

A Database Publication

# THE MICRO USER

Volume 4  
Number 2  
April 1986  
£1.25

## GAMES LISTINGS



Ghouls of Azzod – the last word in ladders and levels



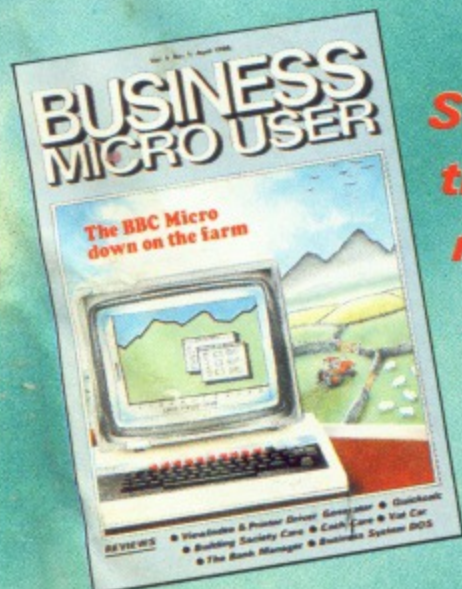
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Top-selling guide to the BBC Micro!

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the ROM that  
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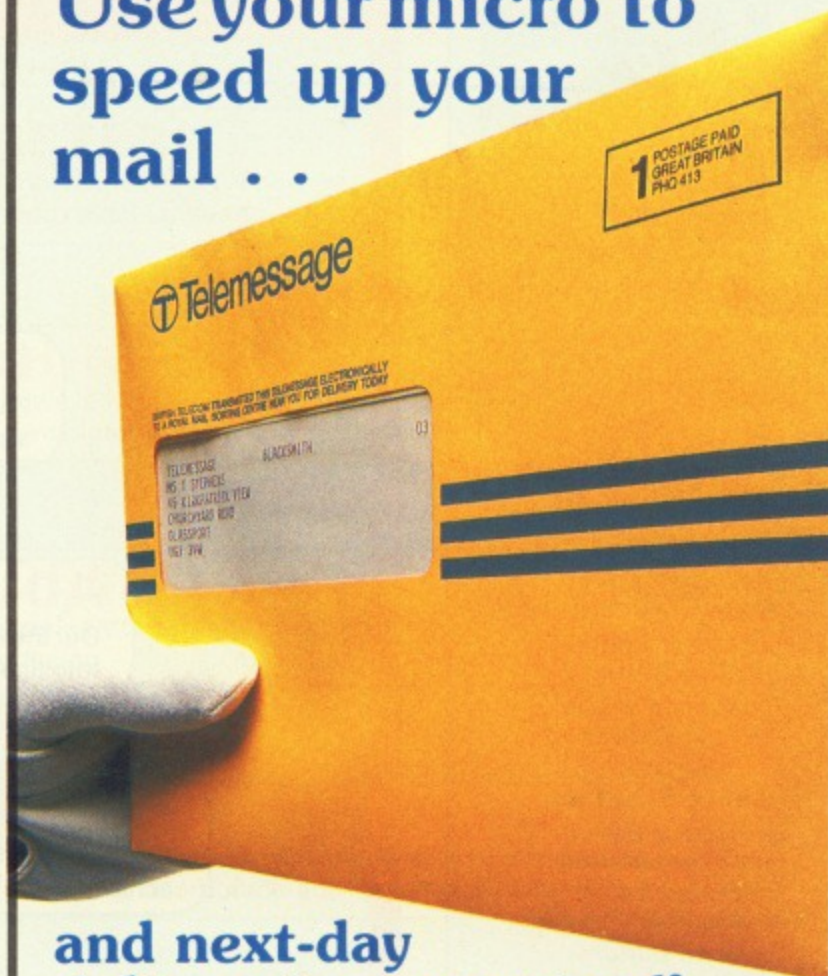
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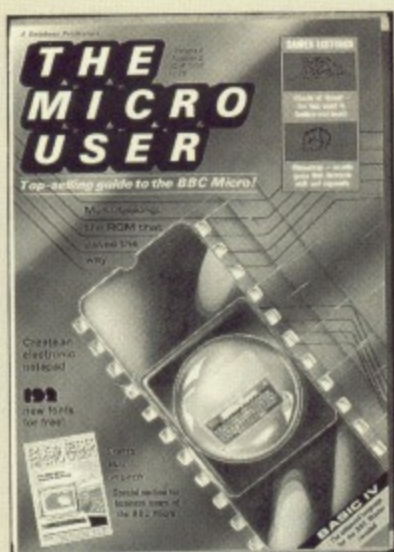
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**ABC**

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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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**Make your micro talk – for £3!**



**SPEECH!** – easily the most talked-about package ever created for the BBC Micro – is the latest exclusive offer for readers of *The Micro User*.

Read all about it on Page 142.

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**Introducing... a new service for the businessman**

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# SOLIDISK MEMORY UPGRADES

**S**olidisk offers the most extensive and economical choice of memory upgrades for the BBC B on the market today. Free installation of these as with all Solidisk products is available from our 90 strong team of Local Experts.

## External ROM Cartridge

Starting from the bottom of the range is a simple External ROM Cartridge Adaptor, which plugs into any ROM socket and will accept Solidisk or Acorn ROM cartridges (as used on the Electron and the new Master). These may easily be inserted or removed without opening the computer case or fear of damage to the ROMs.

## Fourmeg tm CPU and ROM expansion

In the ordinary BBC computer, the processor (CPU runs at 2 Mega-Hertz. By adding faster memory and increasing the speed to 4 MHz, we have enabled the BBC to run most programs in half the time. The Fourmeg plugs into the 6502 processor socket, and the additional connections are made by sprung clips and plugs.

The board also provides four high capacity ROM sockets, as used in the BBC B Plus and the Master machine. Up to 160K of ROM software can be fitted on this board (one 64K and three 32K ROMs). The new 4MHz processor is equivalent to that used on the Master and the Acorn TURBO board. It will run most Master software such as Acorn's new BASIC4 and at twice the speed of the ordinary Master.

A switch reverts the 4MHz speed to normal.

The higher speed is available to all ROMs installed in the Fourmeg board and programs in the onboard RAM. The rest of the machine (ROM, RAM, tape, disc, timers and add-ons) is unaffected.

## Fourmeg and ROM expansion with 32K RAM

The next step in expansion is the Fourmeg board with 32K of RAM. This board can be used exactly as above, with the added advantage of Shadow RAM and Sideways RAM, as on the BBC B Plus. In Shadow mode, an enormous 27K of free RAM is available, even when using MODE O and disc. In non Shadow mode, the expansion RAM can be used as two Sideways RAM banks. These can contain the image of two Sideways ROMs or be used as RAMDISK or printer buffer. As well as the four on board ROM sockets, the Shadow and Sideways RAM can run at full 4MHz speed.

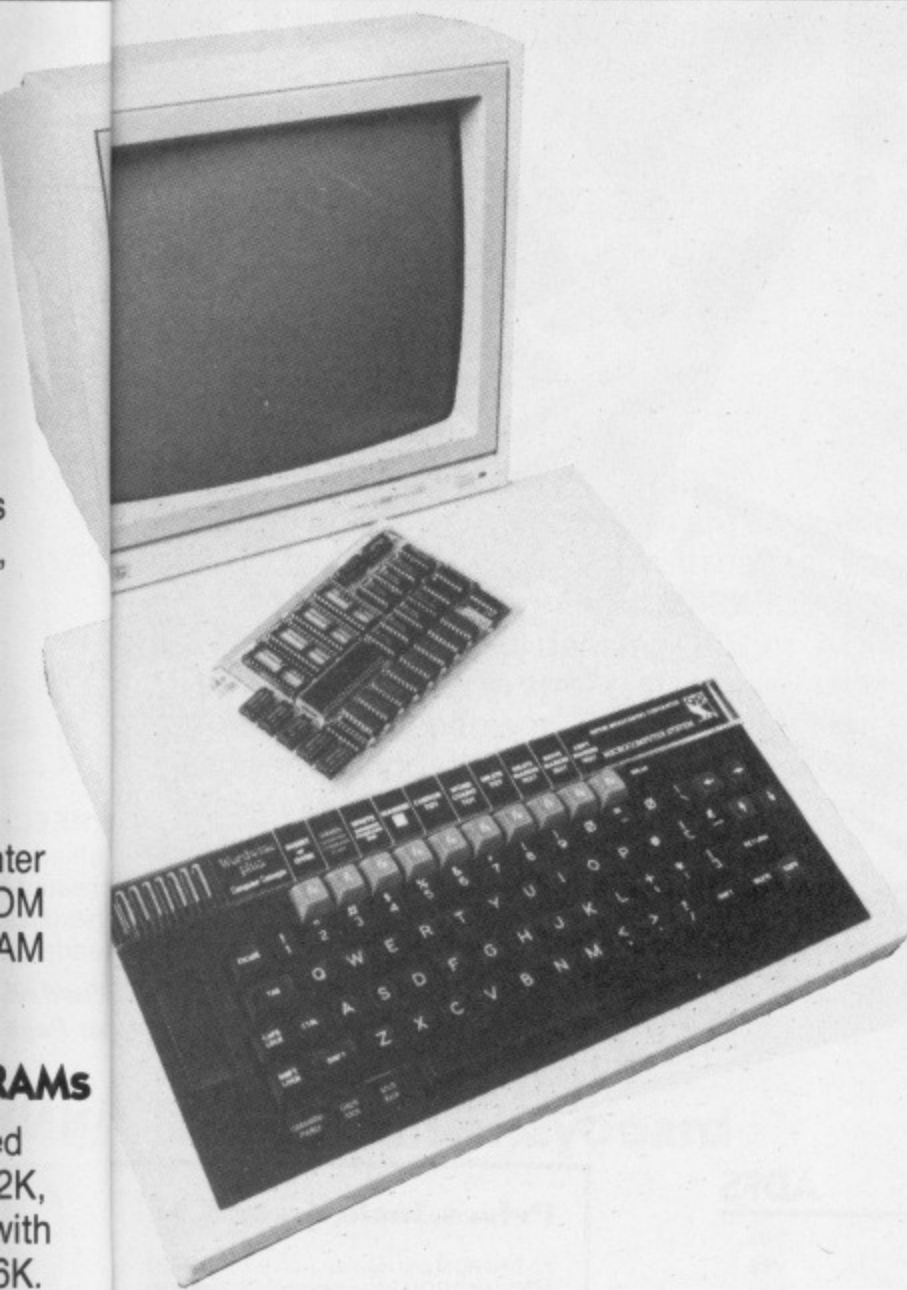
## 32K, 64K and 128K Sideways RAMs

The most popular and well established range of Sideways RAM comprises 32K, 64K and 128K boards. You can start with 32K and upgrade later even to the 256K. The 64 and 128K RAM boards have two high capacity ROM sockets as on the B Plus.

Sideways RAMs are compatible with all issues of BBC B with most add-ons except ROM boards. Sideways RAM can run all types of software that is normally available in ROM. Solidisk has a large library of programs covering many applications. These include Wordprocessor, Database, Spreadsheet, Spelling Checker, Basic, Sprites, Ramdisc, Machine Code Monitor, Digitised Pictures, Teletext Editor, a large number of games, Disc Filing System with Page at EOO etc. and available in packs of five discs, in 40 or 80 track format.

Software pack 1 (volumes 1 to 5) is included with all Sideways RAM boards. Software pack 2 (volumes 6 to 10) and the new software pack 3 (volumes 11 to 15) may be ordered separately.





## The Solidisk 256K Board

Finally, the largest in memory upgrades is the 256K board. This has 256K of RAM, four high capacity ROM sockets and a fourmeg processor, WORDWISE PLUS ROM – the best selling wordprocessor from Computer Concepts, and the Solidisk 32K Manager ROM.

The 256K RAM can be used as Shadow RAM, sideways RAM, RAMDISK, or all three at once.

On this board, each of eight sideways RAM banks can be 16K or 31K to increase to amount of code. Software which occupied two ROM slots in a standard machine may now be re-written into a single ROM slot, thus becoming shorter in size and faster in operation. If needed, each bank can be split between Shadow and Sideways RAM, the border being controlled by the application software.

The Manager ROM, supplied with this board, contains Solidisk Programming Toolkit, VDU recorder, printer buffer and RAMDISK.

## Real Time Clock and Solidesk

The Real Time Clock (RTC) is battery powered, giving accurate time and date. The "SOLIDESK" ROM uses the 50 bytes of battery backed RAM in the RTC chip to custom-configure the BBC computer on start-up as in the new Master machine.

The RTC board is plugged into the Analogue to Digital Converter (ADC, NEC-7002) socket, the latter moved into an empty socket on the board.

★TIME prints the date and time, ★TIME <date> <time> sets the new time.  
★CONFIGURE <parm> <option> sets the start-up option for one of the 20 parameters such as TUBE, Language, Filing System, Boot, Modem, screen mode etc. 20 spare bytes can be used by application software.

★DESK presents a friendly ICON/MOUSE environment. An AMX Mouse or Marconi tracker ball is preferred as input device but the keyboard may also be used. With DESK, you can display the disc catalogue, select programs, set alarm for your appointments (that is one of the things the RTC is good at!), use the calculator or write BASIC program. Available soon.

### Prices, inclusive of VAT

External ROM cartridge adaptor .....	£15.00
Basic Fourmeg board .....	£30.00
Fourmeg board with 32k RAM .....	£69.00
Sideways RAM 32k with software pack 1 .....	£50.00
Sideways RAM 64k with software pack 1 .....	£80.00
Sideways RAM 128k with software pack 1 .....	£125.00
256K board with WW Plus and Manager ROM ....	£175.00
Real Time Clock and SOLIDESK ROM .....	£29.00

Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ



# SOLIDISK DISC INTERFACES

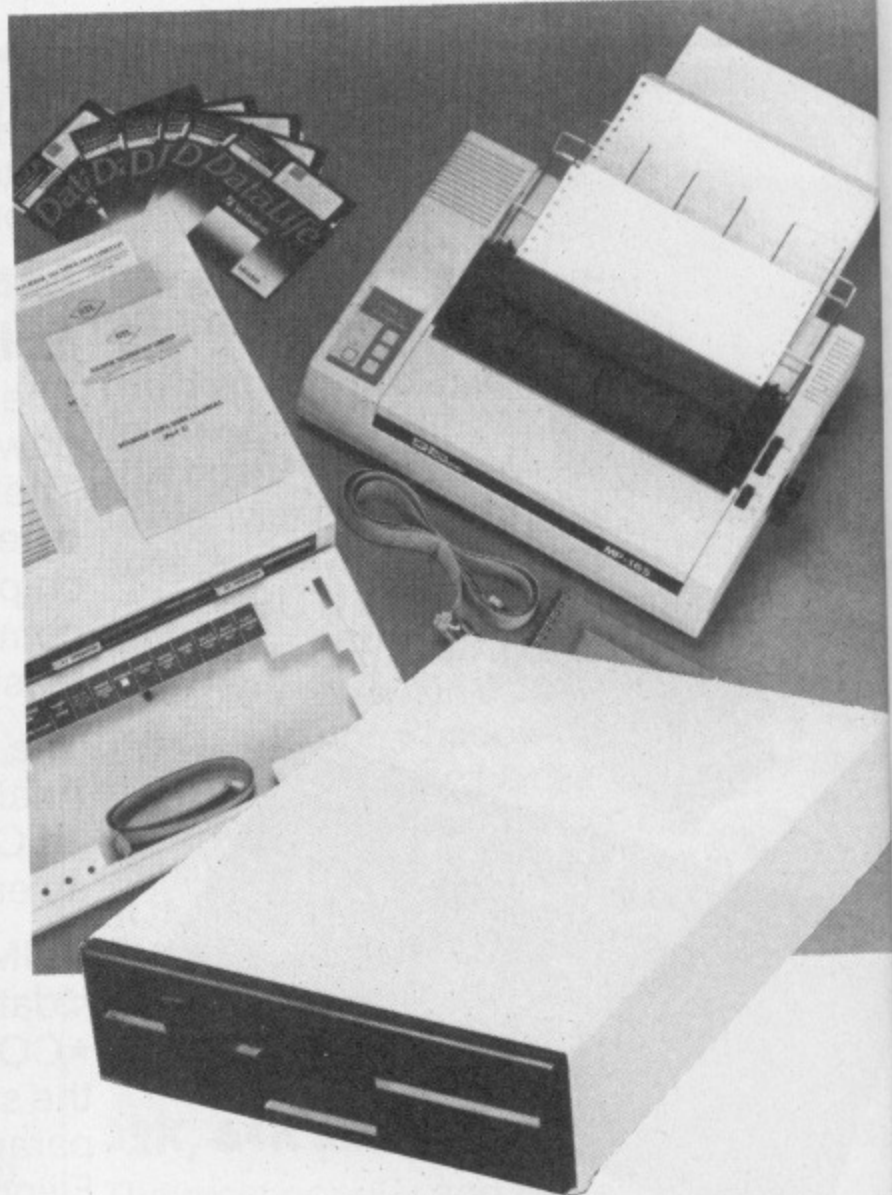
**S**olidisk offers well designed Disc Interfaces enabling your computer to use floppy disc drives. If you feel you would have any difficulty in installing it and/or adding disc drives, you can contact one of our 90+ Local Experts who will install it for you free of charge.

## The 1770 Disc Interface

The Solidisk 1770 Double Density Disc Interface has only four components and can easily be fitted even by a novice. The 1770 Disc Interface is supplied with Solidisk 2.2 DFS ROM.

## The Solidisk 1770+8271 Disc Interface

If you already have an 8271 Disc Interface, then the Solidisk 1770+8271 Interface will give you the best of both worlds. You can select either the 8271 or the 1770 at the flick of a switch. The 1770+8271 Interface is supplied with Solidisk Advanced Disc Filing System (ADFS). This is a 32K ROM set, available in two 16K or one 32K ROM and contains both DFS and ADFS.



### Features built into ROM

Disc formatter  
Disc verifier  
Memory editor  
Disc sector editor  
Disc copier  
Recover & Restore  
Read track & Write track  
Run 8271 floppy disc controller  
Oswold 7F emulator for 1770  
Tape to disc  
Download  
DFS files to ADFS  
ADFS files to DFS  
40/80 switching for 80-track drives  
Solidisk Winchester  
6502, Z80 and 32016 compatible  
Read & Write IBM-PC DOS discs

### DFS 2.2

yes  
yes  
yes  
yes  
yes  
yes  
yes  
yes  
yes  
yes  
yes  
yes  
yes  
no  
no  
yes  
no  
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yes  
yes

### ADFS

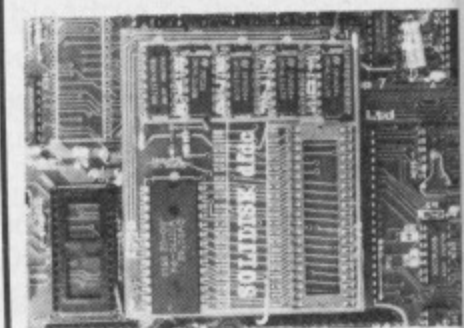
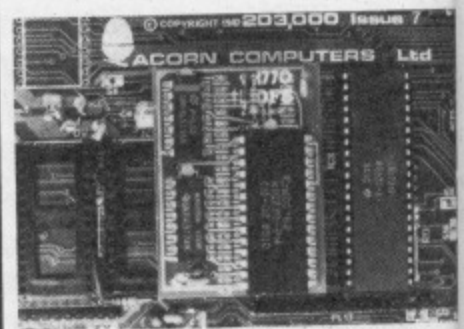
yes  
yes  
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yes  
yes  
yes  
yes  
yes  
yes  
yes  
only in DFS  
yes  
yes  
yes

Both the DFS and ADFS have every facility that you would expect. They can run most protected software, such as Elite, Castle Quest, Island Logic's Music System etc. Other features include read after write, and the option of double density operation (with the 1770 chip) giving 60% extra storage capacity. Their compatibility with all Acorn Second Processors (6502, Z80 and 32016) and Econet File Server (Level 2), and their capability of reading from and writing to IBM-PC DOS diskettes (with the 1770 chip) reflect the broad range of applications supported. Both 1770 and 1770+8271 Disc Interfaces are compatible with Acorn 1770 DNFS and ADFS ROMs.

**The DFS and ADFS ROMs can be used to enhance both standard Acorn 8271 or 1770 Disc Interfaces, on the BBC Model B or the B Plus.**

### Prices, inclusive of VAT

2.0 DFS ROM and manual .....	£10.00
ADFS+DFS ROM set and manual .....	£20.00
Upgrade from 2.0 DFS to ADFS .....	£10.00
1770 Disc Interface, 2.0 DFS ROM and manual .....	£45.00
1770 Disc Interface, ADFS, DFS ROMs and manual .....	£55.00
1770+8271 Disc Interface, 2.0 DFS ROM and manual .....	£50.00
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# The Solidisk Floppy Disc Drives

**S**olidisk floppy disk drives are 80-track, double-sided, 5¼ inch with capacity of one Megabyte unformatted (640K formatted with Solidisk double density DFS or ADFS). They are enclosed in strong steel casings to protect the mechanism. The power and data leads are included. The disc drives, made by NEC or Mitsubishi, are Beeb-powered.

With the disc drive, Solidisk provide five volumes of useful software, each on a separate diskette and with appropriate user manuals.

## The CPU and Keyboard Case

This compact steel case is designed to hold a BBC and two Solidisk floppy disc drives. It will support even a heavy weight monitor, while providing good cooling for the power supply and concealing many connecting cables. The keyboard is housed in a separate case, connected by a 24 inch lead.



## The Wordprocessing Package

The wordprocessing package comprises of 160cps printer, an 80-track double-sided disc drive, five software diskettes, Wordwise Plus ROM, one blank disc, 100 sheets of printer paper, all leads and manuals. In fact, everything you need to start wordprocessing right away. This package is for the new Master machines and the BBC B fitted with Acorn or Solidisk DFS.

The printer is a 9 needle dot-matrix, with a speed of 160cps draft and 32cps NLQ mode. It features multiple pitch settings, italics, boldface, underline, super and subscripts, bit image graphics etc. It uses the same ribbon and control codes as the Epson FX85.

The disc drive is a top quality 5¼ inch drive of either Mitsubishi or NEC manufacture.

Wordwise Plus is Computer Concepts' best selling Wordprocessing ROM combining all features of an excellent wordprocessor with the flexibility of its built-in programming language.

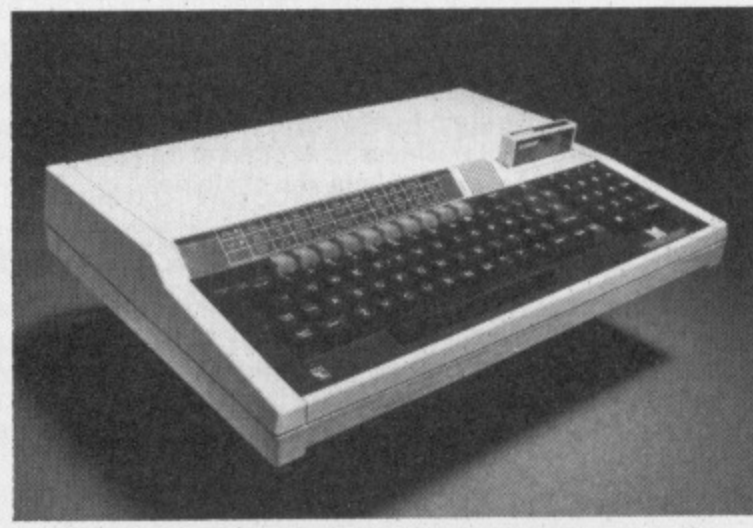
The supplemental software includes Spelling Checker, Database, Spreadsheet and games so this package is not limited just to wordprocessing.

This package can be the centre of a more substantial computer system. For instance, if there are more users, an Econet network can be cheaply built-up, sharing software, printer, disc storage and even Winchester. The cost per user will then decrease dramatically.

### BBC Master Special Package Offers Available

- 1) 128K BBC Master, with Wordprocessing package .....£750
- 2) Business Pack: complete 3 operating 128K Master keyboards, Econet, 160cps printer, 20MB Winchester, 1 floppy drive, Wordprocessor, database, spreadsheet, all leads and manuals. Call for demo. Ideal for small offices .....£2399.00

All prices include VAT, delivery extra.



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Issue 7

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# SOLIDISK WINCHESTER FOR SINGLE AND NETWORK USERS

**T**he Solidisk Winchester provide highly efficient storage for BBC computers — at present the Model B and B Plus, and Acorn Second Processors — and soon the new Master Series.

The Winchester are supplied with both the Solidisk Disc Filing System (DFS) and Advanced Disc Filing System (ADFS) in ROMs. These are fast and reliable, and have full facilities to move files between them.

The Solidisk DFS can use floppy discs in single or double density. Moreover, it can read from, and write to (IBM) PC-DOS and MS-DOS discs (but not format them or add entries to their directories). It also has a good 8271 emulator to run most protected disc software — both games and business — from Acornsoft, Alligata, Beebug, Clares, Island Logic, Micro Power, Superior Software etc.

It is intended for use with one or two floppy disc drives, and allows an unlimited number of filenames, rather than the standard 31. However, it is still limited to a file length of 256K and a maximum of 5 files open at once. Hence the DFS is inadequate for database and accounting applications — for which the ADFS is ideal. Moreover, the catalogue is single level.

## Winchesters for single users

The Solidisk ADFS can handle one or two Winchester drives plus one or two floppy disc drives. Files on any drive can be up to 512 Megabytes (or the drive size limit) in length. Up to 10 files can be open at the same time, and essentially unlimited numbers can be organised in a multi-level catalogue. The ADFS is also much faster acting, and files can grow in place without risk of 'Can't extend'.

Operating systems such as CP/M (Z80) and Panos (32016) can use either the DFS, to control only floppy disc drives, or ADFS, to control both these and Winchester. Furthermore, the ADFS allows the Winchester to be "partitioned" into multiple user areas, accessed by CP/M, Panos etc., as well as the normal ADFS. The powerful Acorn 32016 comes with the "Install" program which will move Panos from the system floppy disc to the Winchester. Panos is first started under the Solidisk DFS or Acorn DNFS, then Install is run. Thereafter, Panos can be booted from the Winchester. Moving files between the floppy discs (DFS format) to the Winchester (ADFS format) is done by the Panos COPY command.

The Acorn Z80 Second Processor as supplied will only allow BBC Basic (Z80) to take advantage of the ADFS, and hence the Winchester. To run CP/M, a new BIOS ROM is required.

## Winchesters for small networks

The existing Net Filing System (NFS) lacks local buffering. For example, each byte transmitted using BGET or BPUT requires four "frames" (or packets).

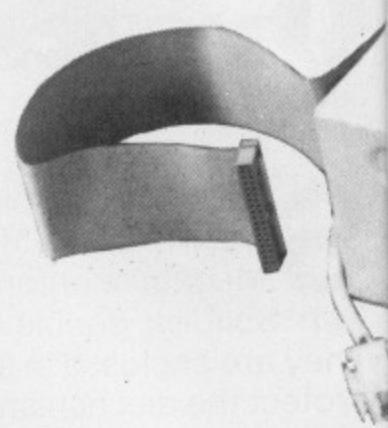
Solidisk will soon introduce the Net-Disc Filing System (NDFS). This, although using the standard Econet hardware, implements a direct link between any work station and the Winchester disc drive on station 254. No dedicated file server machine (nor any Second Processor to run the File Server software) is needed. In addition, the NDFS allows up to 10 channels to be open, and files to be transmitted in blocks of 256 bytes, rather than character by character.

This NDFS is also suitable to network 32016 and Z80 Second Processors.

The cost saving is substantial, especially for small networks. For example, four workstations sharing one Winchester via such a network is cheaper than four stand-alone machines equipped with local floppy disc drives. In business, sharing and transferring files over a network is much more practical than swapping floppy discs between machines.

## Winchesters for level 2 file servers

A sizeable proportion of BBC software runs only under the DFS. Solidisk has therefore developed the Winchester Disc Filing System (WDFS), to emulate multiple floppy disc drives on a Winchester. The latter is normally controlled by the ADFS, but for the WDFS, a "partition" is initially created in the root directory. This contains up to 100 "virtual drives", each of 200K, for use only by the WDFS. Like the real floppy drives, they can be given any number from 0 to 99.



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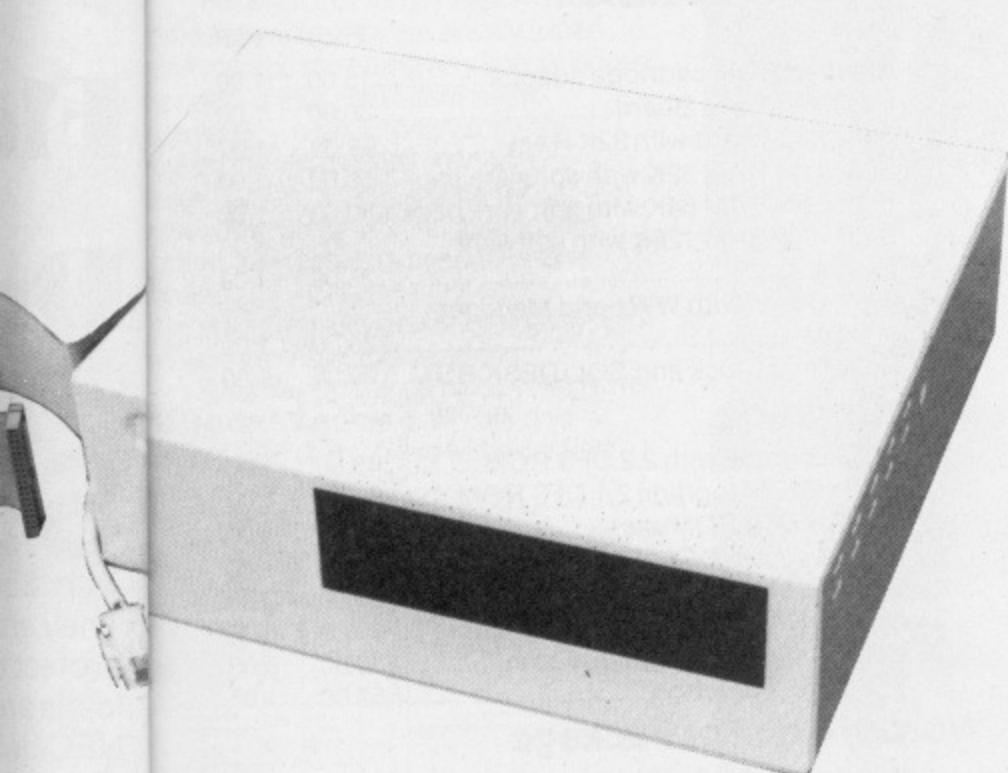
**The Solidisk WDFS  
enables the Econet  
Level 2 File Server  
to use Winchester,  
which dramatically  
improves both  
speed and capacity**

The Winchester is very fast acting, and data written to the Winchester benefits from the in-built "Read after Write" for improved reliability.

To use the Solidisk Winchester with the Level 2 File Server, the Solidisk ADFS and WDFS ROMs are simply fitted to the right of the Acorn DNFS ROM in the file server machine, and the Winchester plugged into the 1MHz bus connector. The WDFS will work with either the 8271 or the 1770 Disc Interfaces.

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## THE SOLIDISK WINCHESTER RANGE

It is easy enough to compare specifications and prices of Winchester drives, but there is more to it than that. Solidisk has a policy of continuous development, which is reflected in the broad range of applications supported. This, in turn, ensures the maximum return for your investment.

The Solidisk Winchesters are available in the following packages:

- 1) 10 Megabytes, 5.25ins, Beeb powered ..... £499.00
  - 2) 10 Megabytes, 5.25ins, mains powered ..... £569.00
  - 3) 20 Megabytes, 5.25ins, Beeb powered ..... £661.25
  - 4) 20 Megabytes, 5.25ins, mains powered ..... £747.50
  - 5) 20 Megabytes, 3.50ins, Beeb powered ..... £720.00
  - 6) 40 Megabytes, 3.50ins, mains powered ..... £1148.85
- Delivery by courier ..... £10.00  
 All prices include VAT.

### The packages include:

- The Winchester drive itself.
- DFS (or WDFS on request) and ADFS ROMs.
- One utility diskette in 5.25 inch, 160 track, ADFS format.
- Manuals for both ROMs and diskette.
- One year guarantee.

### 5.25 inch Winchesters

These drives (of 10 or 20 Megabytes formatted) are of established design, low noise, low power consumption, and have the same "form factor" as a half-height floppy drive. They can be fitted into the Solidisk CPU case in place of a floppy drive if required.

### 3.5 inch Winchesters

These are of the latest technology, featuring even lower noise and power consumption in an even smaller package. The drives have the same form factor as a 3.5 inch half-height floppy drive and a smaller footprint than the "User Guide"!

### Beeb powered or mains powered

The Beeb powered Winchesters are only suitable for use with machines fitted with the shiny, switched mode power supply. The power lead will also support a single floppy disc drive.

If the machine is already supporting twin floppy disc drives, or many add-ons, a mains powered Winchester should be specified.

**TWO KEY ADVANTAGES** of Winchesters over floppy discs are higher capacity and faster transfer rate.

Unlike floppy disc drives, Winchester drives are enclosed in sealed casings, allowing very high track density, up to 600 compared with 40 or 80.

Their discs are non-removable, rotating continuously at high speed (3600rpm), enabling data to be transferred 20 times faster than single density floppy discs.

The Solidisk Winchester drives have a further advantage over some competitors. They have "buffered seek", hence stepping pulses can be as short as 2 microseconds. This results in an average access time of 80 milliseconds — less than one tenth of some other drives.

This is specially important as the Winchester fills up.

### Hardware requirements

To use a Solidisk Winchester, you will need either a BBC Plus, or a BBC Model B, fitted with a 1770 disc interface (Acorn or Solidisk). If you already have the 8271 Disc Interface in your machine, we recommend replacing it with the Solidisk 8271 + 1770 disc interface rather than just the 1770 disc interface. The Winchester drive is connected to the 1MHz bus socket.

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# The Linemaster ROM

The Solidisk Linemaster ROM allows the BBC micro to communicate with other computers. In addition to the standard Terminal and Prestel modes, it has Viewdata Host Mode and the ability to autodial and autoanswer, all controlled by software.

## Telecom Gold

Telecom Gold is the British Telecom electronic Mail Service enabling computer users to send and receive messages, telexes and to access many large databases. The Linemaster ROM allows you to use the BBC computer to communicate with Telecom Gold and Bulletin Boards. Its features include various baud rates and protocols, an elapsed time clock and 40/80 column screen display.

## Prestel

Prestel is the British Telecom Viewdata service. The Linemaster ROM offers extensive facilities to communicate with Prestel. If you have an autodialling Modem, a simple command such as \*PRESTEL 618 (for London) can put you "online" with the local Prestel computer.

## Viewdata Host

In this mode, your BBC is set up as 'Prestel look alike'. Other users can communicate with your computer exactly as with Prestel. They can browse through pages that you create using Linemaster.

## Modems

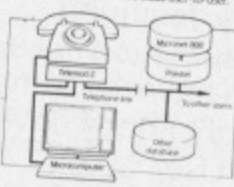
The Linemaster ROM works well with all RS423 type modems, eg Telemod, Nightingale, Miracle etc. but not all modems support all the features of the Linemaster.

## Telemod 2 Modem

The Telemod 2 is a high quality, mains powered, BABT approved MODEM for direct connect. This means that there are no rubber cups to fit the telephone into, but just a connection to a modern socket, with the telephone plugging into the back of the modem. The modem supports 1200/75 baud (V23) communications protocol as in Prestel and Telecom Gold.

### Telemod 2

- ADVANCED INTEGRATED CHIP TECHNOLOGY to provide universal communications with enhanced reliability.
- A DOWN-TO-EARTH PRICE that puts information technology within everyday reach.
- COMPACT DESIGN to fit neatly under your telephone, and an integral power supply.
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- FULL AND HALF-DUPLEX OPERATION - V23 Protocol standard and 1200 baud user-to-user.



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BRITISH MANUFACTURED  
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## Solidisk local experts

Solidisk has a nationwide network of more 90 local experts and a growing number of experts overseas. They do not usually sell our equipment but can generally fit it free of charge. Please ring Solidisk Sales office. If you wish to call at our office for a fitting however, it is necessary to make an appointment.

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## Prices, inclusive of VAT:

### RAM/ROM expansion

Qty		Price	P&P
.....	External ROM cartridge adaptor	15.00	1.00
.....	Basic Fourmeg Board	30.00	1.00
.....	Fourmeg Board with 32K RAM	69.00	1.00
.....	Sideways RAM 32K with software pack 1	50.00	1.00
.....	Sideways RAM 64K with software pack 1	80.00	1.00
.....	Sideways RAM 128K with software pack 1	125.00	1.00
.....	256K Board with WW+ and Manager ROM	175.00	1.00
.....	Real Time Clock and SOLIDISK ROM	29.00	1.00

### Disc Upgrade

.....	1770 Upgrade with 2.2 DFS ROM	45.00	1.00
.....	1770 + 8271 Upgrade 2.1 DFS ROM	60.00	1.00
.....	ADFS + DFS ROM set	20.00	1.00
.....	Upgrade from DFS to ADFS + DFS	10.00	1.00
.....	Solidisk 80 track double sided drive	109.00	3.00
.....	Dual Drives, CPU and Keyboard case	230.00	6.00
.....	CPU and Keyboard case alone	30.00	6.00
.....	EFS for the Electron	59.00	1.00

### Wordprocessor Package

.....	Wordprocessor for the B+ or Master	309.35	10.00
.....	Wordprocessor with 1770 DFS & 2 drives	458.85	10.00

### Winchesters

.....	10 MB 5 1/4 in. Beeb powered	499.00	10.00
.....	10 MB 5 1/4 in. mains powered	569.00	10.00
.....	20 Mb 5 1/4 in. Beeb powered	661.25	10.00
.....	20 Mb 5 1/4 in. mains powered	747.50	10.00
.....	20 Mb 3 1/2 in. Beeb powered	720.00	10.00
.....	40 Mb 3 1/2 in. mains powered	1148.85	10.00

### Modems

.....	Linemaster ROM and manual	10.00	1.00
.....	Telemod 1 MODEM (BABT approved) with Linemaster ROM	50.00	3.00
.....	Other MODEMS	P.O.A.	-

### Datalife Diskettes

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.....	MD557 (DS/QD) box of 10	25.00	1.00

### EPROMS

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.....	27256-25 (or better) pack of 3	25.00	1.00
.....	UVIPROM Eprom Programmer	19.00	1.00
.....	UVIPROM32 for our 27256's	21.00	1.00
.....	UVIPAC Eprom eraser	20.00	1.00
.....	Solidisk Toolkit ROM	10.00	1.00

Total .....

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Address: .....

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When the press use such words as 'Phenomenal', 'Outstanding', 'Ideal' and 'Worth Every Penny', they've obviously discovered something rather special.

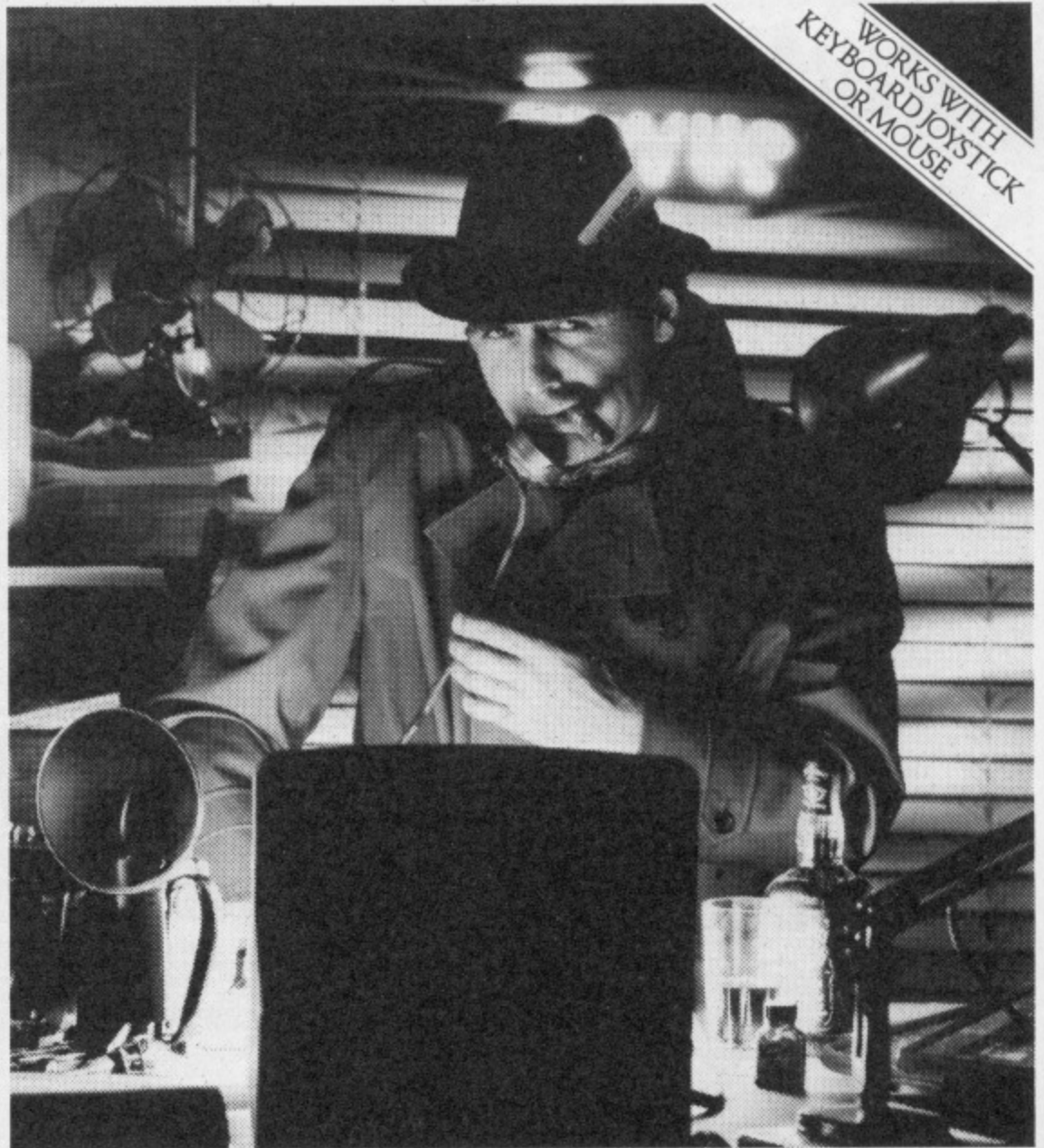
But when that something turns out to be a product in which they are already expert, then it must be something very special indeed. The object of their enthusiasm is AMX Pagemaker - a revolutionary software program that will produce newspapers, posters, leaflets, notices and hand-outs - in fact anything where text and graphics are required, to an extraordinary professional standard.

It's a complete graphics design system and word processor rolled into one.

AMX Pagemaker consists of two Roms and two discs therefore it will work on a standard BBC or B+ micro without a Rom board.



AMX Pagemaker is fully compatible with either the AMX Mouse - joystick or keyboard and requires the minimum of a single 40 track disc drive. It has real time graphics with fast continuous scrolling up and down an A4 page and uses Mode O, the highest graphics resolution on the BBC.



WORKS WITH  
KEYBOARD JOYSTICK  
OR MOUSE

# The program that's making front page news.

## READ ALL ABOUT IT.

You can type directly on to the screen, with any of the 16 typefaces supplied or design your own, alternatively, you can load in wordwise and view files with fully automatic on screen text formatting as they load. Either way centering, ragged right and literal justification are all available. There is full pixel resolution control over character size and spacing: Also included is a Micro justification facility.

## EXTRA, EXTRA.

There are outstanding facilities for drawing, spraying and painting, using either the patterns supplied, or your own pattern designs, enabling you to achieve some incredible graphic results. A complete Mode conversion program is included allowing you to load in drawings and digitised pictures from all BBC graphic modes. The cut and paste facilities include: copying, moving, rotating, stretching and a fantastic zoom is also available.

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AMX Pagemaker is your opportunity to join the publishing revolution, it comes complete with a comprehensive manual which the press describes as 'Superb'.

At only £49.95 the cost of the Pagemaker is as amazing as the program itself. Let's leave the last word to the press.

"Pagemaker" is phenomenal - it lends itself to creating anything where text and graphics are involved - notices, posters, leaflets, hand-outs, newsheets. Packages like this have been the province of the 16-bit micros until now, this product is worth every penny of £49.95."

\* 'Educational Computing', January 1986.

This superb package is available from all good computer dealers or direct using the Freepost order form below.

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### VDU TERMINALS

Standard VDU data entry terminals at give away prices!!  
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100's of other terminals in stock, CALL for more details.

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# We thought it was about time we put you in the picture.

AMX Mouse is compatible with all six modules of **Mini II Office**  
 Word Processor • Database • Spreadsheet • Label Printer  
 Graphics • Communications

When we introduced our AMX Mouse to BBC Micro users, the response was phenomenal.

And no wonder!

It was regarded as 'pushing the BBC to its limits' and hailed by the press as 'probably the best input device that has appeared recently'. The AMX Mouse brought to BBC Micro users the same sophisticated, positive control that had, until then, been the province of the more expensive computers, like the Macintosh.

Now we announce a new enhanced software package which, can be used with a traditional keyboard or joystick but truly comes into its own when used with the AMX Mouse.

AMX Super ROM and Super Art adds colour to the features of the original AMX ROM, on a new 16K ROM.

It dramatically extends the original AMX ROM facilities to include Pull Down Menus, overlapping colour windows, colour patterns and an extended Icon set in all graphic modes.

Specially written to be usable with the vast majority of BBC Systems including 2nd processors, the Aries RAM Board, the BBC + Shadow mode, tape, DFS and ADFS.

The kernel of the Super Art program is included in the 16K ROM, providing tape and disc users with a Mode 1 colour drawing program.

But Super Art really comes into its own when used on a disc based system; a host of additional facilities can be selected direct from the screen.

Colour pictures can be created in dot resolution up to A4 size by scrolling the screen window, over the picture.

Other facilities include colour pattern editing — use of icons, additional text styles, various copy facilities and a superb colour Zoom.



Pictures can be printed out in colour (Integrex) or shades of black and grey on Epson compatible printers.

The results can be astonishing! — you can even store your finished 'masterpieces'.

The AMX Icon Designer facility gives you further freedom to design and store your own custom icons for use in your own programs.

This fabulous new package costs only £89.95 — a price as remarkable as the package itself — and includes a fully illustrated operating manual.

If, however, you are afraid of mice, you can purchase just the software package plus the 16K Super ROM for just £49.95.

You will still achieve some pretty remarkable results using your keyboard or joystick — not nearly as good as with the Mouse of course — but you can always add one later on for just £40.

Then you'll really be 'in the picture'.



## AMX MOUSE

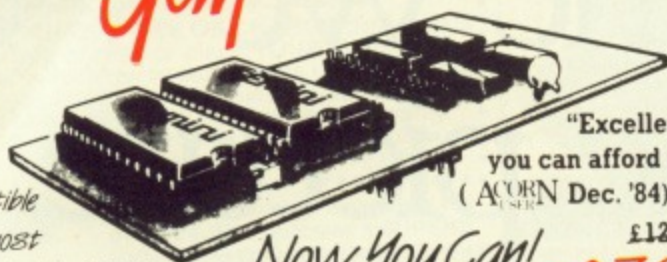
IMAGINATION AT YOUR FINGERTIPS.

BOTH THESE EXCITING PACKAGES ALONG WITH OUR SUPERB RANGE OF AMX ROM AND SUPER ROM COMPATIBLE SOFTWARE ARE AVAILABLE FROM ALL GOOD COMPUTER DEALERS OR BY SENDING CHEQUE OR P.O. TO ADVANCED MEMORY SYSTEMS LTD., FREEPOST, WARRINGTON WA4 1BR. FOR INSTANT ACCESS OR VISA ORDERS, RING (0925) 413501



## DATA Gem

The Definitive Random Access, 24K ROM based Database Management System for the BBC B and BBC B+.



Now compatible with most double density DFS's

"Excellent if you can afford it..." (ACORN Dec. '84)

Now You Can!

£129.95  
£79.95

### DATAGEM

Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right, DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

### AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 x 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

### TECHNICALLY SPEAKING

The System Comprises -

- 2 EPROMs mounted on carrier board containing 24K of 6502 optimised machine language. Carrier board may be inserted in either of two positions under keyboard or in sideways ROM board
- Demonstration applications disk in both 80 and 40 track format with documented examples of DataGem files. Disk contains no DataGem program code
- Full colour packaging consisting of A5 ring binder with professional documentation, user registration card and quick reference card
- Utility program named 'Trans' also supplied to allow transference of data files from all other Gemini databases

The System Features -

- Permits just ONE file to exist over FOUR floppy disk drive surfaces with a maximum file size of at least 10 Megabytes
- Allows up to 5100 User Definable Records
- Maximum number of 62 fields per record, which may be any combination of the following types:
  - STRING - Up to 120 characters long
  - DATE - Either two or four digit year dates may be selected
  - TEXT - A field with no data, allowing background text to be placed anywhere on the record. This may then be altered/moved/deleted, even after the database is in use. Up to 3000 characters of background text may be placed on the record in this way, enough for limited word processing and mail-merge
  - NUMERIC
- Allows searches on any field or COMBINATION of fields to ANY depth
- Up to 9 subsets of data INSTANTLY available and saved to disk automatically
- Sorts alphabetical or numeric on any field, ascending or descending with NO LIMIT on the depth of sort
- Interfaces with 'VIEW' and 'WORDWISE'
- Includes a free format report generator for a completely flexible printing format
- Allows the user to extend the file or add fields after having started to enter data
- Offers a free format painted screen which scrolls 120 x 120, and supports extensive mathematics
- Provides User defined field relational variables and multiple and single character wildcards
- Exists self contained on ROM, and does not require additional utilities on disk
- Finds the occurrence of a string or partial string in ANY field in the database with just one command
- Mathematical Operators
  - \* / ^
  - multilevel parentheses (up to 50 levels), unary negation
- Logical Operators
  - > < >= <= <> = \* (AND) - (OR)

### WHAT OTHERS SAY

DataGem provides many of the Spreadsheet facilities of an item like Lotus 1-2-3. Combined with a Word Processor, it forms the basis of a very competent small business system. Personal Computer News - July 1984

DataGem stands out in terms of both price and performance. Excellent if you can afford it. Acorn User - December 1984

### NEW DATAGEM GUIDE

Available separately to existing owners of DataGem (see below), this new and comprehensive manual has just been completely re-written by Simon Williams, a veteran press reviewer and writer. The new guide takes you step by step through all the facilities of the program with worked examples, and without any requirement for a previous knowledge of databases. It contains over 40,000 words and is fully indexed.

### MONEY-BACK GUARANTEE

The power and facilities of DataGem are just too great to detail in this advertisement. As the product is protected against unauthorised copying, we are able to offer our no-quibble money-back guarantee to customers purchasing DataGem direct from Gemini. If you don't agree that it's worth the price, send it back to us undamaged within 7 days of purchase for ANY reason and we'll refund your money - immediately.

Now available - Wordwise Plus/DataGem MAILMERGE utility - see Gemini page 5!

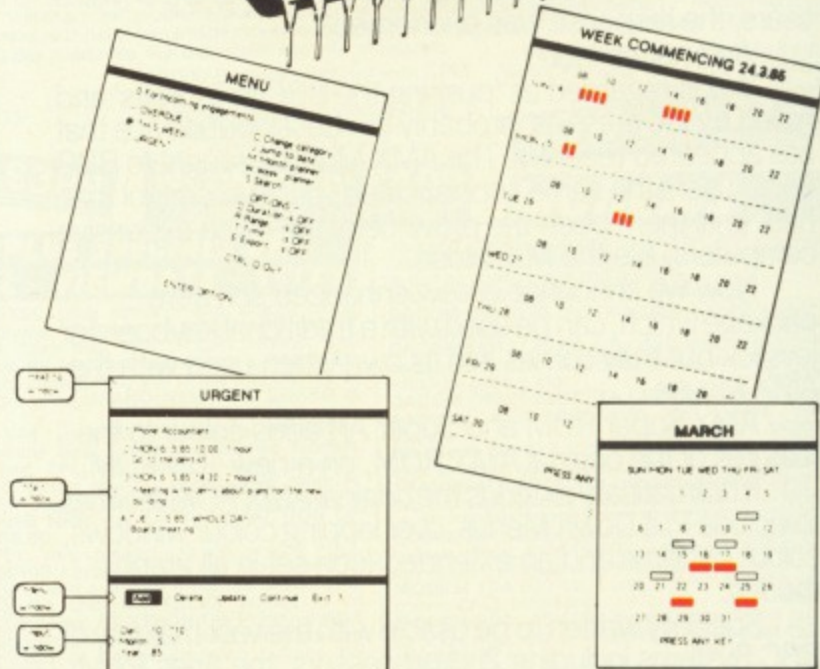
## STOP PRESS!!

New DataGem owner's manual (see above) available separately at **£12.95** inclusive. Price refundable against purchase!



# L.B.O. LIFE & BUSINESS ORGANISER

- the ULTIMATE BBC utility!



## A NEW & EXCITING ROM RELEASE FROM GEMINI

This is a comprehensive life and business organiser package in 100% machine code which has been very carefully designed to provide a wide range of useful facilities for the busy person at home or in the office, and is simplicity itself to use. Once you start using LBO, you'll ALWAYS use it - not like one of those ROMs you only occasionally call on. LBO will put an end to forgetfulness and ensure that your time is organised, you know what you have to do and when, you don't forget bills or birthdays, and you are reminded constantly of urgent matters. LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

- Features include -
- Automatic reminder of entries overdue for attention
  - One week's advance notice of forthcoming events
  - Urgent notice board
  - Creation of categories of entries, e.g. bills, birthdays, letters to be written, notepad etc
  - Sorting of appointments by date and time of day
  - Month AND week's summary at a glance, indicating time booked and free
  - Single entry of a RANGE of events and updating of regular happenings
  - Super search facility to call any event by any related word or part word
  - Month by month preview of all forthcoming events
  - Built-in intelligent calendar
  - All data saved to disk
  - Full printer support
  - Easy to follow documentation
- Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are very 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!

"... certainly the best of its kind on the market. (A&B Computing, March '86)"

**L.B.O.** only **£19.95**

Also available on **DISK** for those with a cluttered ROM board - £19.95. QL version also available now, MS-DOS version early 1986.







## Suite

## THE REVOLUTIONARY 'TRIPLE-D' BBC DISK INTEGRATED SOFTWARE SYSTEM

Of great significance to businessmen, educationalists and hobbyists alike, these programs are certainly the most powerful and sophisticated of their breed, and may be used 'stand-alone' or together as a suite. Gemini have probably the most experience in writing serious software for the BBC micro, with classics such as BEEBCALC and BEEBPLOT achieving sales of tens of thousands of units. We have drawn on almost four years of experience and user feedback to produce what we are confident will be hailed as the ultimate in functional software for the BBC micro: the 'TRIPLE-D' Integrated Suite. We've also brought it in at a price that should make it accessible to more of you, and most importantly, we're giving you REAL value for money.

The modules, which are formatted for both 40 and 80 track systems, are available separately, or as an economical combination pack. Each module is clearly documented with a comprehensive, indexed manual, with training sections that refer to demonstration applications provided with each disk. Remember, 'TRIPLE-D' uses proper random-access files that will take advantage of your true disk capacity, even over TWO drive surfaces. Have you ever heard of a true disk-based spreadsheet before? Well it's here now in the form of the 'TRIPLE-D' suite and can handle up to 52,000 FILLED cells! If you already have our 'DataGem' ROM database, you'll be pleased to know we've even included some special utilities for you!

I confidently recommend the 'TRIPLE-D' suite to you. If you purchase the product from us and don't share my enthusiasm, return it to us in new condition within seven days of purchase and we'll refund your money - immediately and without quibble.

Dale Hubbard  
Chairman & Managing Director  
Gemini Marketing Limited



-BASE £29.95

- Up to 2000 records, 1 search level subset, 26 fields/record, 2 drives, 79 chars/field
- Scrolling screen, 79 x 26. Interrupt driven real-time clock
- Layout painted on-screen to your design, including background text/graphics
- Fully menu driven, with powerful line editor and access to 'OS' commands
- Default entry capability, no need for tedious re-typing of repetitive data
- Lightning search using advanced 'hashing' techniques
- Powerful maths, allowing all BASIC functions, on any field
- 10 user-defined variables to simplify complex calculations
- Multiple level 'intelligent' sort - program only sorts 'out-of-order' data
- Printed reports in record or summary format. Data spool option for transfer to other files
- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'



-CALC £29.95

- True disk-based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor
- Fast, smooth machine code screen scroll with pop-down menu
- Individually adjustable column widths with text overflow
- Full relative and absolute replication
- Find and move to a row by name
- User defined variables, delete/insert rows, SORT rows with 'DDD-Base'
- Send data from all or part of sheet to printer, or just print cell formulae
- Data over 1 or 2 drive surfaces
- Fast recalculation, even over large files
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN'. 'OS' calls, and real time clock
- Data spool option for merging with other files
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'



-PLOT £29.95

- Stunning menu driven colour graphics using the BBC's capability to the full
- Pie charts, histograms, scatter graphs, line graphs and function plotting
- Disk save of screen for instant recall within your own programs
- Superb data entry editor with up to 255 plottable data entries for text and x/y coordinates
- Automatic scaling with user override
- Screen customisation allowable after plotting for background text etc., with up to 64 columns in Mode 1
- Disk save of ALL data
- Statistics facilities include mean, max, min, standard deviation, line of best fit, correlation coefficient etc.
- Colours re-definable for any plot
- Epson m/c fully SHADED screen dump with interface for other dumps on request
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-CALC'

**Combo Pack - All 3 modules £69.95**

**Now a Gemini  
Best-Seller**

## MONEY MANAGEMENT



This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank/Building Society/Investment accounts AND up to 5 Credit card/loan/Mortgage accounts.

The transactions are also analysed - and may be (screen) listed - under 3 separate Income and 15 separate Expenditure headings.

Each transaction consists of:

- (1) Date
- (2) Description - up to 16 characters
- (3) Amount
- (4) Last 4 digits of cheque no. or a credit card transaction reference. (Payments only)

Account and income/expenditure headings may be personalised.

Budget amounts can be stored for each of the 15 expenditure heads and a report shows how expenditure to date compares with the budget. It also shows the balance remaining. This report is also produced in percentage terms and a third report forecasts annual expenditure based on expenditure to date at any particular time.

A further report gives balances for each Bank/Loan account at the beginning of the year, balances for each income/expenditure account to date and the resultant Bank/loan account balances. This report represents, therefore, the changes in liquid assets and liabilities over the period, both in terms of totals and of distribution between accounts.

The main menu contains a print option for this report.

Lists of outstanding cheques or credit transactions may be produced for each account and when statements are received, input of the cheque reference no. (last 4 digits) and the amount causes verification to occur (on screen), whereafter these cheques are removed from the cheque no. file, the remaining list of unpresented cheques allowing simple reconciliation of each Bank a/c. Similar reconciliation of credit card a/cs can be achieved.

The program caters for transfers between accounts (e.g. from Bank to Building Society a/c or from Bank to Credit card a/c etc) the relevant details being input only once.

The program also allows for standing orders to be set up on any single account or between any two accounts. These are paid simply by inputting a date up to which the payment of all orders should be recorded. The necessary debits and credits are then created and the date of each order is reset. Orders can be for any multiple of calendar months.

The program is fully menu driven and all areas of input are 'range protected'. As much guidance as possible is included in all screen displays and the user is always given the opportunity to abort a transaction.

Full amendment and deletion routines are provided, for individual transactions, for Standing orders and for budgets.

The main file can hold between 800 (all full length descriptions) and 1800 (no descriptions) transactions. The former should be sufficient for most people for at least one year and the index file size is set on this basis. A warning is flashed on the main menu when the main file reaches 750 transactions. Account balances may be carried forward to a new set of accounts.

All you will ever need in a home finance package and beautifully presented.

**ONLY  
£12.95**  
Highly  
Recommended



With over four years experience of providing practical software solutions for business and home applications, Gemini have put together a selected range of famous titles for the BBC and BBC Plus in TWO special packs, at VERY SPECIAL prices. These super value packs contain all the serious application software you're ever likely to need for your BBC, from spreadsheet and database management to a complete professional business accounting system. Gemini's 'OFFICE MATE' and 'OFFICE MASTER' packs are here — put that computer to WORK!



- DATABASE • BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS • WORD PROCESSOR • FULL DOCUMENTATION

### DATABASE

Use this program for storing all types of information just the way YOU want to store it. You set up a computerised 'card index' system and add records and data to the file in the format that you choose.

Advanced features include sorting and searching for specific records, mathematical calculations, printer routines, data summaries etc. If you don't have a database, you certainly should!

### BEEBCALC SPREADSHEET

Perhaps the most commercially successful item of business software yet written, the Gemini Spread Sheet processor offers a very wide range of invaluable calculation and editing features.

Consider, for example, a Cash Flow forecast containing rows and columns of figures, combined with text and numbers. If say, the cash receipts for January need to be changed, it would normally be necessary to delete and recalculate several figures for each successive month.

With BEEBCALC, however, an 'on screen' amendment to the January figure is made, and the corrected figures for each successive month automatically appear upon touching the 're-calculate' key.

Formulae cells in the table may be specified which relate to each other and then copied RELATIVELY or ABSOLUTELY to other parts of the program, which in itself is modular, and directly linkable to other Gemini programs. BEEBCALC has a complete range of inbuilt data entry and formatting techniques, and the structure of the table may be amended at any stage. Of course, full printer facilities are included which allow for either the table to be printed or just the data and formulae relating to the table. Another important feature, any valid BBC BASIC formula is acceptable as data entry making the system immensely powerful and versatile. BEEBCALC's sister program, BEEBPLOT, will take data from disk or tape files created by BEEBCALC to provide data portrayal in graph, histogram or pie chart format.

### BEEBPLOT Graphics

Written specially for use with the BBC micro, this program makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

For example monthly sales statistics comparing two year's results may be instantly converted into two side by side pie charts, histograms or graphs ... for easier visual comparison and assimilation.

BEEBPLOT also incorporates a built-in machine code screen dump, enabling a high resolution printed image to be produced using an Epson or similar bit image compatible printer. It also interfaces with other Gemini programs such as Beebcalc and Cash Book and is particularly recommended where any kind of mathematical plotting facility is required.

### WORD PROCESSOR

This program provides many routines found in large and more expensive packages. With a typical word length of 5-6 letters it allows for up to 1000 words in memory at one time and is ideal for the user who wishes to write any kind of business letter on a home computer.

Features include: block delete, block insert, search and replace, edit text, display text, and many more.

**Step up to Office Mate and save money!**

(Price if purchased individually - £79.80

— save £67.80 with this pack)

Electron version available,  
pack contains Database, Beebplot,  
Beebcalc, Home Accounts,  
Cassette only.

**OFFICE MATE**  
**£12**  
Cassette  
or Disk



- CASHBOOK • FINAL ACCOUNTS • MAILIST
- EASILEDGER • INVOICES & STATEMENTS • STOCK CONTROL
- FULL DOCUMENTATION

### CASHBOOK

Gemini's CASHBOOK is a complete 'stand-alone' accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cash book system and will provide you with a computerised system complete to trial balance.

Simple to use, this program will replace your manual cash and bank records and provide vital management information at any time. It will take you from sheaves of invoices and cheque book stubs to trial balance, and may, if desired, be used in conjunction with the Final Account program.

Typical information from CASHBOOK is as follows: 1. Summary of VAT information to enable completion of VAT returns. 2. Cumulative receipts and payments report analysed over the standard profit and loss and balance sheet headings. 3. Option for departmental analysis of sales and purchases. 4. Printout of all transactions, nominal account balances etc. 5. Journal routine for entering transfers between accounts and year end adjustment for debtors, creditors, etc. 6. Trial balance. 7. Full audit trail facility.

This program is recommended not only for businessmen, but also for practising Accountants for use in the preparation of Accounts from incomplete records; a printer is essential.

### FINAL ACCOUNTS

Requires Gemini 'CASHBOOK' module (except Commodore 64 version)  
This program will take data prepared by your Gemini Cashbook module and produce a complete set of accounts for you in the following format: 1. Trial Balance with inbuilt rounding routine. 2. Notes to the Accounts. 3. VAT summary. 4. Profit and Loss Account with comparatives facility. 5. Balance Sheet with comparatives.

All reports may be produced at any time interval comparing actual to budget if required.

### MAIL LIST

Gemini's Mailist program will enable you to keep a record of names and addresses and then print, examine, sort and find them, all with special selection techniques. All our mailists contain our exclusive 'SEARCHKEY' system, giving you the option of creating your own dedicated coding system for each name on file. For example, on most mailing list systems, you are only given the standard heading such as name, street, town, country, postcode etc. With the Gemini searchkey system, you could find, say, all names on the file that are companies having a turnover in excess of '50,000' or all names that are subscribers who are behind in their subscriptions or all names that are eligible for a Christmas card this year!

A full and useful range of routines is included in the menu, and the program allows you to set up your own format for printing labels, i.e. the tab settings you require and spaces between labels, etc. Multiple copies can also be printed.

### EASILEDGER

Contains routines to enable the small business man to keep a record of one of the most important aspects of his business — cash flow.

EASILEDGER is essentially a debit/credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information. Its flexibility lies in its ability to produce account balances instantly for debtors and creditors, together with a record of all transactions, dates and references. A year-to-date summary of sales, purchases, receipts and payments over the twelve month period is also provided, as is a complete INTERACTIVE bank account database.

EASILEDGER is a management aid software tool and is designed to run alongside an existing accounting system. If you operate a cash based business and require a complete accounting package to produce the accounts to trial balance and beyond then we recommend you consider using both Easiledger and Cashbook programs together.

### INVOICES & STATEMENTS

The Gemini INVSTAT program greatly reduces the time and cost of preparing Invoices and Statements by storing essential information such as customer names, addresses and account numbers, VAT routines and footer messages such as 'Please remit by return', 'Overdue and outstanding', etc.

Not only are Invoices and Statements produced more quickly and accurately, but pre-printed forms for them are eliminated since the INVSTAT program produces professionally formatted documents using your own printer.

### STOCK CONTROL

You have a stock of products. With the Gemini program you may enter details of each product on to a record card on the computer with details of your own existing part number (if any), a description of the product, the unit quantity (i.e. one, a gross, a pair, etc.), the cost price per unit, the selling price per unit, a specified minimum satisfactory stock level, units in stock ordering quantity and supplier details.

The program will allow you to enter stock received, stock out, and will also give you a summary of stock items and current holding, together with details of total cost of stock, total sales value of stock, current gross margin on stock, cost of bringing stock up to minimum level, understocked items, etc.

Each stock item has its own computerised record and you may browse through the file as a whole, or just a specified number of records. An extremely powerful program, highly recommended for inventory control in small and medium sized businesses.

**OFFICE MASTER**  
**£25**  
Cassette  
or Disk



## INTEGRATED ACCOUNTING FOR DISK USERS

### WHY INTEGRATED ACCOUNTING?

Because it will retrieve information stored in one program for use by another, and store data in one program which has been generated by another.

This means that the scope for human transposition error is virtually eliminated... for example, when typing an invoice manually, the typist could type £14.25 instead of £42.25, and undercharge the customer. Such an error cannot occur with integrated, computerised invoice generation, since only the part number needs to be entered and the (and product description), are taken AUTOMATICALLY from the Stock Control program, and printed AUTOMATICALLY onto the invoice.

Likewise a Stock Controller, operating a manual system, could transpose the quantity sold, when posting from a copy invoice, and deduct 93 pcs from the Stock card, instead of 39. This would understate the book stock by 54 pcs, and possibly cause the product to be re-ordered, and consequently overstocked. Again, this could not happen with an integrated system, since the quantity invoiced is AUTOMATICALLY deducted from stock, due to integration of the Invoicing and Stock Control programs.

### WHY THE BBC MICRO?

Because, although originally designed as an educational computer, it has the facilities needed for serious business use. In particular, speed of operation... although only an 8 bit machine, it has a faster operating speed than many 16 bit micros. By gearing a suite of Integrated Accounting programs to the BBC Micro, Gemini have produced a combination of excellence which will eclipse any other computerised business system in its price bracket... and many other systems in much higher price ranges.

### WHY GEMINI?

Because our business software for the BBC Micro is based upon the solid foundation of experience. We have successfully written business software for the BBC Micro since it was first launched.

Your choice of software for a computerised business system is critical... badly written programs could bring your business nearer to ruin, more quickly than almost any other investment. The fine reputation of Gemini, evidenced by the independent press comments listed below, are your guarantee of confidence in the professional experience which back this major investment in the efficiency of your business.

### INTRODUCTION

Designed for the small to medium sized business user, where speed and efficiency are vital, Gemini Integrated programs are suitable for sole traders, partnerships, or limited companies. All require a BBC B 32K microcomputer, and an 80 column printer. A double disk drive with an Acorn compatible DFS is required for integrated accounting purposes. A single disk drive may be sufficient where modules are used independently, although this is not recommended for the Sales Ledger and Invoicing module. The manuals indicate the system capacities for various disk drive combinations.

The programs have been devised by HCCS Ltd in the light of substantial mainframe computing experience, and share many of the features normally found only in very large installations. Used in a typical business environment where invoicing, sales ledger posting, stock control adjustment and nominal ledger posting is simultaneously made, the software will convert the BBC micro into a business computer of enormous power, directly comparable with hardware/software combinations costing many times its price.

Each program is supported by a comprehensive, easily followed manual, and 'user friendly' screen prompts with error trapping routines, which makes a specialised knowledge of accountancy unnecessary for the average user. All the programs, however, have many sophisticated features which make the programs revolutionary for the home micro market.

Gemini Marketing Limited confidently recommend the programs to serious commercial owners of the BBC B micro as software capable of making an enormous contribution to business efficiency and profitability at minimal cost, since it requires no expensive second processor in order to achieve the advantages of integrated accounting.

### INVOICING & SALES LEDGER

The Gemini Sales Ledger and Invoicing program will produce invoices and statements for customers and enable a tight control over credit procedures to be maintained by producing aged debtors reports, and by keeping current information concerning customer accounts.

The module can be used independently or interfaced with the Gemini Nominal Ledger and Stock Control modules, and offers the following advantages: ● Maintains open-item sales ledger. ● Comprehensive customer Master File maintained in memory. ● Choice of fixed and free format invoices. ● Integrates with Gemini Nominal Ledger and Stock Control modules. ● Prints invoices, invoice copies, statements and credit notes. ● Reports include: Aged Debtors, Sales Daybook Sales analysis by user defined code, VAT analysis, Audit trail giving copy details of all transactions. ● Automatic updating of sales ledger. ● Comprehensive accounting controls including period end close down routines and full audit trail for all transactions. ● Examine customer status by file enquiry to screen or printer showing year to date activity. ● Trade and settlement discount terms definable for each customer. ● Caters for up to 5 rates of VAT. ● Can hold up to 135 customers on 40 track disk system and up to 610 customers on a 40 track disk system and up to 610 customers on a 80 track disk per Sales Ledger file. ● Comprehensive analysis of invoices over unlimited, user definable sales codes.

Price £69.95

### STOCK CONTROL

A program providing full control over every aspect of stockholding operations which can be interfaced with the Gemini Sales Ledger and Invoicing program, this module includes the following features and routines: ● Inventory Master File holding details of part number, selling and cost price, sales and product code, current stock, location of stock, allocated items, re-order level, quantity on order, current period activity and supplier code. ● Permits four types of transactions - sales, returns, receipts and adjustments. ● Part enquiry routines for any stock item. ● Reports include: Part catalogue, giving stock sales and cost values. Re-order report, Evaluation stocks list, giving stock sales and cost values, Dormant parts report, Delete parts report, Stock usage report, Stocktaking sheet. Stock audit report sorted into part sequence and transaction type and date. ● Screen prompt when item falls below the minimum re-order level. ● Directly interfaces with Sales Ledger to enable automatic generation of product details for invoice production and adjustment of stock records. ● Maximum 980 part numbers on 40 track disk and 1980 on 80 track disk per stock file.

Price £69.95

### PURCHASE LEDGER

Used independently or interfaced with the Gemini Nominal Ledger, the program maintains a complete file for each supplier, records amounts outstanding at any time, helps to determine which invoices are payable, and payment dates for the claiming of discounts. Among this module's many features are the following: ● Automatic posting of supplier's invoices to Purchase Ledger. ● Comprehensive analysis of invoices over unlimited, user definable expense headings. ● Comprehensive accounting controls including period end close down routines with posting reports, and full audit trail facilities at appropriate stages of processing. ● Full integration with Gemini Nominal Ledger module. ● Purchase invoices and credit notes easily processed. ● Supplier file held in memory, with full details of each supplier. ● Maintains open item purchase Ledger. ● Management of invoices due for payment within cash restraints. ● Maximum number of suppliers on 40 track disk system of 135 and maximum of 610 suppliers on 80 track disk system per Purchase Ledger file.

Price £69.95

### NOMINAL LEDGER

This is the central module of the Integrated Accounting system and may also be used independently as a Cash Book or interfaced with the Sales and Purchase Ledgers and payroll programs. It includes the following main features: ● Nominal accounts all of which are user definable. ● Posting of transactions from Sales and Purchase Ledgers and Payroll modules. ● Full Cash Book facilities. ● Print out of full Trading and Profit and Loss Account and Balance Sheet together with notes to the accounts. ● Full accounts may be produced for whatever period chosen by the user. ● Comprehensive accounting controls including period end close down routines and complete audit trail for all transactions. ● Journal feature for adjustments between accounts and correction of book-keeping errors. ● Reports include: Account Master File showing complete code listing. Cash Book entry details, Journal printouts, Trial Balance, Trading and Profit and Loss Account with notes, Balance Sheet with notes, Audit Trail Enquiry for all accounts. ● Account enquiry showing movements over the period under review including opening balance, period end adjustments and closing balance. ● Account posting masks allow conversion of analysis codes set up in other modules into selected user-defined Nominal Ledger codes.

Price £69.95

### PAYROLL

This program provides a full range of controls over the different aspects of Payroll Accounting including tax and other deductions. It can be used independently, or interfaced with the Gemini Nominal Ledger, and offers the following facilities: ● Employee file maintained in memory, containing: Name, address, sex, marital status, National Insurance Number and contribution type, date of birth, personnel number, department, date employment commenced, all applicable tax codes, whether week 1 or month 1 applicable, hourly or salaried, pay cycle, payment type (cash, cheque or direct transfer), PAYE reference number, previous name, bank details. ● Supports weekly, fortnightly, four weekly or monthly employees. ● Company master file containing: Name, address, bank account number and name, bank name and branch, PAYE reference. ● Produces cash analysis of note and coinage to suit requirements. ● Employee pay details include: Gross pay and tax paid to date both current and previous employer, National Insurance contribution for employer and employee, Five rates of overtime per employee. Up to 12 standard and 5 non-standard pay elements per employee. Basic pay. ● Hourly rate. ● Reports include: Payroll reconciliation, Payslips, Coinage analysis, Cheque and bank giro list, Payroll masterfile, Departmental analysis. ● Relevant data to complete Inland Revenue forms including: P11, P35, P45, P14/60. ● Maximum 98 employees on 40 track disk system and 198 employees on 80 track system per Payroll file.

Price £69.95

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"... This is the newest and most exciting... to have achieved a SUBSTANTIAL degree of INTEGRATION, very RAPID file ACCESS and respectably LARGE file SIZES, without the use of a second processor, it is a fine achievement. As one would expect from GEMINI, the individual modules are EMINENTLY PROFESSIONAL and for the first time present the single processor BBC as a viable small business computer... for a FULL range of business functions buy GEMINI'S Integrated Accounting package... a SUPERB example of the programme's art... GEMINI in particular pay careful attention to security:

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Jon Vogler - A&B Computing - December, 1984.

"The GEMINI system does the job... SIMPLY and COMPETENTLY. It works in a manner that ANY book-keeper would be able to master in no time at all."

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"A VERY PROFESSIONAL piece of software."

Which Micro

"Well documented, EASY to load, EXCELLENT screen display."

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... if you or your client needed to run these programs then a fully integrated accounting system can be purchased at a cost significantly less than those that run IBM compatibles and at a level of friendliness rarely found in computer software."

Accountants Record - October, 1985.

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## **DATAGEM/WORDWISE + MAILMERGE**

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Price – **£19.95** with all documentation, or just **£9.95** when purchased together with Wordwise Plus. Remember, all Gemini prices quoted except for hardware INCLUDE VAT and post/packing.

## **WORDWISE PLUS**

The first competitor's software we have ever stocked. In our view, simply the best word processor you can buy for the BBC. Recommended for DataGem owners who may purchase MAILMERGE at **£9.95** when ordering WW+.

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This ROM is designed to make confidential disk data secure, and unavailable to those without the required password. It should be considered by all who are using and storing data of a confidential nature. 'PROTECTOR' encrypts the disk's password prior to storing, removing the possibility of anyone reading the password directly. An interface has been provided between the DFS and the user, to ensure complete compatibility with existing software. The system restricts access to disk based information provided the disk has been formatted to 'PROTECTOR'S' requirements. (The system includes the relevant formatter). A disk formatted in this way can be read by a BBC micro which has not been fitted with a 'PROTECTOR' ROM, although the PASSWORD information will be unintelligible. A password may be extracted from a disk if forgotten, by way of a utility supplied on a master disk with the package. The master disk itself may be protected if required. After three failed attempts to enter a valid password, the computer 'crashes', and a hard reset is necessary. Other facilities include the extension of DFS commands DUMP, LIST and TYPE. 'PROTECTOR' requires ACORN DFS 0.90 or 1.20.

Price – **£24.95**

## **VERTICAL MARKET PACKAGES**

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- \* Requires printer and disk filing system.

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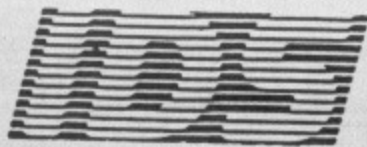
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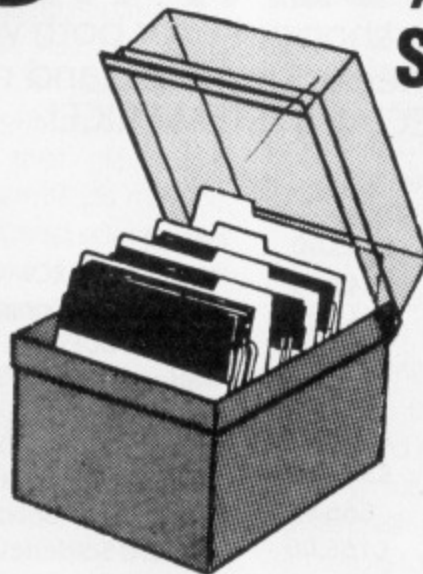
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Double sided for use with single sided drives  
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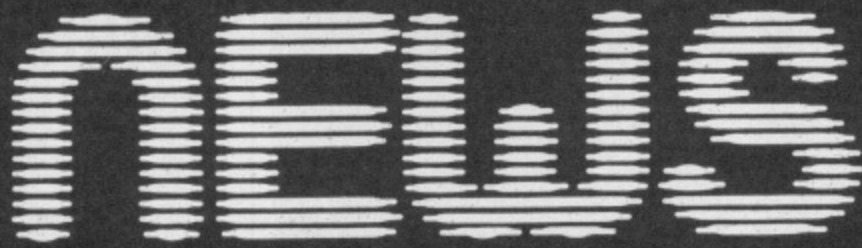
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## How you can check

WORRIED that the B+ you own or are about to buy is bogus? Mike Cook, technical editor of *The Micro User*, explains how you can easily check its validity:

"It would be wise if you are buying a B+ to ask the dealer to remove the four screws holding down the cover of the keyboard. Inside, quite prominently displayed, is the issue number. In

1981 BBC Micros were numbered Issue 3, then came Issue 4 the following year. Finally, in 1985, came Issue 7 for the last B.

"Subsequently the new 64k B+ and the 128k B+ have been renumbered starting at Issue 1.

"Obviously then B+ machines which are numbered anything but 1 or 2 are bogus".

# Fake B+ Micros on sale:

## buyers are warned

**Show  
record  
on way**

THE first of this year's three Electron & BBC Micro User Shows is currently on target to break all previous records.

Within days of the announcement that it was to return to the New Horticultural Hall, London SW1 on May 16, 17 and 18, organisers Database Publications reported unusually heavy advance bookings.

"Once again it seems that interest in Acorn products continues unabated", says Derek Meakin, head of Database.

"Naturally the new Master Series - which will be featured prominently at the show - has provided a fillip.

"But that is only part of it. For the sort of excitement these shows generate can only be found within the BBC Micro fraternity. It is this more than anything else that guarantees their success".

The two other Electron & BBC Micro User Shows to be held this year are scheduled for Umist, Manchester, on September 26, 27 and 28, and at the New Horticultural Hall, once again, on November 7, 8 and 9.

AN in-depth investigation by *The Micro User* has revealed that bogus BBC B+ machines are being sold in a nationwide swindle.

Unsuspecting customers around the country are being offered B+ models which contain only basic Model B motherboards cannibalised from older micros.

By selling the doctored B+ machines, the crooks behind the conspiracy have been raking in profits of up to £100 a time.

"This is now a widespread problem", one leading dealer told *The*

*Micro User*, "and it seems to be very well organised.

"The problem is that it is so easy to dupe first time buyers", he added, urging that his name be withheld in case of possible recriminations.

"After all, most are just paying for the name - and that's what they are getting, if only on the case. Even when they learn to use it, many people would not really appreciate the difference between the two models.

"But to those in the know it would be like buying a Jaguar with a Mini engine inside".

How is the B+ scam

being organised? *The Micro User* has discovered there is very little problem in purchasing either the separate motherboards or cases.

In nearly all cases of bulk sales Acorn readily ships out both among the spares supplied.

From there on anyone with rudimentary assembly skills can doctor up the bogus B+ machines with ease.

"It's easy money", said one informant.

However the authorities have already been alerted to the conmen's activities.

"We would very much

like to hear from any member of the public should they find they have bought a new model with old innards", said Ron Pennington, principle of the Office of Trade Standards for Greater Manchester.

"Given the evidence, these operators could face two charges - each carrying a maximum £2,000 - for issuing a false trade description of goods and selling goods not as new.

"If the offences proved serious enough they could even be sent to Crown Court and face a possible prison sentence".

## Watford raps modem muddle

ONE of the leading entrepreneurs in the BBC Micro marketplace claims that government red tape is currently costing him thousands of pounds a week in lost business.

Nazir Jessa, managing director of Watford Electronics, says the situation has arisen because of bureaucratic delays in approval procedures for modems.

As a result Watford's Le Modem is being forced to display a red triangle

denoting that it does not have the official blessing.

It is this that has upset Jessa. For the company has discovered that the sticker is being interpreted by prospective customers as meaning the modem is unsatisfactory.

"The red triangle is hindering not only my business but the modem business as a whole", Jessa told *The Micro User*.

"As soon as customers see it they shy away from

the product". But the complexities surrounding the issue have put Nazir in a Catch 22 situation.

"If I wait for approval before I put Le Modem on sale I could find that the technology is out of date.

"Alternatively I could sell it without approval as I am doing, and risk customer dissatisfaction. I either ignore BT regulations or lose business. It really is a no-win situation".

According to Jessa the

situation is made even more ridiculous because Le Modem uses all BT-approved components and buyers are offered three months free subscription to Micronet which is partly owned by BT.

"There is no doubt in my mind that Le Modem will sail through the testing process - that's if it ever gets that far.

"The amount of paperation"

**Turn to Page 24**





## MINI OFFICE STAYS ON TOP

NEARLY two years after it first appeared on the market, the original version of Mini Office – the database, spreadsheet, word processing and graphics package from Database Software – is still topping the charts.

The latest Top Five list of non-game software in *Acorn User* magazine, compiled by Gallup, reveals that Mini Office continues to lead the pack.

It beats Speech from Superior Software into second place followed by Music System from Island Logic, Typing Tutor from Pitmansoft and Forth from Acornsoft.

An updated version of the package, Mini Office II, containing many additional features, is now available.

### Modem muddle From Page 23

work involved is astronomical and the time taken to process an application is notoriously slow.

"I would like to see a way of improving the BAPT approval system while in the meantime educating the customer as to the real implications of the red triangle".

## Design wins a plotter

THE computer section of the British national nativist competition was won by 17-year-old BBC Micro users Darren Capel and Richard Hibberd of Long Buckby in Northamptonshire. Their design, *The Road to Bethlehem*, was the only entry in the competition to attempt the use of both colour and texture.

It took the boys 170 hours work to arrive at a software configuration which succeeded in expressing their ideas. At no point did they resort to listings from commercial graphics programs.

Darren and Richard, pictured above with their winning entry on screen, won an HI-80 colour plotter by Epson.

## AMS push Pagemaker

A MAJOR advertising campaign to promote its already highly successful Pagemaker software package has been launched by Advanced Memory Systems at a cost of £30,000.

It features this sleazy, cigar chomping, bourbon swilling journalist holed up in a motel room waiting for the big story to break.

"We are just carrying on with our theme that Pagemaker not only creates the headlines but makes them as well", Nick Pearson, managing director of AMS, told *The Micro User*.

"And judging by the way sales have been going and the publicity we have received this couldn't be more accurate".

The Pagemaker package combines a low cost typesetter, graphics and word processor on two ROMs and two discs.

It lends itself to letters, notices, posters, menus – in fact anything that needs to be created on A4 size paper, including school newspapers and college magazines. The latest news on the Pagemaker front is that it



Waiting for the big story to break

can be used with both keyboard and joystick as well as the AMX Mouse.

At the same time compatibility with the Opus Challenger, a plug-in disc drive system for the BBC Micro priced at

£249.95, has been announced.

● Late news flash – Advanced Memory Systems has announced that Pagemaker is now available for the new Master 128 series.

## Looking for a Lennon

A NOVEL competition to find a modern Chopin or a new Lennon has been launched by System Software for BBC Micro users.

All schools using the company's Music System have been invited to compose a three minute piece, classical or contemporary, using the sounds and facilities on their program.

Prizes for both primary and secondary school pupils include Epson RX80 printers and 40 track disc drives.

Last day for entries is May 12.

System Software at Sheffield stress the budding composers must submit original works to the panel of judges, which will include music teachers and musicians.

## NEW RAM ADD-ON

SEAWELL Automatic Controls, at Andover, Hants, has launched a publicity campaign for its Sacram 256k RAM add-on.

It is connected to the BBC Micro by a 34 way ribbon cable which plugs into the 1MHz bus. The associated ROM may be fitted to any of the sideways ROM sockets.

The ROM-based software provides four star commands which enable large chunks of data to be moved about between Sacram, the micro and disc.

The Sacram is accessible from Basic using the available star commands. Price £199.

## Adventure generator

INCENTIVE Software has launched the Graphic Adventure Creator for the BBC Micro.

Creator is an adventure generator with a built-in graphics editor.

It costs £22.95 on cassette and £27.95 on disc.

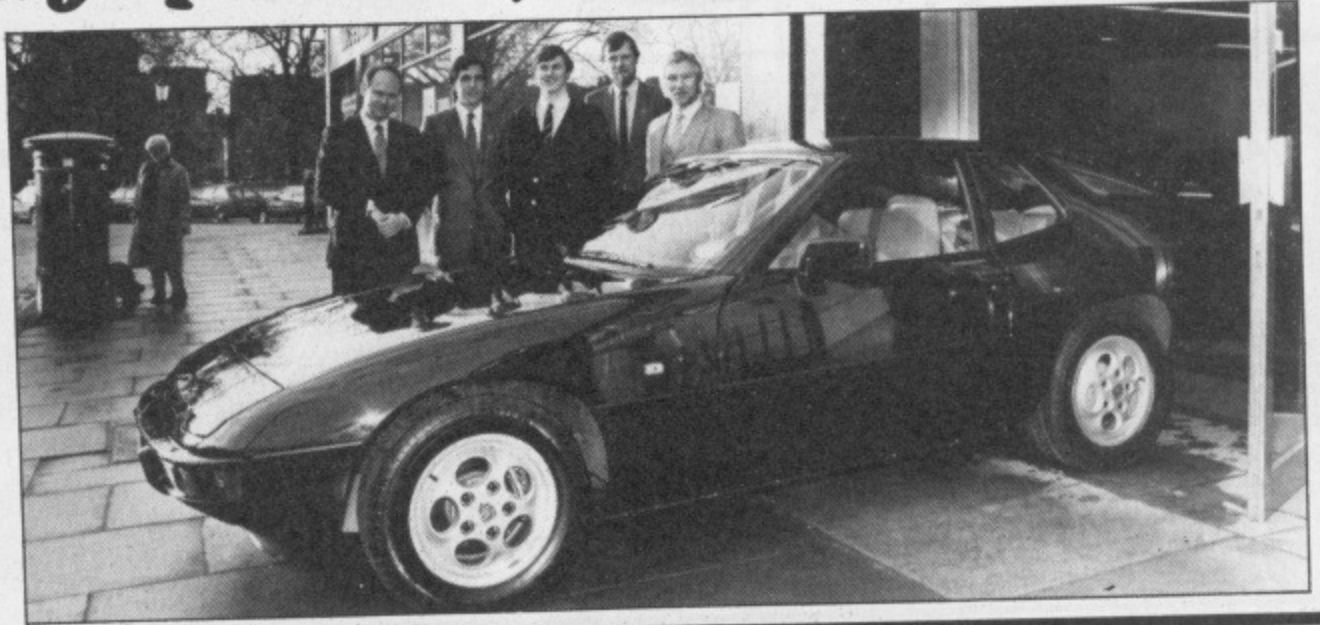


# Mike buys printer, collects Porsche

BBC Micro owner Michael Fowle of Edinburgh is travelling in style these days. Here he is, pictured centre with the £14,000 Porsche 924S he won in a competition organised by printer manufacturer Star Micronics.

Since last September every Star printer buyer has received a numbered key, one of which fitted the prize.

Fowle bought a Star SG-10 for his BBC Micro system from Scottish distributors Microworld Computer Group of Edinburgh.



## BBC COMES OUT TOP OF THE CLASS IN ULSTER

THE BBC Micro is now number one in the six counties of Ulster. According to the latest report from the Northern Ireland Council for Education Research, the BBC B can now be found in more than 90 per cent of the province's post-primary schools.

Compiled by John D'Arcy under the title of "Mathematics and the

Micro", the study was mainly concerned with the use of computers in that academic area.

However the author also sought details on the use of micros throughout the whole school environment.

D'Arcy discovered that the average number of micros in post-primary schools in Northern Ireland is now more than

six.

These machines are being used to teach a variety of subjects including modern languages, art and music.

The report says the micro as a learning tool can most often be found in mathematics, geography, science and history classes.

### Motivation

A detailed examination of the BBC Micro in the Northern Ireland maths classes revealed the machines were being primarily used in the areas of graphs, co-ordinates, geometry, statistics and basic number work.

D'Arcy concluded that the machine had much to offer mathematics teachers not only in its speed, accuracy and graphical qualities but also in the increased motivation of pupils.

### Hotline quiz

IF the world was poised on the brink of a nuclear war and the hotline between the super powers was down could you repair it in time?

This is the task set by Chalksoft's latest offering, Hotline Quiz - but it's more than just a game, it's a flexible learning tool.

To repair breaks in the line the player must correctly answer a series of questions, using one of the general knowledge sets supplied or creating original testing programs as a homework exercise.

Scores are shown by a lengthening line joining up the broken hotline. Random order and repeat tests are possible, and a fully correct quiz sets the telephones ringing. Price £14.25 on disc only.

### BRIGHTER POSTERS PACK

HOMEMADE posters set in old style type look like being the new "in" for BBC Micro users.

Permanent Memory Systems at East Kilbride has come in with a multi-font near text

quality printer driver.

It is directed at schools and colleges needing worksheets and displays and churches and clubs seeking to brighten up their newsletters or notice boards.

### Program exchange planned

A NEW division of publishers Software Express has been created to boost the number of programs available to BBC Micro users.

It has already reached a number of licence agreements that entitle it to import a range of products from the US and to get British software distributed in America.

A key element in the new venture is program exchange - an open invitation to professional software houses and hobbyist programmers alike to join in the venture.

"We see our role as being like that of a record company, publishing software from many sources under one label", says Jon Dean, who is in charge of the project.

"We would welcome the opportunity of evaluating software from professional and amateur authors.

"Quite often home programmers have the best new ideas and approaches to software, but their programming skills are weak".

## RAM disc range

PERMANENT Memory Systems has launched a Z range of non-volatile RAM discs.

The products are for use with the B or B+ with Z80 Second Processor.

Users can now have from 64k to half a megabyte of permanent, battery-backed, RAM configured as any CP/M drive.

Once the RAM disc is selected it behaves as a conventional disc, with one exception - access times can be up to 10 times faster than floppies.

Any CP/M programs can use the RAM discs, and Z80 BBC Basic

random access filing is fully supported.

The Z80 version of the system, Z-ROS, is contained in a sideways ROM.

Entry to the range is by the PMS Z-64, a single non-volatile RAM disc which can be exchanged later for the motherboard unit which can contain two to eight 64k units.

The PMS Z-64 costs £113 and includes the 64k RAM disc, Z-ROS in ROM and user guide.

"The board system is not as yet available for the 6502 second processor but we are working on it", says PMS.



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### VECTOR 1

#### TAPE TO DISK UTILITY

##### Features

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- + Can save to any disk
- + Very user friendly, help pages on disk
- + 40/80 Format
- + No awkward ROMs, can be used on any machine
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- = 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

Prices: £12.00 each for Vector 1 or Vector 2  
£23 for both.

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A program to teach traffic signs

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**NEW**



**RELEASE**



## MEGA-ROM

The latest release from Chalice software, over 60 commands on a 16K ROM. The range of commands available means that there is something for every BBC user. For the disc user the ROM provides a skewed formatter to speed up disc access, a disc sector editor, disc search, verify and repair utilities, a useful free space command, plus many other handy commands. For the BASIC programmer, commands include search and replace on a global or selective basis, list active variable values, append BASIC program, move and copy lines, bad program repair, a highly effective routine to shrink BASIC programs down to a far smaller size etc. Other commands include disassembly, memory edit, graphics compilation, comprehensive file transfer utility, function key lister, envelope lister, rom lister, rom save, full rom status, switches roms off through <CTRL><BREAK>, send commands straight to a ROM, KEEP command, inverse video command, a command to send codes direct to your printer, memory search, base conversion, display character definitions, close open files and many others. All commands have been chosen on the basis that they are useful and not as space fillers.

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**OVER**

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## the SCYTHE

The Scythe toolkit contains a version of the VECTOR 1 tape to disc system, which will transfer most protected tapes, but we have not stopped there. The Scythe has been packed with a host of other commands: MDIS, SDIS, MEDIT, KLIST, BASE, ROMLIST, ROMSAVE, NROM, FLUSH, FORMAT, VERIFY, FREE, SFIND, BFIND, XLIST, BAD, MRELOC, SLOW, TDISK, VECTOR, ROFF, RON, SECTLOAD, SECTSAVE, MSHIFT & MSWAP. These commands cover everything from ROM management, utilities for the disc user, aid for the machine code or BASIC programmer, and a set of general utilities of use to all BBC users. The commands will accept input in HEX, DECIMAL, BINARY and the resident INTEGER variables making the Scythe very easy to use. The Scythe comes complete with a comprehensive manual and a free utilities disk.

**PRICE £24 INCLUSIVE**

## ROM MASTER

ROM Master is a budget utility ROM designed for people with several ROMs on their BBC computer. ROM master has several utilities to help prevent the interference which can occur between different ROMs, any ROMs that cause problems can be switched off even through <CTRL> <BREAK>. Using ROM master has been designed to be as easy as possible. Most commands will accept lists, so you can, for example, switch off several ROMs with just one command. ROMs can be specified by their socket numbers or their title or even abbreviations of the title. 20 commands are available, please send for full details.

As a bonus feature for anyone who has files they want to keep from prying eyes, ROM master contains the commands SCRAMBLE & UNSCRAMBLE which will encrypt or de-encrypt a file based on an entered password. The encryption used is highly sophisticated so unless you know the correct password the files cannot be read.

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Lizette Heathcock and Janet Rothwell working on the interactive video disc-based robotics training programme on a BBC Micro at NCC.

## Sounds shape up on the screen

THE Barry Box, which samples sounds and records their shapes on screen, has been launched for the BBC Micro by electronics wizard Dr Barry Landsberg.

With the help of his wife Linda he runs BML Electronics at Milton Keynes, where they have been producing communications software.

Linda said: "The Barry Box should have a great appeal to physics students, appreciating the various shapes that different sounds make."

"Musicians can tune up, playing a note and

checking it reaches the correct pitch on a projected graph.

"It can also be used with games - introducing your own voice or sounds instead of the usual explosive noises".

Another feature of the little chatter-box is its triggered recording. If a light detector is attached to a computer the recorded barking of vicious sounding dogs could be played back the moment it senses the beam of a thief's torch.

The package, including user guide, microphone and ROM costs £79.95.

## Contex Mk 5

DESIGNED for BBC disc systems only, the Mk V version of its spreadsheet program has been released by Contex Computing.

As well as the normal spreadsheet features it has Mode 7 graphics and its own programming language.

Using a word processor, a Basic program or the \*BUILD command, the user can develop program command files that are used by the spreadsheet program to control input to selected cells and the printing of the sheet. Price: £17.50.

# Interactive video plan for BBC

THE National Computing Centre is working on the development of low cost interactive video involving the BBC Micro.

It will connect a standard domestic VHS recorder with a BBC Micro and use the Microtext authoring language developed at the National Physical Laboratory.

"This is in line with our philosophy that solutions are now available at acceptable cost for implementing even the most powerful computer-based training systems", says Dr Matthew Dixon of NCC's Information Technology in Training division.

"We are also working on integrating intelligent knowledge-based systems techniques into CBT tools to produce in the long

term extremely powerful knowledge management systems that can be used for decision support or in-situ training".

NCC's pool of expertise in CBT is now being focused on building a thriving technology transfer business as part of the centre's new Knowledge Management Systems business area.

Research and development funded by the Department of Trade and Industry has produced a series of reviews of CBT technology, culminating in a reference work on the current status of interactive video.

It has also created a practical demonstration training module on robotics, prepared on a BBC Micro-based interactive video system, for Jaguar cars.

## Fleet Street Editor wary of pirates

MIRRORSOFT'S popular Fleet Street Editor discs have been snapped up by 3,500 BBC Micro users in just four weeks.

The final software is now protected, but Pat Bitton, marketing manager at Maxwell House, is

asking reviewers to return the unprotected pre-production software.

"I hope you understand that we can't afford to take the risk of having even unfinished unprotected software for a product such as Fleet Street Editor not under our control", she told them.

The discs - coloured red following the Mirror's logo - have been so well protected that it would take a semi-professional to make a copy, says Ms Bitton.

She said 15 system, pre-production discs were sent out and not all had yet been returned.

She is asking reviewers to watch out for any pirate software on standard black discs. "Any on black will be considered a pirated copy unless proved otherwise", she added.

# PRINTERS THAT UPSET PICKETS

A TELEPHONE order to a leading supplier of printers to the BBC Micro market almost ended up in a punch-up recently.

The request was for DataStar Systems to deliver 50 machines the same day to an address in the East End of London.

There was nothing surprising in that, as the

company regularly delivers large orders at short notice.

However, when the driver turned up at 1 Pennington Street, Wapping he found he was decidedly unwelcome.

For that just happens to be the new headquarters of Rupert Murdoch's News International. And,

as the company is currently at the centre of a dispute with all the main printing unions, it was ringed by hostile pickets.

When the DataStar driver told them he had 50 printers in the back of his vehicle they were decidedly not amused.

But anger turned to embarrassment when the

van doors were opened to reveal that the printers were of the computer variety.

"Everyone had a good laugh about it in the end", said Barry Krite, managing director of DataStar.

"Unfortunately the last laugh was on us - we discovered the phone call was a hoax".



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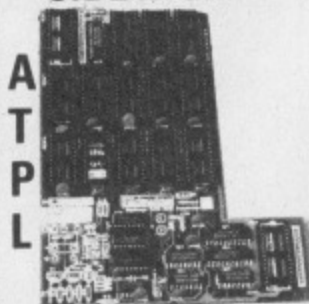


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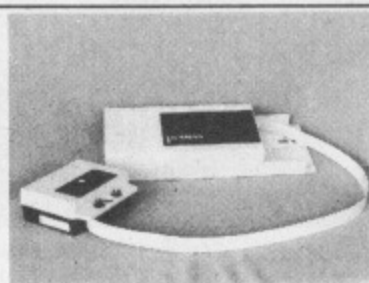
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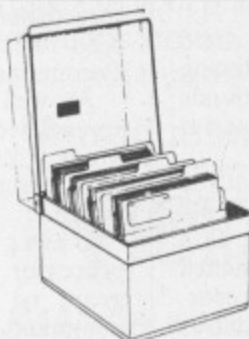
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\*SAY Hello, I'm your computer speaking.

will make the computer say precisely that, with the correct intonation and stress.

The system consists of two ROMs. Firstly our normal speech ROM which controls the speech synthesiser in the Micro. This allows text to be entered in a phonetic fashion and allows very subtle control over the intonation of any words or sentences. This also has a unique singing feature so it is possible to specify the phoneme and the note.

The second ROM contains the text to speech conversion routines. This uses the most advanced algorithms available and converts any English sentence to speech, so it is better at coping with strange English pronunciations. This means that this system speaks in the most realistic manner possible and quite unlike normal monotonous speech systems.

Flexibility beyond anything else available.  
A few examples:



\*SAYIP. Will make the system speak any input from the keyboard. Text may be spelt on a letter by letter basis or spoken a word at a time.

\*SAYOP. This will speak any text sent to the screen.

\*SAYPRT. This intercepts the printer output so that it can speak listings etc, rather than printing them. CTRL-B and CTRL-C turn the speech on and off in the same manner as the printer.

\*PHONS <text>. This will speak any text following the command, but also displays the phonemes of the words as it says them.

\*SAYSCR. This will read all text currently on the screen.

\*SHUTUP. This stops it speaking and clears all buffers.

All of the above commands will speak lower case text on a word by word basis—upper case words are spelt a letter at a time. This option may be turned off. All these commands may be used from BASIC or WORDWISE PLUS programs.

These two ROMs combined (a total of 24K machine code) make this the most comprehensive and the highest quality speech system available for the BBC Micro.



These ROMs require the Acorn speech processor to be present in the machine. This is available separately from us for £10.00 incl. VAT.

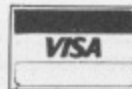
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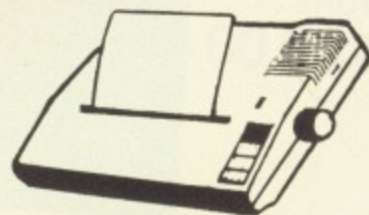
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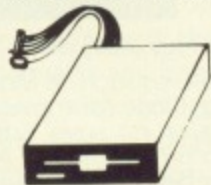
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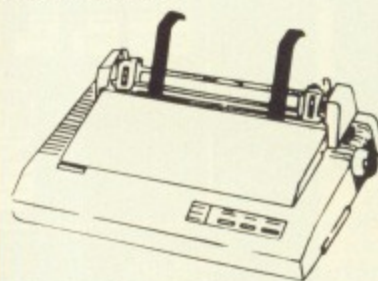
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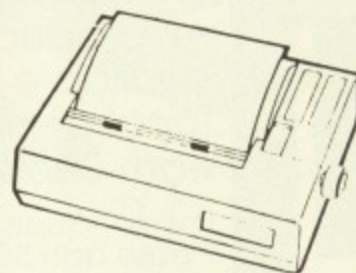
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### CITIZEN 120 D



This new Citizen 120D with 120 CPS and 25 CPS NLQ comes with tractor and friction feed as standard. IBM and Epson compatible with TWO years warranty **£175.00**

### KAGA KP 810



The 80 column printer with 140 CPS Draft and NLQ with friction and Tractor feed offering 9 INT character sets, long life cartridge ribbon and standard centronics interface **195.50**  
Also available KAGA KP 910 (wide carriage printer) **£379.00**

Seikosha GP 50A (Parallel)	<b>£69.00</b>
Seikosha GP50S inc. Printer I/F + Cables	<b>£69.00</b>
Seikosha 1000A (NLQ)	<b>£199.00</b>
Canon PW 1080A (NLQ)	<b>£269.00</b>
Canon PW 1156 A	<b>£379.00</b>
Star SG 10	<b>£249.00</b>
Star SG 15	<b>£389.00</b>
Brother EP 44	<b>£228.00</b>
Shinwa CP 80A	<b>£189.00</b>
MP 165	<b>£240.00</b>
Juki 5100	<b>£269.00</b>

### DAISYWHEEL PRINTERS



**QUENDATA DWP 1120**  
with optional tractor/sheet feeder and 13" paper width facility. This Daisywheel printer with 20 CPS has 96 character printwheel compatible with the QUME. Standard centronics interface (optional RS232 C) **£199.00**

## TCL Special Package

**The TCL All In One Word Processing**  
Package contains a Master 128, High Res Green Monitor, 800K Dual Drives with PSU, Quendata Daisy Wheel Printer together with a box of Discs, Paper, and all the Cables. **£914.25**

## Modems

### NIGHTINGALE MODEM

Including Commstar and Comprehensive Manual	<b>£130.00</b>
Auto Dial/Auto Answer Board	<b>£55.00</b>
Auto Dial Utilities Disc	<b>£11.00</b>
OBBS Bulletin Software	<b>£23.00</b>

### DEMON MODEM

With its Devilishly Clever Features. Auto Dial, Auto Redial, Auto Answer Full and Half Duplex European and USA Standards Complete with Power Supply Leads and Manuals Full Baud Rates	<b>£81.00</b>
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Juki 2200	<b>£275.00</b>
Juki 6300	<b>£799.00</b>
<b>COLOUR PRINTERS</b>	
Canon PJ1080A	<b>£440.00</b>
Juki 5500	<b>£286.00</b>
<b>TRACTOR ADAPTERS</b>	
FX 80	<b>£33.00</b>
LX 80	<b>£23.00</b>
Juki 6100	<b>£129.00</b>
Juki 6300	<b>£129.00</b>
Quendata DWP 1120	<b>£114.00</b>
Brother HR 15	<b>£95.00</b>
<b>SHEET FEEDER</b>	
Juki 6100	<b>£173.00</b>
Juki 6300	<b>£173.00</b>
Quendata DWP 1120	<b>£165.00</b>
Brother HR 15	<b>£212.00</b>



## Printers

### PRINTER RIBBONS

Brother HR 5	£3.45
Brother EP 44	£2.85
Brother M1009	£4.60
Brother HR15/25	£5.45
Multi-strike	
Brother HR15/25 fabric	£4.85
Canon PW1156A/1080	£6.85
Daisystep 2000 multi-strike	£4.00
Daisystep 2000 fabric	£6.30
Epson FX/MX/RX80	£4.50
Epson LX80	£4.90
Epson MX 100	£5.80
Epson LQ 1500	£6.60
Epson DX multi-strike	£5.40
Epson DX 100 fabric	£4.85
Juki 6100 multi-strike	£3.20
Juki 6100 single-strike	£1.95
Juki 6300 multi-strike	£3.05
Juki 6300 fabric	£4.10
Juki 2200 single strike	£2.95
Juki 2200 correctable	£2.88
Kaga KP 810/910	£6.85
MP 165	£4.50
OK1 microline 80/82/83	£2.07
Quendata 2000 multi-strike	£3.97
Quendata 2000 fabric	£6.30
Riteman 80	£6.30
Seikosha GP80	£4.00
Seikosha GP100/250	£4.30
Seikosha GP 500	£4.95
Shinwa CP80 multi-strike	£5.50
CP80 fabric	£5.46
Walters WM80 multi-strike	£5.30
Walters WM80 fabric	£5.46
WM 2000	£5.90

## Accessories

### EPROMS

2764	£2.20
27128	£3.95

### RAMS

6264 LP15	£3.95
Teletext Receiver	£149.00
Prestel Receiver	£139.00
Bitstick	£344.00
Bitstick Multi Plotter Driver	£75.00
IEEE I/F	£293.00
Music 500	£178.00

### POSEIDON

The flexible videotex System with the BeebTel Terminal	
Poseidon Floppy System	£229.00
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BeebTel & Terminal Software	£79.00
Poseidon AES	T.B.A.
Poseidon Multiuser Floppy Disc	T.B.A.
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- LOW DEPOSITS
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## Services

### BBC COMPUTER SPARE PARTS AND COMPONENTS

PSU	£22.00
Keyswitch	£2.00
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JHF Modulator	£5.18
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6522 VIA	£4.10
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LM 324	£0.50
6522A 2 MHZ VIA	£6.33
8271	£52.00
74 LS 123	£0.46
74 LS00	£0.28
74 LS04	£0.28
74 LS10	£0.28
7438	£0.46
74 LS 163	£0.86
74 LS 244	£0.92
74 LS 245	£1.27
74 LS 375	£1.04

## BBC Firmware

### AMX MOUSE AND SOFTWARE

AMX Mouse with Super	
Art ROM	£89.00
AMX Pagemaker	£49.95
AMX 3D Zicon	£24.95
AMX Database	£24.95
AMX XAM	£24.95

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Plus Utilities	£14.95
AMX Paintpot	£14.95
AMX Desk	£24.95

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#### THE MUSIC SYSTEM

Disc Pack	£29.95
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## TCL Special Workstation

No more Messy Wires



Once again TCL has answered a special need of all BBC Computer users with the new mushroom workstation. No more untidy wiring or pulled plugs. Transforms your system into a Handsome Console Unit.

### FEATURES INCLUDE:

- Advanced cable management.
- Twin 400K Mitsubishi Slimline drives switchable from 40 to 80 Track with status indicator LED's.
- On board regulated 4amp power supply with overload protection.
- Mains input filter for clean power supply.
- Filtered power to the 3 take off sockets at rear for Micro, Monitor and Printer.

**Mushroom Workstation £349.00**

## How to Order

You may purchase any of the items listed by cheque made payable to TWILLSTAR COMPUTERS LTD.

All you have to do is to list your requirements on a sheet of paper, and we will despatch your goods within 24 hours, subject to availability. Please add the following amounts for Postage and Packing.

Items below £10.00	add £1.50
Items below £50.00	add £2.50
Items below £100.00	add £3.50
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All prices include VAT at 15% 'No Hidden Extras'

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JUKI	£58.00
CANON	£91.00
KAGA	£85.00
Epson 8148 + 2K buffer	£65.00

### LISTING PAPER

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1000 90 x 36 mm 3 across	£7.70

### MONITOR ACCESSORIES

Monitor stands single	£11.50
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### BBC BOOKS

The Adv. User Guide	£12.95
The Adv. Basic ROM User Guide	£7.95
The BBC Micro ROM Book	£9.95
Guide to the BBC ROM	£9.95
Basic ROM User Guide	£9.95
Disk Drive Projects for Micro	£5.95
The Adv. Disk User Guide for the BBC Micro	£14.95
Get more from your Epson Printer	£7.95
The Hackers Handbook	£4.95
The Epson FX/Kaga printer commands revealed	£5.95
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40/60 Track	£12.30
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Beebugsoft masterfile II	£18.00
Beebugsoft Teletext disc	£10.90
Beebugsoft sprites disc	£10.90
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Beebug billboard disc	£18.00
Beebug quickcalc disc	£14.25
Beebug 'Hershey' Font Disc	£14.25
Beebug paintbox II disc	£12.30
Gemini DDD Base	£26.45
Gemini DDD Calc	£26.45
Gemini DDD Plot	£26.45

## Services

### SERVICES

Fast Repair Service for the BBC	
Computer average charge from	£23.00
Printer repairs from	£20.00
Disc Drive repairs from	£15.00

## BBC Firmware

### FIRMWARE

Acorn View Word Processor	£55.00
Acorn View Sheet	£55.00
Acorn Logo ROM	£65.00
Acorn ISO Pascal	£65.00
Acorn BCPL	£65.00

### COMCONCEPT

Wordwise	£36.00
Wordwise Plus	£46.00
Intersheet	£55.00
Disc Doctor	£27.00
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Printmaster (Star)	£27.00
Caretaker	£27.00
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Communicator	£59.00
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### BEEBUG

Toolkit ROM	£26.45
Toolkit Plus	£39.00
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ROMIT	£34.00
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Enigma Disc Imager	£42.00
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Basic Editor 1	£25.00
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### GEMINI

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### PACE

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Commstar	£33.00
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Edward User Pack	£44.00
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Clares B ROM	£32.00



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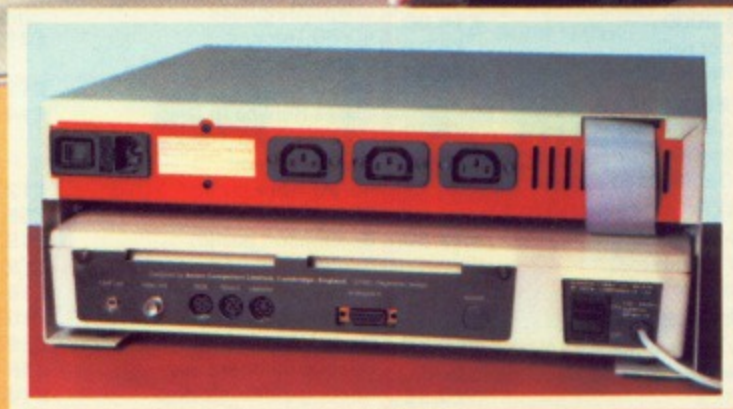
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Features include:—

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The WORKSTATION is manufactured to the highest safety specifications from lightweight aluminium attractively finished in oatmeal with orange trim. When not in use the computer is stored underneath, affording useful protection from accidental knocks or spillage.



The WORKSTATION, complete with twin disc drives, is suitable for all. Areas of use — Domestic, Schools, Local Authorities, Commercial and Industrial.

**This is a must for every user at only £299 Excl. VAT.**

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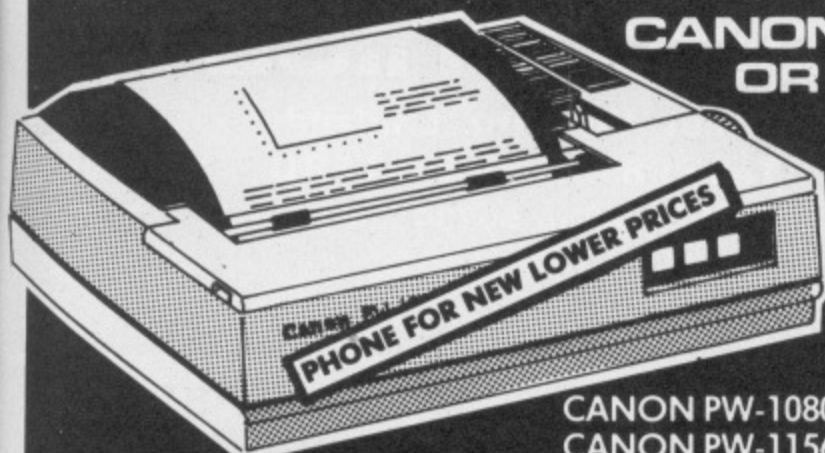
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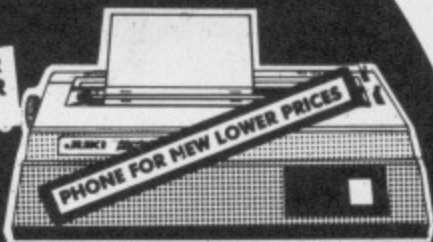


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OR KAGA TAXAN  
KP810**

**NEAR LETTER QUALITY PRINTER**  
 NLQ Mode 23 x 18 Matrix: 27 cps  
 Draft Mode 11 x 9 Matrix: 160 cps  
 Full range of Epson FX 80 Print Codes  
 Friction & Tractor Feed  
 Centronics Interface Standard  
 CANON PW-1156A Available  
 (Accepts 17" Paper)

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**C.J.E. MICRO'S  
BBC PRINTERPACKS**

- For Star, Canon & Juki Printers include:
1. The Printer
  2. Next Working Day Delivery
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  4. Screen Dump Program (M/C Source)
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  12. Character Defining Program for Downloadable-character-set (draft mode)

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 Underline; Backspace + Lots more  
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 Tractor Feed £119 + VAT Extra  
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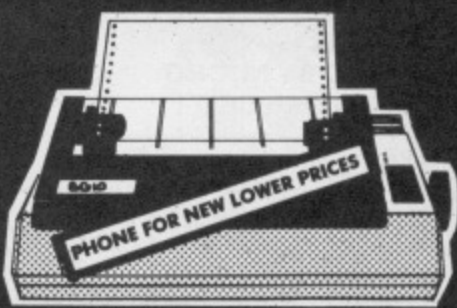
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NLQ Mode 17 x 11 Matrix  
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 Centronics Interface Standard  
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**STAR SG10  
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NLQ Designer for Canon and Taxan Kaga  
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FONTAID requires 6264 RAM Chip in printer.  
**FONTAID (BBC) ..... £30.00**  
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Please state 40 or 80 track when ordering.  
 ROMS of individual fonts are available and can be  
 used with any computer.

**FONT ROMS ..... £18.00 each**  
**P & P on FONTAID ..... £1.00**

Please phone for FONTAID leaflet and demonstration  
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Coming Soon MULIT-FONT NLQ printing for  
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 Design your own font or use supplied predefined font.

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All prices exclusive of VAT; subject to change without notice & available on request.

BBC B + Micro 64K + DFS	£365
BBC B + Micro 128K + DFS	£389
BBC B + 64K + Econet No DFS	£359
BBC B + 64K + DFS + Econet	£389
64K Upgrade Kit for B+	£32
BBC MASTER 128K Micro	£433
BBC MASTER TURBO 4MHz	£544
ECONET UPGRADES Available	

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Gemini's popular OFFICE MATE & OFFICE MASTER Software Packages on Disc consisting of: Database, Spreadsheet, Beebplot Graphics, Wordprocessor, Accounts Packs: (Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, Stock Control on. FREE with every BBC B+ MICRO purchased from us.

6502 Acorn 2nd Processor package	£165
Z80 Acorn 2nd Processor package	£319
TORCH Z80 Card + Perfect Software	£199
Acorn IEEE Interface Complete	£280
Acorn Teletext Adaptor	£125
Acorn Prestel Receiver	£115
Acorn Bitstick I	£299
Robocom Bitstick II	£759
Upgrade for B1 to B2	£450
Bitstick Multiplotter Driver	£65

(Securicor carriage £7)

## Dust Cover for BBC Micro £3.50

## EPSON LX-80 PRINTER

Low cost, High performance printer. Print speed 100 cps, NLQ mode 22 cps. Full FX80 compatible. Friction feed supplied as standard. Tractor Feed & Auto Single Sheet Feeder, optional extras.

Price: £194 (carr £6)  
 Tractor Feed Attachment £20  
 Single Sheet Feeder £49

## VARIOUS PRINTERS

● EPSON GX80	£187
● EPSON RX100	£342
● EPSON FX80 Printer	£259
● EPSON FX85 Printer	£315
● EPSON FX105 Printer	£435
● EPSON JX-80 Colour Printer	£450
● EPSON Hi-80 Printer Plotter	£319
● EPSON Paper Roll Holder	£17
● FX80 tractor attachment	£37
● SEIKOSHA GP50A & GP50S	£69
● Centronics Printer Cable to interface all the above Printers to BBC	£6

(Securicor carriage charge on printers £7)

## RX & FX PRINTER INTERFACES

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

RS232	£25	RS232 + 2K Buffer	£55
IEEE 438	£62		



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 directly 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.

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.

Although the GLP is a very compact printer, it can handle paper up to 10 inches wide. Friction feed is supplied as standard with a low cost tractor feed available as an optional extra.

GLP is bidirectional logic seeking. Has a 9 needle print head. Now available in Serial, Parallel or QL compatible. Please specify.

Send an SAE for further details of the GLP NLQ Designer and extra font ROMs.

Special Offer £107 (carr £5)

Tractor Feed Attachment £9  
 NLQ Designer ROM £20  
 Individual FONT ROM £14

## BROTHER HR-15

Brother HR15 is a high-quality daisy-wheel ideal for a budget printer for serious use. Notable features of this printer include a 3k buffer, 18cps (max), bi-directional proportional spacing, Centronics interface standard, (RS232 optional), optional Sheet Feeder and Keyboard.

ONLY £285 (carr. £7)

Single Sheet Feeder £185  
 Electronic KEYBOARD £135  
 TRACTOR FEED Attachment £84

Ribbon Cartridges:  
 Fabric £3; Carbon £3;  
 Multistrike £5

DAISYWHEELS (various typefaces) £18

## BROTHER HR10

Enhancing the Japanese reputation for quality at a reasonable price, Watford are pleased to offer the new Brother HR10 Daisywheel printer at a new low price that is within the pocket of most Hobbyists and small businesses.

Featuring a 12cps printing speed with a large choice of Daisy wheels on a 10 inch carriage, the HR10 has both Serial & Parallel interfaces as standard, as well as Diablo 630 compatibility. Other features include: 2K Buffer, Bidirectional printing, friction feed standard & tractor feed optional extra.

Only £199 (carr £7)

## PRINTER SHARERS (Ideal for School environment)

Connect 3 BBC Micros to 1 Printer £65  
 Connect 6 BBC Micros to 1 Printer £129  
 (Cables extra)

## 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 £185 (£7 carr.)

Kaga RS232 Interface	£49
Kaga RS232 Interface + 2K Buffer	£69
Kaga RS232 Interface + 16K Buffer	£95

## 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 £339 (£7 carr.)

## PRINTER LEAD

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	£6
Extra long (6 feet long)	£8

We can supply leads to any required length.

RS232 Cables available in any length and any combination. Please telephone for your requirement.

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Type	Ribbons	Dust Covers
FX100	£10.00	£5.25
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RX80	£4.50	£4.50
LX80	£4.00	£4.50
GP80/GP100	£4.50	£4.00
GP250	£5.95	£3.95
Centronics GLP	£4.00	£3.75
KAGA KP810	£5.25	£4.75
CANON PW1080	£5.25	£4.75
Microvitec Metal Monitors	-	£5.50

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

## Listing Paper (Perforated)

1,000 Sheets 9 1/2" Fanfold Paper	£7
2,000 Sheets 9 1/2" Fanfold Paper	£13
1,000 Sheets 15" Fanfold Paper	£9
Teleprinter Roll (Econo paper)	£4

Carriage on 1,000 Sheets £1.50

## PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90x36mm (Single Row)	£5.00
1,000 90x36mm (Twin Row)	£4.90
1,000 90x49mm (Twin Row)	£7.50
1,000 102x36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00





We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

#### MICROVITEC 14"

- 1431 - Medium resolution as used on the BBC television computer programme ..... **£179**
- 1451 - High resolution, suitable for word processing in mode 0 ..... **£225**
- 1441 - High res, exceeds the capabilities of the BBC micro ..... **£385**
- 1431AP RGB + PAL and AUDIO ..... **£199**
- 1451AP RGB + PAL and AUDIO ..... **£269**
- Dust Cover for Microvitecs ..... **£5.50**

#### KAGA/TAXAN 12"

- KAGA KX1201G Hi-res Green Monitor ..... **£90**
- KAGA KX1202G Ultra-Hi-Res Green Monitor ..... **£105**
- KAGA KX1203A Ultra-Hi-Res Amber Monitor ..... **£105**
- KAGA Vision 2, Hi-Res, RGB Colour Monitor ..... **£210**
- KAGA Vision 3, Ultra Hi-res, RGB Colour; Text mode switch allows monochrome text display in either Green/Amber or White reverse ..... **£330**
- PHILIPS 12" Hi-Res Amber Monitor ..... **£73**

#### FIDELITY COLOUR MONITOR

- Medium Resolution, attractively finished, 14" RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen. **£169**

#### ZENITH

**"Test Bureau Recommended for use in Education"**

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith Micro Systems.)  
 Green (New Design) Hi-res ..... **£72**  
 Amber (New Design) Hi-res ..... **£76**

#### LEADS

- BNC Lead for Zenith or Philips ..... **£3**
- RGB lead for KAGA ..... **£3**
- N.B. Carriage on Monitors **£7** (securicor)

**CREDIT CARD**  
**Orders (ACCESS or VISA)**  
 Simply phone  
**(0923) 33383/50234**  
**24 Hour Ansaphone Service**

#### SWIVEL BASES

for Video Monitors



Adjust your Monitor/VDU, Up, Down, Right or Left to provide utmost in operator flexibility & Viewing comfort. It improves your sight lines & reduces stress & eye, neck and back strain. Available in 2 sizes:

- for 12" Monitors **£14**
- for 14" Monitors **£16**
- (carr. £2.50)

#### SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

- 2764-250ns £1.85**
- 27128-250ns £2.55**

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

- 6264LP (8K) £3.50**
- 2 x 6264LP (16K) £6.70**

### BBC MICRO WORD-PROCESSING PACKAGE

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.

#### EXAMPLE PACKAGE

BBC B Plus (64K) Micro; Wordwise Wordprocessor, Twin 800K Double Sided Mitsubishi Disc Drives, Zenith Hi-Res Green Monitor, Brother HR15 professional quality Daisy Wheel Printer, Gemini Database, Spreadsheet, Beebplot Graphics, Accounts Pack: (Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements and Stock Control) Software packages on Disc with Manuals.

#### NEW LOW PRICE

**Only £999**

### THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities - he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED'. This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

### MARK II LIGHT PEN

You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions. It only operates on high frequency light from the TV or Monitor.

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 **£25**

### Watford Electronics' Overseas Dealers:

Absolute Electronics, 483 Centre Road, Bentleigh, Victoria, Australia 3204.

Tel: (03) 557 3971

First Ludonics International, 2400 AJ Alphen aan den Rijn, Netherlands.

Tel: 01720 72580.

Scientex PVBA, Willem Ogierplaats 2 B-2000 Antwerpen Belgium.

Tel: (03) 233 59 06

Viking Tenco, Kirkegade 4C, Tvaerflojen DK9550 Mariager, Denmark.

Tel: (08) 5421 11

### SPECIAL BULK OFFER ON 5 1/4" DISCS

(Lifetime warranty on Discs)

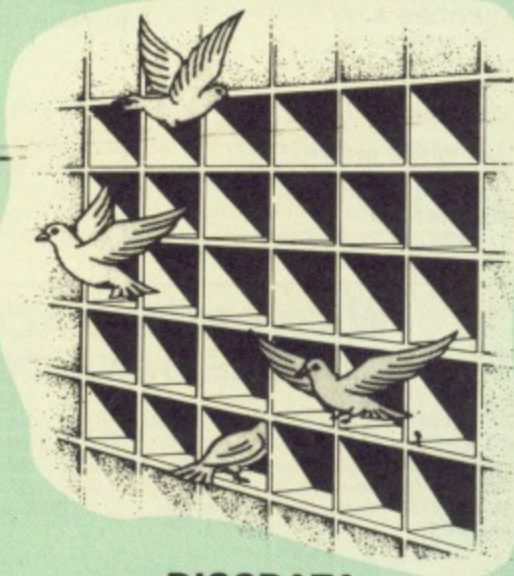
(In Plastic Library Cases)

- 20 x S/S D/Density 48TPI **£17**
- 20 x D/S D/Density 48TPI **£21**
- 20 x D/S D/Density 96TPI **£29**

(In Lockable Storage Units)

- 50 x S/S D/Density 48TPI **£42**
- 50 x D/S D/Density 48TPI **£56**
- 50 x D/S D/Density 96TPI **£70**

### DATABASE MANAGEMENT SYSTEMS



#### DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

On disc at **Only £14**

(Please specify 40 or 80 track when ordering)  
 (Please write in for technical specifications)

#### FILE-PLUS

File-Plus is a powerful database for the BBC micro with many advanced features. Largely menu driven, File-Plus is provided on a 16k ROM with some extra utilities on disc. Features included are detailed below:

- Flexible full screen form layout.
- Built in File Query Language (FQL).
- Printer Output.
- Arithmetic operations in FQL.
- Looping in FQL.
- Number range of +- 9999999999.9999.
- File linking allows files over different drives.
- Multiple forms allow selection of displayed data.

**Only £25**

(Please specify 40T or 80T disc)

**Continued** →



## The ULTIMATE DFSs for the BBC MICRO

### 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.)

Just compare the features:

Features	Acorn	Watford	
	1.20	Single Density	Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD & 7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20 partial	1.43 Yes	1.53 Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

## 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

- Complete Disc Interface Kit incl. DFS ROM & fitting instructions **£47**
- Acorn's DFS Kit complete **£47**
- DFS Manual (Comprehensive) (no VAT) **£6.95**  
(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)
- Watford's sophisticated DFS ROM only **£16**
- We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only **£12**
- DNFS ROM only **£17** ● ADFS ROM only **£25**
- Watford's DFS is exclusively available from Watford Electronics. 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!

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

- Complete DDFS Kit incl. fitting instructions **£46**
- DDFS Manual (no VAT) **£6.95**
- We will exchange your existing Single Density DFS Kit for our DDFS Unit at **£35**

## Watford Electronics DDFS PLUS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today. Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.

Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances its performance with a simple fitting operation.

DDFS PLUS incorporates all the features of the Watford's popular DFS & DDFS for the BBC B, (at the same time retaining full compatibility with Acorn DFSs), plus it has the following extra features:

Automatic density selection - Full single and double density operations - Extremely powerful and comprehensive OSWORD & 7F emulation - Any file can be full size of disc - Density of last access assumed for speed - Automatic 40/80 stepping swapped on error - All Acorn's extra disc commands implemented.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.

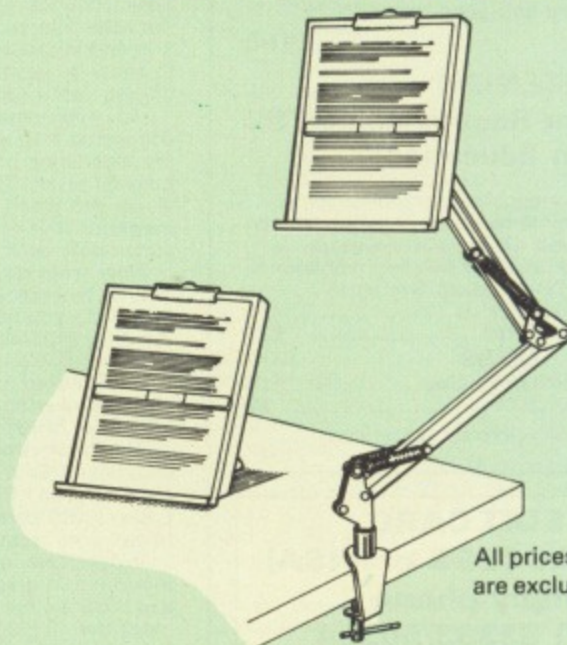
Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.

The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £30 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!

Join the leaders in BBC peripherals; join Watford Electronics - committed to supporting the BBC micro.

**DDFS PLUS (for BBC Plus) £30**  
(Price includes comprehensive manual)

## COPY HOLDERS



All prices in this advert are exclusive of VAT.

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 angle-poise 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 **£17** (carr. £3)



## 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 and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them.

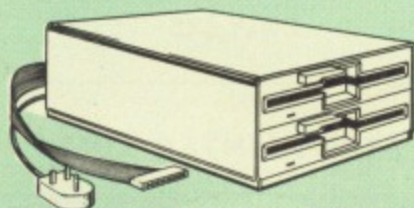
**All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson 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. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

When using a BBC Micro, most people find themselves preciously short of space. The Watford's BBC Micro Plinths form an ideal way of recovering some of this space; your BBC, disc drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. Some of our competitors offer disc drives built into plinths, but these aren't as sensible as you might think. With a Watford 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 and paper, reference manuals, etc. Follow the trend with Watford Plinth.



Drives Subject availability



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS 100 £75		CS 100 £110	
200K (360K)	CLS 200 £91	CLD200 £169	CS 200 £110	CD200 £185
400K (720K)	CLS 400 £96	CLD 400 £169	CS 400 £115	CD400 £182
		CLS400S £98	CS 400S £117	
800K (1.44M)		CLD800 £181		CD 800 £197
		CLD 800S £183		CD 800S £199

● TWIN Disc Drive Case, complete with Power Supply & Cables **£35**  
Securicor carriage on Disc Drives **£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).

## MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

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)

## 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 x 5 1/4" S/S D/D 40 Track Diskettes **£12**
- 10 x 5 1/4" D/S D/D 40 Track Diskettes **£15**
- 10 x 5 1/4" S/S D/D 80 Track Diskettes **£22**
- 10 x 5 1/4" D/S D/D 80 Track Diskettes **£22**

- 10 x 3 1/2" S/S D/D 40/80 track Discs **£25**
- 10 x 3 1/2" D/D D/D 40/80 track Discs **£35**

## TOP QUALITY 5 1/4" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

### DON'T SETTLE FOR LESS, BUY THE BEST

- 10 x M4 S-S D/D 40 Track Discs **£11**
- 10 x M5 D/S D/D 40 Track Discs **£14**
- 10 x M7 D/S D/D 80 Track Discs **£19**
- 3" Double Sided Discs **£4 each**

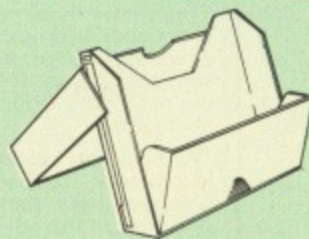
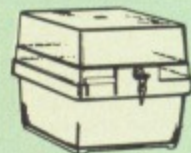
## DISC ALBUMS

Attractively finished in Antique Brown, leather look vinyl. Stores upto 20 Discs. Each Disc can be seen through the clear view pockets. **£4**

## 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 40 discs **£9**
- M85 - holds upto 95 discs **£12**



## PLASTIC LIBRARY CASES

FOR 5 1/4" DISC STORAGE  
holds 10 Discs.

**£1.80**

## FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

**£8**

## DUST COVERS (For our Disc Drives)

- Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
- Single (with PSU) **£3.95** Twin (with PSU) **£3.90**



## EPSON NLQ ROM for the BBC Micro



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 separately 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**

## THE NLQ DESIGNER

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.

A 40/80 track format disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though - work is in development!)

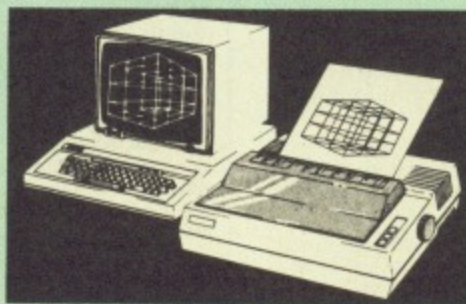
- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

**Now available:**

- Centronics GLP Printer NLQ Designer ROM **£20**
- GLP Individual FONT ROMs **£14**

(Write in for further details on both).

## 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".

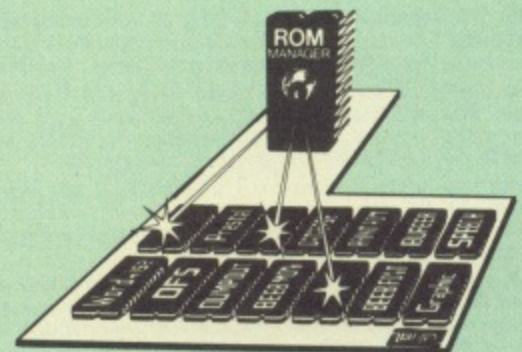
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost 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:

CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, 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**

## BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software. It allows you to display text on the screen in 13 different styles. It is supplied complete with a Spooler and Editor on 40 or 80 track disc. (Please write in for technical details).

**ONLY £25**

## BEEB PRINTER ROM



This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

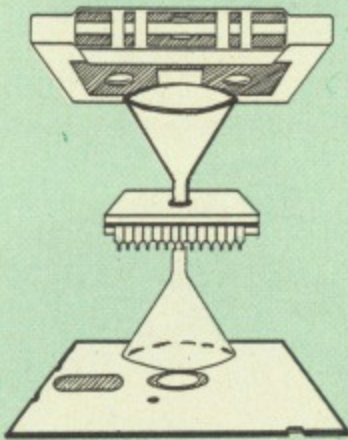
- ★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.
- ★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
- ★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
- ★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
- ★ Commands select the options for the following printers: GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200. Operates with either parallel or serial interfaces.
- ★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

**Price: £25**



## TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

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

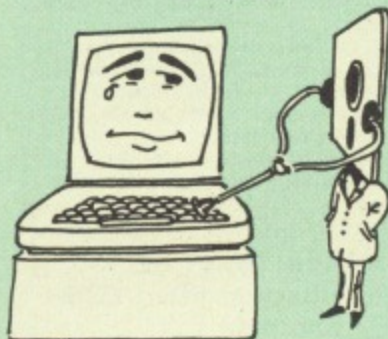
TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

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

All prices exclusive of VAT

## 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.

Continued

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 referencer 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 £45

Please specify 40 or 80 track disc when ordering.

## ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY £34

## ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: £66

## 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

## 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".

Don't settle for less, Buy the best.

ROM-SPELL costs only £25

(Please state 40 or 80 track disc)

## DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces - keep reading our adverts though!)

Price only £10 (40 or 80 track)

## BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.

Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

(Write in for technical details.)

£24

## DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use programmers tool.

Please write in for technical details.

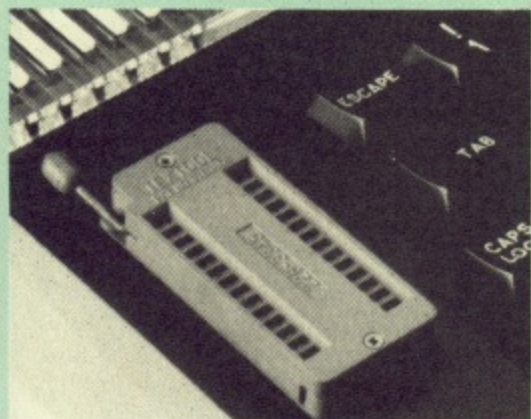
ONLY £16

Continued





## SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- 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, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.
- 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 unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY £15 (carr £2)

## 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:

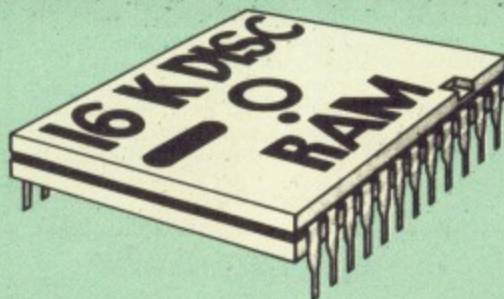
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: £29 (carr £2)

### Optional extras

READ and WRITE protect Switches £2 each  
Battery for Battery Backup £3

All prices exclusive of VAT



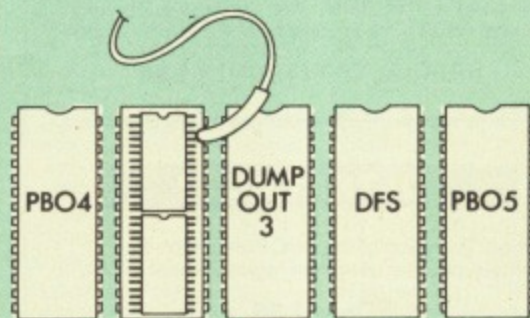
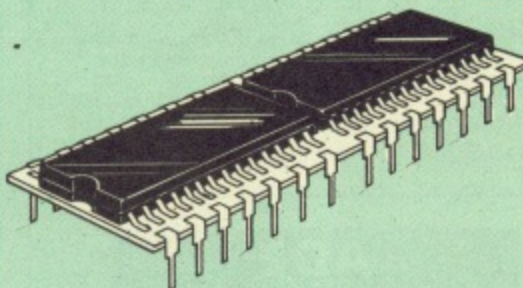
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write 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.
- All existing ROMs can be stored on disk and used in DISC RAM.
- 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

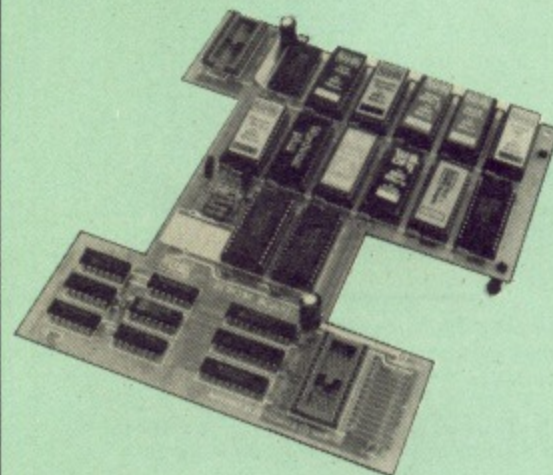


This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead to fit, (no soldering required) this compact unit works with any BBC Micro 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.

## SOLDERLESS SIDEWAYS ROM SOCKET BOARD



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 permissible, 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.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32  
Battery backup fitted £36  
(carriage £2)

## EXTERNAL Sideways ROM BOARD

This extremely versatile 12 ROM Socket Board is supplied with power supply, boxed in an attractively finished BBC beige. A second board can be fitted at a later stage to give a total capability of 28 ROMs.

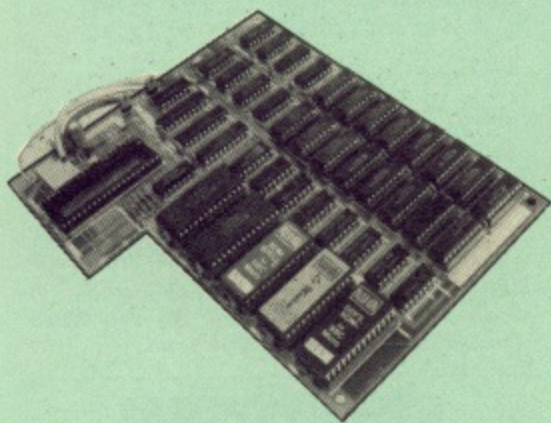
- No soldering required.
- Easy access to ROMs.
- Does not physically interfere with other internal add on boards.
- Built in power supply.
- Write protect for RAM.
- Allows upto 32K Static RAM and 24 ROM Sockets in varied combination.

Price: £75 (carr £3)  
(2nd Add-on Board £30)



## 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 Plus).
- 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).
- Write protect for ALL RAM.
- Master write protect for all sockets.
- 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.
- Can run ANY BBC 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 **£45**
- ROM/RAM card with 64k dynamic RAM **£69**
- ROM/RAM card with a massive 128k dynamic RAM **£109**

(carriage on ROM/RAM Card £3)

### OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£7**
- Battery backup **£3**
- Read and Write protect switches **£2 each**
- Complete ROM/RAM board (all options installed) **£125**

## Le Modem



PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus.

### 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 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, Auto Baud selects 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 a way that you need nothing else except a BBC Micro to communicate with computers all over the world.

- BT Approval applied for.

Price: **£89** (carr £3)

(Price includes Software ROM, Cables and Manual)

## Nightingale Modem

SPECIAL PRICE to our Customers

**£119**

(Price includes COMMSTAR ROM & comprehensive manuals)

- Nightingale Modem without software **Only £99**
- COMMSTAR ROM package only **£29**  
(P&P on modem £2.00)
- Auto Dial/Auto Answer Board **£48**
- Auto Dial Utilities Disc **£9.50**
- OBBS Bulletin Software **£20.00**

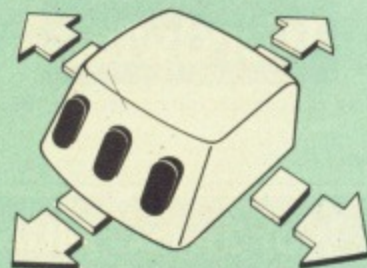
## LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: **£55**

## THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

**ONLY: £65**

(carriage £1.50)

We are giving away the sophisticated COLOUR ART Software package ABSOLUTELY FREE with every purchase of the AMX Mouse from us.

AMX DESK Package	<b>£19.00</b>
AMX UTILITY Package	<b>£11.50</b>
AMX SUPERART Package	<b>£43</b>
AMX PAGE-MAKER Pack	<b>£43</b>
AMX 3D ZICON Disc	<b>£21</b>
AMX Database Disc	<b>£21</b>
AMX XAM Educational	<b>£21</b>

## COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really brings those pictures alive. Not with just any colours; mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

Price **£10**

(please specify 40 or 80 track disc when ordering)

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	£52
CARETAKER Basic Utility	£27
Graphics ROM	£26
Disc Doctor ROM	£26
TERMI	£27
COMMUNICATOR	£58
SPEECH ROM	£26

## Wordwise

The most popular Wordprocessor for the BBC Micro.

Special Offer: £32

## Wordwise plus

£45

FREE FREE FREE

We are giving away absolutely FREE, the superb Word-Aid ROM worth £20, 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.

Only £20

(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

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

£45

## INTER-CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

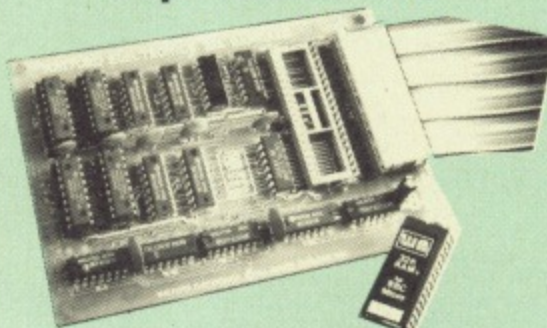
ONLY: £30

## GRAPH PAD

With this popular Mk II British Micro's Graph Pad, you can add new dimensions to your computer enjoyment. It helps you to create your own applications programs by the simple use of the Graphpad. Ideal for educational use. Supplied complete with cables, Manual and Software Cassette.

Special Offer £51 (carr £3)

## 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. 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 text 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 superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.

● 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 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only a 12K printer buffer can be used in Wordwise or Wordwise Plus due to the way in which they are written. Print large text files while running long graphics programs and have all your buffer options available as well (\*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.

● Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.

● 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.

Only: £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

## INCREDIBLE WORD PROCESSING DEAL!!!

Watford Electronics, already renowned for quality products at discount prices, are offering, for a limited period only, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.

32K Shadow RAM Card/Printer Buffer and Wordwise Plus (a very powerful package) for the absolutely astounding price of:

Only £69 (carr £2)

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

## VIEW

VIEW WORDPROCESSOR 2.1 ..... £39

## VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only £60

## HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEW SHEET (Acornsoft) £39

VIEWSTORE £39

## Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

## VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £10

## VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

## ISLAND LOGIC MUSIC SYSTEM

£25

## Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

£42

## GLENTOP'S 3D GRAPHICS

Development System £22



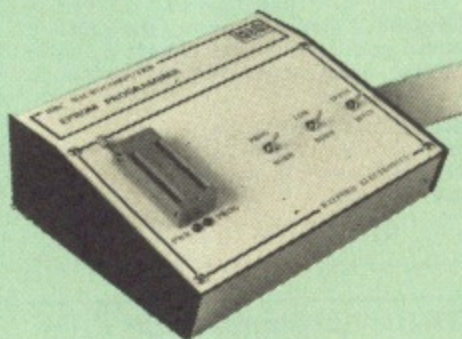
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Continued



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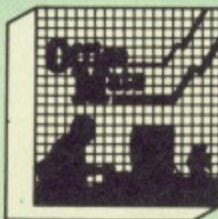
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B/E = BBC/Electron



See us on Prestel - Page 60043754



BEFORE we plough on with our simple guide to the subtleties of BBC Basic let's have a look at what we've done so far. By now you should have a grasp of the Basic keywords PRINT, LET, LIST, CLS and RUN.

Notice how some can be used immediately as in:

```
PRINT "command mode"
```

while others, such as RUN, need a program to work on.

You should also have an understanding of variables, know the difference between a numeric and a string, the rules for naming them and how to use them. So:

```
LET first=1
LET second=2
LET result$="The total is "
LET sum=first + second
PRINT result$;sum
```

should make sense to you.

Finally we saw how to make simple programs that are obeyed one line after another. Program I is such a program.

```
10 REM Program I
20 PRINT "Enter length"
30 INPUT length
40 PRINT "Enter width"
50 INPUT width
60 area=length*width
70 REM Look no LET
80 PRINT "The area is ";area
```

Program I

One thing you'll notice about it is that while it's fairly familiar there's a new keyword in there. It's the Basic command INPUT, one of the more powerful statements in the Basic language.

### It's so rigid

So far you've probably been a bit frustrated by the simplicity of our programs. They have lines like:

```
10 length=5
20 breadth=3
```

which assign values to the variables *length* and *breadth*. The trouble is that no matter how many times you run the program the values of *length* and *breadth* stay obstinately the same. If you want to use different values for the variable you have to enter the lines again.

The point I'm trying to make is that

# Now for some prompt action

## PETE BIBBY explores the ins and outs of INPUT in Part 4 of our guide for beginners

the program is very inflexible. And this is where INPUT comes in.

### Flexibility is all

To see what INPUT does, enter:

```
INPUT number
```

and press Return. Unless your micro is very different from mine, you'll be rewarded with a forlorn looking:

```
?
```

on the screen.

That question mark is a prompt, telling you that the micro is waiting for you to type in a number. So give it one, say 12, by typing in:

```
12
```

and pressing Return. As soon as you do this the micro takes the value 12 and stores in the variable name that followed the INPUT. In this case the variable name is *number*, so after you reply to the prompt *number* holds 12. You'll see this if you now use:

```
PRINT number
```

Now this isn't all that impressive, is it? After all you could have got the same effect with:

```
number=12
```

without the bother of using INPUT or having to reply to the prompt. It's a good point. However when it's used in a program, INPUT comes into its own as you'll see if you run Program II.

```
10 REM Program II
20 INPUT number
30 PRINT number
40 PRINT number*2
```

Program II

When you give the micro the RUN command, it goes to the lowest line number and starts to work. It ignores everything after the REM of line 10 and goes on to line 20. Here it meets the INPUT command, followed by the variable name *number*. Once again you're rewarded with the question mark as the micro waits for you to type in a number and press Return.

In other words the program halts until you give it some input. Put the poor thing out of its misery with, say, 2 and the program springs to life again putting:

```
2
4
```

on the screen.

Now run the program again and this time try other numbers. You can run the program over and over again. Each time the micro does the same thing but does it to different numbers. And that's the flexibility allowed by INPUT. It lets you write a program in general terms, and gives it values to work with when it is run.

### Give us a clue

Having sung the praises of Program II's flexibility, let me now criticise it. The bit I don't like is the question mark. It asks for information but doesn't tell you what information it wants. As we'll see later a program can ask for lots of inputs. This can result in a lot of meaningless question marks scattered across the screen. To use the jargon, it's not very user-friendly.

However this is easily resolved by using PRINT to give a hint as to what's



## From Page 49

expected. Program III shows what's meant.

```

10 REM Program III
20 PRINT "Please give me a number"
30 INPUT number
40 PRINT number
50 PRINT number*2

```

### Program III

In a short program like this labelling inputs may seem a bit silly, but as you get on to longer programs you'll find that it's good practice.

Now suppose you respond to Program III's prompt with:

two

Can you guess the result? The micro doesn't know what you mean so it "fails safe" and gives *number* the value zero.

## Strings as well

So far we've only had numeric variables after the INPUT. Enquiring readers will have asked themselves if you can use INPUT with string variables. The answer is yes, as Program IV shows:

```

10 REM Program IV
20 PRINT "What is your name?"
30 INPUT name$
40 PRINT "Hi there, "name$

```

### Program IV

Here the program waits at the INPUT of line 30 until the user responds. It then takes what is typed in and uses it in the last line to say hello.

So if I type in:

Pete

in answer to the prompt I get rewarded with:

Hi there, Pete

Notice that we don't have to surround the input string with inverted commas as we did with LET. The micro takes it for granted. Can you guess what

## PROBLEM

I HAVE come across a serious problem on my BBC B. On switching on the micro makes one beep, the caps lock and shift lock come on, the screen clears and Mode 3 or 0 is set.

Then the computer will accept no input from the keyboard - or,

## Doing two things at once

You're not limited to having just one variable to an INPUT. You can have two or more so long as they are separated by a comma. Program V shows how it works.

```

10 REM Program V
20 PRINT "Please give me two numbers"
30 INPUT first,second
40 PRINT first,second

```

### Program V

When you run this, the program gets the line 30 and waits for a response from the keyboard. It knows that it has to get two values and put them in the variables first

and second.

There are two ways you can satisfy the program. Suppose the values you want to enter are 2 and 3. You can enter 2 in response to the first question mark, then 3 to satisfy the next question mark that appears. Alternatively you can do both at once by entering:

2,3

and pressing Return.

Notice that the first number you input is given to the first variable after the INPUT, the next to the second. You can add more variables to the list if you want but it gets fraught with difficulty as the user makes mistakes or forgets which variable comes first. I prefer one prompt to one INPUT. It may take a lot of lines but it does save confusion!

will happen if you type in a number such as 45 in response to the prompt?

## More on messages

You don't always have to use a PRINT statement to give a prompt. You can, if you want, put the message in inverted commas between the INPUT and the variable. Try:

```
INPUT "Any message" message$
```

and you'll see:

Any message

appear on the screen as a prompt. Notice that there is now no question mark. Also, when you type in your input it appears right next to the message - which appears a bit cluttered. It's better to have a space before the final inverted commas of the message, as:

```
INPUT "Give me room " message$
```

will demonstrate as you respond to its urging.

If you miss the question mark and

obviously, the recorder. Even Ctrl + Break does not work. - K. Crisp, Bordon.

## SOLVED

The fault is a loose connection between the keyboard and the main board. Try inspecting it closely, or removing and replacing it.

want it back you can always retrieve it by putting a comma before the variable name, as:

```
INPUT "Any message",message$
```

shows.

How you decide to prompt for your inputs I leave to you. Myself, I prefer to use a separate PRINT as it makes the listings appear less cluttered.

## In(input) conclusion

I hope that by now you'll have got some idea of how flexible INPUT makes a program and understand how Program I works. Have a look at Program VI which calculates the mean of two numbers.

```

10 REM Program VI
20 PRINT "Please give me two numbers"
30 INPUT first,second
40 meanAverage=(first+second)/2
50 PRINT meanAverage

```

### Program VI

You shouldn't have any difficulty figuring out how it works. But notice how flexible it is. You can run the same program over and over again with different numbers. You don't have to change a thing in the program itself, just respond to the prompts.

● I'll leave you to explore the flexibility of INPUT in your own programs until next time when we'll be looking at more Basic keywords.





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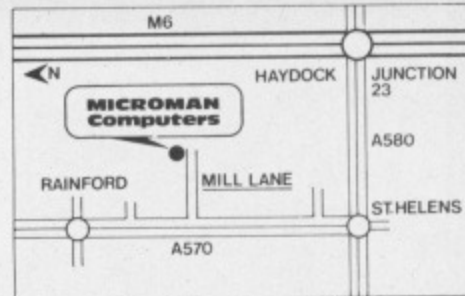
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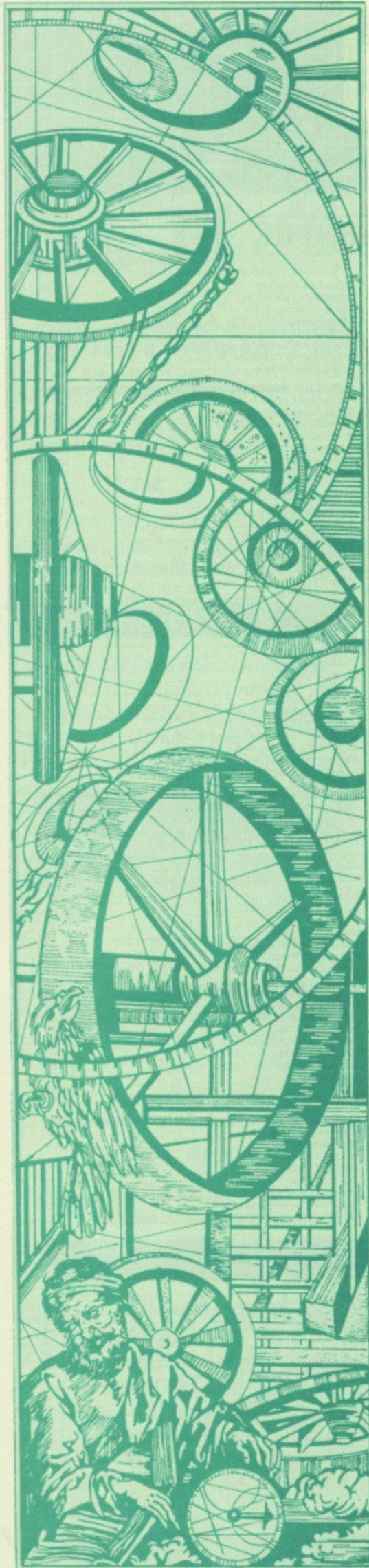
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## Alice considers ways of making and breaking codes and combinational problems

# Wheels within wheels

ONE of the appeals of an adventure is that the computer appears to understand you. This Apparent Intelligence, usually called AI, is being developed in far more serious ways to produce the so-called fifth generation of Machine Intelligence – the “Star Wars” era when machines will, and will have to, make life or death decisions.

But the appeal of a logical – hence correct thinking – machine has a long history. The first one was invented about 700 years ago on the island of Majorca by Ramon Lull, a Spanish theologian. His machine was simply a set of concentric wheels with “information” written round the edge. It now seems rather ridiculous to many people but actually his “wheels within wheels” is the very basis of encryption devices such as those used during the Second World War.

It is a strange paradox that his method should be used successfully to hide information rather than reveal it. Nevertheless, because such machines can generate a fantastic number of possibilities in a fixed order they are both essentially pseudo-random number generators – the fundamental basis of all modern encode/decode machines.

To give you just a taste of how such machines work I have written an Enigma type coding program (see Program I) which requires you to seed the BBC Micro’s random number

generator and then type in your message.

As a test try giving it the date as the various seeds (or keys). So 21 March is 210386 and the message “AAAAA” then becomes “EBYZR”. Note that a different key will give a different result. For example 220386 turns “AAAAA” into “WNJNN” – another (consistent) mix of letters.

```
10 INPUT"SEED";X
20 R=RND(-X)
30 INPUT"MESSAGE";M$
40 FOR I=1 TO LEN(M$)
50 C=ASC(MID$(M$,I,1))+RND(26)
60 IF C>90 THEN C=C-26
70 PRINT CHR$(C);
80 NEXT I
90 PRINT:GOTO 10
```

Program I

If you keep your messages short and choose a rather more complex seed rule then it is practically impossible for anyone to decode the result unless they are told the key.

How to actually decode with the correct key is left as an exercise for the interested user.

Another application of Lull’s machines – and again something he could never have imagined – is in the field of statistics when an investigator wants to



breaki

test all possible combinations in a controlled environment.

A particular biological example might be to test different strains of wheat grown in different soils with different fertilisers and so on.

Lull's machine, if designed correctly, can generate all the required combinations in a fixed and easily defined way.

How to precisely design these combinatorial machines is a very complex subject, but a simple example is one to solve the puzzle of how to keep 15 prisoners, at three to a cell, happy for seven days by making sure they never spend more than one night with each other.

The best solution to this problem was sent in by Norman Purnell of Bristol in the form of a Lull machine, shown in Figure I.

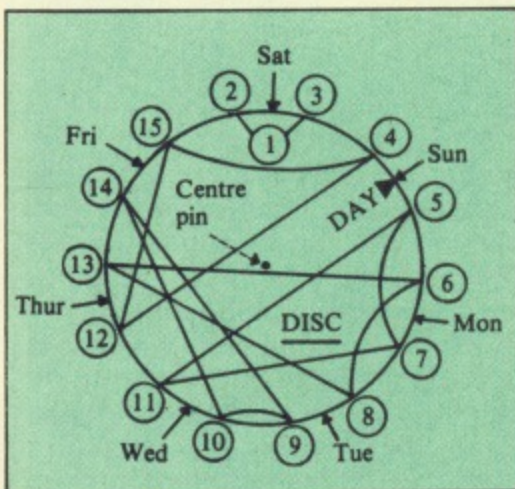


Figure I: A 15 prisoner solution with a Lull machine

It works like this:

1. Turn the disc to DAY → SUNDAY
2. Read off the five triplets, that is the five groups of three numbers linked together by the connected lines thus:  
SUNDAY 1, 2, 3 4, 12, 15 5, 7, 11 6, 8, 13 9, 10, 4
3. Turn the disc to DAY → MONDAY and repeat part 2.

As I said some months ago there are actually seven fundamental groups of solutions to this puzzle and Purnell's layout is just one of these. How to discover or generate the other six groups is difficult to describe and the interested reader should consult Chapter 10 of "Mathematical Recreations and Essays" by Ball and Coxeter.

## FURTHER SOLUTIONS

NO one solved the Dudeney's 7x7 queen's tour problem from the November issue, probably because I did not make clear that the correct path does not go outside the array. The message hidden in the 49 cells of the array is the 49 character WEYLANDS\*SMITHY\*AT\*NOON\*ON\*JULY\*THE\*TWENTY\*SECOND obtained via the following 12 queen moves:

1	NE,5	7	E,3
2	S,4	8	SW,3
3	W,5	9	N,4
4	NE,4	10	E,6
5	S,4	11	S,6
6	NW,4	12	W,6

Weylands Smithy is actually an ancient long barrow, or burial place, about one mile west of the famous White Horse Hill near Swindon in Wiltshire.

**Pellian equation** (December) The smallest integer solution to the equation  $61 \times I \times I + 1 = P \times P$  is  $I=226, 153, 980$  and  $P=1, 766, 319, 049$ . Therefore the number of the editor's deposit box in Zurich is 3, 119, 882, 982, 860, 264, 401.

This was first calculated more than 100 years ago, so no excuses that your

micro could not cope with such a large number.

Despite their age both the above problems by Dudeney are obviously still difficult to solve so now we come to a more modern and simpler type of problem namely **Derlien's puzzle** (January). The problem set by the program is to use all the digits 1 to 9 once (and once only) to create two numbers A and B such that  $B = 3 \times A$ .

There are two such possibilities:  $A=5823$   $B=17469$  or  $A=5832$   $B=17496$  and the correct answer is "hidden in the program" - actually in the superfluous message in line 150. Just count the letters in "THESE CONFOUND ME AND I CONFIRM YOUR MENTAL ABILITIES".

In the two weeks after publication I received 20 "solutions", of which only three refer to line 150 as the correct reason for their answer. These came from T. Hewson of New Milton, J. Warmington of Brighton and D. Bowman of Bedford.

I'm afraid I can't answer Mr Hewson's query that "the real mystery is why do I bother?".

A curious twist is that Peter Derlien did not realise there are two possible answers and cannot decide whether this makes the problem easier or harder. My thanks to everyone who had a go, particularly those who found it "far too easy".

## SELF LISTING PROGRAM

*IN February I mentioned an amazing program that could print an exact copy of itself and you (hopefully) will have tried to perform this trick. If you failed then try Program II to assure yourself that it is possible. The prize puzzle is to write another "self printer" without using RESTORE or prove that RESTORE is essential.*

```

10 DATA B$=" DATA ":0%5
20 DATA FOR J=10 TO 120 STEP 10
30 DATA READ A$
40 DATA PRINT J;B$;A$
50 DATA IF J=60 B$=" ":RESTORE
60 DATA NEXT J
70 B$=" DATA ":0%5
80 FOR J=10 TO 120 STEP 10
90 READ A$
100 PRINT J;B$;A$
110 IF J=60 B$=" ":RESTORE
120 NEXT J
    
```

Program II



From Page 53

## THE HYPERSPACE PUZZLE

AS any adventurer knows (outside of a twisty maze) South is the opposite of North, West is the opposite of East and Down will reverse an Up.

But is it possible to move back and forth in the fourth or higher dimensions?

The answer is yes — all you have to do is type in the Hyperspace program (Program III) to get a taste of the tesseract (a four-dimensional cube).

To test it say you want to travel in just two dimensions which only has four "rooms", the corners of a square.

All these can be visited either by typing N, E, S, W or E, N, W, S.

A tougher test is to make one of the many possible tours of all the 16 rooms in the fourth dimension, thus N, E, S, U, N, W, S, 4, N, E, S, D, N, W, S, R.

I forget exactly how many such tours there are around the tesseract but I do recall that there are 906,545,760 different ways of visiting all 32 rooms in the fifth dimension. This fascinating fact was discovered by a computer in 1972.

If the tests work then you can try to move around in the more complex fifth dimension and above. Note that to return from the fourth dimension you only need to type "R" — the program

will prompt you. Higher dimensions have the following entries/exits:

Entry	Exit
5	Finish
6	Leave
7	Out
8	Quit
9	Xit
(1)0	Kwit
(1)1	Terminate
(1)2	Belay

There are 4096 rooms in the 12th dimension and all you have to do is write down a simple rule that guarantees that you will visit ALL these rooms once and once only AND return to the starting point of NEU456789012.

Note that if you visit a room twice the program drops you into a pit.

This puzzle is obviously open-ended in that it all depends on what you mean by "simple". Nevertheless there is a rule that can be stated in fewer than 20 words which I shall give next time.

In the meantime just finding ANY rule should improve the shining hour for those of you that bother. A hint is the Gray Code solution for the Tower of Hanoi, published in the August 1972 edition of Scientific American magazine.

```

10 DIM A(4096),DIR$(12,1),D(12) =0
20 INPUT"NUMBER OF DIMENSIONS ";DM 220 R=0
30 FOR Y=1 TO DM 230 M=1
40 D(Y)=0 240 FOR I=1 TO DM
50 FOR X=0 TO 1 250 R=R+D(I)*M
60 READ DIR$(Y,X) 260 M=M*2
70 NEXT X 270 NEXT I
80 NEXT Y 280 IF R=0 THEN 320 :REM GOT BACK T
90 DATA N,S,E,W,U,D O START
100 DATA 4,R,5,F,6,L 290 IF A(R)>0 THEN PRINT "YOU FELL
110 DATA 7,D,8,Q,9,X INTO A PIT":STOP
120 DATA 0,K,1,T,2,B 300 A(R)=1
130 C$="" 310 GOTO 130
140 FOR I=1 TO DM 320 FOR I=1 TO 2^DM
150 C$=C$+DIR$(I,D(I)) 330 R=R+A(I)
160 NEXT I 340 NEXT I
170 PRINTC$ 350 PRINT"YOU MISSED ";2^DM-R-1;" R
180 INPUT "CHOOSE ",A$ DOOMS"
190 I=INSTR(C$,A$) 360 IF 2^DM=R+1 THEN PRINT"ALL DONE
200 IF I=0 THEN 180 - WELL DONE"
210 IF D(I)=0 THEN D(I)=1 ELSE D(I)

```

Program III: The hyperspace adventure





# Multi-Basic: the next best thing to multi-tasking

MULTI-TASKING is a feature usually found on larger and more complex computers than the BBC Micro. It allows more than one program to be run at the same time.

This is achieved by quickly switching between different programs, so that each appears to be running normally without interruption.

While full multi-tasking is not possible on the BBC Micro, Multi-Basic gives a very good approximation. The software is supplied on a 16k paged ROM for fitting in addition to BBC Basic.

A Basic program which is running normally is described as the foreground task. MultiBasic controls background tasks. These are short Basic routines which are switched in and out when required.

The background tasks can interrupt the foreground program, but after completing their task allow the foreground program to continue as if there had been no interruption.

These ideas will not be new to machine code programmers. They know that the operating system is regularly interrupting Basic to carry out a variety of actions, from incrementing the internal timer every centisecond to acting when a key has been pressed.

Tasks are defined in a similar way to procedures. Instead of DEF PROC, TASK shows the start of a routine. Similarly EXIT must be placed at the

**By JIM NOTMAN**

end of the routine. For example:

```
100 TASK time
110 PRINT TAB(30,0)" ";
120 PRINT TAB(30,0);TIME
130 EXIT
```

This task will print TIME in the top of the screen every time it is called.

The tasks can be enabled in one of two ways. In the first they can be called at regular intervals. With:

```
ENABLE time EVERY 100cs
```

the task called *time* will be called every 100 centiseconds.

The other way is to check a location in memory, for example:

```
ENABLE key WHENEVER evnt%
```

This time the task called *key* is called whenever a condition specified in *evnt%*

is TRUE. The four bytes of the integer variable combine to define the condition being tested for.

This condition looks quite complicated at first, as it must contain the address (two bytes) that is to be looked at, a byte giving a bit pattern that it must look for and a byte which allows individual bits to be inverted before being tested.

The latter of these is very useful because many of the devices which connect to the user port use inverse logic.

Enabled tasks are checked to see if they should be run every centisecond. For most control purposes this response time is fast enough.

Before MultiBasic was available you would have had to write control functions like these in machine code, never a straightforward job. Now these complex interrupts can easily be written in Basic.

A task will not interrupt Basic in the middle of a Basic statement and will not interrupt another active task. A list of currently defined tasks is kept, up to a maximum of eight. There are commands to remove tasks from the list and install new ones as well as testing which are enabled.

To improve timing capabilities, five system timers are provided. They are incremented every one hundredth of a second. It is possible to use them as alarm clocks when programmed with ENABLE WHENEVER commands.

Apart from multi-tasking, the software is well suited for handling the versatile interface adapters (VIA). It is particularly strong at manipulating bits. To make life a little easier, it has its own set of mnemonics for the different VIA registers.

CMS also produces specialised

I OWN a one year old BBC model B. My problem is that when I try to load Castle Quest, Fortress and Phantom they all load correctly until the final sections of each program, then I only get the searching message and any graphics from the previous sections.

I have tried three different tape players, altering the head, volume and tone controls where necessary, all to no avail. I have tried these programs on other BBC model Bs and they load perfectly. — L.J. Beacher, Horsham.

At one time Acorn produced a serial ULA which was more fussy than the original one. As a result some software protection achieved the ultimate in protection of not even allowing it to be loaded in.

A dealer should be able to fix another ULA, or the software house give you a version that works with your machine.

**PROBLEM**

**SOLVED**



# ROM Roundup

## EXTRA STAR COMMANDS

- \*MULTI Initialises Multi-Basic. This will increase PAGE by &300 bytes. For example, with a DFS fitted PAGE is moved from &1900 to &1C00.
- \*EVENTSOFF Disables multi-tasking.
- \*EVENTSON Re-enables multi-tasking.

### From Page 56

control cards which are fitted with both BBC Basic and Multi-Basic. This makes it possible to solve interfacing problems on the BBC Micro before transferring programs to the control cards.

There is a good clear manual considering that the ideas will be new to many, with numerous example programs and a section with do's, don'ts and avoids.

Scientific and industrial uses will be the biggest group to benefit from the extra facilities, but anyone who hooks even the simplest piece of hardware to the BBC Micro should take a look at this excellent piece of firmware.

## EXTRA COMMANDS ADDED TO BASIC

Command	Purpose
CONFIGURE	To write a bit pattern to a VIA register.
DECLD	To test whether a task is currently declared.
DISABLE	Removes a task from the current task list.
ENABLE	Enables a task.
ENABD	Tests whether a task is currently enabled.
EVERY	Together with ENABLE, defines the time interval between successively calling a task.
EXIT	Marks the end of a task definition.
FETCH	Reads a given VIA register into a memory location.
OMIT	Disable and then delete a task from the current list.
RD_TIMER	Read a selected system timer.
SETBITS	Set a bit or bits in a VIA register.
SET_TIMER	Writes a new four byte value to a system timer.
SHIFTL	Shift left the contents of a VIA register.
SHIFTR	Shift right the contents of a VIA register.
TGGLE	Perform an Exclusive OR on a VIA register.
UNSET	Clear a bit or bits in a VIA register.
WAIT	Suspend all program activity for a specified period.
WHENEVER	Used together with ENABLE to run a task whenever a given condition is true.



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High grade FUJI 5 1/4" disks with LIFETIME WARRANTY! every track of every disk is guaranteed to be error-free High RELIABILITY in reading and writing data even after 10 million passes!

Promotion OFFER Prices:	
SS/DD 40 track, only	£15.40
DS/DD 40 track, only	£16.75
SS/DD 80 track, only	£17.25
DS/DD 80 track, only	£18.50

WITH FREE LIBRARY CASES post & packing £1.00

#### The unique UNIBOX disk storage and filing system:

- \* 8 individually enclosed flipback compartments.
- \* Accepts up to 80 5 1/4" disks.
- \* Guards against bending disks.
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- \* Includes file labelling system.
- \* Compact size.
- \* Price only £12.75 + £1.75 p&p UNIBOX complete with 25 TOP GRADE SS/DD Disks only £35.60
- DS/DD Disks only £40.60
- Post & Packing with disks £2.40

CUMANA QFS 2.0 DOUBLE DENSITY DISK INTERFACE ONLY £44.95 Post & Packing 50p

\* BULK disks per 50 (GUARANTEED) SS/DD only £45.00 (£2 carriage) DS/DD only £51.50 (£2 carriage)

#### Cumana TOUCH PAD and SOFTWARE

Touch Pad with SCREEN ARTIST forms the perfect combination of state-of-the-art technology together with human creativity.

- \* Easy to use graphics plotting aid plus a new software library.
- \* Complete with connecting cables.
- \* Includes character generator for redefining new characters.
- \* Print routine dumps to any Epson or Epson compatible printer.
- \* Price only £38.95 (carriage £2)

#### TOUCH PAD SOFTWARE

School series 1 England & Wales.  
School series 2 Scotland.  
School series 3 Europe.  
School series 4 Heart and Lungs.  
Schoolseries 5 Human Eye.  
\* Price series 1 only £4.95  
\* Price series 2 to 5 £10.90 each. (Post & packing 75p).

#### Cumana Disk Drive

Super Value Pack  
\* CSX100 Disk Drive  
\* QFS 2.0 Disk Interface  
\* Twin Disk pack  
\* Disk drive dust cover  
\* Keyboard cover  
\* Manual and Formatting Disk  
\* Price only £129.95 (carriage £5.00).

#### HARDWARE OFFERS

EPSON P40 Printer, only	£50.75
Seikosha GP50A Printer	£72.00
4 Colour PLOTTER/Printer	£85.00
Brother HR-10 Daisywheel	£263.25
Mannesmann Tally MT80+	£189.00
Epson LX-80 (Friction)	£228.00
Epson LX-80 (F/Tractor)	£248.00
Star SG-10 NLD/tractor	£238.75
Epson FX-80+	£339.25
Epson DX100 Daisywheel	£356.50
Epson JX-80 7 Colour	£499.95
BBC Parallel Cable	£8.25

#### MONITORS:

Philips 7502 Green	£85.00
Philips 7522 Amber	£89.95
Philips CT1114TV colour	£199.00
Microvitec 1431 colour	£205.85
Microvitec 1451 colour	£258.75
Cumana CSX100 Disk drive	£88.95
Cumana CDX200 Disk drive	£165.95

#### NEW BBC Master 128 comp. £ phone

#### SPECIAL DE-LUX COMPUTER & 5 1/4" DISK DRIVE MAINTENANCE KIT:

- \* The display case contains:
  - 1 Head cleaner diskette
  - 2 Head cleaner fluid
  - 3 VDU anti-static cleaner
  - 4 Keyboard & Plastic cleaner
  - 5 Anti-static cloths
  - 6 General purpose cloths
  - 7 Cleaning wands
  - 8 Blower brush
  - 9 Two atomisers
- SAVE £5 - our price £16.95 plus £2 post & packing.

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Orders to: **TIGER SOFTWARE**  
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Tel: 0308 23655

CARRIAGE:  
(unless otherwise stated)  
Disk Drives £4. Monitors £8  
Printers £6 - except P40  
GP50A & Plotter £4



## BBC MASTER SERIES



AMB15	BBC MASTER Foundation computer 128K	£435 (a)
AMB12	BBC MASTER ET 128K (only ANFS)	£348 (a)
AMC06	Turbo (65C102) Expansion Module	£87 (b)
ADF13	Rom Cartridge	£13 (d)
ADF10	Econet Module	£49 (c)
ADJ22	Ref. Manual Part I	£14.50 (c)
ADJ23	Ref. Manual Part II	£14.50 (c)
ADJ24	Advanced Ref. Manual	£19.50 (c)

## BBC PLUS COMPUTER RANGE

BBC B PLUS with 128K.....	£389 (a)
BBC B PLUS Econet & DFS.....	£409 (a)
BBC Dust Cover.....	£4.50 (d)

## UPGRADE KITS

1.2 OS ROM.....	£7.50 (d)	Econet Kit.....	£55 (d)
DNFS ROM .....	£17.50 (d)		
1770 DFS Upgrade for Model B.....	£43.50 (d)		
ADFS ROM (for B with 1770 DFS & B plus).....	£26 (d)		
64K Upgrade Kit for B plus	£35 (d)		

## ECONET ACCESSORIES

Econet Starter Kit.....	£85 (b)		
Econet Socket Set.....	£34 (c)	Printer Server Rom.....	£41 (d)
File Server Level I.....	£75 (d)	10 Station Lead set.....	£26 (c)
File Server Level II.....	£210 (d)	Adv. Econet User Guide	£10 (d)

## ACORN 32016 CO-PROCESSOR

Acorn Cambridge Co-processor combines with the BBC micro to provide full 32 bit processing. The National Semiconductor 32016 processor performs all language and application processing, the NS32081 floating point processor maximises the performance and provides support for IEEE standard fp handling.

The specially developed operating system PANOS, provides efficient interfacing between the languages and the hardware and software of the BBC micro incl. the variety of ACORN filing systems: DFS, ADFS and NFS. PANOS provides a variety of utilities including a full screen editor and a linker providing access to both library routines and cross language linking.

FORTRAN 77, PASCAL and C languages with mainframe type implementations, fully compiled and provided with appropriate library support are included. Other languages include, Cambridge LISP with its compiler, a 32016 assembler and a 32bit interpreted implementation of BBC BASIC with full screen editor. 1 Mbyte of RAM is included as standard.

32016 CO PROCESSOR (Currently available from stock) £1375 (a)

Please phone or write for full specifications on the Cambridge Co-processor and Cambridge Workstation.

## ACORN WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III is installed as standard.

10 Mbyte Winchester	£1350 (a)
30 Mbyte Winchester Drive	£1999 (a)

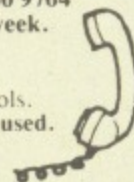
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Please note that a 'Prestel' type terminal must be used.

Now available for use.

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## EPROMs/RAMS

2764-25.....	£2.00 (d)	27128-25.....	£2.75 (d)
6264LP-15.....	£3.75 (d)		

## ACORN 2nd PROCESSORS

**Acorn Z80 2nd Processor:** Z80 CPU with 64K of RAM housed in a separate case with a integral power supply interfaces with the BBC computer through the TUBE. It converts the BBC into a CP/M system and its comprehensive package of software provides a suitable basis to set up a business system. £329 (a)

**Acorn 6502 2nd Processor:** This processor provides faster data processing speeds and larger memory. Particularly useful for use with Hi View word processor for production of large documents.. £169 (b)

## MULTIFORM Z80 2nd PROCESSOR

This processor converts your BBC into a power CP/M system and make it capable of operating in almost any CP/M format. Full details on page 5 of this advertisement. £299 (b)

## TORCH Z80 2nd PROCESSOR

**ZEP100:** This Z80 processor with 64K fits internally in the BBC computer and has the operating system in a ROM. It is supplied with the PERFECT suite of software comprising of a database, wordprocessor and a spreadsheet and a BBC BASIC for Z80. £199 (a)

ZDP240: ZEP100 with TORCH twin 400K Disc drive £429 (a)

## ACORN TELETEXT ADAPTOR

This adaptor will convert the BBC computer into a teletext receiver capable of decoding and displaying the CEEFAX and ORACLE pages and the monitor screen. These pages can also be saved for later reference. BBC TV transmit educational software on their CEEFAX system which can be downloaded free of charge. £125 (b)

## ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £278 (a)

## ROBOCOM BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour palette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 192 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value.

BITSTICK I £349 (a)

**ROBOCOM BITSTICK II:** This package is as Bitstick I with software upgraded to allow scaling and auto dimensioning. Multiplotter driver is also supplied with the package. £775 (a)

Upgrade for Bitstick I to II £415 (b)

Bitstick Multiplotter Driver (most popular plotters included) £79 (b)

Epson FX80 Screen dump routine for Bitstick I £35 (d)

Epson FX80 dump for Bitstick II £39 (d)

# TECHNOMATICS

01-208 1177

**BBC Computer  
& Econet  
Referral Centre**

**MAIL ORDER**  
17 Burnley Road  
London NW10 1ED

**RETAIL SHOPS**  
15 Burnley Road  
London NW10 1ED  
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**West End Branch**  
308 Edgware Road  
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(a) £8 (Datapost)  
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(d) £1.00.



## EPSON PRINTERS

**EPSON LX-80 NLQ:** A new low-cost high performance dot matrix printer from Epson. Its many features include Near Letter Quality, Draft mode, programmable characters, a variety of print styles, graphics etc. Supplied with friction feed as standard 100cps.

LX-80 £195 (a) Optional Tractor Feed £20 (c)

**EPSON FX Range:** This new range designed to meet virtually every type of computer based printing requirement, from correspondence quality (NLQ) text printing, a variety of fonts, to seven different levels of graphic printing. Fully IBM PC compatible with full graphics character set from the PC's keyboard. 8K built in buffer allows either data storage or creation of upto 240 characters of your own design. 160 cps for draft print and 32 cps for NLQ.

FX85 (80 col).....£315 (a) FX105 (136 col).....£449 (a)

EPSON JX80 4 colour printer.....£435 (a)

**EPSON LQ Range:** This range with 24 pin dot matrix printers offers a high, 200 cps, draft speed and superb correspondence quality print at 67 cps and truly high resolution graphics and a variety of fonts.

LQ800 (80 col) £595 (a) LQ1500 (136 col) 2K buffer £875 (a)  
32K buffer £950 (a)

## TAXAN KAGA PRINTERS

A set of economically priced printers that offers full EPSON compatibility and the near letter quality option and a facility to install 8K additional ram or 8K eeprom for custom font. Both friction and tractor feeds as standard. 140 cps draft and 24 cps NLQ. A variety of fonts and graphics in six densities.

KP810 (80 col).....£195 (a) KP910 (156 col).....£339 (a)

## DAISY WHEEL PRINTERS

**BROTHER HR15:** \* 14 cps \* 3K Buffer \* Two colour printing \* Proportional spacing \* Underline \* Bold \* Shadow print \* Super/Sub script + many other features.

BROTHER HR15 £295 (a)

**JUKI 6100:** \* 15 cps \* 2K Buffer \* Switchable 10/12/15 cpi \* Proportional printing \* Linear Motor for max reliability.

JUKI 6100 £289 (a)

Centronics GLP (NLQ) Printer £109 (b)

## DOTPRINT PLUS

The most versatile NLQ rom for the BBC Micro.

**DOT PRINT PLUS** not only gives you the 10 character pitch at 6 lines/in with underlined and double width characters as required but like all other NLQ roms, it offers a lot more.

- \* a built in CHARACTER FONT EDITOR enables disc users to create their own type faces for use in printing spooled text files.
- \* a built in View Printer Driver.
- \* MICROSPACING for professional justification in VIEW and — with discs — in WORDWISE/PLUS.
- \* true BOLD PRINT in addition to double width.
- \* 12 char pitch as standard — providing 96 CHARACTERS PER LINE on the FX/RX 80 for example.
- \* simple control codes allow VARIABLE PITCH LINE SPACING in 1/72" increments and VARIABLE PITCH from 12 cpi in increments of 1/240". (10 cpi can be selected by a single control code).

The 12 cpi pitch is **not available** even on most "NLQ" printers. The rom comes complete with manual for only £28 (d)

## PRINTER ACCESSORIES

### EPSON ACCESSORIES:

**Interfaces:**  
8143 RS232.....£28 (d) 8165 IEEE + Cable.....£65 (d)  
8148 RS232 + 2K.....£57 (d)  
8148 + RS232 + 8K.....£75 (d) 8132 Apple II.....£60 (d)  
8177P NLQ for FX80+ /FX100+.....£99 (d)  
8190S NLQ for FX80+ /FX100+.....£64 (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)

### SHEET FEEDERS:

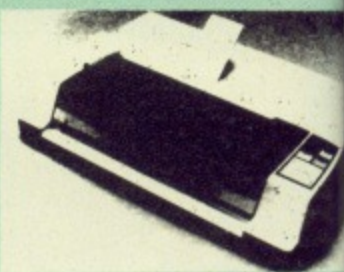
8338 LX80.....£49 (b) 8331 FX80+ /85.....£99 (b)  
8333 FX100+ /105.....£169 (a) 8330 RX80+.....£129 (b)  
RX/FX80/80+, FX85.....£5 (d) RX/FX100/100+, FX105.....£10 (d)  
LX80.....£4.50 (d)  
H180 Pen Set (Aqueous/Ball point).....£7.50 (d)

### Dust Covers:

FX80.....£5.50 (d) FX100.....£7.50 (d)  
TAXAN/Canon KP810.....£6 (d) KP910.....£7 (d)

## EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer.



Detailed leaflet on request.  
Epson Hi-80 Plotter £345 (a)

## HITACHI 672 PLOTTER

Up to A3 on OHP film or paper with 4 colours. Its low inertia plotting system, which moves both the paper as well as the pens, gives high acceleration, and therefore high throughput, from a compact economic mechanism. Features both HP graphics language. Both parallel and RS232 interfaces as standard. Step size 0.1mm.

Hitachi 672 Plotter £465 (a)

## PRINTER BUFFER & SHARERS

**BUFFALO 32K Buffer for EPSON PRINTERS:** This compact 32K buffer can be fitted internally on any EPSON printer within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions.

Buffalo 32K Buffer £75 (a)

**PRINTER SHARER/BUFFER:** A unique sharer/buffer that provides simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate in the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

TSB 64 Buffer/Sharer

£199 (a)

A Serial Buffer/Sharer will soon be available. Please send for details.

## PERIPHERAL & COMPUTER SHARERS

An extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 £69 (c)	25V25-3 £64 (c)
4 Computers to a Printer	36V36-4 £85 (c)	25V25-4 £74 (c)
2 Computers/2 Printers x-over	36V36-X £69 (c)	25V25-X £69 (c)
BBC Cable Set 3 to 1 (1m ea.)	£32 (c)	£34 (c)
BBC Cable Set 4 to 1 (1m ea.)	£39 (c)	£41 (c)

### Computer Sharer:

1 computer to 2 printers fitted with Cable for BBC TCS26 £19.50 (c)

### TAXAN KAGA/CANON Accessories:

RS232 + 2K buffer.....£78 (d) Ribbon.....£6 (d)  
JUKI 6100  
RS232 Interface.....£65 (d) Spare Daisy Wheel.....£14 (d)  
Tractor Feed.....£129 (a) Sheet Feeder.....£182 (a)  
Ribbon (Carbon).....£2.00 (d)

### BROTHER HR15

Daisy Wheel.....£18 (d) Sheet Feeder.....£182 (d)  
Tractor Feed.....£90 (a) Keyboard.....£135 (a)  
Ribbon (Carbon/Nylon).....£3.00 (d) Red Correction Ribbon.....£2.50 (d)

### Printer Leads:

BBC Parallel Lead (1.2m).....£6 (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" x 11".....£13 (b)  
2000 sheets 14½" x 11".....£18.50 (£4.50)

### Labels/1000:

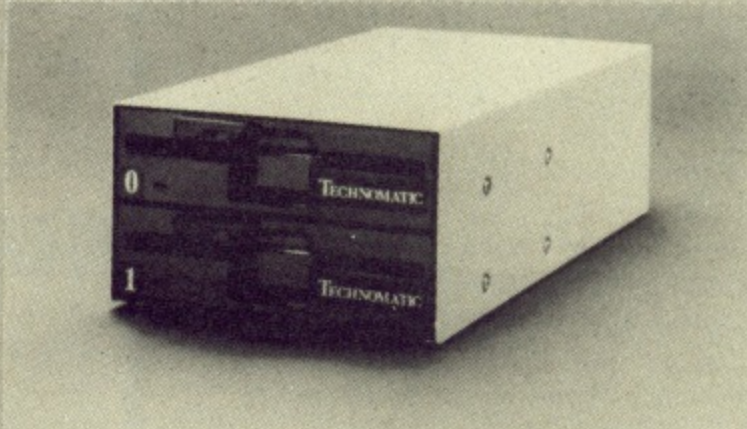
Single Row 3¼" x 1 7/16" £5.25 (d) Triple Row 2 7/16" x 1 7/16" £5 (d)



## DISC DRIVES



PD800



Your computer installation can look like this with our PD800P drive

This highly successful drive offers unique features:

New slimline Mitsubishi mechanisms with ultra low power consumption (only 8 watts per mechanism), front locking lever and capable of single or double density operation. Ultra fast track access times and head settling times.

Fully compatible with the DFS and ADFS filing systems on the new MASTER's range.

40/80 switchable with switches located on the front panel. A generously rated switch-mode power supply ensures reliability with minimum heat dissipation for long periods of operation.

The mechanisms are set inside a sturdy monitor stand painted in 'BBC-matching' beige. Its 'looks' are enhanced by its black front panel, with attractive enamel-white markings.

These disc drives with a built-in monitor plinth provide a compact installation and give a professional look to the system.

As with all standard TECHNOMATIC drives it comes complete with a data cable, and a mains lead with a suitably fused 13A moulded plug.

**PD800P 2 × 400K/2 × 640K 40/80T DS £279 (a)**

TECHNOMATIC's stacked drives are housed in smart metal casings painted in BBC beige colour and are built to the same exacting standards as PD800P drives. The drives are fitted with integral switch mode power supply and supplied with a mains lead with a suitably fused 13A moulded plug and a data lead.

These drives are fitted with the new model MITSUBISHI mechanisms, which have been specially adapted for us to fit the 40/80 track switches on the front panel of the mechanisms. This would mean that the user no longer needs to grope at the rear of the drive to set the correct track setting.

**PD800 (2 × 400K/2 × 640K 40/80T DS) £249 (a)**

TECHNOMATIC's single drives are also housed in metal casings painted in BBC beige colour and are offered with or without power supply. All drives are supplied with data cables and suitable power leads. Mains powered drives have a lead suitably fused with a 13A moulded plug.

1 × 400K/1 × 640K 40/80T DS

**TS400 £109 (b) PS400 with psu £129 (b)**

### SPECIAL OFFER

ACORN's Single Drive 1 × 100K/1 × 160K 40T SS £49 (b)

### TS35

### 3.5" DRIVES



These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives are offered with or without integral mains power supply and they are supplied with all the necessary cables to make them ready for connection to a computer. Mains powered drives are supplied with a lead with suitably fused 13A moulded plug.

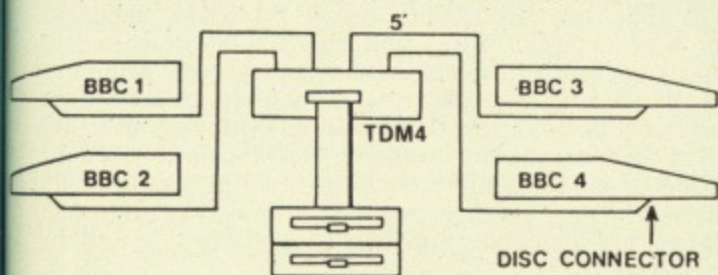
1 × 400K/1 × 640K 80T DS : **TS35 1 £109 (b); PS35 1 with psu £129 (b)**

2 × 400K/1 × 640K 80T DS : **TD35 2 £199 (b); PD35 2 with psu £209 (b)**

All drives listed above are fully compatible with single and double density DFSs. The larger capacity referred to above is for the Acorn's ADFS system.

## DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



**TDM4 Quad Unit (up to 4 computers) £135 (a)**  
**TDM2 Dual Unit (2 computers) £75 (b)**

## DISC STORAGE BOXES

10 5¼" Disc Library Case **£1.80 (d)**

30 5¼" Disc Lockable Box **£15 (c)**

40 5¼" Lockable Box **£9.50 (c)**

100 5¼" Disc Lockable Box **£15 (c)**

10 3½" Disc Case **£3 (d)**

### 3M 5¼" FLOPPY DISCS

40 T SS DD **£12 (d)** 40 T DS DD **£16 (d)**

80 T SS DD **£21 (d)** 80 T DS DD **£22 (d)**

**£1 extra pack for library case packing**

### 3M 3½" FLOPPY DISCS

80 T SS DD **£30 (d)** 80 T DS DD **£38 (d)**

Discs in packs of ten

## DRIVEHEAD CLEANING KIT

The FLOPPICLENE drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits.

5¼" **£14.50 (d)**  
 3½" **£16.00 (d)**

Floppiclene with 20 disposable cleaning kits.

# TECHNOMATIC

01-208 1177  
**BBC Computer & Econet Referral Centre**

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 Service 01-450 9764

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All prices ex VAT  
 Prices are subject to change without notice

Please add carriage  
 (a) £8 (Datapost)  
 (b) £2.50  
 (c) £1.50  
 (d) £1.00.



## COLOUR MONITORS

RGB MONITORS (all monitors supplied with a BBC lead)

1431 14" RGB Std Res	452 x 585 pixels	£179 (a)
1451 14" RGB Med Res	653 x 585 pixels	£235 (a)
1441 14" RGB Hi Res	895 x 585 pixels	£375 (a)

MICROVITEC 14" RGB/PAL/Audio

1431AP 14" Std Res	452 x 585 pixels	£205 (a)
1451AP 14" Std Res	653 x 585 pixels	£275 (a)

The above monitors are available in plastic or metal case.

MICROVITEC 20" RGB/PAL/Audio

2030CS 20" Std Res	£380 (a)	2040CS 20" Hi Res	£685 (a)
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TAXAN KAGA 12" RGB:

Super Vision III + with amber/green option	£345 (a)
--	----------

MITSUBISHI XC1404 14" Med Res RGB:

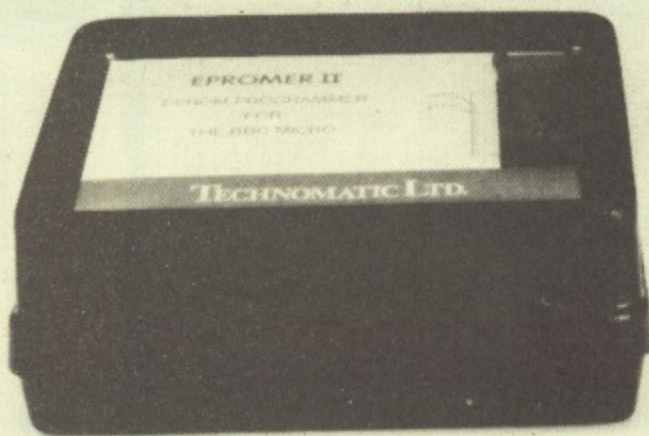
BBC/IBM Compatible. A new monitor with etched dark screen with both brilliance and contrast controls giving sharp graphics and text display. £249 (a)

## TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software.

Touchtec 501 £260 (b)

## EPROMER II



A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.

Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

- \* Integral power supply ensures no power drain from the computer.
- \* Interfaces through 1 MHz bus, fully buffered.
- \* Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
- \* Eproms upto 16K (27128) programmed in single pass (27256 in two passes).
- \* Selectable programming voltage 25/21/12.5V
- \* Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
- \* User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
- \* Full screen editor with HEX/ASCII input.
- \* Data input from keyboard/Tape/Disc/Eprom.
- \* Software interface for integration of user's special requirements.
- \* Constant display of all options selected.
- \* Several BBC BASIC programs can be entered on a single eprom.
- \* Checksum facility allows for easy identification of programmed roms.
- \* Enter OS Commands from within the epromer program.

EPROMER II with Manual & Software on disc £99 (b)  
ROM based software £10

## UV ERASERS

UVIT Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins.

UV1B as above but without the timer. £47 (b)

## MONOCHROME MONITORS

KAGA

KX1201G 12" HI-RES green etched screen	£99 (a)
KX1203A 12" HI-RES amber etched screen	£105 (a)

SANYO

DM8112CX 12" HI-RES green screen	£95 (a)
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PHILIPS

BM7502 12" HI-RES green screen	£75 (a)
BM7522 12" HI-RES amber screen	£79 (a)

## MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£20 (c)
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Kaga Swivel Base for mono monitors with integral clock	£22 (c)
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Philips Swivel Base	£14 (c)	Monitor Plinth	£13.50 (c)
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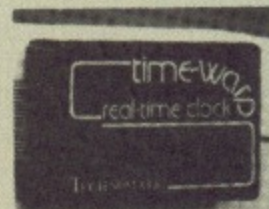
Double Tier Plinth for flat drive, computer and monitor	£19.50 (c)
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Kaga RGB Cable	£5 (d)	Microvitec RGB Cable	£3.50 (d)
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Monochrome BNC/PHONO Cable	£3.50 (d)
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## REAL-TIME CLOCK CALENDER

A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery-backup is supplied as standard. A full manual as well as extensive software including a simple demonstration diary/planner application program on disc. £29 (c)



## ROM/RAM EXPANSION SYSTEMS

**ARIES B-32 BOARD:** Features 32K of RAM and a 16K ROM socket. RAM can be configured as 20K or 16K as shadow RAM and 12K or 16K or 32K sideways RAM. New commands include comprehensive sideways ROM/RAM management system, simplified direct access to screen RAM and the ability to move/swap the contents of any area of memory. ROM/RAM management system allows RAM allocation, list ROMs, load sideways RAM, disable ROMs, and extend any buffer including printer buffer.

ARIES B32 RAM BOARD £79 (d)

ARIES B12 ROM BOARD £40 (d)

ARIES B12C Adaptor Board for B12 £7.50 (d)

**ATPL SIDEWISE ROM EXPANSION BOARD** A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sideways rom expansion to 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board £37 (c) Battery Backup Kit £18 (d).

ATPL Board for BBC PLUS 10 x 16K ROMs £29 (d)

COMPUTER VILLAGE CV-16 Rom Board £38 (d)

**RAMROM-15** The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. No soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. Battery back-up fitted as standard. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. £79 (b)

(Above boards are for use with standard BBC computer and not compatible with B plus unless specifically mentioned)



# MULTIFORM Z80

The MULTIFORM Z80 2nd Processor for the BBC Micro — opens the horizons of CP/M software to the BBC micro user

- \* Will enable running of almost any CP/M applications software
- \* Will enable transfer of data between different disc formats
- \* Emulates the two terminals most frequently used by CP/M software

MULTIFORM Z80 interfaces directly to a normal BBC micro requiring no hardware changes. It is supplied with OS/M operating system in rom which can run all software that obeys CP/M 2.2 constraints and its configuration is not hardware specific.

MULTIFORM Z80 is truly flexible and can be used with any BBC micro drive system, single or dual drive, 40 or 80 track format and single or double sided. Unlike other currently available Z80 processors for the BBC micro, there are absolutely no restrictions on the type of drive that can be used with the MULTIFORM Z80.

MULTIFORM Z80 plugs into the 1MHz bus connector of the BBC micro. It is mains powered and does not put any extra load on the BBC's psu. The data cable can be several feet in length, allowing convenient siting of the MULTIFORM Z80, unlike present second processors, which have 8" cables.

The formats supplied include: Acorn Z80, RML 380Z and 480Z, Torch (read only), Osborne, Televideo ... we also offer to configure other formats at an extra charge."

Rom based OS/M operating system is fully compatible with Acorn's single and double density disc interfaces. Installing the OS in rom allows more space on discs for programs and data and response to system commands is very fast. (Note: Single density DFS will only read/write to single density CP/M formats).

MULTIFORM Z80 can format, read or write from a very wide range of CP/M disc formats. On a dual drive system, the drives can be set up independently to run two different formats at the same time. This will enable:

- \* The user to buy software from a very wide range of suppliers without having to worry about the type of format supplied.

- \* Interchange of valuable data and files among users of various CP/M computers.

- \* Using a system at home for preparing data required in the office.

- \* Software writers/developers to write software in any one format and transfer it to any other format without having to pay for expensive porting charges.

MULTIFORM Z80 is supplied with a library of a number of popular CP/M formats and a utility disc containing a program for creating files for the additional formats. Each library can load 32 formats and there are no restrictions on the number of libraries that can be created.

The utility disc also contains a program to interconvert ASCII texts wordprocessed on a normal BBC and under OS/M or CP/M.

MULTIFORM Z80's terminal emulation includes the ADM-3A, the HAZELTINE 1500 and the BBC VDU making the installation of most of the well known CP/M software easy.

MULTIFORM Z80 converts your BBC computer into an almost universal CP/M machine and adds the power of being able to run two different formats simultaneously, which currently is possible on only the very sophisticated specialist machines.

For any one working or intending to work in a CP/M environment, MULTIFORM Z80 is an indispensable tool.

In offices where there are a multitude of CP/M machines and a few BBCs, MULTIFORM Z80 will prove to be invaluable for transferring data between the various CP/M machines.

MULTIFORM Z80 (including utility disc, library disc and manual) **£299 + £4 p&p**

(When ordering please specify the type of DFS, MULTIFORM Z80 will be used with)

## CP/M SOFTWARE FOR TORCH & ACORN Z80 PROCESSORS

We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors. Phone for details on prices for popular packages for IBM

Please phone for our new professional software catalogue

**WORDSTAR PROFESSIONAL** The advanced word processing package comprising of WordStar, MailMerge, StarIndex and SpellStar, a total combination offering substantial savings on individual prices. WordStar is the best selling word processing program on the market. Extensive operator aids include a comprehensive friendly manual, step-by-step training guide, command cards, on-screen menus. Spellstar checks text files against a 20,000 word-plus dictionary. You can both add to the dictionary and create specific supplementary ones. Mailmerge is ideal for mailing applications. It enables the fast production of personalised 'form' letters, mailing labels, invoices, etc. StarIndex creates alphabetical indexes, tables of contents, paragraph numbering etc.

**WORDSTAR PROFESSIONAL £310 (a)**

**WORDSTAR £275 (a) WORDSTAR Upgrade to W/S Prof £195 (a)**

**DBASE-II** Undoubtedly 'The Database', can be used for an almost limitless number of business applications, ranging from mailing list preparation through to running accounting ledgers and payrolls. An on-disc tutorial takes you from setting up a simple file all the way through to setting up custom screens and reports. Automatic calculations may be performed on data. Fields or entire databases may be modified or replaced with single, English-like basic commands; Dbase-II can therefore be used by general personnel having no programming knowledge. It can be tailored to suit a variety of professions and individual needs, with files such as accounting, payroll, time billing, job costing, scheduling and mailing lists. It can access several files at a time. It is fast, flexible and powerful.

**SAGE ACCOUNTS:** This package has been designed for the smaller business, for the user who is unfamiliar with computers but wanting or needing to computerise the bookkeeping and accounting

functions. Sage is easy-to-learn and easy-to-use and is complete with a full tutorial booklet and a free manufacturers 90-day 'Hot-Line' support. It is a truly integrated package (all on one disc!) and covers Sales, Purchase & Nominal Ledgers, with a capability of handling up to 9999 accounts per ledger. It will handle all your Sales and Purchase invoices and can easily generate account & management reports. **£375 Sage plus (£695)** for the larger business, and **Sage Payroll (£195)**

Other packages available include PRO-PASCAL, CIS-COBOL, Supercalc II, MACRO-80 etc. Please telephone with your requirements.

**A.T.I. Trainers** — these superb interactive training discs simulate the package being studied. A unique screen technique provides a friendly interaction — in the upper area, a faithful reproduction of the screen is displayed, while at the bottom, a series of prompts and explanations lead the student through the exercise. AT1 trainers available include Wordstar, dBase-II, dBase-III, Multimate, Multiplan, Word at **£75 (b)**. Please phone for other trainers.

**TORCH GRADUATE IBM SOFTWARE:** We are able to supply most popular software packages including: WORDSTAR, WORD, EASY-WRITER, DBase-II & III, LOTUS-123, VISICALC, SAGE etc. Please telephone with your requirements.

## PROFESSIONAL SOFTWARE PUBLICATIONS

Wordstar made easy Introduction to Wordstar	<b>£16.95 (c)</b>	Multimate Complete Guide	<b>£15.95 (c)</b>
Wordstar Handbook	<b>£14.95 (c)</b>	ABC of LOTUS 123	<b>£13.95 (c)</b>
Wordstar Handbook dBase-II for the first time user	<b>£11.95 (c)</b>	The RS232 Solution	<b>£15.95 (c)</b>
Understanding dBase-II	<b>£18.95 (c)</b>	CP/M Bible	<b>£15.95 (c)</b>
Understanding dBase-III	<b>£17.95 (c)</b>	Soul of CP/M	<b>£14.95 (c)</b>
Understanding dBase-III	<b>£20.95 (c)</b>	CP/M Handbook	<b>£13.95 (c)</b>
Multiplan Made Easy	<b>£18.95 (c)</b>	Mastering the CP/M	<b>£16.95 (c)</b>

(no VAT on books)

# TECHNOMATIC

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Prices are subject to change without notice

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(a) £8 (Datapost)  
(b) £2.50  
(c) £1.50  
(d) £1.00.



## COMMUNICATIONS

**MIRACLE WS3000 Range:** \* A new, professional series of intelligent modems with full auto dial and auto answer facilities as standard. \* HAYES protocols are implemented allowing the use of a wide range of well proven communications software. 'Plain English' command structure simplifies the use of the modem even for the first time user. \* All models feature a centronics compatible printer port allowing direct output to a printer. \* A line sharing facility that allows WS3000 to differentiate between calls intended for data, and those for speech. \* An intelligent speed buffered RS232 port and a wide range of available data rates makes this one of the most powerful multi speed range of modems available. \* Line noise filtering ensures error free transmission and reception of data on long or noisy lines. \* Internal battery backup allows storage of 63 names and telephone nos. \* This range of modems can be factory fitted with high security data access protection system. \* Models V2123 and V22 can be factory upgraded to V22bis standard giving a single compact modem capable of data rates from 75bps to 2400bps.

**WS3000 V21/23:** This modem complies with the CCITT V21, V23 and Bell 103 standards and operates at CCITT standards for 300 bps, 75/1200 bps, 1200/75bps full duplex, 600bps and 1200bps half duplex, and the Bell standard for 300bps full duplex. **£295 (b)**

**WS3000 V22:** This modem operates on all V2123 standards plus V22 standard for 1200bps full duplex V22bis standard. **£495 (b)**

**WS3000 V22bis:** This modem operates on all V21/23 and V22 standards plus 2400bps full duplex. **£650 (b)**

**BBC Data Cable for WS3000 £6 (d)** Data cables for other micros available.

**MINOR MIRACLES WS2000** This highly successful world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. **WS2000 £125 (c)** Data Cable **£7.**

**WS2000 Auto-Dial card:** includes an integral loudspeaker for monitoring of the phone line **£30 (d)**.  
**BBC User Port cable (for modem control) £4 (d)**

**WS2000 Auto-Answer Card £30(d).**  
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

**SKI KIT** (Allowing total control of the modem by your computer) **£10 (d)**

**DS1 Disc (for Commstar):** When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling **£10 (d)**

**GEC DATACHAT 1223 Modem:** An economically priced BABT approved modem complying with CCITT V23 standard capable of operating at 1200/75bps and 75/1200bps and 1200/1200bps pseudo full duplex. It is line powered does not require external power source. It is supplied with software suitable for connecting to PRESTEL, Micronet 800, Telecom Gold and a host of bulletin boards. **£86 (b)**

**DATA-BEEB** An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. **£24 (d)**

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



## COMMUNICATIONS SOFTWARE

**CONNECT-3000 AN ESSENTIAL UTILITY FOR THE WS3000 OWNER** — a dedicated control package specially written to optimise the potential of the WS3000 series of modems. It provides a friendly menu-driven 'front end', for the superb but rather complex multitude of facilities of the 3000 — no need to remember register nos. or complex command codings etc. It provides easy control for Prestel, Terminal, Auto-Answer/Dial use, while its unique 'default' facility provides automatic, pre-defined screen presentation. Works in conjunction with ALL communication software, including Commstar, Data-Beeb, Termulator, Termi, Communicator etc. **£16.50 (d)**  
**40/80 Disc**

**TERMULATOR** An advanced terminal emulator on a 16K Rom. Emulation includes VT52/100, Tektronix 4010 etc. Allows a BBC to be used as a terminal for almost any mainframe computer or computer network. **£25 (d)**

**COMMUNICATOR** This is a full 80 col VT100 terminal emulation program on 16K eeprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£49 (d)**

**RS232 Solution (Book)** **£15.95 (c)**

**COMMSTAR** An ideal communications rom for both Prestel and bulletin boards. Facilities include Xmodem, clock etc. **£28 (d)**

**RS232 SolutionBook** **£15.95 (c)**

## AMX MOUSE with SUPERART

The mouse will now be available with enhanced software, the 'SUPER ART' which is compatible with 6502 2nd processor, the ARIES RAM board, BBC+ shadow mode, tape and ACORN DFS and ADFS. Allows full use of colour in mode 1. Disc users can create colour pictures in A4 size with dot resolution by scrolling the screen window. Other facilities include, colour pattern editing, use of icons, additional text styles, superb zoom in colour. There is a variety of optional software to make the mouse one of the most versatile peripherals that can be added to the BBC micro.



**AMX Mouse with Super Art** **£67 (d)**

**AMX Super Art Package on its own** **£43 (d)**

**AMX PAGEMAKER** provides a high resolution A4 Typesetting and Artwork system. **£47 (d)**

**AMX 3D ZICON** will let you transform three dimensional vector data and translate them into 3D on screen graphics. **£21 (d)**

**AMX DATABASE** is a new filing system with 1000 records per file and unlimited number of fields per record. **£21 (d)**

## RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package. **£59 (c)**

**RB-21 (with 'icon artmaster').**



## FIRMWARE AND SOFTWARE

### DATABASE MANAGEMENT SYSTEMS

**VIEWSTORE** An exciting, powerful database with many features: display can be 'spreadsheet' or 'card-layout' type. Powerful selection and sorting utilities. Any screen mode can be used. Data can be sent to View and ViewSheet. Maximum file size 4096MByte! Maximum record size 60K. £44 (d)

**STARdataBASE** A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. £59 (d)

**MASTERFILE II** The new version of the popular general purpose file management system allowing large amounts of information to be stored and processed. It allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. This latest version features many new facilities including use with WORDWISE/VIEW £17.00 (d) Disc (80 or 40T). £49 (d)

**EMINI'S DATAGEM** £59 (c)

### WORD-PROCESSORS

**VIEW** Acorn's version V2.1 word processor rom. £44 (c)

**VIEW VERSION V3.0** Also compatible with BBC + Complete with Printer Driver Generator. £69 (c)

**VIEW** Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. £36 (c)

**VIEW INDEX** Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. £10 (d)

**VIEW PRINTER DRIVER GENERATOR:** This driver generator will enable you to produce a driver to suit your printer and also let you view the text as it will appear on the paper including condensed, italics, sub and super script modes. £10 (d)

**VIEWSPELL:** A rom based spelling checking utility with a dictionary of 70,000 words on disc. Additional/specialised dictionaries can be created. Facility to search the dictionary for words beginning with or ending with certain characters. £52 (d)

**WORDWISE** £28 (d)

**WORDWISE PLUS** The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. £47 (d)

**WORDWISE** £24.50 (d)

**VIEWSPELL III** A 16K rom based program for View and Wordwise plus. Contains 2000 words on the rom and 6000 expandable to 17000) on disc. £31 (d)

### SPREADSHEETS

**VIEW SHEET** Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. £44 (d)

**VIEWPLOT:** A disc based Linear graph/barchart/piechart plotting program. £25 (d)

**INTER SHEET** The new spreadsheet from Computer Concepts. Many advanced facilities including 105 character display, several spreadsheets may be used at once, may be used with View & Wordwise etc. etc. £49 (c)

**INTERCHART** Graphics Package for the Intersheet. £49 (d)

**ULTRACALC** £49 (d) **QUICKCALC** £14.50 (d)

### LANGUAGES

**META-ASSEMBLER:** Both an editor and Macro-Assembler. Meta can assemble most 65xx, 68xx, 6804, 6805/6305, 6809, 8048, 8080/8085, Z80, 1802 and more. (Free updates due very soon — 8000 series, 8088/8086, Z8000 etc.) Many advanced features including Macros, conditional assembly, Global/selective search etc. Includes 16K Eprom, disc, function key card, and comprehensive manual. Please phone for comprehensive leaflet. **Meta-Assembler** £126 (c)

**ACORN P-SYSTEM** A portable operating system supplied complete with USCD PASCAL and FORTRAN 77. £259 (b)

**6502 DEVELOPMENT PACKAGE** A Macro-Assembler with utilities for use with the 6502 2nd Processor. Enables the serious programmer to develop large programs in assembly language. £39 (d)

**ACORN MICRO-PROLOG:** The logic programming language seen as the language for programming in the future and used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more user friendly for new users. 16K Rom, manual and extension modules. £62 (c)

**ISO-PASCAL** Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. £48 (a)

**ISO PASCAL Stand ALONE GENERATOR:** Utility to convert programs produced using ISO PASCAL for stand alone applications. £28 (d)

**ACORN LOGO** A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. £49-(b)

**LOGOTRON** logo £56 (c)

**BCPL** A full implementation of the BCPL compiler language consisting of the language of ROM, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. £46 (b)

**BCPL CALCULATIONS PACKAGE** Supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calculation files, example files and a comprehensive user guide. £17.30 (d)

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

**Acorn LISP Rom, Acorn FORTH Rom, Acorn COMAL,** (each) £39 (d)

**MICROTEXT** A frame based authoring system from National Physical Laboratory for interactive computer tutoring. Disc based. £49 (c)

**G:FORTH** An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. £39 (d)

**OXFORD PASCAL** A fast, compact P-Code compiler, that fully utilises BBC Graphics and sound, contains a powerful editor, and produces 'standalone' software. (Specify 40/80T) £35 (c)

### UTILITIES

**ACCELERATOR**.....£49 (d) **ACORN BASIC EDITOR**.....£24 (d)

**BROM**.....£28 (d) **SLEUTH**.....£24 (d)

**TOOLKIT plus**.....£31 (d) **EXMON-II**.....£22 (d)

**HELP II**.....£27 (d) **DISC DOCTOR**.....£26 (d)

**DISCMASTER**.....£18 (d)

**ACORN GRAPHICS ROM GXR**.....£23 (d) (specify BBC B or BBC B PLUS)

**COMPUTER CONCEPTS GRAPHICS ROM**.....£22 (d)

**PRINTMASTER**.....£26 (d)

**DUMPMASER II** 16K rom with dump routines and a variety of features for about 40 different printers. £26 (d)

**FONTWISE**.....£10 (d)

**HERSHEY CHARACTER FONT GENERATOR**.....£18 (d)

**ICON MASTER**.....£29 (d) **STAND ALONE MOUSE**.....£34 (d)

**BILLBOARD**.....£18 (d) **STUDIO EIGHT**.....£19 (d)

**ACORN'S CREATIVE SOUND**.....£15 (c) **CC SPEECH ROM**.....£28 (c)

**ACORN'S SPEECH PROCESSOR ROM**.....£15 (d) **ROMIT**.....£29 (d)

**PROGRAM BUILDER**.....£18 (d) **REPLICA III**.....£12 (d)

**DATABEEB**.....£24 (d) **COMMUNICATOR**.....£49 (d)

**COMMSTAR**.....£26 (d) **TERMULATOR**.....£25 (d)

When ordering software on disc please specify track format (40/80)

### BOOKS

#### No VAT on books; Carriage (c)

<b>LANGUAGES:</b>	BBC Micro Sideways Roms
Acorn BCPL User Guide.....£15.00	B. Smith.....£ 9.95
Acorn FORTH.....£ 7.50	Guide to the BBC ROM.....£ 9.95
Acorn LISP.....£ 7.50	Exploiting BBC BASIC.....£ 6.95
S-PASCAL.....£ 7.50	Further Programming for BBC.....£ 4.00
Acorn ISO Pascal Ref Manual.....£12.50	.....£ 4.00
Intro to COMAL.....£10.00	Programming the BBC.....£ 6.50
Intro to LOGO.....£ 7.50	Structured Programming.....£ 6.50
Micro Prolog Ref Manual.....£12.50	Using BBC BASIC.....£10.00
Creative Sound.....£ 7.50	View 3.0 User Guide.....£12.50
Introduction to Pascal.....£16.50	Viewstore.....£12.50
Prog the Micro with Pascal.....£ 8.50	Viewsheet.....£12.50
The UNIX Book.....£12.00	Word Processing on BBC (Wordwise + Epson).....£ 5.25
<b>BBC MICRO BOOKS</b>	<b>SOUND &amp; GRAPHICS:</b>
<b>BOOKS FOR BEGINNERS:</b>	Advanced Graphics with BBC£ 6.00
BBC User Guide Acorn.....£15.00	BBC Graphics & Sound.....£ 7.50
BBC PLUS User Guide.....£15.00	Creative Sound on the BBC...£ 9.95
Drawing Your Own BBC Programs.....£ 6.95	Graphics on the BBC Micro...£ 6.00
.....£ 6.95	
Introducing the BBC Micro...£ 4.50	<b>DISC DRIVE SYSTEMS:</b>
Mathematical Programs in BBC Basic.....£ 4.50	Advanced Disc User Guide.....£14.95
<b>PROGRAMMING/UTILITY BOOKS:</b>	BBC Micro Disc Companion...£ 7.95
Advanced User Guide.....£12.50	Disc Book.....£ 3.50
Adv BASIC Rom User Guide...£ 7.50	Disc Programming Techniques£ 7.95
Advanced Prog Tech for BBC£ 8.95	Disc Systems.....£ 6.95
Applied Ass./Lang on the BBC.....£ 9.95	<b>APPLICATIONS:</b>
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BBC Micro Advanced Programming.....£ 9.95	Business Programming on BBC.....£ 7.95
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BBC Micro Sideways ROM's RAM's.....£ 9.95	DIY Robotics & Sensors.....£ 6.95

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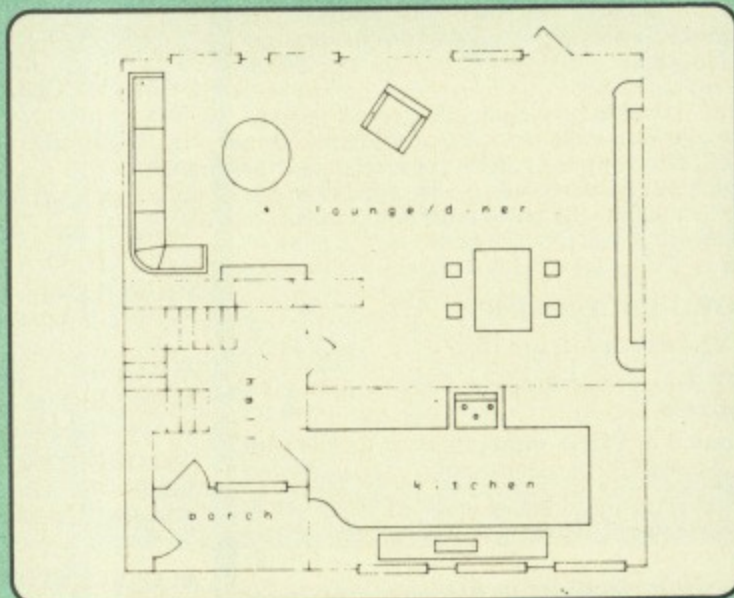
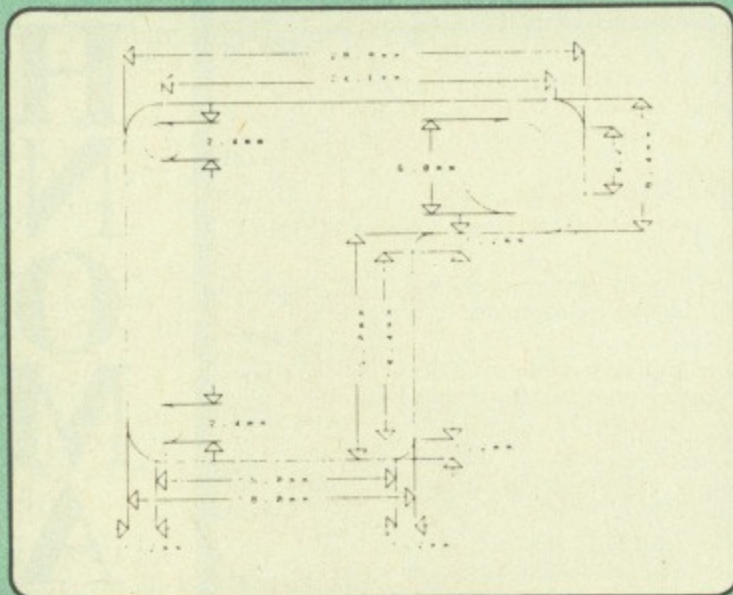
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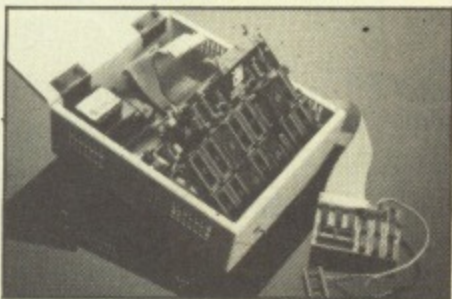
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### NEW FEATURES

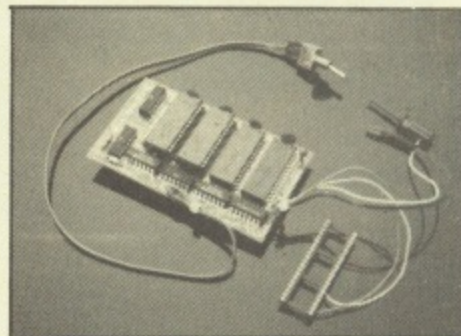
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- Read protect link.

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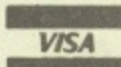
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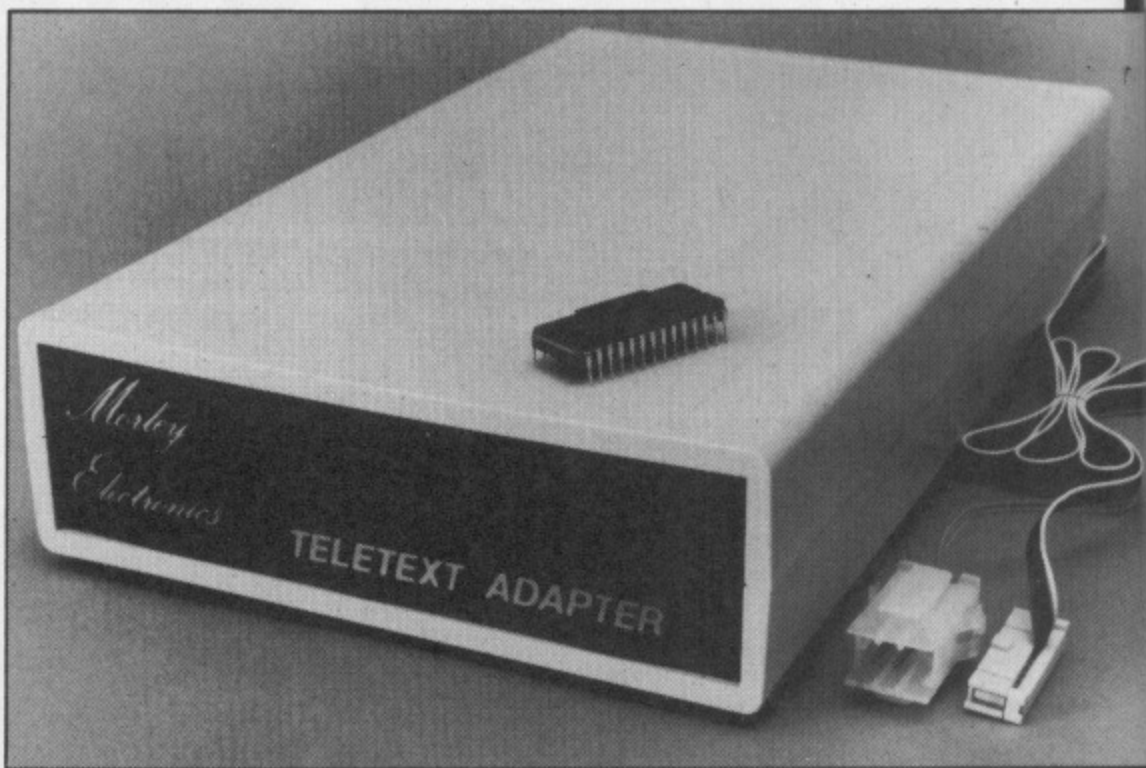
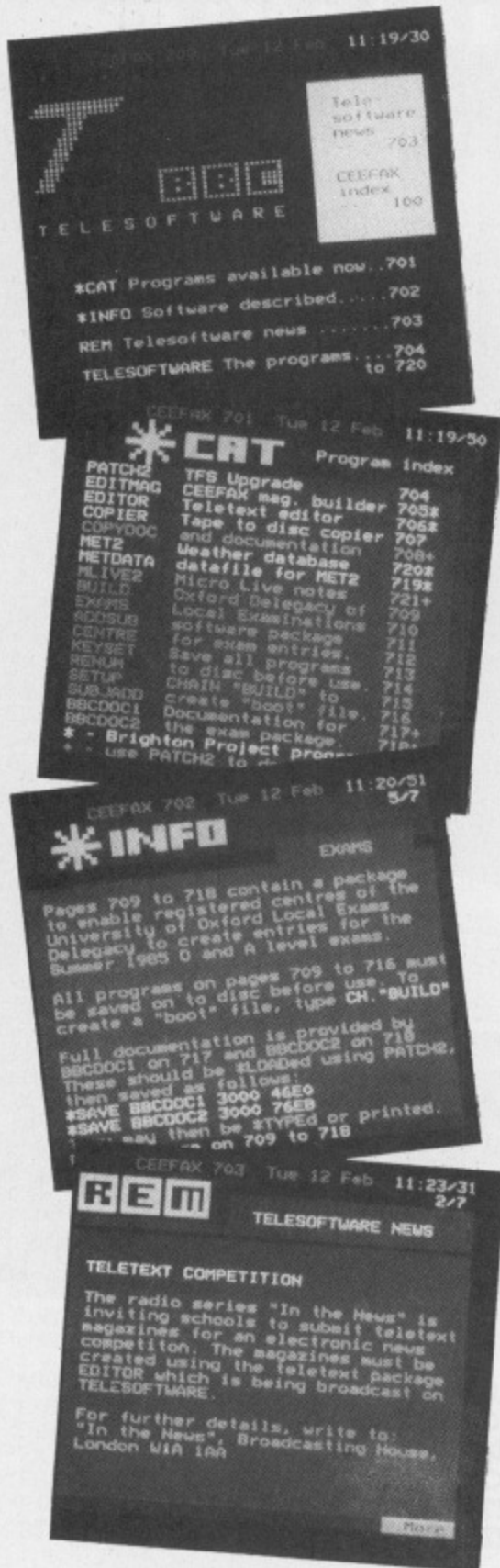








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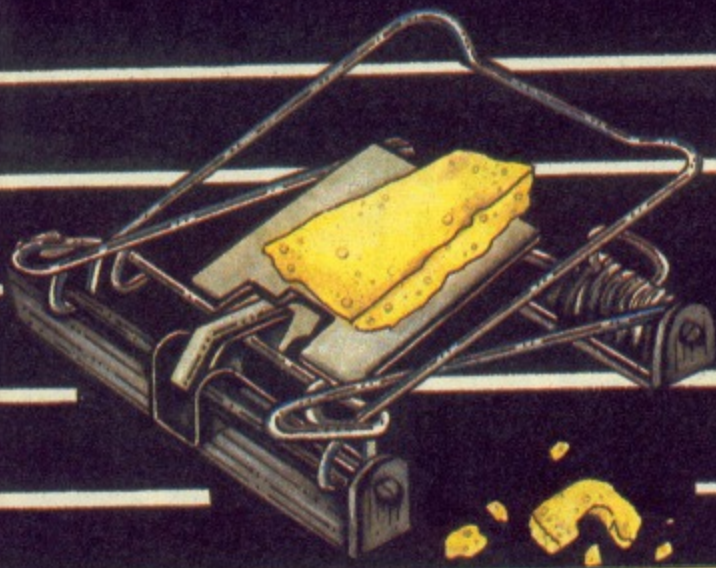
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# MOUSETRAP

By  
**GEOFF TURNER**



IN this game of skill the mouse – it's actually a dot – is bouncing its way around the screen trying to eat up pieces of cheese.

The object is to force the hungry rodent into the trap at the top left hand corner of the screen by drawing lines with the Z, X, : and / keys.

Unfortunately there is only a limited length of line, indicated by the reducing number at the bottom of the screen.

If the mouse becomes trapped on the wrong side of the line you have failed and it will be necessary to clear away all the lines drawn by pressing the spacebar.

In trying to trap the mouse, you must also prevent it eating the cheese because when it does so all the lines already drawn on the screen will clear.

One strategy worth adopting is to surround each piece of cheese in turn

while heading the mouse away from any other pieces. Also you could try creating thin corridors in which to herd the mouse. But beware of making the corridor too narrow or the mouse will get stuck.

The game ends when the mouse is trapped for at least three seconds, or you have used up all your line. Happy mousehunting – and good luck. You're going to need some.

## PROCEDURES

instructions	Displays instructions.
cheese	Places cheese in random positions.
line	Detects direction and draws line.
test	Checks for collisions.
clear	Clears away drawn lines.
time	Checks if mouse is trapped for three seconds.
win	Ends the game if you win.
lose	Ends the game if you lose.

## VARIABLES

V%	Mouse's vertical movement.
H%	Mouse's horizontal movement.
L%	Amount of line left.
E%	Game over flag.
XL%	Line's horizontal position.
YL%	Line's vertical position.
X%	Mouse's horizontal position.
Y%	Mouse's vertical position.
XX%	Mouse's new horizontal position.
YY%	Mouse's new vertical position.
CX%	Cheese's horizontal position.
CY%	Cheese's vertical position.



Full listing starts  
on Page 111



# How to change your Epson's image – a bit at a time

Part two of ROBIN NIXON's series on designing your own customised characters

LAST time we examined ways of exploding user-defined character definitions. This month we will look at how to print these characters on an Epson compatible printer.

You should by now have created your own character set. But don't worry if you haven't because the technique works equally well with the BBC Micro's own character set.

The technique by which you can get an Epson to print out any character definition is called bit imaging. Once bit image mode has been initialised, in place of sending the Ascii value of a character to the printer the character's definition is sent – a byte at a time.

This definition works in a similar manner to VDU 23 except that the character needs to be rotated through 90 degrees. This is because the pins on a dot matrix printer are arranged vertically rather than horizontally as you will see from Figure I.

You may also notice that the Epson has nine dot wires. The ninth is used for underlining and lower case descenders. As descenders and underlining are kept within the 8x8 character cell on the BBC Micro the ninth wire is not used in bit image mode.

Let's have a look at how we would print the character A.

To define the character A as a user-defined character, assuming it doesn't already exist, we would type the command:

```
VDU 23,65,56,100,100,198,254,
198,198,0
```

The result can be seen in Figure II. So far, so good. But as the character has to be rotated to the left by 90 degrees for the bit image definition (see Figure III)

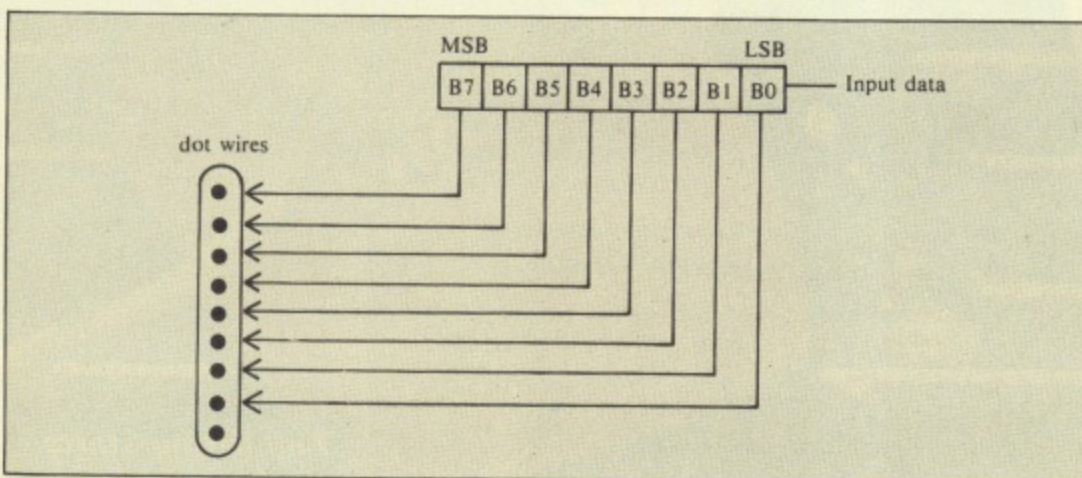


Figure I: Relationship between data and dot wires

we have to send the following sequence to the printer.

```
30,126,232,136,232,126,30,0
```

Before we send the rotated A, however, we must first tell the printer to go into bit image mode by sending the escape sequence:

```
1,27,1,75
```

The 1 before the 27 and 75 tells the computer to send the next byte to the printer only. The 27 tells the printer that an escape sequence is to follow and the 75 is ASC"K" which instructs the printer to go into bit image mode.

Next we must say how many bytes of

bit image information are to follow so that the Epson knows when to go back to normal printing, and doesn't confuse character data with bit image data.

In the case of the letter A this is eight bytes because we are only sending the one character, which has a definition

```
10 REM ** Program to print 'A'
20 REM ** on an Epson printer.
30 VDU 2:REM Printer on
40 VDU 1,27:REM ** Escape to print
er
50 VDU 1,ASC("K"):REM ** Bit image
mode
60 VDU 1,0,1,0:REM ** Number of by
tes to send
70 REM ** 0=low byte, 0=high byte
80 REM ** So 8 bytes altogether
90 VDU 1,30,1,126,1,232,1,136,1,23
2,1,126,1,30,1,0
100 REM ** Definition data
110 VDU 3:REM ** Printer off
120 END
```

Program I

made up of eight bytes. Because there may be more than 256 bytes of data, the format we send this number in is the low byte followed by the high byte.

So, if you take a look at Program I you will see that lines 40 to 60 initialise the printer to bit image mode and



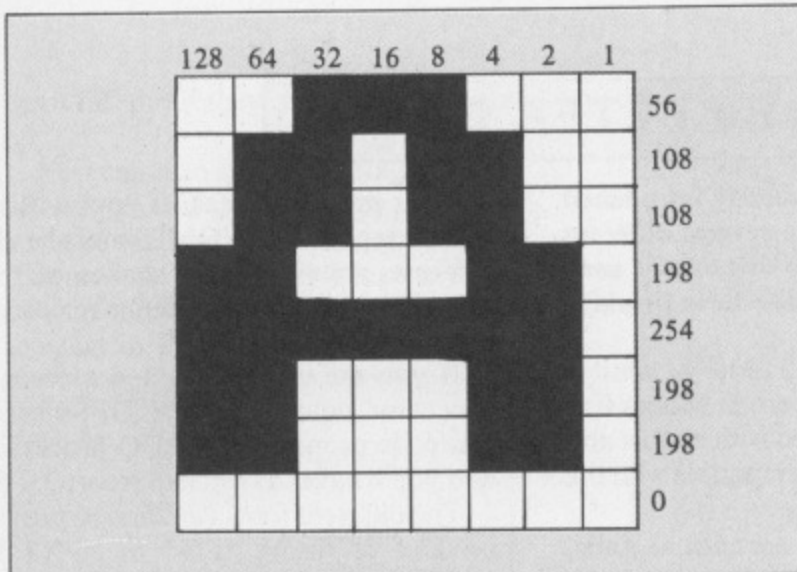


Figure II: The character definition of A held in the BBC Micro

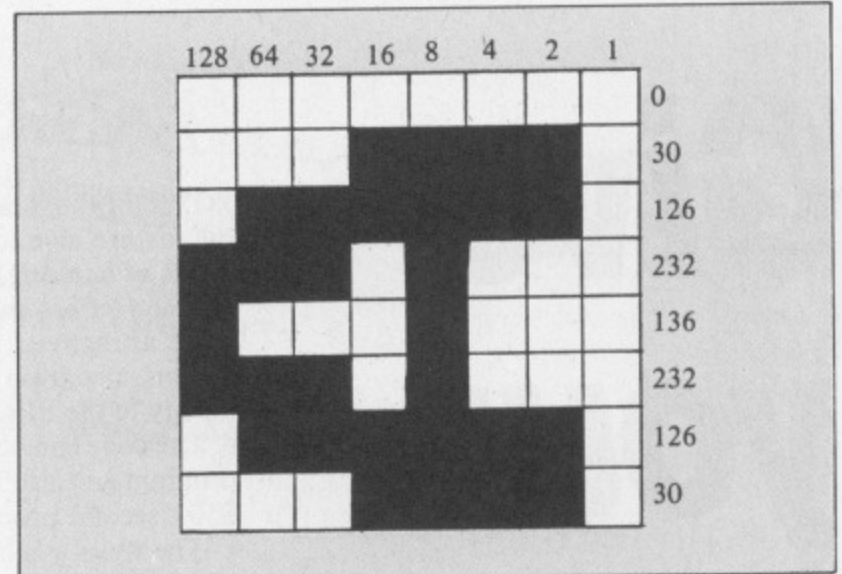


Figure III: The definition as it must be sent to an Epson printer (reading from bottom to top)

prepare it for eight bytes of data. Then line 90 sends the data for the character A which is then printed out.

Program II, Anyprint, assembles the program Driver which, when \*RUN or called, intercepts the print vector OSWRCH and waits for a VDU 2 - printer on - ignoring anything else. When a VDU 2 is received all following bytes are assumed to be printable characters.

The definitions of these characters are then looked up using OSWORD &A, rotated and sent to the printer. This means that no matter what characters you've defined, they will be printed out.

When run, Anyprint asks you for an address to assemble to. If you have a disc-based system &1100 is a good place to store the code. If your micro is cassette-based, raise PAGE to &1000 before you type or load in Anyprint. Then answer E00 to the start address.

Remember, if you press Break the utility will be destroyed and you'll have to reload it. Thereafter if your micro is tape based, when Driver is in memory ensure you set PAGE to &1000 before loading any programs or it will be overwritten.

I hope you find Anyprint useful and would be interested to see any novel uses you make of it. For example with a little ingenuity you could adapt it to give a Mode 7 screen dump.

● Next month we'll be looking at how to define a squashed character set and manipulate the video ULA to get 40 characters a line in Mode 2.

## Program II

```

100 REM *****
110 REM *
120 REM * ANYPRINT *
130 REM *
140 REM * By Robin Nixon *
150 REM *
160 REM * (c) The Micro User *
170 REM *
180 REM *****
190 REM
200 MODE 7
210 chartable=&80
220 INPUT "Enter address to assemble to (in hex) ""&A$:A$=""&0"+A$:START
=EVAL A$
230 FOR PASS=0 TO 3 STEP 3
240 PZ=START
250 [
260 OPT PASS
270 \
280 .init
290 \
300 LDA &20E
310 STA &70
320 LDA &20F
330 STA &71
340 LDA @start MOD &100
350 STA &20E
360 LDA @start DIV &100
370 STA &20F
380 LDA @0
390 STA &72
400 STA &74
410 STA &7C
420 STA &7F
430 RTS
440 \
450 .start
460 \
470 PHA
480 LDA #1
490 CMP &74
500 BNE noskipflag
510 PLA
520 JMP (&70)
530 \
540 .noskipflag
550 \
560 PLA
570 STA &73
580 CMP #2
590 BNE notprinteron
600 PHA
610 LDA #1
620 STA &72
630 PLA
640 JMP (&70)
650 \
660 .notprinteron
670 \
680 CMP #3
690 BNE notprinteroff

```

Turn to Page 113



# Give your type 192 new fonts

You can set it  
sideways, too!

By **PETER GAUNT**

SOME of the more recently introduced micros are able to use several different styles of lettering, and this can be used to good effect to make their displays more attractive.

This program will add a similar facility to the BBC Micro in Modes 0 to 6. The code can be used with almost any program and is fully compatible with the 6502 second processor.

The styles available are normal, italic, feint, underlined, sideways, reversed, double width and any combination you like. You could if you wished produce double width, feint, underlined, sideways and reversed print.

Sideways print is useful for doing things such as labelling the axes of graphs. Reversed print does not print letters backwards but reverses the background and foreground colours.

The fonts are selected using an OSBYTE (\*FX) command and can be toggled on and off.

The only effect that the presence of the code has on normal printing and graphics is to slow it down by around one per cent (only about half a per cent with the 6502 second processor). You must also make sure that you don't use character 255 as this is used by the code. The new fonts themselves print at around one tenth the normal speed, but even so are not exactly slowcoaches.

Before you can use the code though you'll have to type in and save Program I. If you run the program in 6502 second processor you must set PAGE to &B00 or above before you do so otherwise the code will overwrite the program as it assembles.

When it has run the object code will be saved to disc or tape as a file called *FONTS*. The top two bytes of the load address will be set to &FFFF so that it will load into the I/O processor when used with a second processor.

The code occupies &900 to &AEE which is quite safe so long as you don't intend using the cassette filing system, the RS423 interface, the speech processor or envelopes 5 to 15. If you do intend using any of these you will have to locate it elsewhere. This is explained later.

When you want to use *FONTS* just enter \*RUN *FONTS* (\**FONTS* will do from disc). Don't \*RUN it again

without pressing Break. If you're using it from tape \*RUN *FONTS* must be the last use your program makes of the cassette system unless you've relocated it.

If you are using discs and a second processor note that some DFSs can't run code properly in the I/O processor and you'll have to switch to Acorn DFS.

The different fonts can then be turned on and off using \*FX1 or \*FX241, which is the same as \*FX1 when used without a Y parameter.

When you first run *FONTS* all printing will be normal. \*FX1 writes to a location in RAM at &281 whose bits are used to turn on and off the various fonts. If bit 0 of this location is set to zero the computer will print normally regardless of the setting of the other bits. The bits are arranged as follows:

Bit 0	(1)	normal print if zero.
Bit 1	(2)	italic.
Bit 2	(4)	feint.
Bit 3	(8)	underline.
Bit 4	(16)	reversed.
Bit 5	(32)	sideways (letters rotated clockwise)
Bit 6	(64)	sideways (letters rotated anticlockwise).
Bit 7	(128)	double width.

The numbers in brackets are the bit value. Thus to switch all output to italics you should use \*FX1,3 to turn on bits 0 and 1, for italic underlined use \*FX1,11 to turn on bits 0, 1 and 3.

Remember that bit 0 must be on before any of the other flags have any effect. If you turn on both bits 5 and 6 then bit 5 will be ignored since sideways anticlockwise has priority. \*FX1,0 will turn off all the flags and return you to normal printing

\*FX241 can be used to turn individual bits on and off without affecting any of the others by setting the Y parameter to 255.

For instance, if bit 0 is on and you use \*FX241,1,255 it will be turned off returning you to normal print. If you then use \*FX241,1,255 again bit 0 will be turned back on and print will return to whatever it was before you turned it off. In other words \*FX241,X,255 toggles the bits. If they're on it turns







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Command examples are:

- ★ Disc free space per drive.
- ★ Dump text window to printer.
- ★ Erase; Memory in specified area, ROM control switch and tube memory.
- ★ Display low memory areas.
- ★ Load menu.
- ★ Switch NFS off.
- ★ Manipulate read/write on ROM 15.
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As can be seen from just a few of the many commands this ROM is a useful addition to the SIDEWISE ROM board.

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# NOTEPAD

Throw away your pencil and those tatty bits of scrap paper. **ROBIN NIXON** helps you to unclutter your desk with this electronic answer to odd jottings

I DON'T know about you but when I'm programming I usually find I get through reams of scrap paper as I jot down various locations, screen coordinates, variable names and so on.

And of course, life being the way it is, that valuable scrap of paper which contained my latest mega-fast sprite routine will have disappeared five minutes after I put it down. To help solve this problem - and unclutter my desk - I wrote *Notepad*.

The idea of this program is that, at the expense of 4k of RAM, a notepad is tucked in just under the start of screen RAM.

This pad holds three screens full of information which can be scrolled through using the cursor keys.

It works by intercepting OSWRCH - the Operating System Write Character vector - and checking whether a VDU 9 or TAB is being sent to the screen. If so, the notepad is brought into use and the VDU 9 is ignored.

All registers are saved on the stack during use so that you can even be in the process of typing in a program line when you decide to call up the notepad.

To exit you press TAB once more and are returned to exactly where you were before and can continue typing a line in - or whatever you were in the process of doing.

Disc users should type in the program as it stands and save it. When run it will save the assembled machine code program *SCRATCH*. This can be called up at any time in the future by typing:

```
*RUN SCRATCH
```

Before typing in the program, cassette users should type:

```
PAGE=&1100  
NEW
```

and change the value of P% in line 250 to &E00. As with disc users the assembled code will be saved as *SCRATCH*. But, tape users should ALWAYS set page to &1100 before loading or writing any programs while *SCRATCH* is in memory.

Before you use *Notepad* there are two points to note (if you'll forgive the pun).

Firstly, so that the BBC Micro can scroll quickly when printing text the screen is hardware scrolled. This means that the start position of the screen is incremented by 40 characters each time a scroll is required, thus saving the need to copy large chunks of text merely to move it all up a line.

However this causes problems when you try to copy information to and from the screen so the program defines a text window of the exact size and dimensions of a Mode 7 screen. Thereafter when the screen scrolls it will be a software scroll and the start position of the screen will remain in the same place.

So, if you remove the window by changing mode or defining a new window, be sure to type:

```
MODE 7
```

to reset the screen start address before pressing TAB to go into *Notepad*.

Also, if you do change to another mode apart from Mode 7, anything you had in the notepad will be garbled. So, if you want to keep the information stored in the pad by saving it to tape or disc, type:

```
*SAVE filename 7000 7C00
```

where *filename* is the name of the file to be saved.

To reload the file at a later date, just type:

```
*LOAD filename
```

The second point is that some of the machine code for *SCRATCH* is held in the envelope buffer (&8C0-&8FF).

If you define an envelope, *SCRATCH* will therefore be destroyed and the computer will probably crash. The only way to recover from this is to press Break and re-run *SCRATCH*.

In practice these are minor limitations. I have found *Notepad* a useful utility for program development and I'm sure you'll find it invaluable.

Full listing starts on Page 114



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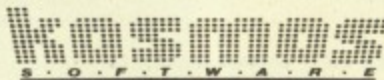
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## Who can save the universe?

*Program: Dr Who and the Mines of Terror*  
 Price: £18.95 (cassette and 16k ROM), £19.95 (disc and 16k ROM)  
 Supplier: Micro Power, Northwood House, North Street, Leeds LS7 2AA. Tel: 0532 458800

THE latest release from Micro Power, **Dr Who and the Mines of Terror** combines the best in arcade and adventure games.

Your old adversary, the Master, has taken over one of the moons of the planet Rijar.

The mining complex he is using as a base is used to extract Heatonite, a rare mineral used in the building of a Time Instant Replay Unit (TIRU).

He proposes to build his own TIRU to aid him in his plans to conquer the universe and what's more, he intends using your brain to make it more powerful.

Can you, as the Doctor, put an end to his plans?

You have two types of adversaries to avoid or outwit in your task, the Controllers, Dalek-like machines that sense your presence if you get too

near, and Madrags, large monsters that are either fully grown or waiting to be hatched.

To get past the eggs you need the help of your Splinx, a semi-intelligent robot programmed to perform simple tasks from a menu.

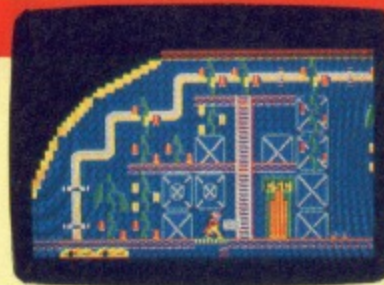
Movement around the moon is by use of platforms and ladders, and a central lift provides access to all sections of the complex.

There are two ways to get to this lift – both very dangerous and requiring split second timing. You either find out how to pass the Madrag or find your way past the Controllers.

In the latter case, you'll find that it takes a lot of practice. You score points by reaching machines with CCS written on them.

I have explored a lot of the complex but I still haven't managed to get my timing right for the third jump necessary to by-pass the Madrag, so I can't get the air bottle needed to go on to the moon's surface.

Neither can I work out the combination necessary to get into the safe that houses the pass



card allowing you to get through the locked doors.

Documentation, which includes a briefing manual, cross-sectional map and an explanation of how to get past the Madrag, is comprehensive and very well presented.

The graphics are not as good as those of Castle Quest and I found them jerky on occasion. Considering the number of things going on though, I am surprised they are as good as they are.

How they managed to pack so much into this magnificent program is a source of amazement and the inclusion of an eeprom makes the package especially good value.

**Paul Gardner**

Sound .....	4
Graphics .....	7
Playability .....	9
Value for money .....	7
Overall .....	7

## Take a chance with Leisure Genius

*Program: Monopoly*  
 Price: £12.95 (cassette), £14.95 (disc)  
 Supplier: Leisure Genius, 3 Montagu Row, London W1H 1AB. Tel: 01-935 4622

OFTEN when an established board game is transferred to the computer something seems to be lost in the translation.

The computer edition of **Waddington's Monopoly** by Leisure Genius is an exception to this rule.

A tape or disc version of the game is available and the comprehensive instruction booklet sets out the object and rules, which are all as in the original game.

A key strip is provided for the function keys and a miniature layout of the proper board is also provided.

Two to six persons can play at

one time, with an option for the computer to take the part of any or all of the players.

Each player enters his or her name then selects a token. The dice are then rolled and the player with the highest total starts the game.

One or two points are worthy of special mention.

All the rules are strictly enforced by the computer, thus ending the usual inter-player arguments that crop up in games of Monopoly.

If you land on another player's property, the owner's token appears on the screen against that property reminding him to claim the rent.

When a player does not take the opportunity to purchase the property on which he has landed a fast and furious auction is held.

There is a facility to engage in negotiations with other players.

If a player has a cash flow problem a mortgage can be arranged through the bank, a part always played by the computer.

The graphics are simple but effective with four board squares being displayed from the top to the bottom of the screen. The squares are scrolled up for each move with an accompanying bleep.

The houses and hotels are simple but striking, and the property deeds are displayed when a property is bought.

The computer edition of Monopoly is well written and even more addictive than the board game.

**Alan Cockman**

Sound .....	2
Graphics .....	8
Playability .....	10
Value for money .....	9
Overall .....	9

## Heavy

## breathing

*Program: Hypersports*  
 Price: £12.95 (disc only)  
 Supplier: Imagine, 6 Central Street, Manchester M2 5NS. Tel: 061-832 6633

**HYPERSports** is a compilation of six sporting events. The qualifying standard must be achieved in each event before you are allowed to progress to the next one.

Event number one is the 100 metres freestyle swim. The competitor is powered by rapidly pressing the Z and / keys. All would be fine if it were not for your little swimmer's insistence on breathing at regular intervals.

Every 10 metres the message Breathe flashes in front of him and in response you must press the spacebar.

A mistimed breath results in a mouthful of water and a stationary swimmer.

Having qualified in the aquatic event you next display your marksmanship in the skeet shooting. Owners of Acorn speech synthesisers must remove the chips before this event will function correctly.

I found the third event, the long horse, to be the most difficult.

A little man runs towards the springboard automatically. As he reaches it you must press the spacebar, and up he flies in a graceful arc heading for the horse.

Another quick dab at the spacebar as he reaches the horse and he heads skyward once more.

Now is the time to begin bashing the other two keys to cause him to perform multiple somersaults, thus boosting your points.

I failed to qualify for the archery, triple jump, or weight lifting events, but if they are half as entertaining as the first three, Hyper Sports is value for money.

**Carol Barrow**

Sound .....	5
Graphics .....	8
Playability .....	8
Value for money .....	8
Overall .....	8



Program: *Olympic Decathlon*  
 Price: £9.95 (disc only)  
 Supplier: Alligata, 1 Orange  
 Street, Sheffield S1 4DW.  
 Tel: 0742 755796

EVER fancied stepping into Daley Thompson's shoes and competing in the Olympic games? Now is your chance.

In *Olympic Decathlon* from Alligata Software you can try your hand at the 10 events of the decathlon.

The crowds look on, the flags wave in the wind and a merry little ditty plays while you decide which events to tackle.

In the 100 metre sprint you compete against another athlete, though you must beat the qualifying time to get to the next event. If you beat the world

## Step in for Daley Thompson

record a message of congratulations appears on the screen. Later there are both 400 metre and 1500 metre runs.

In the long jump you run up to the board and press jump at the last possible moment. Leave it too late and you get a foul — three fouls and you're out of the games.

The longer you hold the jump button down, the greater will be the angle of your jump.

Now for the shot putt, where you control when the athlete throws the shot and at what angle. To throw the javelin you run up to the line and throw at the last possible moment. The



hurdles, pole vault and high jump provide the added requirement of jumping to perfection as well as running.

The program is disc based and loads each event separately. This allows for features previously not seen on a BBC Micro because of lack of memory. The graphics are

stunning and the animation is some of the best I've seen.

Sound is sparse but adequate.

Control is by keyboard or joystick, though I found keyboard easier because you can define the keys.

The game is easy to play but difficult to master. In my opinion this is one of the best games of its type and considerably less tiring than the real thing.

Phil Tudor

Sound .....	5
Graphics .....	9
Playability .....	8
Value for money .....	8
Overall .....	8

## Solve an enigma

Program: *Star Drifter*  
 Price: £3.95 (cassette)  
 Supplier: Firebird, Wellington  
 House, Upper St. Martin's  
 Lane, London WC2H 9DL.  
 Tel: 01-379 6755

IN the latest release in the Super Silver range from Firebird Software, an ancient ship of the doomed galactic colonisation programme has mysteriously entered Earth space.

You must enter this ghostly ship, which is full of non-humanoid life, to solve the enigma of *Star Drifter*.

You start in the bridge which, like all the rooms, has circuit boards, dials and switches plastered on the walls.

The first job is to find a gun to fend off the marauding aliens that frequently hustle up to you.

You have three lives and a limited supply of oxygen which gets lower if you bump into an alien.

Scattered about the ship are objects such as floppy discs, potions and a tool box, which yield a bonus when found.

The hyper-zap gun and the oxygen replenishing oxygenator are especially useful.

You are instructed what to look for so you're not totally in the dark. The major difficulty is that certain corridors are sealed



by doors requiring keys to get through. Other blockages even need blasting away with a bomb.

The hardest part of the game is moving the keys around the 120 rooms, since you can only carry three things.

Sound is fantastic but optional, with all the usual blasts, pings and tinkles.

The graphics are detailed, with each room shown in plan view on the screen and animation is smooth with large distinct characters.

*Star Drifter* is great fun, addictive and kept me hooked for hours at a time.

Phil Tudor

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

## Manager in Mexico '86

Program: *Mexico '86*  
 Price: £9.95 (cassette), £12.95 (disc)  
 Supplier: Qualsoft, 18 Hazelmere Road, Stevenage, Herts. SG2 8RX. Tel: 0438 721936

A FEW months ago I was introduced to the delights of football management on the BBC Micro, and have often frittered away a few hours moving up and down through the divisions.

But now, in *Mexico '86*, the ultimate challenge has been offered me, that of managing the England football team and guiding them safely to Mexico.

Actually the path begins with a couple of friendlies against France and Russia, followed by the South American tour.

At the end of these first matches the squad is assembled and ready to take on the qualifying group. Obviously some matches do not directly involve England, and these games are "played" by the computer, with a few strange results occurring.

At each England match the team and reserves can be selected, thus the formation of the team may be decided by the manager.

There are opportunities to make tactical alterations and

substitutions, and the game is played out automatically on the screen by 22 little men moving up and down the pitch in a reasonably realistic manner.

There are five levels of play, and further interest may be introduced by the inclusion of more dimensions for the computer to interrogate the player's choices.

When England eventually qualify the position is saved on to a blank cassette, which is then loaded into a second program dealing with the final stages.

These follow an authentic pattern, although there is a disappointingly short message when the trophy is eventually won.

The sound effects are rudimentary, but can be controlled, while the graphics are quite acceptable for a program of this complexity.

Apart from the point at which qualification is reached, there is no other option to save the position, which is a glaring omission.

Otherwise there's plenty to keep the football fan happy until *Mexico '86*.

Pat Hillery

Sound .....	2
Graphics .....	4
Playability .....	5
Value for money .....	5
Overall .....	4



## Lively

### but late

**Program:** *Fat Man Sam*  
**Price:** £3.95 (cassette)  
**Supplier:** Firebird, Wellington House, Upper St. Martin's Lane, London WC2H 9DL.  
 Tel: 01-379 6755

**FAT Man Sam** is a Super Silver release from Firebird Software, which means that it isn't as cheap as most of their stuff but should be much better.

Taking the now familiar format of *Manic Miner*, you guide Fat Sam around 40 screens collecting objects as they appear.

The screens themselves consist mainly of platforms and creatures floating to and fro. You jump from platform to platform, collecting your objects.

Killer weed, jagged rocks and most things that move are bad news and are to be avoided.

All the graphics are well defined and the animation is most impressive.

Each screen has a certain feature that makes it unique. One for example, has two pairs of giant crushers that move up and down in sequence. You need to watch these for ages before you can figure out when to jump.

You have six lives, shown as little men who dance merrily at the top of the screen while you struggle with your current life.

Another feature is that you can start in any of the first 10 screens, which stops you getting bored if you are stuck on an early screen.

The sound can be turned off and is generally satisfactory and the music that plays during loading is a brilliant version of *Roll out the Barrel* that makes loading a pleasure!

The three control keys can be redefined or swapped for a joystick

I think this is a good version of the classic game, but a little late to impress people all that much.

Phil Tudor

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

## Menace of the 3D plague

**Program:** *Nightshade*  
**Price:** £9.95 (cassette)  
**Supplier:** Ultimate Play The Game, The Green, Ashby-De-La-Zouch, Leicestershire LE6 5JU. Tel: 0530 411485

**HOT** on the heels of their smash hit *Knight Lore*, Ultimate releases **Nightshade**, yet another 3D arcade adventure game.

The program derives its name from the village of Nightshade in which the adventure is set.

Many years ago Nightshade was a tranquil little haven lying in the valley between the purple mountains and the sea. All was well until the day darkness descended on the land.

Many villagers fled for the hills, those who remained were transformed into hideously foul creatures.

Since the plague no person has entered the village, let alone dared to challenge the evil overlord.

Once again it looks as though

you are on your own against the evil hordes. Just to make things that little bit more difficult you are not told where the overlord is, or how to defeat him.

No one could expect you to enter the village unarmed so you have been provided with a pocket full of antibodies. These will soon be exhausted if you fire at every reptile or blob of slime which crosses your path, so use them wisely.

You are free to wander



through the streets and enter any of the buildings, but the many characters you will encounter will deplete your energy by a certain amount if you collide with them.

A useful tip is to collect the things which look like spinning candles. These can be used as ammunition against the enemy.

Owners of the previous Ultimate titles will be familiar with the 3D techniques used in their games.

The characters move around each other in such a way that you can sense the depth of the display.

Once again Ultimate has produced a high quality and highly taxing adventure game using tried and trusted techniques.

James Riddell

Sound .....	5
Graphics .....	9
Playability .....	8
Value for money .....	8
Overall .....	8

## Give those bugs the hammer

**Program:** *Chipbuster*  
**Price:** £7.95 (cassette), £10.95 (disc)  
**Supplier:** Software Invasion, PO Box 68, London SW19 4TX. Tel: 01-947 8876

**EVERY** one of us will at some time have problems with a bug in a program, though some of us tend to have more problems than others.

**Chip Buster**, from Software Invasion, is a game about computer bugs. Not of the "Syntax error" variety, but the ones with six legs which munch through chips, tracks and other assorted components.

As the game begins you are given a choice of three computers. You can practice your extermination skills on the BBC B, B+, or a machine known as the crazy computer. Your decision made you are transported onto the main circuit board of your chosen micro.

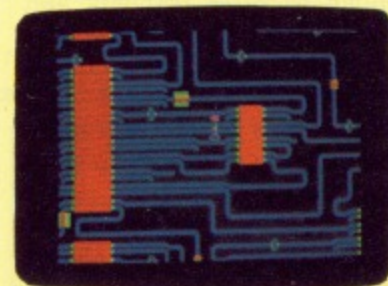
Armed with the tool of your trade, a sledge hammer, you set

out in search of bugs.

Your task is divided into two distinct areas, component repair and bug splatting. Both are carried out in a similar way.

Components are repaired by standing on them and hitting them with a big hammer, just like my local BBC dealer (only kidding guys!).

Bugs are a little more difficult. Touch them while they're moving and you are dead. The



trick is to sneak up on them while they're chewing a chip, then whammo, exit one bug.

The repair man is only allowed to walk on the tracks or the chips themselves. This introduces an element of maze negotiation into the game. The

computer screen displays only a small proportion of the circuit board. Movement in any of the four directions causes the screen to scroll smoothly in that direction.

Pressing the D key at any time will display a damage report, providing information on any areas which are currently under attack. Using the map on the inlay card you can then home in on the damaged area.

The game ends when you have lost all four lives, or every section of the board is damaged and the computer explodes.

**Chip Buster** will never be a blockbuster, but it provided me with several hours of entertainment. More importantly it can be played at a leisurely pace and is therefore ideal for younger children.

Jon Revis

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



## Race game can be an enthralling project

*Program: Cars - Maths in Motion*  
*Price: £19 (cassette or disc + 54 page manual)*  
*Supplier: Cambridge Software House, The Town Hall, St. Ives, Huntingdon PE17 4AL. Tel: 0480 66805*

**CARS - Maths in Motion** is one of the better educational programs in which children aged nine and upwards can compete in a series of grand prix races where they can be driver, mechanic, weatherman and psychologist. They can choose one

out of 10 different race tracks to compete at, from Detroit and Brands Hatch to Buenos Aires.

They plan the route to the track, adjust the car and carry out safety checks on tyres and oil.

Then after a few practice laps comes the big race.

The children have to make their own estimations and calculations from information given them, so there is quite a bit of understanding and use of mathematics.

The first time I tried it I spun and crashed on feature number

6, a tight bend or TB as they call it.

Quite demoralising when there are 20 features, bends and straights on the Detroit course.

Unperturbed, I went back to the drawing board and adjusted my variables at the touch of a button.

Each team does its own preparations and when the practice laps are complete you enter your final position on the grid and you're ready for the race.

Every few laps you can get a progress report of who's doing

what, when, where and how. You can program the number of reports, laps, or in fact anything you want.

Good use is made of colour, graphics and sound, and the program is accompanied by a user pack containing track layouts, worksheets and manual.

There are a great many activities leading up to the race and it is crucial for children to be able to work in small groups.

This enthralling program would make a great project over a number of weeks.

David Boyd

## Grid of confidence

*Program: Number Games*  
*Price: £9.95 (cassette)*  
*Supplier: BBC Soft, 35 Marylebone High Street, London W1M 4AA. Tel: 01-927 4128*

DO you find yourself intimidated by the complexities of a chess board? Then perhaps this package will give you confidence to find your way round a two dimensional grid.

**Number Games** provides six maths programs for children from eight years upwards and aims to improve their two dimensional spatial ability while giving practice in basic addition and subtraction.

Two of the games use the move of a chess knight and with the exception of one game they are played on a numbered grid, the object being to collect a target number or highest score.

Most offer a choice of playing against the computer or a friend and are simple to understand.

Youngsters soon discover that random moves do not bring much success and that logic and strategy help tip the odds in their favour.

The graphics are well planned but not spectacular and the instructions are a bit untidy.

Although neither spectacular nor holding any surprises the package is good value for money.

John Daddy

## Colourful sequence for infants

TEACHERS who say that software designed for infants should be colourful, have few written instructions, and above all be fun, need look no further than **The Circus**.

The main menu allows the teacher to alter certain levels, or to set up a sequence of children and games, a very useful facility.

Apart from the teacher's screens, there are five main choices which together provide valuable experience with counting, matching colours, numbers and shapes.

Make A Circus allows children to build up an illustration of a circus by selecting pictures from the borders.

These can be positioned and

*Program: The Circus*  
*Price: £13.80 (disc)*  
*Supplier: Sherston Software, 8 Court Street, Sherston, Malmesbury, Wiltshire SN16 0LL. Tel: 0666 840433*

coloured and the scenes can be animated so that the jugglers, clowns, and acrobats will perform.

Clown Snap can even be played by pre-school children, who will find matching the various shapes of parts of the clown's face great fun.

The Strong Man is trying to lift his weights, and it is important that the masses on each end of the bar balance

correctly by adding or subtracting weights until this is achieved.

Circus Count is poor in comparison with the rest, although it does show the relation between a group of objects and the corresponding numeral.

My favourite is the marvelous Custard, in which colours, numbers or words have to be swiftly matched so that each child tries to build up and throw a plate of custard over his opponent.

This is a delightful package, well programmed and totally crash-proof, and will certainly enliven classroom activity.

Phil Tayler

## Learning with the dragon king

*Program: Wizard's Revenge*  
*Price: £14.38 (disc)*  
*Supplier: Sherston Software (see above)*

entry to the wizard's castle.

Throughout the program problems have to be solved before progress to another part can be made.

For example, the story begins with chores before the children can go to the beach, so washing up involves number work.

The train journey brings in timetables, and also money to buy the tickets.

Once on the island, drawn rather attractively with an overlaid coordinate grid, the

child can choose which square to explore.

Some squares contain tests which are both fun and educational and these must be passed before passwords are given.

When all four passwords and the key to the dungeon are successfully gained there is a journey by bus across the desert before the castle is reached and the dragon king released.

The program may eventually become repetitive because the clues and passwords are always the same, but it will provide a lot of enjoyable learning for junior children.

Phil Tayler







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THERE are many interesting facets of the Master 128. In this article we'll look at just one of them – the improved version of Basic supplied with the machine, Basic IV (or CBasic as it has been called due to the use of the CMOS 6502 instruction set).

To keep the discussion manageable I'll assume you know normal BBC Basic pretty well, and are interested in the esoteric new features of Basic IV.

Although identical in use to the previous BBC Basic standard, which was Basic II, the new Basic provides some new commands and statements which make it more powerful and faster than ever.

It may seem strange that Basic could have been enhanced to any degree and kept to the same size of 16k. The reason is simple – the Master machines use a new version of the 6502 processor, the 65SC12, which has a few new instructions which do the same thing as several instructions on the standard 6502, thus saving valuable memory.

A version of this processor is used in the 6502 second processors. The new instructions for this were described in the September and October 1985 issues of *The Micro User*, and details are also included in Table I (see Page 88).

By using these new instructions Roger Wilson, the author of BBC Basic and designer of the ARM instruction set, has managed to reduce the space and time required by existing Basic functions, and squeezed the new bits in the space created.

I'll talk first about the new commands – that is, the things you can type only after the > prompt – then describe the new programming features.

One of the incredible things about Basic IV is that if you type:

**\*BASIC  
REPORT**

it says (C) 1984, which means it's been around for well over a year. Just how long have Acorn had the Master Series under wraps?

The only totally new command is EDIT. This is used to call a screen editor which can be used to edit Basic programs instead of using cursor copying.

When EDIT is entered, Basic first has to convert the program, which is held in a special tokenised form, into pure text. It does this by LISTing the program, but instead of sending the characters to the



## Inside the Master's faster, more powerful Basic

By PETER JOHNSON

screen it stores them in memory. There they can be accessed by the editor.

There is a bit of a restriction on the size of programs which you can edit, but with good reason. When the program is being LISTed into memory both the tokenised version and pure text version of the program must exist at once. This is so that if the text version is too big to edit, the "No room" error can be given and the program may remain intact.

So, say programs are 30 per cent bigger when converted to text than the tokenised version, and the amount of memory available is 29184 bytes (PAGE at &E00 and HIMEM at &8000, as is usual on a Master 128), then the biggest program that can be EDITed is about 12690 bytes long.

Once the program text has been listed into memory the editor is called. Basic just issues a \*EDIT command. Well, I say "just". In fact, it does a special form of \*EDIT, where additional parameters tell the editor (which is another program in the Master 128 MegaROM) where in memory to find the text to edit. The form of this \*EDIT command is:

**\*EDIT [start pointer address],[end pointer address]**

The [start pointer address] is the address in hex and in zero page of a pointer to the start of the text. The [end pointer address] is the address of a pointer to the byte after the end of the text.

For example, after converting the program to text, Basic stores the address of the first byte of text in locations &12-&13, and the address of the end – just after the program – in addresses &02-&03. The call to edit is thus:

**\*EDIT 12,2**

When EDIT starts up it looks at the rest of the command line. If there is nothing there, it just does a "new". If there's a filename, it loads it, and if there's a couple of numbers, as above, it uses the contents of the pointers to initialise its own text pointers.

Here's an illustration of how to call EDIT in this way. Type the following lines in Basic's command mode:

```
DIM string 20
$string="HELLO THERE"
!&70=string
!&72=string+LEN$string+1
*EDIT 70,72
```



When you call EDIT, the string HELLO THERE will appear automatically on the screen.

After you have edited the program, you will want to return to Basic with the program intact. The Shift+f4 command in EDIT asks you for the language you wish to return to. When you type BASIC, this is used as a command passed to the operating system. Once again, a special bit is tagged on to the end to tell Basic to start using a text program which resides in memory. The form of the command is:

```
*BASIC @
```

When Basic IV is called it checks for a @ within the first 32 characters after the \*BASIC command. If one is found – and is followed immediately by a Return – an “in core” program is assumed.

The address of this text program is held in locations &00-&01, where Basic stores LOMEM. These are set up by the editor before issuing the star command. The textual program is tokenised as if it had been typed in at the keyboard.

The end of the text should be marked by a zero byte. Alternatively, Basic will stop reading from the in-core program if it runs out of room to insert lines.

Here's an example of how the in-core program facility works. This time Basic is used to generate the program instead of the editor. In command mode type the following:

```
NEW
DIM prog 100
$prog="10 PRINT ""It works!""
prog?(LEN$prog+1)=0
!0=prog
*BASIC @
RUN
```

Pay attention to the number of quotes in the third line. Using this technique any editor can be used to create Basic programs, so long as it sets up &00-&01, puts a zero byte at the end and uses \*BASIC @ to call Basic.

That just about covers the EDIT command, except to say that you can use EDIT IF ... just as LIST IF ... is now possible (see later). This isn't particularly useful though.

There are two enhancements to program listing. First, the formatting produced by the non-zero LISTO

options is a lot better. This means that FOR ... NEXT and REPEAT ... UNTIL constructs line up properly when you list under LISTO 7.

The only time indentation goes wrong is when the NEXT A,B,C form of the NEXT statement is used. This closes three FOR loops, but LIST thinks only one has been changed, as illustrated by the following program listed under LISTO 7:

```
1000 FOR A=1 TO 2
1010   FOR B=1 TO 3
1020     FOR C=1 TO 4
1030       REM Some statements
1040     NEXT C,B,A
1050   REM You can't win them all
1060   END
```

If line 1040 were NEXT:NEXT:NEXT, LIST would get the indentation right. 6502 programmers among you may be wondering why Basic couldn't just count the number of commas after the NEXT and close that plus one lot of indentation.

For example, in line 1040 there are two commas, so close three FOR loops. Well, unfortunately in this case Basic lets you use array elements as looping variables. If you were particularly sick in the head, you could have the following program:

```
1000 DIM A(10,10)
1010 FOR A(0,0)=1 TO 100
1020   FOR A(0,1)=1 TO 20
1030     REM Some statements
1040   NEXT A(0,1),A(0,0)
1050   END
```

Obviously in this example counting the commas would be totally wrong, as one belongs to the NEXT and the others are subscript separators. The answer if you want well-formatted programs is not to use the NEXT A,B.. version of NEXT.

The behaviour of the tokeniser has changed a little from earlier versions of Basic. In particular, when the LISTO option is anything but zero, spaces after the line number are stripped.

This is to prevent a problem with the accumulation of spaces after the line number when lines were cursor-copied in Basics I, II and III with non-zero

LISTOs. So if you've typed LISTO 7 (all indentation) and enter the line:

```
1000 PRINT "HELLO"
```

it will actually be entered into the program as:

```
1000PRINT "HELLO"
```

but since LIST is indenting for you, it shouldn't matter. One nasty effect of this is that you can no longer enter blank lines unless the LISTO option is zero. For example, to space out PROC and FN definitions I use lines such as:

```
2340(space)
```

in my programs. However if LISTO is non-zero on Basic IV, the space will be deleted, so the effect is the same as typing just the line number and will simply delete any line of the same number in the program.

The answer is to do a LISTO 0 before typing spacer lines or use something like:

```
2340:
```

The other major addition to LIST is the ability to LIST only those lines which contain a given string. After the usual (optional) line number range, you may now have the keyword IF, followed by a string to match. Only lines where the match succeeds will be listed. For example:

```
LIST IF DEF
```

will list all the lines with DEF statements, and:

```
LIST 10,200 IF "
```

will list all lines containing a quote character between lines 10 and 200 inclusive.

There are two things to look out for with LIST IF. First, if the search string contains one of the pseudo-variables TIME, PAGE, LOMEM, HIMEM or PTR, only the lines where it is included as a function will be listed. For example, with the program:

```
100 TIME=0
110 PRINT TIME
```

If you LIST IF TIME, only line 110 will be listed. This is because the pseudo-variables have two tokens, one



## From Page 87

for use in statements (line 100) and the other when they are used as functions (line 110).

When a pseudo-variable appears in a LIST IF line it gets tokenised into the function form, and only that one is matched.

The other feature is that if you have the line:

```
10 GOTO 1000
```

it will be listed by LIST IF d. This is because Basic tokenises line numbers such as the 1000 after the GOTO above in a special four byte form.

The first of these bytes is &8D and the next three are a strange binary representation of the line number. In the

case of 1000 one of the bytes happens to be &64, ASC "d", so the LIST IF prints line 10. This shouldn't be too much of a problem in practice, especially if you don't use line numbers very often.

A final change to LIST is that it now no longer detokenises characters in the range &80-&FF in REM statements, so you can embed Mode 7 colour codes in REMs without having to put a " immediately after the REM (which you used to have to do).

That just about covers the changes to command mode operation, except to note that AUTO no longer prints a space after the line number, presumably because Mr Wilson decided it was misleading since the space printed by earlier Basic wasn't actually part of the line. The additions to the rest of Basic

are even more interesting. Some are very trivial, such as in VDU. Others such as ON . . . PROC are fairly major.

Since I've mentioned it, I'll describe the | in VDU. You will be familiar with the , and ; separators in VDU. A number followed by , is sent as one byte to the VDU drivers, one followed by ; is sent as two bytes. after a number is a synonym for ,0,0,0,0,0,0,0,0. That is:

```
VDU 23,1!
```

is equivalent to:

```
VDU 23,1,0,0,0,0,0,0,0,0
```

Thus | sends the number as a single byte followed by nine zero bytes to the VDU drivers. It may be used wherever , and ; may be used. Another example is:

```
VDU 19,1!
```

*Basic IV takes advantage of the extra instructions in the CMOS processor of the Master machines to provide shorter and faster routines.*

*You can use these too, as the assembler built-in to Basic has been extended to give a complete set of mnemonics. These, with their meanings, are listed in Table I.*

*The other change to the assembler is that the formatting of assembly listings - those produced by OPT I-type assemblies - has been made neater.*

*There is now room for a label field at the start of the line, so that lines with labels on don't have their*

*mnemonics pushed over to the right, unless the label is more than eight characters long.*

*Actually, this isn't new to Basic IV. Basic III - or American Basic, as it was designed for the American version - also included it.*

*Another feature the Basic IV shares with American Basic is the keyword COLOR as an alternative to COLOUR, though it's always listed as COLOUR.*

*A very nice feature which will be appreciated by programmers who, use lower-case in assembler, is that the assembler is now totally case-insensitive.*

*Earlier Basics let you have mnemonics in either case, such as LDA, Lda, lda, but expected the letters which form parts of addressing modes to be in upper case.*

*So you could say lda &70,X and equS "Hello", but not lda &70,x and equS "Hello". Now you can.*

*There was a problem with the earlier assemblers in that if you had a label beginning with A, say ATOMS, then something like ROR ATOMS would be taken not as a rotate right of location ATOMS, but as a ROR A followed immediately by the comment TOMS. This has been fixed in Basic IV.*

<b>BIT zp,x</b>	Do a BIT operation with location zp+x.	<b>TSB zp</b>	OR [zp] with the acc., storing the result in zp. Set the flags on the result of [zp] AND acc.
<b>BIT abs,x</b>	Do a BIT operation with location abs+x.	<b>TSB abs</b>	OR [abs] with the acc., storing the result in abs. Set the flags with the result of [abs] AND acc.
<b>BIT# imm</b>	Do a BIT operation with imm (but doesn't affect the V flag).	<b>ORA (zp)</b>	Logical OR acc. with [[zp]].
<b>BRA loop</b>	Branch unconditionally to the label.	<b>AND (zp)</b>	Logical AND the acc. with [[zp]].
<b>DEC A</b>	Decrement the accumulator.	<b>EOR (zp)</b>	Logical EOR the acc. with [[zp]].
<b>INC a</b>	Increment the accumulator.	<b>ADC (zp)</b>	Add [[zp]] to the acc.
<b>JMP (abs,x)</b>	Jump to the address held in locations abs+x and abs+x+1.	<b>STA (zp)</b>	Store the acc. in [[zp]].
<b>PHX</b>	Push the X register on to the stack.	<b>LDA (zp)</b>	Load the acc. from [[zp]].
<b>PHY</b>	Push the Y register on to the stack.	<b>CMP (zp)</b>	Compare the acc. with [[zp]].
<b>PLX</b>	Pull the X register from the stack.	<b>SBC (zp)</b>	Subtract [[zp]] from the acc.
<b>PLY</b>	Pull the Y register from the stack.		
<b>STZ zp</b>	Set [zp] to zero.	<i>Notes:</i>	
<b>STZ zp,x</b>	Set [zp+x] to zero.	<i>zp is a zero page address.</i>	
<b>STZ abs</b>	Set [abs] to zero.	<i>abs is an absolute address.</i>	
<b>STZ abs,x</b>	Set [abs+x] to zero.	<i>[zp] means the contents of zp.</i>	
<b>TRB zp</b>	AND [zp] with NOT acc., storing the result in zp. Set the flags on the result of [zp] AND acc.	<i>[[zp]] means the contents of the location pointed to by [zp],[zp+1].</i>	
<b>TRB abs</b>	AND [abs] with the acc., storing the result in abs. Set the flags from the result of [abs] AND acc.	<i>[abs] means the contents of abs.</i>	
		<i>DEA is a synonym for DECA, INA for INCA and CLR for STZ.</i>	

Table I: The new instructions



which is equivalent to:

```
VDU 19,1,0,0,0,0,0,0,0,0
```

Don't worry that only four zeros are actually required by the VDU 19 command. The rest are swallowed up as Ascii 0 (NUL) has no action on its own.

Finally, and incidentally, did you know that space can be used instead of a comma in the VDU statement even in old Basics?

I also mentioned ON...PROC. This is an enhancement of the ON...GOSUB. Whereas the line:

```
1000 ON n GOSUB 2000,3000,4000,5000
```

jumps to the nth entry of the list of line numbers (where n evaluates to an integer between 1 and 4), this line:

```
1000 ON n PROCfred,PROCjim,PROCsheila,PROClynne
```

calls the nth procedure in the list. The procedure may have parameters as usual, and the ELSE part may be

included. For example:

```
1230 ON choice%+1 PROCalpha(10),PROCbeta(a,b),PROCgamma(a+1,b-3) ELSE STOP
```

This is much more useful than ON...GOSUB, and means that the GOSUB keyword should never have to appear in BBC Basic ever again.

There are a couple of changes in the pseudo-variables. First the EXT# function, which returns the length of an open file, can now appear on the left hand side of an assignment. This gives us a way of shortening the length of a file. You could always lengthen a file by saying, for example:

```
PTR#chan=EXT#chan+1024
```

but it was never possible to shorten it. Now you can say:

```
EXT#chan=EXT#chan-1024
```

This will only work on filing systems which support the OSARGS operation which EXT#chan= actually invokes, that is OSARGS with A=3. The ADFS

and ANFS support the call, the CFS and 1770 DFS do not.

The other pseudo-variable change is TIMES\$. This is used to read and write the time from the battery-backed real-time clock. When used as a function, TIMES\$ returns a string of the form:

```
Tue,21 Jan 1986.14:59:00
```

The string is always 24 characters long, with date and time being separated by a full stop. When as a statement, TIMES\$= is followed by a string expression which evaluates to either a time, date or both.

The time is in the format given after the . above, such as TIMES\$="12:00:00". The date follows the format before the . as in TIMES\$="Wed,01 Jan 1986". Or you can set both at once by giving a string in exactly the same format as above.

● *Well that's plenty for now. Next time we'll take a look at the new star commands and PLOT codes.*

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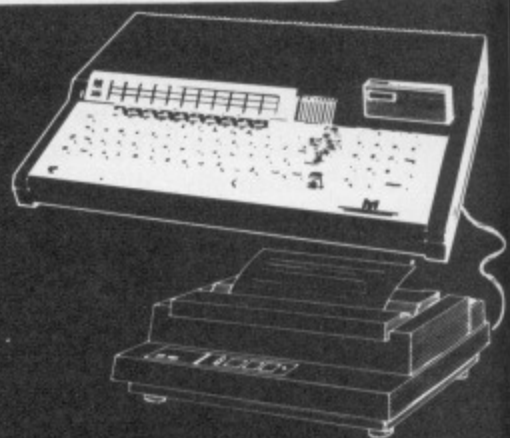
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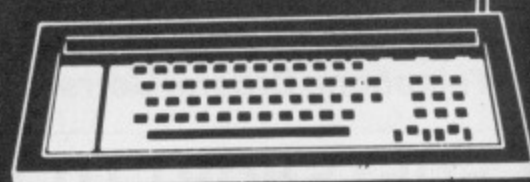
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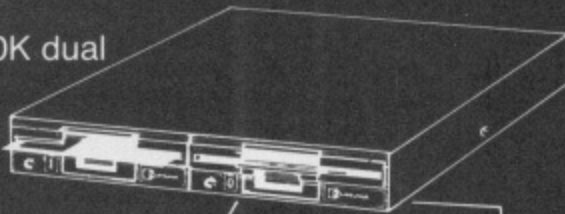
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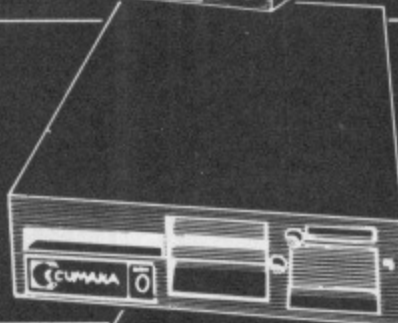
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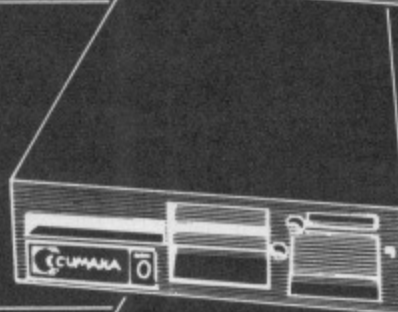
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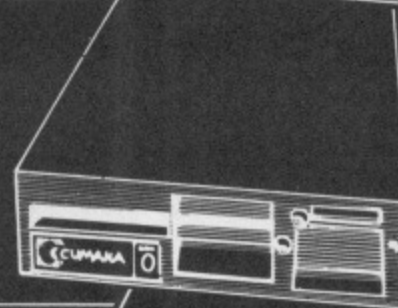
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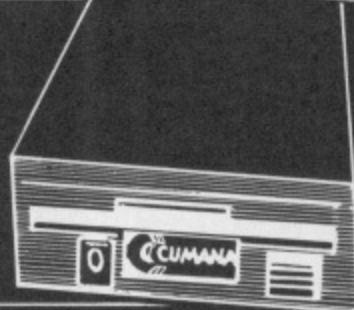
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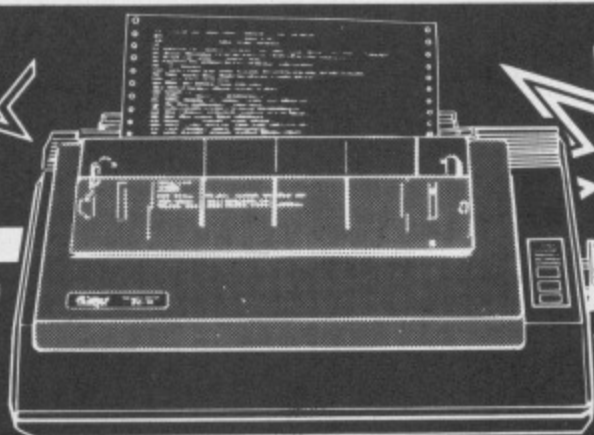
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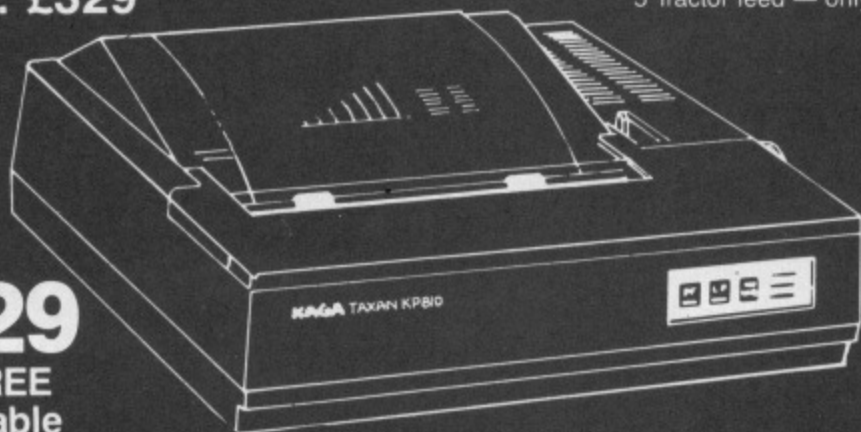
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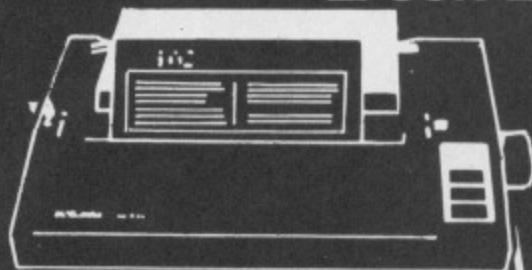
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*Idea one: A machine code program is a sequence of bytes stored in a memory location. A byte is a number between zero and 255 which, conveniently enough, is just the range of numbers that can be stored in a memory location.*

*Idea two: To run a machine code program we point the 6502 at the start of it and say go! The 6502 gets the first byte from memory, decodes its meaning – hence the words machine code – and does what that byte tells it.*

Let's look at this in practice: Our first program was:

**A9 41 8D 00 7D 60**

Doesn't make sense does it? You see, we humans are more into words than numbers, so let's try a verbose version:

```
LDA #41      A9 41
STA &7D00    8D 00 7D
RTS          60
```

We've listed the instructions together with the bytes that go with them. Notice that a single instruction may involve one, two, or three bytes. How does the 6502 know which has how many?

Well, it works that out when it decodes the instructions. You see, each valid hexadecimal instruction or opcode not only gives the 6502 a job to do, it tells it where to get its raw materials from.

Often the opcode needs some more hexadecimal numbers following it to give it data to work on – or to tell it where to get data from and so on.

In the first case we have an opcode &A9 and following it data &41. The 6502 worked it out like this:

*"&A9. Ah, that wants me to load my internal memory byte, called the accumulator, with a number. That's why its mnemonic is LDA – LoAD the Accumulator. I know that opcode &A9 means that the number I load the accumulator with is the hex number that's next after &A9 in memory.*

*"Let me see, that's &41. Right so I*

# Hexer will help you cast light on machine code

## MIKE BIBBY helps make sense of machine code

*load the accumulator with &41 and that's one instruction over with. So I've dealt with bytes &A9 and &41, finished with one instruction and am ready for the next. Well that must be the next unused byte, &8D."*

So what does &8D boil down to? This means STore the Accumulator (STA) in a memory location. What memory location? Well &8D tells the 6502 that the address of the location is given, lo byte, hi byte fashion in the two bytes following it. (See the panel on lo byte, hi byte if you don't follow.) Here the two bytes are &00, &7D, so the address to copy the accumulator into is &7D00.

Right, so the 6502 dealt with these three bytes and is ready for another instruction. That must be the byte in the next "unused" memory location, so it's a &60. This just ReTurnS (RTS) us from whence we came. This is a vital "stopper" for our machine code routines.

Actually we've been a bit naughty, we haven't said where our program actually is, and that's vital. You've got to put a machine code program into context, that is, tell it which area of memory you want to store it in. Last

month we stored it at &900, so here's our full mnemonic listing.

Location	Mnemonic	Opcodes
0900	LDA #41	A9 41
0902	STA &7D00	8D 00 7D
0905	RTS	

Program 1

Remember, the mnemonics are there for your convenience – the way the program actually exists in memory is more accurately represented in Figure I.

*Idea Three: To keep track of where it's up to in memory, the 6502 uses a two byte internal register called the Program Counter. This points to the next instruction to be done.*

We can now fill out our exploration of how the 6502 knows where to get the next opcode or instruction from. The Program Counter (PC) holds the address of the next instruction to be done.

When it starts on the initial opcode of this instruction, the 6502 decodes how many bytes are needed for the complete instruction (one, two or three) and adds that to the PC so that the PC yet again points to the memory address of the next instruction to be done.

Last month we used CALL &900 to point our 6502 at the first instruction to be done. We can see now a little more

Memory location	&900	&901	&902	&903	&904	&905
Contents	A9	41	8D	00	7D	60

Figure 1: How Program 1 is stored in memory



## From Page 95

clearly how it works. The CALL &900 causes the Program Counter to be loaded with &0900, so the 6502 picks up its next opcode from there – that is, it starts doing our program.

All right, so what does Program I do? The effect is to put an A on the screen (assuming you're in Mode 7). You see the Mode 7 screen is what's known as a memory mapped screen – the character shown at any position on the screen is determined by the value stored in a particular byte of memory.

On the Mode 7 screen – provided you haven't done any scrolling since the last clear screen – the memory used to

determine what goes on the screen starts from &7C00. If we haven't scrolled &7C00 corresponds to the top left character position of our screen, so if we store a number in that particular memory location the character with the corresponding Ascii number appears there.

What actually happens is that at every flicker of the TV screen a clever chip looks at the memory from &7C00 onward and “generates” the corresponding characters in their correct positions on the screen.

Other modes work similarly, but use more memory to generate the screen, giving you room for more detail, such as finer graphics and colours. At first

though, most of our work will be done on the unscrolled Mode 7 screen. (Clear the screen before CALLing your code to be sure of this.)

Program I puts the character at &7D00. Since the screen starts at &7C00, with character number 0:

$$\&7D00 - \&7C00 = \&100$$

means that our letter A will appear as character number &100, that is, 256. As there are 40 characters “cells” to a row, and:

$$256 = 6 * 40 + 16$$

&7D00 corresponds to character number 16 on row number 7. Think!

Let's change this so that the A appears as the first character on the third row down – row 2. The first row goes from character cell 0 to 39, so the second goes from 40 to 79, which means the first character on the third row down is character cell 80 (&50). So the character cell we're after is mapped onto memory location:

$$\&7C00 + \&50 = \&7C50$$

Remembering that the 6502 likes its addresses specified as two byte numbers with the low byte first, our modification of Program I gives us Program II.

Location	Mnemonic	Opcodes
0900	LDA #41	A9 41
0902	STA &7C00	8D 00 7C
0905	RTS	60

Program II

By now you should know that a machine code program consists of a sequence of bytes in memory. So how do we get them into memory? One way is to use a special translator called an assembler that will take our mnemonics and convert them into the appropriate hex codes at the correct place.

The BBC Micro has such an assembler built in and we'll be making a great deal of use of it later on.

For the moment though we'll get a better feel for machine code if we use a simple hex loader. This is a program that pokes the hexadecimal numbers you give it into the memory locations you want.

Hexer, listed alongside this article, not only does this for you, but also displays the contents of memory locations, so you can check the

## LO BYTE, HI BYTE

IN the last couple of months we've seen that we often have to deal with hexadecimal numbers bigger than can be held in one byte. We found that we could cope with numbers in the range 0 to 65535 by using two bytes “side by side”.

Just as one byte required two hex digits to specify it (&06=6, &FE=254) so our larger two byte numbers required four hex digits (&0006=6, &FFFE=65534).

It often helps to think of these two byte numbers as being two column numbers, the value in each column corresponding to each of the bytes, that is, each pair of hex digits.

For instance, &2345 could be thought of as two columns, the high column, or byte, containing &23 and the low column or byte containing &45. Similarly, for &FE07 the high byte column would be &FE and the low byte column &07.

If you cast your mind back to last month you'll remember that to convert a two byte hex number to decimal you multiply the high byte by 256 and add the decimal equivalent of the low byte to it. For instance:

$$\begin{aligned} \&2345 &= 35 * 256 + 69 = 9029 \\ \&FE07 &= 254 * 256 + 7 = 65031 \end{aligned}$$

If you want you can think of the hi (high) byte as the 256s column, and the lo (low) byte as the units

column.

One of the things we frequently use two byte hex numbers for is to specify an address. For example, &7D00 can, and does, refer to a memory location. To store the value of the accumulator there we'd use the instruction STA &7D00.

However that's in our convenient mnemonic terms. The 6502 likes things in hex, stored in a string of contiguous memory locations.

In this case the hex for STA is &A9, so you might think that in memory the code would be:

A9 7D 00

It isn't, though. The 6502 likes addresses with the lo byte coming *before* the hi byte. We say that it likes addresses in lo byte, hi byte fashion. This means STA &7D00 translates as:

A9 00 7D

Don't be too hard on the 6502 for this quirk, it's quite understandable. After all, when you're doing your hundreds, tens and units sums, you start with the low column, the units, first. Similarly the 6502 finds it easier to start with the lo byte first – and expects you to deliver.

Incidentally, it's a convention that we write hex numbers with an even pair of digits, even if we have to add a leading zero, so that &9 is written &09 and &3EF is written &03EF.



## OFF TO A FLYING START

HEXER is a utility designed to get you off to a flying start in machine code. You can:

**Display Memory:** This option prompts you for a start address, then displays the contents of memory eight bytes at a time, preceded by the address of the first byte of that line to help you keep track.

Pressing Return shows you the next eight bytes and so on. To return to the main menu enter X for exit.

**Alter Memory:** Again you're prompted for a start address, then

you're shown the contents of that location and are given the option of changing it.

You can either enter a hex number – which will replace the current contents – or simply press Return and leave the byte unchanged.

Again, X exits. This, of course, is the option you use to enter your machine code programs.

**Run Code:** This CALLs the machine code routine at the address you enter, clearing the screen first.

**Exit Hexer:** This returns you to

Basic command level. Be warned, Hexer is not idiot-proofed. For example, it doesn't check to see if the numbers you're entering really are valid hex.

Also it sets HIMEM to &1FFF to give you &2000 and above for your code, up to &7C00 – Hexer works in Mode 7. When prompted for a start address, pressing Return defaults to &2000.

One final point: Hexer directly alters memory, and any typing errors you make can be catastrophic – so save it before you try to run and debug it.

```

10 MODE 7
20 HIMEM=&1FFF
30 end% = FALSE
40 VDU 23;8202;0;0;0;
50 @%=4
60 *FX 202,32
70 REPEAT
80 PRINT "You may :-"
90 PRINT " 1. Display memory"
100 PRINT " 2. Alter memory"
110 PRINT " 3. Run code"
120 PRINT " 4. Exit hexer"
130 PRINT "Enter option"
140 REPEAT
150 choice%=GET$
160 UNTIL INSTR("1234",choice%)
170 choice%=VAL(choice%)
180 IF choice%= 1 THEN PROCmemory
190 IF choice%= 2 THEN PROCalter
200 IF choice%= 3 THEN PROCrun
210 IF choice%= 4 THEN end%=TRUE
220 UNTIL end%=TRUE

```

```

230 END
240 DEF PROCmemory
250 INPUT "Start Address? " address
$
260 IF address%="" THEN address%="2000"
270 address% = EVAL("&" + address%)
)
280 REPEAT
290 PRINT ^ address%;
300 FOR loop%= 0 TO 7: PRINT ^?(address%+loop%); NEXT loop%
310 address% = (address% + loop%) MOD &10000
320 PRINT
330 UNTIL INSTR("Xx",GET$)
340 ENDPROC
350 DEF PROCalter
360 LOCAL end%
370 end%=FALSE
380 INPUT "Start Address? " address
$

```

```

390 IF address%="" THEN address%="2000"
400 address% = EVAL("&" + address%)
)
410 REPEAT
420 PRINT ^ address%;
430 PRINT ^?(address%) " ";
440 INPUT "? " byte$
450 IF INSTR("Xx",byte$) AND byte$(">") THEN end% = TRUE
460 IF byte$(">") AND NOT end% THEN address%=EVAL("&" + byte%)
470 address% = address% + 1
480 UNTIL end%
490 ENDPROC
500 DEF PROCrun
510 INPUT "Start Address? " address
$
520 IF address%="" THEN address%="2000"
530 CLS
540 CALL EVAL("&" + address%)
550 ENDPROC

```

accuracy of the programs you've entered and their effect on memory.

We'll be using Hexer a fair bit over the next few months, so I suggest you type it in and save it. Once you've got it debugged use it to enter Program II, then use option three to CALL the routine.

Then try altering Program II. Get it to "print out" different letters, or an asterisk (Ascii &2A). Change the location on the screen it appears at – making sure it isn't over written when hexer's options menu re-presents itself

on the screen.

Then try writing out more than one letter at once. Why not, using Hexer, try locating your code at &2000? Table I gives you some useful start addresses for rows of the unscrolled Mode 7 screen.

Once you can play around and adapt Program II with impunity you'll have gained a fair understanding of what machine code is. With that – and Hexer itself well and truly typed in – you'll be ready for the feast of programs and new ideas coming next month.

line number	address of first character
-------------	----------------------------

0	&7C00
1	&7C20
2	&7C50
3	&7C78
4	&7CA0
5	&7CC8
6	&7CF0
7	&7D18

NB Assumes no scrolling has occurred eg screen just cleared

Table I: Some unscrolled Mode 7 line start addresses.



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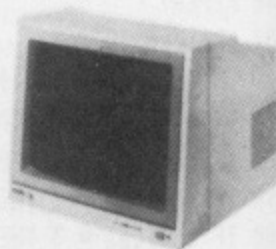
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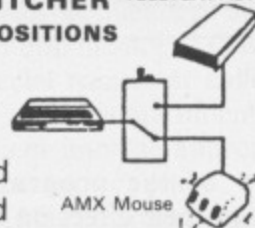
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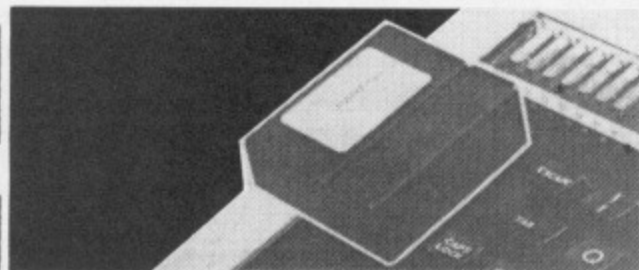
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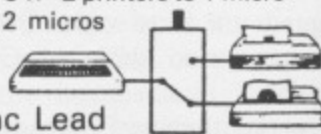
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# Piling on the pressure .. according to Boyle

**MIKE COOK**  
 moves away from music in Part 36 of his course to look at pressure sensing applications

THIS month I want to look at a neglected area of computer interfacing, that of sensing pressure. No, not the "get it by yesterday" type of pressure, but the type studied by Boyle and others. I shall explore the techniques of measuring pressure in a gas or liquid and some of the applications to which we can put this.

Rather than presenting a cut and dried project I intend to show how you can begin experimenting with pressure sensing.

The measurement of pressure is very useful. For example you can monitor atmospheric pressure for a weather station. You can investigate the pressure in and around an internal combustion engine or measure vibrations. With suitable hardware you can even weigh objects quite accurately, and there are applications in monitoring and control.

The only snag with all this is that pressure transducers tend to be expensive. Nevertheless, let's have a brief look at what's available and how they work.

While there are a few different types of pressure transducers, the family we are going to look at here is the type based on the monolithic piezoresistive crystal - one which changes its resistance in response to mechanical stress. In a pressure transducer the piezoresistive crystal is formed into a bridge circuit.

The Wheatstone bridge was invented by Charles Bridge for the measurement of relative resistances. Figure 1a shows a simple potential divider. The voltage at point V depends upon the supply voltage and the ratio of the two resistors. This voltage will increase and decrease with resistor B increasing and

decreasing, whereas if resistor A changes the change in voltage will be reversed. That is, as A increases the voltage decreases.

Now suppose we have a physical phenomena that alters resistance. If we make two such potential dividers and make the top resistor variable in one and the bottom resistor the variable in the other, we have doubled the size of the effect.

By measuring the difference in the mid-point voltages we can get a more accurate measurement than would otherwise be possible. This is shown in Figure 1b. However, just to confuse us,

the resistors are normally drawn in a diamond configuration as shown in Figure 1c.

By altering the resistors that are not effected by the physical phenomena we can get both voltages to be the same or as we say, balance the bridge. This can be done with great accuracy because you only need to detect whether there is a voltage, not measure how large it is. Then, with some simple calculations, the values of the unknown resistors can be worked out from the values needed to balance the bridge.

Pressure transducers, however, make all resistors in the bridge active. One set of resistors respond to pressure in one way and the second set respond in the opposite sense.

It is quite easy to understand how this happens if you look at Figure II which shows a crystal being deformed under pressure. The top surface is stretched

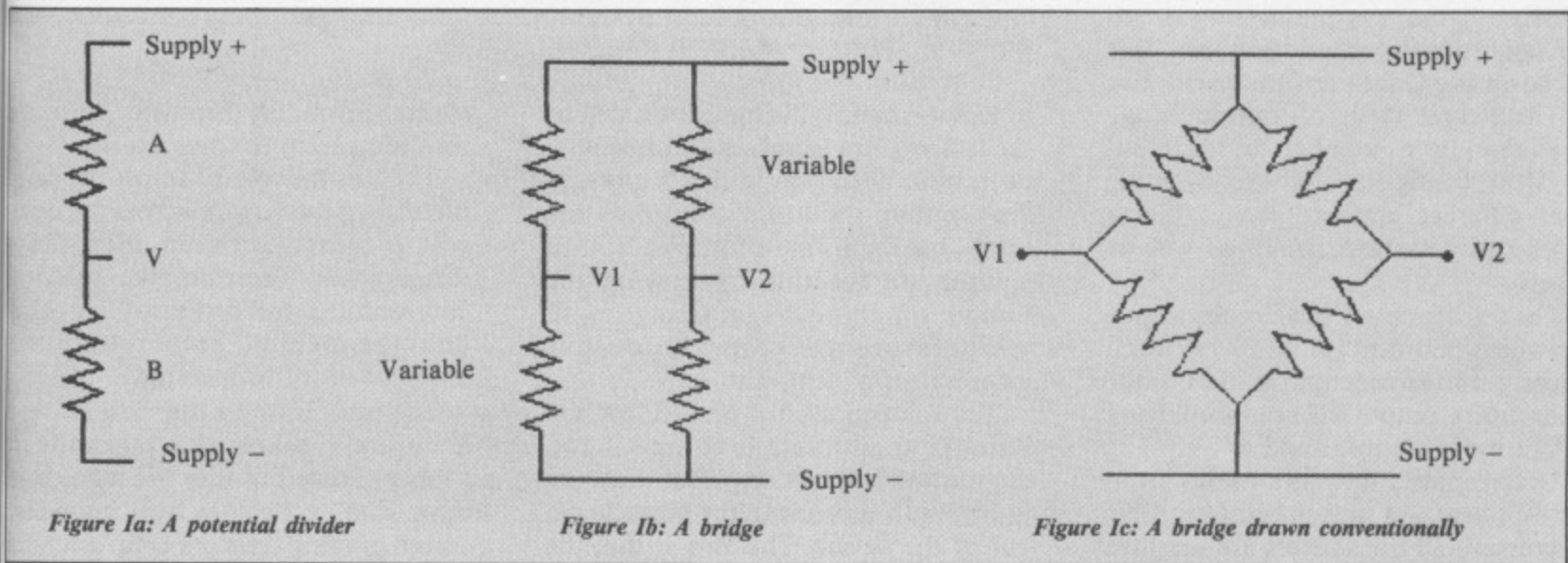
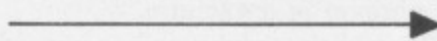


Figure 1a: A potential divider

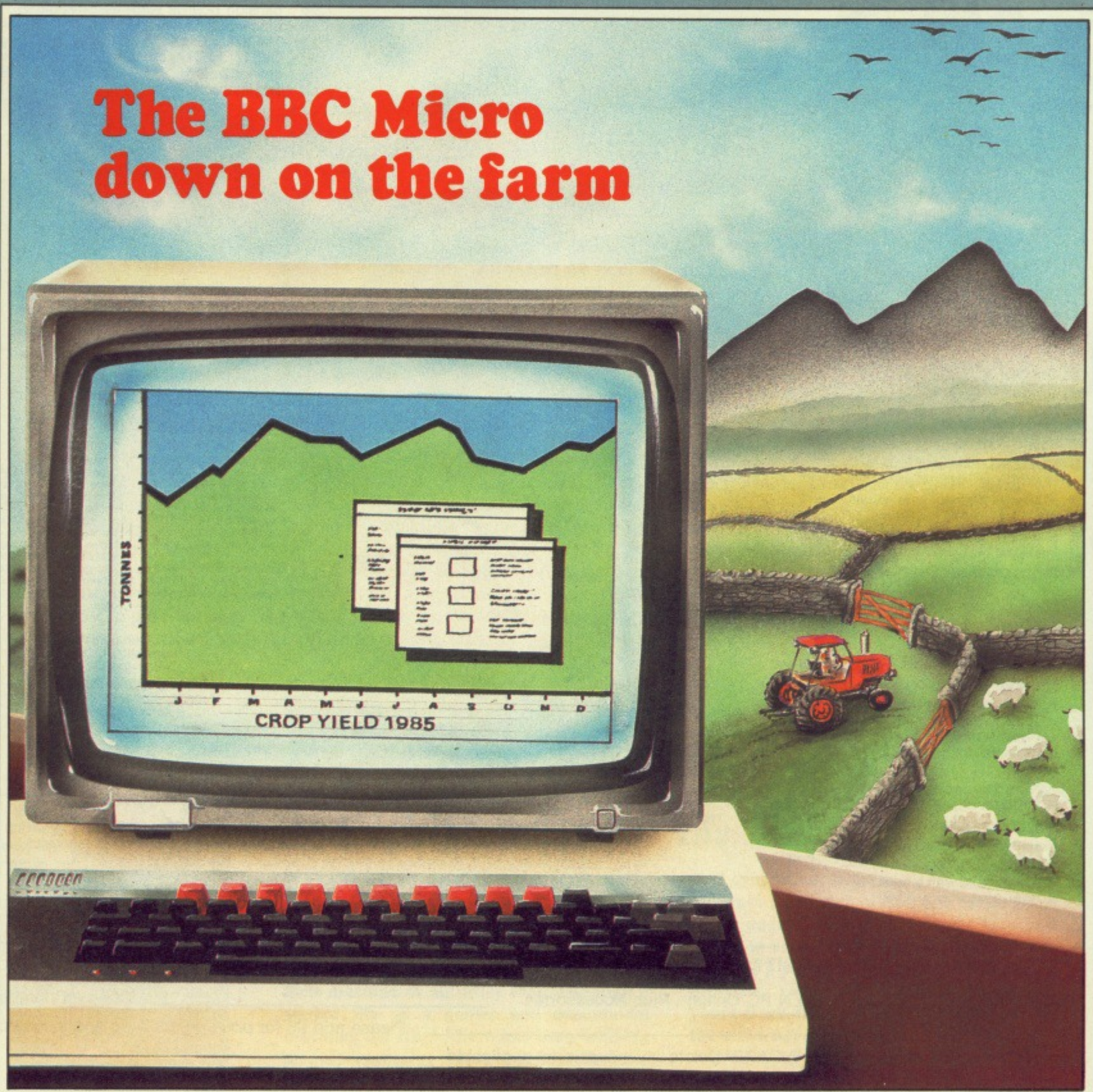
Figure 1b: A bridge

Figure 1c: A bridge drawn conventionally



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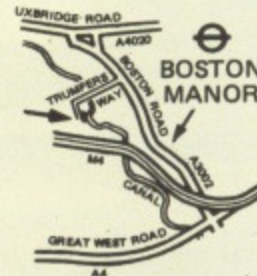
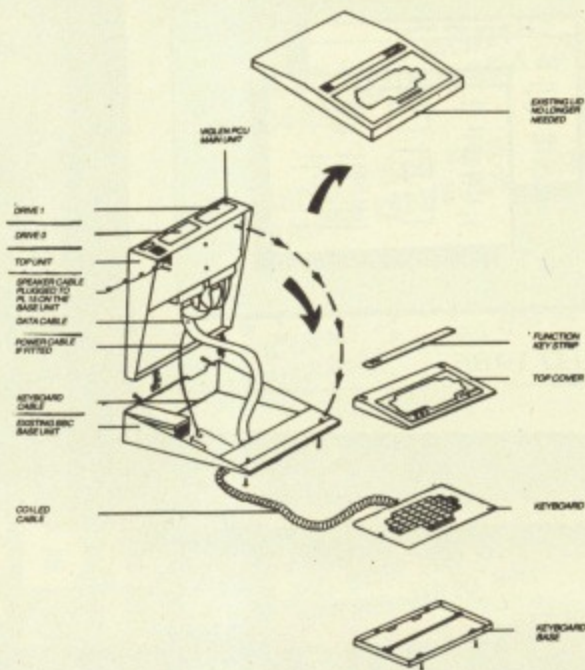
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David Verity: "Market information alone paid off the investment..."

## Helping hand for the 'office farmer'

**REGINALD JONES looks  
at the computerised  
management techniques  
which promise to revolutionise  
the agricultural industry**

AS Britain's agricultural industry becomes increasingly more sophisticated, thousands of farmers find themselves bogged down with tedious but essential paper work.

Even the National Farmers Union with a membership of 117,000 finds it impossible to put a total on the amount of time spent on what they call office farming.

That wasted time is now being rapidly filled by computerised management techniques.

Last year the Acornsoft Farm Management package was released

which consists of four modules, Farm-Cash for accounting, FarmPlanner covering land availability and labour, FieldFile for detailed record keeping of up to 80 fields and cropping, and finally CapCost for investment appraisal.

A version of the package which will run on the BBC Micro, B+ and the Master series for Econet and Torchnet have now been released by Rural Planning Services.

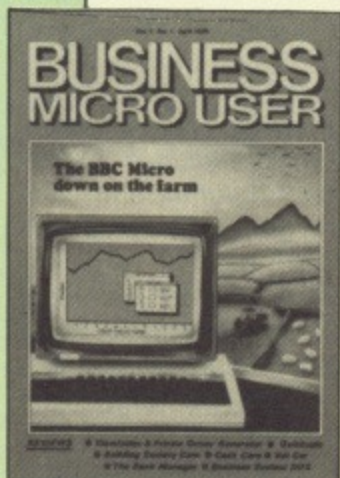
Costing from £750 to £975, it was promoted on a trial basis in Scotland, where they now sell two a week, and the East Midlands. Now the launch is going

to the rest of the country on a regional basis. First will be East Anglia, where arable farming is ideally suited to the package.

Although the programs are aimed at farms from 150 to more than 3,000 acres, agricultural colleges have been showing interest - six already have it in use.

Farmer David Verity, 52-year-old ex-chairman of the Worcester County branch of the National Farmers Union, was one of the first to buy one for his

## Expert advice for the business user



WELCOME to the first issue of *Business Micro User* - a new section of the magazine that in the months to come will act both as guide and forum for the growing number of readers of *The Micro User* who are using their machine as an office tool. Although it started life as a games and educational machine, the BBC Micro has been fulfilling an ever-increasing role as a serious business computer.

The arrival of the Master series - and its spectacular initial sales - will certainly accelerate this trend and create an entirely

new generation of users.

Hence the launch of *Business Micro User*. In its pages you will find expert help and advice to ensure you make the most of your machine's potential, reviews of all the latest products, and stories of how people like yourself are using the BBC Micro to increase the efficiency of their business.

We would also like to hear from YOU - both about your achievements and your problems. The address: *The Editor, Business Micro User, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.*



## From Page 3

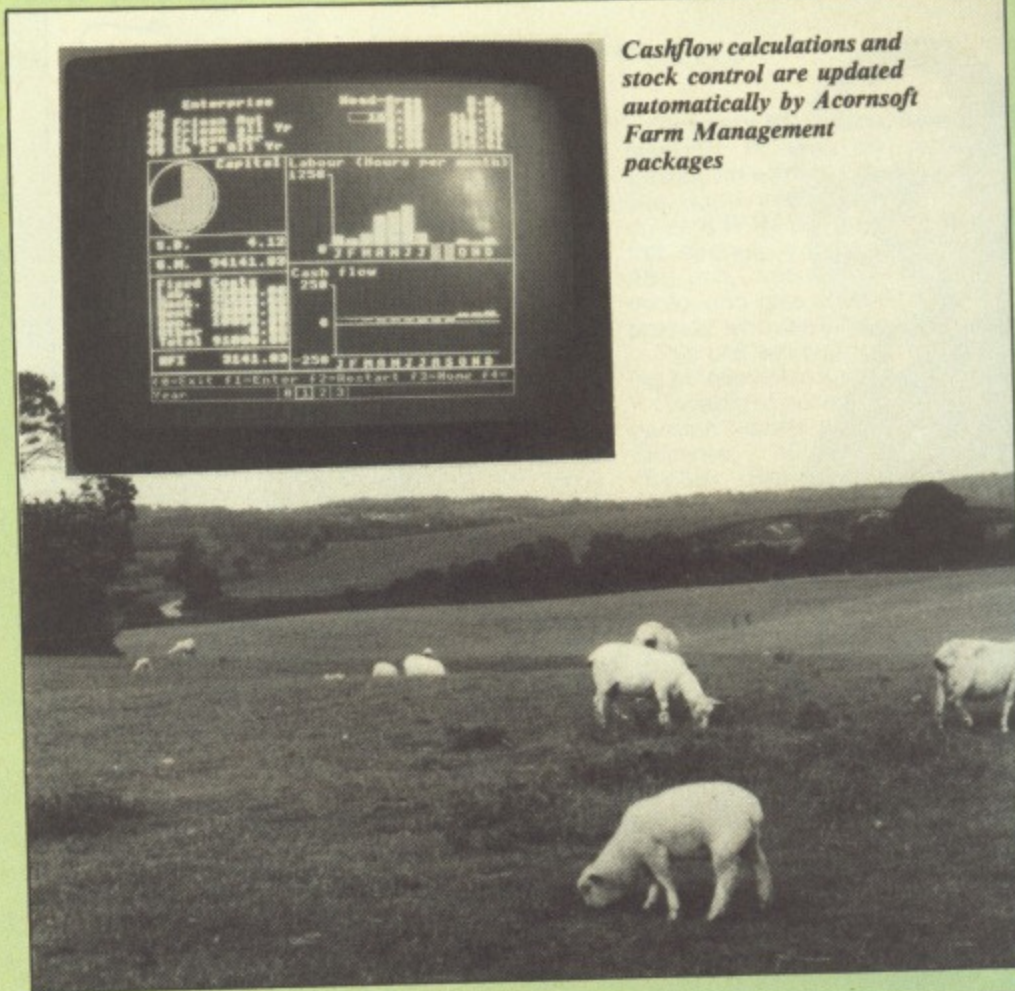
320 acre farm at Droitwich.

He has a 100-strong herd of milking cows and grows wheat and barley. He has joined the NFU's closed user group on Prestel. "It soon paid off", he says. "The market and prices information alone more than paid me for the investment in the first month.

"I have always been keen on gadgetry and the Farm Package was priced right for the average farmer. My wife, Sheila, who runs the farm with me, is very keen on our BBC Micro, which she finds most useful.

"The instruction was first class but, of course, I am still learning new techniques. It enables me to rotate my crops properly and keeps my cash performances up to date. It saves a lot of pencil work and allows me to spend more time on what I want to do - real farming".

He smiled when he said an added bonus will come when he has, at last, spare time for his relaxing hobby - sailing with his wife in their Enterprise dinghy on the River Severn.



Cashflow calculations and stock control are updated automatically by Acornsoft Farm Management packages

ALL the Acornsoft Farming Package modules are capable of using relevant information from other modules as part of their calculations and FarmPlanner has a facility for obtaining any necessary price information from either Prestel Farmlink or the BBC Ceefax teletext service, which require the use of a Prestel adapter or Teletext adapter.

The FarmCash electronic cash-book program contains all the features necessary for the maintenance of the farm's day to day and month to month financial affairs.

Transactions are easily entered, either cash or cheque, VAT calculations and monthly returns are automatic. Individual trader account records may be kept and records of unpaid transactions allow automatic production of creditor and debtor lists with totals.

Cashflow calculations can be linked to the FarmPlanner module for automatic updates. Stock control is automatic, being updated by transaction entry and by records programs such as FieldFile.

FieldFile allows full detailed record keeping of up to 80 fields. The records include field profiles, five years cropping and field summary, and current crop information.

The crop/field matching program

allows the user to easily plan the optimum crop for each field, then using detailed crop information monthly action lists for each field may be produced. The action lists will automatically include estimates for the amounts of fertiliser and sprays required and of the required man hours that need allocating.

When actions are taken and entered on the computer, field records are updated and the stock control file amended (FarmCash).

A field performance monitor, with graphical output, is provided. This allows investigation of costs and outputs on a field-by-field basis, evaluating performance down to the last litre of spray.

FarmPlanner is a two part module. The first part is the FarmPlanner itself while the second is the Enterprise Database which will provide data for planning decisions.

FarmPlanner allows the optimisation of a business plan taking into account land availability, labour, cashflow and capital constraints. Several reference profiles are provided allowing the user to make comparisons with national standards and to use either supplied figures or new figures specific to the plan.

The completed plan becomes the

reference for the cashflow and stock control monitoring functions of FarmCash. FieldFile or one of the alternative record keeping programs will also use the FarmPlanner records when generating action lists and for detailed planning.

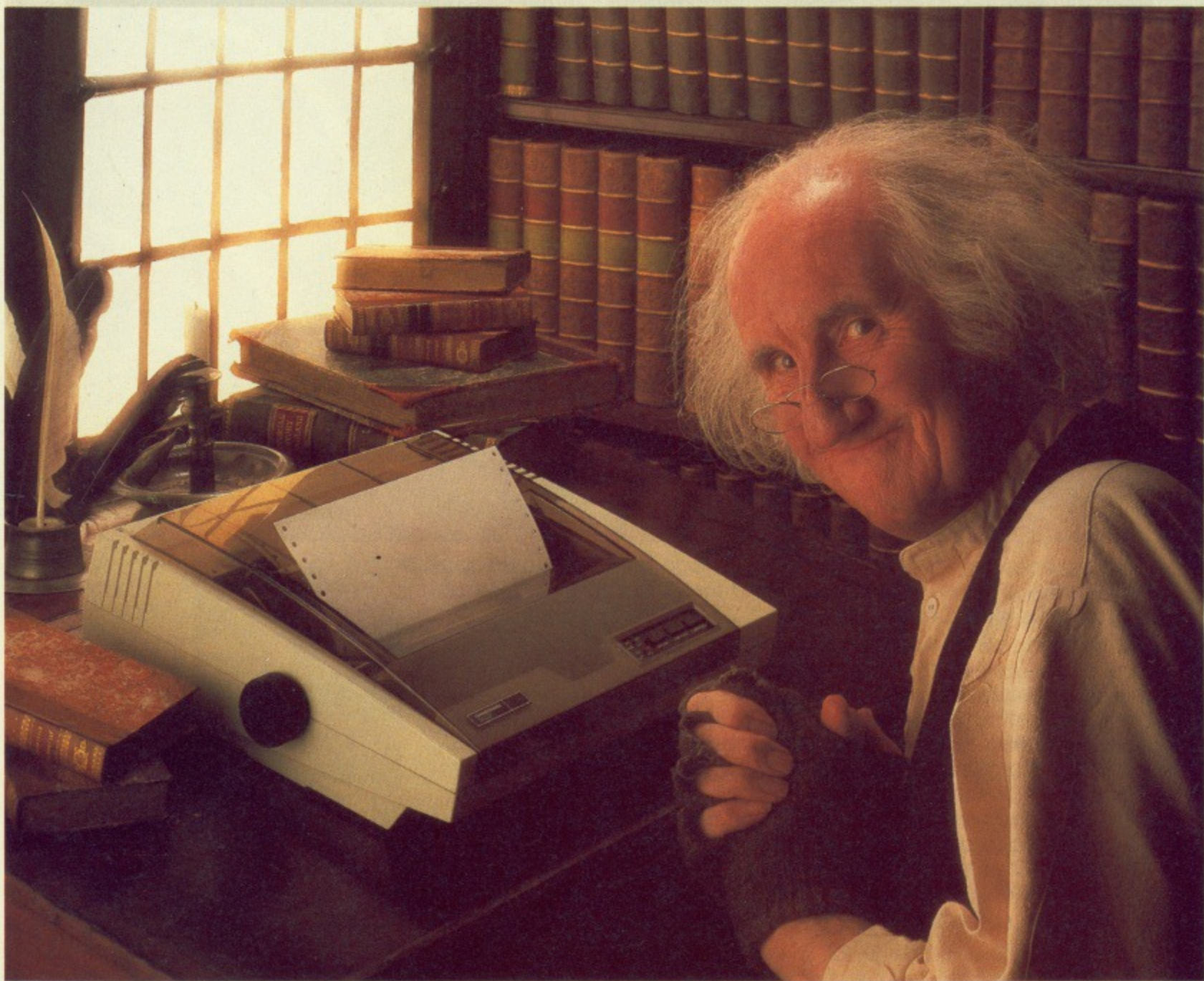
The Enterprise Index allows the specification and storage of all financial and statistical data likely to affect long term planning. If used with a Prestel adapter, information can be automatically incorporated from the Prestel Farming database. Alternatively a Teletext adapter can obtain information from the farming pages of the BBC Ceefax service.

CapCost provides a flexible means of appraising investment strategies for machinery, buildings and other forms of capital investment. It will cope with most of the variables involved with long term investments, providing automatic comparisons of alternative schemes and allowing the user to present his funding agency with detailed reasoning for any proposed plan.

In addition to the core package, other modules are planned to meet differing needs. Four will be similar in function to Fieldfile but configured for specific areas of farming - DairyFile, StockFile, PigFile and PoultryFile.



# Thrifty micro owners choose the new MT80+



**K**een on saving money? But not prepared to sacrifice quality and performance? Then the new MT80+ serial matrix printer has plenty to offer at a price that will have you rubbing your hands with glee.

The MT80+ prints at 100 cps and is compatible with just about any popular office or home micro. For true print

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the quick tear facility is a real bonus.

The new MT80+ from Mannesmann Tally. Europe's leading matrix printer manufacturer. You'll be laughing all the way to the bank. Contact us now for our literature pack.



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# Nightingale Does It Better!



Communicating with the outside world can present its own special problems. Fortunately help is at hand for BBC users in the form of Nightingale and Commstar.

The Nightingale modem has become the standard by which others are judged. Combining simplicity of use with true multi-baud rate operation, Nightingale can provide access to both Viewdata (1200/75 & 75/1200 baud) and full duplex (300/300 baud) systems. Furthermore, Nightingale can be expanded to include auto dial/auto answer facilities with full software control. Commstar THE communications software for the BBC, *is now better than ever!* The new enhanced version now available on a 16K Eprom is totally compatible with the new Master Series BBC computer. Commstar's features are too numerous to list here, so please ask for a fact sheet.

Available also for Commstar, is a Technical Appendix Manual for advanced users.

Nightingale and Commstar are available direct from Pace or from good dealers everywhere.

**Nightingale Modem**  
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**£119.00**  
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**Nightingale/Commstar Combination** **£139.00**  
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Please add carriage and V.A.T. to the above prices.  
P & P (U.K.): £0.75 with Nightingale £2.50.

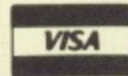
Comprehensive fact sheets are available for these and other Pace products.



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## View is growing

A **PRINTER** driver is a section of machine code, limited to 256 bytes and residing at memory location &400, which interprets instructions from View into codes that the printer will understand.

This allows you to modify the output of the printer from commands embedded in your text depending on the type of printer.

Most dot matrix printers can be instructed to produce pica, elite, proportional, condensed and near letter quality fonts with the addition of underlining, italics, bold and/or emphasised, enlarged, superscripted and subscripted features to the printing.

Daisywheel printers are usually limited to underlining or bold type. Super or subscripting requires reverse and forward half-line feeds.

The default printer driver built into View is limited to two highlights, underline and bold, and even these control codes are not correct for every make of printer.

To change the highlights to produce other print-styles requires highlight1 or highlight2 to be redefined using the HT command to another printer code. This is a cumbersome procedure which still limits you to two print features at any

View, Acornsoft's versatile word processor, is only part of a whole family of interrelated programs and utilities. The recent release of View 3.0, and its inclusion as standard in the Master series, guarantees its future. Here RORY McCLOY takes a close look at two extremely useful members of the View family - a printer driver and an index.

one time.

The Acornsoft printer driver now allows multiple highlights using a combination of highlight1 (underbar) and highlight2 (asterisk) markers (see Figure I). Repeating the combination of markers switches off most of the chosen effects.

The only requirements are that highlight2 is redefined to 130 (HT 2 130) at the start of the text and that a specific printer driver created by this generator package has been loaded using the **PRINTER** command. You can now have all the advantages of View text, formatted on the screen as you enter it, together with multiple embedded printer commands, a feature favoured by Wordwise users.

The printer driver package comes as a disc or cassette (easily transferable to disc) with an excellent 39 page manual. Printer drivers, already compiled, are provided for the Epson FX80, Ricoh Flowriter, Facit 8105, Juki 1600 and JP101 printers, but the main feature is the generator program which allows you to create a block of machine code specific for your printer - provided you can understand the summary pages of your printer manual.

To help you overcome this potentially unsurmountable problem the generator instructions, together with the printer driver manual, are very friendly. They

offer the useful suggestion of loading an existing printer driver answer file, which most closely resembles your dot matrix or daisywheel printer, into the generator so that you can see how to answer the prompts from the generator with the option of changing the answers or codes as necessary.

I was able to modify the Epson and Juki answer files to create printer drivers for my NEC 8023 (dot matrix) and Brother (daisywheel) printers within a few minutes.

The generator allows you to define six print features. They do not have to be limited to those listed in Figure I. For example, if the appropriate codes are used the embedded highlight **\*\_\*** could define enlarged print rather than italics. In addition, the generator can create a limited extended character set of 2 to 32 predetermined characters, such as the degrees sign or French accents (on dot matrix printers only), depending on the number of other features chosen.

I was pleased to find the pad (exact space) character included - a regrettable omission from the original View program.

In this printer driver the @ character appears on the screen but is printed as a space thus fixing the space between words and prevents splitting of two words at the end of a line or filler spaces being inserted during formatting of lines.

However, this printer driver is not without its shortcomings. Combining print features, such as bold elite font with underlining, fails to work unless spaces are left between the sets of highlights, for example **\*\*\* \*\_\***. Therefore it is not possible to have a heading requiring more than one highlight definition starting exactly at

Highlight	Effect (after stored command HT 2 130 is in text).
-	Switch underlining on/off, cancelled at end of line.
***	Switch bold on/off.
*	Next character part of extended character set.
*_	Begin subscripting, cancelled at end of line.
**	Begin superscripting, cancelled at end of line.
**_	Return to normal print after sub- or superscript.
*_	Switch alternative font on/off.
*_*	Switch italics on/off.
*_	Reset all functions off (use at start of document).
-	Used by View Index only.

Figure I: Multiple highlight effects









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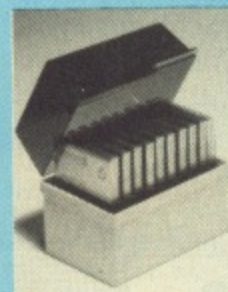


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## From Page 8

numbers in three very easy steps.

Words or phrases in each of the View text files are highlighted using a double 'Highlight1' command (see Figure 1) before and after the word or phrase (up to 50 characters long).

Then load the ViewIndex printer driver by typing `PRINTER INDEX` and create an intermediate index file, not readable by View, by typing:

```
PRINT (templatefile) (textfile1)
      (textfile2) .....
```

The ViewIndex disc contains two template files, TPP and TPS, for index by page number or section number. They can be loaded easily and altered if required. Creating a page number index is very simple but the section number index requires a macro to be called by entering an appropriate `EDIT` command in the text files to be indexed at the

start of each chapter, section and subsection. A final index file is created by the ViewIndex sort program run by `!BOOTing` the ViewIndex disc.

This file offers options on the final layout of the index – for example right justification of the page numbers – and can be loaded into View for a final check and edit before printing.

After quickly scanning the simple 22 page manual I was able to create a page number index containing 78 word/phrase entries from a 6,800 word document on three text files in a remarkably short time.

ViewIndex took only 1min 30secs to create an intermediate file by picking out the double highlighted words and phrases and a further 1min 20secs to read this file, sort it into alphabetical order using up to 50 characters and write the formatted index of 78 entries back to disc.

From my first read of the manual, insertion of the text highlights, to final

## ViewIndex is quite outstanding and thoroughly professional

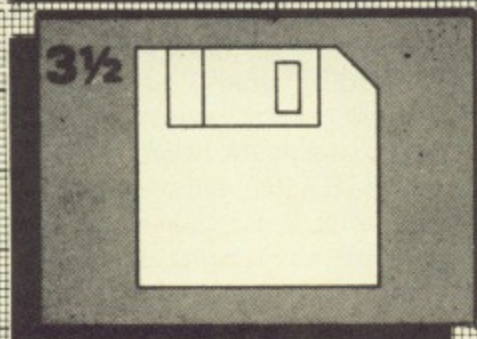
printout of the index had taken just 30 minutes.

The ViewIndex disc comes with part of the manual entered as a text file for you to use as an example and practice creating an index.

It is a pity that relatively few BBC Micro users will be writing books or manuals and need to buy this quite outstanding, and thoroughly professional, utility.

Wordwise users who have already written their book could use ViewIndex (as long as they have View as well) by `READING` their Wordwise files into View, set the double highlights (ignoring the Wordwise embedded commands) and `SAVE` as View files, then proceed as described earlier in this article.

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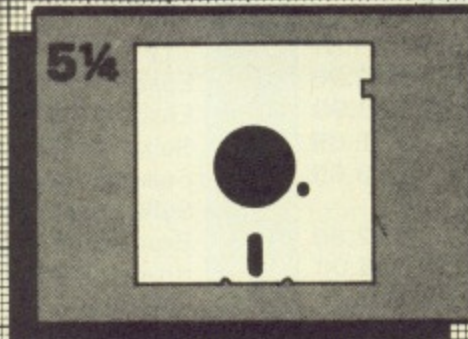


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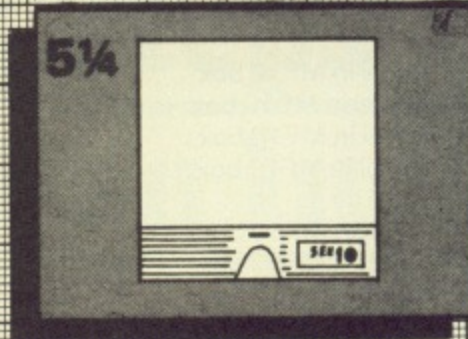


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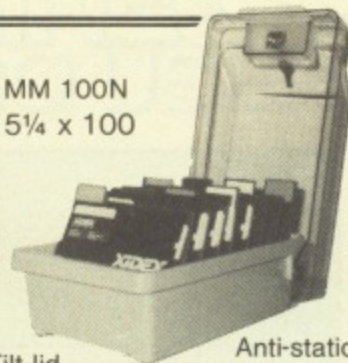
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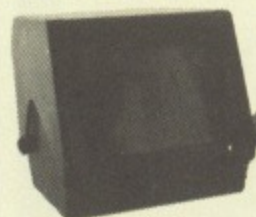
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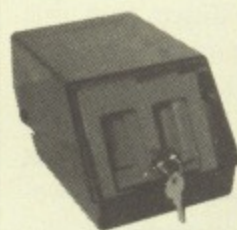
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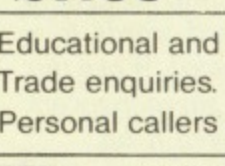


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**JO STORK**  
tells why he  
dislikes many  
business  
packages

# More power — but software lags behind

A RECENT query from a client made me think why I am increasingly seeing business software which is slick, reliable and stuffed full with seemingly highly desirable features, but which I cannot recommend whole-heartedly.

There are many reasons why this can be so, but at the heart of them all I detect a worrying trend.

In the years since micros first appeared everyone has unfortunately concentrated on the hardware's capabilities resulting from the electronic advances. As far as business users are concerned few have realised that this has been coupled with a gradual erosion of good systems design.

Everyone is aware of the progress that has been made in electronics. But few are aware how relatively little pro-

gress has been made in the many other aspects of computing. Even fewer users are aware of how bad systems design is frequently disguised by the ever improving performance of the hardware.

Granted there have been many software developments, but try to think of one to rank with the following:

Each of my five office micros has more memory, more disc storage and in two cases more processing power than the room-sized number cruncher I first used in 1969. Furthermore, their total cost is probably not much more than was paid for 512 bytes of that mainframe's core memory.

Software has also advanced, but much more slowly. While certainly much easier to use than 17 years ago

and also offering more facilities, particularly in the case of operating systems, progress has mainly been limited to utilising this new technology.

This is particularly true of file handling, since in 1969 the majority of computers used only tapes as off-line storage, and most data input was via 80 column punch cards.

## *Excessive faith*

While the tools available have been dramatically improved, the tasks Mr Average wishes the computer to perform have not changed at all. Some applications were only computerised in the last five years simply because it required massive hardware price reductions before a small organisation could consider them candidates for computerisation.

This widely unequal development has had several unfortunate effects, one of which is Mr Average's excessive faith in the power of the chip, while failing to consider the other two sides of his systems triangle, the software and the task.

Many users fail to realise that being delighted with a computer's word processing or spreadsheet performance is no guarantee that other applications are going to be equally successful.

You need to analyse four elements of a computer's performance to ensure that a task will computerise efficiently. Even when this is done, it is no guarantee that the software will prove suited to the job.

These four elements are:

- **Processor power.** Representing the number of calculations and data

## Salutory reminder

*A PROUD record of 17 years dis-integrated through my own carelessness. I will recount it so that you may learn from my mistake.*

*I had always been diligent about ensuring my back-ups are up to date and therefore had never lost any data, despite the usual variety of hardware and software mishaps which a career in computing has accumulated.*

*The other day I was asked to append a few hundred words to a document I had produced. When this was done I naturally saved my work and immediately backed it up.*

*Unfortunately, owing to a set of circumstances which come under the classification brainstorm and sub-classification finger trouble, all I*

*saved was the short amendment. You've guessed it, I had not merged it with the original text.*

*The back-up I immediately made was therefore nothing more than a destruction of my last remaining copy of the original work.*

*By the time the error was discovered it was far too late for me to "unerase".*

*Had the data been more critical I am certain I would have paid more attention. Nevertheless, I will now be more careful than ever that I do not take a back-up of garbage.*

*This unhappy occurrence has been a salutory reminder that while time does make for more experience, it also leads to complacency and hence sloppiness.*



transfers that it can handle in a given time.

● *Memory:* Representing the space available for the operating system, program and data before time-consuming input/output becomes necessary.

● *Type of off-line storage and ways in which data is retrieved from it:* Representing not just the cassette/disc capacity but whether genuine random access is possible.

● *Input/output time required:* Representing the time needed to enter the data, including file creation, and to display/print the results.

Looking at these four criteria more closely we find that the technology is rarely a constraint. Almost invariably it is the system's facilities or general design which causes the major implementation headaches.

Until recently the power available on a home micro was usually geared to giving acceptable graphic/animation speed or to ensuring that reasonable skills and reflexes were needed when playing games. As processor power grows and scientific co-processors become more common it is safe to say that it is now far in excess of what is required for debit/credit/plonk.

Only when your application requires considerable sorting of files or multiple reiterations of complex formulae is processor power likely to appear limited.

Now that memory is so cheap lack of it should never present a problem unless the off-line storage available is wholly inadequate. For many micros the amount supplied was governed by the games sector needing to hold large mazes or dramatic animations.

### *Off-line storage*

If designers would adopt the tried and tested principles of employing several small programs to make up a system rather than one behemoth to perform all the tasks, you should never find memory in short supply.

It is the off-line storage which usually renders the micro inadequate for a particular commercial task. A few figures will demonstrate this.

Even the simplest stock system requires a minimum of 100 characters

per stock record. Allowing for suppliers records, programs, losses due to formatting and a small amount of work area, a 400k disc can therefore store no more than 2000 such records. This represents a definite limiting value.

If only a 128k disc is available even 800 records will probably force considerable swapping of floppies at various stages of the system's running.

Setting aside other essential factors such as the speed of accessing individual records, it should now be obvious why 40 megabyte fixed discs are becoming increasingly common at the business end of the micro market, particularly if any networking is carried out.

### *Time consuming*

These limits vary widely between applications. If the application had been payroll then 500 staff could be easily handled per 128k floppy, and yet firms with this number of workers are almost certainly in the mainframe league as far as data processing is concerned.

If you have ever keyed in a long program you will be well aware of how much time accurate data entry requires. Remember the most expert typist can enter no more than two characters per second. As for printers, they can cost more than your processor plus monitor if they must deliver over 140 high quality characters a second.

The four points I have made are virtually truisms and yet I witness with depressing regularity sensible people attempting to clip three nanoseconds off the processing time of a transaction which requires 18 seconds of data entry and three seconds of output. This is then compounded by the software houses marketing their wares on the basis of speed of calculation.

The BBC Micro is certainly a

## **Businessmen need a load-and-go system which meets most of his needs with the minimum of familiarisation time**

hacker's delight, but the average businessman is not interested in such facilities. He needs a load-and-go system which meets most of his needs with the minimum of familiarisation time.

In the days when multi-national organisations used computers with at most 48k of memory and a large specialist staff to operate them, elegant coding was more important than user friendliness. The one advantage was that you were provided with the essentials and no more.

With today's hardware every program should be slick. There is no excuse for a program being unreliable. Now that memory is so freely available, although the standard BBC Micro has one of the smallest of the popular micros, programs can usually contain all the options the designers wish to provide.

You should now understand why selecting your package is more than just finding polished, reliable and multi-option programs.

Without doubt the starting point must be whether the application is one which shows a satisfactory cost-benefit ratio on the hardware for which it was designed. Assuming this acid test is passed an assessment of the features on those available will follow.

Mercifully market forces weed out the truly miserable products, but sadly their demise can take time.

What you will find available usually results in a choice between many different possible solutions. The one which you buy must be the one which is the most user-friendly.

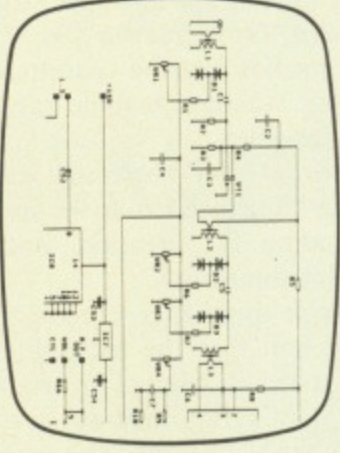
It should now be obvious how many reasons exist why I do not always recommend the slickest program. With the technology available there is no excuse for choosing a tortoise, but nevertheless speed is not everything.



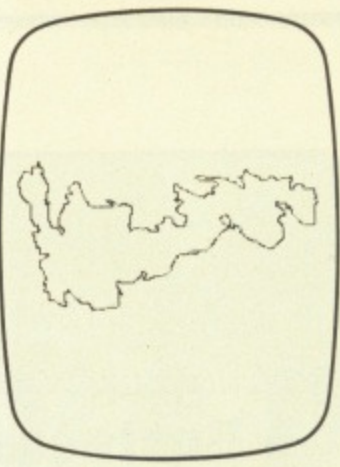
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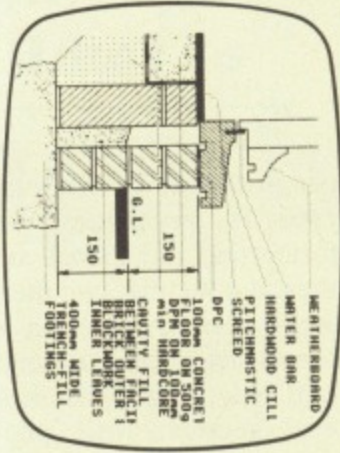
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12D	33.01	27/3/88	6 10.25 25.90
13I	= =	1/4/88	4 10.25 17.30
14W	34.85	4/4/88	3 7.25 9.17
15W	99.47	11/4/88	7 7.25 21.37
16W	60.00	12/4/88	1 7.25 3.03
Bal	15252.85	S/tls	102 334.76

C-Change: I-Insert: D-Delete: T-Totals  
S/BAR to Scroll: CURSORS move arrow

## Simple yet satisfying

PEOPLE who wish to do the simple tasks well need look no further than The Care Utility Series from Squirrel Software.

I have tested three of Squirrel's programs:

- Cash Care copes with up to 60 categories of income/expenditure in either one or two accounts.
- Vat Care produces the three-monthly VAT liability reports on up to 240 sales or purchase postings per month.
- Building Society Care handles a maximum of 240 deposits, withdrawals or rate changes in any year to a building society account, thereby allowing one to know the interest earned at any given time.

It is curious that I received Cash

*Programs: Cash Care £11.95 (cassette) £13.95 (disc)  
Vat Care £14.95 (cassette) £16.95 (disc)  
Building Society Care £9.95 (cassette) £11.95 (disc)  
Supplier: Squirrel Software, 4 Bindloss Avenue, Eccles, Manchester M30 0DV. Tel: 061-789 4120*

Care at the same time as Bank Manager. While offering nothing like the facilities of the latter, it seems far better suited to the market into which it is pitched.

It is a great compliment when I say that this is the sort of program which you'd wish you could produce at home over a weekend.

At the cost of a take-away meal, Squirrel have taken all the chore out of getting a useful program.

Vat Care adopts the same no frills approach. For the small tradesman who loathes keeping the books and is not interested in copious management information, this is the ideal system.

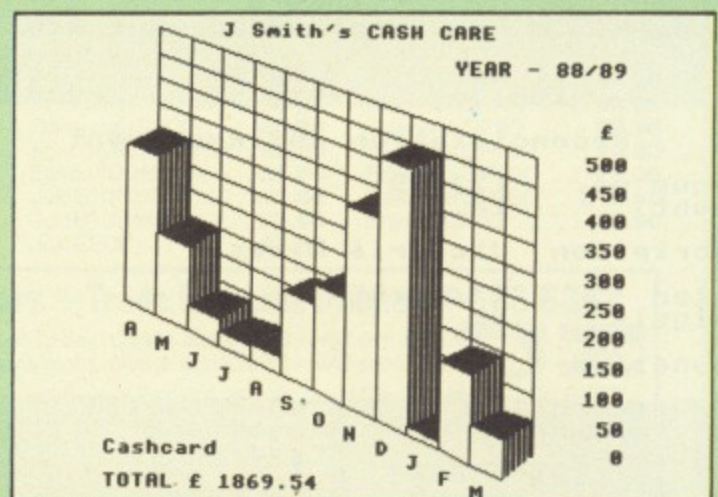
Whereas Bank and Vat Care work on the time honoured debit-credit-plonk principle, Building Society Care is more like a spreadsheet. This is so that you may experiment in order to test the effect of money being moved around.

Each row represents a transaction, while each cell of the matrix represents the detailed effect the transaction has upon the account.

At a cost of £10 to £15 each they represent excellent value for money.

Joe Stork

J. EVERYMAN'S VAT CARE Jun 88			
Three month period to end Aug 88			
Invoice	Gross	Vat	Net
C/Amount £	= =	= =	= =
AMPLX 001	123.44	16.10	107.34
WENDBY 002	431.94	56.34	375.60
SOWERBY003	515.43	67.23	448.20
JONES 004	41.40	5.40	36.00
CLARK 005	61.18	7.98	53.20
HOPES 006	262.27	34.21	228.06
LEWIS 007	517.11	67.45	449.66
BORAX 008	2650.98	345.78	2305.20
ALLIED 009	513.66	67.00	446.66
MOXBY 010	1800.82	234.89	1565.93
GARAGE 011	68.23	8.90	59.33
STATNY 012	26.06	3.40	22.66
XPPUBS 013	1786.33	232.00	1554.33
COUNCIL014	59.80	7.80	52.00
XYDISTB015	346.45	45.19	301.26
S/tls	£ 9205.10	1200.67	8004.43
page 1	: 'M' - month selector & info		





## Managing a little too much, perhaps?

THE Bank Manager from Contex Computing is a delightfully simple program which performs its task admirably and yet I wonder how successful it will be. Just how many people are there who require to keep track of and analyse up to 36 separate bank accounts?

Who needs cheque reconciliation, interests, credit cards, standing orders and so on to be analysed under a maximum of 99 different categories split into 12 monthly accounting periods?

Further facilities such as the ability to set a budget against any category and compare actual against target performance is possible, as is the automatic posting of regular payments to the appropriate account. Password protection is standard.

I stick by my opening statement that The Bank Manager is a simple program, despite this lengthy list of facilities. Data entry is a delight. The professional, chatty and comprehensive manual answered the few queries I had during operation. It is one of the few systems at this end of the

*Program: The Bank Manager*  
*Price: £17.50 (disc)*  
*Supplier: Contex Computing, 15 Woodlands Close, Cople, Bedford MK44 3UE. Tel: 02303 347*

market to have a sensible index.

The program is menu driven to select the required option, and uses question and answer for data entry and modification. When used for the first time the program automatically enters file-building mode.

While the fields to be filled are mandatory, you can select how many records are to be handled and in some cases, such as descriptions, can choose the field lengths.

This is particularly useful if only a single drive is available and several different accounts need controlling.

Postings are held on the system chronologically, which makes reconciliation simple. Transactions may be left unreconciled indefinitely. On completing the data entry you can select from a variety of reports. Complete files, or only those records which meet certain criteria may be listed. Simple histograms can also be produced.

A feature I particularly liked was the look ahead facility which allows a date in the future to be selected and an estimate of the balance likely at that time to be made.

As with any system, personal preference counts for much. Although most of my quibbles fall into this class, there is one of universal relevance.

Despite the manual's strenuous warnings not to press Break during operation, I decided to test what would happen.

As predicted, my test files were left a shambles. I hope to see some disabling of this key implemented in future revisions.

Despite regarding Bank Manager highly I believe that companies needing all these facilities will probably have more computing power available than a BBC Micro. What is more, the whole cash reconciliation system will then be linked in with the nominal ledger.

Although this is an excellent product I still wonder how big the market is.

Jo Stork

### Contex Bank Manager

19/02/86

Bank	M	Midland Current A/c	
B/f bal	100.00	Unrec	-429.90
		Total	-329.90

#### Reconciliation and Amendment

Cheque no. 123459  
Amount 18.95  
Description Victoria Wines  
Posted 17/12/85  
Analysis HH  
Reconciled NO

R reconcile	U unreconcile
F forward	B backward
A amend	S search
I initial record	L last record
D delete record	Z no more

19/02/86 Itemised Look Ahead  
A/c M Midland Current A/c

Description	Ref	Amount	Balance
B/f balance			100.00
19/02/86 Total unreconciled		429.90	-329.90
27/02/86 CU Life Insurance		25.00	-354.90
28/02/86 Salary approx		-1600.00	1245.10
28/02/86 Ending balance			1245.10

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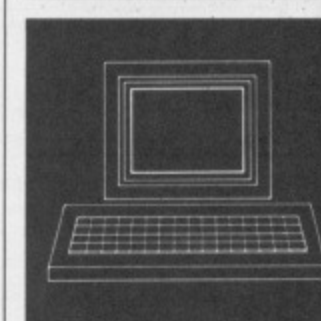
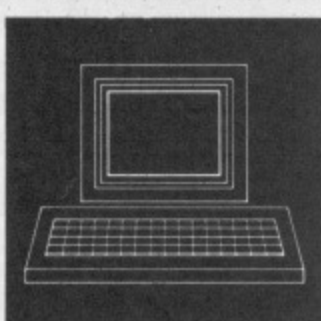
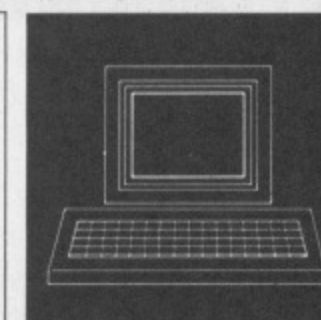
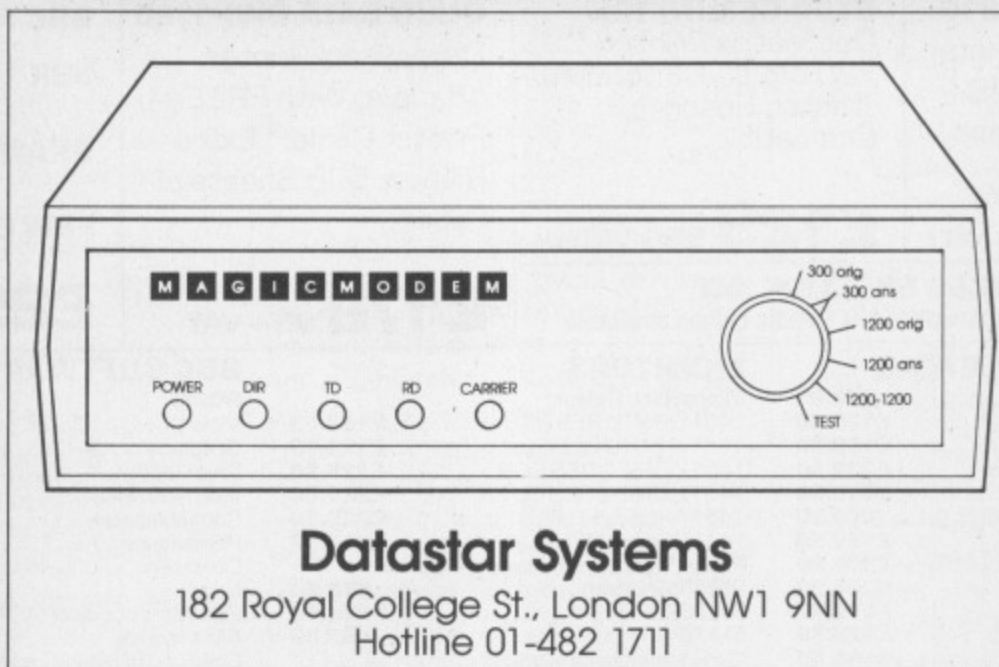
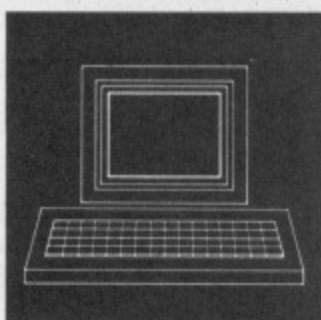
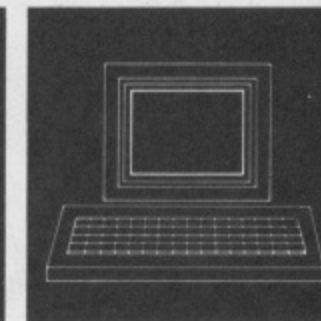
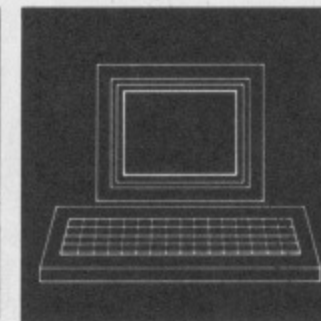
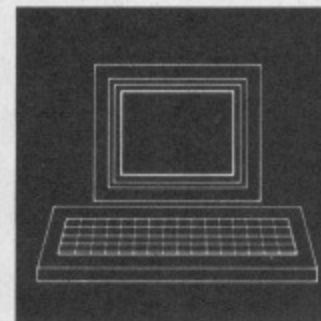
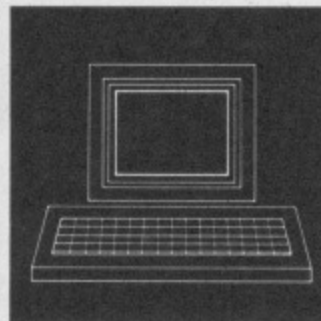
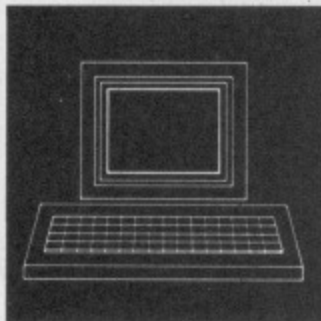
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**QUICKCALC**, as its name implies, is a spreadsheet. After considerable testing I came to the conclusion that for a system aimed at a relatively small machine, it stands up extremely well.

In ease of constant, variable and formula entry Quickcalc is typical of most spreadsheets in this respect. Manoeuvring round the work area and then making the entry is done in the time honoured manner adopted by the majority of software houses.

Moving the cursor a cell at a time, or a screen at a time when used in conjunction with the Shift key, or directly to cell, all work no differently to dozens of other products. There is nothing quirky or unexpected in this area.

The ever-present windows on the screen are particularly useful, if at times worrying. One indicates the amount of memory still available. This starts at a small number and seems to reduce at a horrifying rate, particularly if you are using considerable replication or quantities of text.

I would reckon on 600 cells as a realistic maximum unless your formulae are extremely simple or you really keep the text to an absolute minimum. This is normally more than sufficient for most purposes.

In ability to precisely define which rows and columns are to be output there is nothing remarkable about Quickcalc. Like the vast majority in its price range, only a single area can be output at one time. I have learnt to accept that the facility to print columns A-D, L, O and R-T is only available on the most sophisticated spreadsheets.

Nevertheless there are two features

## Quickcalc compares well with the really big boys

which I particularly like.

The first is the ability to direct set-up codes to the printer at any time, thereby allowing either the maximum density of print possible before the printout needs to be segmented or alternatively double sized characters for the maximum clarity when producing overhead projector slides and the like.

The second feature is that simple barcharts constructed from asterisks may be produced. The only problem with this is that it does require you to create a very wide column in order to work in a realistic scale. Placing the

**By JO STORK**

graphic area at the end of the work area gets it out of the way when you are still working on the screen.

I do not normally "open up" the software when testing. Had I done so I suspect that I would have found Quickcalc has a direct line to Basic. Twenty one arithmetic, plus a further four specialist functions, puts this product in the first division. Add to this the normal operators, both mathematical and logical, and you have enough facilities to calculate how big a disappointment Halley's Comet will be when it next comes this way.

In ability to alter the dimensions of the spreadsheet with the minimum disruption to other sections of the work area once again Beebugsoft have passed one of my favourite acid tests with flying colours.

I produced a 10x10 chi square matrix and obtained the results. If you don't know what one of these is, it doesn't matter. Suffice it to say that it uses some of the functions. Next I swapped columns 4 and 5, deleted row 1 (I had no titles), inserted a new row 10 and finally selected a change in the order

of calculation. This last means that rather than calculate column by column I requested calculation row by row.

This whole operation took somewhere between two and three minutes and I did not touch a formula or cell reference. I reckon with respect to this criteria Quickcalc is watertight.

Copying single cells or text is simple. This is why the modification above was so quick. Nevertheless I would still have halved the time if rows, columns or blocks could have been shifted in one move. The swap needed 10 separate copies, whereas I would have needed only one had this feature been available.

Not finding any obvious way of filing a spreadsheet in Ascii or display format in the excellent little handbook, I began experimenting. I soon gave up when all I achieved was to demonstrate some of the error messages.

This program adopts the principle that text entries are associated with the cells. I find this useful in some respects, such as when used for row or column headings and awkward at others when you wish to add comment lines, footnotes and the like.

My preference is for systems which disassociate the text from the cells where only one method is available, but I would never downgrade software for adopting the cell-based method.

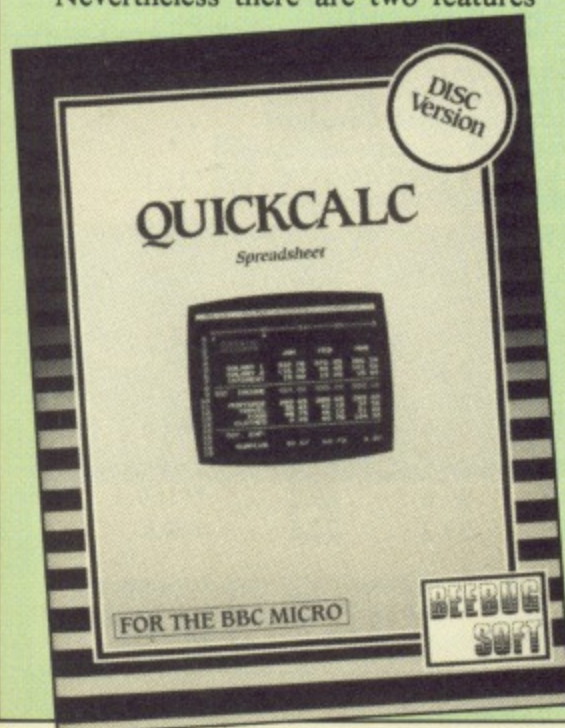
Few things irritate me more than systems which force me to count spaces, therefore I do like Quickcalc's ability to justify the headings.

Reading back through this review, I sincerely hope that I have not given the impression that the package is in anyway unsatisfactory. Nothing could have been further from my intention. I have matched this product against a set of criteria which would break many of the largest, most sophisticated spreadsheets designed to run on IBM PCs with half a megabyte of memory.

The fact that Beebugsoft's spreadsheet can even stand comparison with the ultimate programs is intended to be high praise indeed. I described it the other day as follows: "I started testing a Metro or a Fiesta and discovered it compared very favourably with a Mercedes or Jaguar".

Nice one Beebugsoft.

Program: Quickcalc  
Price: £15 (cassette), £18 (disc)  
Supplier: Beebugsoft, PO Box 109, High Wycombe, Bucks HP10 8NP. Tel: 049481 6666





*Business System DOS  
from Computer Users Club,  
69 Hadlow Road, Welling,  
Kent.*

## BSDOS offers more files — but at a price

By JIM NOTMAN

THERE was a time when anyone who was selling a new DFS would tell you how compatible it was with the standard Acorn single density system. Not Business System DOS from Computer Users Club. It has deliberately turned its back on Acorn's DFS to produce something which gets around its deficiencies.

The main limitations of the standard system were that there was a maximum of only 31 files, 7 characters for each filename and an inefficient use of disc space. Disc files had to be placed in one continuous space, sometimes making it impossible to extend a file.

BS DOS has a completely different way of organising the disc and its files. This allows up to 256 files. Filenames can have up to eight characters with a three character extension. This is similar to CP/M, where these extra three characters are necessary to show the system what sort of file it is dealing with.

If the disc is double sided both sides are treated as one continuous side, allowing longer files. One of the biggest advantages in the new system is hardly noticed at all. There is no \*COMPACT command because it is not needed. Disc space is allocated much more efficiently, so there is no need for the "Can't extend" error.

### Names changed

With just the BS DOS fitted PAGE is at &1700, because it doesn't reserve any private workspace just for itself. This means that even with the standard Acorn DFS fitted PAGE is still at &1900.

There are fewer commands than in the Acorn DFS (see Figure I). Some of the familiar commands have had their names changed, the \*LOOK replacing \*TYPE and \*INPUT rather than \*BUILD. The main additions are disc format and verify commands.

First impressions were that the system seemed very slow when filing, and this was confirmed by the benchmarks. All the timings were slower than the slowest Acorn DFS, the

0.90. The only exception to this was in writing a relative file backwards.

There seemed to be an error with the internal pointers, because a file written in reverse order, starting with the last item and working backwards, was not the same as one written from the start. These files were the same for other disc system, why not for the BS DOS?

Organisation of the disc is the same as for Torch's CPN (later versions are known as MCP). So with BS DOS you can make use of files produced by the Z80 in an ordinary BBC Micro or when the Z80 is switched off. However this format is not the same as the Acorn DFS or Acorn's Z80 CP/M system.

Acorn recognised the failings with its standard DFS and produced the ADFS

```

▷*HELP DOS BS-DOS 2.19
ACCESS [afsp] (L/S/U)
COPY [src drv] [dest drv] [afsp]
DELETE [fsp]
DRIVE [drv];
FORMAT [drv] [trks] (ltype)
INPUT [fsp]
LOOK [fsp]
RENAME [old fsp] [new fsp]
USER [user]
VERIFY [drv]
WIPE [afsp]
    
```

Figure I: The response to \*HELP DOS

(reviewed in the December 1985 issue of *The Micro User*). The ADFS is a much better system, being even more flexible and double density as well. So apart from Torch owners, it is difficult to see who the BS DOS will appeal to.

DFS	Acorn 0.90	Acorn 1.20	ADF 1.30	BS DOS
1 OPEN + CLOSE files*1000	4.3	5.1	21.7	*21.1
2a PRINT 1000 numbers	15.7	6.7	13.3	21.1
2b PRINT 100 strings	61.0	24.8	46.4	113.0
3a INPUT 1000 numbers	12.6	5.8	6.2	16.5
3b INPUT 100 strings	57.1	23.0	23.2	73.3
4 BPUT 1000 bytes	5.0	3.4	8.0	7.5
5 BGET 1000 bytes	3.9	2.5	3.4	5.7
6 Move PTR 1000 places	2.2	2.2	6.8	5.3
7a Write test relative file	62.9	25.9	48.6	103.7
7b Read test relative file	58.4	23.5	23.8	77.6
8a Write relative file backwards	240.3	99.6	69.2	**169.3
8b Read relative file backwards	99.9	39.2	22.6	119.3

(\* opened and closed only 10 times)  
(\*\* see text)

Table I: Benchmarks



# WE OFFERED THEM A CHALLENGER-THEY GAVE US BACK A CHAMPION

After testing the new 3 in 1 Challenger disc drive system from Opus Supplies, Britain's three leading BBC micro magazines were clearly impressed. After all Challenger is the fastest disc link-up ever with no complicated

interface connections, soldering or track cutting. No wonder this remarkable plug-in disc drive, double-density disc interface and super fast 256K RAM disc combination is currently taking the market by storm.

## A&B COMPUTING

### THE VERDICT

"Opus have got a winner on their hands. If you are looking for a disc upgrade you can't go far wrong by buying a Challenger, even if you already have a single drive this would certainly be a sensible upgrade path. This certainly gets my vote as best buy of the year."

A & B COMPUTING - JANUARY 1986

### RAM DISC PERFORMANCE

"Here is the pièce de résistance of the whole system - a 256 K RAM disc. I honestly don't know how Opus can do it for the price.

Using the RAM disc is a real dream with disc based applications. Getting back to the actual performance of Spellcheck II, with the dictionary disc set up in the RAM disc, the result is amazing. When in automatic checking mode the text scrolls past so fast it is difficult to read. To put some figures on the improvement in speed, I checked a document just over 21 K long, which took 5 minutes 56 seconds on floppy and only 1 minute 7 seconds using the RAM disc."

A & B COMPUTING

## ACORN USER

### THE VERDICT

"At £249.95 inclusive you get the RAM disc, double-sided 40/80 track drive, Opus DDOS plus manuals and leads. Overall very good value for money, particularly if you are looking for a disc upgrade from scratch."

ACORN USER - FEBRUARY 1986

### RAM DISC PERFORMANCE

"The big deal comes in the speed. Being a purely electronic device, actions such as reading and writing are performed in fractions of the time a mechanically engineered disc drive takes.

To prove the point, I ran three programs on the RAM disc and the same three on the standard Opus drive with the following results (timings in seconds):

	RAM DISC	NORMAL
1 Save 32 K memory	0.34	13.69
2 BPUT 1 to 1000	1.14	4.71
3 PRINT/1000 strings	4.64	10.17

You don't need me to point out the huge speed increases."

ACORN USER

## THE MICRO USER

### THE VERDICT

"For the serious user Challenger could make file handling far easier and a good sight faster to use than a standard DFS as well as bringing a permanent end to 'is it 40 or 80 track, single or double density?' problems. In addition all the workspace used by a standard DFS is reclaimed and made available to the user by Challenger."

THE MICRO USER - FEBRUARY 1986

### RAM DISC PERFORMANCE

"Of course it's not just a versatile disc drive, Opus also provides you with 256 K of RAM to play with. This RAM thinks it is a disc and the DDOS treats it as drive 4. If you have the 512 K version you get a drive 5 too. The RAM disc allocates sectors to files so that errors such as 'can't extend' are eliminated. In other words, it is a simple matter to use the RAM disc for most of your random access files then copy completed files from the RAM disc to a floppy disc."

THE MICRO USER

**FREE**

256K SOLID STATE

RAM DISC WORTH £50

Opus.

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### CHALLENGER-STILL SIMPLY LIGHT YEARS AHEAD OF THE OPPOSITION

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

\_\_\_\_\_ Challenger Unit(s) £249.95 each  
 \_\_\_\_\_ RAM DISC upgrade(s) to 512K at £49.95 each

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

My Access  Visa  no. is: \_\_\_\_\_

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Quantity _____	ZDP 240(s)	@ £549.00	£ _____	Model B + <input type="checkbox"/>
Quantity _____	HDP Z80(s)	@ £1,999.00	£ _____	
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# NEWSLETTER

## Hot line for fishermen

ICELANDIC subscriber Ingiber Oskarsson is casting his net wide, hoping to catch MicroLink members and their friends who are involved in fishy business.

Ingiber works in the fish processing industry, based in Keflavik, and wants to contact other system users with connections in the trade.

His company supplies salted fish to customers in

Spain, Portugal and Italy.

This takes care of all the cod that's brought ashore, but it leaves him with plenty of other species on the slab – and he'd like to find markets for them.

Haddock, catfish, halibut – and the exotically-named tusk and redfish – are available, fresh and unsalted, and Ingiber can be contacted on MAG20213.

## LINK WITH THE ERA OF STEAM

THE British Rail booking service on MicroLink isn't all about high speed Inter City travel. It also caters for those who like to hark back to a more leisurely and stylish era.

Subscribers can turn back the clock by taking their reserved seats on one of a series of steam-hauled excursions running between Marylebone Station and Stratford-upon-Avon on Sundays during the spring and summer months.

These special trains will be pulled by historic steam locomotives such as LNER Pacific locos Flying Scots-

man, Sir Nigel Gresley and Sir Lamiel.

The return fare of £35 per passenger includes First Class reserved seat, morning coffee and three-course roast beef luncheon on the outward journey, and afternoon tea complete with scones and clotted cream on the way back.

All the meals are served at your seat by BR waiters and there's also a fully licensed bar available throughout the day.

MicroLink plans to add more special train excursions to its British Rail booking service in the near future.

## Ready for your order

*HUNDREDS of items of computer hardware, software and peripherals are now within keyboard reach of MicroLink subscribers through OrderLink.*

*Like a shop that is open 24 hours a day, seven days a week, OrderLink is the con-*

*venient way to buy products from some of the biggest names in the industry.*

*And the list is growing as more major suppliers join this increasing popular electronic mail-order database for computer and communications equipment.*

## Guide to all the micro shows

**THE most complete list of computer exhibitions held in the UK is now available via MicroLink. As new shows are announced they go straight onto the database – making it the most up-to-the-minute guide there is. Currently there are 37 shows on the list – an all-time record.**

## Satellite covers weather scene

A DRAMATIC breakthrough on the computer front now allows MicroLink subscribers to discover what the weather holds in store.

Whether they live in Turkey or Torquay, they can tap into the same information from outer space that enables the men from the Met Office to predict sunshine or showers.

The reason for this is WeatherLink, an exclusive new service on MicroLink.

Using an aerial based in Kent, signals from the

NOAA9 weather satellite are intercepted and converted into electronic data.

The receiver works on circular polarisation to follow NOAA9 every time it appears on the horizon, faithfully monitoring it until it disappears from view some 15 minutes later.

And the same sequence is followed on average four times a day.

Live pictures produced by the satellite hovering 450 miles overhead – it takes two at a time, one in visible light,

the other infra red – clearly show the part of the world from North Africa, through Europe and Great Britain up to Iceland.

All these are recorded on a micro linked to the receiving aerial. The next stage involves a converter which takes the image and readies it for transmission over standard telephone lines to the main MicroLink computer.

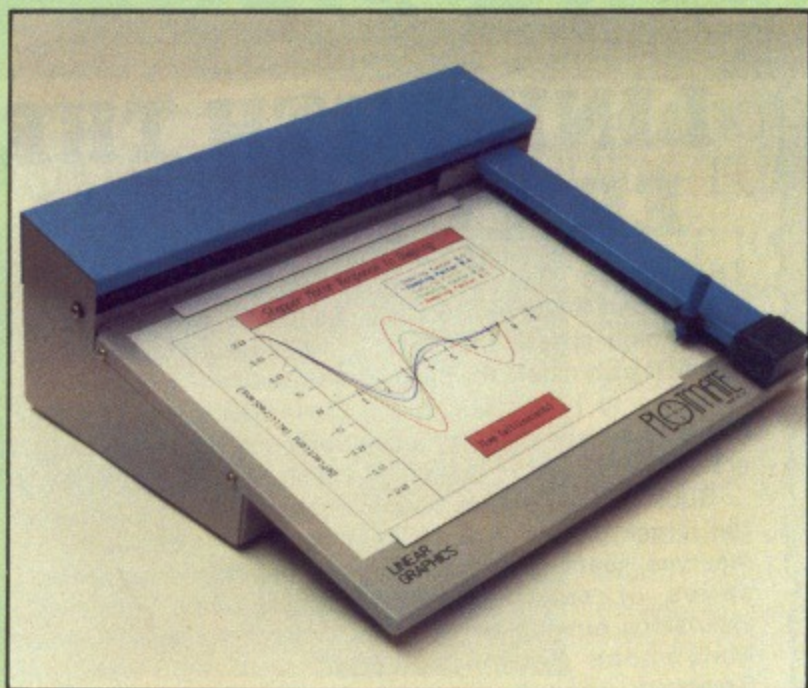
Once a MicroLink subscriber logs on, all he needs to do is pull down the

information file in its expanded format, compress it using specially written software which is also on the MicroLink menu, and then display it.

Launched on February 12, WeatherLink generated such excitement that a team from Thames Television was on hand to cover the event.

At exactly 3.05pm, subscriber John Wallbridge achieved a world first by displaying the first weather satellite picture on his micro in his London home.





# Plotting those multi-coloured graphics

The new flatbed plotter from Linear Graphics reviewed by MIKE COOK

**PLOTMATE**, a flat bed plotter from Linear Graphics, is sturdily built of sheet steel and the drawing area is sloped.

The paper is fixed on with magnetic strips – so you have to keep them away from your discs – and the fibre tipped pens locate firmly in a twist lock holder.

It was supplied with several sheets of expensive paper which is specially coated to prevent ink from soaking in and making the lines fuzzy, thus showing the output at its best.

Basically the Plotmate allows you to get multi-coloured hard copy from your graphics programs in a simple and painless way. It also enables you to use

a much higher resolution than the computer screen, so that straight lines will be smooth not stepped.

Let me explain. I arrived home one day with a Plotmate and was immediately harangued by my wife who wanted to know what use it could possibly be.

"It would be useful if it could help me with my embroidery", she said. So in the interests of marital harmony I put the Plotmate through its paces.

In essence, to create an embroidery chart from a picture postcard – you must lay a piece of squared tracing paper over it.

Then each square of the picture is

coded with the relevant colour. The trouble is trying to plot this chart on a scale that can be read. So what I decided to do was type into the computer the colours of each picture square and get the Plotmate to print out a chart.

By using the five different coloured pens roughly corresponding to the colours of the final threads and a number of simple symbols, all 17 thread colours could be plotted. Also we would have a very rough idea of what the final embroidery should look like.

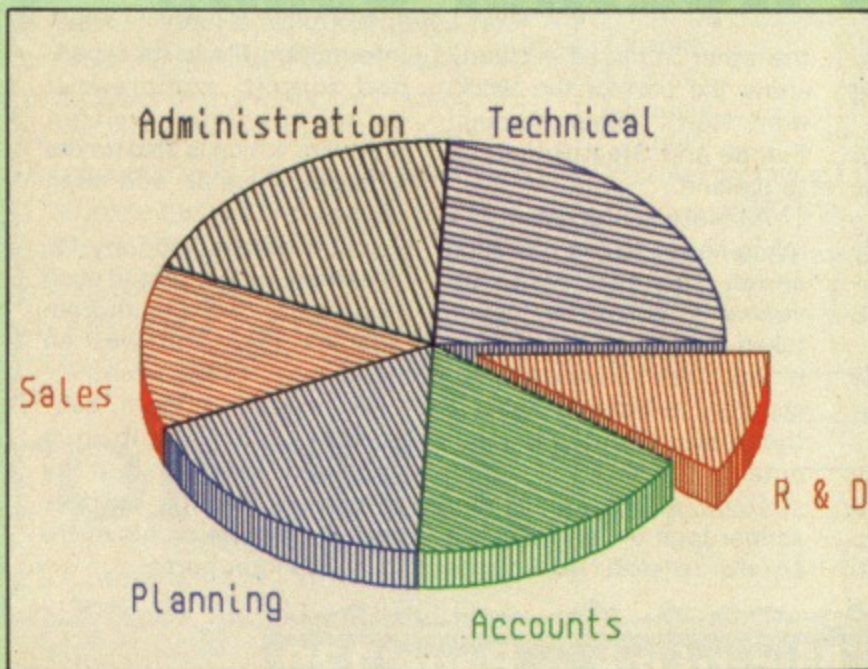
So let's see how I fared. First of all the lead connecting Plotmate to the user port of the computer was very short and I could only just place the plotter next to the computer on the bench. I am assured I was sent the wrong lead.

The instruction manual was brief but to the point, so I ran the demonstration program and selected the instructions option.

They winked on and then off, the screen giving me no time to read them. I thought I would stab the Escape key the next time round, but found it to be disabled.

Why do people protect software that is of no use to anyone without the hardware? Especially when the software comes free with the hardware. It could have been a useful exercise in how to drive the plotter.

Undaunted, I ran the option which lets you drive the plotter from keyboard commands. Although the pen up and down commands would not always



*Departmental budget pie chart produced on the flatbed plotter*



work the rest behaved as it should plotting graphs, charts and maps.

The idea of Plotmate is that the software intercepts the PLOT commands and translates them into pen movements. This will allow you to first get it right on the screen and then activate the plotter to get your hard copy. Unfortunately the driving software takes up so much space that you can't work in any of the large memory Modes 0, 1 or 2.

There are two versions of the software driver, one that sits from &3400 to &5800 and the other from &5800 to &7000. The former allows a Mode 4 screen to be used and the latter allows more Basic programming space at the price of not being able to use a graphics screen simultaneously.

With a second processor fitted the software is still in the I/O processor allowing more programming space but still the same mode restrictions.

Once your program is running you can activate the Plotmate software by having a program line \*RUN the appropriate file, when all drawing commands will be sent to the plotter. Commands to change colour result in a prompt being given to change the pen, and the pen lifting off the paper and moving to one side.

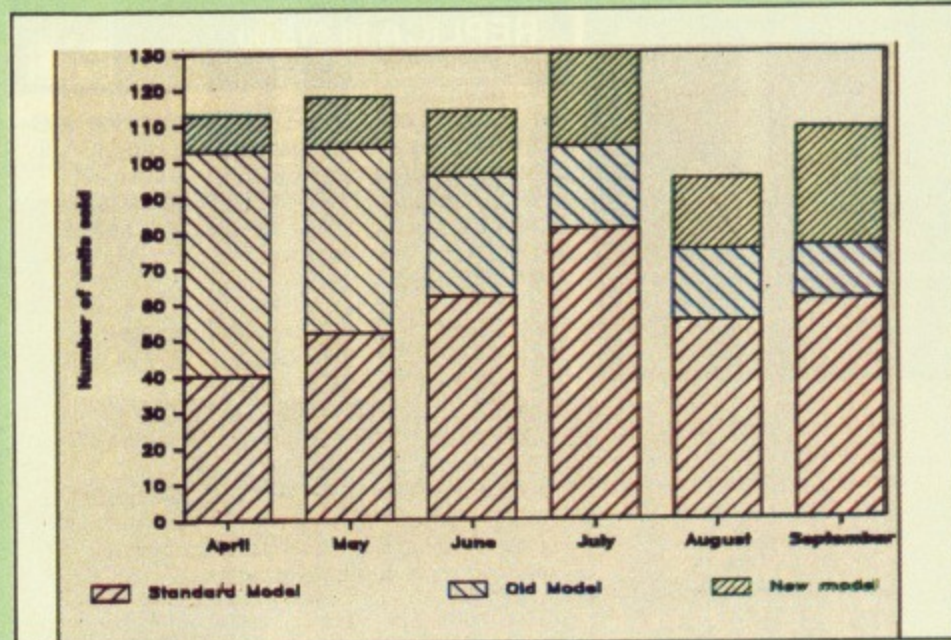
These prompts can be suppressed but not when you are using the second processor. If your plot commands specify a filled area Plotmate will fill it. However, this can take quite some time for large areas.

To save time and obtain special effects you can specify various degrees of shading to fill a block or triangle. The line drawing can also be defined as continuous or various patterns of dots.

As Plotmate enables simple scaling to be performed within the bounds of your A4 paper you can enlarge or reduce any picture to almost any extent. Also the origin may be shifted. Text may be drawn and it can even be given the italic treatment.

There are a few restrictions in techniques when moving a picture on to a plotter. First of all nobody has yet invented a flashing ink. Also the GCOL commands have no purpose except for changing colour.

Once a line is drawn it obviously cannot be erased which means that certain hidden line algorithms do not



Product sales displayed as a bar chart

work – mainly those that start drawing from the back of an object and allow areas to the front to obliterate sections of earlier areas.

So armed with the knowledge gained from these experiments, my wife and I typed in all the embroidery data and with a little deft programming I was able to produce the required chart. It took about 45 minutes to plot.

As it would be totally incomprehensible to most people I will not reproduce it here. However, my wife was more than pleased with it, saying that the computer had finally been useful.

All hardware is only as useful as its driving software, so Plotmate is accompanied by a suite of packages that allow you to exploit it to maximum advantage. While space does not permit a full evaluation, here's a rough idea of their capabilities:

**Lincad** is a general purpose drawing package with a zoom and editing facility. There is help in the creation of 3D images with arcs of ellipses and the entire drawing can be labelled and saved to disc. The results are prepared on screen and then sent to a matrix printer or Plotmate.

**Lintronic** is a package especially for the creation of circuit diagrams. Component symbols can be created and used many times. Some symbols such as the loudspeaker require to be constructed from more than one symbol.

**Linchart** can create bar and pie charts in a number of different ways. The charts are produced either from

data typed directly from the keyboard or from an Ascii disc file created by some other program.

Unfortunately all these packages require Basic II to be fitted, a rather unprofessional attitude on the part of the writers of the packages.

To summarise, Plotmate performs well and enables you to create hardcopy coloured graphics of high resolution. I found it a bit noisy in operation when the pen was being lowered – it came down with quite a thump and after a time flattened the fibre-tipped pen, producing a broader line.

Its accuracy was adequate for most applications. When lines failed to meet up it was only by less than the thickness of a line.

However, I felt the software was a little cumbersome in operation and full use was not made of any possible second processor, though I am assured that this is under consideration and will probably have been implemented by the time you read this.

Like most plotters its small fibre tipped pens and coated paper make its running costs not inconsiderable, but nevertheless it is a solid piece of equipment sensibly priced.

Product: Plotmate Plotter  
 Prices: Plotter £299; Lincad £49.50;  
 Linchart £19.50; Lintronic £19.50.  
 Supplier: Linear Graphics, 28 Purdeys  
 Industrial Estate, Rochford, Essex. Tel:  
 0702 541664



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REPLICA III will not work with all programs but neither will anything else and anybody who claims differently is making false claims. Although REPLICA does not appear in any charts over 30,000 REPLICA users cannot be wrong - they have voted with their wallets!

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\*EDIT is a FULL SCREEN EDITOR, which means that you can scroll your program up and down just like WORDWISE does with text, do not confuse this powerful editor with the line editor used in other toolkit ROMs. The EDITOR allows insertion and deletion of lines and insert and overwrite within a line. This is the editor that the BBC micro should have had.

\*ERROR ON will trap errors in a program and enter the EDITOR at the statement generating the error, no more wading through multi statement lines trying to identify the error.

Commands pioneered by BROM are:

\*ROMON & ROMOFF which enable you to turn on/off sideways ROMs so that they stay off even after CTRL/BREAK. This also allows the DFS to be switched off and PAGE reverts to &E00 automatically.

\*CASE which forces input into upper or lower case irrespective of caps/shift lock.

\*FLIST which lists a program one statement to a line but more importantly it will even list 'BAD PROGRAMS'.

\*ONEKEY is a single key entry option but you can also define your own strings to any ASCII key, just like an extra 48 function keys.

\*FIND, \*CHANGE & \*SCHANG provide selective or global SEARCH and REPLACE facilities. These commands work with strings and keywords or a mixture of both e.g. \*FIND PROChelp T, will list the full line containing PROChelp, the 'T' simply tokenizes any keywords.

Yet another group of commands allow lines to be moved or copied to a new location.

The other commands provide function key editor, 'BAD PROGRAM' cure, variable lister, integer variable flush, program compacter etc.

This is a genuine useful ROM that no user should be without. Be warned, once used you will not be able to live without it!

"This is the best BASIC screen editor I have so far used." MICRO USER August 85.

"...this is the best On-Screen BASIC Editor I have ever used; it is far superior to BEEBUGSOFTS TOOLKIT." Viewfax Tubelink

## FONTWISE PLUS £20.00



Now compatible with WORDWISE, WORDWISE+ and VIEW plus additional format commands and extra fonts. Now you can have PROPORTIONAL and JUSTIFIED text by using FONTWISE to print text prepared on the above word processors. Not only that but you can have it in 12 different fonts, all within the same document if required.

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- \* 12 FONTS - inc. italic, serif, Broadway, script etc. with more to follow
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- \* Plus many more features

Ask for a sample printout and you will be amazed at the quality that your printer can produce, (requires an EPSON compatible printer capable of single, double and quad density graphics). The quality achieved by FONTWISE is incredible for such a low cost program but the speed is about the same as NLQ printing on most printers! You have got to see this to believe it.

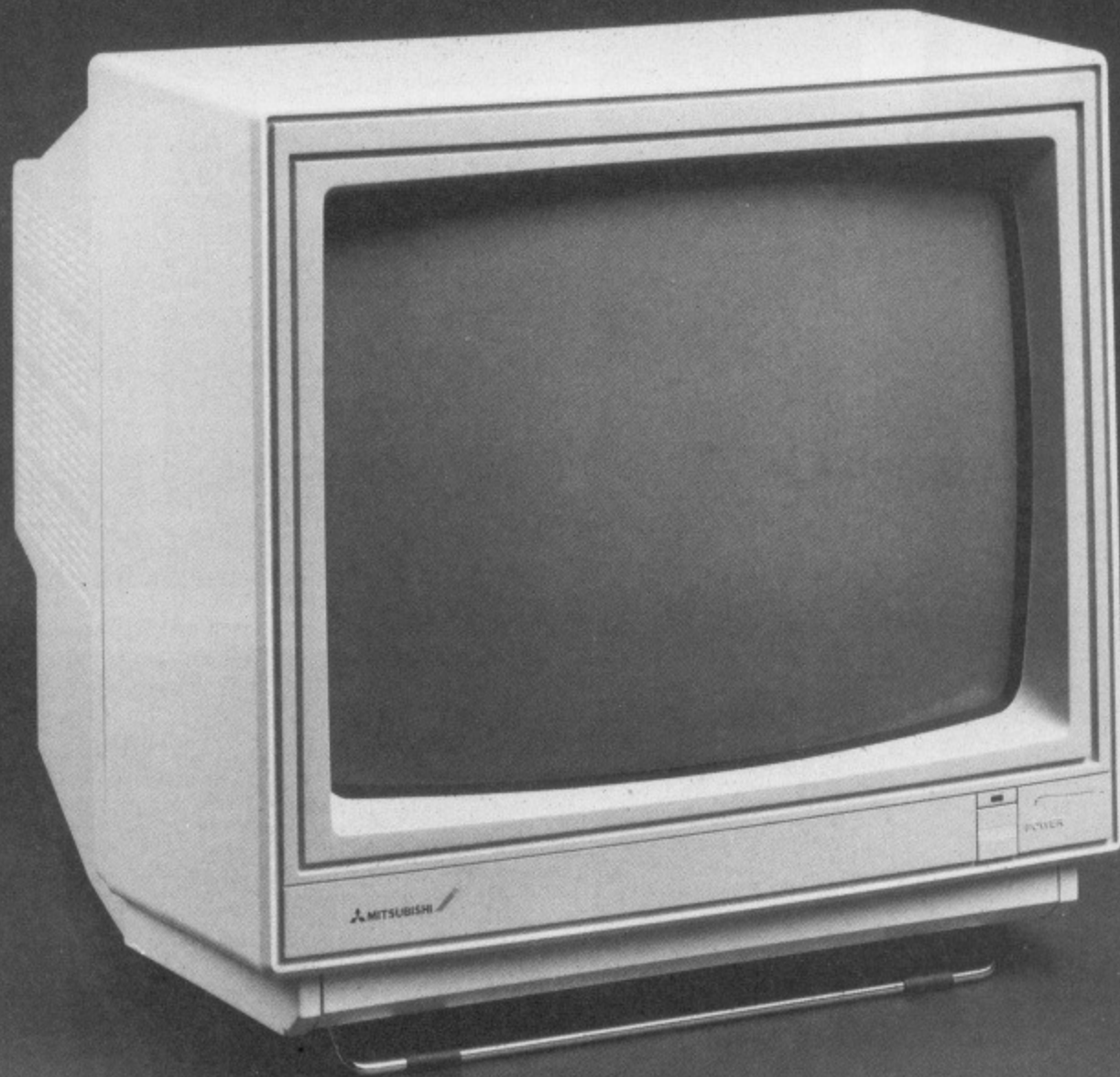
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BMU4

**Opus.**



**From Page 99**

and offers a longer path to the current, so the more pressure the crystal is under, the greater is the surface resistance.

Similarly, the bottom surface is compressed, presenting a lower resistance with increasing pressure. This is just the phenomena that we need to construct a bridge.

The pressure transducer is made by etching a diaphragm into a crystal and connecting it up like a bridge. As pressure can be applied to both sides of the diaphragm we can construct basically three different types of pressure transducer. These are illustrated in Figure III by reference to

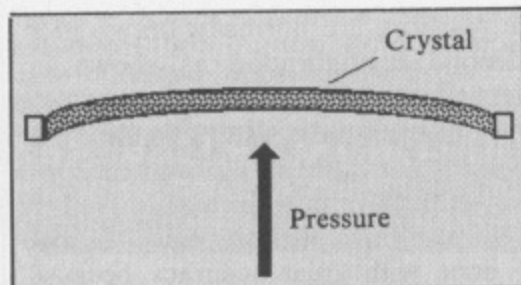


Figure II: A crystal deforming under pressure

National Semiconductors LX06XXX series of pressure transducers. The three Xs on the end of the number indicate that any number may be used and still be in the same family.

The first type measures pressure differences by applying pressure to both sides of the diaphragm. One side increases the bridge output and the other side decreases it. Hence they are labelled positive and negative ports.

The second type measures absolute pressure by sealing one side of the diaphragm in a vacuum.

Finally the third type has one side of the diaphragm open to atmospheric pressure so that any pressure measured is relative to atmospheric pressure. This is known as a Gage pressure transducer.

These three types of transducer are available in a number of different physical configurations and working over different pressure ranges. Some types can withstand liquids as well as gases.

The transducers are calibrated to give anywhere between 1.4 to 20 mV each pound per square inch, so in all cases the transducers' output will need amplifying before it can be measured.

Unfortunately there is a further fly in the ointment. As well as being sensitive to pressure all transducers are sensitive

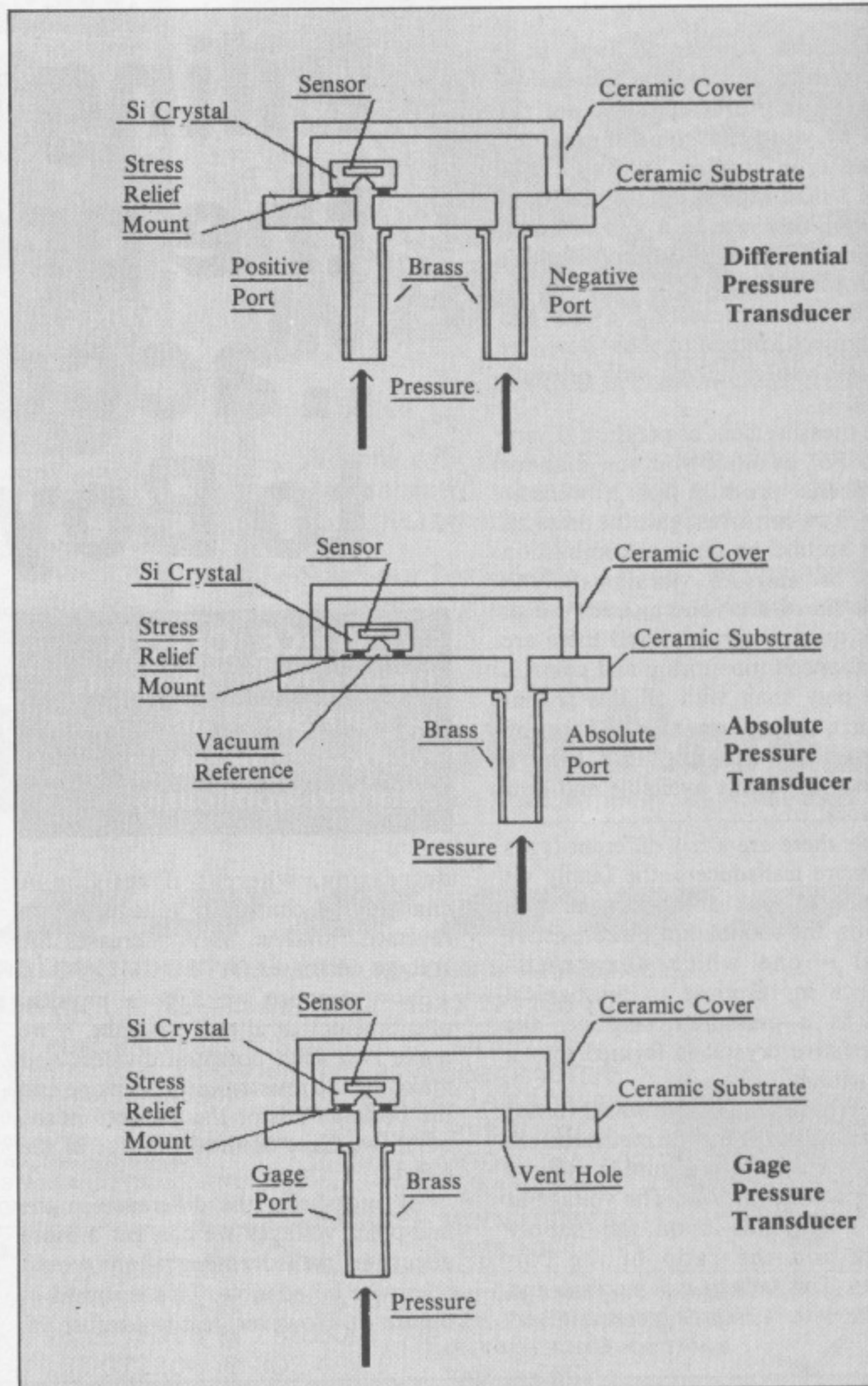


Figure III: Three types of pressure transducers

to temperature. What happens is that as the temperature increases the sensitivity decreases, almost as if the diaphragm were getting stiffer. Of course it's not really, but that is the effect. We have to compensate for this by making the bridge supply voltage change with temperature to keep the output independent of temperature.

The solution used in the LX06XXX series of transducers is to mount two thermistors in the bridge. This is shown in Figure IV along with the physical pin out of the device. The idea is that the

resistance of the thermistor decreases with increasing temperature.

Then, as the voltage across the device is constant the voltage across the bridge will increase with an increase of temperature. Therefore the sensor is compensated for decreased sensitivity and the overall sensor output is independent of temperature.

The trick is to get the thermistors to accurately track the transducer's change. To do this they are made using thick film technology which involves screen printing resistors on to a ceramic







## From Page 101

swing in either direction. However with an absolute type of transducer the signal can only go in one direction as you can't get a lower pressure than a vacuum.

This circuit uses an LM324 which contains four operational amplifiers, the fourth being used to further amplify the transducer output to give a more accurate reading over a restricted range of pressures. The variable resistor VR1 adds an offset voltage to allow the range of pressures to be set. To get a really fine control you can use a multi-turn pot.

As this output has undergone a lot of amplification it is inevitable that some noise will have been picked up - C2 will help to filter this out. Note that this is an inverting amplifier so that if the pressure increases the output voltage will drop. You can take care of this in your calibration procedure.

The circuit shows the connection to be made to the analogue input port. This has a rather unstable reference of about 1.8v and for this application is best being read with an ADVAL(1) AND 255 statement to restrict the values returned to 8 bits.

Normally the built-in converter is just about good for 10 bits and is ANDed with a value of 1023. However the last two bits are rather noisy and unless you take the average of about 10 measurements you are better sticking to 8 bits.

If you want a more stable reference and accurate measure of the pressure, you could use the four and a half digit DVM described in the April 1985 Body Building article. This allows measurement of voltages to be made to an accuracy of greater than 1mV.

By knowing the actual voltage out of the system and the gain of the amplifiers you can calculate the output from the

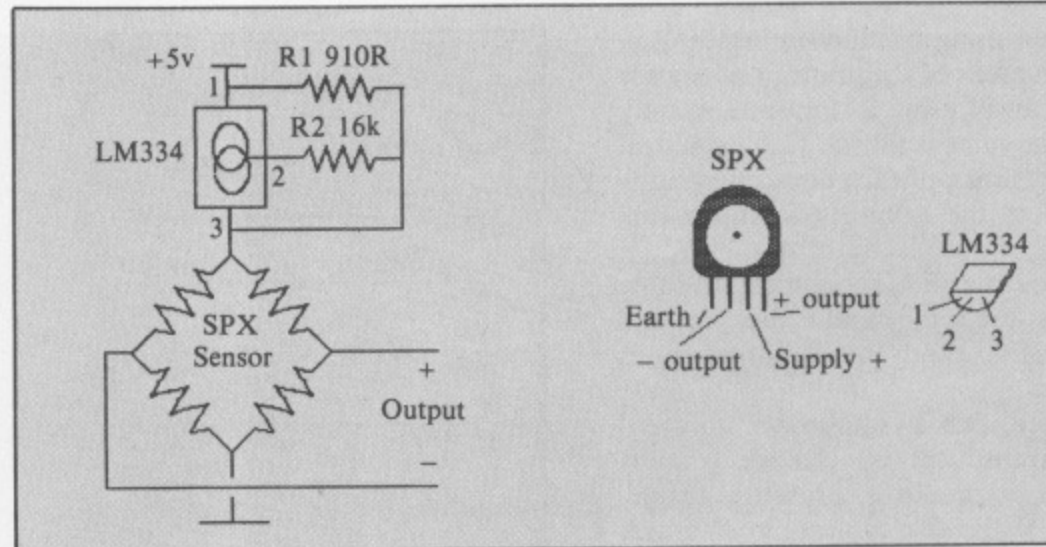


Figure VI: Compensation of the SPX transducer

transducer. From the sensitivity of the transducer you can then work out the pressure.

Note that the DVM will only give about three readings per second and so this method is not suitable when you want to measure rapidly changing pressures.

There is an alternative way of temperature compensation and this allows us to use much cheaper transducers. These transducers are the SPX range. They have only a simple hole in one side for the absolute range, and both sides for differential or gauge measurements.

They have a fairly wide range of sensitivities and so would probably need to be calibrated in most situations. As they are un-compensated we have to make some form of temperature compensation. To do this we need an LM334 programmable current source. As its name implies this device acts as a constant source of current.

The size of the current can be programmed by the value of an external resistor. Now the current output of the LM334 rises linearly with temperature.

In fact it rises at a greater rate than the sensor's sensitivity drops.

If we use the LM334 on its own we would over-compensate, so what we have to do is supply some of the bridge current from the LM334 and some from a shunt resistor. If we get the proportions of currents right we will have a current supply that changes to match the change in bridge sensitivity.

Going by the values on the data sheets for the sensitivity of the cheaper SPX transducer, we get a compensation circuit as shown in Figure VI.

The resistors should be of the metal film type as they are the most stable with changes in temperature and having just compensated for the bridge change, we don't want to bother with changing resistors. It can then be used in the same circuit as the other transducer.

This circuit should be accurate to about  $\pm 2$  per cent. For really accurate compensation, the two resistor values have to be adjusted on the individual transducers. It should be noted that both the transducer and the LM334 should be in close thermal contact so that they are both at the same temperature.

This month's project is more experimental and so does not lend itself to a printed circuit board. However as pressure transducers are not the easiest things to get hold of, I can supply them with the kits.

On offer this month is a kit of parts to build the circuit in Figure V consisting of a piece of veroboard, the op-ams and resistors, and a selection of pressure transducers. The order form is on Page 122.

A review of the vital statistics of each transducer is given in Table I. There are other types of pressure transducer available. Write to me with an SAE if

Type	Range	Sensitivity	Type
LX06015A	0 to 15 psi	6.67 mV/psi	Absolute
LX06030A	0 to 30 psi	2.63 mV/psi	Absolute
LX06001G	-1 to +1 psi	27.7 mV/psi	Gage
LX06005G	-5 to +5 psi	10.0 mV/psi	Gage
LX06015G	-15 to +15 psi	6.65 mV/psi	Gage
LX06100G	0 to 100 psi	1.4 mV/psi	Gage
LX06001D	-1 to +1 psi	27.7 mV/psi	Differential
LX06005D	-5 to +5 psi	10.0 mV/psi	Differential
LX06015D	-15 to +15 psi	6.67 mV/psi	Differential
LX06030D	-30 to +30 psi	2.63 mV/psi	Differential
SPX200A	0 to 30 psi	.033 to .065 mV/psi	Absolute
SPX100D	0 to 15 psi	.065 to .13 mV/psi	Differential/Gage
SPX200D	0 to 30 psi	.033 to .065 mV/psi	Differential/Gage

Table I: Pressure transducers



you would like a list of the full range.

Having got our measurement of pressure what can we do with it? It can be a useful addition to the anemometer (June 1985) in a computerised weather station. Although the more expensive sensors will give better results you could get some useful results using the low cost SPX sensors.

The SPX100D would give normal atmospheric pressure of 14.7 psi in the middle of its range. Atmospheric pressure is normally measured in millibars (mb) but as you will have to calibrate the sensor it does not matter.

The SI unit of pressure is the Pascal and 1 psi is equal to  $6.894757 \times 10^3$  Pascal (Pa). The Pascal is in the unit of Newtons per square Metre ( $\text{NM}^{-2}$ ). Finally there are 100 $\text{NM}^{-2}$  in 1 millibar.

Normally atmospheric pressure ranges between 990 to 1030 mb, but on a barometer I saw the range was 880 to 1090 mb. Nevertheless there is adequate range using the analogue input port or even more accuracy using the Body Build DVM.

You will have to calibrate the system and the calibration will take care of those messy conversions of units. All you need is a measure of pressure in whatever system you like. There are two ways you can calibrate it, one using a barometer and the other by using the local weather forecasts.

If you make the gain of the amplifier about 220 and use the times 10 input, I have calculated that you will be able to get accuracy of about 1 mb. That is if you read the analogue input port with the ADVAL(2) AND 255 statement.

In order to calibrate it you will need to take two readings at known pressures. The conversion will be in the form of  $\text{Pressure} = C + \text{Reading} * F$  where C and F are constants of conversion.

The task of calibration is to find these constants. Suppose you have taken two readings labelled R1 and R2, associated with each reading is a pressure P1 and P2. Now the value of F can be found by using:  $F = (P1 - P2) / (R1 - R2)$ .

As there is an inverting amplifier the value for F will be negative. Once you have found F you can find C by:  $C = P1 - R1 * F$ .

You now have the constants to build into your monitoring program. Remember - after calibration do not alter the offset control VR1 otherwise the value of the constant C will be changed. The constant F is governed by the gain of the amplifier.

When the atmospheric pressure is

used for weather forecasting it is normalised so that the value used was as if it were measured at sea level. You see, as you increase in height, atmospheric pressure drops by about one millibar for every 10 metres.

If you are using a barometer you can adjust the pressure reading according to your height above sea level. You can easily find this by looking at an ordnance survey map. If you use the local weather office to get your readings these will already have been normalised, so you don't have to bother.

Once you have set up the system make sure you do not handle the pressure sensor as you will increase its temperature and not the temperature of the compensating current source. I have not tried the SPX sensor and amplifier circuit for long term stability but the data sheets suggest that it should be all right.

Another application of pressure measurement could be to weigh an object by connecting it up to an old inner tube. If you place an object on a partially inflated inner tube or bag the pressure is increased proportionally to the weight of an object. What about a gauge that measures your lung capacity by measuring how hard you can suck or blow?

A pressure gauge inserted in place of

a spark plug in an engine can indicate compression ratios and point to a damaged cylinder head gasket or worn piston rings. Placed around the carburettor or exhaust a pressure gauge can give an indication of a car's performance. In fact, the SPX series of transducers were specially made for the motor industry.

Many school physics experiments can be computerised such as Boyle's law and the Stirling engine. Like all Body Build articles, the fun begins when you let loose your creativity on it.

● See you next month - when the pressure is off.

**Body Build Pack 31:** Pack 31a components to build Figure V £3.50. Pack 31b a pressure transducer type LX06015A £44; LX06030A £44; LX06001G £62; LX06005G £40; LX06015G £40; LX06100G £55; LX06001D £62; LX06005D £44; LX06015D £40; LX06030D £40; SPX200A £15.50 includes LM334 and two resistors; SPX100D £25 includes LM334 and two resistors; SPX200D £25 includes LM334 and two resistors.

All prices include Vat and P&P. Educational establishments: Official orders accepted.

## PROBLEM

I WAS watching the special edition of Micro Live on television about synthesising music using a personal computer. I have a BBC Micro and an electric piano at home, and I would really like to be able to link the two together.

My piano has the Midi input/output socket that they talked about on the show. My father and I have tried all the local computer stores to find out how to do this but nobody seems to know how. I would be grateful if you could help me. - Tony Lancaster, Haverhill, Suffolk.

## SOLVED

The Midi interface is a serial protocol like the RS432 on the back of the BBC Micro. It uses TTL levels and not the  $\pm 5$  volts used in the RS432. It also runs at 31.25k baud, a speed that cannot be achieved on the BBC Micro without some modification.

This modification would mean you lose the ability to use tape to load and save programs. The alternative is to build an add-on to the 1MHz bus. I might do this in the future, but it depends upon demand.

In the meantime The London Rockshop at 26 Chalk Farm Road, London NW1 makes a BBC Midi interface (pricey) and the magazine Electronics and Music Maker, Alexander House, 1 Milton Road, Cambridge CB4 1UY published details of an interface some time early in 1985. I think you could get a kit for about £50.

Mike Cook



# Ghouls of Azzod

Help explorer Azzo  
this block - bustin

LOSING his foothold, explorer Azzo plunged deep into the sea below, which fortunately opened beneath him, revealing a long chute which carried him to an underwater city.

And there he was incarcerated in a spooky manor called Azzod.

Your aim is to recreate Azzo's explorations and help him escape from the four levels of Azzod. To do this you must pass over all the platforms and cover them with a magic dust.

As you move through the levels you will encounter many hazards, including cat and dog monsters, bouncing balls, moving floorboards and a multitude of venomous plants.

The program uses almost all of the BBC Micro's memory and disc users will have to download it to &E00. It must be typed in exactly as shown with no extra spaces, as these will almost certainly result in "No room" error messages.

Save the program before you run it as it contains a self-deletion routine to remove the initialisation section when finished with.

## Keys:

Z Left  
X Right  
Shift Jump

## VARIABLES

LI% Lives left.  
X%,Y% Man's screen coordinates.  
SO Score.  
SC% Screen.  
B(4) Ball's orientations.  
MS(11) Man's orientations.  
C(9) Screen's colour.  
SS(4) Screen's titles.  
PLAT% Number of floors.  
R% Man's orientation printed.  
A%,B% Floor boundaries.  
D% Moving floor's X coordinate.  
E% Step size for moving floor.  
J%,I% Ball's boundaries.  
F%,G% Ball's X,Y coordinates.  
H% Ball's step size.  
K% Ball's orientation to be printed.  
L%,M% X and Y coordinates of platform.  
V%,W% Boundaries for moving platform.  
U% Step size for moving floor.

## PROCEDURES

d Initialises main variables.  
m Displays screen.  
l Moves man left.  
r Moves man right.  
h Fills in platform.  
f Drops man.  
j Makes man jump.  
g Calls hazards.  
x Moves floor.  
y Moves platform.  
z Moves ball.  
tim Reduces strength by small amounts.  
str Reduces strength by large amounts.  
o Lose life.  
i Displays title page.





**Azzo escape from the monster - ridden manor of Azzod in  
ting, memory - gobbling epic from PETER AZZOPARDI**





**Some of the features of the new Mini Office II**

**With the word processor you can...**

- ★ Select most features by menu or embedded commands. ★ Transfer records from database for personalised circulars. ★ Choose from three methods of display: 20 column (double size characters), 40 column, 80 column (20 and 80 columns only on 'B' Plus and 6502 Second Processor).
- ★ Centre, indent, tab, justify and merge text. ★ Insert, copy, move or delete blocks of text.
- ★ Select two editing modes: insert or overwrite. ★ Search and replace globally or selectively. ★ Check typing speed in words per minute. ★ See on-screen real-time clock, plus word and character count.

**With the database you can...**

- ★ Select five field types (Alpha, Decimal, Date, Integer, Formula).
- ★ Perform all arithmetic functions.
- ★ Search over multiple fields.
- ★ Mark individual records. ★ Use flexible printout routine. ★ Pass records to the word processor. ★ Carry out powerful multi-field record sorting.

**With the spreadsheet you can...**

- ★ Total rows and columns, with easy selection of criteria. ★ Copy formulae either absolutely or relatively. ★ Print out all or part of the spreadsheet.
- ★ Move directly to a specific location.
- ★ Select movement of cursor.
- ★ Recalculate automatically or manually.

**With the label printer you can...**

- ★ Design any style of label with the versatile editor. ★ Select label size and sheet format. ★ Read directly from database files.

**With the graphics pack you can...**

- ★ Enter data directly or take from spreadsheet. ★ Use icon type menus.
- ★ Choose pie chart, bar chart or line graph. ★ Display up to three line graphs simultaneously. ★ Display up to three bar charts side by side or stacked.
- ★ Choose bar charts in either 2D or 3D. ★ Draw compacted or emphasised pie charts. ★ Define your own style of shading. ★ Dump graphs directly to Epson or Seikosha compatible printer.

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- ★ Access MicroLink or Telecom Gold with only two key presses. ★ Select protocols as required. ★ Change modes while on-line. ★ Store text directly to memory or disc. ★ Use one-key 'Stop' command.

**With all the modules you can...**

- ★ Use the AMX Mouse. ★ Choose foreground and background colour in most modes. ★ Make more efficient use of memory and faster response time thanks to machine code content.
- ★ Take advantage of the extra memory of the BBC B Plus and 6502 Second Processor.

- ★ Features that were not in the original Mini Office.

# Databases proudly presents...

When it was launched in October, 1984, Mini Office was acclaimed as the most innovative software of the decade, creating new standards in serious programming - and at a price everyone could afford.

Since then it has become far and away one of the best-selling packages ever created for the BBC Micro, frequently displacing games from their position in the Top Ten. And, unlike most software releases, it is still as much in demand now as it was 15 months ago.

Which is why there has been so much speculation throughout the industry about what the much-rumoured Mini Office II would be like. After all, how do you beat a best-seller?

The answer is - by making it even better! And the new Mini Office II is certainly that ... in every respect.

While still retaining upward compatibility with the original Mini Office, it is packed with a host of new features that have been made possible by the tremendous strides made in programming techniques in the last 12 months.

The result is the most comprehensive suite of business programs ever produced for the BBC Micro - and still the best value ever.

And it comes with a no-nonsense easy-to-follow guide to business computing that will take you step by step through all the many features, showing you how to use their huge potential to the full.

**It's a word processor...**

**Mini Office II Word Processor**

**Word Processor menu**

- Edit text
- Preview text
- Print text
- Clear text
- Search & Replace
- Catalogue
- Select Mouse
- 49 character mode
- Merge text
- Save text
- Load text
- Mini Office II Menu

Use cursor keys to choose then press RETURN

(c) Database Software 1986

**It's a database...**

**Mini Office II Database**

**Database menu**

- Edit data
- Load/Save/Print
- Search data
- Sort data
- Calculate
- Edit structure
- Select Mouse
- Clear data
- Clear all markers
- Toggle markers
- Hardware options
- Mini Office II Menu

Use cursor keys to choose then press RETURN

(c) Database Software 1986

**It's a spreadsheet...**

**Mini Office II Spreadsheet**

**Spreadsheet menu**

- Edit spreadsheet
- Load spreadsheet
- Save spreadsheet
- Save graphics data
- Print spreadsheet
- List formulae
- New spreadsheet
- Alter screen display
- Catalogue
- Select Mouse
- Mini Office II Menu

Use cursor keys to choose then press RETURN

(c) Database Software 1986

**It's MINI OFFICE II on the BBC Micro! All 6 modules for...**



# e Software

ORDER FORM  
ON PAGE 143



... It's a graphics pack...

It's a comms pack...

It's a label printer...



Modules or £14.95 (cassette), £16.95 (5¼" disc), £19.95 (3" disc)



From Page 73

Program I

```

10 REM Additional fonts
20 REM Normal, italic, feint,
30 REM reverse, sideways, double
40 REM width or any combination
50 REM (C) The Micro User
60 REM By Pete Gaunt
70 REM Code intercepts oswrch vect
or
80 REM and should work with any
90 REM program which uses oswrch i
n
100 REM "legal" way.
110 :
120 REM Assembled code is saved aft
er
130 REM listing is run. Code must r
un
140 REM in the I/O if a second proc
150 REM in use; top two bytes of lo
ad
160 REM address set to &FFFF to
170 REM ensure this.
180 :
190 REM If this listing is run in
200 REM second proc raise PAGE abov
e
210 REM &C00 first.
220 :
230 REM See article for details.
240 :
250 :
260 REM Assembly address is OK if
270 REM cassette, RS423, speech or
280 REM envelopes 5 - 15 not in use

290 code=&900
300 osword=&FFF1
310 oswrch=&FFEE
320 osbyte=&FFF4
330 wrchv=&20E
340 REM &201 is user flag set by
350 REM Osbyte 1 and 241
360 flag=&201
370 FOR IX=0 TO 2 STEP 2
380 PZ=code
390 [OPT IX
400 .swap \change vectors
410 SEI
420 LDAwrchv
430 STAoldwrchv
440 LDAwrchv+1
450 STAoldwrchv+1
460 LDA#intercept MOD &100
470 STAwrchv
480 LDA#intercept DIV &100

```

```

490 STAwrchv+1
500 LDA#0
510 STAflag
520 CLI
530 RTS
540 .oldwrchv
550 BRK
560 BRK
570 .intercept
580 STAbuffer
590 TXA
600 PHA
610 TYA
620 PHA
630 LDA#1
640 BITflag
650 BEQdo_nothing
660 .on
670 LDA#210 \check that VDU queue
is
680 LDX#0 \empty (char not part
of
690 LDY#255 \graphics sequence etc
.)
700 JSR0sbyte
710 CPX#0
720 BNEdo_nothing
730 LDAbuffer
740 .check_char
750 CMP#32
760 BCCdo_nothing
770 CMP#127 \delete
780 BNEchar_ok
790 LDA#120
800 BITflag
810 BEQdo_nothing \double width
820 JSRdn2 \needs extra
830 JMPdo_nothing \delete
840 .char_ok
850 JSRcheck_toggles
860 BCBend
870 LDA#254 \any font bits set?
880 BITflag
890 BEQdo_nothing
900 .bits_set
910 JSRfonts
920 .end
930 PLA
940 TAY
950 PLA
960 TAX
970 LDAbuffer
980 RTS
990 .do_nothing
1000 PLA
1010 TAY
1020 PLA
1030 TAX
1040 .dn2

```

```

1050 LDAbuffer
1060 .oldoswrch
1070 \a JSR to here by-passes code
1080 JMP(oldwrchv)
1090 .check_toggles \check if char
1100 LDX#6 \is a toggle cha
r
1110 .ctloop
1120 LDA#tog_chars,X
1130 CMPbuffer
1140 BEQtog_found
1150 DEX
1160 BMINot_toggles
1170 JMPctloop
1180 .tog_found
1190 INX
1200 LDA#1
1210 .tf1 \if toggle char found
1220 ASL A \convert position in lis
t
1230 DEX \to bit value
1240 BNETf1
1250 EORflag
1260 STAflag
1270 SEC
1280 JMPendct
1290 .not_toggles
1300 CLC
1310 .endct
1320 RTS
1330 .tog_chars \chars used fo
r
1340 BRK:BRK:BRK:BRK \toggles store
d
1350 BRK:BRK:BRK \here
1360 .fonts
1370 LDA#&A
1380 LDX#buffer MOD &100
1390 LDY#buffer DIV &100
1400 JSR0sword \char def returned
1410 LDA#2 \at buffer+1
1420 BITflag
1430 BEQcheck_feint
1440 \for italics rotate top three
1450 \three lines of char right and
lower
1460 \three lines left
1470 .italics
1480 LDX#3
1490 .it_loop
1500 CLC
1510 RORbuffer,X
1520 CLC
1530 ROLbuffer+5,X
1540 DEX
1550 BNEit_loop
1560 .check_feint
1570 LDA#4
1580 BITflag

```



1590 BEQcheck_ul	2170 ROR A	2750 BPLdloop2
1600 \for feint shift each line of	2180 JMPnext_byte	2760 .print_font
1610 \char left and AND with origina	2190 .clockwise	2770 \redefine char 255 using the
l	2200 PLA	2780 \rearranged bytes in buffer
1620 .feint	2210 LSRbuffer,X	2790 LDX@(buffer+1) MOD &100
1630 LDX#0	2220 ROL A	2800 LDY@(buffer+1) DIV &100
1640 .floop	2230 .next_byte	2810 JSRredefine
1650 LDAbuffer,X	2240 DEX	2820 LDA#255
1660 ASL A	2250 BNErotloop2	2830 JSRoldoswrch \print char 255
1670 ANDbuffer,X	2260 STAstore,Y	2840 LDA#128
1680 LSR A	2270 DEY	2850 BITflag
1690 STAbuffer,X	2280 BPLrotloop1	2860 BEQnot_double
1700 DEX	2290 LDX#7 \copy store to buffer	2870 \if double flag set redefine
1710 BNEfloop	2300 .moveloop	2880 \char 255 using bytes at store
1720 .check_ul	2310 LDAstore,X	2890 LDX@store MOD &100
1730 LDA#0	2320 STAbuffer+1,X	2900 LDY@store DIV &100
1740 BITflag	2330 DEX	2910 JSRredefine
1750 BEQcheck_reversed	2340 BPLmoveloop	2920 LDA#255 \print right side
1760 \underline adds dotted line to	2350 .check_double	2930 JSRoldoswrch \of double char
1770 \bottom line of char. Dotted	2360 LDA#128	2940 .not_double
1780 \line allows descenders to show	2370 BITflag	2950 LDA#96
1790 .underline	2380 BEQprint_font	2960 BITflag \if not sideways then
1800 LDA#170	2390 \double width creates a copy of	2970 BEQendpf \end
1810 ORAbuffer+0	2400 \the left side of char in buffe	2980 \if sideways then get cursor to
1820 STAbuffer+0	r	2990 \right place
1830 .check_reversed	2410 \with each bit doubled and a	3000 LDA#0
1840 LDA#16	2420 \copy of right side of char in	3010 JSRoldoswrch
1850 BITflag	2430 \store with each bit doubled	3020 LDA#128
1860 BEQcheck_sideways	2440 .double_width	3030 BITflag
1870 \reversed turns all on bits off	2450 LDX#7	3040 BEQnot_double_side
1880 \and all off bits on	2460 .dwloop1	3050 LDA#0
1890 .reverse	2470 LDAbuffer+1,X	3060 JSRoldoswrch
1900 LDX#0	2480 STAstore,X	3070 .not_double_side
1910 .revloop	2490 DEX	3080 LDA#64
1920 LDAbuffer,X	2500 BPLdwloop1	3090 BITflag
1930 EOR#&FF	2510 LDX#7	3100 BEQnot_anti
1940 STAbuffer,X	2520 .dwloop2	3110 LDA#11
1950 DEX	2530 LDAbuffer+1,X	3120 JMPpside
1960 BNErevloop	2540 STAtemp	3130 .not_anti
1970 .check_sideways	2550 STAtemp+1	3140 LDA#10
1980 LDA#96	2560 STAtemp+2	3150 .pside
1990 BITflag	2570 STAtemp+3	3160 JSRoldoswrch
2000 BEQcheck_double	2580 LDY#4	3170 .endpf
2010 \sideways rotates each line	2590 .dwloop3	3180 RTS
2020 \left or right into accumulator	2600 LDAbuffer+1,X	3190 .redefine
2030 \and stores at store. When all	2610 ASLtemp	3200 STXredef+1 \X & Y point to
2040 \eight lines are done store is	2620 ROL A	3210 STYredef+2 \definition address
2050 \copied back to buffer	2630 ASLtemp+1	3220 LDA#23
2060 .sideways	2640 ROL A	3230 JSRoldoswrch
2070 LDY#7	2650 STAbuffer+1,X	3240 .charno
2080 .rotloop1	2660 LDAstore,X	3250 LDA#255
2090 LDX#0	2670 LSRtemp+2	3260 JSRoldoswrch
2100 .rotloop2	2680 ROR A	3270 LDX#0
2110 PHA	2690 LSRtemp+3	3280 .redef
2120 LDA#64	2700 ROR A	3290 \operand set by calling routine
2130 BITflag	2710 STAstore,X	3300 LDA&FFFF,X
2140 BEQclockwise	2720 DEY	3310 JSRoldoswrch
2150 PLA	2730 BNEdwloop3	
2160 ASLbuffer,X	2740 DEX	



## From Page 109

```

3320 INX
3330 CPX#0
3340 BNEredef
3350 RTS
3360 .buffer
3370 BRK:BRK:BRK:BRK:BRK
3380 BRK:BRK:BRK:BRK
3390 .temp
3400 BRK:BRK:BRK:BRK
3410 .store
3420 BRK:BRK:BRK:BRK
3430 BRK:BRK:BRK:BRK
3440 ]
3450 NEXT
3460 :
3470 FOR NX=0 TO 6
3480 READ N$
3490 tog_chars?NX=ASCN$
3500 NEXT
3510 :
3520 REM Characters used as toggles
3530 DATA "\", "i", "_", "(", "[", "]", " "
"
3540 :
3550 REM Check code length
3560 IF P%-code(<)&1EC THEN VDU7:PRIN
T"Error: code should be &1EC bytes":E
ND
3570 :
3580 REM Set top two bytes of load
3590 REM address to &FFFF
3600 RX=code OR &FFFF0000
3610 :
3620 DIM oscli 41
3630 $oscli="SAVE FONTS "+STR$code
+" "+STR$PX+" "+STR$RX+" "+STR$RX
3640 X%=oscli MOD &100
3650 Y%=oscli DIV &100
3660 CALL&FFF7

```

### Program II

```

10 REM Demonstration of "FONTS"
20 REM (C) The Micro User
30 REM By Pete Gaunt
40 REM #RUN FONTS before running
50 REM this demo.
60 REM Remember bit 0 must be on
70 REM before any of the fonts wil
1
80 REM work.
90 MODE0
100 VDU19,0,2;0;19,1,0;0;
110 REM Bits 0,4,5,7
120 REM Reversed, sideways
130 REM (clockwise), double width.

```

```

140 #FX1 177
150 PRINTTAB(77,1)"Demonstration"
160 PRINTTAB(75,1)"of fonts "
170 PRINTTAB(73,1)"routine "
180 REM Bits 0,2,6,7
190 REM Feint, sideways (anticlock),
200 REM double width
210 #FX1 197
220 PRINTTAB(67,13)"Demonstration"
230 PRINTTAB(69,13)"of fonts"
240 PRINTTAB(71,13)"routine"
250 REM All bits off, normal
260 #FX1
270 PRINTTAB(0,0)"Normal: The quick
brown fox jumps over the lazy dog"
280 REM Bits 0,1
290 REM Normal italics
300 #FX1 3
310 PRINT"Normal italics: The quic
k brown fox jumps over the lazy dog"
320 REM Bits 0,2
330 REM Normal feint
340 #FX1 5
350 PRINT"Normal feint: The quick
brown fox jumps over the lazy dog"
360 REM Bits 0,3
370 REM Normal underlined
380 #FX1 9
390 PRINT"Normal underlined: The q
uick brown fox jumps over the lazy do
g"
400 REM Bits 0,4
410 REM Normal reversed
420 #FX1 17
430 PRINT"Normal reversed: The qui
ck brown fox jumps over the lazy dog"
440 REM Bits 0,7
450 REM Double width
460 #FX1 129
470 PRINT"Double: The quick brown
fox""jumps over the lazy dog"
480 REM Bits 0,1,7
490 REM Italic, double width
500 #FX1 131
510 PRINT"Double italic: The quick
brown""fox jumps over the lazy dog"
520 REM Bits 0,2,7
530 REM Feint, double width
540 #FX1 133
550 PRINT"Double feint: The quick
brown fox jumps""over the lazy dog"
560 REM Bits 0,3,7
570 REM Underlined, double width
580 #FX1 137
590 PRINT"Double underlined: The q
uick brown fox""jumps over the lazy
dog"
600 REM Bits 0,4,7
610 REM Reversed, double width

```

```

620 #FX1 145
630 PRINT"Double reversed: The qui
ck brown fox""jumps over the lazy do
g"
640 REM All bits off; normal
650 #FX1
660 PRINT"Normal again: The quick
brown fox jumps over the lazy dog"
670 REM Bit 0
680 REM Normal until one of toggle
690 REM characters is encountered
700 #FX1 1
710 PRINT"The quick brown, \italic
, _underlined, }double fox}\_ jumps o
ver the lfeint, }double, {reversed do
g{)"
720 REM All bits off
730 #FX1
740 VDU31,0,31

```

This listing is included in this month's cassette tape offer. See order form on Page 143.

## PROBLEM

I HAVE a Watford single density DFS and Shugart disc drives. I had just written to Watford to complain because some of the DFS commands refused to work when your reply to Alister Hart was published in the December issue of *The Micro User*.

I dived into my drives and removed the resistor pack in drive 0 and now everything works perfectly. Many thanks. However I cannot find the switch labelled MUX. There is one labelled MX. Is this the same?

It is presently set to the left (west) on both drives. Is this correct? — Bill Cooke, Liverpool.

## SOLVED

Yes it sounds like MX is the same as MUX. It stands for multiplex and means that when a drive is not enabled it is not driving the input lines to the disc controller.

In a single drive system it does not matter which way round it goes but it must be set correctly on a multi drive system. The symptom of getting it wrong is that neither drive will work properly.



From Page 69

```

10 REM *****
20 REM *   MOUSETRAP   *
30 REM *       By       *
40 REM *   GEOFF TURNER *
50 REM * (c)The Micro User *
60 REM *****
70 MODE 7
80 VDU23,1,0;0;0;0;
90 PROCInstructions
100 REM INITIALISE VARIABLES
110 ENVELOPE 1,5,-45,1,2,-9,0,0,80,
0,0,-126,126,126
120 ENVELOPE 2,1,43,0,0,100,0,0,126
,0,0,-126,126,126
130 ENVELOPE 3,1,70,16,2,2,0,0,126,
0,0,-126,126,126
140 ENVELOPE 4,1,-36,-93,-9,11,0,0,
126,0,0,-126,126,126
150 HX=0
160 HZ=8:VZ=4
170 LX=2500
180 EX=0
190 XLZ=1263:YLZ=40
200 VDU23,224,192,224,176,252,239,1
91,252,192
210 MODE2
220 VDU23,1,0;0;0;0;
230 REM DRAW SCREEN
240 GCOL0,1
250 MOVE0,32
260 DRAW0,1023
270 DRAW1279,1023
280 DRAW1279,32
290 MOVE0,32:DRAW 1279,32
300 MOVE0,959:DRAW79,959
310 MOVE0,955:DRAW79,955
320 XZ=8
330 YZ=36
340 GCOL0,6
350 PLOT69,XX,YZ
360 PROCcheese
370 COLOUR6
380 PRINTTAB(3,31);"Line left ";LZ;
390 REM MAIN PROGRAM LOOP
400 REPEAT
410 IF XZ<16 THEN HZ=8:SOUND 1,1,26
,3
420 IF XZ>1263 THEN HZ=-8:SOUND 1,1
,26,3
430 IF YZ<40 THEN VZ=4:SOUND 1,1,26
,3
440 IF YZ>1015 THEN VZ=-4:SOUND 1,1
,26,3
450 XXZ=XZ+HZ
460 YYZ=YZ+VZ
470 IF POINT(XXZ,YYZ)>0 PROCtest:XX

```

```

Z=XX:YYZ=YZ
480 IF POINT(XXZ,YYZ)=3 PROCclear:P
ROCcheese
490 PLOT69,XXZ,YYZ
500 GCOL0,0
510 PLOT69,XXZ,YZ
520 GCOL0,6
530 XZ=XXZ:YZ=YYZ
540 IF XZ<79 AND YZ>959 PROCtime EL
SE TIME=0
550 PROCline
560 UNTIL EX=1 OR LX<1
570 MODE6
580 VDU23,1,0;0;0;0;
590 IF EX=1 PROCwin ELSE PROClose
600 GOTO 160
610 REM PROCEDURES
620 DEFPROCline
630 HLZ=0:VLZ=0
640 IF INKEY(-98) AND XLZ>15 THEN H
LZ=-8:GOTO700
650 IF INKEY(-67) AND XLZ<1267 THEN
HLZ=8 :GOTO700
660 IF INKEY(-73) AND YLZ<1015 THEN
VLZ=8:GOTO 700
670 IF INKEY(-105)AND YLZ>39 THEN V
LZ=-8:GOTO700
680 IF INKEY(-99) THEN PROCclear:PR
OCcheese
690 ENDPROC
700 GCOL0,2
710 MOVEXLZ,YLZ
720 XLZ=XLZ+HLZ
730 YLZ=YLZ+VLZ
740 IF POINT(XLZ,YLZ)>0 THEN XLZ=XL
Z-HLZ:YLZ=YLZ-VLZ:SOUND 1,-7,50,1 ELS
E DRAW XLZ,YLZ:LX=LX-1:PRINTTAB(13,31
);LX;SPC(1);
750 ENDPROC
760 DEFPROCtest
770 IF POINT(XXZ,YYZ)=3 SOUND 1,2,1
7,18:PROCclear:PROCcheese:ENDPROC
780 SOUND 1,1,26,3
790 IF HZ=8 AND VZ=-4 PROCtest1 :EN
DPROC
800 IF HZ=-8 AND VZ=-4 PROCtest2:EN
DPROC
810 IF HZ=-8 AND VZ=4 PROCtest3 :EN
DPROC
820 IF HZ=8 AND VZ=4 PROCtest4 :EN
DPROC
830 DEFPROCtest1
840 HZ=-8:VZ=4
850 IF POINT(XXZ-8,YYZ)=0 THEN VZ=-
4
860 IF POINT(XXZ,YYZ+4)=0 THEN HZ=8
870 IF HZ=8 AND VZ=-4 THEN HZ=-8:VZ
=4

```



```

880 ENDPROC
890 DEFPROCtest2
900 HZ=8:VZ=4
910 IF POINT(XXZ+8,YYZ)=0 THEN VZ=-
4
920 IF POINT(XXZ,YYZ+4)=0 THEN HZ=-
8
930 IF HZ=-8 AND VZ=-4 THEN HZ=8:VZ
=4
940 ENDPROC
950 DEFPROCtest3
960 HZ=8:VZ=-4
970 IF POINT(XXZ+8,YYZ)=0 THEN VZ=4
980 IF POINT(XXZ,YYZ-4)=0 THEN HZ=-
8
990 IF HZ=-8 AND VZ=4 THEN HZ=8:VZ=
-4
1000 ENDPROC
1010 DEFPROCtest4
1020 HZ=-8:VZ=-4
1030 IF POINT(XXZ-8,YYZ)=0 THEN VZ=4
1040 IF POINT(XXZ,YYZ-4)=0 THEN HZ=8
1050 IF HZ=8 AND VZ=4 THEN HZ=-8:VZ=
-4
1060 ENDPROC
1070 DEFPROCclear
1080 VDU24,8;36;1271;1019;
1090 CLG
1100 GCOL0,1
1110 MOVE0,959:DRAW79,959
1120 MOVE0,955:DRAW79,955
1130 VDU26
1140 ENDPROC
1150 DEFPROCtime
1160 IF TIME>300 EX=1
1170 ENDPROC
1180 DEFPROCcheese
1190 COLOUR3
1200 FOR IX=1 TO 5
1210 CXZ=RND(16+2):CYZ=RND(29)
1220 PRINTTAB(CXZ,CYZ);CHR$(224)
1230 NEXT
1240 COLOUR6
1250 ENDPROC

```



*From Page 111*

```

1260 DEFPROCwin
1270 SOUND1,3,100,10
1280 FOR IX=1 TO 3000:NEXT
1290 CLG
1300 PRINTTAB(8,2);"YOU TRAPPED THE
MOUSE !"
1310 PRINTTAB(9,6);"AND SCORED ";LX;
" POINTS"
1320 IF LZ>HIX HIX=LX
1330 PRINTTAB(12,10);"BEST SO FAR ";
HIX
1340 PRINTTAB(7,14);"PRESS SPACE TO
PLAY AGAIN"
1350 REPEAT UNTIL INKEY(-99)
1360 REPEAT UNTIL NOT INKEY(-99)
1370 ENDPROC
1380 DEFPROClose
1390 FOR IX=1 TO 3000:NEXT
1400 SOUND 0,4,50,30
1410 CLG
1420 PRINTTAB(13,2);"YOU BLEW IT !"
1430 PRINTTAB(10,4);"YOU RAN OUT OF
LINE !"

```

```

1440 PRINTTAB(7,10);"PRESS SPACE TO
PLAY AGAIN"
1450 REPEAT UNTIL INKEY(-99)
1460 REPEAT UNTIL NOT INKEY(-99)
1470 ENDPROC
1480 DEFPROCInstructions
1490 PRINTTAB(13,0);"MOUSE TRAP"
1500 PRINTTAB(13,1);"-----"
1510 PRINTTAB(10,3);"By Geoff Turne
r"
1520 PRINT
1530 PRINT"Chase the bouncing mouse
into the trap"
1540 PRINT"at the top left of the sc
reen."
1550 PRINT"Use Z,X,/,,: keys to draw
lines to"
1560 PRINT"trap the mouse."
1570 PRINT
1580 PRINT"If the mouse eats a piece
of cheese"
1590 PRINT"it will clear the lines f
rom the "
1600 PRINT"screen. The player may a
lso clear"

```

```

1610 PRINT"the screen if necessary b
y pressing"
1620 PRINT"the space bar."
1630 PRINT
1640 PRINT"The game ends when the mo
use is trapped"
1650 PRINT"for three seconds, or the
player runs"
1660 PRINT"out of line."
1670 PRINT
1680 PRINT"Lines cannot be drawn acr
oss existing"
1690 PRINT"lines, or through pieces
of cheese."
1700 PRINT
1710 PRINT"Press Space Bar."
1720 REPEAT UNTIL INKEY(-99)
1730 REPEAT UNTIL NOT INKEY(-99)
1740 ENDPROC

```

*This listing is included in this month's cassette tape offer. See order form on Page 143.*

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- ★ Current squad of 16 players + 20 user defined players.
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- ★ Group of 4 prelims. 16 to final knockout comp.
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## From Page 71

700 PHA	1270 LDA &73	1870 LDA #13
710 LDA #0	1280 STA chartable	1880 JSR &FFEE
720 STA &72	1290 LDA #&A	1890 LDA #1
730 PLA	1300 JSR &FFF1	1900 STA &72
740 JMP (&70)	1310 LDA #128	1910 SEC
750 \	1320 STA &75	1920 LDA #76
760 .notprinteroff	1330 \	1930 SBC &7C
770 \	1340 .loop1	1940 STA &7D
780 PHA	1350 \	1950 LDA #0
790 TXA	1360 LDA #0	1960 STA &7C
800 PHA	1370 STA &76	1970 \
810 TYA	1380 LDA #128	1980 .loop3
820 PHA	1390 STA &77	1990 \
830 PHP	1400 LDY #1	2000 LDA #&8
840 LDA &73	1410 \	2010 STA &7E
850 CMP #32	1420 .loop2	2020 \
860 BCS testsendflag	1430 \	2030 .loop4
870 JMP quit	1440 LDA chartable,Y	2040 \
880 \	1450 BIT &75	2050 LDA #1
890 .testsendflag	1460 BEQ notset	2060 JSR &FFEE
900 \	1470 CLC	2070 LDA #0
910 PHA	1480 LDA &77	2080 JSR &FFEE
920 LDA #1	1490 ADC &76	2090 DEC &7E
930 CMP &72	1500 STA &76	2100 LDA #0
940 BEQ send	1510 \	2110 CMP &7E
950 PLA	1520 .notset	2120 BNE loop4
960 JMP quit	1530 \	2130 DEC &7D
970 \	1540 LSR &77	2140 CMP &7D
980 .send	1550 INY	2150 BNE loop3
990 \	1560 CPY #9	2160 \
1000 PLA	1570 BNE loop2	2170 .notcr
1010 LDA #1	1580 LDA #1	2180 \
1020 STA &74	1590 JSR &FFEE	2190 LDA #6
1030 LDA &7F	1600 LDA &76	2200 LDX &73
1040 CMP #1	1610 JSR &FFEE	2210 JSR &FFF4
1050 BEQ alreadyset	1620 LDA &75	2220 PLP
1060 LDA #1	1630 LSR A	2230 PLA
1070 STA &7F	1640 STA &75	2240 TAY
1080 JSR &FFEE	1650 CMP #0	2250 PLA
1090 LDA #27	1660 BNE loop1	2260 TAX
1100 JSR &FFEE	1670 LDA #0	2270 PLA
1110 LDA #1	1680 STA &74	2280 LDA &73
1120 JSR &FFEE	1690 INC &7C	2290 \
1130 LDA #75	1700 LDA &7C	2300 .exit
1140 JSR &FFEE	1710 CMP #60	2310 \
1150 LDA #1	1720 BNE notcr	2320 JMP (&70)
1160 JSR &FFEE	1730 LDA #13	2330 J
1170 LDA #224	1740 STA &73	2340 NEXT
1180 JSR &FFEE	1750 \	2350 DIM S% 100
1190 LDA #1	1760 .quit	2360 Y% = S% MOD &100
1200 JSR &FFEE	1770 \	2370 Y% = S% DIV &100
1210 JSR &FFEE	1780 LDA &72	2380 \$% = "SAVE DRIVER "+STR\$*START+
1220 \	1790 CMP #1	"+STR\$*P%
1230 .alreadyset	1800 BNE notcr	2390 CALL &FFF7
1240 \	1810 LDA &73	2400 END
1250 LDX #chartable MOD &100	1820 CMP #13	
1260 LDY #chartable DIV &100	1830 BNE notcr	
	1840 LDA #0	
	1850 STA &7F	
	1860 STA &72	

This listing is included in this month's cassette tape offer. See order form on Page 143.



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100 REM *****	630 JMP through1	1180 BNE down	1730 JSR oswrch	2200
110 REM *	640 \	1190 JMP quit	1740 JMP work2	2290
120 REM * NOTE PAD *	650 .through	1200 \	1750 \	2300
130 REM *	660 \	1210 .down	1760 .right	2310
140 REM * By Robin Nixon *	670 PLA	1220 \	1770 \	2320
150 REM *	680 \	1230 CMP #138	1780 CMP #137	2330
160 REM * (c) The Micro User *	690 .through1	1240 BNE up	1790 BNE del	2340
170 REM *	700 \	1250 LDA &319	1800 LDA &318	2350
180 REM *****	710 PLP	1260 CMP #23	1810 CMP #39	2360
190 REM	720 JMP (&70)	1270 BNE down1	1820 BNE right1	2370
200 MODE 7	730 \	1280 JSR put	1830 LDA &319	2380
210 oswrch=&FFEE	740 .work	1290 JSR incpointer	1840 CMP #23	2390
220 osbyte=&FFF4	750 \	1300 JMP work1	1850 BNE right1	2400
230 get=&FFE0	760 TXA	1310 \	1860 JSR put	2410
240 FOR PASS=0 TO 3 STEP 3	770 PHA	1320 .down1	1870 JSR incpointer	2420
250 P%=&8C0	780 TYA	1330 \	1880 LDA #9	2430
260 I	790 PHA	1340 LDA #10	1890 JSR oswrch	2440
270 OPT PASS	800 LDA #229	1350 JSR oswrch	1900 LDA #11	2450
280 \	810 LDX #1	1360 JMP work2	1910 JSR oswrch	2460
290 .start	820 STX &266	1370 \	1920 JMP work1	2470
300 \	830 JSR osbyte	1380 .up	1930 \	2480
310 JSR window	840 JSR save	1390 \	1940 .right1	2490
320 LDA #0	850 LDA #&70	1400 CMP #139	1950 \	2500
330 STA &72	860 STA &75	1410 BNE left	1960 LDA #9	2510
340 STA &6	870 LDA #4	1420 LDA &319	1970 JSR oswrch	2520
350 LDA #&6C	880 LDX #1	1430 BNE up1	1980 JMP work2	2530
360 STA &7	890 STX &72	1440 JSR put	1990 \	2540
370 LDA &20E	900 JSR osbyte	1450 JSR decpointer	2000 .del	2550
380 STA &70	910 LDA &318	1460 JMP work1	2010 \	2560
390 LDA &20F	920 STA &76	1470 \	2020 CMP #127	2570
400 STA &71	930 LDA &319	1480 .up1	2030 BNE char	2580
410 LDA #main MOD &100	940 STA &77	1490 \	2040 LDA &318	2590
420 STA &20E	950 LDA #31	1500 LDA #11	2050 BNE del1	2600
430 LDA #main DIV &100	960 JSR oswrch	1510 JSR oswrch	2060 LDA &319	2610
440 STA &20F	970 LDA #0	1520 JMP work2	2070 BNE del1	2620
450 LDA #12	980 STA &74	1530 \	2080 JSR put	2630
460 JSR oswrch	990 JSR oswrch	1540 .left	2090 JSR decpointer	2640
470 LDA #&70	1000 JSR oswrch	1550 \	2100 LDA #10	2650
480 JSR save0	1010 \	1560 CMP #136	2110 JSR oswrch	2660
490 LDA #&74	1020 .work1	1570 BNE right	2120 LDA #127	2670
500 JSR save0	1030 \	1580 LDA &318	2130 JSR oswrch	2680
510 LDA #&78	1040 LDA &74	1590 BNE left1	2140 JMP work1	2690
520 JMP save0	1050 STA high+1	1600 LDA &319	2150 \	2700
530 \	1060 LDA &75	1610 BNE left1	2160 .del1	2710
540 .main	1070 STA high+2	1620 JSR put	2170 \	2720
550 \	1080 LDA #0	1630 JSR decpointer	2180 LDA #127	2730
560 PHP	1090 STA low+1	1640 LDA #10	2190 JSR oswrch	2740
570 PHA	1100 LDA #&7C	1650 JSR oswrch	2200 \	2750
580 LDA &72	1110 STA low+2	1660 LDA #0	2210 .del2	2760
590 BNE through	1120 JSR save	1670 JSR oswrch	2220 \	2770
600 PLA	1130 \	1680 JMP work1	2230 JMP work2	2780
610 CMP #9	1140 .work2	1690 \	2240 \	2790
620 BEQ work	1150 \	1700 .left1	2250 .char	2800
	1160 JSR get	1710 \	2260 \	2810
	1170 CMP #9	1720 LDA #0	2270 PHA	2820



```

2280 LDA &318
2290 CMP #39
2300 BNE char1
2310 LDA &319
2320 CMP #23
2330 BNE char1
2340 PLA
2350 JSR oswrch
2360 JSR put
2370 JSR incpointer
2380 LDA #11
2390 JSR oswrch
2400 JMP work1
2410 \
2420 .char1
2430 \
2440 PLA
2450 JSR oswrch
2460 CMP #13
2470 BNE del2
2480 LDA #138
2490 JMP down
2500 \
2510 .quit
2520 \
2530 JSR put
2540 JSR window
2550 LDA #31
2560 JSR oswrch
2570 LDA &76
2580 JSR oswrch
2590 LDA &77
2600 JSR oswrch
2610 LDA #&6C
2620 STA high+2
2630 LDA #&7C
2640 STA low+2
2650 LDA #4
2660 LDX #0
2670 JSR osbyte
2680 LDA #229
2690 LDX #0
2700 JSR osbyte
2710 JSR save
2720 LDA #0
2730 TAY
2740 STA &72
2750 PLA
2760 TAY
2770 PLA
2780 TAX
2790 PLP
2800 JMP (&70)
2810 \
2820 .save0

2830 \
2840 STA low+2
2850 \
2860 .save
2870 \
2880 LDY #4
2890 \
2900 .loop1
2910 \
2920 LDX #0
2930 \
2940 .high
2950 \
2960 LDA &7C00,X
2970 \
2980 .low
2990 \
3000 STA &6C00,X
3010 INX
3020 BNE high
3030 INC high+2
3040 INC low+2
3050 DEY
3060 BNE loop1
3070 TYA
3080 STA high+1
3090 STA low+1
3100 LDA #&7C
3110 STA high+2
3120 LDA #&6C
3130 STA low+2
3140 RTS
3150 \
3160 .incpointer
3170 \
3180 LDA &75
3190 CMP #&77
3200 BNE incl
3210 LDA &74
3220 CMP #&FB
3230 BNE incl
3240 \
3250 .end
3260 \
3270 LDA #7
3280 JMP oswrch
3290 \
3300 .incl
3310 \
3320 LDA &74
3330 CLC
3340 ADC #40
3350 STA &74
3360 BCC inc2
3370 INC &75

3380 \
3390 .inc2
3400 \
3410 RTS
3420 \
3430 .decpointer
3440 \
3450 LDA &74
3460 BNE dec1
3470 LDA &75
3480 CMP #&70
3490 BEQ end
3500 \
3510 .dec1
3520 \
3530 LDA &74
3540 SEC
3550 SBC #40
3560 STA &74
3570 BCS inc2
3580 DEC &75
3590 RTS
3600 \
3610 .put
3620 \
3630 LDA &74
3640 STA low+1
3650 LDA &75
3660 STA low+2
3670 JMP save
3680 \
3690 .window
3700 \

3710 LDY #0
3720 \
3730 .windloop
3740 \
3750 LDA wind,Y
3760 JSR oswrch
3770 INY
3780 CPY #7
3790 BNE windloop
3800 RTS
3810 \
3820 .wind
3830 \
3840 ]
3850 RESTORE 3900
3860 FOR ZX=PX TO PX+6
3870 READ ?ZX
3880 NEXT
3890 PX=ZX
3900 DATA 22,7,28,0,24,39,0
3910 NEXT
3920 DIM SX 25
3930 $SZ="*SAVE SCRATCH
      "+STR$*start+" "+STR$*PX
3940 ZX=SZ MOD &100
3950 YX=SZ DIV &100
3960 CALL &FFF7

```

*This listing is included in this month's cassette tape offer. See order form on Page 143.*

## PROBLEM

I HAVE been experiencing problems with my BBC Micro including corruption of write protected discs.

Any suggestions or help would be appreciated. — Brian A. French, Hove.

## SOLVED

There is no way that the disc controller chip can write to a write protected disc. So you either have a faulty disc control chip or the discs are being damaged some other way, perhaps by magnetic fields from magnets.



From Page 105

```

10 REM The Ghoul's Of Azzod
20 REM (C) The Micro User
30 REM By P.P. AZZOPARDI
40 REM
50 ON ERROR PRINT"ERROR AT LINE ";
ERL:END
60 MODE7
70 FORP=&D01T0&D96:READ?P:NEXT
80 DATA19,60,31,96,20,96,25,60,35,
60,30,80,30,80,35,80,35,60,35,84,35,9
2,31,84,44,91,59,91,43,72,66,92,64,72
,49,72,60,91,83,91,67,72,90,92,80,72,
73,72,91,91,95,95,92,96,112,92,100,96
,112,96,91,72,95,60,92,60,100,60,112,
71,112,60,96,76,96
90 DATA87,100,91,100,91,103,91,96,
76,96,76,103,91,100,72,100,72,103,91,
107,87,100,72,103,72,107,80,103,72,10
7,76,107,80,132,60,136,72,136,60,117,
96,136,96,136,91,136,84,132,92,136,96
,120,76,120,89,130,73,120,89,120,80,1
30,73,130,73,120
100 DATA80,130,84,130,73,131,76,131
,84
110 VDU23,224,0,96,240,240,124,96,0
4,62
120 VDU23,225,62,60,24,56,124,60,04
,214
130 VDU23,226,222,94,120,120,40,40,
0,56
140 VDU23,227,62,60,24,56,56,100,11
0,103
150 VDU23,228,251,60,50,54,110,166,
192,103
160 VDU23,229,62,60,24,56,124,110,1
10,109
170 VDU23,230,235,220,46,54,110,166
,192,103
180 VDU23,231,0,6,15,31,62,6,42,124
190 VDU23,232,124,60,24,20,62,34,42
,107
200 VDU23,233,123,122,30,30,12,12,0
,28
210 VDU23,234,124,60,24,20,20,54,11
0,237
220 VDU23,235,223,60,92,100,110,101
,3,230
230 VDU23,236,124,60,24,20,62,110,1
10,102
240 VDU23,237,215,59,116,100,110,10
1,3,230
250 VDU23,238,96,240,240,124,64,45,
123,119
260 VDU23,239,46,14,60,60,60,124,12
4,124
270 VDU23,240,60,20,20,14,14,12,3,6
280 VDU23,241,6,15,31,62,2,100,222,

```

```

238
290 VDU23,242,116,112,60,60,60,62,6
2,62
300 VDU23,243,60,56,56,112,112,40,1
92,96
310 VDU23,244,224,0,224,64,64,64,64
,224
320 VDU23,245,255,126,231,195,102,3
6,102,195
330 VDU23,246,24,60,102,94,126,126,
60,24
340 VDU23,247,0,60,110,251,251,126,
60,0
350 VDU23,248,0,60,126,255,251,102,
60,0
360 VDU23,249,24,60,126,94,94,110,6
0,24
370 VDU23,250,153,255,90,126,60,24,
29,15
380 VDU23,251,0,255,255,255,255,255
,255,0
390 VDU23,252,60,255,90,126,60,24,1
84,240
400 ENVELOPE1,1,5,0,0,25,0,0,126,0,
0,-126,126,126
410 ENVELOPE2,1,0,0,0,0,0,0,126,-1,
0,-3,126,126
420 ENVELOPE3,2,-40,50,-20,-10,5,2,
127,-3,-2,-1,126,0
430 ENVELOPE4,1,1,1,1,5,5,5,-5,-1,-
1,-1,120,120
440 ENVELOPE5,2,1,-1,1,2,4,2,1,0,0,
-1,126,126
450 ENVELOPE6,3,-1,0,0,150,0,0,10,0
,0,-10,126,126
460 ENVELOPE7,130,0,-2,0,0,25,20,0,
-4,-4,-3,120,120
470 ENVELOPE8,2,0,0,0,0,0,255,3,0,0
,-126,0,20
480 ENVELOPE9,1,1,0,0,0,0,0,-20,-
40,-60,126,100
490 ENVELOPE10,1,0,0,0,1,1,1,-2,-2,
-2,-2,100,20
500 *FX130,0,60
510 *FX130,0,69
520 *FX130,0,76
530 *FX130,0,46
540 *FX130,0,40
550 *FX130,0,44
560 *FX130,0,54
570 *FX130,0,53
580 *FX130,0,40
590 *FX130,0,13
600 *FX130,0,02
610 *FX130,0,05
620 *FX130,0,70
630 *FX130,0,13
640 END
650 ON ERROR MODE7:PRINT"ERROR AT L

```

```

INE ";ERL:END
660 PROCd:REPEAT:MODE2:VDU23;0202;0
;0;0;:PROCI:SCX=1:SO=0:FORLIZ=2TO0STE
P-1:PROCm:REPEAT:A=130:IFINKEY-98PROC
l:A=0
670 IFINKEY-67PROCr:A=0
680 IFINKEY-1PROCj:A=0
690 IFINKEY-17 THEN *FX210,1
700 IFINKEY-02 THEN *FX210,0
710 PROCg:IF POINT(XZ,YZ-96)=0 AND
POINT(XZ+56,YZ-96)=0 PROCf
720 FORP=0TOA:NEXT:UNTIL LIFE<>0
730 IFLIFE=2PROCn ELSEPROCc
740 NEXT:UNTIL FALSE
750 DEFPROCd:SO=0:DINB(4),M$(11),C(
9),S$(4)
760 FORA=1TO4:B(A)=A+245:NEXT:FORA=
0TO11:READB,C,D:M$(A)=CHR$B+CHR$B+CHR
$10+CHR$C+CHR$B+CHR$10+CHR$D:NEXT:FOR
P=1TO9:READC(P):NEXT:D$="GAME OVER":F
ORP=1TO4:READ S$(P):NEXT
770 DATA224,225,226,224,227,228,224
,225,226,224,229,230,231,232,233,231,
234,235,231,232,233,231,236,237,230,2
39,243,241,242,240,241,242,243,230,23
9,240,1,2,5,4,6,8,9,12,13
780 DATA"Ye Cumbersome cellar","The
Loitering Lounge","Boisterous Bedro
om","The Authentic Attic"
790 *TV255
800 ENDPROC
810 DEFPROCm:IF SCX/2=INT(SCX/2) VD
U23,250,60,127,174,126,76,60,20,14,23
,252,60,254,117,126,50,60,56,112 ELSE
VDU23,250,40,100,254,174,254,140,89,
62,23,252,20,54,127,117,127,49,154,12
4
820 FORP=1TO15:VDU19,P,0;0;:NEXT:VD
U4,17,120,12:COLOUR135:COLOUR4:PRINTT
AB(3,1);CHR$251;CHR$251;CHR$251;:COLO
UR6:PRINT;STRING$(11,CHR$251)
830 COLOUR0:PRINTTAB(16,1);CHR$251:
COLOUR120:8COL0,7:MOVE312-120,960:DRA
W312-120,980:MOVE1216-120,960:DRAW121
6-120,980
840 RESTORE(930+SCX*30):ON SCX00SUB
900,1010,1040,1070
850 READPLATX:LPX=0:COLOUR9:READ NX
:FORZX=1 TO NX:READ X,Y,N:PRINTTAB(X,
Y);STRING$(N,CHR$254):NEXT:COLOUR134:
COLOUR4:VDU23,254,255,193,131,226,50,
30,8,255
860 PRINTTAB(0,3);STRING$(20,CHR$25
4);TAB(0,20);STRING$(20,CHR$254):VDU2
3,254,143,139,153,177,225,225,189,135
870 PRINTTAB(0,3);STRING$(25,CHR$25
4+CHR$B+CHR$10);TAB(19,4);STRING$(25,
CHR$254+CHR$B+CHR$10):COLOUR120:COLO
UR3:PRINTTAB(7,30);"SCORE:";SO:VDU5:R

```



```
EADNX:FORZX=ITONX:READX,Y:MOVEX*64,10
20-Y*32
```

```
880 BCOL284,1:VDU253:IF POINT(X*64,
988-Y*32)<>VDU8,10:BCOL3,8:VDU255
```

```
890 NEXT:BCOL284,1:MOVE192,1020:PRI
NT*STRENGTHOMETER*:BCOL231,1:MOVE0,95
6:PRINTS*(BCZ):BCOL3,2:READ AX,BX,DX,
EX:IF AX<>0 CX=AX:MOVEAX,BX:VDU244
```

```
900 BCOL3,5:READFX,BX,JX,HX:IF FX<>
0 IX=BX:KZ=1:TX=1:MOVEFX,6X:VDUB(KX)
```

```
910 READLX,MX,VX,WX:IF LX<>0 UX=LX:
BCOL3,1:MOVELX,MX:VDU245
```

```
920 BCOL0,8:MOVE64,156:PRINTSTRINB#
(18,CHR#255)
```

```
930 SOUND2,8,53,60: SOUND3,8,53,60:V
DU23,0,1,1;0;0;0;:FORP=1TO9:READA:VDU
19,C(P),A;0;:NEXT:VDU19,10,3;0;19,11,
3;0;19,3,3;0;19,14,7;0;19,15,7;0;19,7
,7;0;:FORF=1.1TO01STEP.1:VDU23,0,1,F;
0;0;:NEXT
```

```
940 Y#=CHR#224:BCOL3,3:RX=1:YX=256:
YZ=892:VDU24,XZ,YZ-92;XZ+64;YZ;:YZ=80
8-28:MOVEXZ,YZ:VDU224:FORP=1TO14:MOVE
XZ,YZ:PRINTY#:YZ=YZ+8:IF P=7 Y#=Y#+CH
R#8+CHR#10+CHR#227 ELSEIF P=11 Y#=Y#+
CHR#8+CHR#10+CHR#228
```

```
950 SOUND3,3,P*4+53,2: SOUND2,1,P*4+
53,2:MOVEXZ,YZ:PRINTY#:FORL=1TO99:NEX
T,VDU26:MOVE0,96:PRINTSTRINB*(LIX,M#
(8)+CHR#11+CHR#11+CHR#9):OZ=1000:PX=2
48:QZ=1:Z=0:BCOL3,7:MOVEOZ,PX:VDU252:
TIX=1024:LIFE=0:ENDPROC
```

```
960 DATA58,23,8,15,2,1,7,4,1,8,5,1,
9,15,14,8,1,15,10,2,16,11,2,17,12,2,1
7,13,2,16,14,2,13,15,4,3,15,3,1,15,1,
2,17,1,1,19,1,1,20,2,1,21,3,16,21,3,1
8,22,1,17,24,2,16,25,1,15,26,1,1,27,1
8,6,5,20,4,26,8,26,12,26,14,14,10,8
```

```
970 DATA256,348,1024,24,512,892,764
,-8,0,0,0,3,6,5,4,6,7,1,6,2
980 VDU23,253,153,153,153,219,90,90
,126,255,23,254,255,0,255,111,38,34,2
,32,23,255,0,255,0,144,218,93,53,0:RE
TURN
```

```
990 DATA48,25,1,7,4,16,7,3,1,9,1,1,
10,1,4,10,4,8,12,3,12,9,3,1,15,1,10,1
5,9,4,16,1,2,18,5,10,18,4,1,20,1,1,21
,2,12,21,3,12,22,1,12,23,1,12,24,1,12
,25,1,9,26,5,18,21,1,18,23,1,18,25,1,
1,27,18,7,21,1,14,13,6,7,9,8,11,9,11,
11,14,14,14
```

```
1000 DATA1,14,4,17,9,20,14,20,18,20,
13,25,8,26,16,26,1000,796,304,-24,256
,680,536,-8,192,348,696,24,6,4,7,1,5,
3,2,7,3
```

```
1010 VDU23,253,66,102,36,102,102,60,
24,255,23,254,255,204,127,45,37,100,1
2,0,23,255,0,51,128,210,218,147,242,3
0:RETURN
```



```
1020 DATA53,25,1,7,4,17,7,2,1,9,2,3,
11,2,8,11,2,13,11,1,10,14,1,9,14,1,3,
17,2,8,17,2,11,17,1,11,18,2,11,19,3,1
1,20,8,1,21,2,3,23,2,8,23,2,11,22,8,1
1,23,3,11,24,2,11,25,1,17,24,2,16,25,
2,15,26,2,1,27,18,9,1,8,9,16,11,16
```

```
1030 DATA17,19,9,22,4,26,8,26,12,26,
1,20,1064,796,320,-24,384,672,224,-32
,1056,572,672,-16,1,3,5,7,2,6,4,5,3
```

```
1040 VDU23,253,153,153,153,219,60,24
,90,255,23,254,255,170,53,94,132,66,0
,0,23,255,0,85,202,161,105,173,165,0:
RETURN
```

```
1050 DATA53,24,1,9,16,8,7,2,11,7,2,7
,8,3,11,8,3,17,10,1,16,11,1,15,12,1,1
4,13,1,13,14,1,8,12,2,3,12,2,2,13,1,1
,15,2,3,18,2,1,21,2,6,21,2,11,21,2,16
,21,3,8,23,3,13,23,1,15,24,1,14,25,1,
1,27,18,16,16,14,9,14,10,22,8,22,2,26
,3,26,4,26
```

```
1060 DATA5,26,6,26,8,26,9,26,10,26,1
3,26,14,26,16,26,17,26,192,540,888,24
,640,888,760,-8,64,220,1152,16,4,1,6,
2,3,7,5,2,6
```

```
1070 VDU23,253,66,102,36,255,153,255
,66,102,23,254,255,170,85,255,86,210,
150,176,23,255,0,85,170,0,169,45,105,
79:RETURN
```

```
1080 DEFPROC1:SOUND0,2,3,1:IFPOINT(X
Z-8,YZ-92)=4 FORP=1TO99:NEXT:ENDPROC
```

```
1090 rZ=RZ:XX=XZ:YY=YZ-16:IFXZ<=OZ+5
6 AND XZ>=OZ-56 AND YZ>=PZ-32 AND YZ<
=PZ+96 OR POINT(XZ,YZ-92)>11 PROCstr
```

```
1100 RZ=RZ+1:IFRZ>7 OR RZ<4 RZ=4
```

```
1110 PROC1:BCOL3,3:MOVEXZ,YZ:PRINTM#
(rZ):MOVEXZ,YZ:PRINTM*(RZ):ENDPROC
```

```
1120 DEFPROC2:SOUND0,2,3,1:IFPOINT(X
```

```
Z+64,YZ-92)=4 FORP=1TO99:NEXT:ENDPROC
1130 rZ=RZ:XX=XZ:YY=YZ+16:IFXZ<=OZ+5
6 AND XZ>=OZ-56 AND YZ>=PZ-32 AND YZ<
=PZ+96 OR POINT(XZ+56,YZ-92)>11 PROCs
tr
```

```
1140 RZ=RZ+1:IFRZ>3 RZ=0
```

```
1150 PROC1:BCOL3,3:MOVEXZ,YZ:PRINTM#
(rZ):MOVEXZ,YZ:PRINTM*(RZ):ENDPROC
```

```
1160 DEFPROC1:IF XZ/64<>INT(XZ/64) E
NDPROC
```

```
1170 IF POINT(XZ,YZ-96)<>9 ENDPROC E
LSE IF POINT(XZ+24,YZ-100)=0 BCOL3,8:
VDU25,4,XZ,YZ-96;255: SOUNDO,2,6,1:LPZ
=LPZ+1:SO=SO+2:VDU4,17,3,31,13,30:PRI
NT;SO:VDU5:IF LPZ=PLATZ LIFE=2
```

```
1180 ENDPROC
```

```
1190 DEFPROCf:U=1:SOUND2,6,YZ/10,99:
REPEAT:YZ=YZ:YZ=YZ-16:U=U+1:BCOL3,3:F
ORP=1TO20:NEXT:MOVEXZ,YZ:PRINTM*(RZ).
MOVEXZ,YZ:PRINTM*(RZ):PROCg:IF U>11 P
ROCstr
```

```
1200 UNTIL POINT(XZ+56,YZ-96)<>0 OR
POINT(XZ,YZ-96)<>0
```

```
1210 SOUND&12,0,0,0:IF POINT(XZ,YZ-9
2)>11 OR POINT(XZ+56,YZ-92)>11 OR POI
NT(XZ,YZ-96)>11 OR POINT(XZ+56,YZ-96)
>11 PROCstr
```

```
1220 PROC1:ENDPROC
```

```
1230 DEFPROCj:SOUND2,4,YZ/9,1:9=RZ:V
=0:IFINKEY-67W=64:R=8:RESTORE1340ELSE
IFINKEY-98W=-8:R=9:RESTORE1350ELSEW=3
2:R=RZ:RESTORE1360
```

```
1240 REPEAT:XZ=XZ:YZ=YZ:READX,Y:IFX=
0ANDY=0 V=2:GOTO1310
```



# Game of the month

From Page 117

```

1250 IFPOINT(XZ+W,YZ-96)<>4 XZ=XZ+X
1260 IFPOINT(XZ+32,YZ+4)<>4 YZ=YZ+Y
1270 IFPOINT(XZ+56,YZ-92)>11 OR POIN
T(XZ,YZ-92)>11 OR XZ<=0Z+48 AND XZ>=0
Z-56 AND YZ>=PZ-28 AND YZ<=PZ+96 PROC
str
1280 IFY<0 AND R=0 R=11 ELSEIF Y<0 A
NDR=9 R=10
1290 IFY<0 AND POINT(XZ,YZ-96)<10 AN
D POINT(XZ,YZ-96)>0 OR Y<0 AND POINT(
XZ+56,YZ-96)<10 AND POINT(XZ+56,YZ-96
)>0 V=1
1300 @COL3,3:MOVEXZ,YZ:PRINTM$(RZ):R
Z=R:MOVEXZ,YZ:PRINTM$(R)
1310 PROCg:UNTIL V<>0 OR LIFE=1
1320 IF V=2 PROCf
1330 PROCch:@COL3,3:MOVEXZ,YZ:PRINTM$
(R):MOVEXZ,YZ:PRINTM$(S):RZ=S:ENDPROC
1340 DATA16,16,16,16,16,16,16,16,16,
16,16,-16,16,-16,16,-16,16,-16,16,-16
,0,0
1350 DATA-16,16,-16,16,-16,16,-16,16
,-16,16,-16,-16,-16,-16,-16,-16,-16,-
16,-16,-16,0,0
1360 DATA0,16,0,16,0,16,0,16,0,16,0,
-16,0,-16,0,-16,0,-16,0,-16,0,0
1370
1380 DEFPROCg:ON SCZ GOSUB 1390,1400
,1410,1420:PROCT:ENDPROC
1390 IFYZ<736 PROCx:RETURN ELSE PROC
z:RETURN
1400 IFYZ>736 PROCx:RETURN ELSEIF YZ
>528 PROCz:RETURN ELSE PROCy:RETURN
1410 IFYZ>764 PROCx:RETURN ELSEIF YZ
>640 AND XZ>400 PROCy:RETURN ELSEIFXZ
<576 PROCz:RETURN ELSE RETURN
1420 IFYZ>764 PROCz:RETURN ELSEIFYZ<
448 PROCy:RETURN ELSE PROCx:RETURN
1430 DEFPROCT:Z=Z+1:IFZ<15 ENDPROC
1440 PROCTim:Z=0:OX=0Z:pX=PZ:qX=QZ
1450 IF PZ>YZ PZ=PZ-8 ELSEIF PZ<YZ P
Z=PZ+8
1460 IF OZ>XZ OZ=OZ-8 ELSEIF OZ<XZ O
Z=OZ+8
1470 OZ=-OZ:IFXZ<=OZ+48 AND XZ>=OZ-5
6 AND YZ>=PZ-28 AND YZ<=PZ+96 PROCstr
1480 @COL3,7:MOVEOX,pX:VDU251+qX:MOV
EOX,PX:VDU251+QX:ENDPROC
1490 DEFPROCx:AZ=AZ+EZ:IFAZ<CZ OR AZ
=DX EZ=-EZ: SOUND3,5,RND(40)+20,30:END
PROC
1500 VDU18,3,2,25,4,AZ:BZ,244:ENDPRO
C
1510 DEFPROCz:fX=FX:gX=GX:kX=KX:lX=0
X+HX:IF GX=IX OR GX=JX HX=-HX:TX=-TX:
SOUND3,7,TX+99,20
1520 KX=KX+TX:IF KX=5 KX=1 ELSEIF KX

```



```

=0 KX=4
1530 VDU18,3,5,25,4,fX:gX:B(KX):25,4
,FX:GX:B(KX)
1540 IFXZ<=FX+48 AND XZ>=FX-48 AND Y
Z>=GX-28 AND YZ<=GX+96 PROCstr:PROCat
r
1550 ENDPROC
1560 DEFPROCy:lX=LZ:mX=MX:@COL3,1:LZ
=LX+MX:IF LZ=UX OR LZ=VX WX=-WX: SOUN
D3,5,RND(40)+50,30
1570 VDU25,4,lX:mX,245,25,4,LX:MX,24
5:ENDPROC
1580 DEFPROCn:@COL0,0:VDU4:FOR P=TIZ
TO192STEP-8:SO=SO+5:MOVEP,984:DRAMP,9
64:VDU17,2,31,13,30:PRINT;SO:NEXT:SCZ
=SCZ+1:LIZ=LIZ+1:IF SCZ=5 SCZ=1
1590 VDU4,17,128,31,0,31: SOUNDO,8,4,
14:FORQ=0TO31:VDU10:FX19
1600 NEXT:ENDPROC
1610 DEFPROCTim:@COL0,0:TIZ=TIZ-8:IF
TIZ<=192 LIFE=1:MOVE192,988:VDU251:E
NDPROC
1620 MOVETIZ,984:DRAMTIZ,964:ENDPROC
1630 DEFPROCstr:SOUNDO,1,1,2:TIZ=TIZ
-48:@COL0,0:IF TIZ<=192 LIFE=1:MOVE19
2,988:VDU251:ENDPROC
1640 MOVETIZ,988:VDU251:IF SO>10 SO=
SO-5:VDU4,17,3,31,13,30:PRINT;SO; "
:VDU5
1650 ENDPROC
1660 DEFPROCoi:Y$=M$(RZ):@COL3,3:VDU2
4,XZ,YZ-92;XZ+64;YZ;:FORP=1TO12:SOUN
D2,4,12-P,1:MOVEXZ,YZ:PRINTY$:YZ=YZ-8:
IF P=4 Y$=LEFT$(Y$,4) ELSE IF P=8 Y$=
LEFT$(Y$,1)
1670 MOVEXZ,YZ:PRINTY$:FORL=1TO99:NE
XT,VDU26,25,4,XZ,YZ+32;18,0,7,23,254
,8,56,30,16,16,16,122,255,9,127,254:F
ORF=1TO2000:NEXT:VDU4,26,17,128
1680 IF LIX=0 FORP=0TO8:SOUND2,7,P+9
9,5:COLOURP/2+2:A$=MID$(D$,P+1,1):PRI

```

```

NTTAB(P+2,14);A$:FORL=1TO600:NEXT,
1690 SOUND2,8,4,20:SOUND3,8,4,20:FOR
F=81TO8STEP-.3:VDU23,0,1,F;0;0;0;NEX
T:ENDPROC
1700 DEFPROCi:VDU19,1,0;0;@COL0,129
:FORP=160TO1064 STEP192:VDU24,P;544;P
+160;760;CLB:NEXT:VDU26:@COL0,0:FORP
=0TO0STEP6:A=?P:B=?P+1:C=?P+
2:D=?P+3:E=?P+4:F=?P+5:MOVEA+8
,B+8:DRAMC+8,D+8:PLOT85,E+8,F+8:NEXT
1710 VDU19,1,1;0;@COL0,3:MOVE256,76
0:DRAM1088,576:PLOT85,1056,544:@COL0,
128
1720 VDU5:@COL0,7:MOVE544,960:PRINT
The":@COL0,6:MOVE552,964:PRINTThe":@
COL0,6:MOVE320,860:PRINTShouls of":@
COL0,4:MOVE328,864:PRINTShouls of":@
COL142,1:MOVE576,440:PRINTBy":@COL13
8,1:MOVE256,384:PRINTP. Azzopardi"
1730 MOVE192,160:@COL146,1:PRINT"Spa
ce to start":VDU4:8$="--SCORE:"+STRIN
8$(4-LEN(STR$(SO)),"0")+STR$(SO)+"--"
:FORP=1TO14:COLOURP:IFP<8 COLOUR15-P
1740 PRINTTAB(P+2,24);MID$(8$,P,1):N
EXT:COLOUR3:PRINTTAB(2,18);M$(8);TAB(
17,18);M$(9):F=7:FORP=0TO19:COLOURF+7
:PRINTTAB(P,0);"0";TAB(19-P,30);"0";
F=F+1:IF F>7F=1
1750 NEXT:F=6:FORP=1TO29:COLOURF+7:P
RINTTAB(0,P);"0";TAB(19,30-P);"0";F=
F-1:IF F<1F=7
1760 NEXT:Q$="1234567":REPEAT:8$=R18
HT$(Q$,6)+LEFT$(Q$,1):Q$=8$:FORP=1TO7
:Q=VAL(MID$(Q$,P,1)):VDU19,P+7,0;0;:N
EXT:UNTIL INKEY-99:ENDPROC

```

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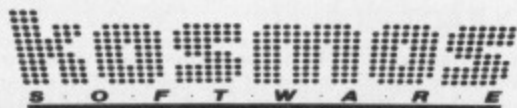
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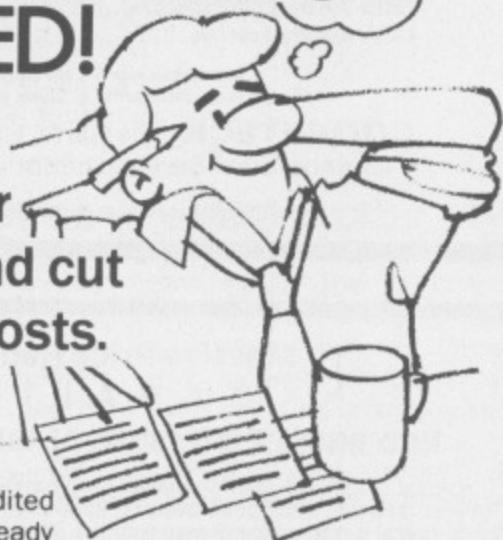
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## Inside the Canon for a quid...

WITH reference to Mike Yorke's letter in Micromail, February 1986, regarding the old £ and # problem on the Canon 1080A printer. I agree that the only answer is to modify the printer firmware.

The # character is no problem since the USA character set can be used as the default setting. This leaves the £ which the BBC Micro defines as Ascii 96 and the Canon as Ascii 6.

The printer's Ascii 96 accent character is rarely used so the answer is to swap the definitions of these two characters within the Canon. This is quite simple once you know which ROM does what and how many bytes are assigned to each character.

The standard font is contained within ROM IC4. The standard NLQ and the alternate italic font are both contained in ROM IC2.

The socket for IC3, which is normally empty, would contain either an optional NLQ font eprom, typically italic, or a 6264 RAM for use with downloadable NLQ fonts.

The characters we are interested in reside at the following locations within these ROMs:

### ● IC2 - Standard NLQ font

The definition of a £ (Ascii 6) is 48 bytes long, starts at &0120, finishes at &014F and is:

```
02 16 00 00 00 00 00 00 00
00 02 04 10 00 04 02 10 00
04 02 38 38 06 44 10 00 40
04 10 00 42 00 00 02 40 00
20 42 02 00 20 44 00 00 00
00 00 00
```

The definition of an accent (Ascii 96) is 48 bytes long, starts at &1200, finishes at &122F and is:

```
06 11 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00
00 00 00 40 00 00 00 00 00
00 00 00 00 00 00 00 00 00
00 00 00
```

### ● IC2 - Alternate (Italic) font

The definition of a £ (Ascii 6) is 12 bytes long, starts at &1A48, finishes at &1A53 and is:

```
0A 12 04 3A 40 12 00 02 04
00 00 00
```

The definition of an accent

(Ascii 96) is 12 bytes long, starts at &1E80, finishes at &1E8B and is:

```
C9 00 00 00 00 00 00 40 00
00 00 00
```

### ● IC3 - Optional NLQ font

The characters should occupy the same addresses as those in the standard NLQ font but will obviously contain different code. I do not possess this font ROM so I cannot give the code for this.

### ● IC4 - Standard font

The definition of a £ (Ascii 6) is 12 bytes long, starts at &0048, finishes at &0053 and is:

```
0B 11 00 7F 00 11 00 01 00
41 00 00
```

The definition of an accent (Ascii 96) is 12 bytes long, starts at &0480, finishes at &048B and is:

```
0B 00 00 00 00 00 00 40 00 00
00 00 00
```

Just edit the eprom code to swap the Ascii 6 and Ascii 96 definitions in each of the above fonts, although I suggest you keep the original eproms and blow the modified code into fresh 2764-250 eproms just in case of disasters.

Before refitting the printer top, reset the DIP switches SW1-1 through to SW1-4 to off, which sets the USA character as default.

The printer will now print the # and £ correctly in all modes.

Incidentally, whichever mode is used the accent character can still be printed out using the printer control codes:

```
VDU2,1,27,1,73,1,1,1,6,1,27
,1,73,1,0,3
```

or from within Wordwise:

```
0C27,73,1,6,27,73,0
```

- Dave Binnington, Clacton-on-Sea.

## Bug in descenders

I FOUND Geoffrey W. Brown's

routine to convert variable names to lower case in January's Micromail very useful but it does have one bug.

If a line ends in a hexadecimal constant the routine misses the end of line (&0D) byte.

This is not a problem under most circumstances as the program recovers itself when it finds the next end of line byte.

However Murphy occasionally strikes - if a program has very long lines ending in successive hex constants the program hangs up. It is easily cured by adding two lines of code:

```
041 CMP 0&0D
```

and:

```
042 BEQ newline
```

I am trying to modify this program to cope with assembly language which it currently does not.

Finally, now that Acorn seem to be moving away from the idea of second processors for the home market is there any chance of us seeing a price drop for 6502 second processors? - D.H. Lockwood, BFPO.

● The second processors may well come down in price as a result of the launch of the Master series.

## Radio link-up

I AM writing on behalf of AMRAC, Amateur Radio And Computers, which serves licensed radio amateurs keen to exploit the use of computers with two way radio in the Hampshire, Sussex and Wiltshire areas.

We have 62 members of which about 40 are BBC Micro owners, the rest owning CBM64, Spectrum and IBM PC machines.

Most of our members live in the South of England but we do have a couple of members in the North and are keen to promote the formation of similar groups

throughout the UK.

We have developed a range of good quality free software to members for amateur radio applications such as Prestel-style mailbox emulation over radio and Ceefax style teletext retrieval and so on.

We meet once a month at the Crown Inn, Bishops Waltham, near Southampton and supplement out meetings with a regular newsletter.

Membership enquiries should be addressed to Tony Trigell G1JAF, Gleness, East Boldre, Brockenhurst, Hants SO42 7WD. (Tel: 0590 612130). - Philip Bridges, Blackfield, Southampton.

## Help for Harriers

THIS is the first of a series of hints and tips we are releasing for those frustrated Harrier pilots who are as yet unable to locate and destroy the enemy HQ.

To survive for any length of time you must look after your landing sites. The rules are simple, but easy to forget if you have three MiGs on your tail.

If a tank moves on to a landing site the site is destroyed. If you are using sound, you will hear an explosion. A new landing site then becomes available at Home Base, where Q landing site starts off.

If a tank moves on to Home Base the game will end and the red screen appears.

Have you noticed that the red screen is maintained until you play dead by taking your fingers off the keyboard?

So if you hear explosions or get the red screen when everything seemed to be under control, you have probably forgotten your landing site.

You are particularly vulnerable when a landing site is destroyed and you get a new one



## From Page 123

at Home Base, because tanks are targetted towards landing sites.

With a landing site on Home Base, your Achilles heel is exposed. Two tips:

● As soon as you're airborne, go and destroy the four tanks to the east of landing site Q.

● Move your landing sites every 15 minutes or so. — **Mirrorsoft Harrier Hot Line, 01-377 4837.**

## Interested party

THE comments made by Kenneth Knight in the February Micromail on the calculation of building society interest were less than helpful.

A rate of interest of, for example, 8 per cent pa paid in two instalments on January 31 and July 31 means that £100 held six months to July 31 would allow £4 to be withdrawn then leaving £100 to earn the further £4 in the rest of the accounting year to January 31.

If the first £4 interest was left invested the principal for the second six monthly period would be £104 and the next interest credited would be £4.16.

The true annual rate of interest, compounded daily, is 8.16 per cent.

Interest is earned on a daily basis, the effective rate being  $(m-1)*100$  per cent per day where the daily multiplier,  $m$ , is given by  $m=(1 + (\text{annual rate paid twice year})/(2*100))^{(2/365)}=1.0002149$ . Notice that  $1.0002149^{365} = 1.081600$  and so on.

The building of a Basic program for such calculations is not difficult once the task is correctly understood.

I have such a program, extensible to other accounts and to disc filing, which is helpful in many financial judgements. — **Alan Clark, Stafford.**

## Citadel breached

I THOUGHT your readers would be interested to know of a small bug in Superior Software's latest release,

Citadel.

Take one of the trampolines across the island to the right-most room (location 18:0, the ocean).

Jump on the trampoline three times. On the third jump move left until you go off screen then immediately move right to return to the trampoline.

Eventually enough height can be obtained to reach the room above the ocean, which is the title screen.

Although nothing useful can be achieved here you can jump off to the right and will fall back to the top of castle, though the coordinates will be incorrect. — **M.M. Young, Worthing, Sussex.**

## Solidisk policy

READERS may be aware of a number of complaints recently upheld against Solidisk by the Advertising Standards Authority.

We would like to take the opportunity of giving our reply, and trust that it will raise points which may not yet have been

taken into consideration.

The majority of complaints currently being raised are based on occasional discrepancies between the specification of the product received and the technical description made in the advertisement.

What complainants may not realise is that the "discrepancy" invariably amounts to an improvement in specification.

As everyone knows, specifications in the field of computing change extremely rapidly. The customer usually bears the cost if he wishes to acquire updated products.

Solidisk's policy is quite different — improvements in products are usually offered on a simple exchange basis and at no charge, and our range of free software is currently unequalled.

We therefore feel that some licence to change specifications for improvement should be given to us without being constantly penalised because they no longer conform strictly to the description within the advertisement.

If customers wish us to abide strictly by the regulations laid down by the ASA we shall be happy to provide them with the

lower specification products as advertised!

We would then be obliged, however, to charge for the updating service.

On a happier note, out of some 1500 to 2000 new customers entering our books each month fewer than three complaints are upheld. Readers can draw their own conclusions. — **Hatti Perry, director, Solidisk.**

## Cover appeal

I AM writing to you with some commendation, criticism and suggestion for your magazine.

First of all I would like to mention your front covers, which never seem to get much publicity. One of the things I look for in a magazine is its presentation, and yours seems to have an endless supply of appealing covers.

The last two, *Elite* and *The Master Series* have been the best so far, and I am looking forward to seeing the next cover.

It is obvious that other magazines think that they are so

## When a bald patch isn't

THE answer to Colin Johnson's letter in the December 1985 *Micro User* concerning PLOT21 is very simple. The bald patch is not bald — it is full of lines.

The problem is that the area around it is white because the lines are drawn at different angles.

The computer keeps drawing dotted lines, but the dots fill in the "holes" created by previous dotted lines. Therefore the dotted effect disappears. An added snag is that this only occurs when lines are drawn at certain angles. The program (right) demonstrates this.

It draws a series of dotted lines, and overlays lines over these. This results in, among other things, the attractive check pattern in the bottom right-hand corner.

However the main point of the program is that as areas become filled with solid colour the areas with dotted colour appear to vanish so the problem is an optical illusion.

To prove the point, the program runs in Mode 2 and Mode 4, and the lines certainly do not disappear. So the problem is that the original program ran in Mode 0, thus creating the illusion problem because the dots are very small and do not show up well.

But things still aren't that simple. The BBC Micro has two dotted lines — well, it doesn't actually, it just appears to.

At certain angles the dotted effect forms horizontally parallel lines, while at other angles it forms vertically parallel lines.

Thus, if a horizontal dotted pattern crosses a vertical dotted pattern, the dotted effect becomes solid. This is best shown when the program runs in Mode 2.

I hope this solves the problem. Finally, another odd effect can occur when using a TV — if you draw dotted lines in Mode 0 in white they appear to be blue because of the TV colour crawl.

— **Jeremy Bullock, Shropshire.**

```
10 REM PLOT 21 Demonstration.
20 FOR mode=0 TO 4 STEP 2
30 MODE mode
40 FOR AX=0 TO 1279 STEP 4
50 MOVE 0,0
60 PLOT 21,1280,AX
70 IF AX>500 MOVE AX,0:PLOT 21,1280,AX+500
80 NEXT
90 FOR AX=500 TO 1000 STEP 4
100 MOVE AX,1024:PLOT 21,AX,500
110 MOVE 0,AX:PLOT 21,500,AX
120 MOVE 0,AX-500:PLOT 5,500,AX-500
130 NEXT
140 KEY=GET:NEXT
```



## SAYING IT SIDeways

HAVING nothing to do on the bus to work one morning I decided to write a potentially useful program which would convert a given input message to a large letter sideways printout with each individual letter of the message appearing on a separate sheet.

Having successfully done so I wonder if it would be of any use to your readers. — Michael J. Weight, Camberley.

```

10 CLS
20 INPUT "WHAT IS THE MESSAGE "M$
30 VDU 2
40 FOR L=1 TO LEN(M$)
50 C$=(MID$(M$,L,1))
60 C=ASC(C$)
70 C=C-32
80 A=(8+C)+&C000
90 MASK=128
100 FOR BIT=1 TO 8:P$=""
110 FOR BYTE=A+7 TO A STEP-1
120 D=MASK AND ?BYTE
130 IF D=0 THEN P$=P$+" "
ELSE P$=P$+"*** *****": REM TEN SPACES
140 NEXT BYTE
150 FOR P=1 TO 8:PRINT P$:NEXT P
160 MASK = MASK/2
170 NEXT BIT
180 NEXT L
190 VDU 3
    
```

## AND SAYING IT BIG

superior that they can get away with unappealing and often hideous covers.

My second point concerns internal layout. The contents page is well set out, and always easy to read unlike other magazines.

Also regulars like Micromail are always in the same place, and so easy to find without the contents page.

Your endless Body Building Course is always fascinating, and I find that it makes a good read even without embarking on the practical side.

As you can see, on the whole, I am thoroughly satisfied with the magazine. Keep it up. — Michael Spalter, London NW7.

● We are grateful for the praise as we are proud of the overall appearance of the magazine. Once the content is balanced and correct a great deal of extra time and effort goes into producing the cover and it's nice to know that these efforts are not wasted.

### Good guide

I WRITE to express my thanks for the Guide to playing Elite.

It has opened up a game which my eldest son and I had reluctantly given up as we couldn't progress.

In three days we have gone from nowhere to Dangerous.

Elite is the ideal computer game as it combines adventure, strategy and arcade action in one program. — M. Crowther, Kidlington, Oxon.

IN the February issue of Micromail P. Sargent of Sheffield wanted to mix single and double height letters on one line.

It can't be done in teletext as you pointed out, but there are several large letter routines around in the graphics modes.

Here is an assembler routine to do what is required.

The machine code, only 80 bytes plus the buffer, takes each letter in turn (lines 210 to 290) and explodes it into its individual bytes using OSWORD with A=10 (lines 310 to 350).

The top half of the letter is spread over a whole user defined character and printed, likewise

the bottom half (lines 390-560).

The function FNd places the required string in the buffer and calls the double height routine. It then returns the value 0 so that the CHR\$ to be printed does nothing.

I chose this way of constructing the print line so that it would be easy to handle. Don't forget the extra line print symbol ' at the start of line 40.

If there is room in the main program you can leave the assembler in, using:

```
DIM double 120
```

before assembly, and changing line 120 to:

```
P% = double
```

otherwise assemble it:

```
*SAVE DOUBLE 900 950
```

or whatever assembly area you use and make a note of the two variables buf and double which will be required in the main program.

```
*LOAD DOUBLE
```

with your main program, making sure you leave a whole line for the buffer which will require up to 40 bytes.

The character address chr has been calculated to use the area of memory reserved for user defined character 255. To use a different character amend line 100 accordingly. — Peter Vasey, South Shields.

```

10 PROCassemble
20 MODE 4
30 FOR AX=1 TO 15
40 PRINT 'TAB(10)" THE "
CHR$FNd("MICRO")" USER"
50 NEXT:END
60 DEF FNd($buf)
70 CALL double
80 =0
90 DEF PROCassemble
100 osrch=&FFEE:chr=&500
+8*255
110 FOR NX=0 TO 2 STEP 2
120 P%=&900
130 [OPT NX
140 .double
150 LDA #buf MOD &100
160 STA &70
170 LDA #buf DIV &100
180 STA &71
190 LDY #0
200 STY &73
210 LDA (&70),Y
220 .loop
230 JSR db
240 INC &73
250 LDY &73
260 LDA (&70),Y
270 CMP #13
280 BNE loop
290 RTS
300 .db
310 STA &74
320 LDA #10
330 LDX #&74
340 LDY #0
350 JSR &FFF1
360 LDA #11
370 JSR osrch
380 LDX #0
390 JSR define
400 LDA #10
410 JSR osrch
420 TYA
430 JSR osrch
440 .define
450 LDY #0
460 .defloop
470 LDA &75,X
480 STA chr,Y
490 STA chr+1,Y
500 INX
510 INY
520 INY
530 CPY #8
540 BNE defloop
550 LDA #(chr-&500) DIV 8
560 JMP osrch
570 .buf:]
580 NEXT
590 ENDPROC
    
```



## Loops routine

IN the February issue of The Micro User you published a program by Robin Nixon showing how to implement WHILE-WEND loops in BBC Basic.

Unfortunately, as the author points out, nested loops are not allowed and I found some problems when using these new loops with GOSUBs and PROCs.

With some modifications I wrote a new routine (Program I) which seems to work correctly and deals with up to 28 nested loops and reports three new error messages:

Error 45: too many WHILEs - when attempting to nest more than 28 WHILE-WEND loops.

Error 46: no WEND - when the WEND associated with a given WHILE has been

searched for and not found.

Error 47: no WHILE - when a WEND has been found with no associated WHILE.

To keep the code as short as possible I cut out the automatic Basic I or II test, leaving it to the user.

The new routine uses the area &900-&AAB for storing the machine code and &AAC-&AFF as a stack recording WHILEs' positions in the Basic program.

Byte &80, in which the number of nested loops is kept, acts as a stack pointer.

Before using WHILE-WEND loops in a program after the routine has been made active with \*RUN WW, the stack must be cleared by typing ?&80=0.

Program II is a demonstration of this utility in action. - B. Kokanosky, Amiens, France.

### Program I

```

10 REM WHILE-WEND
20 REM nested loops
30 REM
40 REM By Bernard Kokano
sky
50 REM (c) The Micro Use
r
60 REM
70 PROCinit
80 FOR PASS=0 TO 3

```

```

90 PROCassemble
100 NEXT
110 PRINT "Press SPACE to
save the object code";
120 REPEAT UNTIL GET=32
130 +SAVE WW 900 AAC
140 PRINT "The object co
de has been saved as WW"
150 END
160 DEF PROCassemble
170 PX=&900
180 [OPT PASS

```

## Hiccups

MICHAEL Stallybrass's Basic Analyser program in the November 1985 issue of Micro User has proved invaluable in checking typing errors before trying to run a program. There is, however, a discrepancy between the results displayed at the end of Part 1 and those in the summary of Part 2.

This is because, although all lines are analysed, the results obtained from the last line are not added to the display in Part 1 but do appear in Part 2.

I have overcome this by adding line 265 which is basically a copy of line 350 with the first PRINT statement Tab(18,7);N% omitted. If this

statement is left in then current line is shown as -1.

A semi-colon must be added after PRINTTAB(18,9) to get the spacing right.

Find and Replace (January 1986) has had a bit of a hiccup in the listing. Lines 6610-6650 have got themselves inserted between lines 6140 and 6150.

Although it doesn't affect the operation of the program I'm curious to know what the comment was whose remains appear between lines 6600 and 6660. - J.L. Bulmer, Brightstone, Newport.

● Thanks for pointing out the hiccups in Find and Replace. Fortunately as you say it does not affect the program. The comment belongs at the end of line 6650.

```

190 SEI:LDA &24B:STA &F4:
STA &FE30
200 CLI:LDA &202:LDX &203
210 CMP #start MOD &100:B
NE brkvector
220 CPX #start DIV &100:B
EQ alreadych
230 .brkvector
240 STA &70:STX &71
250 LDA #start MOD &100:S
TA &202
260 LDA #start DIV &100:S
TA &203
270 .alreadych
280 RTS
290 .start
300 PHA:TYA:PHA:TXA:PHA
310 LDY #0:LDA (&FD),Y
320 CMP #4:BEQ mistake
330 .notnewword
340 PLA:TXA:PLA:TAY:PLA:J
MP (&70)
350 .mistake
360 LDA #newkeytable MOD
&100:STA &39
370 LDA #newkeytable DIV
&100:STA &3A
380 LDY &A:DEY:TYA:CLC:AD
C &B:STA &37
390 LDA &C:ADC #0:STA &38
400 JSR nextword
410 BCS notnewword
420 DEY:TYA:CLC:ADC &A:ST
A &A
430 PLA:PLA:PLA:PLA:PLA:P
LA:PLA:PLA
440 JMP (&37)
450 .nextword
460 LDY #0:LDA (&39),Y:BE
Q nomatch
470 CMP (&37),Y:BNE diffe
rent
480 .nextchar
490 INY:LDA (&39),Y:BEQ g
etaddress
500 CMP (&37),Y:BEQ nextc
har
510 .different
520 INY:LDA (&39),Y:BNE d
ifferent
530 INY:INY:TYA:SEC:ADC &
39:STA &39
540 LDA &3A:ADC #0:STA &3
A
550 JMP nextword
560 .getaddress

```

```

570 INY:LDA (&39),Y:STA &
37:INY
580 LDA (&39),Y:STA &38:D
EY:DEY
590 CLC:RTS
600 .nomatch
610 SEC:RTS
620 .while
630 LDX &80:CPX #&1C:BCS
toowhiles
640 LDA &A:STA &1B:STA &A
AC,X
650 LDA &B:STA &19:STA &A
C8,X
660 LDA &C:STA &1A:STA &A
E4,X
670 INC &80
680 .while1
690 JSR evaluate:JSR inte
ger:LDA &2A
700 DRA &2B:DRA &2C:DRA &
2D:BNE true
710 LDA &1B:CLC:ADC &19:S
TA &B
720 LDA &1A:ADC #0:STA &C
730 LDA #0:STA &A
740 .searchwend
750 JSR findwend
760 INC &A:LDA &80:BEQ no
while
770 DEC &80:JMP quit
780 .wend
790 LDX &80:BEQ nowhile
800 LDA &AAB,X:STA &1B
810 LDA &AC7,X:STA &19
820 LDA &AE3,X:STA &1A:JH
P while1
830 .true
840 LDA &1B:STA &A:LDA &1
9:STA &B
850 LDA &1A:STA &C
860 .quit
870 JSR checkend:JMP cont
inue
880 .newkeytable
890 OPT FNequs("WHILE")
900 OPT FNequb(0)
910 OPT FNequ(while)
920 OPT FNequs("WEND")
930 OPT FNequb(0)
940 OPT FNequ(wend)
950 .toowhiles
960 OPT FNequb(0)
970 OPT FNequb(45)
980 OPT FNequs("Too many
WHILEs")

```



```

990 .nowend
1000 OPT FNequb(0)
1010 OPT FNequb(46)
1020 OPT FNequs("No WEND")
1030 .nowhile
1040 OPT FNequb(0)
1050 OPT FNequb(47)
1060 OPT FNequs("No WHILE")
)
1070 OPT FNequb(0)
1080 .findwend
1090 JSR get:CMF @ASC"N":B
NE findwend
1100 JSR get:CMF @ASC"E":B
NE findwhile
1110 JSR get:CMF @ASC"N":B
NE findwend
1120 JSR get:CMF @ASC"D":B
NE findwend
1130 RTS
1140 .findwhile
1150 CMF @ASC"H":BNE findw
end
1160 JSR get:CMF @ASC"I":B
NE findwend
1170 JSR get:CMF @ASC"L":B
NE findwend
1180 JSR get:CMF @ASC"E":B
NE findwend
1190 JSR findwends:JMP find
wend
1200 .get
1210 JSR getbyte:CMF @&D:B
EQ newline
1220 RTS
1230 .newline
1240 JSR getbyte:BMI nowen
d
1250 JSR getbyte:JSR getby
te
1260 .getbyte
1270 LDA &B:CLC:ADC @1:STA
&B
1280 LDA &C:ADC @0:STA &C
1290 LDY @0:LDA (&B),Y:RTS
1300 ]
1310 ENDPROC
1320 DEF FNequs(string$)
1330 $PZ=string$
1340 PZ=PZ+LEN(string$)
1350 =PASS
1360 DEF FNequb(byte)
1370 ?PZ=byte
1380 PZ=PZ+1
1390 =PASS
1400 DEF FNequw(word)
1410 ?PZ =word MOD &100
1420 PZ?1=word DIV &100
1430 PZ=PZ+2
1440 =PASS
1450 DEF PROCinit
1460 oswrch =&FFEE
1470 osword =&FFF1
1480 osbyte =&FFF4
1490 IF ?&8015=49 PROCone
ELSE PROCtwo
1500 ENDPROC
1510 DEF PROCone ;REM Ba
sic 1
1520 checkend=&9810
1530 continue=&8B0C
1540 evaluate=&9B03
1550 integer =&929F
1560 ENDPROC
1570 DEF PROCtwo ;REM Ba
sic 2
1580 checkend=&9857
1590 continue=&8B9B
1600 evaluate=&9B29
1610 integer =&92EE
1620 ENDPROC

```

**Program II**

```

10 REM WHILE-WEND
20 REM Nested loop demo
30 REM
40 ?&80=0
50 X=0
60 WHILE X<=10
70 PRINT "X=";X:X=X+1:Y=
0
80 WHILE Y<5
90 PRINT TAB(10)"Y=";Y:Y
=Y+1
100 PROCprintz
110 WEND
120 WEND
130 END
140 DEF PROCprintz
150 Z=0
160 WHILE Z<3
170 PRINT TAB(20)"Z=";Z:Z
=Z+1
180 WEND
190 ENDPROC

```

*This listing is included in this month's cassette tape offer. See order form on Page 143.*

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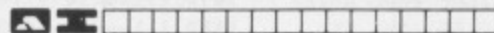
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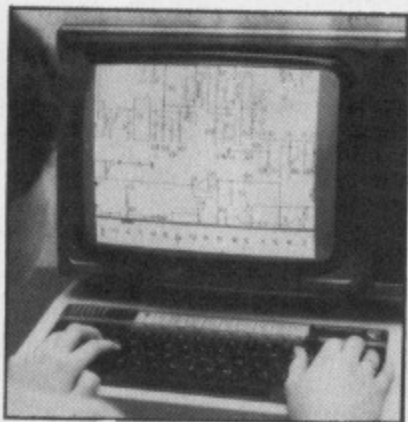


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# How much it costs to use MicroLink

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**Filing charge:** 20p per unit of 2,048 characters per month.

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**Information Databases:** Various charges. Any charges that may be applicable are shown to you before you obtain access to the database.

**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.

**Telex registration:** £10.

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Deferred messages sent on the night service are subject to a 10 per cent discount.

**Incoming telex:** 50p for each correctly addressed telex delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 50p.

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.

**Telemessages:** £1.25 for up to 350 words.

Telemessages can be sent with an illustrated greetings card for 65p extra.

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**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.

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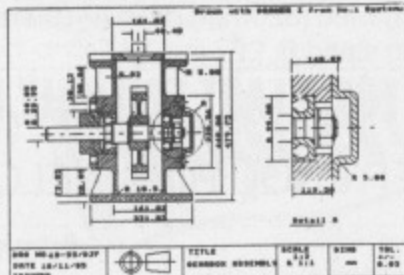
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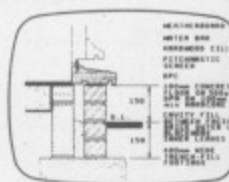
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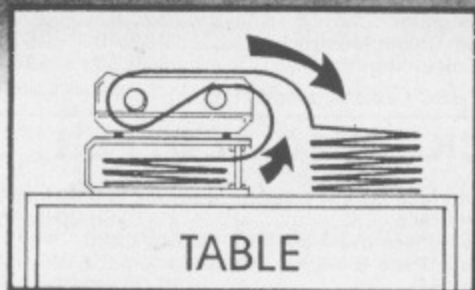
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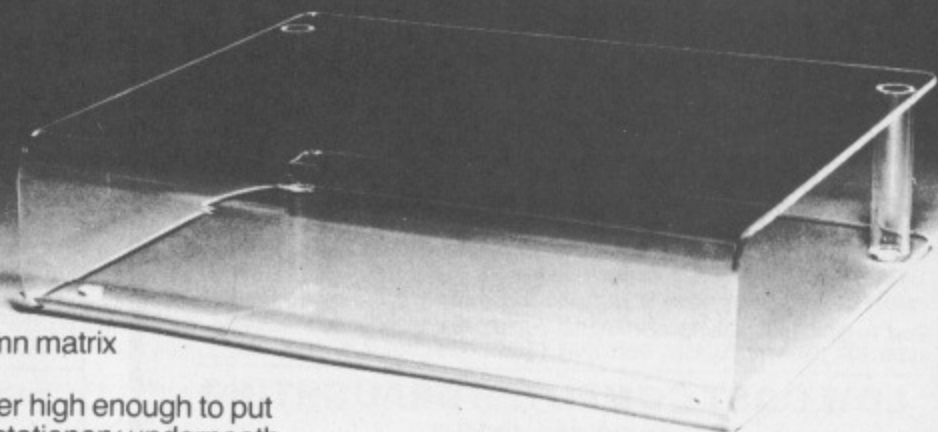


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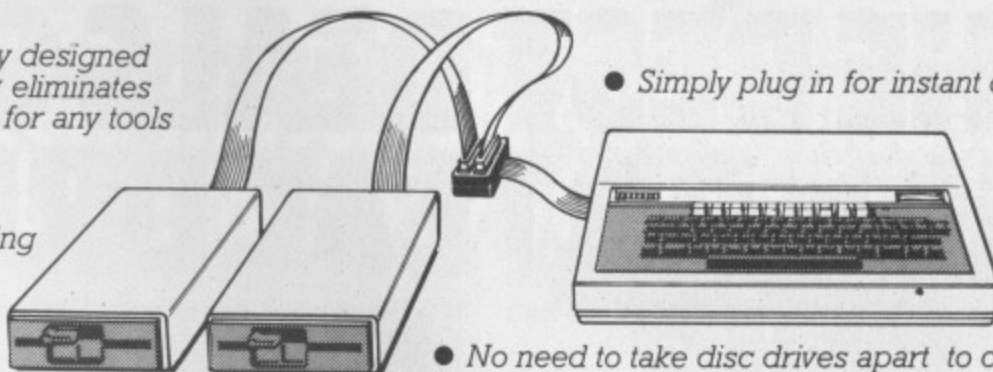
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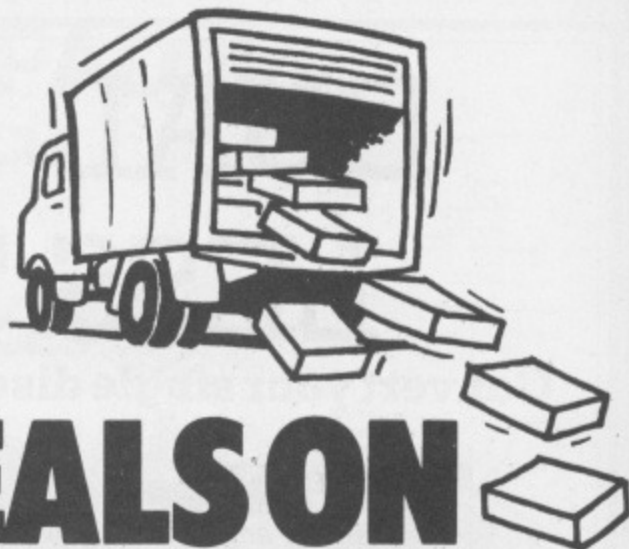
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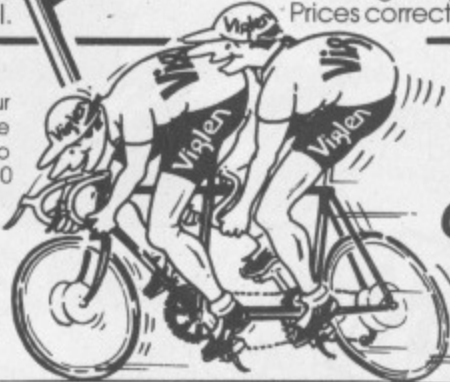


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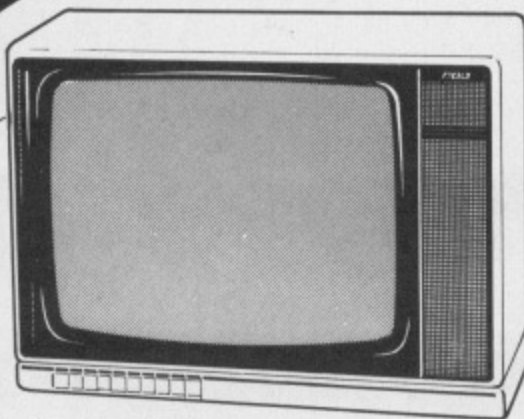
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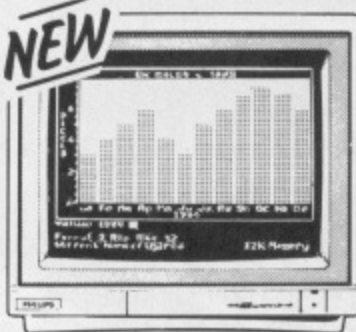


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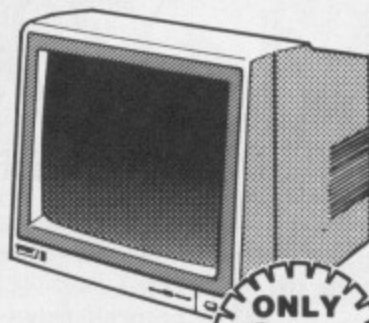
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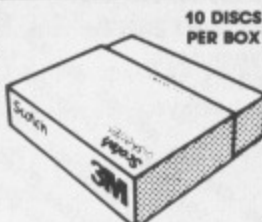
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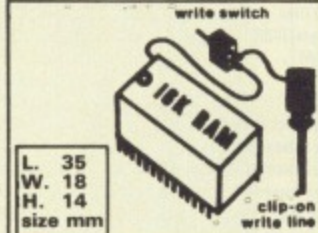
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**MARCH:** *Morris Miner*, collect the keys and escape the mine before your time runs out in this levels and ladders spectacular. *Poster Puzzler*, a sliding block simulation to provide hours of fun for the whole family. *Quicksort*, a fast machine 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,

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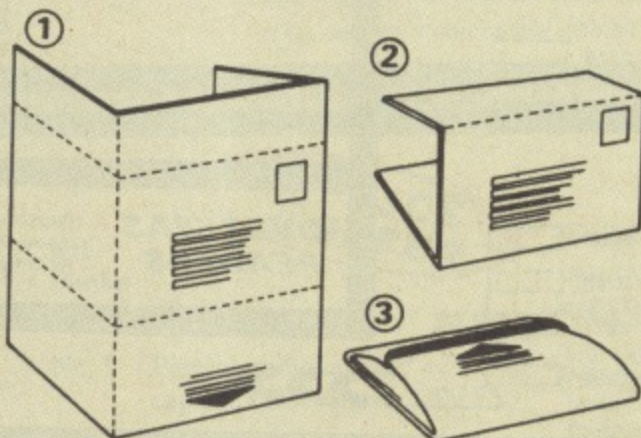
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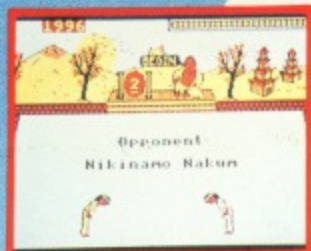


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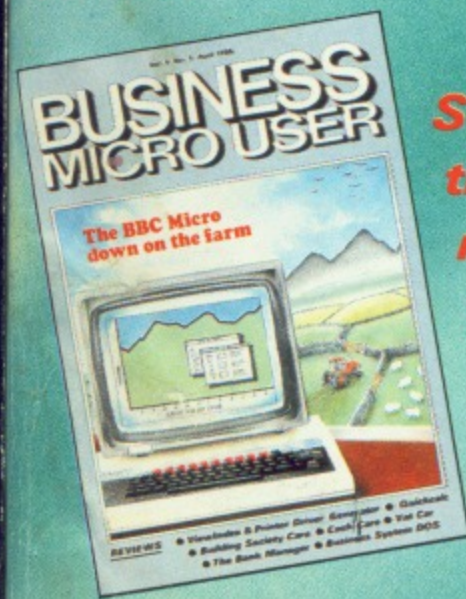
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