS will then clear the screen and print the requested line in yellow in the centre of the screen between two horizontal blue borders, with the line number separate and above the first border. See Table II for a list of the control keys for editing.

The only drawbacks with BOS are that only one Basic line is visible on-screen at a time and new lines cannot be created from within BOS.

For these reasons it is best to use BOS mainly as a debugging tool. So when you are presented with an error just jump into BOS at the line in question. Then you can quickly correct, enter it and exit back to Basic to carry on.

Finally, remember to save the program before running it, for the usual reasons – corrupted programs, bruised knuckles and smashed keyboards. I hope you enjoy this new addition to your repertoire of *Micro User* utilities.

Left arrow:	Moves the cursor one character to the left through the line.
Right arrow:	Moves the cursor one character to the right through the line.
Up arrow:	Moves one line backwards through the Basic program.
Down arrow:	Moves one line forwards through the Basic program.
Delete:	Deletes the character at cursor position and shunts following text one character to left.
Return:	Re-enters current line into the Basic program.
Any other key:	Inserts character at cursor position and shunts following text one character to right.

Table II: Control keys for editing

```
100 REM ****************************
110 REM *                          *
120 REM * BOS Editor Version 1.0 *
130 REM *                          *
140 REM *     By Chris Nixon       *
150 REM *                          *.
160 REM *   (c) The Micro User     *
170 REM *                          *
180 REM ****************************
190 REM
200 IF PAGE>&11FF THEN GOTO 240
210 *K.0 CLS:*FX3,2|MFORX%=TOP TO P
AGE STEP -4:!(&1200+X%-PAGE)=!X%:NEXT
:PA.=&1200|MOLD|M*FX3,0|MRUN|M
220 *FX138,0,128
230 END
240 MODE 7
250 linenum=&70
260 key=&72
270 char=&73
280 ptr=&74
290 len=&75
300 xpos=&76
310 ypos=&77
320 new=&78
330 line=&B
340 temp=&52
350 page=&54
360 IF ?&8015=49 PROCset1 ELSE PROC
set2
370 PRINT"Is your system Disc or Ca
ssette based?";:REPEAT:G=GET AND 223:
UNTILG=68 OR G=67
380 IF G=68 START%=&900 ELSE START%
=&E00:*TAPE
390 PRINTCHR$G''
400 DIM oscli 30
410 FOR PASS=0 TO 3 STEP 3
420 P%=START%
430 [
440 OPT PASS
450 SEI
460 LDA &24B
470 STA &F4
480 STA &FE30
490 CLI
500 LDA &200
510 CMP #BOS MOD 256:BNE notchanged
520 JMP escape
530 .notchanged
540 STA &230
550 LDA &201
560 STA &231
570 LDA #BOS MOD 256
580 STA &200
590 LDA #BOS DIV 256
600 STA &201
610 JMP escape
620 .BOS
630 CMP #1
640 BEQ bos
650 JMP (&230)
660 .bos
670 STX line
680 STY line+1
690 LDA #0
700 STA page
710 LDA &18
720 STA page+1
730 LDY #1
740 LDA (page),Y
750 BPL ok
760 RTS
770 .ok
780 DEY
790 LDA (line),Y
800 CMP #&0D
810 BNE loop1
820 INY
830 STA (line),Y
840 DEY
850 LDA #48
860 STA (line),Y
870 .loop1
880 LDA (line),Y
890 STA &600,Y
900 CMP #&0D
910 BEQ convert
```

Turn to Page 134

What it offers the BBC Micro user . . .

Electronic mail is much cheaper than the post

Sending mailbox messages to other subscribers, whose numbers are rapidly growing, is the cheapest form of communication possible. You can send a message of any length to another mailbox for less than the cost of a first-class stamp. And it doesn't cost a penny more to send the same message to 500 different mailboxes! Even a message sent to a mailbox on the other side of the world only costs 30p.

The biggest bulletin board of them all

The number of bulletin boards is growing rapidly. The only snag is that the vast majority are single-user boards – which means lots of other people are also trying to make contact and all too often all you get is the engaged tone. But with the MicroLink bulletin board there is no limit to the number of people using it at the same time. And no limit to the number of categories that can be displayed on the board.

Give your micro mainframe power

With MicroLink your micro becomes a terminal linked directly to the Telecom Gold mainframe computer, and able to tap its tremendous power and versatility. Right away you'll be able to use giant number-crunching programs that can only run on a mainframe.

The mailbox that is always open

MicroLink is in operation 24 hours a day, every day. That means you can access your mailbox whenever you want, and from wherever you are . . . home, office, airport – even a hotel bedroom or golf club! No-one needs to know where you are when you send your message.

We're only a local phone call away

The majority of MicroLink subscribers can connect to our mainframe computer in London by making a local phone call. This is possible because they use British Telecom's PSS system, which has access points all over Britain. A local phone call is all you need, too, for direct access via MicroLink to all the other countries belonging to the international Dialcom system.

Telemessages – at a third off

The modern equivalent of the telegram is the telemessage. Send it before 10pm and delivery is guaranteed by first post the following day (except Sunday). The service was intended for people phoning their message to the operator, which costs £3.50 for 50 words. But you can now use it via MicroLink, for only £1.25 for up to 350 words! For an extra 65p your message can be delivered in an attractive greetings card.

Go teleshopping on your micro

With MicroLink you can study the British Rail timetable – and then buy your ticket in advance. You can book theatre tickets. And even order a bouquet of flowers. It's all part of the tele-shopping revolution!

Send and receive telex messages

With MicroLink you can turn your micro into a telex machine, and can send and receive telex messages of any length. You will be able to communicate directly to 96,000 telex subscribers in the UK, 1½ million worldwide – and even with ships at sea via the telex satellite network. Business people can now send and receive telexes after office hours, from home or when travelling.

What does it all cost?

Considering all the services you have on tap, MicroLink is remarkably inexpensive. You pay a once-only registration fee of £5, and then a standing charge of just £3 a month. On-line costs are 3.5p a minute (between 7pm and 8am) or 11p a minute during office hours. There is an additional 2.5p a minute PSS charge if you are calling from outside the 01- London call area. Charges for telex, telemessages and storage of files are given on the next page.

How much it costs to use MicroLink

Initial registration fee: £5.

Standing charge: £3 per calendar month or part.

Connect charge: 3.5p per minute or part – cheap rate; 11p per minute or part – standard rate.
Applicable for duration of connection to the Service. Minimum charge: 1 minute.
Cheap rate is from 7pm to 8am, Monday to Friday, all day Saturday and Sunday and public holidays; Standard rate is from 8am to 7pm, Monday to Friday, excluding public holidays.

Filing charge: 20p per unit of 2,048 characters per month.
Applicable for storage of information, such as telex, short codes and mail files. The number of units used is an average calculated by reference to a daily sample.

Telex registration: £10.

Outgoing telex: 5.5p per 100 characters (UK); 11p per 100 (Europe); 18p per 100 (N. America); £1.25 per 400 (Rest of world); £2.75 per 400 (Ships at sea).
Deferred messages sent on the night service are subject to a 10 per cent discount.

Incoming telex: No charge.

It is not possible to deliver a telex without a mailbox reference. If a telex is received without a mailbox reference the sender will be advised of non-delivery and asked to provide a mailbox address.
Each user validated for telex and using the facility will incur a charge of 6 storage units a month. Further storage charges could be incurred depending on the amount of telex storage and the use made of short code and message file facilities.

MicroLink PSS service: 2.5p per minute or part (300 baud); 3p per minute or part (1200/75 baud).
Only applies to users outside the 01-London call area.

Telemessages: £1.45 for up to 350 words.
Telemessages can be sent with an illustrated greetings card for 75p extra.

Radiopaging: No charge.
If you have a BT Radiopager you can be paged automatically whenever a message is waiting in your mailbox.

International Mail: For the first 2,048 characters – 20p to Germany and Denmark; 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 1,024 characters – 10p; 15p.

These charges relate to the transmission of information by the Dialcom service to other Dialcom services outside the UK and the Isle of Man. Multiple copies to addresses on the same system host incur only one transmission charge.

Billing and Payment: All charges quoted are exclusive of VAT. Currently all bills are rendered monthly.

Software over the telephone

MicroLink is setting up a central store of software programs which you'll be able to download directly into your micro. The range will include games, utilities, educational and business programs, and will cover all the most popular makes of micros.

Talk to the world – by satellite

MicroLink is part of the international Dialcom network. In the USA, Australia and a growing number of other countries there are many thousands of users with electronic mailboxes just like yours. You can contact them just as easily as you do users in Britain – the only difference is that the messages from your keyboard go speeding around the world via satellite.

What you need to access MicroLink

You must have three things in order to use MicroLink: a computer (it can be any make of micro, hand-held device or even an electronic typewriter provided it has communications facilities), a modem (it can be a simple Prestel type using 1200/75 baud, or a more sophisticated one operating at 300/300 or 1200/1200 baud), and appropriate communications software.

MicroLink

in association with

TELECOM GOLD*

Application Form

I/We hereby apply to join MicroLink

(✓) ☐ I enclose my cheque for £5 payable to Database Publications as registration fee to MicroLink.

(✓) ☐ I also wish to use Telex. I authorise you to charge an additional £10 to my initial bill for validation.

☑ I confirm that I am over 18 years of age.

☑ I confirm that I accept the terms and conditions for the time being in force, a copy of which are available on request.

I intend to use the following computer _____

Signature _____

Date _____

FOR OFFICE USE ONLY:

Mailbox assigned _____

Start date _____

Password _____

MU 11

SEND TO:
MicroLink
Database Publications
Europa House
68 Chester Road
Hazel Grove
Stockport SK7 5NY.

** Telecom Gold is a trademark of British Telecommunications plc.*

Name ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

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Postcode ☐☐☐☐☐☐☐☐ Daytime telephone ☐☐☐☐☐☐☐☐☐☐

Commencement of Service
Please indicate month of commencement ☐☐ 19 ☐☐
Allow 10 days for validation of mailbox

Payment
Whilst Database Publications Ltd is the supplier of all the services to you, the commission and billing thereof will be handled by Telecom Gold as agents for Database Publications Ltd.
Date of first payment to be on 15th of month following commencement.
Please complete billing authorisation form A, B or C below:

(✓) ☐ **A. Direct Debiting Mandate** *(Enter full postal address of Bank Branch)*

To ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

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I/We authorise you until further notice in writing to charge to my/our account with you on or immediately after 15th day of each month unspecified amounts which may be debited thereto at the instance of British Telecommunications plc – TELECOM GOLD by Direct Debit. Bills are issued 10 days before debit is processed.

Name of Account to be debited ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Account Number ☐☐☐☐☐☐☐☐

(✓) ☐ **B. Please debit my/our Access/Visa/*American Express account number** ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

** Overseas subscribers only*

I/We authorise you until further notice in writing to charge to my/our account with you on or immediately after 15th day of each month unspecified amounts which may be debited thereto at the instance of British Telecommunications plc – TELECOM GOLD. Bills are issued 10 days before charge is applied to your account.

(✓) ☐ **C. Please invoice the company/authority.**

If you select this option, which is ONLY AVAILABLE to government establishments and Public Limited Companies, we will require an OFFICIAL ORDER to accept unspecified amounts.

CLASSIC GRAPHICS ON THE COMPACT

ALAN McLACHLAN reviews Artroom, Clare's graphics package for the Compact Master

Product: Artroom
Price: £27 (3½in disc), £25 (5¼in disc for Master), £59.90 (with Nidd Valley mouse)
Supplier: Clare's Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7DA. Tel: 0606 48511

TO complement the release of the Acorn Compact Master, Clares Micro Supplies has launched a package designed to provide high quality graphics, using either the keyboard or a mouse.

Aptly named Artroom, the icon driven software allows you to create full screen high resolution black and white drawings which you can edit in a variety of ways, paint with different patterns, save to disc for future use and later print.

As you can see from the illustrations the results can be quite spectacular.

When you boot the disc the program automatically loads into sideways ram, offering you a choice of entering the drawing program or dumping a file to an Epson-compatible printer.

Initialising the drawing program provides you with the 8 × 5 grid of key shaped icons shown in Figure I. You highlight the icon you want, using the mouse or cursor keys, pressing the centre mouse button or Return to confirm selection.

The icons fall into three main categories. One set creates high quality drawings using lines, circles, boxes, patterns and text, another edits them by copying, changing size, mirroring, zooming and so on, and the third accesses the disc for loading and saving.

The only thing I found difficult to use was the pixel editing facility in the Zoom option. In keyboard mode the cursor moved so quickly that I had to tap the keys very lightly in order to avoid skipping over points that I wished to set or clear.

It seemed a little easier to handle when using the mouse, so perhaps it's my age - I'm not particularly sharp when it comes to arcade games either!

I found the Freeze and Restore options an absolute godsend when dabbling with the fills. The idea is that at any time, but particularly when you are about to try something that might spoil your drawing, selecting Freeze instantly stores the current picture in memory ready to be recalled should it be required.

It's an excellent tactic to use before trying out something new, and more than makes up for the "Are you sure?" prompt found on similar packages.

There were several occasions when I was glad I could restore the picture in exactly the same state it was in just before I drew a line in the wrong place, or chose the wrong pattern to fill with.

There are other ways to undo mistakes, such as drawing in the background colour, but restoring is quicker.

The printer program, which isn't mouse controlled, is completely separate and can only be accessed from the opening menu, so it means quitting the

→

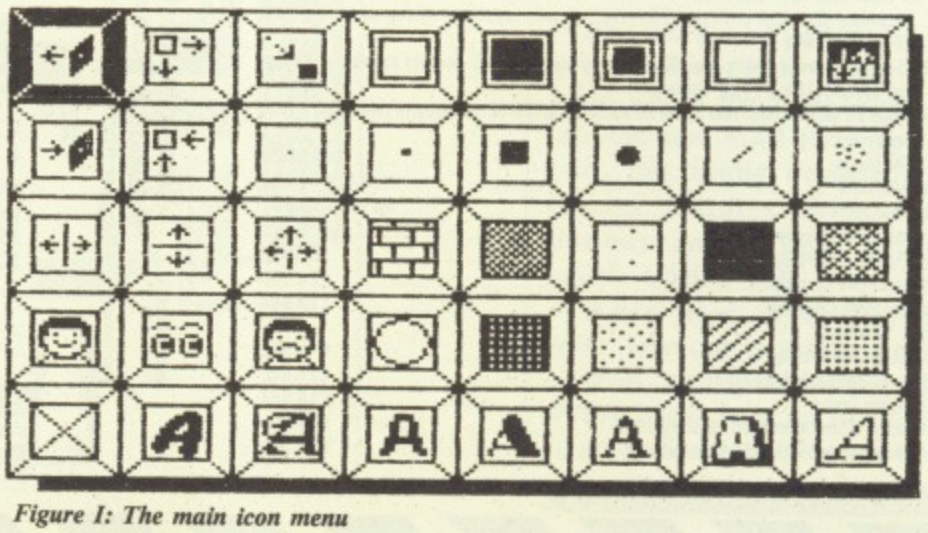


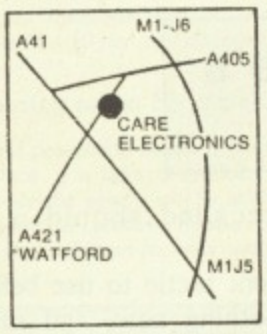
Figure I: The main icon menu

CARE ELECTRONICS

CARE ELECTRONICS

OPEN
9am-5pm Mon-Thu
9am-4pm Fri-Sat

**800 ST ALBANS ROAD,
GARSTON, WATFORD,
HERTS. WD2 6NL.
Tel: 0923 672102**



NEW PRODUCT AVAILABLE
* Centronics Switcher
* Trivial Pursuit

DOT MATRIX PRINTERS

Kaga Taxan 810 with NLQ	£247.25a
Kaga Taxan 910 with NLQ	£391.00a
Printer Cable (BBC to Centronic) 1mt	£6.90c
Printer Cable (BBC to Centronic) 1.5mt	£8.97c
Ribbon Hi-Sec KP-R	£6.90c
Printer Stand	£16.56d

FLOPPY DISCS

3.5" D/S D/D (each)	£3.22c
3.5" D/S D/D (per 10)	£28.75c
5.25" S/S D/D (per 10)	£12.65c
5.25" D/S D/D (per 10)	£13.80c
5.25" Disc Storage Box Lockable	£11.50c

SEMICONDUCTORS

SN74LS10n	£0.28c
SN74LS123N	£0.92c
SN74LS393N	£1.15c
C'Mos 4013	£0.46c
C'Mos 4020	£0.69c
P8271 Floppy disc controller	£40.25c
Eprom 2764 250n/s 8k	£2.53c
Eprom 27128 250n/s 16k	£3.45c
Acorn DNFS Interface kit	£69.00c

Plus wide range of other Semiconductors.

MONITORS (Price incl lead)

Philips Monitors	
BM7502 Green Hi-Res	£89.70a
BM7522 Amber Hi-Res	£92.00a
CM8533 Colour Med-Res	£289.80a
Hantarex Monitors	
HX-12 Green Hi-Res	£79.50a
CT9000 Colour Med-Res	£199.50a

TV/MONITORS (Price incl lead)

Philips CF1114 14"	£180.55a
Philips CT2016 16"	£276.00a
Philips CT2216 16" Remote	£310.50a

POWER SUPPLIES

For use with disc drives.

Single BBC Outlet	£28.75b
Dual BBC or D/D Outlets	£29.90b

For use with most peripherals

Quad BBC Outlets	£36.80b

MASTER SERIES CORNER

CARTRIDGES FOR MASTER SERIES

Coming soon!
Non Volatile Battery backed 32k RAM Cartridge

CARE MASTER ROM EXTENDER:

Designed to enable owners of CARE or Viglen BBC Model B Cartridges. To now use them on the master series micros. The extender is capable of taking one 8k, 16k or 32k Eprom Cartridge. Specifically designed to fit neatly into either of the Master cartridge slots, is unobtrusive and easy to use.

CARE MASTER ROM CARTRIDGES:

Designed by CARE Electronics to Acorn Specifications. The CARE Master Cartridges offer three options for maximum user flexibility.

Option 1: Standard Cartridge with two 28pin I.C. sockets capable of taking up to two 16k 27128 Eproms.

Option 2: Single Zif version with one 28pin Zif and one 28pin I.C. sockets capable of taking up to two 16k 27128 Eproms.

Option 3: Dual Zif version with two 28pin Zif sockets capable of taking up to two 16k 27128 eproms.

Master 128k Micro	£460.00a
Reference Manual I	No VAT £15.00c
Reference Manual II	No VAT £15.00c
CARE Master ROM Extender	£9.20c
CARE BBC Model B Cartridge	£2.07c
Acorn Master ROM Cartridge	£14.95c
CARE Master ROM Cartridge	£10.81c
ZIF Socket Versions	
CARE Master ROM Cartridge (1xZif)	£16.56c
CARE Master ROM Cartridge (2xZif)	£21.62c
Master Monitor Stand	£16.56d
Master Monitor Stand with 5.25" Disc Housing	£32.20b
Master Monitor Stand with 3.5" Disc Housing	£32.20b

Wanted for Master Series
Hardware & Software Designs
Please contact above for details.

RGB CONVERSION

Philips/Pye & Ferguson TX	
Conversion Kit (DIY)	£46.00d
Factory Conversion	£69.00a

CONNECTORS

BBC Power plug 6 way	£0.92c
BBC Power socket 6 way	£00.92c
Card edge 34 way	£2.53c
Centronics 34 way	£4.60c
Disc Drive plug 4 way	£0.82c
Disc Drive socket 4 way	£0.82c
Domino plug 5 way RS423	£0.46c
Domino Socket 5 way RS423	£0.46c
DIN plug 5 way Econet	£0.36c
DIN plug 6 way RGB	£0.36c
DIN socket 6 way RGB	£0.36c
DIN plug 7 way Ferguson/Hitachi	£0.36c
DIP Header IDC plug 28 way	£1.38c
Scart plug (Euro)	£1.38c
Zif Socket 28 way	£5.75c

Plus wide range of IDC and other connectors.

VARIOUS CABLE

6 way screened cable price per metre	£0.69
15 way screened cable	£1.84c
20 way ribbon cable price per metre	£0.69c
26 way ribbon cable price per metre	£0.92c
34 way ribbon cable price per metre	£1.15c

READYMADE LEADS

Centronics to Centronics 1.5 mt	£11.50c
Disc Drive Data (Single) 1.2 mt	£5.75c
Disc Drive Data (Dual) 1.5 mt	£8.05c
Disc Drive Power (Single) 1.2 mt	£3.45c
Disc Drive Power (Dual) 1.5 mt	£4.60c
Phono to BNC	£4.60c
Phono to Phono	£2.99c
Phono to UHF	£2.60
RGB 6-6 pin DIN 1.2 mt	£2.99c
RGB 6-7 pin DIN (Hitachi) 1.2 mt	£4.14c
RGB 6-7 pin DIN (Ferguson) 1.2 mt	£4.14c
RGB 6 pin to SCART (Euro) 1.2 mt	£7.82c
User Port Extension Socket to Plug .5 mt	£9.20c
1MZ Bus Extension Socket to Plug .25 mt	£10.35c

Many other types available please telephone or write for details.

ROMS EXPANSION BBC Model B & B+

BBC Model B & B+
The original and best selling.

Low Profile System	£10.81d
Spare Cartridge	£2.07c
Zif Socket Cartridge	£8.05c
Library Rack (Holds 6 Cart)	£1.84c

SWITCHING UNITS

BBC Printer 2 to 1 (Inc Lead)	£34.50d
BBC Printer 6 to 1	£80.50d
Centronics 4 to 1	£83.95d
Printer 2 to 2 'CPX2 Fully Buffered'	£57.50b
User Port 2 way & Off Posn (Inc Lead)	£37.95d
User Port 6 way & Off Posn (Inc Lead)	£80.50d
RS423 2 to 1	£23.00d
RS232C 2 to 1 'T' (All lines)	£57.50d
RS232C 4 to 1 (All lines)	£78.20d
RS232C 2 to 2 'X' (8 lines)	£69.00d

SOFTWARE SECTION

The Computer Game.

Trivial Pursuit 5.25" Disc Version	£19.95c
Cassette Version	£14.95c

* Over 3000 Question of no vital importance!
* No typing is necessary.

Without music, graphics and sound the board game has become the most popular in the world. Now it has them.

MONOPOLY By Leisure	5.25" Disc	£14.95c
SCRABBLE By Genius	5.25" Disc	£14.95c

NEW SUPER ADVANCED 68000 COMPUTER
**** THE SANDY 68000 ****

HOW TO ORDER: All prices inclusive of VAT. By Post. Enclose your cheque/PO made payable to CARE Electronics. Or use your ACCESS/VISA. Please allow 7 days for delivery. Please add carriage.
a = £9.99 b = £5.00 c = £1.00 d = £2.00

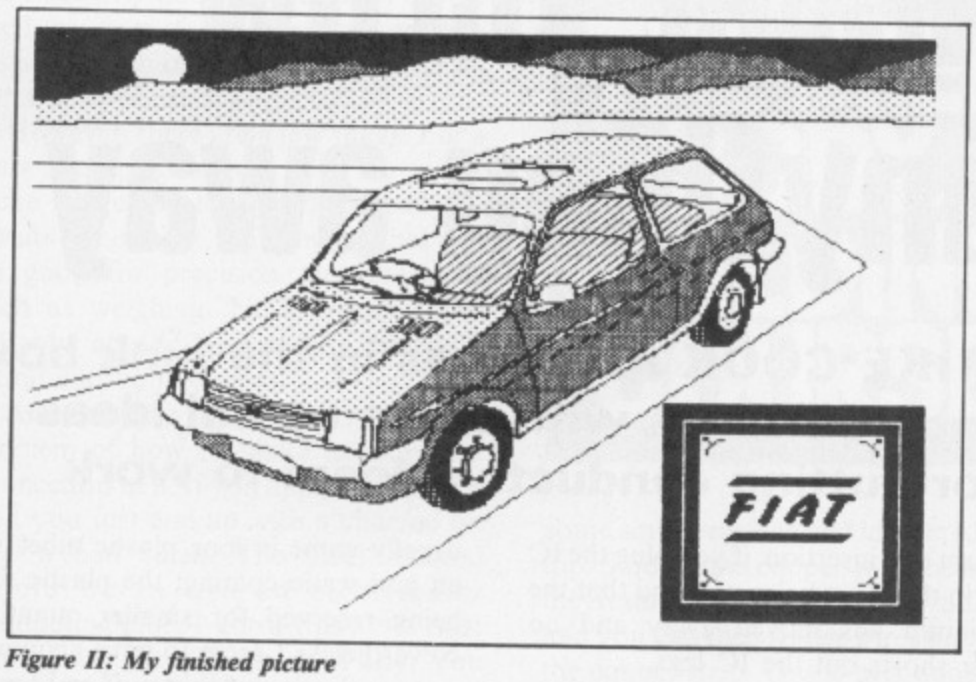


Figure II: My finished picture

From Page 107

art program with a Control+Break and booting up the disc again.

This utility is also icon-driven, with options to load a file, view the screen, alter size of printout or print the file.

There are two additional information boxes on the screen, one indicating the exact size, by the number of characters, of the final printout on the page, and the other its position, also in characters.

The whole of the right hand side of the screen is devoted to the representation of a sheet of A4 printer paper, so that you can correctly position any drawing you wish to dump.

Loading a file displays your picture before returning you to the menu, where you can switch between two sizes of printout. Toggling between these also changes the size information in the appropriate box.

When you select the print icon, control is handed over to a large flashing box, in proportion to the size of dump you have selected and superimposed on the sheet of A4 paper.

You can move this around using the cursor keys, and in consequence the information relating to its exact position on the paper changes in the box on the left.

Once all your options have been correctly set, starting the printout is simply a matter of pressing a button or the Return key.

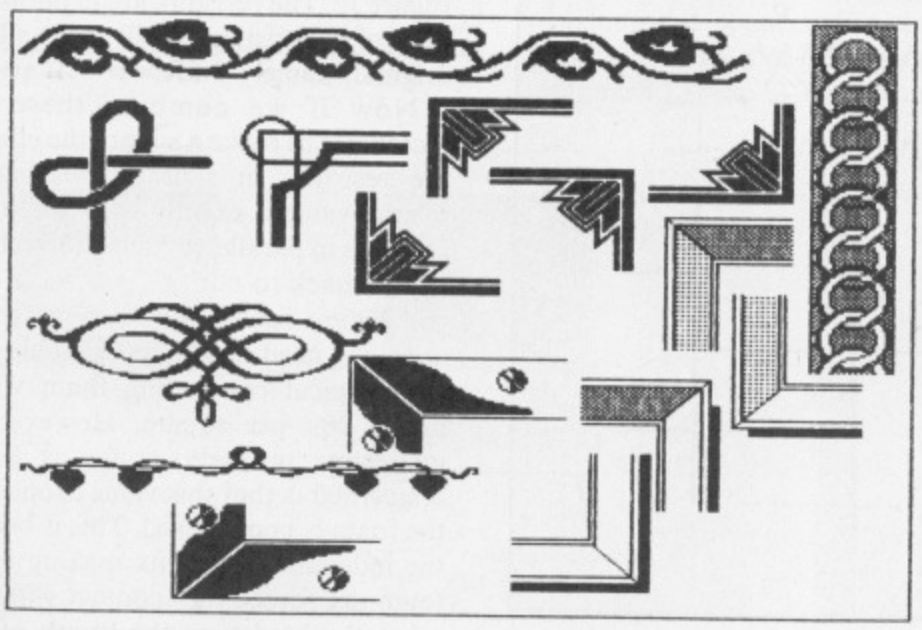
Clares has got round the potential problem of non-Epson type printers by including a driver configuration program on the disc. It prompts you for several codes to set correct line feed, left margin and so on, and once correct your new configuration is saved to disc for future use.

Also included with the software is a library of pictures, symbols and borders. These can be incorporated in whole or part into your own drawings and their quality is such as to encourage even the most inexperienced artist to have a go.

The manual, which is well laid out and easy to follow, includes a 28 step guide to creating a finished picture, using all the functions starting by loading a picture from the disc.

The illustration shown in Figure II is the end result of my efforts, but does not follow the guide to the letter, as I like to experiment.

VERDICT: This package is the first of its kind I've seen for the Compact, and if its standard is anything to go by, purchasers of Acorn's latest investment are in for some very pleasant surprises. ■



FIRST hardware add-on for the new Compact is a mouse from Nidd Valley Products. Plugging into the new Atari-style joystick port, this neatly designed peripheral features three select buttons and a high quality, plastic tracker ball.

When used in conjunction with Artroom it makes precise control and positioning simplicity itself. It is an invaluable upgrade for your Compact.

Never throw anything away

MIKE COOK rummages in the junk box and comes up with some useful ideas for putting conductive foam to work

MOST Body Build exercises involve the use of high technology to enhance or improve your BBC Micro. Well this month I want to look at what you can do with a material whose only link with high technology is that it is used as packing material for it.

This is the stuff that is always thrown away when you unpack your latest rom: The black plastic conducting foam!

It's used to protect delicate electronic gates from damage by static electricity. In theory it is simple – connect all the pins together so that there can't be any potential difference between them. In this way the chips are kept safe.

When the first FETs (Field Effect Transistors) were produced they were supplied with a wire lassoo wrapped round all three pins. You soldered it into the circuit like this and then snipped off the wire before applying the power. However, with the advent of multi-legged beasties (integrated circuits), a more practical method of protection was needed.

One way was to use aluminium foil wrapped around polystyrene blocks. This is all right but you can only perform one insertion, if you plug the IC back in the same holes you find that the aluminium has moved away and no longer shorts out the IC legs.

Conducting plastic foam was invented to overcome these problems and allow a safe and convenient way of storing ICs. Basically there are two grades, light and dense. The dense grade gives the IC legs some support whereas the light does not. However, I have seen both types used for supplying ICs.

If you buy ICs in bulk as I do, they usually come in long plastic tubes with an anti-static coating, the plastic foam being reserved for smaller quantities. Nevertheless I seem to have acquired a great collection of this stuff as I tend to treat it like folk used to treat string and never throw it away.

There are many different manufacturers and grades of conducting plastic foam, the main electrical characteristic being conductivity. This is measured in ohms per square. Remember the teachers who would not accept your perfectly correct answer because you had missed the units off? "Ohms per square WHAT, Cook?" they would say! Well in this case it does not matter, it really is simply ohms per square.

Let me explain. Look at Figure Ia where we have a square of conducting material which can be represented by a resistance of value R. Suppose we stick another square on the end so we now have a rectangle as in Figure Ib. As the resistors are in series they will add to give a value of 2R. Now suppose we add the extra square on the other edge as in Figure Ic. The resistors are in parallel so the total resistance will be half the original, namely 0.5R.

Now if we combine these two rectangles to make a square the effect of the resistors in series increasing the overall value is exactly balanced by the resistors in parallel reducing the value so we are back to our original value of R, see Figure Id. So you see the square does not need any units to qualify it.

A typical conducting foam will be about 20k per square. However, the interesting property as far as we are concerned is that this value drops when the foam is compressed. This is because the individual filaments making up the foam are forced into contact with each other thus reducing the length of path

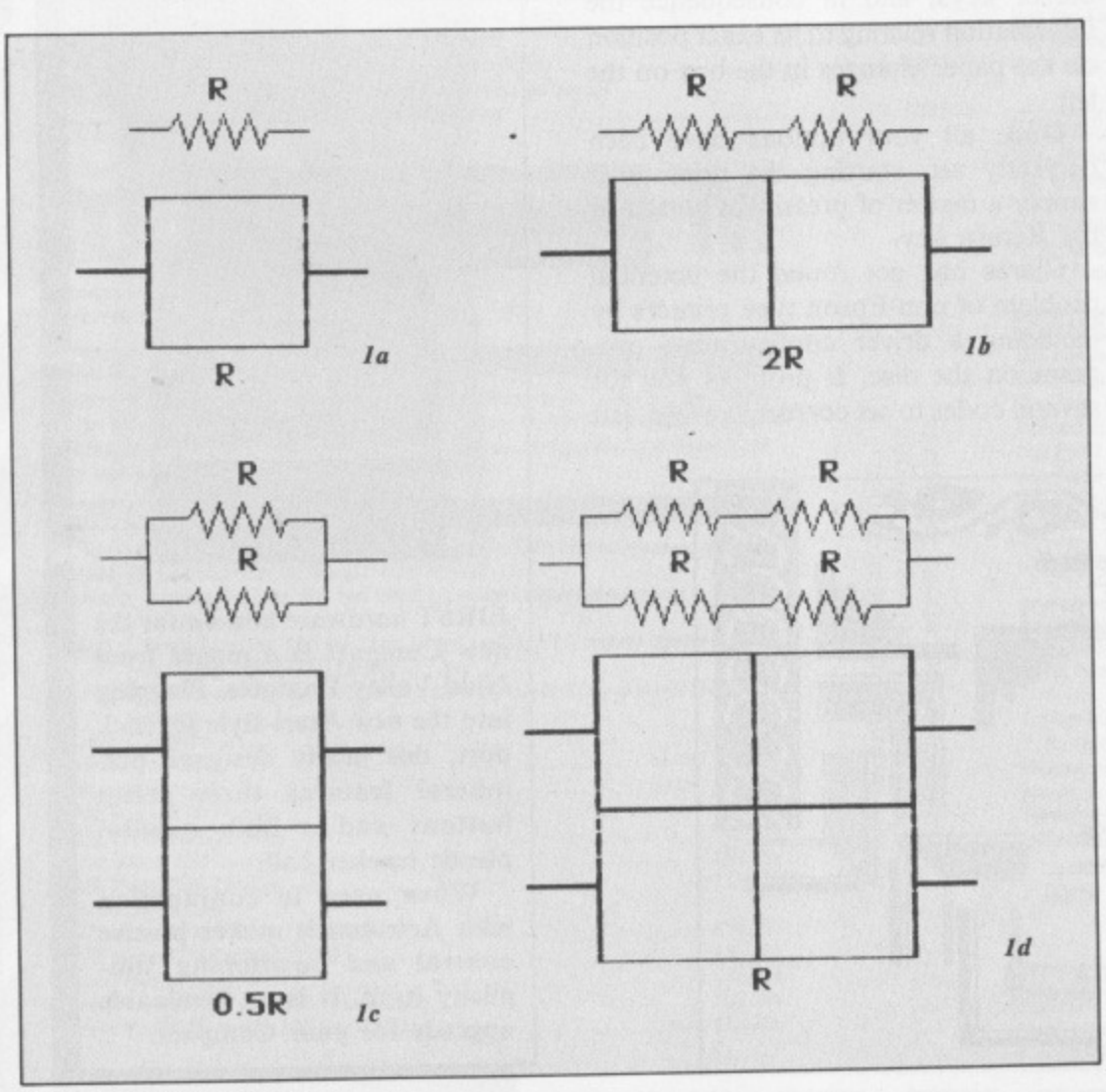


Figure I: Square measure

THE BEEB BODY BUILDING COURSE

the electricity has to travel. This can be used as a sort of pressure sensitive resistor which opens up potential for all sorts of applications.

However, there are a few snags. For a start the material will tend to suffer some fatigue so the reproducability of results is not high. This means that it is no good for precision measurements such as weighing. Nevertheless, for a suitably chosen application this limitation can be irrelevant.

Another snag with this material is the problem of how to make an electrical connection to it. If you apply a soldering iron you just end up with a charred bit and a bad smell. The ideal method would be to use an electrically conducting glue. I know this must exist but I don't actually know of any. You could then sandwich the foam between two plates and use it as a foot pedal or squeeze control.

Fortunately you do not need to have electrical access to both sides of the foam to utilise the effect. I have some adhesive backed copper strip that I use in stained glass work. I also used it in the Anemometer project that you'll find in the June 1985 issue of *The Micro User*.

It is is ideal for making a connection to the foam. Simply stick the strip to some sound surface and lay the foam on top. Smooth the copper with the back of the thumb to get maximum adhesion and you can then solder wires directly to the copper strip. This is best done at the ends using fine wire.

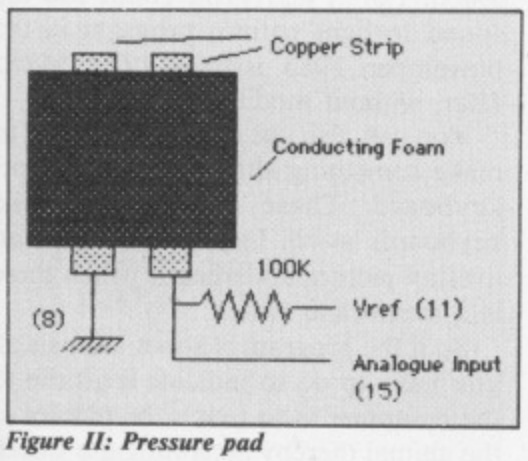


Figure II: Pressure pad

Also make sure you solder quickly as prolonged application of the iron will bubble the adhesive and lift the strip. I used a thin perspex sheet for my experiments and found the heat caused the plastic to melt very slightly thus increasing the adhesion of the strip.

If you like you can tack the foam to the surface with ordinary glue just to hold it in place. When the foam is compressed the resistance drops.

You can now use your BBC Micro's analog input port to measure when and how much pressure is applied to the foam. As the analogue input port measures voltages we have to convert the change in resistance to a changing voltage. This is simply done as can be seen in Figure II.

One strip is connected to an analog input channel and also through a resistor to the reference voltage, the other strip is connected to earth. This is connected to the computer by the standard 15 way D-Type connector and multi-cored cable.

In the absence of any conduction by the foam the analog channel reads the maximum voltage. However, as the foam starts to conduct it diverts current through it pulling down the voltage on the analog input. The harder it is compressed the lower the voltage will be. You can experiment here with the value of the resistor.

If it is too low the foam will not be able to pull the voltage down very much. If it is too high the foam will easily pull the voltage down but you will then lose any proportional effect. The best bet is to experiment as it will depend on all sorts of factors.

I found it best to keep the gap between the copper strips as small as possible when pressing on the foam with your finger. However, large separation of the copper strips could be used when you want a pressure pad hidden under a carpet as part of a security monitoring set-up.

One use of this material would be to make a very different type of joystick. As joysticks should give a midway reading when not being touched (self-centring) we need to pull up the analog input as much as we pull it down. This can be done by using two identical resistors.

Figure III shows a two finger joystick where pressure on one pad will raise the voltage and pressure on the other will lower it. As you have two axes of control on a joystick you will need two of these circuits.

Alternatively, Figure IV shows a single finger circuit. This uses three strips of copper, the centre one connected to the input and the other two to the supplies. To achieve movement

→

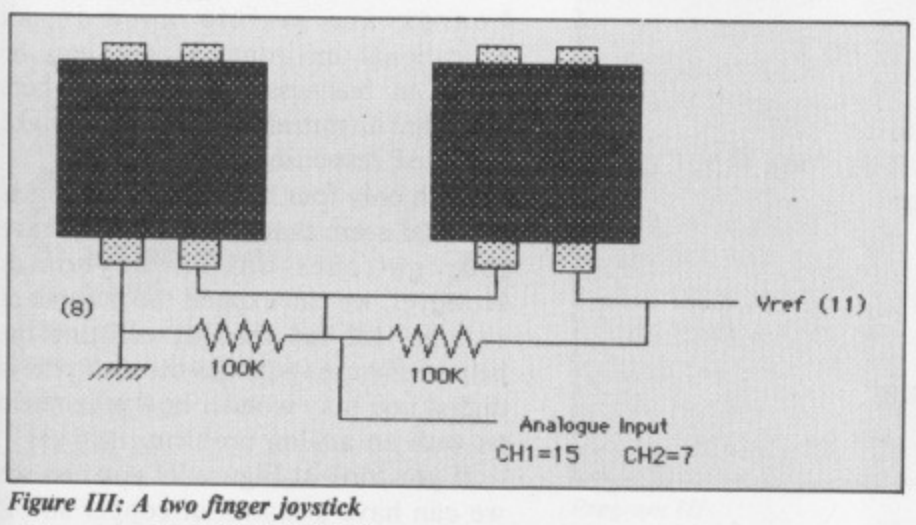


Figure III: A two finger joystick

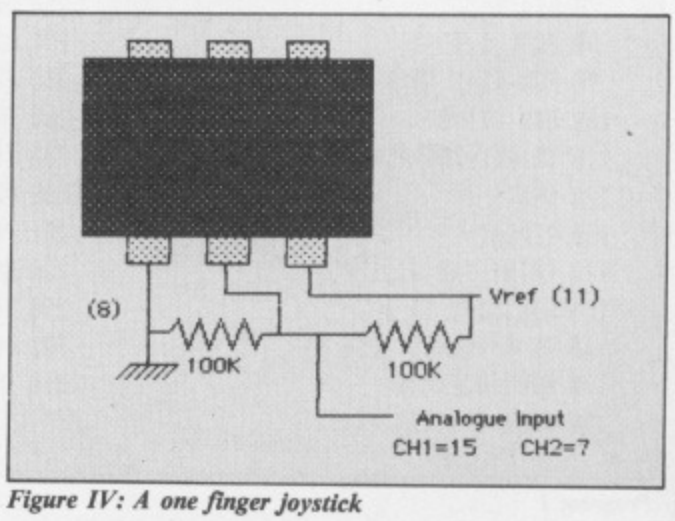


Figure IV: A one finger joystick

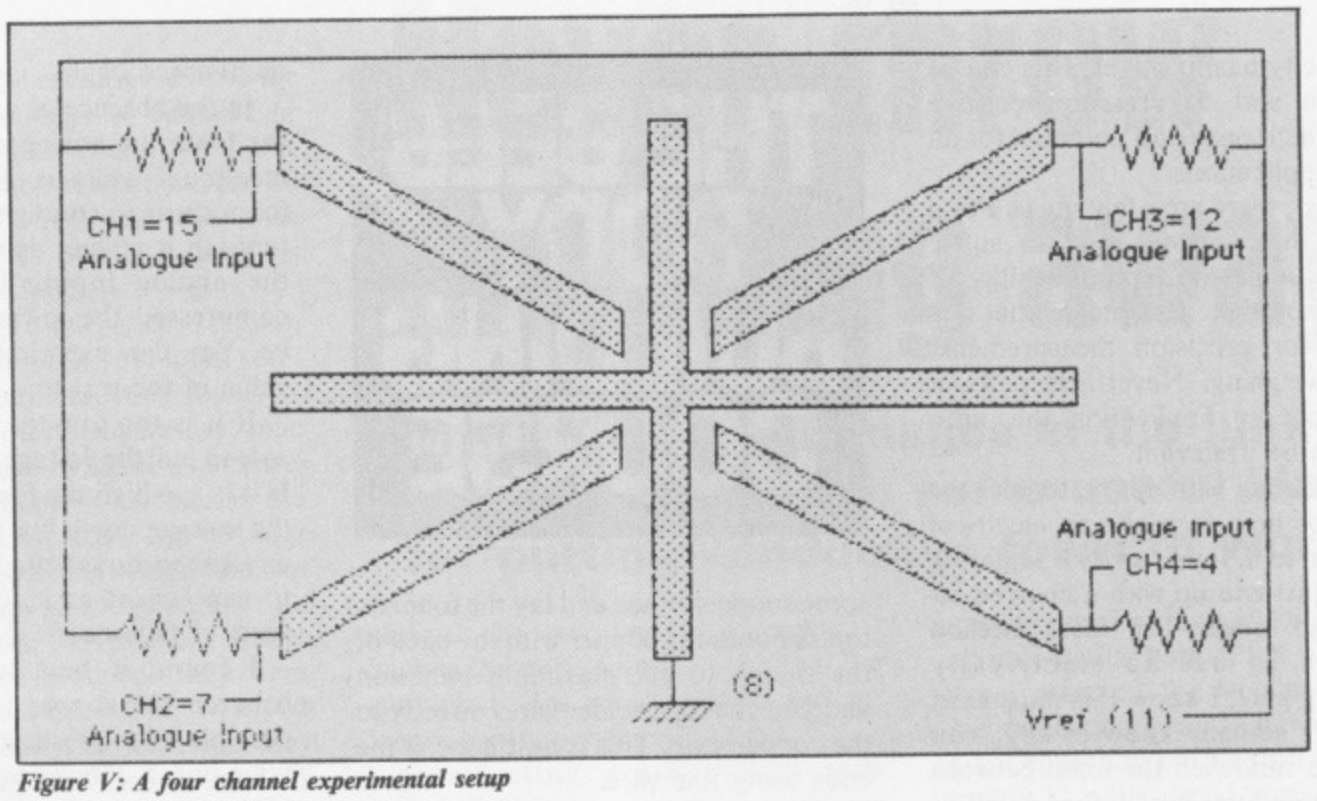


Figure V: A four channel experimental setup

From Page 111

simply roll your finger from one side to the other. In my prototype I did not manage to get the full movement range but it was close enough to be used with most applications that require a joystick.

In order to monitor the effectiveness of these devices I used Program I. This reads each analog input channel in turn and displays its value along with a line proportional to this value. The use of a varying length line makes it a lot simpler to see what's going on and gives a better feel in assessing limits of pull and proportionality.

You can make all sorts of variations on this simple theme. Figure V shows a four channel pressure sensor with the copper strips getting further apart. The idea is that the input reading will vary with the distance along the strip you apply the pressure.

However, this effect was not as great as I expected and I suspect that a little more experimentation with resistor values and copper strip separation would yield better results.

Whatever the arrangement you can use this new form of input in all kinds of interesting ways. For example, let the strips control the sound channels from the touch and pressure of your hands. You could have pitch and volume controlled separately or the speed of a rhythm unit under your direct control.

Or you could control patterns on a moving graphics display with the patterns changing in response to your touch. For a start you could use the sound to light pattern program in the November 1983 issue of *The Micro User*, without modification.

You can also use conducting foam to make something similar to a Concept keyboard. These do not look like keyboards at all. Instead they have an overlay picture underneath which there is a membrane switch.

So if the program is about animals all you have to do to indicate a giraffe to the computer is to touch the picture of the animal thereby activating the switch underneath the picture. These keyboards are mainly used in an educational environment but can be useful in business applications where you want an untrained operator to make a limited response.

With only four analog input channels it would seem that we could only have four switches on our keyboard. However, we can expand the number of switches we can read by enlisting the help of the user port. As the user port is digital you may wonder how it can help us with an analog problem.

If you look at Figure VI you can see we can have a matrix of copper strips.

```
  10 MODE 4
  20 PRINT TAB(0,4)"THE BEEB BODY BU
ILD COURSE"
  30 PRINT"MICRO USER NOV 1986"
  40 PRINT"By Mike Cook"
  50 PRINT"Analogue Port Monitor"
  60 DIM OX%(4),Y%(4)
  70 A$="*"
  80 GCOL 3,1
  90 FOR A%=1 TO 4
 100 OX%(A%)=0
 110 Y%(A%)=700-A%*100
 120 NEXT
 130 REPEAT
 140 PRINT TAB(0,11)
 150 FOR C%=1 TO 4
 160 A%=ADVAL(C%) DIV 64
 170 MOVE 0,Y%(C%)
 180 DRAW OX%(C%),Y%(C%)
 190 MOVE 0,Y%(C%)
 200 DRAW A%,Y%(C%)
 210 PRINT"CHANNEL ";C%;" ";A%;SPC(6
)
 220 PRINT
 230 PRINT
 240 OX%(C%)=A%
 250  NEXT
 254 B%=ADVAL(0) AND 3
 255 FOR D%=1 TO 2
 260 PRINT "Switch ";D%;
 280 IF (B% AND D%) THEN PRINT" OFF"
ELSE PRINT" ON"
 281 PRINT
 285 NEXT
 290 *FX19
 300 *FX19
 310 UNTIL FALSE
```

Program I

You can lay this out on any size grid but I should keep at least an inch between each strip. Where the strips cross there is no connection, so I used some of the backing off the copper strip to separate the columns and rows. Over this matrix is placed a large sheet of conducting foam and the point of pressure can be calculated quite easily.

All the analog inputs (rows) are pulled up. If all the digital outputs (columns) are at logic 1 then no row can be pulled down. If, however, one column is placed at logic zero then this can pull the inputs down. The input pulled the furthest is the one nearest the compression on the foam.

If the analog inputs are checked while each column in turn is placed at logic zero then the lowest reading will indicate where the foam is being pressed. I used Body Build Packs 1 & 2 to make the connections to the user port (see the September 1986 issue of *The Micro User* for a brief description) but you could use a connector and ribbon cable.

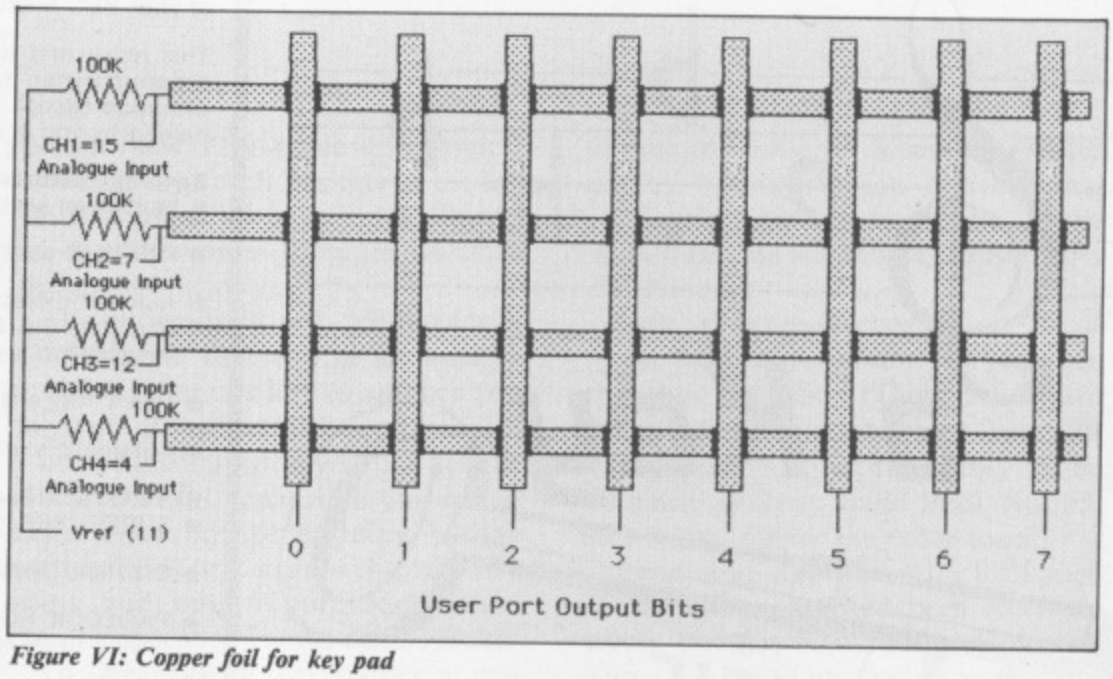


Figure VI: Copper foil for key pad

Program II is used to check out the construction. This places a zero on each user port output in turn then reads and displays the value on the analog input port. To get the value of the travelling zero to output to the user port I use the simple method of generating a travelling 1, (start with 1 and keep multiplying by two). Then, before the result is output, I invert the value with an EOR command.

The display of numbers is in the same formation as the matrix and you will be able to see it in action. I found I could get a better speed of response if I used the *FX17 command to force the conversion on one channel and then wait until conversion was completed. As *FX commands do not accept a variable as a parameter I had to call each channel up specifically. A tidier program could be made by converting the command into a string and passing it to the command line interpreter but this

→

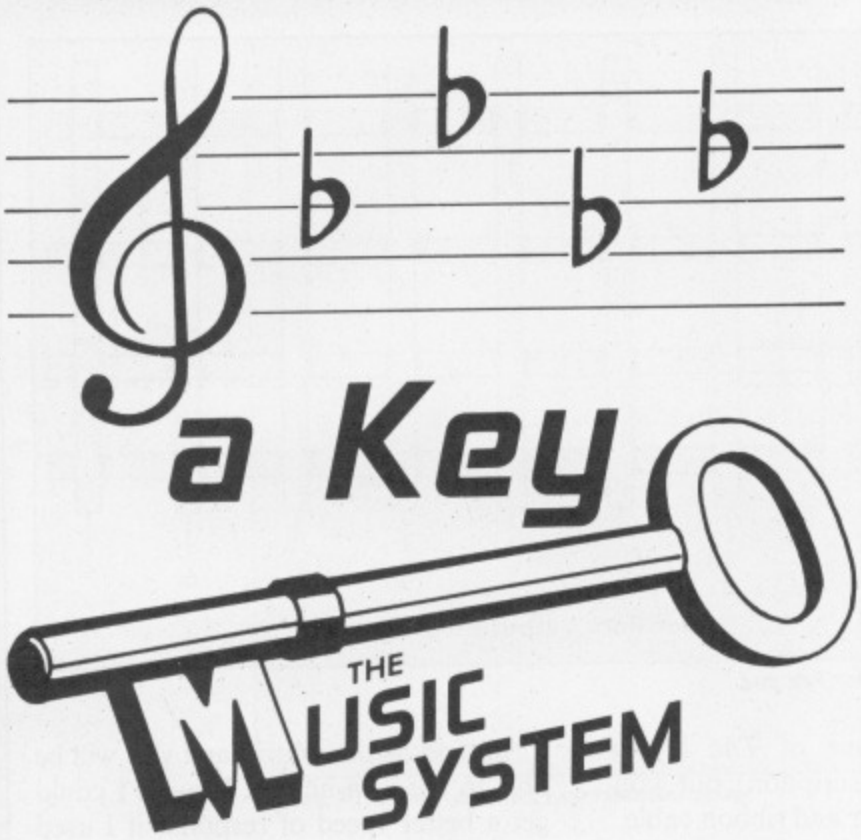
```
  10 MODE 7
  11 PRINT
  20 PRINT"THE BEEB BODY BUILD COURS
E"
  30 PRINT"MATRIX KEYPAD TEST"
  40 PRINT"By Mike Cook"
  50 PRINT
  60 ?&FE62=&FF
  70 REPEAT
  80 PRINTTAB(0,5)
  90 C%=1
 100 REPEAT
 110 ?&FE60=C% EOR 255
 120 *FX17,1
 130 PROC_FIN(1)
 140 *FX17,2
 150 PROC_FIN(2)
 160 *FX17,3
 170 PROC_FIN(3)
 180 *FX17,4
 190 PROC_FIN(4)
 200 PRINT
 210 C%=C%*2
 220 UNTIL C%=256
 230 UNTIL FALSE
 240 DEF PROC_FIN(A%)
 250 REPEAT
 260 UNTIL (ADVAL(0) DIV 256)=A%
 270 B%=ADVAL(A%) DIV 64
 280 PRINTB%;
 290 ENDPROC
```

Program II

```
  10 MODE 7
  20 PRINT
  30 PRINT"THE BEEB BODY BUILD COURS
E"
  40 PRINT"MATRIX KEYPAD DRIVER"
  50 PRINT"By Mike Cook"
  60 PRINT
  70 T%=950
  80 ?&FE62=&FF
  90 REPEAT
 100 ?&FE60=0
 110 FOR A%=1 TO 4
 120 IF ADVAL(A%) DIV 64 < T% THEN P
ROC_SCAN
 130 IF K%<>0 THEN PRINT "KEY ";K%;"
 DOWN":K%=0
 140 NEXT
 150 UNTIL FALSE
 160 DEF PROC_SCAN
 170 LOCAL M%,C%,COL%,ROW%,B%
 180 M%=1024
 190 C%=1
 200 REPEAT
 210 ?&FE60=C% EOR 255
 220 *FX17,1
 230 PROC_FIN(1)
 240 *FX17,2
 250 PROC_FIN(2)
 260 *FX17,3
 270 PROC_FIN(3)
 280 *FX17,4
 290 PROC_FIN(4)
 300 C%=C%*2
 310 UNTIL C%=256
 320 C%=-4
 330 REPEAT
 340 ROW%=ROW% DIV 2
 350 C%=C%+4
 360 UNTIL ROW%=0
 370 K%=C%+A%
 380 ENDPROC
 390 DEF PROC_FIN(A%)
 400 REPEAT
 410 UNTIL (ADVAL(0) DIV 256)=A%
 420 B%=ADVAL(A%) DIV 64
 430 IF B%<M% THEN M%=B%:COL%=A%:ROW
%=C%
 440 ENDPROC
```

Program III

Now works on BBC Master, B+ and ALL dfs and ddfs (inc. SOLIDISC and WATFORD)



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From Page 113

raises difficulties between Basics 1 and 2. To incorporate these ideas into a program however, you need to give each matrix position a number and only scan the matrix when you know something is being pressed. An example of such a routine is given in Program III. To see if anything is being pressed simply put all the columns to zero and look at each analog input channel in turn.

If the reading is below the threshold *T%* then go and scan the matrix. This is done in a similar way to the previous program only this time we make a note of the value, column and channel number of the minimum reading. Then we can work out the matrix position from these values. The value returned will be the intersection nearest to the pressure.

The only problem here is that the column value is a variable with a logic 1 in one bit. For each position to the left the bit is found we have to add four to the matrix number (because we have four input channels).

The program is not "de-bounced" which means that if you are rapidly changing from one key to another you might get some intermediate value. This is done deliberately so you can see the effect. In a real application you would either incorporate a delay before starting the matrix scan or else take two scans and only report back when successive scans give the same results.

To finish off the keyboard you can overlay a plastic sheet or put a cardboard mask with holes in to press. You could even cut out shapes in the cardboard and those would act as protection for the foam. Remember you can glue to the top surface of the foam with no detrimental effect. This type of keyboard involves a much greater degree of travel than conventional membrane switches but some people think this is an advantage rather than a disadvantage.

Like all projects constructed out of "junk box" material not everyone has the same junk box. Therefore I have tracked down suppliers of the foam and the other bits and pieces and they can be obtained as Body Build Pack No. 35. (See Page 159 for the order form.)

I was quite surprised at the high price of this foam as I had been receiving pieces free for many years. However, with a size of 300mm square you should be able to make a decent keyboard. And you'll have more than enough copper strip – you could always take up stained glass work.

● *So, there you have it, a project from high tech packing material. Next month back to the high tech itself.*

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2 screen memories in modes 4, 5 and 6

PETER GAUNT describes a fast screen switching utility

THERE probably comes a time in every second processor owner's life when they have a flash of insight and think: "Hang on a minute, what's all that memory in the I/O doing now?". Pretty soon after this the answer appears: "Not a lot".

OK, so quite a bit of it is being used for the screen, workspace and buffers, but even with two disc filing systems running, a fully exploded font and the screen in Mode 0, there's still 3.75k of RAM sitting idle.

Many people use this for running utilities which for one reason or another must directly address screen or OS memory, but they're probably still left with a whole load redundant.

There's room in the I/O memory for two separate screen memories in Modes 4, 5 and 6, and this article describes a utility living in the I/O processor which lets you have them.

You can choose which one you're currently using with simple OSBYTE (*FX) calls. You may even choose to be outputting to one screen while the other is displayed on the VDU, and you can copy one screen on to the other.

The program works with any BBC Micro OS1.2 and above. It will also work without a second processor, but this leaves even less memory in Mode 4 than you normally have in Modes 0 to 2.

All sorts of possibilities open up. At a simple utilitarian level you can have a menu of options on one screen and your main graphics output on another. You can then switch to your menu without losing the picture you've drawn. When you switch back to the other screen it'll still be there.

If you want to be a little more flash you can use the copy screen command and overlay your menu on top of your graphics, a sort of primitive pull-down menu.

Dual screens can also be very useful for animation. If you're moving a lot of objects around you have to wipe out the old positions before drawing the new. If your program is in Basic the wiping out and redrawing can make your program look very tacky.

Using two screens and the ability to draw on one screen while the other is displayed you can draw alternate positions on different screens, only revealing the screen when all the drawing has been done.

Type in Program I, save it and then run it. This will assemble the code, then save it with the name *dualscn*. You will find that the load and execution address of *dualscn* have the top two bytes set to &FFFF. This is so that the filing system will load it into the I/O processor. Initially you'll have to assemble the program under Basic II or Hi-Basic.

The code can be used from disc by entering ***dualscn,** which will load and initialise it. If you use tape then you'll have to enter ***run dualscn.** Some disc filing systems can't run code properly in the I/O processor and if you use one of these you'll have to switch to the Acorn DFS by pressing D-Break.

You'll now find that the computer will respond to the commands in Table I.

OSBYTE (*FX) 136 is exactly the same as *CODE and is easier to use from assembler.

Codes 26, 28 and 24 are included because the screens *must* operate inside software windows, otherwise CLS and scrolling messes them up. Make sure you don't use VDU26 to remove windows but use *CODE 26 instead. Codes 24 and 28 are an added bonus. These only operate on the current output screen.

You must also make sure that you don't change mode using MODE or VDU22 or you will lose the dual screens. Use *CODE 22 instead.

The code produces three error messages, with error numbers 252 to 254, which can be trapped from Basic in the usual way. See Table II.

To get an idea of how to use the screen-swapping commands run the code then enter *CODE 22,5 to set up two Mode 5 screens. After a *CODE 22 command you'll be left on screen 1. For the moment change screens using the *CODE X,2 command. If you use *CODE X,0 and *CODE X,1 you may well find you're typing on a different screen to the one which is displayed. You won't be able to see anything.

Try setting things like the graphics colour and windows differently on the two screens. You'll find that when you swap from one screen to the other and back again all the parameters are remembered.

It is even possible to get half way through drawing a triangle using PLOT85 and swap screens – the computer will still remember where it was.

Once you've got the hang of it you can try writing a few short programs. You'll probably find it easier to use

OSCLI to issue *CODE commands so that you can use variables. If you do this then you'll have to use Basic II or Hi-Basic.

To see how to use the screen swapping commands in a program look at the demo, Program II, which is a simple program to rotate wire framed objects, in this case a cube. Leave out all the *CODE commands when you first run it and replace *CODE 22,4 with MODE 4. You'll find that the rotating cube doesn't look very good since you can see it wiping itself out each time it moves. If you now add the *CODE commands it will look much better.

There is one slight catch, the colour palettes are not completely independent. If you change the palette with VDU19 on, say, screen 2 while screen 1 is displayed, the colours of the display will change. When you switch output back to screen 1 its palette will be restored.

The palette of the screen on display is always that of the screen which is being used for output.

Most of the time this isn't a problem. If you only use *CODE X,2 to swap screens it will appear as if the palettes are completely separate. Since keeping independent palettes slows the screen swapping down slightly, you can use *CODE 20 to turn the facility off. Both screens will then share the same palette until you use *CODE 19.

You may find it useful to be able to find out which screen is actually in use and which is displayed from inside programs. You can do this using *CODE 4 to find which is the current output screen and *CODE 5 which will tell you which screen is on display.

Both these commands return their result in the keyboard buffer, from where you can read them with GET$ or INKEY$.

The program works in a fairly simple way. The operating system keeps track of the parameters it is currently using for screen output by keeping copies of them in page 3 of RAM and zero page. For instance, before it prints any text on the screen it will look at location &357 to see what colour it is supposed to use.

When you use the COLOUR command from Basic you change the contents of this address. Other things like the current text window, the cursor position and the graphics origin are also kept somewhere in page 3. Change these memory contents and you change the parameters.

One of the things kept in page 3 is the address of the start of screen memory. If you alter this the OS will start sending its output to a different part of RAM. You will not, however, see anything being printed. You haven't yet told the chip which actually produces the screen – the 6845 – which part of the memory it is supposed to look at.

The 6845 doesn't look at &34E but at two of its own internal registers. If the two chips are looking at different, non-overlapping parts of memory then the OS can output to one part of memory while the 6845 is displaying another on the VDU.

The program intercepts the user vector which is used by *CODE. Whenever you use commands which change the output screen all the VDU

→

***CODE 22,Y**	Switch to Mode Y and set up two screens (4 to 6).
***CODE X,0**	Use screen X for output (X=1 or 2).
***CODE X,1**	Display screen X.
***CODE X,2**	Output to and display screen X.
***CODE 3**	Copy current output screen to the other screen.
***CODE 4**	Tell the user which is the current output screen.
***CODE 5**	Tell the user which is currently on display.
***CODE 26**	Restore all windows to the whole screen.
***CODE28**	Restore text window only to the whole screen.
***CODE 24**	Restore graphics window only to the whole screen.
***CODE 19**	Palettes of two screens to be semi-independent.
***CODE 20**	Both screens to use the same palette.

Table I: The new commands

● **Mode!**	(252)	You can only use Modes 4, 5 or 6.
● **Not set up**	(254)	You haven't yet set things up with *CODE 22.
● **Mode changed**	(235)	You've changed mode since the last *CODE 22.

Table II: The new error messages and numbers

PROBLEM

I AM interested in using my BBC Micro to decode Baudot code received from short wave transmissions.

This requires that the micro is set up to receive 1 start bit, 5 data bits and 1.5 stop bits (1 or 2 stop bits would be acceptable).

Also transmission of data takes place at 45.45, 50 and 75 baud, but the BBC Micro only seems to cater for speeds down to 75 baud.

I have been through both the User Guide and the Advanced User Guide, but can find no indication of how to set this. – D. Hobson, Bell Bar, Hatfield.

SOLVED

I don't think you want to receive Baudot code, as none has been transmitted for about 80 years.

What you are talking about is CCITT code No.2 which some people mistakenly call Muray code. This is used by radio amateurs and is known as RTTY.

There is no way of making the 6850 accept these standards. What you have to do is to attach a UART to the 1mHz bus or do some fancy software with the user port's shift register.

Either way you need an adapter for converting the tones into logic levels. I know of one company supplying all the necessary equipment built up – J. Melvin G3LIV, 2 Salters Court, Gosforth, Newcastle, Tyne & Wear NE3 5BH.

Mike Cook

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DIAGRAM

Still the only drawing program available for the BBC micro which gives you the ability to draw really large diagrams and scroll them smoothly around the screen stopping to edit them at any time if required.

Pineapple's unique method of storing the diagram information on disc means that the size of diagrams is limited only by the free space on disc, and not the amount of computer memory you have available. (A blank 80 track disc will allow up to 39 mode 0 screens of diagram).

The superb print routines supplied with the program enable large areas of the diagram to be printed in a single print run in a number of different sizes and rotated through 90 deg. if required. Full use can also be made of printers which have a wider than normal carriage available.

The program is fully compatible with the Marconi Tracker ball described below.

PLEASE STATE 40 or 80 TRACK DISC & WHETHER STANDARD BBC or MASTER VERSION IS REQUIRED

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MARCONI TRACKER BALL

This high quality device comes with it's own Icon Artmaster drawing program and utilities to enable it to be used in place of keyboard keys, joysticks, or with your own programs.

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TRACKER BALL for MASTER series

The Pointer ROM is supplied instead of the Icon Artmaster disc and enables the Tracker ball to work directly with the MASTER series computers. (e.g. to use with TIMPAINT etc.). Prices are the same as for the standard tracker ball.

POINTER

The Pointer Rom is available separately for people already owning tracker balls, and comes with instructions for use with the MASTER computer.

PRICE £12.50 + VAT

PCB

This new release from Pineapple is a printed circuit board draughting aid which is aimed at producing complex double sided PCB's very rapidly using a standard BBC micro and any FX compatible dot-matrix printer.

The program is supplied on EPROM and will run with any 32k BBC micro (including Master series). Also supplied is a disc containing a sample PCB layout to demonstrate the programs features.

By using an EPROM for the program code the maximum amount of RAM is available for storing component location and ASCII identification files etc. (Up to 500 components and 500 ASCII component descriptions may be stored for a given layout). These is no limit to the number of tracks for a given PCB, although the maximum size of board is restricted to 8" ★ 5.6".

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

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 scale, enabling direct contact printing to be used on resist covered copper clad board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample prinouts.

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From Page 117

variables in page 3 and zero page are copied into a store and replaced by those for the other screen.

*CODE 22 initially copies the default values to the store so that there is something there to swap. Commands to change the displayed screen simply use VDU23 to write to registers 12 and 13 of the 6845 CRTC chip.

The problem with the palettes is caused by VDU19 writing directly to the video ULA. Fortunately, a copy of the palette is kept in page 3 and so long as you haven't used *CODE 20 the video ULA is set up anew each time you swap output screens by reading this copy. OSWORD &C is used to do this, instead of VDU19, since it is faster but does the same thing.

When you've been playing around with the program for a while you might come across an oddity. Let's say you've set up two screens and drawn things on them and you then swap continuously between them using a REPEAT... UNTIL loop and *CODE 1,1/ *CODE 2,1. You'll find the swapping is quite slow unless you press a key on the keyboard.

'The program has endless possibilities – most of which I've only hinted at, many of which I haven't even thought of...'

If you output anything in between the swaps or read the keyboard with INKEY(0) everything will speed up considerably. This only happens if you're using the program from a second processor and only when using *CODE X,1. *CODE 1,2, which both swaps output and displayed screen works very quickly. I guess it has something to do with Tube protocols.

The overlaid menus? Let's say you're outputting some graphics to screen 1 and want to overlay a menu. Copy screen 1 to screen 2 using *CODE 3, switch output to screen 2, print your menu then display screen 2. When you switch back to screen 1 you'll find your graphics intact.

The program has endless possibilities, most of which I've only hinted at, many of which I haven't even thought of.

If anyone should come up with anything really interesting using *dualscn* then I sure would like to hear of it.

Have fun!

Full listing starts on Page 120

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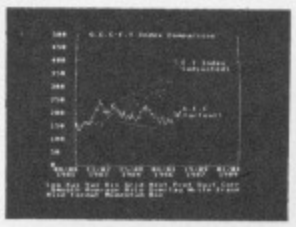
RAPID READER



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From Page 119

Program I

```
  10 REM *** DUAL SCREEN ***
  20 REM (C) The Micro User
  30 REM By Pete Gaunt
  40 REM Assemble code to use I/O pr
ocessor memory for extra screen
  50 REM Code must run in the I/O pr
ocessor
  60 REM Modes 4, 5 and 6 only.
  70 REM Code saved after assembly a
s "dualscn"
  80 REM Run using Basic 2 or Hi-Bas
ic
  90 code=&2C00
 100 DIM ass_addr &400
 110 REM Code assembles at ass_addr
but with origin at "code". Inc store
space
 120 userv=&200
 130 oldv=&230:REM spare vector, may
 cause trouble if other software uses
 it.
 140 oswrch=&FFEE
 150 osword=&FFF1
 160 osbyte=&FFF4
 170 FOR I%=4 TO 6 STEP 2
 180 O%=ass_addr
 190 P%=code
 200 [OPT I%
 210 .change_vectors   \this routine
 called when code is *RUN
 220 LDA#dualscreen MOD &100   \chec
k that code isn't being re-run
 230 CMPuserv
 240 BNEfirst_run
 250 LDA#dualscreen DIV &100
 260 CMPuserv+1
 270 BNEfirst_run
 280 JMPend_init
 290 .first_run  \set up vectors if
not already set
 300 LDAuserv    \store copy of old
user vector contents
 310 STAoldv
 320 LDAuserv+1
 330 STAoldv+1
 340 LDA#dualscreen MOD &100  \userv
ec to point to new code
 350 STAuserv
 360 LDA#dualscreen DIV &100
 370 STAuserv+1
 380 .end_init
 390 RTS
 400 .dualscreen
 410 CMP#0
 420 BEQok \*code enters with A=0, *
line with A=1, oswords 224+ with A=22
4+
 430 JMP(oldv)  \if not *code or *fx
136 then exit to old routine
 440 .ok
 450 STAstore_A
 460 STXstore_X
 470 STYstore_Y
 480 CPX#3  \X less than three switc
hes screens
 490 BCSnot_screens
 500 JSRscreens
 510 BCCfine  \returns with C=0 if e
verything OK
 520 JMPbad_command
 530 .fine
 540 JMPreturn
 550 .not_screens
 560 CPX#22
 570 BNEnot_init  \X=22 means set up
 for Mode Y
 580 JSRinitialise
 590 JMPreturn
 600 .not_init
 610 CPX#26   \X=26 removes text and
graphics windows
 620 BNEnot_clear_all
 630 JSRcheck
 640 JSRno_textwind
 650 JSRno_graphwind
 660 JMPreturn
 670 .not_clear_all
 680 CPX#24    \X=24 removes graphic
s window
 690 BNEnot_no_graphwind
 700 JSRcheck
 710 JSRno_graphwind
 720 JMPreturn
 730 .not_no_graphwind
 740 CPX#28    \X=28 removes text wi
ndow
 750 BNEnot_no_textwind
 760 JSRcheck
 770 JSRno_textwind
 780 JMPreturn
 790 .not_no_textwind
 800 CPX#19  \X=19 or 20 switches pa
lette flag
 810 BEQps
 820 CPX#20
 830 BNEnot_palette_switch
 840 .ps
 850 JSRcheck
 860 JSRpalette_switch
 870 JMPreturn
 880 .not_palette_switch
 890 CPX#3
 900 BNEnot_copy
 910 JSRcheck
 920 JSRcopy_screen
 930 JMPreturn
 940 .not_copy
 950 CPX#4
 960 BNEnot_tell_output
 970 JSRcheck
 980 JSRtell_output
 990 JMPreturn
1000 .not_tell_output
1010 CPX#5
1020 BNEbad_command
1030 JSRcheck
1040 JSRtell_display
1050 .return
1060 RTS      \main return point
1070 .bad_command    \any other X val
ue exits to old uservec routine
1080 LDAstore_A
1090 LDXstore_X
1100 LDYstore_Y
1110 JMP(oldv)
1120 .screens
1130 CPX#0
1140 BNEx_ok
1150 SEC
1160 JMPend_screens
1170 .x_ok
1180 JSRcheck
1190 CPY#0  \Y=0 means switch output
to screen X
1200 BNEnot_output
1210 JSRoutput_to_screen
1220 CLC
1230 JMPend_screens
1240 .not_output
1250 CPY#1  \Y=1 means reveal screen
X
1260 BNEnot_reveal
1270 JSRreveal_screen
1280 CLC
1290 JMPend_screens
1300 .not_reveal
1310 CPY#2  \Y=2 means output to and
reveal screen X
1320 BEQnr_ok
1330 SEC
1340 JMPend_screens
1350 .nr_ok
1360 JSRoutput_to_screen
1370 JSRreveal_screen
1380 CLC
1390 .end_screens
1400 RTS
1410 .output_to_screen
1420 JSRcurrent_screen
1430 CPXstore_X
1440 BEQend_ots  \if screen requeste
d is the one already used then do not
hing
```

```
 1450 JSRswap_variables \else swap va
riables
 1460 .end_ots
 1470 RTS
 1480 .rev_scn BRK \store for current
 revealed screen start address
 1490 .reveal_screen
 1500 JSRget_start \get start of scre
en X in A
 1510 STArev_scn
 1520 LSR A
 1530 LSR A
 1540 LSR A  \divide by 8
 1550 STArev_codes+17
 1560 LDA#rev_codes MOD &100
 1570 STAvdu+1
 1580 LDA#rev_codes DIV &100
 1590 STAvdu+2
 1600 LDXrev_codes
 1610 JSRvdu    \change 6845 CRTC reg
isters 12 & 13
 1620 RTS
 1630 .rev_codes
 1640 EQUB(20) \20 bytes
 1650 EQUD(0)  \equiv to VDU23;12,x;0
;0;0;23;13,0;0;0;0;
 1660 EQUD(&0D000000)
 1670 EQUD(&00001700)
```

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```
 1680 EQUD(0)
 1690 EQUD(&17000CFF)  \"FF" set up b
y reveal routine
 1700 .no_textwind  \set text window
of current output screen to whole scr
een
 1710 LDA#t_window MOD &100
 1720 STAvdu+1
 1730 LDA#t_window DIV &100
 1740 STAvdu+2
 1750 LDXt_window
 1760 JSRvdu
 1770 RTS
 1780 .t_window \store for default te
xt window
 1790 EQUB(6) \6 bytes
 1800 EQUD(&001E)  \sequence ends in
30 (to simulate VDU26)
 1810 EQUW(0) \set by set_up routine
to 28,a,b,c,d,30 (in reverse)
 1820 .no_graphwind \set graphics win
dow to whole screen
 1830 LDA#ngw_codes MOD &100
 1840 STAvdu+1
 1850 LDA#ngw_codes DIV &100
 1860 STAvdu+2
 1870 LDXngw_codes
 1880 JSRvdu
 1890 RTS
 1900 .ngw_codes
 1910 EQUB(20) \20 bytes
 1920 EQUD(0)  \equiv to VDU29,0;0;24
,0;0;1279;1023;25,4,0;0;
 1930 EQUD(&FF031904)
 1940 EQUD(&0000FF04)
 1950 EQUD(&00180000)
 1960 EQUD(&1D000000)
 1970 .copy_screen  \relies on screen
s starting at page boundary
 1980 JSRcurrent_screen  \and lo-byt
e of length always being zero
 1990 CPX#1
 2000 BNEtwo_to_one
 2010 LDXscreen
 2020 LDYscreen+1
 2030 JMPmove_mem
 2040 .two_to_one
 2050 LDXscreen+1
 2060 LDYscreen
 2070 .move_mem
 2080 STXstart1+2
 2090 STYstart2+2
 2100 LDA#0
 2110 STAstart1+1
 2120 STAstart2+1
 2130 LDY#0
 2140 LDXlength
 2150 .start1
 2160 LDA&FFFF,Y  \dummy operand
 2170 .start2
 2180 STA&FFFF,Y  \dummy operand
 2190 INY
 2200 BNEstart1
 2210 INCstart1+2
 2220 INCstart2+2
 2230 DEX
 2240 BNEstart1
 2250 RTS
 2260 .tell_output
 2270 JSRflush_keyboard
 2280 JSRcurrent_screen
 2290 TXA
 2300 CLC
 2310 ADC#48
 2320 TAY
 2330 JSRpoke_keyboard
 2340 RTS
 2350 .tell_display
 2360 JSRflush_keyboard
 2370 LDY#49
 2380 LDArev_scn
 2390 CMPscreen
 2400 BEQsc1
 2410 INY
 2420 .sc1
 2430 JSRpoke_keyboard
 2440 RTS
 2450 .flush_keyboard
 2460 LDA#21
 2470 LDX#0
 2480 JSRosbyte
 2490 RTS
 2500 .poke_keyboard  \put char in Y
into keyboard buffer
 2510 LDA#138
 2520 LDX#0
 2530 JSRosbyte
 2540 RTS
 2550 .get_start  \return hi-byte of
screen start in A
 2560 LDXstore_X
 2570 DEX
 2580 LDAscreen,X
 2590 RTS
 2600 .vdu  \output VDU codes. Number
 of bytes passed in X
 2610 LDA&FFFF,X  \dummy operand
 2620 JSRoswrch
 2630 DEX  \note list is accessed fr
om end. Set up in reverse.
 2640 BNEvdu
 2650 RTS
 2660 .current_screen  \returns curre
nt output screen (1 or 2) in X
 2670 LDX#1
 2680 LDA&34E
 2690 CMPscreen
 2700 BEQend_cs
 2710 INX
 2720 .end_cs
 2730 RTS
 2740 .palette_switch  \set flag for
separate/common palettes
 2750 LDA#0
 2760 STApalette
 2770 CPX#20
 2780 BNEnot_off
 2790 INCpalette  \palette=1 if X=20
(no separate palettes)
 2800 .not_off
 2810 RTS
 2820 .check  \check if enabled or mo
de changed
 2830 LDAenabled
 2840 BNEcheck_mode
 2850 BRK  \generate error if not s
et up (with *CODE22,Y)
 2860 EQUB(254)
 2870 EQUS("Not set up")
 2880 BRK
```

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From Page 121

```
 2890 .check_mode
 2900 LDA&355  \&355 contains current
 mode
 2910 CMPmode
 2920 BNEmode_changed
 2930 RTS
 2940 .mode_changed   \generate error
 if mode has changed since set up
 2950 BRK
 2960 EQUB(253)
 2970 EQUS"Mode changed"
 2980 BRK
 2990 .enabled
 3000 BRK
 3010 .swap_variables  \swap current
variables with stored variables
 3020 LDX#0
 3030 .swap_loop
 3040 LDA&300,X
 3050 PHA
 3060 LDAstore,X
 3070 STA&300,X
 3080 PLA
 3090 STAstore,X
 3100 INX
 3110 CPX#&7F
 3120 BNEswap_loop
 3130 LDX#0
 3140 .swapzp_loop
 3150 LDA&D0,X
 3160 PHA
 3170 LDAzp_store,X
 3180 STA&D0,X
 3190 PLA
 3200 STAzp_store,X
 3210 INX
 3220 CPX#&A
 3230 BNEswapzp_loop
 3240 LDApalette
 3250 BNEnot_palette \if palette<>0 t
hen ignore palette changes
 3260 LDA&360   \&360 contains number
 of colours in current mode minus one
 3270 STAno_colours
 3280 INCno_colours
 3290 LDX#0
 3300 .palette_loop
 3310 LDA&36F,X    \&36F - &37E conta
in current palette
 3320 STXosword_block
 3330 STAosword_block+1
 3340 TXA
 3350 PHA
 3360 LDA#&C       \use osword &C to
program Video ULA with stored palette
 3370 LDX#osword_block MOD &100  \fas
ter than VDU19
 3380 LDY#osword_block DIV &100
 3390 JSRosword
 3400 PLA
 3410 TAX
 3420 INX
 3430 CPXno_colours
 3440 BCCpalette_loop
 3450 .not_palette
 3460 RTS
 3470 .initialise    \called after *c
ode22,Y
 3480 CPY#7
 3490 BCSno_way
 3500 CPY#4
 3510 BCCno_way  \if not Mode 4,5 or
6 then flag error
 3520 STYmode
 3530 LDA#22
 3540 JSRoswrch
 3550 TYA
 3560 JSRoswrch   \change to Mode Y
 3570 LDA&354     \store length of scr
een memory (hi-byte)
 3580 STAlength
 3590 LDA&34E
 3600 STAscreen  \store bottom of nor
mal screen memory (hi-byte)
 3610 SEC
 3620 SBClength \subtract length of s
creen
 3630 STAscreen+1  \store start addre
ss for extra screen
 3640 LDA#28
 3650 STAt_window+6
 3660 LDX#0
 3670 LDY#4
 3680 .wloop \store default text wind
ow
 3690 LDA&308,X
 3700 STAt_window+1,Y
 3710 INX
 3720 DEY
 3730 BNEwloop
 3740 JSRno_textwind
 3750 LDX#0
 3760 .su_loop  \store default VDU va
riables from page 3 in store
 3770 LDA&300,X
 3780 STAstore,X
 3790 INX
 3800 CPX#&7F
 3810 BNEsu_loop
 3820 LDX#0
 3830 .su_loop2
 3840 LDA&D0,X   \store default vdu v
ariables from zero page in zp_store
 3850 STAzp_store,X
 3860 INX
 3870 CPX#&A
 3880 BNEsu_loop2
 3890 LDAscreen+1 \alter value of scr
een start in store to that of new scr
een
 3900 STAstore+&4E
 3910 STAstore+&51
 3920 LDA#1
 3930 STAenabled   \set enabled flag
 3940 \clear both screens. OSBYTE 136
is same as *code
 3950 LDA#136
 3960 LDX#2
 3970 LDY#0
 3980 JSRosbyte
 3990 LDA#12
 4000 JSRoswrch
 4010 LDA#136
 4020 LDX#1
 4030 LDY#2
 4040 JSRosbyte
 4050 LDA#12
 4060 JSRoswrch
 4070 RTS
 4080 .no_way  \generate error if not
Mode 4, 5 or 6
 4090 LDA#0
 4100 STAenabled
 4110 BRK
 4120 EQUB(252) \error number 252
 4130 EQUS("Mode!")
 4140 BRK
 4150 .palette BRK
 4160 .store_A BRK
 4170 .store_X BRK
 4180 .store_Y BRK
 4190 .screen   \store for hi-bytes o
f start of each screen
 4200 BRK
 4210 BRK
 4220 .length   \store for hi_byte of
 screen length
 4230 BRK
 4240 .no_colours   \store for number
 of colours in current mode
 4250 BRK
 4260 .mode
 4270 EQUB(255)  \store for screen mo
de when set up (with *code22,Y)
 4280 .osword_block
 4290 EQUB(0)
 4300 EQUD(0)
 4310 .store
 4320 EQUS(STRING$(&80,CHR$0)) \store
 for page 3 (first &7F bytes)
 4330 .zp_store
 4340 EQUS(STRING$(&B,CHR$0))  \store
 for zero page &D0 to &DA
```

→

REPLAY

The Acclaimed Utility for Tape to Disc Transfer

'Master' ROM boards, 'phone for availability.

"REPLAY is a pretty marvellous device, more than a toy for those who have to document software, very useful if you can only buy a tape version of a program (it doesn't matter what nooks and crannies the code is packed into) and a good opportunity to have fun with the screens of your choice. A liberating piece of software and highly recommended".

'Software Reviews',
A&B Computing, Dec. '85

"REPLAY is the current state-of-the-art answer to tape to disc transfer, available for the BBC B (and B+). This consists of a ROM and some hardware which must be attached inside the computer. Once installed it will cope with virtually any program you care to put to the test".

'First Byte',
ACORN USER, May, '86.

"Many facilities are advertised to enable BBC micro users to copy or back-up protected programs and transfer them from tape to disc. While some break the protection in the process and thus assist software piracy, others are more responsible, using techniques which retain the protection. Vine Micros, who already leads the field in the latter group with the T.D.ROM, now supplies REPLAY".

'ROM Roundup',
MICRO USER, July, '86.

TAPE TO DISC TRANSFER – MID-PLAY 'STOP AND SAVE' - MID-GAME PAUSE FACILITY
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R1770 - Opus 3.45 and Solidisk Issue 1 board: R1770A - Acorn 1770 DFS and ADFS, also Solidisk Issue 2 board:
R1770B+ - BBC B+: R1770C - Opus Challenger: R1770W - Watford DDFS: R2791 Opus 3.15:
R2793 - Opus 3.35: R8877 - Cumana QFS: (Acorn 'Master' in preparation).
Price **£35.00** inclusive, with full instructions for installation and use.
Further details and reviews available.

The MATRIX ROM
BBC 'B', B+ and ELECTRON

This ROM will be of interest to Engineers, Scientists and Mathematicians. Using BASIC commands it is an indispensable tool for performing matrix operations and the solving of linear simultaneous equations. The MATRIX ROM was written with the co-operation of the Civil Engineering Dept., University of Southampton.
Price: **£36.00** (plus VAT) includes Manual.
Quantity discount offered.
Further details can be provided on request.

"B+ to B" CONVERSION KIT

This addition will enable BBC 'B' tapes to be used on the B+ computer. (requires 1.20 O.S. ROM) Price: £21.95 with O.S. 1.20 ROM.
£15.95 without ROM (both prices include VAT & Post).

WRITE-PROTECT SWITCH
Acorn 'Master'.

A small module which plugs into the computer and offers write-protection to the sideways RAM banks. Price: **£8.95** inclusive.

The ADDCOMM ROM
BBC 'B', B+ and ELECTRON.

A Toolkit/Graphics utility adding 40 extra BASIC commands. Brilliant programming and value for money. 16-page brochure and reviews sent on request. Price: **£28.00** inclusive.

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The June and July issues of COMPUTER GAMER magazine reviewed 16 soccer simulations, including Ocean's MATCHDAY and INTERNATIONAL MATCHDAY (128k SP), Addictive's FOOTBALL MANAGER, Artic's WORLD CUP and WORLD CUP 2, US Gold's WORLD CUP CARNIVAL, Virgin's FA CUP, etc etc. MEXICO '86 was given a NOVA overall rating and 5 "planets" from 5 for Value for Money. Only one other game could equal this, Commodore's classic INTERNATIONAL SOCCER.

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From Page 123

```
 4350 .end
 4360 ]
 4370 NEXT
 4380 S%=code OR &FFFF0000
 4390 OSCLI"*save dualscn "+STR$~ass_
addr+" "+STR$~O%+" "+STR$~S%+" "+STR$
~S%
```

Program II

```
   10 REM Demo of BBC second processo
r dual screen utility
   20 REM (C) The Micro User
   30 REM By Pete Gaunt
   40 REM Run code in I/O processor
   50 *RUN DUALSCN
   60 REM Switch to Mode 4 and set up
 two screens
   70 *CODE22,4
   80 REM Output to screen 2 and set
graphics origin
   90 *CODE2,0
  100 VDU29,640;512;23;8202;0;0;0;
  110 REM Output to screen 1 and set
up origin
  120 *CODE1,0
  130 VDU29,640;512;23;8202;0;0;0;
  140 REM Turn off separate palettes
(slight speed increase)
  150 *CODE20
  160 ON ERROR GOTO810
  170 VDU19,1,6;0;
  180 PROCget_data
  190 x_rot=3:y_rot=-2:z_rot=-1
  200 x_rot=90-x_rot:y_rot=90-y_rot:z
_rot=90-z_rot
  210 cos_x=COSRADx_rot:sin_x=SINRADx
_rot
  220 cos_y=COSRADy_rot:sin_y=SINRADy
_rot
  230 cos_z=COSRADz_rot:sin_z=SINRADz
_rot
  240 REM This could be done more bri
efly with an inner loop and using the
  250 REM OSCLI command. Done this wa
y for clarity.
  260 REPEAT
  270 REM Output to screen 1
  280 *CODE1,0
  290 PROCrotate_coordinates
  300 PROCconvert_to_2D
  310 CLS
  320 PROCdraw_shape
  330 REM Reveal screen 1
  340 *CODE1,1
  350 REM Output to screen 2
  360 *CODE2,0
  370 PROCrotate_coordinates
  380 PROCconvert_to_2D
  390 CLS
  400 PROCdraw_shape
  410 REM Reveal screen 2
  420 *CODE2,1
  430 UNTIL FALSE
  440 END
  450 DEFPROCconvert_to_2D
  460 LOCAL C%,D
  470 FORC%=1 TO no_of_points%
  480 D=2500/(5000-Z(C%))
  490 X_2D(C%)=X(C%)*D
  500 Y_2D(C%)=Y(C%)*D
  510 NEXT
  520 ENDPROC
  530 DEFPROCrotate_coordinates
  540 LOCAL C%,X,Y,Z
  550 FOR C%=1 TO no_of_points%
  560 IF x_rot<>0:X=X(C%):Y=Y(C%):Z=Z
(C%):Z(C%)=Z*sin_x-Y*cos_x:Y(C%)=Y*si
n_x+Z*cos_x
  570 IF y_rot<>0:X=X(C%):Y=Y(C%):Z=Z
(C%):Z(C%)=Z*sin_y-X*cos_y:X(C%)=X*si
n_y+Z*cos_y
  580 IF z_rot<>0:X=X(C%):Y=Y(C%):Z=Z
(C%):Y(C%)=Y*sin_z-X*cos_z:X(C%)=X*si
n_z+Y*cos_z
  590 NEXT
  600 ENDPROC
  610 DEFPROCdraw_shape
  620 LOCAL C%
  630 FOR C%=1 TO no_of_lines%
  640 MOVE X_2D(start_corner%(C%)),Y_
2D(start_corner%(C%))
  650 PLOT5,X_2D(end_corner%(C%)),Y_2
D(end_corner%(C%))
  660 NEXT
  670 ENDPROC
  680 DEFPROCget_data
  690 LOCAL C%
  700 READ no_of_points%
  710 DIM X(no_of_points%),Y(no_of_po
ints%),Z(no_of_points%),X_2D(no_of_po
ints%),Y_2D(no_of_points%)
  720 FOR C%=1 TO no_of_points%
  730 READ X(C%),Y(C%),Z(C%)
  740 NEXT
  750 READ no_of_lines%
  760 DIM start_corner%(no_of_lines%)
,end_corner%(no_of_lines%)
  770 FOR C%=1 TO no_of_lines%
  780 READ start_corner%(C%),end_corn
er%(C%)
  790 NEXT
  800 ENDPROC
  810 ON ERROR OFF
  820 *CODE1,2
  830 IF ERR<>17 THEN MODE7:REPORT:PR
INT" at line ";ERL:END
  840 CLS
  850 CLEAR
  860 GOTO160
  870 REM Cube
  880 REM Co-ordinates of points (8)
  890 DATA 8,-560,560,560,560,560,560
,560,-560,560,-560,-560,560,-560,560,
-560,560,560,-560,560,-560,-560,-560,
-560,-560
  900 REM Connections between points
(12 lines)
  910 DATA 12,1,2,2,3,3,4,4,1,1,5,2,6
,3,7,4,8,5,6,6,7,7,8,8,5
```

PROBLEM

I RECENTLY decided that I would like to fit a ROM expansion board to my micro so I bought ATPL's Sidewise and fitted it myself.

On switching on all seemed well, with *HELP showing all ROMs present and correct. But on trying to run software that had performed faultlessly before fitting the expansion unit I found that the machine crashed with monotonous regularity.

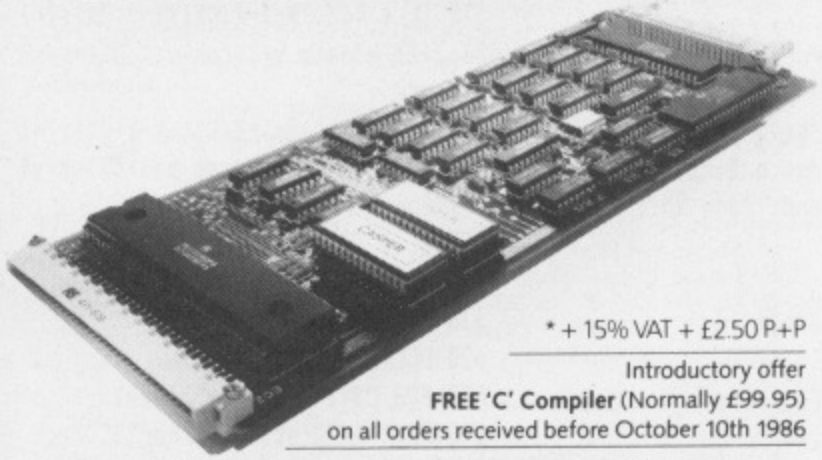
Thinking that this was a faulty board I returned it to the dealer who refunded my money. On the advice of a friend I bought an MR 2000 Mini ROM board from Pear Tree Computers as he had fitted one in his micro with great success. However this board also caused my micro to crash or fail to load programs . — D. Cowley, Sheffield.

SOLVED

The problem is probably that when the board is fitted with extra ROMs the variable PAGE is moved as each ROM grabs its own workspace. The error messages you give certainly point to this problem. Disable the ROMs you do not want to use with a toolkit.

This listing is included in this month's cassette tape offer. See order form on Page 159.

CASPER UPGRADES YOUR BBC TO 68000 FOR £299*



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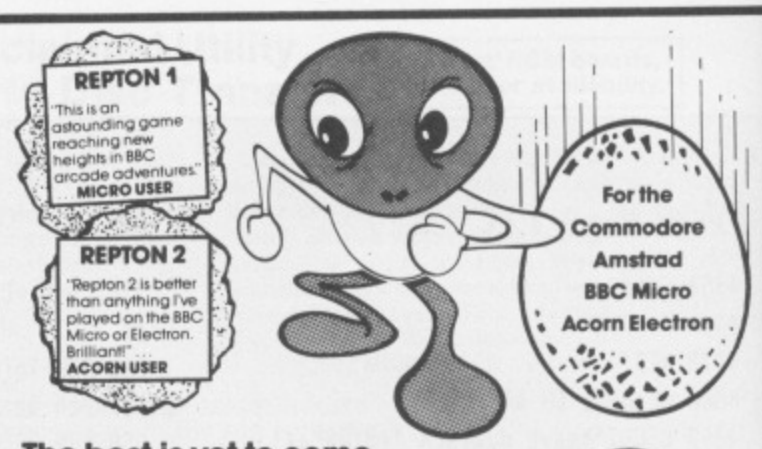

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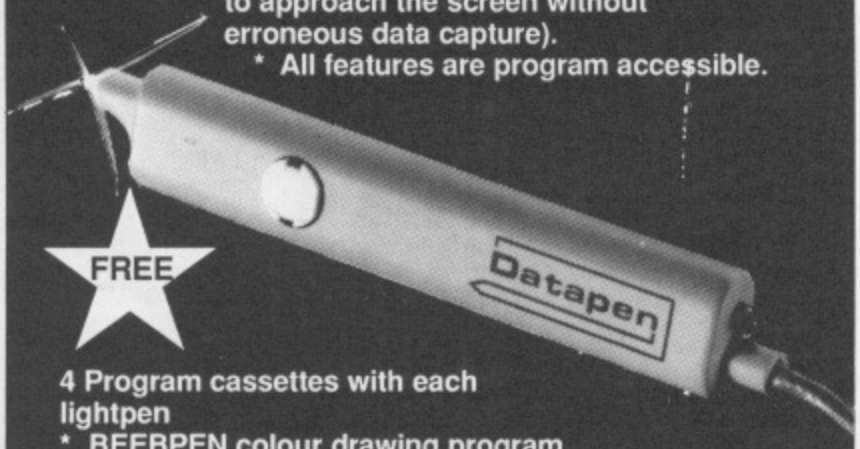

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Excellent reviews

Access

NAME _____ ADDRESS _____

TITLE _____ COMPUTER _____ 40/80 Disc/tape

From Page 47

Listing I

```
  10 REM PRINTER *COMMANDS
  20 REM By Jonathan Temple
  30 REM (c) The Micro User
  40 MODE 7
  50 base=&900
  60 PROCassemble(&7000,1)
  70 PROCassemble(base,0)
  80 PROCread
  90 PRINT''"Code seems correct."
 100 PRINT "Now save using:-"
 110 PRINT''"*SAVE ""PRINTER"" ";STR$
~(base);" ";STR$~(T%+2)'
 120 END
 130 DEFPROCassemble(address,check)
 140 FOR pass=0 TO 2 STEP 2
 150 oldvec=?&208+?&209*256
 160 printer=&FFEE
 170 osbyte=&FFF4
 180 P%=address
 190 [OPT pass
 200 .setvec
 210 LDA #start MOD256
 220 LDX #start DIV256
 230 CMP &208:BNE notset
 240 CPX &209:BEQ vecset
 250 .notset
 260 STA &208:STX &209
 270 .vecset
 280 RTS
 290 .start
 300 PHP:PHA
 310 STX cmline+1:STY cmline+2
 320 LDA #table MOD256:STA &F2
 330 LDA #table DIV256:STA &F3
 340 LDX #0:JSR cmline
 350 CMP #42:BNE continue
 360 INX
 370 .continue
 380 STX &F9
 390 .search
 400 LDX &F9:DEX:LDY #255
 410 .nextchar
 420 INX:INY
 430 JSR cmline:AND #223:STA &F8
 440 LDA (&F2),Y:BMI return
 450 CMP #13:BEQ found
 460 CMP &F8:BEQ nextchar
 470 CPY #2:BCC nextentry
 480 LDA &F8:CMP #46:BEQ found
 490 CMP #13:BEQ found
 500 .nextentry
 510 LDA (&F2),Y:INY
 520 CMP #13:BNE nextentry
 530 TYA:CLC:ADC (&F2),Y
 540 ADC &F2:STA &F2
 550 LDA &F3:ADC #0:STA &F3
 560 CLC:BCC search
 570 .found
 580 LDA (&F2),Y:INY
 590 CMP #13:BNE found:TYA:PHA
 600 LDA #3:LDX #10:JSR osbyte
 610 PLA:TAY
 620 LDA (&F2),Y:TAX:DEX
 630 INY:LDA (&F2),Y
```

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

```
 640 CMP #255:BEQ nextcode
 650 DEY:LDA #27:JSR printer
 660 .nextcode
 670 INY:LDA (&F2),Y:JSR printer
 680 DEX:BNE nextcode
 690 LDA #3:LDX #0:JSR osbyte
 700 LDX cmline+1:LDY cmline+2
 710 PLA:PLP
 720 RTS
 730 .return
 740 LDX cmline+1:LDY cmline+2
 750 PLA:PLP
 760 JMP oldvec
 770 .cmline
 780 LDA &FFFF,X:RTS
 790 .table
 800 ]
 810 NEXT
 820 IF check=0 ENDPROC
 830 T%=0:FOR N%=address TO return+8
 840 T%=T%+?N%:NEXT
 850 IF T%<>&66B6 PRINT'"Error in PR
OCassemble"'"Please check and try aga
in."':END
 860 ENDPROC
 870 DEFPROCread
 880 T%=table:READ A$
 890 REPEAT
 900 $T%=A$:T%=T%+LEN(A$)+2
 910 N%=T%-1:READ B$
 920 REPEAT
 930 ?T%=VAL(B$):T%=T%+1
 940 READ B$:UNTIL LEN(B$)>3
 950 ?N%=T%-N%:A$=B$
 960 UNTIL A$="****"
 970 ?T%=255
 980 ENDPROC
 990 REM  DATA FOR COMMANDS
1000 DATA RESET,64
1010 DATA CONDENSED,15
1020 DATA ECONDENSED,255,18
1030 DATA UNDERLINE,45,1
1040 DATA EUNDERLINE,45,0
1050 DATA ITALICS,52
1060 DATA EITALICS,53
1070 DATA EMPHASISED,69
1080 DATA EEMPHASISED,70
1090 DATA BOLD,71
1100 DATA EBOLD,72
1110 DATA LARGE,14
1120 DATA ELARGE,255,20
1130 DATA PROPORTIONAL,112,1
1140 DATA EPROPORTIONAL,112,0
1150 DATA ELITE,77
1160 DATA PICA,80
1170 DATA AMERICAN,82,0
1180 DATA BRITISH,82,3
1190 DATA HALF,115,1
1200 DATA FULL,115,0
1210 DATA ****
```

Listing II

```
  10 *PRINTER
  20 VDU2
  30 DIMA$(10)
  40 FORI=1TO10:READA$(I):NEXT
  50 FORI=1TO9:FORJ=I+1TO9
  60 *RESET
  70 OSCLI(A$(I)):OSCLI(A$(J))
  80 IFA$(I)<>""PRINTA$(I)" ";
  90 PRINT A$(J)
 100 NEXT:NEXT
 110 VDU3
 120 DATA ""
 130 DATA CONDENSED
 140 DATA UNDERLINE
 150 DATA ITALICS
 160 DATA EMPHASISED
 170 DATA BOLD
 180 DATA LARGE
 190 DATA PROPORTIONAL
 200 DATA ELITE
 210 DATA PICA
```

This listing is included in this month's cassette tape offer. See order form on Page 159.

From Page 101

```
  10REM MALTESE CROSS
  20REM by David Wale
  30REM The Micro User 1986.
  40*KEY0 DELETE10,80|M DELETE2190,2
430|M*TAPE|MFORI%=0 TO TOP STEP4:I%!&
E00=I%!PAGE:N.|MPAGE=&E00|MO.|MRUN|M
  50TIME=0
  60MODE5:VDU23;8202;0;0;0;:PROCtitl
es
  70VDU21:*FX138,0,128
  80END
  90REPEAT UNTIL TIME>500
 100VDU 6:MODE1:DIM DOM%(28),N$(4),S
(4),C%(4)
 110ONERROR IFERR<>17THENMODE6:REPOR
T:PRINT" at line ";ERL:END ELSERUN
 120*FX18
 130COLOUR130:CLS:COLOUR0:P%=RND(-TI
ME):*FX15,1
 140PRINTTAB(3,7)"How many players f
or this game? ";:P%=GET-48:IFP%<2ORP%
>4THENVDU7:PRINTTAB(3,9)"You must cho
ose between 2 and 4":GOTO140 ELSEPRIN
T;P%
 150PRINTTAB(3,14)"Type 'BBC' for co
mputer to play"'':FORK=1TOP%:PRINT'"
  Enter name of player ";K;:INPUT" "
P$:N$(K)=LEFT$(P$,8):S(K)=0:NEXT
 160VDU19,2,3,0,0,0:TX=9.5:TY=9:LX=9
:LY=7.5:BX=TX:BY=7:RX=11:RY=LY:FORK=1
TO28:DOM%(K)=-1:NEXT:FORK=0TO4:C%(K)=
0:NEXT:NG=0:VDU23,1,0;0;0;0;
 170PROCdeal:FORPLR=1TOP%:CLS:IFLEFT
$(N$(PLR),3)="BBC"THEN190ELSEPRINTTAB
(1,13)N$(PLR)''" Ensure nobody else c
an see, then press  'V' to note down
your dominoes."''" Press 'F' when you
 have finished."
 180B$=GET$:IFB$="V"PROChand:GOTO180
ELSEIFB$<>"F"GOTO180
 190NEXT
 200PROCscreen:I=7
 210I=I-1:PLR=DOM%(FNan(I,I)):IFPLR<
1THEN210ELSEDOM%(K)=0:TV=I:BV=I:LV=I:
RV=I:CV=I:D1=I:D2=I
 220GCOL0,2:FORY=480TO548STEP4:MOVE5
60,Y:DRAW696,Y:NEXT:PROCd(8.875,7.625
,"HN")
 230PROCplay
 240PROCpts
 250VDU28,5,22,16,19:COLOUR130:PRINT
'"End of roundY=Another go";:A=GET AN
D 95:IFA=89VDU26:GOTO160ELSE IFA=78 C
LS:PRINT"Another.."TAB(3)"Game Y/N?";
 ELSE GOTO 250
 260A=GET AND 95:IFA=89RUN ELSEIFA=7
8VDU26:END ELSE260
 270DEFPROCplay
 280PLR=PLR+1:IFPLR>P%PLR=1
 290D1=-1:VDU28,5,22,16,19:CLS:COLOU
R131:PRINTN$(PLR):COLOUR130:PRINT"to
play?"
 300IFLEFT$(N$(PLR),3)="BBC"THENPRIN
TTAB(1,2)"-THINKING-";:GOTO1790
 310A=GET:IFD1=-1PROCerr(0)
 320IFA=127GOTO290ELSEIFA=83PROCscor
es:GOTO290ELSEIFA=86PROChand:PROCmenu
:GOTO290
 330IFA<>80ELSENG=NG+1:IFNG=P%:CLS:P
RINT"ALL PASSED. ";:ENDPROC ELSE270
 340IFA>54ORA<48GOTO310ELSED2=A-48:P
RINT;D2;
 350IFD1=-1D1=D2:PRINT":";:GOTO310
 360IFDOM%(FNan(D1,D2))<>PLR PROCerr
(1):GOTO290
 370LK1$=FNlink(D1):LK2$=FNlink(D2):
IFLK1$=""ANDLK2$=""PROCerr(2):GOTO290
 380IFLK1$<>LK2$THEN390ELSEIFC%(4)=0
PROCerr(3):GOTO290ELSE470
 390IFD1<>BV ANDD2<>BV ANDC%(4)=0PRO
Cerr(3):GOTO290
 400IFLK2$<>""ANDDOM%(FNan(D2,D2))<>
0LK2$="":D3=D2
 410IFLK1$<>""ANDDOM%(FNan(D1,D1))<>
0LK1$="":D3=D1
 420IFLK1$=""ANDLK2$=""PROCerr(4):GO
TO290
 430IFLK1$<>""ANDLK2$<>""THEN440ELSE
470
 440PRINTTAB(0,2)"End to link?";:D3=
GET-48:IFD3<>D1 ANDD3<>D2 THEN440
 450IFD3=D1 P$=LK1$ELSEP$=LK2$
 460GOTO480
 470IFLK1$<>""P$=LK1$:D3=D1 ELSEP$=L
K2$:D3=D2
 480NG=0:DOM%(FNan(D1,D2))=0:PROCII:
A=0:FORI=1TO28:IFDOM%(I)=PLR A=A+1
 490NEXT:IFA>0THEN280ELSEPRINTTAB(8,
0)"OUT!":ENDPROC
 500DEFFNan(I,R):LOCALD3,A:K=0:D3=I:
IFI<R I=R:R=D3
 510FORA=6TO0STEP-1:IFA=I A=0:NEXTEL
SEK=K+A+1:NEXT
 520K=K+R+1:=K
 530DEF FNdval(K):IFK<8 D2=(K+6)MOD7
:=6ELSEIFK<14 D2=K MOD8:=5ELSEIFK<19
D2=K MOD14:=4
 540IFK<23 D2=K MOD19:=3ELSEIFK<26 D
2=K MOD23:=2ELSEIFK<28 D2=K MOD26:=1E
LSED2=0:=0
 550DEFFNlink(K):I=30:B$=""
 560IFK=TV I=C%(1):B$="T"
 570IFK=LV ANDC%(2)<I I=C%(2):B$="L"
 580IFK=RV ANDC%(3)<I I=C%(3):B$="R"
 590IFK=BV ANDC%(4)<I I=C%(4):B$="B"
 600=B$
 610DEFPROCdeal:K=26DIVP%:IFK>12K=12
 620FORPLR=1TOP%:FORI=1TOK
 630R=RND(28):IFDOM%(R)<>-1THEN630EL
SEDOM%(R)=PLR:NEXT
 640NEXT:ENDPROC
 650DEFPROChand:VDU28,12,12,16,5:K=0
:I=0
 660REPEAT:K=K+1:IFDOM%(K)<>PLR THEN
690
 670IFI=6VDU28,24,27,29,19:COLOUR130
:CLS:VDU28,26,28,29,22
 680D1=FNdval(K):PRINT;D1;":";D2:I=I
+1
 690UNTILK=28
 700A$=INKEY$(50):IFA$="V"THEN700
 710CLS:VDU28,12,12,16,5:CLS:VDU26:E
NDPROC
 720DEFPROCscreen:VDU19,2,6,0,0,0:GC
OL0,130:CLG:GCOL0,0:VDU29,576;448;
 730MOVE8,8:DRAW8,124:MOVE124,124:DR
AW124,8:FORY=8TO124STEP4:PLOT77,12,Y:
NEXT
```

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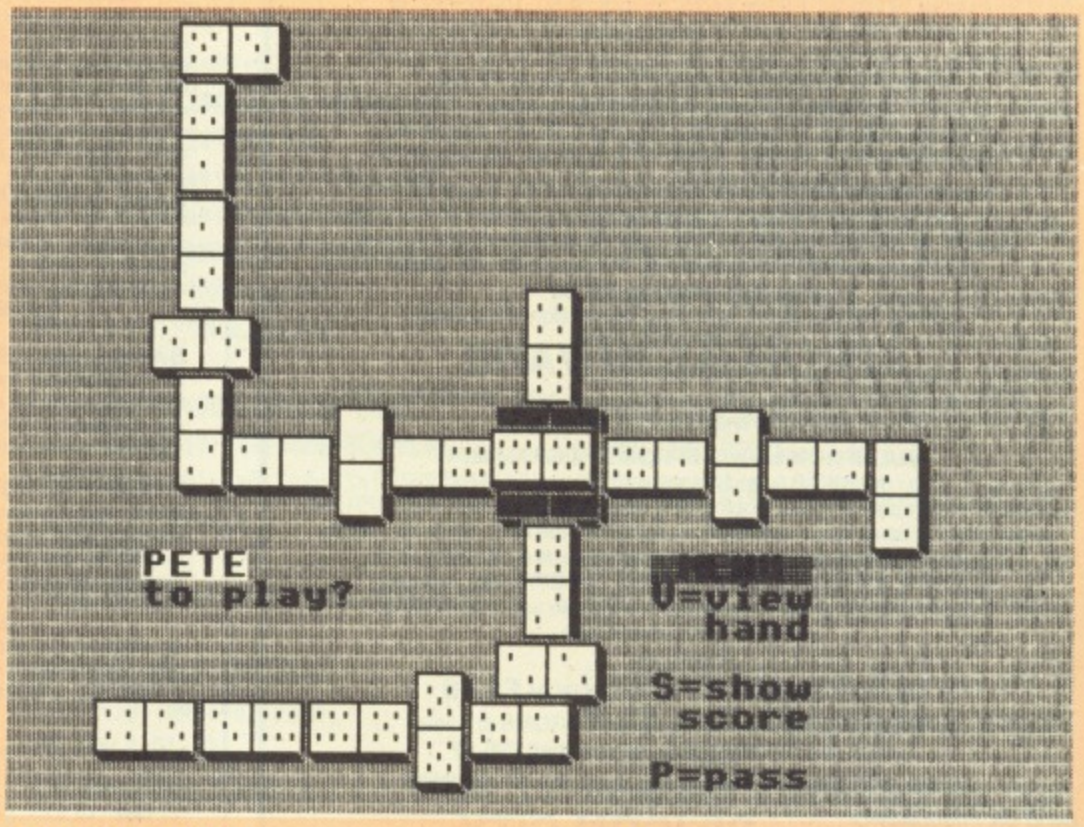
```
 740MOVE12,0:DRAW124,0:MOVE16,-4:DRA
W128,-4:MOVE132,4:DRAW132,120:MOVE136
,0:DRAW136,116
 750GCOL0,2:MOVE76,-4:DRAW68,4:DRAW6
8,128:GCOL0,0
 760PROCmenu:ENDPROC
 770DEFPROCmenu:VDU28,24,28,29,19:CO
LOUR129:PRINT" MENU ";
 780COLOUR130:PRINT"V=view  hand"''"S
=show score"''"P=pass":VDU26:ENDPROC
 790DEFPROCscores:VDU28,23,14,34,18:
COLOUR131
 800FORK=1TOP%:PRINTN$(K);:P$=STR$(S
(K)):PRINTTAB(12-LEN(P$),K-1)P$;:NEXT
 810IFC%(0)=9ENDPROC
 820A$=INKEY$(50):IFA$="S"THEN820ELS
EVDU28,23,13,34,18:COLOUR130:CLS:ENDP
ROC
 830DEFPROCerr(K):VDU28,23,13,34,18:
CLS:IFK=0VDU28,5,22,16,19:PRINTTAB(9,
1);:ENDPROC
 840VDU28,23,14,34,18:PRINT;D1":";D2
" ";:COLOUR131:PRINT"ILLEGAL":COLOUR1
30
```

```
  850IFK=1PRINT"You haven't""that do
mino!"ELSEIFK=2PRINT"Can't link""any
where..."
  860IFK=3PRINT"Form the""Cross firs
t!"ELSEIFK=4PRINT"Double ";D3;" notbe
en played!"
  870ENDPROC
  880DEFPROCpts:VDU28,12,14,16,7:PRIN
T"SPOTSLEFT:":FORA=1TOP%:C%(A)=0
  890FORI=1TO28:IFDOM%(I)=A C%(A)=C%(
A)+FNdval(I)+D2
  900NEXT:PRINT"  ";C%(A):NEXT:K=P%-1
  910REPEAT:TV=200:FORA=1TOP%:IFC%(A)
<TV TV=C%(A)
  920NEXT:I=0:FORA=1TOP%:IFC%(A)=TV S
(A)=S(A)+K:C%(A)=200:I=I+1
  930NEXT:K=K-I:UNTILK<1:C%(0)=9:PROC
scores:ENDPROC
  940DEFPROCII:IFP$<>"R"GOTO1090ELSEC
V=RV:C%(3)=C%(3)+1:A=1450
  950IFRY<>7.5THEN990
  960IFD1<>D2 THEN980ELSEPROCd(RX,7,"
VN"):RX=RX+1:IFRX=17THENRX=16:RY=7
  970GOTOA
  980IFRX=11ORRX=14THENPROCd(RX,RY,"H
N"):RX=RX+2:GOTOA ELSERX=16:RY=6.5:PR
OCd(RX,RY,"VN"):GOTOA
  990IFRX<>16THEN1050
 1000IFD1=D2 THEN1030
 1010IFRY>=2RY=RY-2:PROCd(RX,RY,"VN")
:GOTOA ELSEIFRY>=1RY=RY-1:RX=15ELSERX
=14
 1020PROCd(RX,RY,"HR"):GOTOA
 1030IFRY-1>=0RY=RY-1:PROCd(15.5,RY,"
HN"):IFRY<1RX=15.5
 1040GOTOA
 1050IFD1=D2 THEN1070
 1060IFRX-2>=0RX=RX-2:PROCd(RX,RY,"HR
"):GOTOA ELSEIFRX-1>=0RX=RX-1:PROCd(R
X,RY,"VR"):GOTOA ELSE1080
 1070IFRX-1>=0RX=RX-1:PROCd(RX,0,"VR"
):GOTOA
 1080VDU7:ENDPROC
 1090IFP$<>"L"GOTO1220ELSECV=LV:C%(2)
=C%(2)+1:A=1460
 1100IFLY<>7.5THEN1130ELSEIFD1<>D2 GO
TO1120ELSELX=LX-1:PROCd(LX,7,"VN"):IF
LX=3LY=9
 1110GOTOA
 1120IFLX=9ORLX=6LX=LX-2:PROCd(LX,LY,
"HR"):GOTOA ELSELX=3:PROCd(LX,LY,"VR"
):LY=9.5:GOTOA
 1130IFLX<>3THEN1180
 1140IFD1=D2 THEN1160
 1150IFLY<=14PROCd(LX,LY,"VR"):LY=LY+
2:GOTOA ELSEIFLY<=15PROCd(LX,LY,"HN")
:LX=5:GOTOA ELSELY=LY-1:LX=4:PROCd(LX
```




```
,LY,"HN"):LX=6:GOTOA
 1160IFLY<=15PROCd(2.5,LY,"HN"):LY=LY
+1:IFLY>15LX=4.5:LY=LY-1
 1170GOTOA
 1180IFD1=D2 GOTO1200
 1190IFLX<=18PROCd(LX,LY,"HN"):LX=LX+
2:GOTOA ELSEIFLX<=19PROCd(LX,LY,"VN")
:LX=LX+1:GOTOA ELSE1210
 1200IFLX<=19PROCd(LX,14,"VN"):LX=LX+
1:GOTOA
 1210VDU7:ENDPROC
 1220IFP$<>"T"GOTO1340ELSECV=TV:C%(1)
=C%(1)+1:A=1470
 1230IFTX<>9.5GOTO1250
 1240IFD1=D2 PROCd(9,TY,"HN"):TY=TY+1
:GOTOA ELSEIFTY=12PROCd(TX,TY,"HN"):T
X=11.5:GOTOA ELSEPROCd(TX,TY,"VR"):TY
=TY+2:GOTOA
 1250IFTY<>12GOTO1300
 1260IFD1=D2 THEN1280
 1270IFTX+2<=20PROCd(TX,TY,"HN"):TX=T
X+2:GOTOA ELSEIFTX+1<=20TY=TY-1:PROCd
(TX,TY,"VN"):GOTOA
 1280IFTX+1>20TX=TX-1:TY=TY-2:PROCd(T
X,TY,"VN"):GOTOA ELSEPROCd(TX,11.5,"V
N"):TX=TX+1:IFTX>19TX=TX-1:TY=11.5
 1290GOTOA
 1300IFD1=D2 THEN1330
 1310IFTY-2>=0TY=TY-2:PROCd(TX,TY,"VN
"):GOTOA
 1320IFTY-1>=0TY=TY-1:PROCd(TX,TY,"HR
"):GOTOA
 1330IFTY-1>=0TY=TY-1:PROCd(18,TY,"HN
"):GOTOA ELSEVDU7:ENDPROC
 1340CV=BV:C%(4)=C%(4)+1:A=1480
 1350IFBX<>9.5THEN1370
 1360IFD1=D2 BY=4:PROCd(9,BY,"HN"):GO
TOA ELSEIFBY=4BY=3:BX=8.5:PROCd(BX,BY
,"HR"):GOTOA ELSEBY=5:PROCd(BX,BY,"VN
"):GOTOA
 1370IFBY<>3THEN1420
 1380IFD1=D2 THEN1400
 1390IFBX-2>=0BX=BX-2:PROCd(BX,BY,"HR
"):GOTOA ELSEIFBX-1>=0BX=BX-1:PROCd(B
X,BY,"VR"):BY=BY+2:GOTOA
 1400IFBX-1<0BY=BY+1:PROCd(BX,BY,"VR"
):BY=BY+2:GOTOA ELSEBX=BX-1:PROCd(BX,
2.5,"VN"):IFBX<1BY=4.5
 1410GOTOA
 1420IFD1=D2 THEN1440
 1430IFBY+2<=16PROCd(BX,BY,"VR"):BY=B
Y+2:GOTOA ELSEIFBY+1<=16PROCd(BX,BY,"
HN"):BY=BY+1:GOTOA
 1440IFBY+1<=16PROCd(0,BY,"HN"):BY=BY
+1:GOTOA ELSEVDU7:ENDPROC
 1450IFD1=CV RV=D2:ENDPROC ELSERV=D1:
ENDPROC
 1460IFD1=CV LV=D2:ENDPROC ELSELV=D1:
ENDPROC
 1470IFD1=CV TV=D2:ENDPROC ELSETV=D1:
ENDPROC
 1480IFD1=CV BV=D2:ENDPROC ELSEBV=D1:
ENDPROC
 1490DEFPROCd(XX,YY,P$):GCOL0,0:XX=XX
*64:YY=YY*64:VDU29,XX;YY;:L$=RIGHT$(P
$,1):P$=LEFT$(P$,1):IFP$="V"GOTO1570
 1500MOVE120,4:DRAW8,4:DRAW8,60:DRAW1
20,60:DRAW120,8:GCOL0,3:FOR Y=4TO56:P
```

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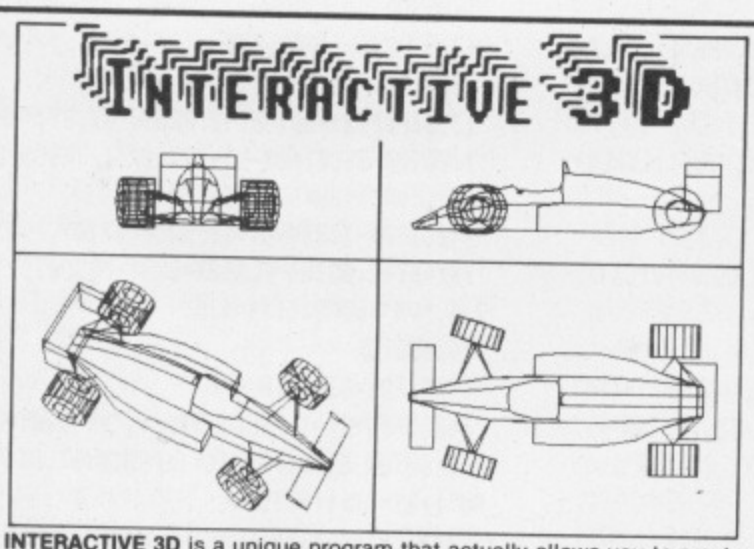

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From Page 129

```
LOT77,68,Y:NEXT:GCOL0,0:MOVE68,4:DRAW
68,60
 1510GCOL0,2:PLOT69,8,-4:PLOT69,12,-4
:PLOT69,4,0:PLOT69,8,0:MOVE4,4:DRAW4,
64:IFXX=448ANDYY=480THENGCOL0,0ELSEDR
AW128,64:GCOL0,0
 1520K=0:FORX=12TO124STEP4:IFPOINT(X,
-4)=0K=X+4ELSEPLOT69,X,0
 1530NEXT:MOVE16,-4:DRAW128,-4:IFK>0G
COL0,2:PLOT69,K,-4:PLOT69,K+4,-4:PLOT
69,K,0:GCOL0,0
 1540FORY=4TO56STEP4:IFPOINT(140,Y)=2
THENPLOT69,132,Y
 1550NEXT:FORY=0TO52STEP4:IFPOINT(144
,Y)=2THENPLOT69,136,Y
 1560NEXT:GOTO1640
 1570MOVE56,4:DRAW8,4:DRAW8,124:DRAW6
4,124:DRAW64,8:GCOL0,3:FORY=4TO120:PL
OT77,32,Y:NEXT:GCOL0,0:MOVE8,64:DRAW6
4,64
 1580GCOL0,2:MOVE4,4:DRAW4,128:DRAW68
,128:PLOT69,68,124:PLOT69,72,124:GCOL
0,0
 1590K=0:FORY=120TO4STEP-4:IFPOINT(72
,Y)=0K=Y-4ELSEPLOT69,68,Y
 1600NEXT:MOVE72,116:DRAW72,0:IFK>0GC
OL0,2:PLOT69,72,K:PLOT69,68,K:GCOL0,0
 1610FORX=12TO60STEP4:IFPOINT(X,-4)=2
THENPLOT69,X,0
 1620NEXT:FORX=16TO64STEP4:IFPOINT(X,
-8)=2THENPLOT69,X,-4
 1630NEXT
 1640IFD1=CV ANDL$="N"PROCf(D1,D2)
 1650IFD2=CV ANDL$="N"PROCf(D2,D1)
 1660IFD1=CV ANDL$="R"PROCf(D2,D1)
 1670IFD2=CV ANDL$="R"PROCf(D1,D2)
 1680GCOL0,0:ENDPROC
 1690 DEFPROCf(D1,D2)
 1700IFP$="H"PROCdot(D1,P$):VDU29,XX+
64;YY;:PROCdot(D2,P$):ENDPROC ELSE PR
OCdot(D2,P$):VDU29,XX;YY+60;:PROCdot(
D1,P$):ENDPROC
 1710DEFPROCdot(K,P$):IFK=0ENDPROC
 1720DATA36,36,24,48,48,24,48,48,24,2
4
 1730DATA24,48,48,24,24,24,48,48
 1740DATA20,48,36,48,52,48,20,24,36,2
4,52,24
 1750IFK=6RESTORE1740ELSERESTORE1720
 1760IFK=20RK=4RESTORE1730
 1770FORI=1TOK:IFP$="V"READY,X:X=72-X
ELSEREADX,Y
 1780PLOT69,X,Y:PLOT69,X,Y-4:NEXT:END
PROC
 1790X=0:Y=0:REM BBC PLAY
 1800FORA=1TO28:IFDOM%(A)<>PLR GOTO18
90
 1810D1=FNdval(A):LK1$=FNlink(D1):LK2
$=FNlink(D2):H%=D1+D2
 1820IFLK1$=LK2$ANDC%(4)=0THEN1890
 1830IFLK1$=LK2$THEN1860
 1840IFDOM%(FNan(D1,D1))<>0LK1$=""
 1850IFDOM%(FNan(D2,D2))<>0LK2$=""
 1860IFLK1$=""ANDLK2$=""THEN1890
 1870IFLK1$<>""PROCwgt(D1)
 1880IFLK2$<>""PROCwgt(D2)
 1890NEXTA
 1900IFX=0A=80:GOTO330:REM PASS
 1910D1=FNdval(Y):GOTO480:REM PLAY
 1920DEFPROCp(R):X=R:Y=A:D3=I:IFD3=D1
P$=LK1$ELSEP$=LK2$
 1930ENDPROC
 1940DEFPROClead:XX=0:YY=0:LOCALD3:D3
=I
 1950IFI=D1 ANDI<>D2 D3=D2
 1960IFI<>D1 ANDI=D2 D3=D1
 1970LOCALA,D1,D2
 1980FORA=1TO28:IFDOM%(A)<>PLR THEN20
20
 1990D1=FNdval(A)
 2000IFD3=D1 ORD3=D2 XX=XX+1
 2010IFD3=D1 ANDD3=D2 YY=1:IF(D1+D2)>
=8YY=8
 2020NEXTA:ENDPROC
 2030DEFPROCwgt(I):PROClead:IFLK1$=LK
2$THEN2120
 2040IFC%(4)=0ANDH%>8GOTO2160
 2050IFX<8PROCp(8)
 2060IFH%>8ANDX<9?PROCp(9)
 2070IFXX>1ANDX<10PROCp(10)
 2080IFXX>1ANDH%>8ANDX<11PROCp(11)
 2090IFYY>8ANDX<12PROCp(12)
 2100IFYY=8ANDX<13PROCp(13)
 2110ENDPROC
 2120IFX<XX PROCp(XX)
 2130IFN6>0ANDX<15PROCp(15)
 2140IFN6>0ANDXX>1ANDX<16PROCp(16)
 2150ENDPROC
 2160IFYY>0PROCp(18)ELSEPROCp(17)
 2170IFYY=0PROCp(19)
 2180ENDPROC
 2190DEFPROCtitles
 2200VDU19,0,5,0,0,0:VDU19,1,5,0,0,0:
VDU19,2,5,0,0,0:VDU19,3,5,0,0,0:GCOL0
,130:CLG
 2210GCOL0,128:VDU24,400;336;624;816;
:CLG
 2220VDU24,656;336;880;816;:CLG
 2230GCOL0,130:VDU24,400;456;880;696;
:CLG
 2240GCOL0,131:VDU24,400;464;880;688;
:CLG
 2250GCOL0,0:MOVE400,464:DRAW400,688:
DRAW880,688:DRAW880,464:DRAW400,464:D
RAW400,468:DRAW880,468:MOVE400,684:DR
AW880,684
 2260GCOL0,1:VDU5:MOVE416,624:PRINT"M
ALTESE":MOVE480,560:PRINT"CROSS":VDU4
 2270PROCTD(528,832,752,1023):VDU29,5
28;832;:PROCVDOM:VDU26
 2280PROCTD(528,0,752,316):VDU29,528;
72;:PROCVDOM:VDU26
 2290PROCTD(0,464,368,688):VDU29,128;
464;:PROCHDOM:PROCTS(-120,122):VDU26
 2300PROCTD(912,464,1279,688):VDU29,9
12;464;:PROCHDOM:PROCTS(300,72):PROCT
S(300,172):VDU26
 2310VDU19,0,0,0,0,0:VDU19,1,1,0,0,0:
VDU19,3,7,0,0,0
 2320COLOUR0:COLOUR130:PRINTTAB(13,24
)"by"TAB(14,26)"David"TAB(14,27)"Wale
"
 2330DATA24,272,T,120,272,H,216,272,E
,48,224,M,136,224,I,232,224,C,328,224
,R,424,224,O
 2340DATA80,176,U,176,176,S,272,176,E
,368,176,R
 2350VDU23,224,253,255,255,255,255,25
5,255,255:VDU5:RESTORE2330:FORL=1TO12
:GCOL0,1:READX,Y,A$:MOVEX,Y:PRINTCHR$
(224)
 2360MOVEX,Y+8:DRAWX+72,Y+8:MOVEX,Y+4
:DRAWX+72,Y+4:DRAWX+72,Y-32:MOVEX+64,
Y:DRAWX+64,Y-32:GCOL0,0:DRAWX-4,Y-32:
DRAWX-4,Y+4
 2370MOVEX+8,Y:GCOL0,3:PRINTA$:NEXT:V
DU4
 2380ENDPROC
 2390DEFPROCTD(X,Y,XX,YY):GCOL0,128:V
DU24,X;Y;XX;YY;:CLG:GCOL0,131:VDU24,X
+8;Y+8;XX-8;YY-8;:CLG:ENDPROC
 2400REM:MOVEX,Y:DRAWX,YY:DRAWXX,YY:D
RAWXX,Y:DRAWX,Y:ENDPROC
 2410DEFPROCVDOM:MOVE0,4:DRAW224,4:MO
VE0,240:DRAW224,240:PROCTS(60,60):PRO
CTS(60,128):PROCTS(60,192):PROCTS(156
,192):PROCTS(156,128):PROCTS(156,60):
ENDPROC
 2420DEFPROCHDOM:MOVE0,0:DRAW0,220:MO
VE240,0:DRAW240,220:PROCTS(52,72):PRO
CTS(120,72):PROCTS(184,72):PROCTS(184
,172):PROCTS(120,172):PROCTS(52,172):
ENDPROC
 2430DEFPROCTS(X,Y):GCOL0,0:MOVEX,Y:M
OVEX,Y-16:MOVEX+16,Y-16:PLOT85,X,Y:MO
VEX+16,Y:PLOT85,X+16,Y-16:ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 159.

From Page 69

```
  10 REM ***   Life   ***
  20 REM By R.A.Waddilove
  30 REM *(c) Micro User*
  40 MODE 7
  50 ON ERROR GOTO 1760
  60 PROCassemble
  70 PROCinfo
  80 CLEAR
  90 MODE 5
 100 VDU 23,224,&E0,&E0,&E0,&E0,0,0,
0,0
 110 REPEAT
 120 PROCdesign
 130 G%=0
 140 COLOUR 2:PRINT TAB(0,31)SPC(19)
TAB(3,31)"Generation:";
 150 REPEAT
 160 G%=G%+1:PRINT TAB(14,31);G%;
 170 CALL &900
 180 UNTIL INKEY(-74)
 190 PROCcheat
 200 UNTIL FALSE
 210 END
 220 DEF PROCcheat
 230 VDU 22,7
 240 FOR I%=2 TO 3:PRINT TAB(7,I%)CH
R$141"C h e a t  S h e e t !":NEXT
 250 PRINT''' TAB(5)CHR$133"1"CHR$131
"Normal rules of Life."
 260 PRINT'TAB(5)CHR$133"2"CHR$131"N
o overcrowding."
 270 PRINT'TAB(5)CHR$133"3"CHR$131"N
o starvation."
 280 PRINT'TAB(5)CHR$133"4"CHR$131"L
ittle starvation/overcrowding."
 290 PRINT TAB(7,20)CHR$129"Press a
number...";
 300 REPEAT K%=GET-48:UNTIL K%>0 AND
K%<5
 310 IF K%=1 M%?1=2:L%?1=4
 320 IF K%=2 M%?1=2:L%?1=7
 330 IF K%=3 M%?1=0:L%?1=4
 340 IF K%=4 M%?1=0:L%?1=6
 350 ENDPROC
 360
 370 DEF PROCinfo
 380 FOR I%=0 TO 1:PRINT TAB(12,I%)C
HR$134;CHR$141;"L I F E":NEXT
 390 PRINT'CHR$131"Life simulates th
e growth of a colony"'CHR$131"of cell
s. After you've set up the"'CHR$131"i
nitial colony it will grow according"
'CHR$131"to four simple rules:"
 400 PRINT'CHR$133"*"CHR$130"Any cel
l which has two or three"'CHR$130"  n
eighbours will survive."
 410 PRINT'CHR$133"*"CHR$130"Any cel
l which has four or more"'CHR$130"  n
eighbours will die of overcrowding."
 420 PRINT'CHR$133"*"CHR$130"Any cel
l which has less than two"'CHR$130"
neighbours will die of starvation."
 430 PRINT'CHR$133"*"CHR$130"A new c
ell will be born in any space"'CHR$13
0"  which has three neighbours"
 440 PRINT'CHR$131"If the colony die
s out hold down"'CHR$131"Return to de
sign another."
 450 PRINT TAB(10,24)CHR$129"Press s
pace...";
 460 REPEAT UNTIL GET=32:CLS
 470 FOR I%=2 TO 3:PRINT TAB(5,I%)CH
R$141"Editor commands":NEXT
 480 PRINT'''TAB(5)CHR$134"CURSOR ke
ys to move."
 490 PRINT''TAB(5)CHR$134"COPY to pl
ace a cell."
 500 PRINT''TAB(5)CHR$134"DELETE to
delete a cell."
 510 PRINT''TAB(5)CHR$134"RETURN to
restart."
 520 PRINT TAB(5,20)CHR$129"Press sp
ace...";
 530 REPEAT UNTIL GET=32:CLS
 540 ENDPROC
 550
 560 DEF PROCdesign
 570 VDU 22,5
 580 VDU 19,3,1;0;19,2,6;0;19,1,3;0;
 590 VDU 23;8202;0;0;0;
 600 GCOL 0,1:MOVE 0,32:DRAW 0,1023:
DRAW 1278,1023:DRAW 1278,32:DRAW 0,32
 610 COLOUR 2:PRINT TAB(1,31)"Design
 1st Colony";
 620 X%=638:Y%=512
 630 *FX21
 640 REPEAT K%=INKEY10:*FX21.
 650 GCOL0,0:MOVEX%,Y%:PLOT1,32,0:PL
OT1,0,-16:PLOT1,-32,0:PLOT1,0,16
 660 X%=X%+32*((K%=136 AND X%>32)-(K
%=137 AND X%<1210))
 670 Y%=Y%+16*((K%=138 AND Y%>64)-(K
%=139 AND Y%<1000))
 680 GCOL0,1:MOVEX%,Y%:PLOT1,32,0:PL
OT1,0,-16:PLOT1,-32,0:PLOT1,0,16
 690 IF K%=135 GCOL0,2:MOVEX%+4,Y%-4
:VDU5,224,4
 700 IF K%=127 GCOL0,0:MOVEX%+4,Y%-4
:VDU5,224,4
 710 UNTIL K%=13
 720 GCOL0,0:MOVEX%,Y%:PLOT1,32,0:PL
OT1,0,-16:PLOT1,-32,0:PLOT1,0,16
 730 REPEAT UNTIL NOT INKEY(-74)
 740 ENDPROC
 750
 760 DEF PROCassemble
 770 *FX16
 780 *FX4,1
```

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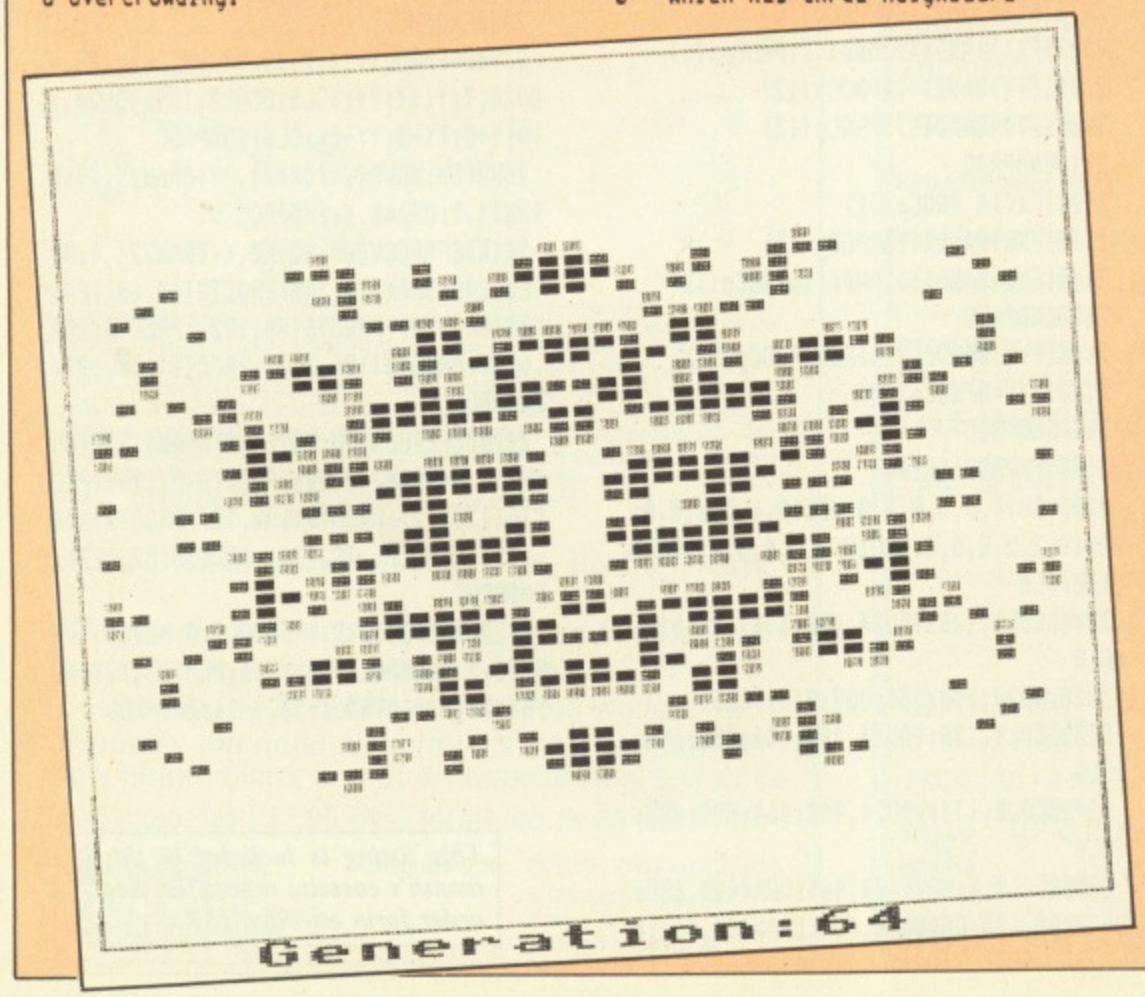

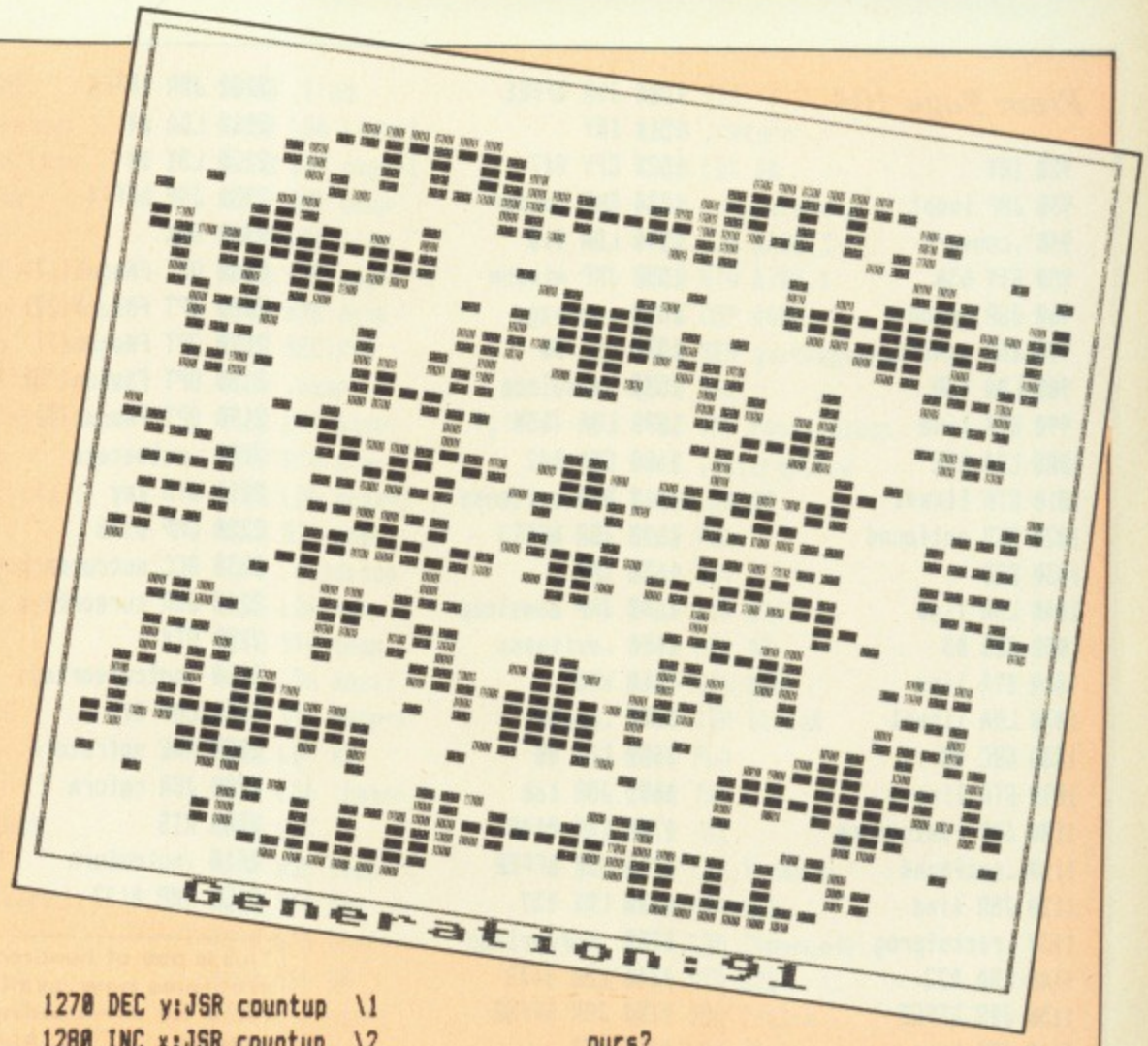


```
  790 red=&EE:blue=&E0:yellow=&0E
  800 x=&70:y=&71:addr=&72:tempx=&74:
tempy=&75:cellcount=&76
  810 xmax=38:xmin=1:ymax=60:ymin=1
  820 FOR pass=0 TO 2 STEP 2
  830 P%=&900
  840 [ OPT pass
  850 SEI
  860 LDA #ymax:STA y  \y=ymax
  870 .loop
  880 LDA #xmax:STA x  \x=xmax
  890 .loop1
  900 JSR convert  \get address
  910 LDY #0:LDA (addr),Y  \red or bl
ue cell?
  920 BEQ blank:JMP cell
  930 .blank
  940 JSR count
  950 CMP #3:BNE main2  \3 neighbours
?
  960 JSR convert
  970 LDA #yellow:JSR plot
  980 .main2
  990 DEC x:BNE loop1
 1000 DEC y:BNE loop
 1010 \-----------------------------
----
 1020 LDA #&00:STA addr:LDA #&58:STA
addr+1  \address=&5800
 1030 .loop
 1040 LDY #0:LDA (addr),Y:BEQ next  \
blank?
 1050 CMP #red:BNE yel
 1060 TYA:JSR plot:JMP next  \erase r
ed
 1070 .yel
 1080 CMP #yellow:BNE next
 1090 LDA #blue:JSR plot  \yellow ->
blue
 1100 .next
 1110 CLC:LDA addr:ADC #4:STA addr:LD
A addr+1:ADC #0:STA addr+1  \addr=add
r+4
 1120 CMP #&7F:BNE loop
 1130 CLI
 1140 RTS
 1150
 1160 .plot
 1170 LDY #0:STA (addr),Y:INY:STA (ad
dr),Y:INY:STA (addr),Y
 1180 RTS
 1190
 1200 .count
 1210 LDA #0:STA cellcount
 1220 INC x:JSR countup  \4      1 2 3
 1230 INC y:JSR countup  \5      8 * 4
 1240 DEC x:JSR countup  \6      7 6 5
 1250 DEC x:JSR countup  \7
 1260 DEC y:JSR countup  \8
 1270 DEC y:JSR countup  \1
 1280 INC x:JSR countup  \2
 1290 INC x:JSR countup  \3
 1300 DEC x:INC y
 1310 LDA cellcount
 1320 RTS
 1330
 1340 .countup
 1350 LDA x:STA tempx  \save x
 1360 CMP #xmax+1:BNE c1:LDA #xmin  \
check for border
 1370 .c1
 1380 CMP #xmin-1:BNE c2:LDA #xmax
 1390 .c2
 1400 STA x
 1410 LDA y:STA tempy  \save y
 1420 CMP #ymax+1:BNE c3:LDA #ymin
 1430 STA y
 1440 .c3
 1450 CMP #ymin-1:BNE c4:LDA #ymax
 1460 .c4
 1470 JSR convert:LDY #0:LDA (addr),Y
:AND #&F0:BEQ c5  \count red+blue cel
ls
 1480 INC cellcount
 1490 .c5
 1500 LDA tempx:STA x:LDA tempy:STA y
  \restore y
 1510 RTS
 1520
 1530 .cell
 1540 JSR count
 1550 .M% CMP #2:BCC die  \ <2 neighb
ours?
 1560 .L% CMP #4:BCS die  \ >3 neighb
ours?
 1570 JMP main2
 1580 .die
 1590 JSR convert
 1600 LDY #0:LDA #red:STA (addr),Y:IN
Y:STA (addr),Y:INY:STA (addr),Y
 1610 JMP main2
 1620
 1630 .convert  \x,y -> address
 1640 LDA x:ASL A:TAX
 1650 LDA y:ASL A:TAY
 1660 CLC:LDA mult2,X:ADC mult1,Y:STA
addr
 1670 LDA mult2+1,X:ADC mult1+1,Y:STA
addr+1
 1680 RTS
 1690 ]
 1700 mult1=P%
 1710 FOR I%=0 TO 63:!P%=&5800+&140*(
I%DIV2)+4*(I%MOD2):P%=P%+2:NEXT
 1720 mult2=P%
 1730 FOR I%=0 TO 39:!P%=I%*&08:P%=P%
+2:NEXT
 1740 NEXT
 1750 ENDPROC
 1760 *FX4,0
 1770 *FX12,4
 1780 MODE 7:PRINT':REPORT:PRINT " at
line";CHR$130;ERL
```

This listing is included in this month's cassette tape offer. See order form on Page 159.

From Page 104

```
 920 INY
 930 JMP loop1
 940 .convert
 950 STY &36
 960 JSR cston
 970 JSR schlin
 980 LDA &3D
 990 STA line
1000 LDA &3E
1010 STA line+1
1020 BCS notfound
1030 SEC
1040 LDA line
1050 SBC #3
1060 STA line
1070 LDA line+1
1080 SBC #0
1090 STA line+1
1100 JMP restofprog
1110 .notfound
1120 JSR find
1130 .restofprog
1140 LDA #22
1150 JSR &FFEE
1160 JSR beep
1170 LDA #214
1180 LDX #2
1190 LDY #0
1200 JSR &FFF4
1210 JSR screen
1220 LDA #4
1230 LDX #1
1240 JSR &FFF4
1250 JSR getline
1260 .mainloop
1270 JSR edit
1280 JMP mainloop
1290 .screen
1300 LDA #mess1 MOD 256
1310 STA &58
1320 LDA #mess1 DIV 256
1330 STA &51
1340 JSR message
1350 JSR message
1360 LDY #9
1370 JSR border
1380 LDY #17
1390 JSR border
1400 LDA #mess2 MOD 256
1410 STA &50
1420 LDA #mess2 DIV 256
1430 STA &51
1440 JSR message
1450 LDX #0
1460 LDY #10
1470 .colour
1480 JSR tab
1490 LDA #131
1500 JSR &FFEE
1510 INY
1520 CPY #17
1530 BNE colour
1540 LDA #10
1550 JMP window
1560 .message
1570 LDY #0
1580 .messloop
1590 LDA (&50),Y
1600 CMP #42
1610 BEQ exitmess
1620 JSR &FFE3
1630 INY
1640 JMP messloop
1650 .exitmess
1660 RTS
1670 .border
1680 LDX #0
1690 JSR tab
1700 LDA #148
1710 JSR &FFEE
1720 LDX #37
1730 .borderloop
1740 LDA #172
1750 JSR &FFEE
1760 DEX
1770 BPL borderloop
1780 RTS
1790 .window
1800 PHA
1810 LDA #28
1820 JSR &FFEE
1830 LDA #1
1840 JSR &FFEE
1850 LDA #16
1860 JSR &FFEE
1870 LDA #38
1880 JSR &FFEE
1890 PLA
1900 JMP &FFEE
1910 .tab
1920 LDA #31
1930 JSR &FFEE
1940 TXA
1950 JSR &FFEE
1960 TYA
1970 JMP &FFEE
1980 .edit
1990 LDA #21
2000 LDX #0
2010 JSR &FFF4
2020 LDA #10
2030 STA &FE00
2040 LDA #0
2050 STA &FE01
2060 JSR &FFE0
2070 BCC notescape
2080 .escape
2090 LDA #126
2100 JSR &FFF4
2110 LDA #4
2120 LDX #0
2130 JSR &FFF4
2140 BRK
2150 OPT FNequb(17)
2160 OPT FNequb(22)
2170 OPT FNequb(7)
2180 OPT FNequs("Ok")
2190 OPT FNequb(0)
2200 .notescape
2210 STA key
2220 CMP #136
2230 BCC notcursorkeys
2240 JSR cursorkeys
2250 RTS
2260 .notcursorkeys
2270 CMP #13
2280 BNE notreturn
2290 JSR return
2300 RTS
2310 .notreturn
2320 CMP #127
```

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```
2330 BNE wasinsert
2340 JSR delete
2350 RTS
2360 .wasinsert
2370 JSR insert
2380 RTS
2390 .getline
2400 LDA #10
2410 STA &FE00
2420 LDA #&FF
2430 STA &FE01
2440 JSR copyline
2450 LDA #12
2460 JSR &FFEE
2470 JSR printline
2480 LDA #6
2490 JSR window
2500 LDX #22
2510 LDY #0
2520 JSR tab
2530 LDA #135
2540 JSR &FFEE
2550 LDY #1
2560 LDA (line),Y
2570 STA linenum+1
2580 STA &2B
2590 INY
2600 LDA (line),Y
2610 STA linenum
2620 STA &2A
2630 JSR plnum5
2640 LDA #10
2650 JMP window
2660 .copyline
2670 LDA &20E
2680 STA &232
2690 LDA &20F
2700 STA &233
2710 LDA #newoswrch MOD 256
2720 STA &20E
2730 LDA #newoswrch DIV 256
2740 STA &20F
2750 LDA #4
2760 STA &A
2770 LDA #0
2780 STA len
2790 .copyloop
2800 LDY &A
2810 LDA (line),Y
2820 CMP #&0D
2830 BEQ exitcopy
2840 CMP #&8D
2850 BEQ unpack
2860 JSR ptoken
2870 INC &A
2880 JMP copyloop
2890 .unpack
2900 JSR getlna
2910 JSR plnum0
2920 JMP copyloop
2930 .exitcopy
2940 JSR &FFEE
2950 LDA &232
2960 STA &20E
2970 LDA &233
2980 STA &20F
2990 LDA #0
3000 STA ptr
3010 STA xpos
3020 STA ypos
3030 .newoswrch
3040 STA char
3050 PHP
3060 TXA
3070 PHA
3080 TYA
3090 PHA
3100 LDA char
3110 LDX len
3120 STA &600,X
3130 INC len
3140 PLA
3150 TAY
3160 PLA
3170 TAX
3180 PLP
3190 LDA #0
3200 JMP (&232)
3210 .printline
3220 LDX xpos
3230 LDY ypos
```

```
3240 JSR tab
3250 LDX ptr
3260 .ploop
3270 LDA &600,X
3280 CMP #&0D
3290 BEQ exitploop
3300 JSR &FFEE
3310 INX
3320 JMP ploop
3330 .exitploop
3340 LDA #32
3350 JSR &FFEE
3360 LDX xpos
3370 LDY ypos
3380 JMP tab
3390 .insert
3400 LDA len
3410 CMP #253
3420 BCC okinsert
3430 JMP beep
3440 .okinsert
3450 LDX #&FE
3460 LDY #&FF
3470 .shuntup
3480 LDA &600,X
3490 STA &600,Y
3500 DEX
3510 DEY
3520 CPY ptr
3530 BNE shuntup
3540 LDX ptr
3550 LDA key
3560 STA &600,X
3570 INC ptr
3580 INC len
3590 LDA key
3600 JSR &FFEE
3610 JSR storetab
3620 JMP printline
3630 .delete
3640 LDA ptr
3650 BNE okdelete
3660 JMP beep
3670 .okdelete
3680 LDX ptr
3690 STX temp
3700 DEC temp
3710 LDY temp
3720 .shuntdown
3730 LDA &600,X
3740 STA &600,Y
3750 CMP #&0D
3760 BEQ exitdelete
3770 INX
3780 INY
3790 JMP shuntdown
3800 .exitdelete
3810 DEC ptr
3820 DEC len
3830 LDA #8
3840 JSR &FFEE
3850 JSR storetab
3860 JMP printline
3870 .storetab
3880 LDA #134
3890 JSR &FFF4
3900 STX xpos
3910 STY ypos
3920 RTS
3930 .cursorkeys
3940 CMP #136
3950 BNE checkright
3960 LDA ptr
3970 BNE okleft
3980 JMP beep
3990 .okleft
4000 LDA #8
4010 JSR &FFEE
4020 DEC ptr
4030 RTS
4040 .checkright
4050 CMP #137
4060 BNE checkdown
4070 LDX ptr
4080 LDA &600,X
4090 CMP #&0D
4100 BNE okright
4110 JMP beep
4120 .okright
4130 LDA #9
4140 JSR &FFEE
4150 INC ptr
4160 RTS
4170 .checkdown
4180 CMP #138
4190 BNE up
4200 CLC
4210 LDY #3
4220 LDA (line),Y
4230 ADC line
4240 STA temp
4250 LDA line+1
4260 ADC #0
4270 STA temp+1
4280 LDY #1
4290 LDA (temp),Y
4300 BPL okdown
4310 JMP beep
4320 .okdown
4330 LDA temp
4340 STA line
4350 LDA temp+1
4360 STA line+1
4370 JMP getline
4380 .up
4390 JSR find
4400 BCC doup
4410 JMP beep
4420 .doup
4430 JMP getline
4440 .find
4450 LDA line+1
4460 CMP page+1
4470 BNE okup
4480 LDA line
4490 CMP page
4500 BNE okup
4510 SEC:RTS
4520 .okup
4530 LDA page
4540 STA new
4550 LDA page+1
4560 STA new+1
4570 .findloop
4580 LDA new
4590 STA temp
4600 LDA new+1
4610 STA temp+1
4620 LDY #3
4630 LDA (temp),Y
4640 CLC
4650 ADC temp
4660 STA new
4670 LDA temp+1
4680 ADC #0
4690 STA new+1
4700 LDA new
4710 CMP line
4720 BNE findloop
4730 LDA new+1
4740 CMP line+1
4750 BNE findloop
4760 LDA temp
4770 STA line
4780 LDA temp+1
4790 STA line+1
4800 CLC
4810 RTS
4820 .return
4830 LDX #0
4840 .replaceloop
4850 LDA &600,X
4860 STA &700,X
4870 CMP #&0D
4880 BEQ quitreplace
4890 INX
4900 JMP replaceloop
4910 .quitreplace
4920 LDA #0
4930 PHA
4940 TAY
4950 STA &37
4960 LDA #7
4970 STA &38
4980 JSR tline0
4990 PLA
5000 TAY
5010 TAX
5020 LDA linenum
5030 STA &2A
5040 LDA linenum+1
5050 STA &2B
5060 JSR inslin
5070 LDA #213
5080 LDX #198
5090 LDY #0
5100 JSR &FFF4
5110 JSR beep
5120 LDA #213
5130 LDX #100
5140 LDY #0
5150 JSR &FFF4
```

→

PROBLEM

UP to a few months ago I used a black and white television for a monitor (disc drive and a printer taking precedence), but after a long programming session I found I could not look at the screen for more than a few minutes without considerable discomfort. I switched to a Sanyo green monitor model DM 8112 CX with a fitted screen which reduced the effect but it still persists.

Although the picture is rock steady I have tried turning the interlacing off with *FX 144,0,1 and varying the brightness, with no effect. Would it help if I switched to an amber screen monitor? If so, which one? Or could a 16 bit machine offer a different picture? I also use my micro at work – is it possible the fluorescent lights could be causing a strobe effect? – E.A. Nanson, Coventry.

SOLVED

Fatigue can be caused by having the VDU too close, try moving it further back. An amber screen could help as I have heard that yellow is more restful on the eyes.

There are people who can have epilepsy induced by flickering light. However, I am told this condition is much rarer since the abolition of the 405 line standard. The condition you describe is not common and I would advise you ask your doctor if you can have a test for flicker susceptibility.

From Page 135

```
5160 LDA #138
5170 JMP checkdown
5180 .beep
5190 LDA #7
5200 JMP &FFEE
5210 .mess1
5220 OPT FNequd(&2020208D)
5230 OPT FNequd(&9D812020)
5240 OPT FNequd(&534F4287)
5250 OPT FNequs(" Editor Version 1.0
")
5260 OPT FNequd(&2A8D9C20)
5270 .mess2
5280 OPT FNequd(&86020A1F)
5290 OPT FNequs("(c) The Micro User"
)
5300 OPT FNequd(&85060A1F)
5310 OPT FNequs("Line number")
5320 OPT FNequb(58)
5330 OPT FNequd(&8616031F)
5340 OPT FNequs("CSR KEYS Move")
5350 OPT FNequb(58)
5360 OPT FNequs("CR Enter")
5370 OPT FNequb(58)
5380 OPT FNequs("ESC Quit*")
5390 ]
5400 NEXT
5410 $oscli="*SAVE BOS "+STR$~START%
+" "+STR$~(START%+&400)
5420 X%=oscli MOD 256
5430 Y%=oscli DIV 256
5440 CALL &FFF7
5450 PRINT'"NB-If you are using this
utility to edit";
5460 PRINT"programs on cassette, PAG
E must be set"
5470 PRINT"to &1200 or higher (e.g.
PAGE=&1200)"
5480 END
5490 DEFPROCset1
5500 getlna=&97AE
5510 ptoken=&B53A
5520 plnum0=&98F1
5530 plnum5=&98F5
5540 cston=&AC5A
5550 schlin=&9942
5560 inslin=&BCAA
5570 tline0=&88D3
5580 ENDPROC
5590 DEFPROCset2
5600 getlna=&97DF
5610 ptoken=&B58E
5620 plnum0=&991F
5630 plnum5=&9923
5640 cston=&AC34
5650 schlin=&9970
5660 inslin=&BC8D
5670 tline0=&8951
5680 ENDPROC
5690 DEFFNequd(D%)
5700 !P%=D%
5710 P%=P%+4
5720 =PASS
5730 DEFFNequs(S$)
5740 $P%=S$
5750 P%=P%+LEN S$
5760 =PASS
5770 DEFFNequb(B%)
5780 ?P%=B%
5790 P%=P%+1
5800 =PASS
```

This listing is included in this month's cassette tape offer. See order form on Page 159.

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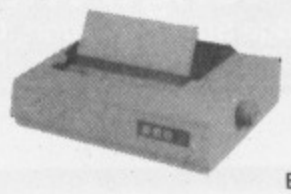

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APRIL: X15, sideways-scrolling spectacular. **Mornington Crescent,** fun on the London underground. **Calculator,** AMX mouse mathematics. **Dithering,** colour mixer. **Chatterbox,** speech chip procedures. ***Plus Rabbit Run – a machine code game.***

MAY: Stellar Rescue, arcade action. **Dominoes,** simulation. **Plot69,** fast Mode-2 plot routine. **Musical Events,** a music interrupt utility. **Pound and Hash,** an Epson printer routine. **Sheila,** let your micro run your slide show.

JUNE: Othello, simulation of the board game. **Activities,** word association. **Catnap,** arcade enjoyment. **Simon Quackers,** superb lightpen game. **Shape recognition,** teach your micro to identify. **Stripper,** a routine for removing line numbers. **Epson,** a type-setting utility. **Lprint,** simplifies string output. **Eval,** using the Basic command from machine code.

JULY: Fly, an arcade spectacular. **Draughts,** a superb version. **Compox,** 3D noughts and crosses. **Double Height,** large characters in Modes 0-6. **Clock,** alarm utility. **Compacter,** compress Mode 2. **Inside Basic,** basic routines in machine code. **RAMpage and RAMsave,** sideways RAM utilities. **Video,** graphics to music.

AUGUST: Harbour Command, protect a Cornish town. **Fruit Machine,** a gambler's favourite. **Mouse Organ,** AMX mouse music utility. **Flash,** alternative flashing colours. **String Formatter,** prevent end of line word splitting. **M/C Games,** random number and key detection routines.

SEPTEMBER: Ball Lightning*, tame the lightning. **Quarters,** game of skill. **6502 Games,** a simple arcade game. **Variable Lister,** track your variables. **Smiley Hunt,** Al's game. **Error handling,** the vital routines.

OCTOBER: Karate, superb martial art action. **Solitaire,** all-time favourite. **Scroller,** text scroll utility. **Case,** an ON PROC command. **Disc Scan,** search for disc files. **Adventure,** avoid the vampire.

NOVEMBER: Whodunnit, solve the murder. **Gloop Gulp,** zany arcade action. **Basic Analyser,** take the drudgery of debugging. **Wordwise F/keys,** get the most from your word processor. **Sideways,** sideways screen clear. **New Modes,** Modes 8, 9 and 10. **Disabler,** prevent star command clashes.

DECEMBER: Wizard's Castle*, recover a diamond from the necromancer's lair. **Squares,** 'join the dots' strategy. **McBase,** powerful database. **Alphabet Train,** early spelling. **Basic Analyser,** the vital cross reference tables. **Wordsquare Creator,** to create your own puzzles. **Dumper,** how your programs affect memory. **Subhunt,** the final listing. ***Plus the listings from Body Building and Adventures.***

JANUARY 1986: Megaroids, exciting space action. **Claustrophobia,** alone in a maze. Can you get out of the maze in one piece? **Fives,** mind bending noughts and crosses. **Music Editor,** translate musical notation. **Wordsquare Solver,** the program to help you solve them. **Find and replace,** find and replace any item of text in a Basic listing. **Discopy,** copy and/or rename files. **S-sound,** sounds into electronic effects. **Alice,** another baffling problem.

FEBRUARY: Tipaka, can you escape the Logan King's castle in one piece? **USS Endeavour,** fast and exciting space invader action. **Ploy,** brain teasing strategy game. **Up-and-down-loader,** an aid for loading and saving. **Fast Verify,** a superb utility for verifying saved disc files. **Disc Assembler,** assemble multi-part source files to disc. **Shift and Echo,** more electronic effects from the Body Building course. **8271,** using OSWORD to format a disc in a special way. **Elite Cheat,** the easy way to the top.

MARCH: Morris Miner, collect the keys and escape the mine before your time runs out in this levels and ladders spectacular. **Poster Puzzler,** a sliding block simulation to provide hours of fun for the whole family. **Quicksort,** a fast machine code sort routine that uses and teaches recursion. **Character Sets,** a program to create and display your own fonts. **8271,** four programs to complement the last article in the series. **Sound Sampler,** two programs from the Body Building course. **Eleusis,** another mind bending puzzle from Alice.

APRIL: Ghouls of Azzod, can you escape from Azzod manor with its monsters, moving floorboards and venomous plants? **Mousetrap,** you'll need skill, strategy and a lot of luck in this very simple but infuriating chase game. **Character Sets,** outputting characters using Epsom compatible bit-imaging. **Special Fonts,** create interesting displays with this utility to give alternative fonts. **Notepad,** forget scraps of paper with this electronic jotter. **Hexer,** a hexadecimal loader for use in the machine code series. **Hyperspace,** another puzzler from Alice. **While Wend** and **While Wend Demo,** two listings from the mail pages.

MAY: Cavern Quest*, can you collect the diamonds before your oxygen runs out, avoiding the falling boulders as you go? **4-Site,** a mindbending 3-dimensional adaptation of noughts and crosses. **Catalog II,** disc operations achieved quickly with a single key press. **Taming the Tube,** turning the 6502 second processor on and off by software. **Character Sets,** creating slim characters for use in Modes 2 and 5. **Alice,** another intriguing puzzle from our adventurer.

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JUNE: Pendragon*, can you keep the evil yellow perils away from the sugar cubes, while positioning the four diamonds? **Spacebase,** as commander of a solitary spacebase you must defend Earth from the invading hoarde of aliens. **Rainbow,** this lightpen graphics utility will keep you happy for hours.

JULY: Royal Wedding, celebrate the most exciting royal event of the decade with this superb sliding block puzzle. **Dual Catalog,** This utility provides 56 files on one side of a disc. **Viewgen,** what you see is what you get with this printer driver generator for View. ***PLUS digitised picture of Andrew and Sarah (disc only).***

AUGUST: Fruit Worm, can you survive the dangers of the deadly garden? **Upper,** force all your input into upper case. **Inkjet,** a printer test and two screen dumps for the ink jet printer. **Safer,** prevent accidentally overwritten files. **Hash,** a suite of programs illustrating searching techniques. **Geiger,** the software for the Body Building course.

SEPTEMBER: Pear Picker, avoid Plastered Patrick in your attempts to become a professional fuit 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).***

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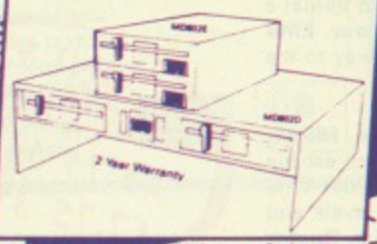

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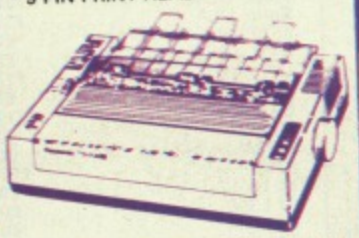

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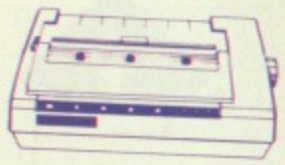

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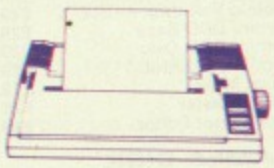

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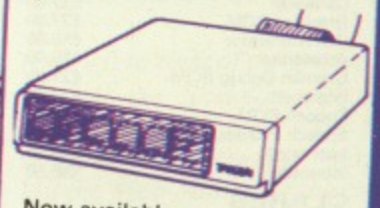

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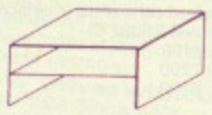

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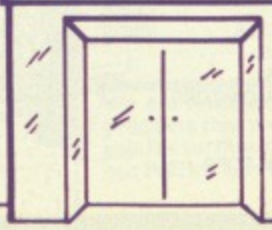

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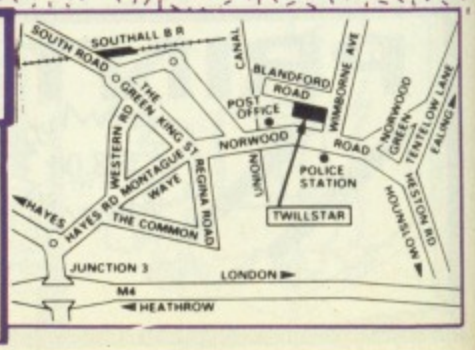

£10 Prize letter

Short cuts through Mini Office II menus

THE menu driven system of the word processor of the Mini Office II suite is very user-friendly to the first time user, but it has the disadvantage that once you've found your way around it is not so helpful.

Adopting the good advice to save your text regularly to avoid loss through power cuts can become a little daunting when you have to go through the following procedure:

Escape to the command page, move to Save with three cursor presses, press Return, press Return, give a filename, press Return, and finally press Y to confirm we do wish to overwrite the previous save.

The block of these commands can be programmed on to one of the user-friendly function keys, and give you a save text key. It is possible to plan other sequences as well.

You need to know that the sequence !!!O – Oh not zero – entered into a function key will move the cursor up a line and !!!N will move the cursor down a line.

These together with !M, Return, and !], Escape, will allow a short cut through the menu routines.

The easiest way to arrange this is to make a short Basic program with the key definition. This allows you to go back and check the string, in case you didn't enter it correctly the first time.

*Run this Basic program, then save the key definitions with a *SAVE.*

The program for the one key described above is:

```
  10 *FX18
  20 *KEY1 !!!O!!!O!!!O
!M!Mtemp!Ma
  30 REM a save text key
for Mini Office II
```

The apparently unnecessary 'a' added to the end of line 20 is required, otherwise the menu screen of Mini Office II is corrupted.

Save this program and then run it. The key definition and any others added to the program can be saved to disc using:

```
*SAVE keydef 0B00 0C00
```

*If Mini Office II is now loaded into the computer the key definitions can be set by typing *keydef from the command screen.*

The save text routine is then obtained from the text screen by pressing Shift+Control+f1 – the text will of course be saved with the filename temp. – **Dr P.C. Russell, Burnham Overy Staithe, Norfolk.**

Catalog II procedure

I HAVE been working on the Catalog II program, which was published in The Micro User, *May 1986.*

I preferred to type it in rather than buy the mail order tape, but the program keeps on throwing up errors which I have managed to eliminate because they were of my own making.

However I have now encountered one which keeps repeating as no such variable at line 1310.

This has been looked at by the debugging disc Sleuth, which shows that no DEFPROC has been declared when we come to line 1340 at ENDPROC.

I have typed this in correctly and will repeat here line 1310 as of your listing:

```
1310 IFPNT%=0 PNT%=1:GOTO1340
```

Can you please help? – **E.M. Jones, Withington, Manchester.**

● The ENDPROC of line 1340 matches the DEFPROC of line 1280. The procedure has more than one exit and this must be confusing Sleuth.

The problem that you encountered is caused by the fact that in some circumstances line 1310 can be reached before *PNT%* is initialised. To ensure that this does not happen change line 180 to read:

```
180 PNT%=0
```

Win a tenner

● *Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Writers of the three most interesting letters will each receive a £10 prize.*

Murder is the ultimate objective of Nightshade

PUZZLED by Ultimate's Nightshade? No need to worry, I have solved those frustrating problems for you.

The object of the game – although unclear in the instructions – is to kill each part of the evil force which has taken over the village of Nightshade.

To kill them, pictured on the bottom right hand corner of the screen, you have to find the four objects scattered throughout the village.

To complete Nightshade firstly, to get your source of firepower, get the antibodies which float around the rooms.

Avoid contact with all creatures as your energy will be depleted, and avoid contact with any of the evil force as you will lose a life.

Remember antibodies cannot kill any of them. You can distinguish the evil force from the rest of the creatures by the noise they make.

To kill any of it you have to locate the special objects, which are the cross, hammer, egg timer and bible.

To make matters easier I shall tell you which object is which to kill each of the evil force.

On the bottom right hand corner of the screen starting from left to right of the evil force: To kill the Skeleton, fire the hammer at it, to kill Mr Grimreaper fire the egg timer, to kill the Mad Monk fire the cross and to kill the ghost fire the bible.

If any of the evil force is close by you and you have the object to kill it with, that object will begin to flash. The closer you are to it the quicker it will flash.

The last point to remember is that there is no set order of killing each of the evil force. Good luck Nightshade adventurers. I hope you succeed in your quest. – **Charles Ewan, South Woodford, London.**

Printer options

HERE is some information that may interest BBC Micro owners.

It concerns printers. Those of us with big ideas and limited funds will sooner or later have to

From Page 145

face up to choosing a printer to buy for word processing and so on.

I have just got the Amstrad DMP2000 dot matrix printer. This has its own NLQ facility and is, up to the time of writing, Epson compatible – tractor and friction feed are standard.

I have used it in conjunction with Mini Office, Fleet Street Editor, Interchart, Intersheet and Interword to total satisfaction.

It has also proved compatible with CJE Micro's Multi-Font NLQ rom and fonts.

The irony of this printer is that, although it is an Amstrad product the manual is actually written with examples of how to use each and every facility it offers with a BBC Micro – including those mystical Escape control codes. Epson take note.

In short, for the £170 it costs this printer has everything I need for all requirements.

So if you are looking for a competent and reasonably priced dot matrix printer do take a look at the DMP2000. – **Eilir Hughes, Kings Heath, Birmingham.**

● Anyone wanting to find out more about this printer should read the review in the August 1986 edition of *Electron User*. All the points made are relevant to the BBC Micro also.

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 program, 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.

Tips for Star Drifter

Here are ten tips for Firebird's excellent game Star Drifter.

To get key 4 make your way through door 2-3 where you will find the radio. Return the radio to the bridge and when you exit you will have key 4 in your possession. To obtain key 5 get the bomb which is located two screens above door 1.

Then make your way into the large area to the right where there is hardly any scenery.

On the right hand wall an area must be blown away. Use the bomb and you will find key 5.

To get to the oxygenator unit make your way up and right past door 1-4.

The hyper-zap gun is in the large clear area above door 6-7 and behind an area which must be blown away on the right hand wall.

The rooms behind doors 8-9 and 6-7 need not be accessed as they have no useful items within them.

To get to the first log book make your way through door 1-7, collect key 8 and go through doors 6-8, 7-8 and 2-3.

To get to the second log book go through door 1-9 which is behind an area needing to be blown away by a bomb, and then go one screen right, two up and then left.

One of the other four bombs is located one screen down and right of door 5-4.

The third bomb is located five screens right and two up of the second bomb. To access this you will have to have keys 1, 2, 3, 5, 6, 7. Key 7 is found as you make your way towards the bomb.

The final bomb is located in the room below the room with door 2-9 in it which is found three screens down and one right of door 1-9. – **Simon Lock, Sutton Coldfield, West Midlands.**

Getting straight to the point

£10 Prize letter

ONE of the more knotty problems when working with graphics is determining the point of intersection of two straight lines.

The problem can be solved using similar triangles which I favour for a computer solution – it has the advantage of speed since no trig functions such as sines or cosines are required and almost all the calculations can be performed using integer variables.

PROCCROSSOVER does all the work – the first part of the program is just for demonstration purposes, and proves the success of the calculation by flashing a pixel at the point of intersection.

With the procedure as written it takes around 35 milliseconds to perform the calculation.

If the coordinates are passed directly to the procedure – using global variables A%.,B% and so on with the LOCAL statement removed – the time is reduced to only 25 milliseconds.

Incidentally even if the lines do not actually cross, the point at which they would cross when extended beyond their actual ends will be found.

It is not necessary to know which end of a particular line is left or right so long as the coordinates are passed in the correct XY pairs.

But the resulting X intersection value may vary slightly due to rounding. This variation is negligible for practical purposes. – **Peter Vasey, South Shields, Tyne & Wear.**

```
  10 REM LINE INTERSECTION
  20 REM by Peter Vasey
  30 REM (C) THE MICRO USE
R 1986
  40 :
  50 MODE4
  60 INPUTTAB(0,2),X1L%,Y1
L%,X1R%,Y1R%,X2L%,Y2L%,X2R%
,Y2R%
  70 PROCCROSSOVER(X1L%,Y1
L%,X1R%,Y1R%,X2L%,Y2L%,X2R%
,Y2R%)
  80 PRINT "CROSSOVER POIN
T IS: ";XC%;","YC%
  90 MOVEX1L%,Y1L%:DRAWX1R
%,Y1R%
 100 MOVEX2L%,Y2L%:DRAWX2R
%,Y2R%
 110 REPEAT
 120 GCOL3,1:PLOT69,XC%,YC
%
 130 FORA%=0TO500:NEXT
 140 UNTILFALSE
 150 :
 160 :
 170DEFPROCCROSSOVER(A%,B%
,C%,D%,E%,F%,G%,H%)
 180 LOCALBD%,HF%,CA%,GE%,
DI%,YC
 190 BD%=B%-D%:HF%=H%-F%
 200 CA%=C%-A%:GE%=G%-E%
 210 DI%=BD%*GE%+CA%*HF%
 220 IFDI%=0VDU7:PRINT"LIN
ES ARE PARALLEL":END
 230 YC=(F%*BD%*GE%+(C%-E%
)*BD%*HF%+D%*CA%*HF%)/DI%
 240 YC%=YC
 250 IFBD% XC%=C%-CA%*(YC-
D%)DIVBD%:ENDPROC
 260 IFHF% XC%=E%+GE%*(YC-
F%)DIVHF%
 270 END PROC
```

Open Sesame

HERE are some hints for Level 9's Snowball.

To get out of the mortuary quickly type OPEN SESAME and you will end up at the padded room with the loose drinks machine. The tool box is underneath the lift.

To get the lance you need to get a green and a red ticket. Swap the red ticket for the red form and go North, then swap red form and green ticket and get the orange form.

Get two more tickets and swap orange form and red ticket for yellow form, and swap yellow

£10 Prize letter

Make your Speech clear

THIS program, to be used in conjunction with Superior Software's Speech, enables integers from 0 to 999999 to be spoken as they would normally be heard, rather than recited as a series of individual digits.

The procedures can easily be added to your own Basic program.

*It would be possible to read out decimal fractions by modifying PROCsaynumber to extract the numbers after the decimal point, *SAY POINT and then *SAY the digits as normal.*

A short description of the main procedures is given below. PROCsaynumber takes the number, checks that it lies in the permitted range, converts all numbers to six digits and calls PROChalf for each three digits, checking whether an AND is necessary after the thousands are spoken.
PROChalf sorts out whether an AND is necessary after the hundred are spoken, and calls PROCtens.

*PROCtens *SAYs the tens and units, ensuring that correct grammar is used.*

*Finally PROCoscli passes the *SAY commands to the CLI on Basic I and II.* – **Dominic Moore, Lavenham, Suffolk.**

```
  100REM Procedure to allow
  110REM "SPEECH" to speak
any
  120REM number from 0 to 9
99999
  130REM
  140REM By D.Moore
  150REM
  160:
  170REM *RUN SPEECH before
 use
  180:
  190MODE7
  200DIM n(6)
  210REPEAT
  220INPUT'"Enter a number
(0-999999) "n
  230PROCsaynumber(n)
  240UNTIL FALSE
  250END
  260:
  270DEFPROCsaynumber(numbe
r)
  280IF number>999999 OR nu
mber<0 VDU7: ENDPROC
  290IF number<>INT(number)
 VDU7:ENDPROC
  300IFnumber=0 PROCoscli("
*SAY ZEERO"):ENDPROC
  310N$=STR$(number)
  320IF LEN(N$)<6 N$="0"+N$
:GOTO320
  330FOR I%=1 TO 6
  340n(I%)=EVAL(MID$(N$,I%,
1))
  350NEXT I%
  360IF number<999 THEN 410
  370PROChalf(n(1),n(2),n(3
))
  380PROCoscli("*SAYTHOUSAN
D")
  390IF n(5)=0 AND n(6)=0 T
HEN 410
  400IF n(4)=0 PROCoscli("*
SAYAND")
  410PROChalf(n(4),n(5),n(6
))
  420ENDPROC
  430:
  440DEFPROChalf(d1,d2,d3)
  450IF d1=0 THEN 480
  460IF d2=0 AND d3=0 PROCo
scli("*SAY"+STR$(d1)+"HUNDR
ED"):ENDPROC
  470PROCoscli("*SAY"+STR$(
d1)+"HUNDREDAND")
  480IF d2=0 THEN 510
  490PROCtens(d2,d3)
  500ENDPROC
  510IF d3=0 THEN ENDPROC
  520PROCoscli("*SAY"+STR$(
d3))
  530ENDPROC
  540:
  550DEFPROCtens(n1,n2)
  560IF n1>1 THEN 640
  570IF n2=0 PROCoscli("*SA
YTEN"):ENDPROC
  580IF n2=1 PROCoscli("*SA
YELEVEN"):ENDPROC
  590IF n2=2 PROCoscli("*SA
YTWELVE"):ENDPROC
  600IF n2=3 PROCoscli("*SA
YTHIRTEEN"):ENDPROC
  610IF n2=5 PROCoscli("*SA
YFIFTEEN"):ENDPROC
  620PROCoscli("*SAY"+STR$(
n2)+"TEEN")
  630ENDPROC
  640IF n1=2 PROCoscli("*SA
YTWENTY"):GOTO680
  650IF n1=3 PROCoscli("*SA
YTHIRTY"):GOTO680
  660IF n1=5 PROCoscli("*SA
YFIFTY"):GOTO680
  670PROCoscli("*SAY"+STR$(
n1)+"TEE")
  680IF n2<>0 PROCoscli("*S
AY"+STR$(n2))
  690ENDPROC
  700:
  710DEFPROCoscli(str$)
  720$&700=str$
  730X%=0:Y%=7
  740CALL&FFF7
  750ENDPROC
```

form and green ticket for the green form.

Get a red ticket and swap the green form and red ticket for the lance. All of these can be found in the robot repair store.

The LEDs are under the airbed in the condo. The lamp and cup are North of the food machine in the condo.

The dead crew member is South of the freezer control, the video viewer is on the floating table in the library and the mempak is North in the next room.

The visor is visible when sitting on the control chair in the freezer control.

You can not get into the droid junk yard through the main door unless you wear the dead member's clothes. But if you go West and out from the padded room you will come in the rear entrance.

The yellow button in the south airlock leads to the hanger and gun. – **Piers Jackson, Gt. Yarmouth, Norfolk.**

Counting characters

ANDREW Verwer's Learn program – The Micro User, *September 1986 – is a useful addition to the Wordwise repertoire, but it does assume that the customer can, or will, count the number of characters being remembered.*

The keyboard buffer will only hold 31 of them, and if attempts are made to store more than that after Control+L has been pressed the extra letters fall off the end.

However the program goes blithely on its way without issuing any warning.

A small modification can prevent this. At line 860 X contains the total number of characters in the buffer.

This can be tested and when the limit has been reached the user can be informed by a beep. The extra lines required are:

```
862 CPX #31
864 BNE return
866 LDA #7
868 JSR &FFEE
```

*A further refinement that would appeal only to the true devotee of Wordwise is to use the machine code equivalent of *FX213,n to change the pitch of the beep before executing line 866 and to restore it afterwards.* – **Peter Howard, Church Crookham, Hants.**

Castle of fear

I WAS very pleased with the program Castle of Fear *which I typed in from the August, 1984 issue of* The Micro User. *I know that this is two years old, but that should show you how fast I can type.*

Without giving too much away I would like to give those still stuck inside some hints on

From Page 147

this work of art.

Firstly signs are there to be obeyed – at least most of them. Secondly let sleeping skeletons lie.

Finally the coins always start in the same place – but they prefer to be near to each other.

I hope that with the aid of these hints, more people may be able to solve this work of art that did, at least at first, mystify even the person that typed it in. – **J. Wilson, Oldham, Lancs.**

Disc conversion

I HAVE typed in several of your programs in the past and now have tried to convert them to disc.

Everything that is Mode 2 does not work and comes up 'bad mode'. Can anybody help? – **Philip Keen, Watford, Herts.**

● The disc interface uses part of the ram. With many programs, particularly those using the memory eating modes – 0,1 and 2 – you can load them, but when you run them as soon as the program tries to enter the hi-res modes it runs out of space.

Once you have loaded the program from disc there is no need to waste this space.

You can copy the program down from where it has been loaded to a new position, overwriting the memory that the disc system takes up.

Moving it down in memory like this is known as downloading. The easiest way to ensure that programs are downloaded is to insert the following three lines into all your programs:

```
    0 IF PAGE>&E00 THEN 320
00
32000 *KEY0*TAPE¦MD%=PAGE-&
E00:FORI%=PAGE TO TOP STEP4
:!(I%-D%)=!I%:NEXT:PAGE=&E0
0¦MOLD¦MRUN¦M
32001 *FX138,0,128
```

To save room also ensure that you do not type any unnecessary spaces into the program. The space after the line number can always be omitted.

Confessions of a faint-hearted Micro User

The tribulations of teaching

Dear Trev,

Why oh why did I ever get involved with a computer science teacher? And especially one who thinks a spreadsheet is an agricultural program. My life is now a misery.

I can't even find solace at the Ram and Buffer any more as the Rogues all think it's hilarious. They keep referring to Doreen as "Parity – Bob's bit on the side."

Clive, who's always sympathetic when he's had a pint or two at my expense, says that I should tell them to Xon/Xoff but when I did they just asked if Doreen taught at a secondary modem and howled with laughter.

I do wish that she hadn't told them I was good at debugging (I've had years of practice enduring Andrea's fault-finding). And I still don't get the remarks about the user port.

Anyway it's not a secondary modem she teaches at, it's El Alamein Comprehensive. They were going to call it after the battle of the Somme but thought that was a bit over the top. A pity, as the sandbags surrounding it would have fitted the name exactly. I know, because I've been there and lived to tell the tale. In fact, despite all I've said, I'm very grateful to the Rogues for raising the ransom.

Have you ever had one of those times when your mouth has taken on a life of its own? You know, when you mean to say "No" and out comes "Yes". Well it happens with Doreen all the time. As soon as she asked me to go into her school and give a lesson on spreadsheets I knew I didn't want to but my mouth agreed. That's how I ended up with A.

"But I know nothing about teaching computing", I wailed as she gave me details on how to meet the escort into school.

"Then you'll fit in perfectly", she smiled. And that's how I found myself outside the Staff Room, scared stiff. "We'll leave you here," said the leader of the Securicor team, "We don't like going in there, it's too depressing."

I know what they mean. Apparently it's the only staff room in the country that has a group membership of EXIT. And I can believe it: It looked like the "before" bit of an advert for antidepressants. Happily before I'd time to join in the discussion on the most painless way of suicide and whether it was professional to take a few of the kids with you, Doreen – sporting a "Teachers mark it out of ten" badge – spotted me.

"Right Bob, do you want protective clothing or not? I prefer not, you can run faster. Come on, we've got to go to the bunker to meet the Desert Rat."

At first the phrase Desert Rat brought back memories of school dinners but it turned out to be the headmaster's honorary title – the teachers referring to themselves as the lemmings. "Ah, so you've come to talk about the agricultural program, have you? Do you know anything about teaching?"

"No", I admitted hoping that this would get me off the hook.

"Pity, we could do with someone who did. Now then, you're the computer expert, can you write me a program to keep track of things like attendance and black marks and who's to be kept in after school?"

"Well I can," I lied, "but it seems a bit unfair on the kids."

"Who said anything about the kids? I'm talking about the teachers."

And with that and a regal wave of the gin bottle we were dismissed and made our way to the class I was to talk to. As we walked there I found that you could tell the age groups in the classrooms we passed by the height the graffiti reached.

"This lot are a bit lively," Doreen warned as we unlocked the door, "but so long as you don't turn your back you've got a chance. And don't forget I'm riding shotgun."

I shall never forget the experience as long as I live, though I'll try. I've been told that most computers in schools were used for games and this place was no different, except that here the BBC Masters were being used for goal posts. It gave a whole new meaning to Econet. Anyway, it didn't take long for Doreen to settle them down and when the gas had cleared I was confronted with an amazing sight. In front of me were sat 25 multicoloured punks and one kid looking immaculate in blazer, tie and smart trousers who I recognised as the football.

"How come he's the only one in school uniform?" I muttered out of the side of my mouth, trying hard not to let them see I was afraid.

"He's not, the rest of them are. It's easier that way."

And that's where I'll draw a veil over the proceedings as I've started shaking again. Far be it from me to mention the fact that Doreen said that the kids liked me – "They offered you the first sniff from the tube" – or the tension in the staff room that night as they monitored the return of the teachers – two failed to come back from a mission in the artroom. All I can say is that that half hour was the longest in my life. And I was delighted when a sheet of flame brought the lesson to an early end.

"It's alright," I cried, "it's only a burning Master."

And it was. But it wasn't a micro.

Yours pedagogically,

Bob

PS A. seems to suspect about Doreen. She's just brought home a "Teachers do it by the bell" badge for "your little friend".

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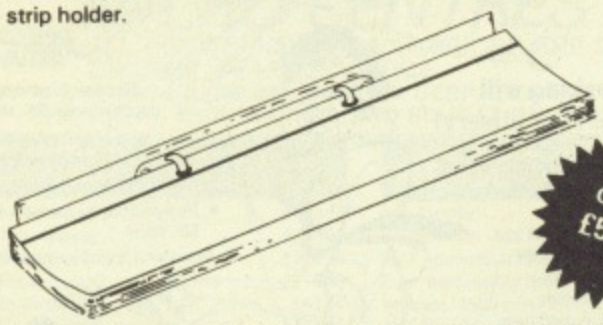

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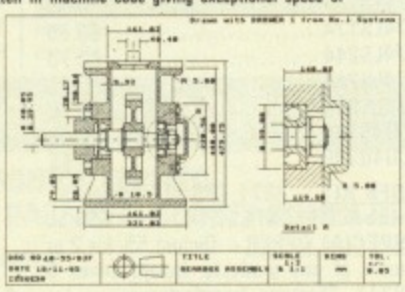

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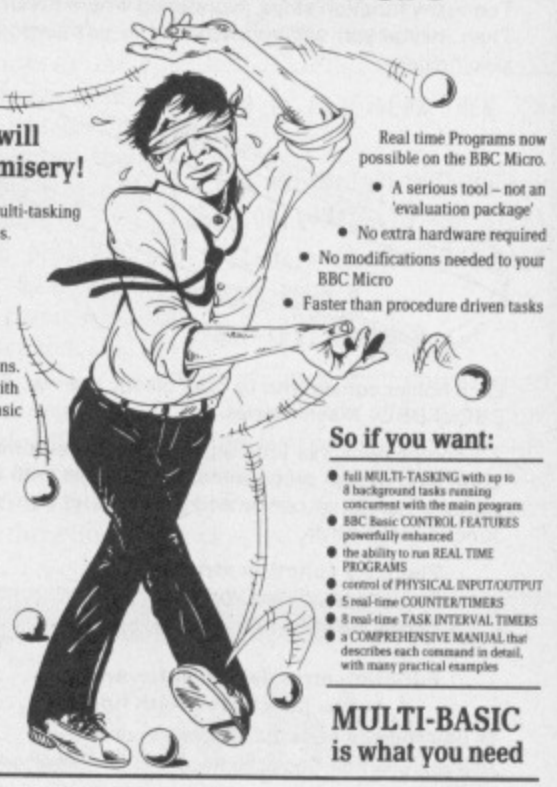

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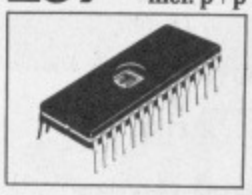

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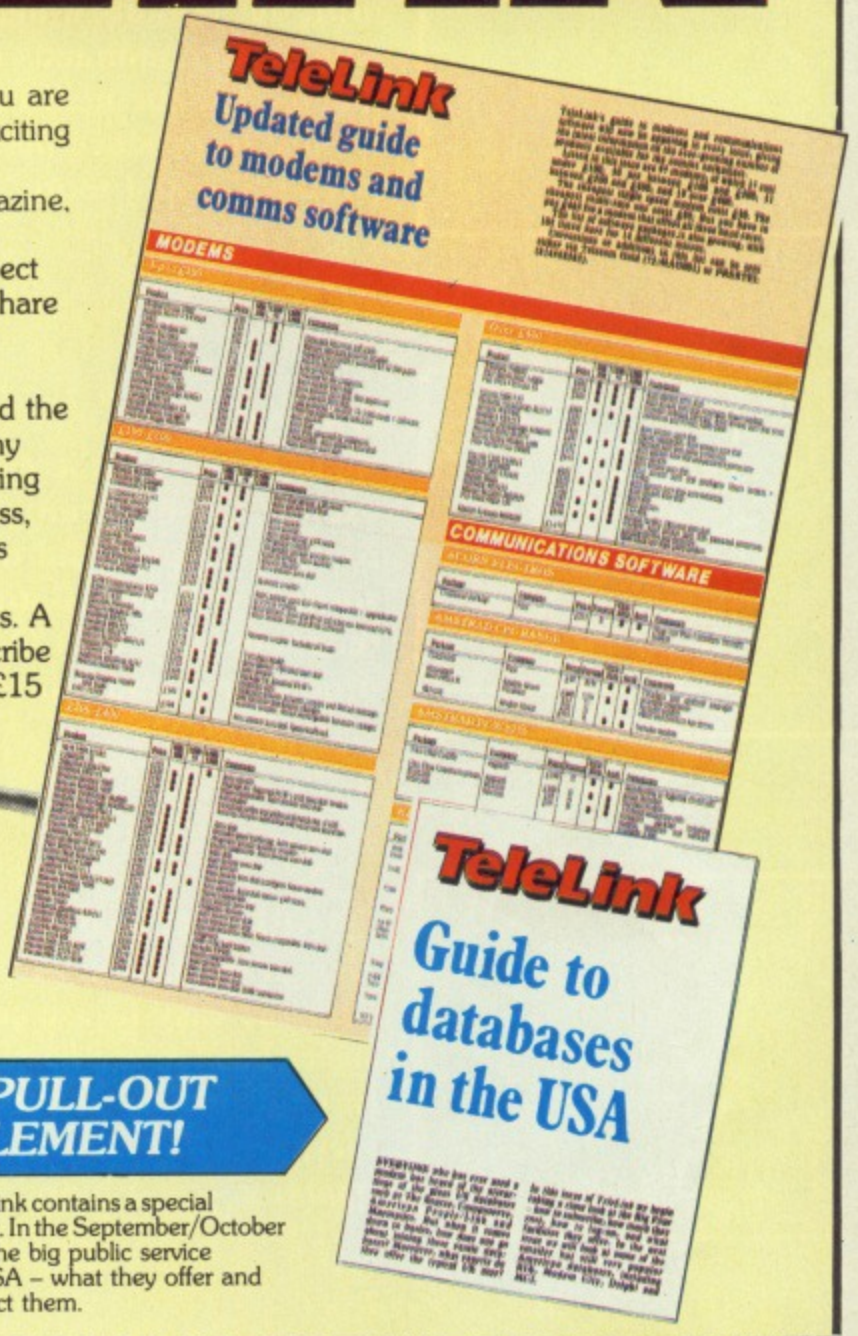

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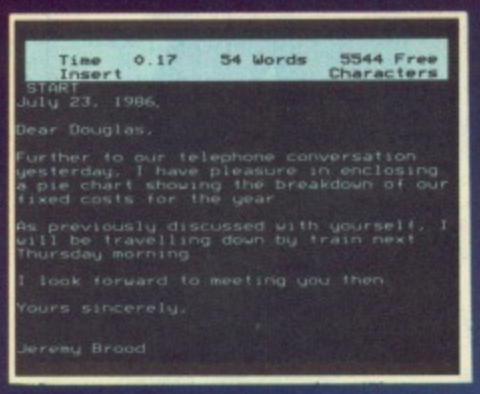

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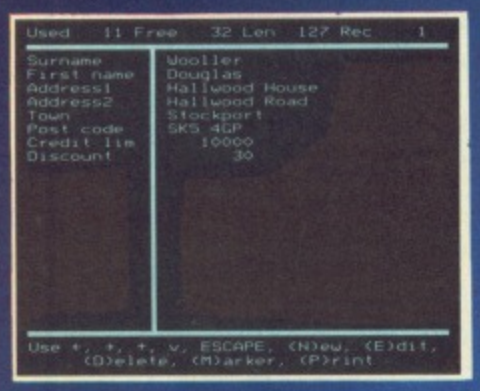

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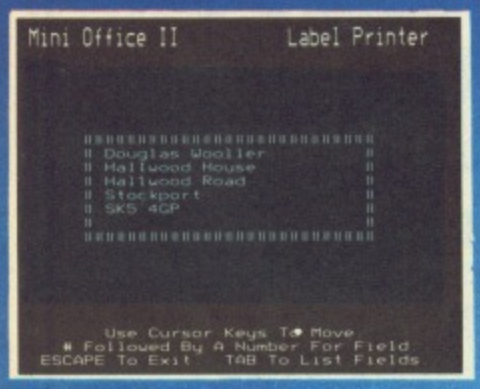

LABEL PRINTER
Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!

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Mini Office II offers the most comprehensive, integrated suite of programs ever written for the BBC Micro – making it the most useful productivity tool yet devised.

A team of leading software authors were brought together to devote a total of 26 man years of programming to the development of Mini Office II. What they have produced is a package that sets new standards in home and business software.

The sample screenshots above illustrate just a few of the very wide range of features, many of which are usually restricted to software costing hundreds of pounds. Most are accessed by using cursor keys to move up and down a list of options and pressing Enter to select.

Is it that easy to use? Several leading reviewers have already sung its praises on this very point.

Yet possibly the best advertisement for Mini Office II is that it comes from the same stable that produced the original Mini Office package back in 1984.

That was so successful it was shortlisted in two major categories of the British Microcomputing Awards – the Oscars of the industry – and sold in excess of 100,000 units!

It was up to Mini Office II to take over where the first Mini Office left off, with 32 extra features, two additional modules, a program to convert existing Mini Office files to Mini Office II format, and a 60 page, very easy to follow manual.

This is the package thousands of BBC Micro owners have been waiting for – and at a price everyone can afford!

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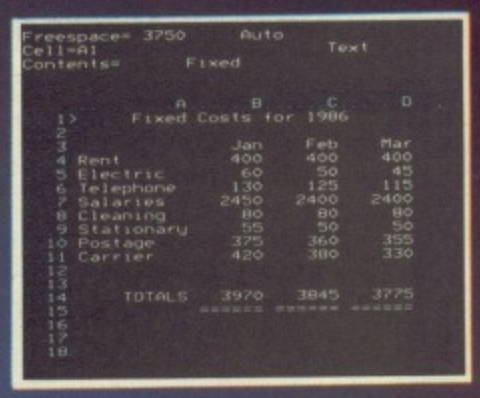
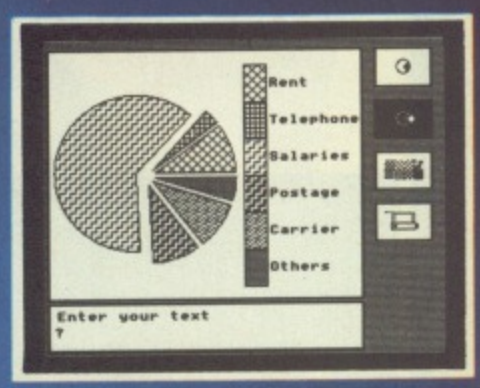


GRAPHICS

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!



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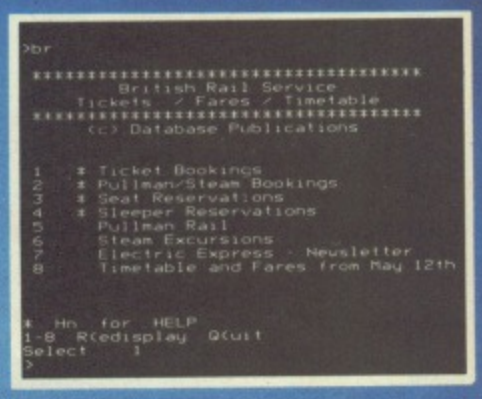

that can't be matched!

Here's what some independent reviewers say about Mini Office II:

Menus throughout the program were abundant and well structured, allowing complex choices to be made with hardly a glance at the pocket-sized spiral-bound manual, and offering a wealth of user-defined functions . . . For the money it really is unbeatable. Dedicated word processors, spreadsheets and comms packages may offer some extra facilities, but some are so full of whistles and bells you may find yourself forever in the manual or even not using half of their power. What you get with Mini Office II is a valiant attempt to provide an all-embracing small business package at a down to earth price; it fulfills all its promises, and there's nothing cut-rate about the facilities it provides. – **Viewfax 258 (Prestel)**

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The original Mini Office has been recognised as an astonishing bargain for anyone looking for a low-cost introduction to serious software. Now the four programs which made it up have been substantially enhanced and two new programs have been added. The result, Mini Office II, is more than just an introduction to serious software applications. It's good enough to fulfill the entire software needs of many a small business! . . . The range of features in each program is astonishing for a package of this cost . . . The spreadsheet is every bit as good as a program such as MasterCalc which costs more than the entire Mini Office II . . . This delightful little program [Graphics] allows you to produce professional looking charts to illustrate a set of figures. – **Amstrad Action**

The word processor is literally overflowing with excellent features . . . The database is very easy to use yet extremely powerful . . . The spreadsheet program is the next little gem . . . Having used Mini Office II for the past few days I cannot praise it too highly. – **Popular Computing Weekly**

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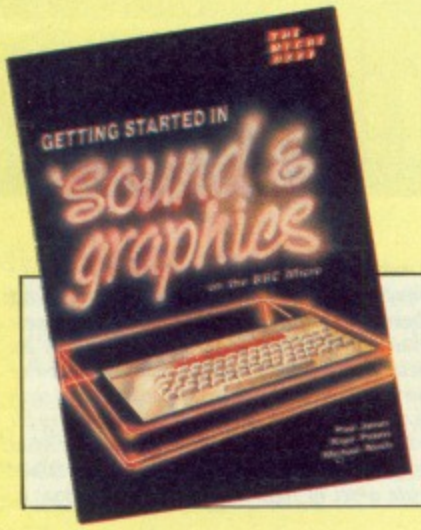

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In this complilation of their highly praised series of articles in *The Micro User*, Michael Noels, Paul Jones and Nigel Peters explore the BBC Micro's outstanding sound and graphics capabilities.

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Its hands-on approach has been specifically designed to teach the absolute novice not only the formal rules of Basic but also that elusive quality – good programming style.

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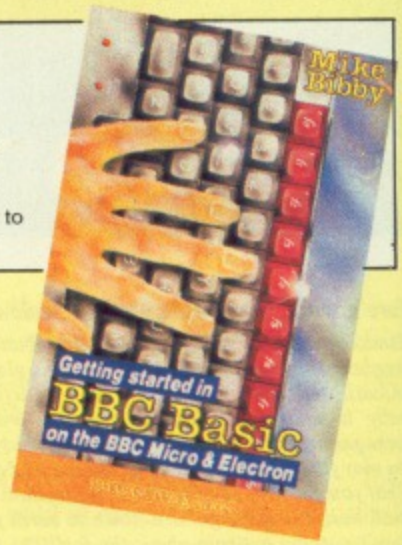

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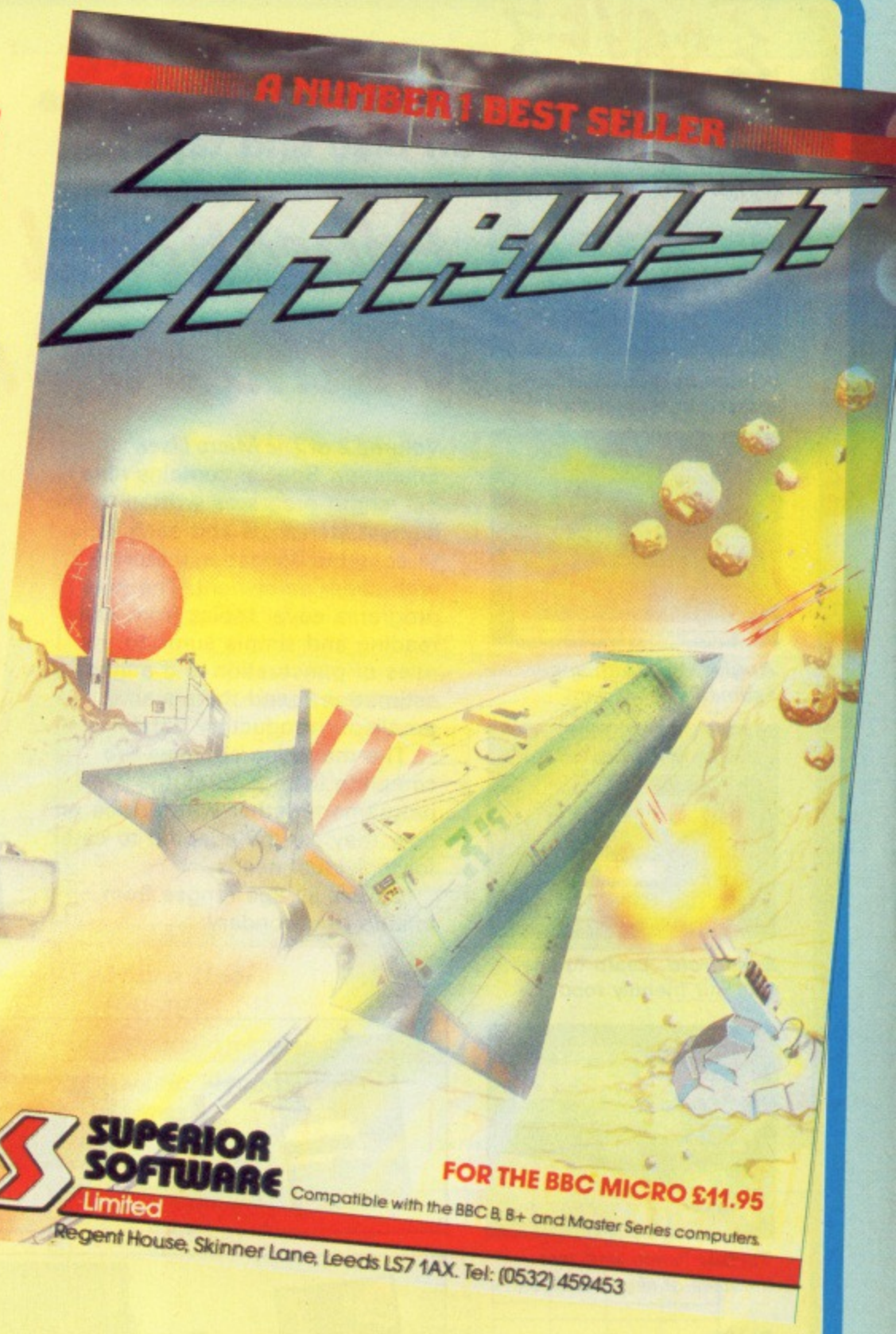

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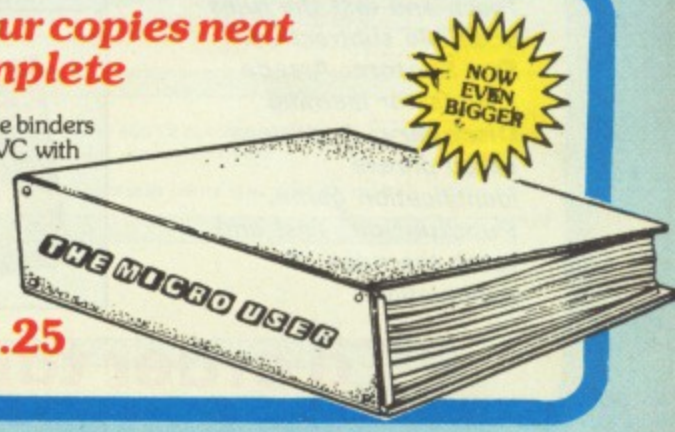

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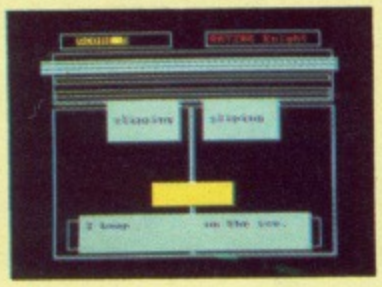

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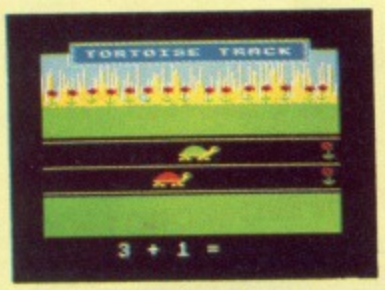

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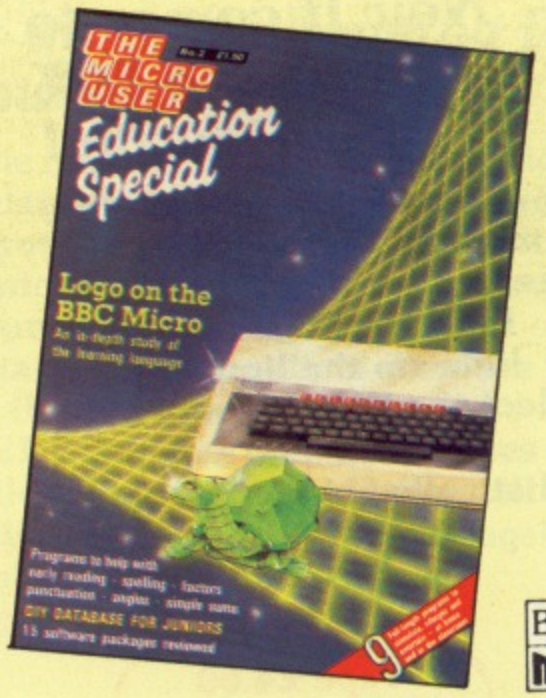

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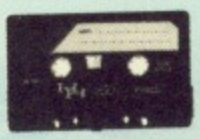
+  = **£1.95**
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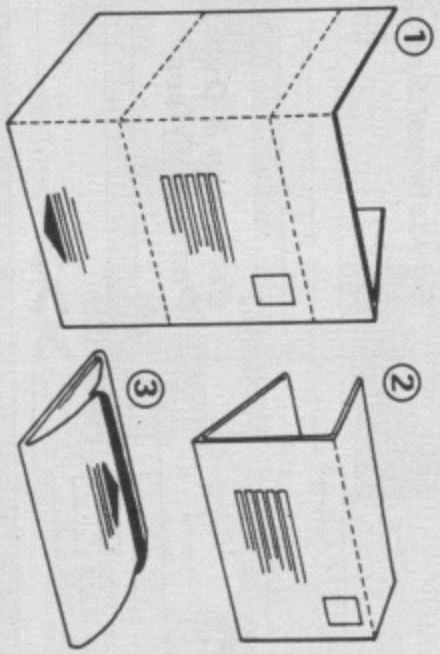

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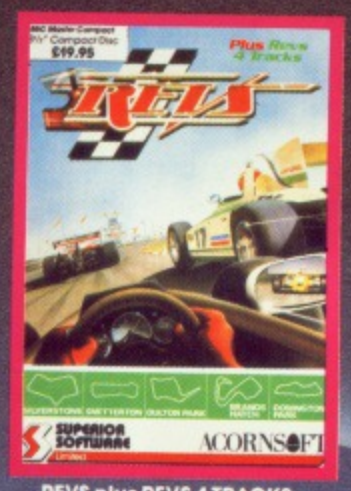

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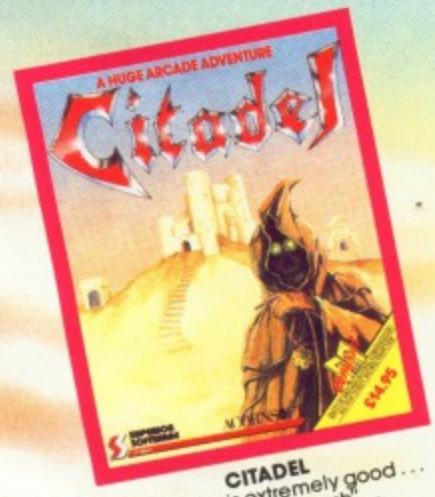

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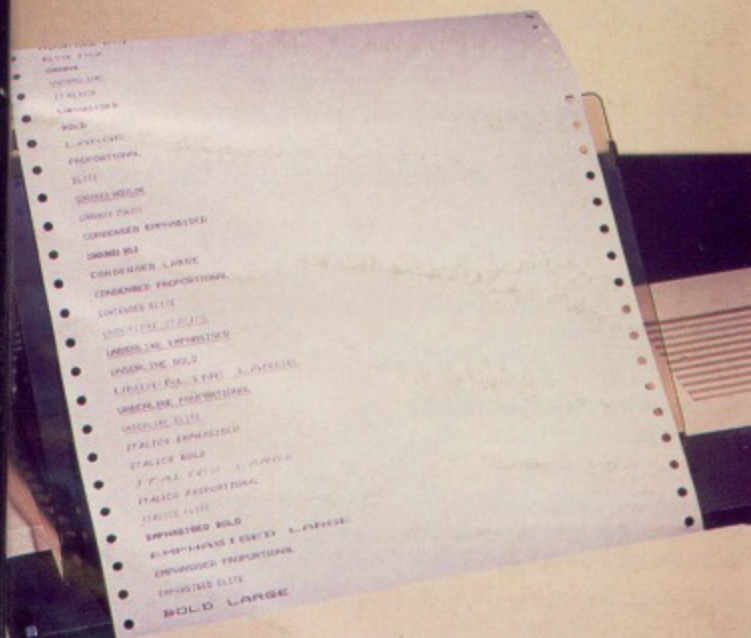

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