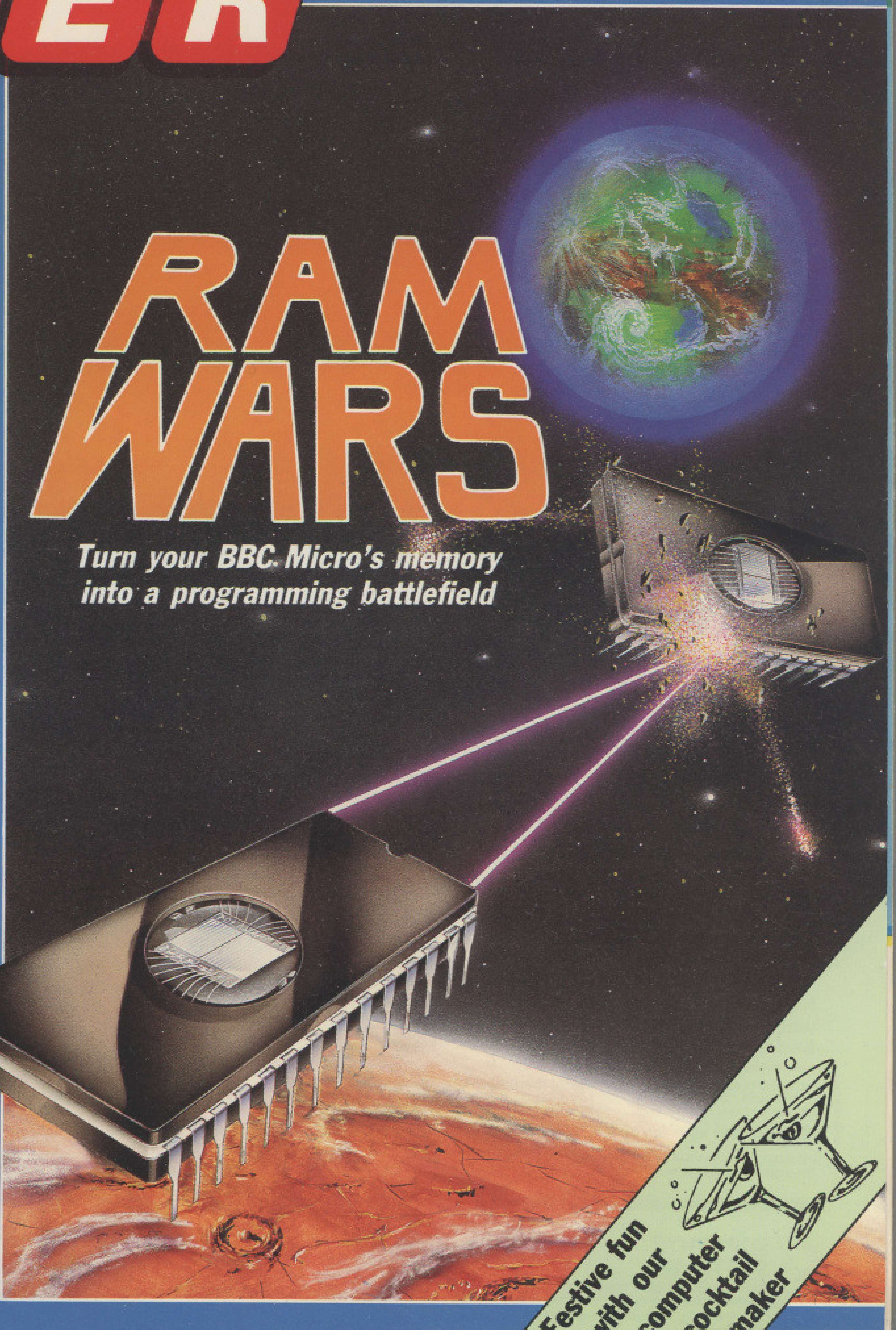
A Database Publication

THE MICRO USER

Volume 5
Number 11
January 1988
£1.25

All about the BBC Micro and Archimedes



RAM WARS

Turn your BBC Micro's memory into a programming battlefield

Festive fun with our computer cocktail maker

PARTNERS
Linking Sinclair's Z88 to your BBC

EDUCATION
Play to learn with Number Invaders

ARCHIMEDES
Queries answered
Artisan reviewed

GAMES
Arcade action + Classic strategy

UTILITIES
How to create your own art gallery
Using tape to archive files

REVIEWS
- Advanced Basic
- Midi hardware
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. . . plus all the latest games

Spellbinder
TEACH YOURSELF SORCERY
SPELLS AND POTIONS
TOAD LEG
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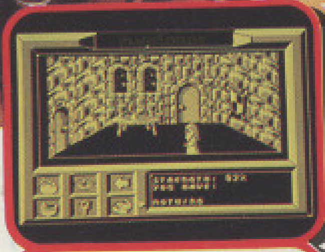
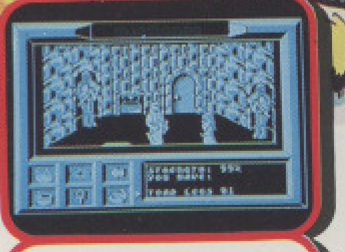
BURNED ASH


SEARCHING A ROOM


A DEATHMONK APPROACHES

ANOTHER NASTY CONFRONTATION

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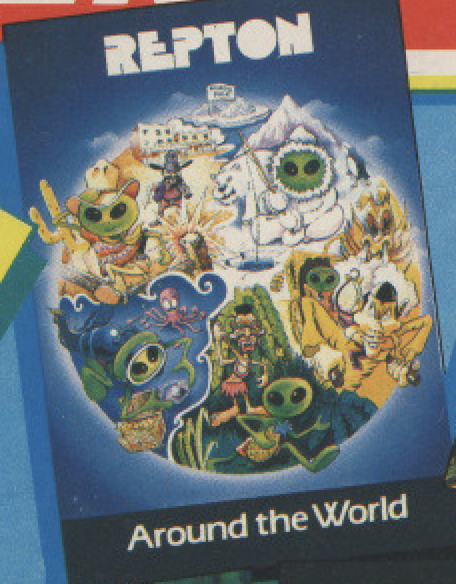
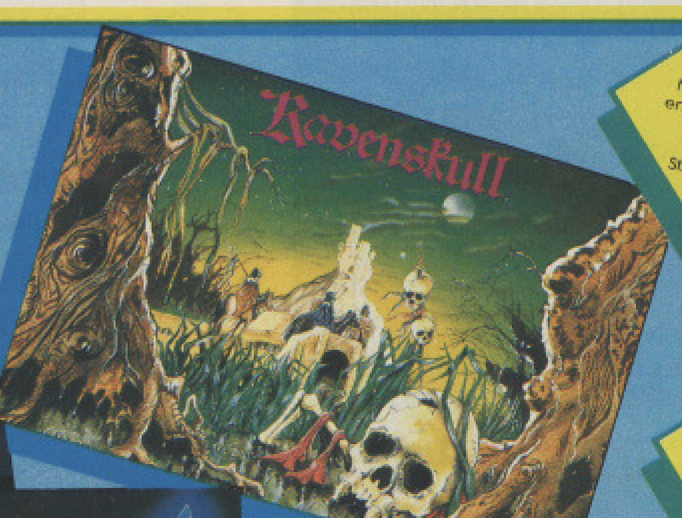
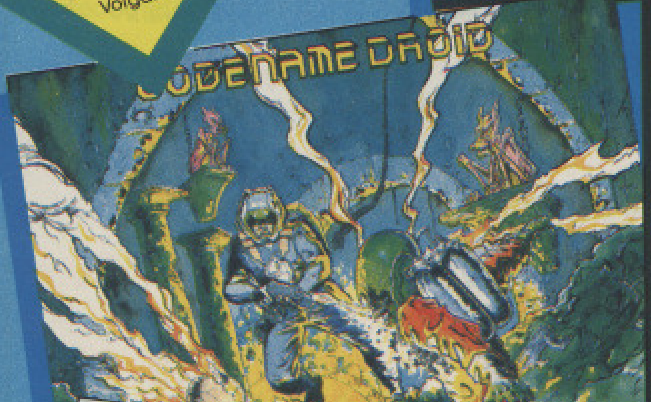


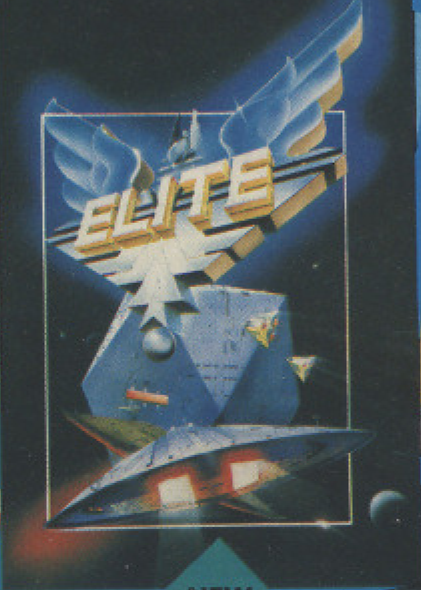


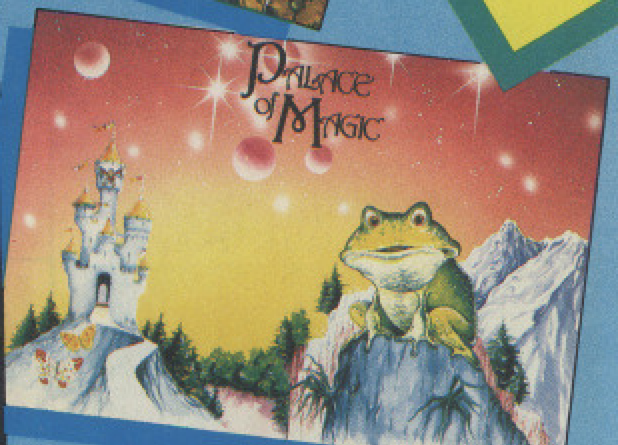
RAVENSKULL
3 eerie horsemen prepare to enter the now notorious Fortress of Doom. The evil Baron Strieg awaits them.

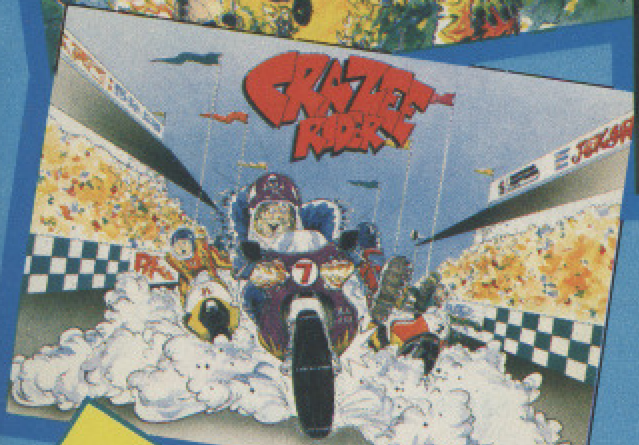
Codename: Droid
John Stryker is depicted showing no mercy with the warmongering Volgans.

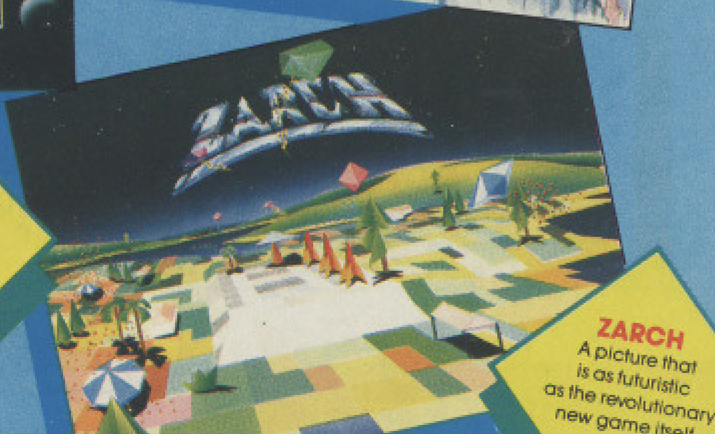
PALACE OF MAGIC
This beautiful piece of artwork makes the Palace of Magic look inviting. But beware, all is not what it seems.











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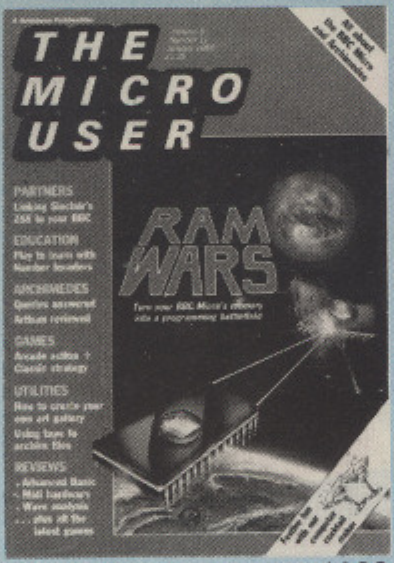

Vol. 6 No. 11 January 1988

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Quoting Ref. MAG001
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Published by:
Database Publications Ltd,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

Subscription rates for
12 issues, post free:
£15 – UK
£25 – Europe (incl. Eire)
£31 – Overseas Surface
£42 – Overseas Air

ABC 59,727
Jan-June 1986
ISSN 0265-4040

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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News trade distribution: Diamond Europress Sales & Distribution, Unit 1, Burgess Road, Ivyhouse Lane, Hastings, East Sussex TN35 4NR. Tel: 0424 430422.

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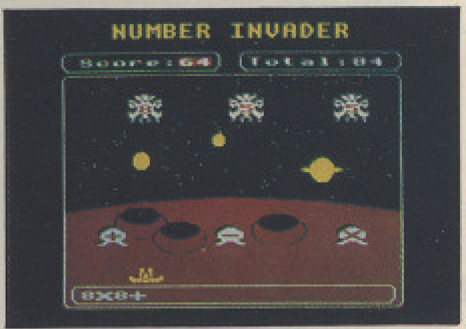

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RAM WARS

This month we present part one of a unique BBC Micro game in which you create computer programs that fight for domination of the computer's memory.
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The Z88 Link

Why and how this new portable could be a partner for the BBC Micro. Find out all about it on Page 132

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NEW SERIES
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HARDWARE
Integrex colour printer
REVIEWS
Nidd Valley Illustrator

THE MICRO USER
February 1988 issue on sale January 6

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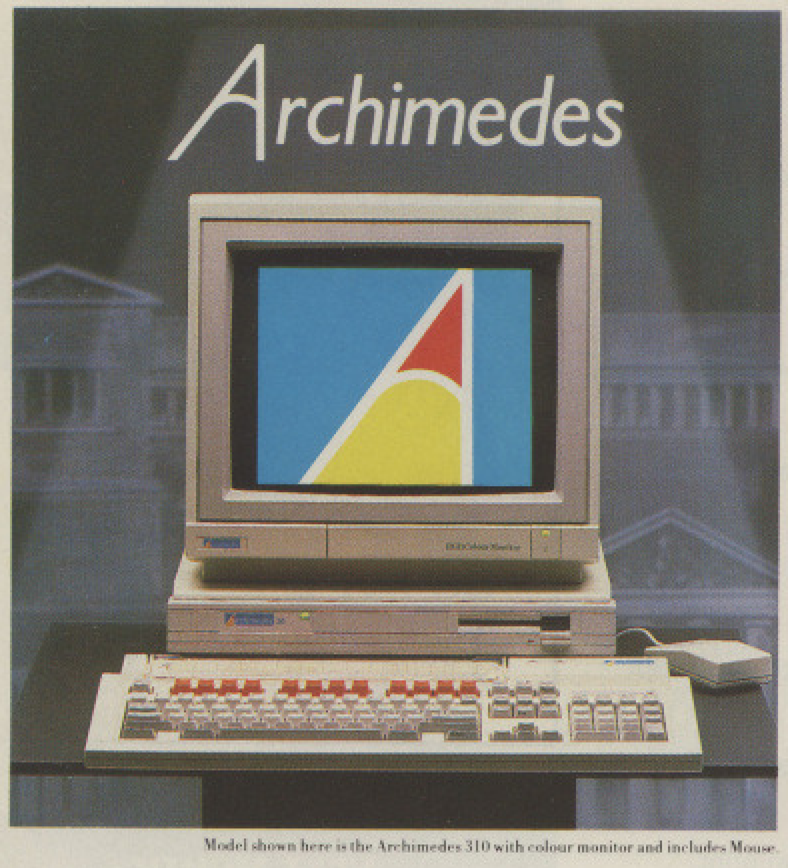
†Home/Small Business Category of the British Microcomputing Awards.



Model shown here is the Archimedes 310 with colour monitor and includes Mouse.

- ▷ At an operating speed of 4 million instructions per second just about everything you do happens instantly. With this kind of power at your fingertips the advantages are enormous.
- ▷ Already Archimedes* has won the British Microcomputer of the Year award, a clear winner against the other two finalists, the Amstrad 1512* and the Amiga 500*
- ▷ In addition to BBC Basic V, high level languages such as 'C' and 'Pascal' can be used for specialist applications fully exploiting the computer's outstanding power, graphics and speed.
- ▷ The huge potential of Archimedes doesn't stop there. The 310M with its built-in PC emulator can run Lotus 1.2.3,* D BASE III,* MS-WORD,* and other popular business programs available under MS-DOS.*
- ▷ With prices starting at £749 exc. VAT for the 305 with mono monitor and rising to £1035 exc. VAT for the 310M with colour monitor, the Archimedes 300 series represents unparalleled value for a computer system of such capability.

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THE MICRO USER NEWS

Acorn chief talks of Unix project

HINTS of a brighter future for Acorn are broadening as changes at the top begin to take effect.

As former managing director Brian Long decided not to renew his contract, the man who has temporarily taken over the helm, Bruni Soggiu, began to talk about a new Unix workstation project, which whetted the appetites of industry pundits.

Long had been managing director for two years. He joined soon after Olivetti stepped in to rescue Acorn from receivership with a £26 million refinancing package.

The company moved back into profit last year after large losses, but Long's departure came only a few weeks after £1.37 million losses were announced.

The official statement said he had "indicated to the board his intention to resign from the company in order to pursue other interests following the completion of his initial assignment".

The statement explained that Bruno Soggiu, who has been a member of the board since September 1985, would continue as chairman and would also assume Mr Long's executives responsibilities within the company.

Mr Soggiu has since reaffirmed Acorn's commitment to its present product line and customer base.

He said that he looked forward to further developments of Risc technology which had been successfully used in the Archimedes range.

He also spoke in outline of an "exciting project for the future" – a new series of the Unix workstations, currently under development.

This is expected to be a special development of the Risc chip to produce a microprocessor to drive a Unix workstation, a purpose which many believe to be a perfect application for Acorn's state of the art technology.

A tune on Archimedes

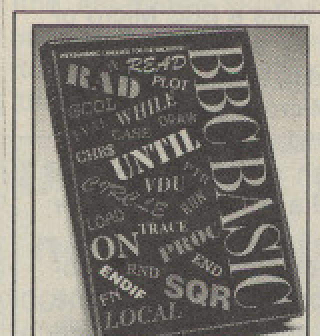
THE laborious task of writing down musical notes can now be tackled by the Archimedes.

Philip Hazel, software developer at the University of Cambridge's Computer Laboratory, has produced a music printing program for the machine.

Hazel (0223 334714) has combined his computer expertise with an interest in music to produce PMS, at present under consideration for commercial release.

The input is entirely by text so that the name of the note and its duration is entered rather than a graphical symbol on a musical stave. Hazel believes this method is far easier and quicker.

Output is to any page printer which can support PostScript.



Macintosh gets a BBC Basic

BECAUSE of the growing number of Apple Macintosh computers that are finding themselves alongside the popular BBC Micro in educational establishments, Human Computer Interface has announced a version of BBC Basic for the Macintosh.

The new version is identical to the ones on the BBC Micro and Master 128. A built-in file transfer allows programs to be exchanged directly between computers, without additional software.

Second City Systems (021-359 4621), who are the exclusive distributors, say that developments in the language for the Archimedes have been included in the package, including the most significant extensions such as WHILE, ENDWHILE, the CASE construct, and additional graphics capabilities such as rectangle and circle fill, and patterns.

A listing editor is also included for fast entry and editing of programs using the standard Macintosh features, and menus give access to the most important Basic commands. Price £149.

Domesday Project's award

THE Domesday Project – the imaginative BBC Master-based multi-media record of British life in the 1980s – has won a major computing award.

To mark its 30th anniversary, the British Computer Society gave its special award to BBC Enterprises for demonstrating significant achievements in the three areas for which it annually makes presentations. These are technical achievement, social benefit and applications.

Domesday technical project manager Roger Kelly said the commemorative award was an honour, and added: "The Domesday Project and the Advanced Interactive Video System are the products of an incredible joint effort".

He said this involved not only all the contributors to the Domesday Discs – a massive interactive database about every aspect of Britain in the 1980s – but also the cooperation of Acorn, the Department of Trade and Industry, and others.

"I believe this award is a credit to everyone who worked so hard to make the project a reality", said Roger Kelly.

The original Domesday project resulted in two discs.

The Community Disc is based on Ordnance Survey maps and provides a wide range of associated information accessed by geographical location.

The National Disc takes a countrywide approach accessed by topics and includes the 1981 Census, extracts from Hansard and many special features.

NEWS

MicroLink plans a massive expansion after £1.3m deal

A MASSIVE expansion of MicroLink, Britain's fastest-growing electronic mail service, is now being planned following the completion of a £1.3 million contract with Telecom Gold.

MicroLink – which has a section specifically for BBC Micro users – was launched in April 1985 as a means of encouraging people to start exploring the exciting new world of electronic communications.

It became an instant success, not only throughout the whole of Britain but in Europe, the Middle East and Australasia.

The MicroLink service is housed on a Prime 750 computer in Telecom Gold's top-security London headquarters.

As part of the new deal, the service is being transferred to a machine that is four times more powerful – the Prime 9955.

"The phenomenal development of MicroLink has meant that we have now outgrown the computer that has served us so well in the last two and half years", said MicroLink chairman Derek Meakin.

"The new machine will give us much greater flexibility. It will allow us to provide a much faster service, introduce a variable charging structure to meet the different needs of our users, and make possible the installation of new and exciting facilities".

Head of MicroLink Derek Meakin (left) looks on as Telecom Gold general manager Clem Jones signs the historic £1.3 million deal between the two companies

Prizes in the maze

AN entrepreneurial dragon named Bono is the protagonist in one of Superior Software's latest releases, Bonecruncher.

The game turns life in a bath house into a soap opera of Wagnerian complexity.

Bono is a little dragon who has opened a bath house for the monsters who lurk in the stagnent waters of the deep sea.

Business is booming but the smell of the monsters has lured malevolent Glooks into the bath house.

Bonecruncher is a series of mind-bending mazes which Superior (0532 459453) say will challenge even the best of players.

There is a prize of a portable radio complete with headphones, a Bono's Bathing Co badge and a winners certificate for anyone who completes the game. Price £11.95 on disc and £9.95 on cassette.

ARCHIMEDES TRANSFER

THE BBC Micro is now able to transfer files to an Archimedes with the help of a new utility package from Zaphod Software.

Known as Beeb-to-Ark, the package links a BBC Micro or Master computer to an Archimedes by a supplied data cable. Menu-driven software is supplied to transfer the files.

Machine requirements for the BBC Micro are one or more disc drives, Acorn DFS or ADFS, and OS1.0 or better.

A similar package is available which allows files to be transfered back to a BBC machine, and a bureau service for BBC/Archimedes file transfer.

Zaphod (031-556 4056) are also including a bonus program on the Archimedes disc which allows users to examine and change the load and execution addresses of Archimedes files in the root ($) directory. Price £29.95.

Designer aids blind

POPULAR BBC Micro program Knitwear Designer has found a new role – helping to raise money for the blind.

The Database Publications software lets users design their own woollies and print out patterns.

So it was a "perfect fit" for a Christmas Fair selling handicraft articles made by the blind at Surbiton, near London. Visitors to the fund-raising event were able to see Knitwear Designer in action during a special computer-aided sweater design demonstration.

Guide Dogs for the Blind and the Kingston and District Social Club for the Blind are among groups that will benefit financially from the fair.

Christmas collection

A BUDGET-PRICE games compilation for the BBC Micro has been released by Prism.

This is the fourth year that Prism (01-804 8100) has produced such a pack especially for the Christmas games market.

The war collection includes Paras, a simulation of a small army unit of 15 men under direct control.

Battlezone 2000, in which the aim is to stop an ogre leaving the bottom of the map; Johnny Reb, a simulation of the American civil war; and Empire, in which the player has to stop a ruthless force threatening to conquer the world, also feature.

The compilation is completed by The Stolen Lamp, where the task is to survive a number of dangers at the same time as solving problems, and Roman Empire which sets the task of trying to conquer six countries. Price £4.99.

Archimedes goes to DTP winner

Winner Dan Smith

SCHOOLBOY Daniel Smith is now the proud owner of an Archimedes, thanks to his desktop publishing skills.

For Daniel was the winner of the special Youth Category in the 1987 Desktop Publishing Awards, and his prize was the top Acorn machine.

The awards were sponsored by PIRA, the UK technology centre for the printing and publishing industries and presented at the Desktop Publishing Show organised by Database Exhibitions at London's Business Design Centre.

Daniel, aged 15, a pupil at the Kings of Wessex Upper School in Cheddar became a computer buff at the age of nine when his parents bought him a Video Genie Mark II.

He was given a BBC Micro a year later for his birthday after his father Patrick had bought him a book on BBC Basic on the understanding that when he was proficient in it he would get the present.

His entry for the contest was a series of GCSE exam course booklets prepared on his BBC Micro.

An avid reader of *The Micro User*, Daniel is not, however, taking computer studies at school – he prefers to keep it as a hobby – but is studying applied science, as he wants to be a physicist.

Daniel insists that the Archimedes is what he most wanted in the world.

"I was getting worried that somehow or other I was going to have to find the money to buy him one", said his father.

The Desktop Publishing Show set out to be the first prestige event for desktop publishing and it succeeded overwhelmingly.

The confidence in the DTP market is reflected by the news that Database Exhibitions has set the dates of the next showcase event.

The Desktop Publishing Show 1988 will be held on October 13, 14 and 15, with the venue once again being the Business Design Centre, Islington, London.

"Our faith in the market has been totally vindicated by this, the first show to be completely dedicated to desktop publishing", said Derek Meakin, head of Database.

"We always knew we would have a success on our hands with this event, but the level of interest demonstrated surprised even us.

"So many new people are now getting involved in desktop publishing that I am convinced that the figure of £300 million always given as the estimated value of the market for 1988 will in fact turn out to be virtually double that".

Upgrades for new machine

CONTEXT has just released enhanced versions of its range of BBC software in Archimedes form.

These are not just 6502 emulations, says Context (02303 347), but work under the full native Archimedes operating system, providing – among other things – significant performance improvements.

Programs available in this form are Bank Manager Master (at £25), Business Utilities (£12), Typing Tutor (£15), Madlibs (£12.50) and Easy Reader (£12.50).

Upgrades are available for existing users.

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NEWS

New comms devices

TWO communications devices and a stand-alone C generator for the BBC Micro and Master have been announced by Beebug.

The first is an upgraded version of the Command communications rom which now includes Hayes compatibility.

Command contains over 50 commands designed to aid the creation of customised communications software. As well as the usual Viewdata and text terminals, the new rom also includes a telephone directory and Viewdata editor.

Other features include auto-dial/answer facilities, real-time clock, XMODEM file transfer, telesoftware downloading, and split screen operation. Price £39.

The other new release from Beebug (0727 40303) is an internal modem for the Master 128 which features baud rates of 1200/75, 75/1200 and 300/300.

It has auto-baud rate selection, tone and pulse dialling, auto dial and auto answer. Price £119, which includes the Command rom.

A stand-alone C generator for the BBC Micro and Master Series is the latest of the releases.

The program interfaces with the Beebug C Linker to produce code that will run on any BBC Micro or Master.

As well as the stand-alone facility, the dual format disc contains a number of C functions such as SIN, COS, and TAN. Price £19.

Research that pays

ONE of Britain's leading BBC Micro dealers, Watford Electronics, is celebrating its 15th year in business.

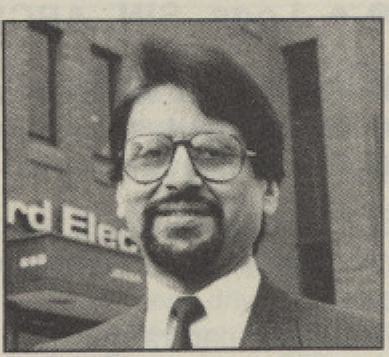
The multi-million pound company started out as an electronic components mail order service operating from the home of the present managing director, Mr Nazir Jessa.

Since then it has grown rapidly and now occupies a purpose-built shop and office complex on Watford's High Street.

Building an empire based on the BBC Micro was not easy. Not until Watford Electronics had sold over 17,000 micros did Acorn make the company an official dealer.

But the delay did nothing to stop Nazir's will to succeed. In order to meet the high demand for the BBC Micro he would buy stocks from a hi-fi dealer and sell them for more than he paid.

With the volume of sales came demands from customers for such things as cables, disc drives, printers, software and anything else that could be attached to the micro – demands that Nazir was pleased to cater for.



Nazir Jessa . . . accent on back-up service

Commenting on the success of the company he said: "We have grown rapidly, not just by shifting products out of the door, but by giving an essential back-up service to our customers".

Another aspect of the Watford success has been its research and development program. Not being content with some of the products on the market, which Nazir calls "poor and inadequate", he set about developing hardware and software which combined quality with value.

Today, hundreds of BBC Micro products, from dust covers to 30Mb Winchester disc drives, carry the Watford name badge.

THE GALLUP CHART TOP 20 BBC SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	TAPE PRICE
1	△ 2	PALACE OF MAGIC *Superior*	9.95
2	△ 13	SURVIVORS *Atlantis*	2.99
3	▽ 1	GRAND PRIX CONSTRUCTION SET *Superior*	9.95
4	◁ 4	CRAZEE BIDER *Superior*	9.95
5	●	PLAY IT AGAIN SAM *Superior*	9.95
6	▽ 3	SPY VS SPY *Tynesoft*	9.95
7	●	SPITFIRE 40 *Mirrorsoft*	9.95
8	▽ 5	PHANTOM *Tynesoft*	7.95
9	◁ 9	COMMONWEALTH GAMES *Tynesoft*	6.95
10	▽ 8	SUPERIOR COLLECTION VOL 1 *Superior*	9.95
11	▽ 7	PAPERBOY *Elite*	9.95
12	△ 16	STRYKER'S RUN *Superior*	9.95
13	▽ 11	LIVING DAYLIGHTS *Domark*	9.95
14	△ 15	MICROPOWER MAGIC *Micropower*	7.95
15	▽ 6	DUNJUNZ *Bug-Byte*	2.99
16	△ 17	REPTON 3 *Superior*	9.95
17	●	RED ARROWS *Alternative*	1.99
18	▽ 10	MINI OFFICE II *Database*	14.95
19	▽ 18	WINTER OLYMPICS *Tynesoft*	7.95
20	▽ 12	AROUND THE WORLD IN 40 SCREENS *Superior*	6.95

Compiled by Gallup/Microscope

Grand Prix Construction Set has finally been removed from the number one slot by another Superior title, Palace of Magic. Look out for Superior's new release, Life of Repton, and for Play it Again Sam, a compilation entering the chart at number five. Spitfire 40 from Mirrorsoft enters at number seven and you can read the review in this issue of *The Micro User.*

The Christmas present

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RISC USER is written by an experienced team of Archimedes enthusiasts with roots in home computing, education, and over 5 years experience with the BBC Model B and Master computers with BEEBUG magazine. So popular is BEEBUG that membership exceeds 20,000 worldwide.

RISC USER provides lively and informed coverage of what's happening in the world of the Archimedes. Reviews, hints, programs and articles are specifically written for the Archimedes, showing how to exploit the many features of this sophisticated computer. RISC USER has material of direct use to education, business, industry and home computing.

RISC USER includes a well balanced selection of the latest news from Acorn and other major suppliers, pre-release reviews of the latest software and peripherals, as well as editorial features, ideas, hints and tips, readers letters and much more. RISC USER is published 10 times a year and is only available on subscription.

RISC USER subscription also gives you free access to our technical support team who may be contacted by phone or letter. This team of experts will endeavour to resolve any software or hardware problems that you may have, and will also provide unbiased advice. RISC USER is also an Acorn appointed Archimedes Support & Service Centre should you need repairs etc.

Although the focal point of RISC USER is the Magazine, remember that you get far more than JUST a magazine when you subscribe. You become part of an organisation which has provided many years of support to micro computer users. Let us have the opportunity to help you make the most of your Archimedes.

The first issue of RISC USER included the following:
ARM ADFS Menu – a useful utility to access ADFS files & directories under mouse control, *Visual Effects* – some Basic routines to produce stunning effects, *Sound & Music* – how to use the sound system, *Off The Shelf* – reviews of products available now, *Acorn Hotline* – using aliases and details of the OS, *Archie's White Mouse* – the first in a series on Archimedes graphics, dozens of vital *Hints & Tips* and much, much more.

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MU I

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NEWSLETTER

ONLINE COMPUTERS ARE HELPING UK FARMERS

A NEW users group has been set up on MicroLink to help UK farmers make better use of their computers. The British Farm Computer Users' Group is being organised by Andrew Cooley, who is project co-ordinator for on-farm systems with the Milk Marketing Board.

"My experience is that many farmers are already exploring the potential of micros beyond their use in day-to-day management", he said, "but they suffer, perhaps more than managers in any other business, from the isolation inherent in farming itself. The primary aim of BFCUG is to overcome this isolation.

We want farm computer users to be able to share their ideas and experiences and get the maximum value from these immensely powerful management tools".

At first MicroLink is providing a farming section on its bulletin board, but eventually BFCUG will become a closed user group on the system.

Support for the new organisation has come from Dr John Craven, head of the Milk Marketing Board's farm management services, and from leading farm software suppliers Farmplan and Sum-It.

Special terms are being arranged for farmers subscribing to MicroLink and BFCUG – and a reduced subscription will also apply for existing MicroLink users who join BFCUG before the end of this year.

Moving with the times

ONE of Britain's largest removals specialists has joined MicroLink in order to improve communications between its widespread offices.

Scotpac – a subsidiary of P&O International Removals – ships by land, sea and air to just about anywhere in the world you can think of, everything from a single item to a houseful of furnishings.

The company has 15 depots in the British Isles plus branches in Australia, New Zealand, Canada, South Africa and the Middle East.

All are now able to send messages to each other via MicroLink telex and electronic mail services.

Scotpac has installed at least one micro and modem at each of its depots, and has eight micro systems in its Glasgow headquarters.

It all adds up to some very busy MicroLink mailboxes – last year Scotpac handled more than 20,000 individual shipments weighing a total of 21 million lbs.

Comms boom in the heavens

AMATEUR astronomers are joining MicroLink at the rate of ten a month.

The reason is that nothing beats electronic mail as a means of getting to know about the latest happenings in the heavens.

Initiative behind the booming interest in MicroLink comes from Guy Hurst, editor of The Astronomer, a monthly magazine with an international readership.

A constant stream of astral activity means he also needs to produce twice-weekly newsletters detailing all the fresh sightings reported by the Smithsonian Institute in America.

"When it is processed and distributed by conventional means, this information is often quite dated by the time it reaches our readers", said Guy Hurst.

"MicroLink has, however, speeded up the transmission of news from America. A paging device alerts me each time a telex message arrives from the Smithsonian and I don't waste a moment relaying it via Email.

"Those of our members with MicroLink facilities can often access information the same day it reaches me -- but others have to wait until one of my newsletters arrives by post. That's why so many astronomers are keen to join MicroLink.

"People in places as far away as Sweden, West Germany, Australia and New Zealand are now receiving the Email version of my newsletters. This means they are often able to study new phenomena within hours of a first sighting -- something not possible before we joined MicroLink".

The fax in a flash

SHROPSHIRE entrepreneur Duncan Baker has come up with a novel idea for getting more mileage out of his MicroLink subscription.

He is using the system to help him operate a faximile service from his office in Lydbury.

"Basically we need the fax machine for our own purposes", said Duncan, proprietor of the Lydbury English Centre, "but we have a fair amount of spare capacity.

"Seeking to help cover our costs we've started a fax service priced at roughly half that of other local agencies".

The service Duncan offers includes receiving text via MicroLink electronic mail or telex, printing it out on plain paper or letterhead and distributing it by fax. And of course this procedure also operates in reverse when required.

YOUR chance to join MicroLink – Page

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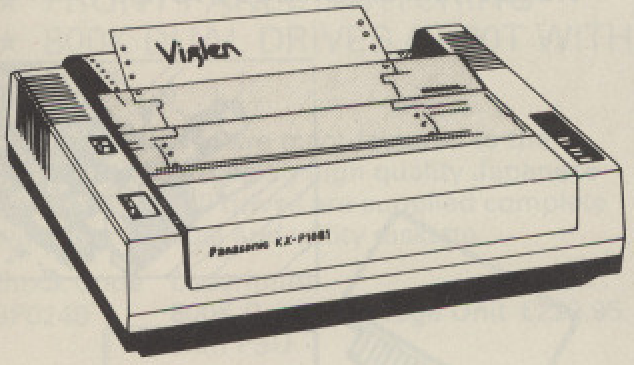
VISA

SPECIAL CHRISTMAS OFFERS FROM VIGLEN

PANASONIC PRINTER KIT



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

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

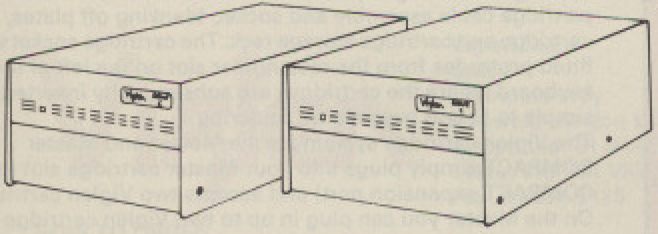
Stock Code	Description	Price inc. VAT
SP079	Panasonic KX-P1081 plus accessories	£185.95

Please add £8 for insured courier delivery.

WINCHESTER

MEGA BYTES FOR MINI BUCKS

NEW LOW PRICES



Plug in 20 to 112 Megabytes of extra storage with the Viglen Winchester system.
The Viglen Winchester is ready to plug in and use on a BBC Master micro; for a BBC B or B plus you will merely need to fit the Acorn ADFS Rom. The Winchesters are 100% compatible with the Acorn Winchester and Acorn ADFS and will also work with the Acorn Master 512 board with DOS plus.
Drive 1 Winchesters are also available for backup or just more storage and simply plug into the back of the Drive 0 unit.
The Winchester package consists of: Winchester unit (cased with controller boards, power supply and fan), Master reference Manual part 1, Winchester user guide and Winchester utilities on disk (such as formatter, verifier, ADFS menu and sophisticated backup program allowing you to make fast backups on DFS disks, ADFS disks or Drive 1 Winchester).

Stock Code	Description	Price inc. VAT
Drive 0 Single		
V150	VB20 20Meg Viglen Winchester	£569.00
V152	VB28 28Meg Viglen Winchester	£599.00
V155	VB40 40Meg Viglen Winchester	£799.00
V156	VB56 56Meg Viglen Winchester	£899.00
Drive 1 Second Drive		
V160	VB120 20Meg Drive 1 Winchester	£499.00
V162	VB128 28Meg Drive 1 Winchester	£529.00
V165	VB140 40Meg Drive 1 Winchester	£739.00
V167	VB156 56Meg Drive 1 Winchester	£769.00
V157	20MB Tape Streamer Backup	£689.00
V503	Acorn ADFS Rom and Manual (Only necessary for BBC B or B Plus)	£29.95

Please add £8 for insured courier delivery.

Available for use with SJ research file server at no extra cost, please specify when ordering.

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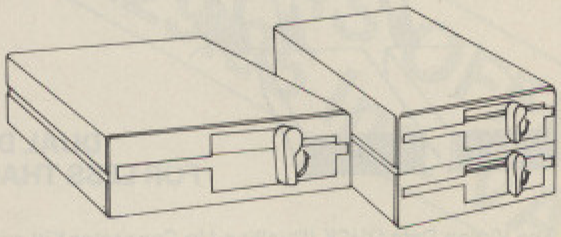

All disc drives are supplied with a manual, packed utilities disc and a full 12 Months warranty (2 Year Warranty available) and are ready to plug in and use on a BBc B (fitted with a DFS) B + or Master micro. 40/48 Track drives have a switch which enables operation in either 40 or 80 track mode.
The capacity quoted are given in single density mode; for double density mode (1770 DFS + ADFS as in the Master) the capacities should be approximately doubled.
An integral power supply is not necessary as the disc drives run from the micro's power source however should you require drives with their own power supply, these are also available.
If your BBC B micro does not have a DFS fitted then you will also require the Acorn dfs kit. These are available from Viglen.

Stock Code	Description	Price inc. VAT
SP014	400K Single Drive 40/80T	£99.95
SP030	400K Single Drive 40/80T + PSU	£109.95
SP019	800K Dual Drive 40/80T	£189.95
SP020	800K Dual Drive 40/80T + PSU	£209.95
VPD0240	100K Single Drive	£105.95
VPD0241	400K Single Drive 40/80T	£113.00
VPD0242	200K Dual Drive	£195.95
VPD0243	800K Dual Drive 40/80T	£219.00
VPD0245	100K Single Drive + PSU	£119.95
VPD0246	400K Single Drive + PSU	£135.00
VPD0247	200K Dual Drive + PSU	£209.95
VPD0248	800K Dual Drive 40/80T + PSU	£235.00
VPD0249	800K Dual Drive 40/80T + PSU in Metal Bridge Unit	£265.00
V0060	3.5" 400K Single Drive	£95.95
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V0063	3.5" 800K Dual Drive + PSU	£199.00
V0065	3.5" and 5.25" 800K Dual Drive	£219.00
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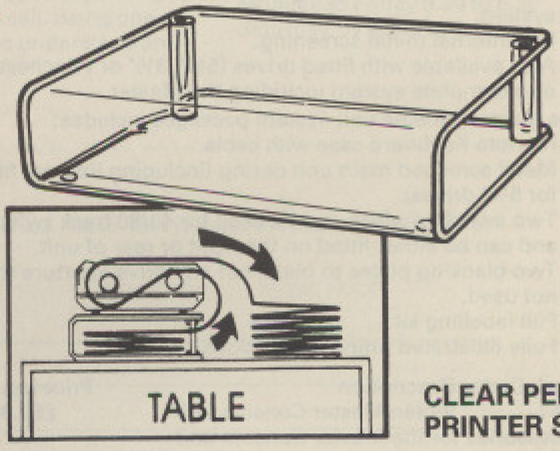
PRINTER STANDS



CLEAR PERSPEX PRINTER STAND

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

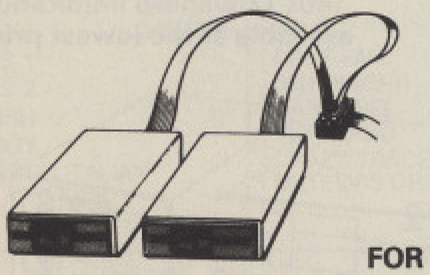
Stock Code	Description	Price inc. VAT
V490	80 Column Printer Stand (15" × 13" × 3.5")	£19.95
V491	136 Column Printer Stand (23.5" × 13" × 3.5")	£29.95

Please add £3 P & P

ORDER FORM ON LAST PAGE OF VIGLEN SECTION

SPECIAL CHRISTMAS OFFERS FROM VIGLEN

DUCKS



DUAL DRIVES FOR LESS THAN £17!

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

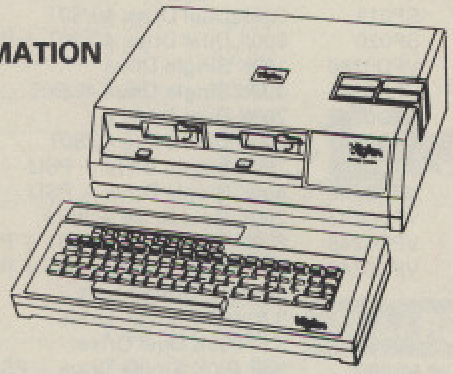
- ★ No soldering simply plugs in.
- ★ No need to take disk drives apart to change links.

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

Please add £2.50 for P & P.

CONSOLE SYSTEM

MASTER TRANSFORMATION



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

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

The Master console unit system packages includes:

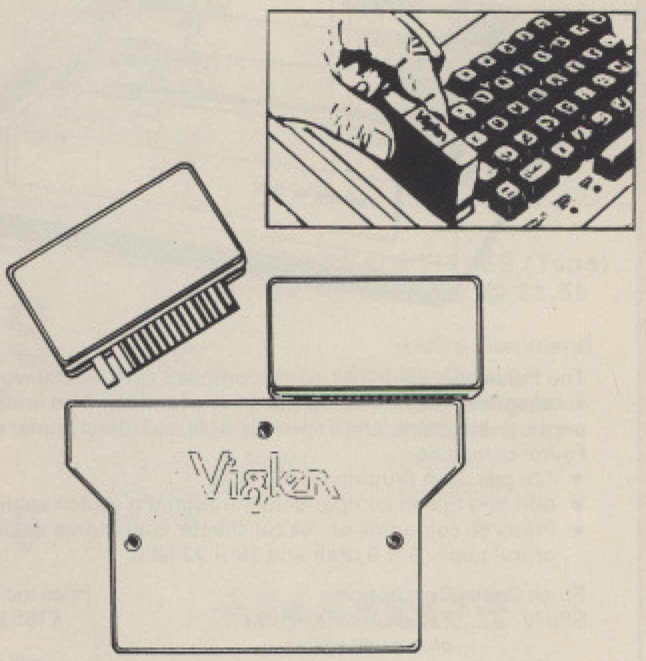
- ★ Remote Keyboard case with cable.
- ★ Metal screened main unit casing (including internal fittings for 5¼" drives).
- ★ Two switches which can be used for 40/80 track switching and can be either fitted on the front or rear of unit.
- ★ Two blanking plates to blank out any drive aperture that is not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

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

Please add £8 for insured courier delivery.

CARTRIDGE SYSTEM

VIGLEN ROM CARTRIDGE SYSTEM



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

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

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

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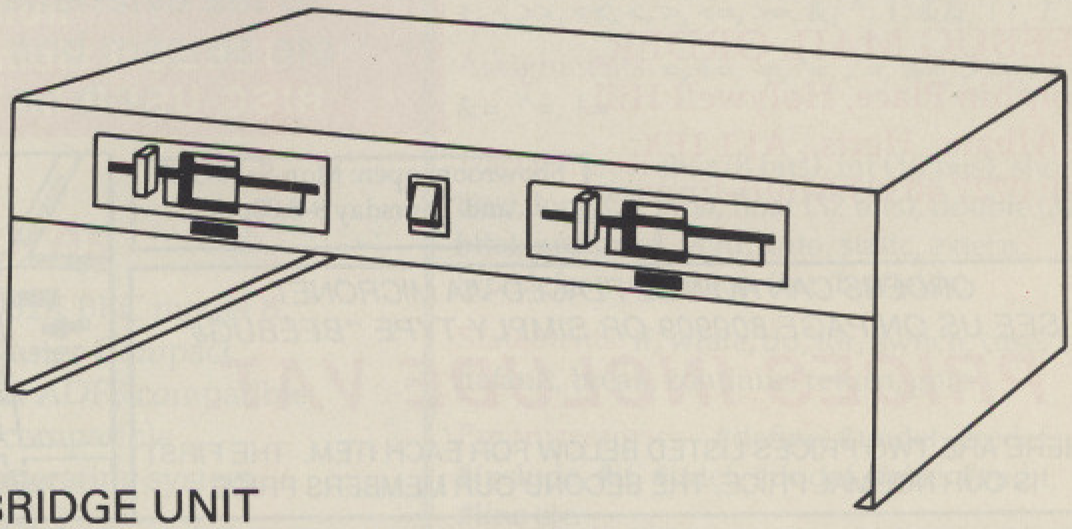

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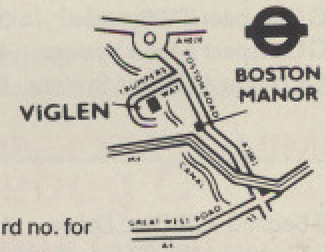

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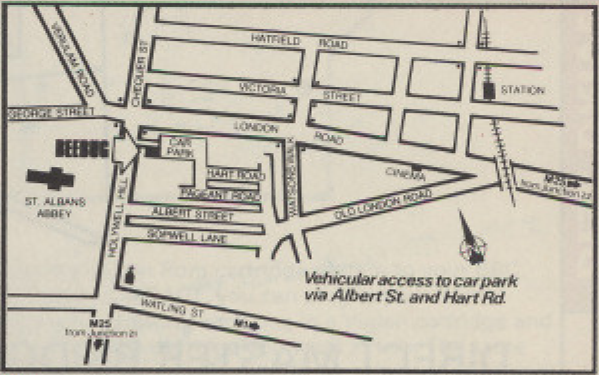

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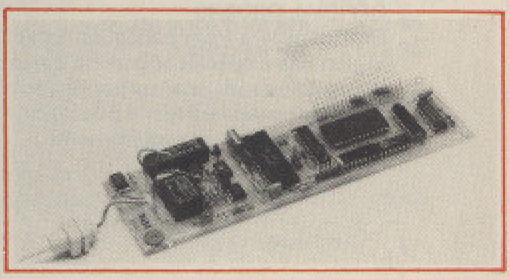

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Beebug C is a full implementation of the language C conforming to, and extending beyond the Kernighan and Ritchie standard. Beebug C produces fast compact code and supports floating point maths. A comprehensive set of library functions and macros are supplied on disc.

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Technical Summary

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Expressions: *, &, -, !, ~, ++, --, sizeof, ->, *, /, %, +, -, >>, <<, <, >, <=, >=, &, ^, |, &&, ||, ?:

Assignments: =, +=, -=, *=, /=, %=, >>=,<<=, &=, ^=, |=

Declarations: char (8 bits), int (16 bits), short (8 bits), long (32 bits), float (32 bits), double (32 bits), unsigned, void, auto, static, extern, typedef, struct, union (inc. bit fields)

Statements: if, while, do, for, switch, case, default, break, continue, return, goto

Preprocessors: #define, #undef, #redef, #include, #if, #ifdef, #ifndef, #else, #endif, #line etc.

Library: over 90 library functions, plus 12 header files: h.stdio, h.stdlib, h.string, h.call h.ctype, h.assert, h.float, h.limits, h.stdarg h.stddef, h.math, h.setjmp

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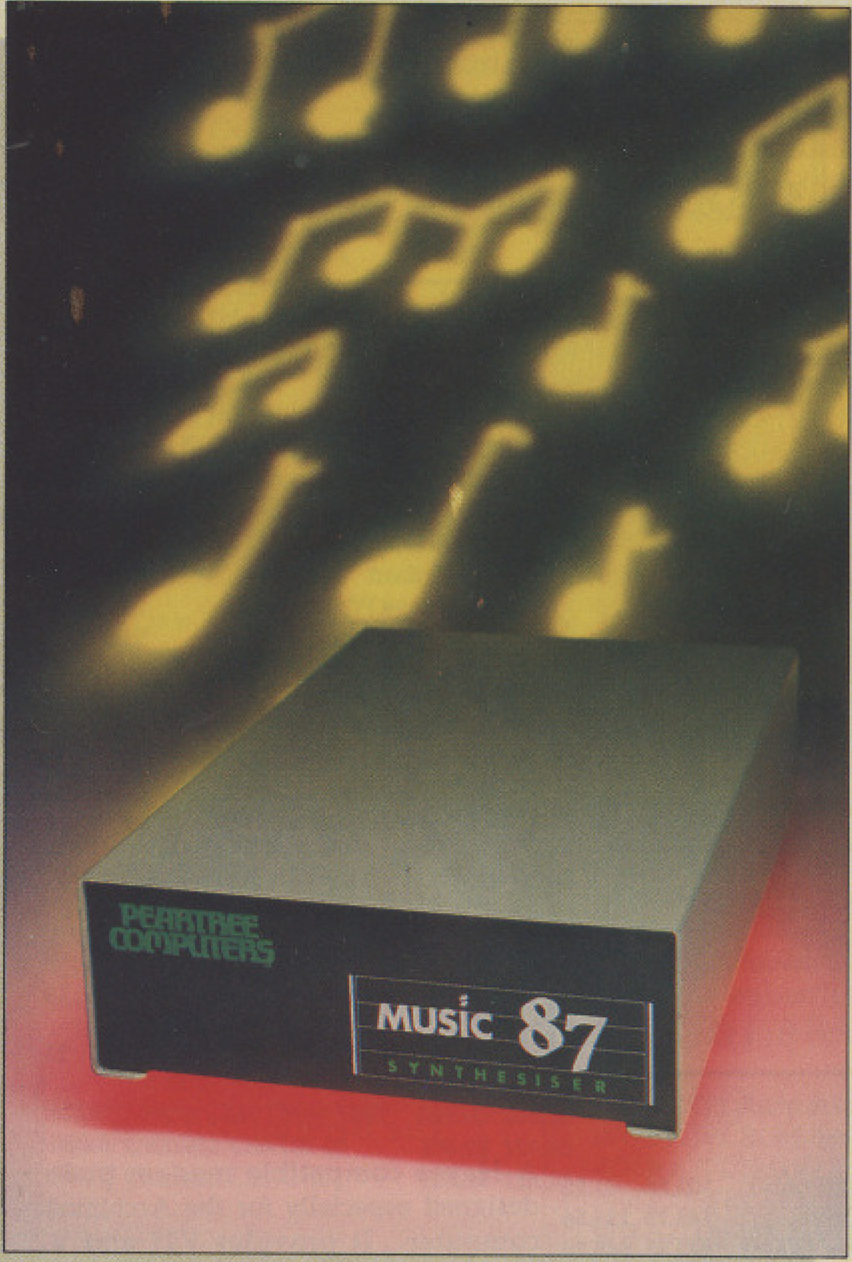

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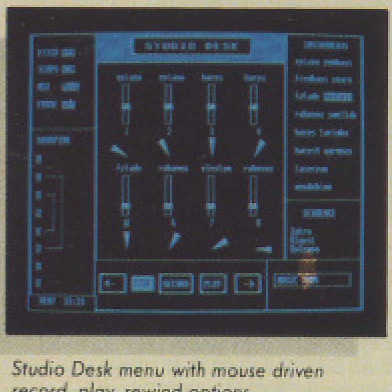
OVER 17000

visitors attended the 87 Acorn User Show. Most were amazed at the performance of the **MUSIC 87**. As a result we have been receiving hundreds of telephone calls from people wanting to know the differences and merits of the **MUSIC 87** synthesiser when compared to more expensive music synthesisers. Below is a table showing how the **MUSIC 87** compares to the Music 5000.*

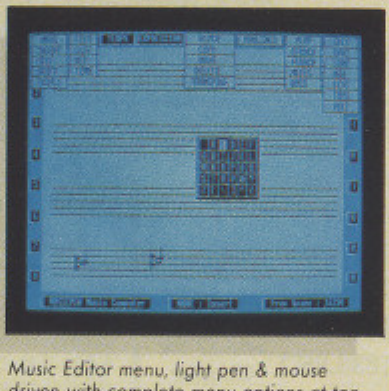
9 good reasons to buy the **MUSIC 87** rather than the Music 5000.*

FUNCTION	Music 5000	MUSIC 87
Mouse driven	✕	✓
2nd processor compatible	✕	✓
Light pen driven	✕	✓
Full 32k EPROM	✕	✓
Waveform designer as standard	✕	✓
Ability to bypass AMPLE	✕	✓
Graphic representation of waveforms, envelopes and score	✕	✓
Music printout as standard	✕	✓
Expensive	✓	✕

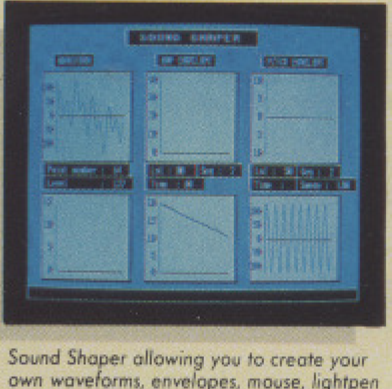
Price	Music 5000.*	MUSIC 87
	£161.00	**£79.95**



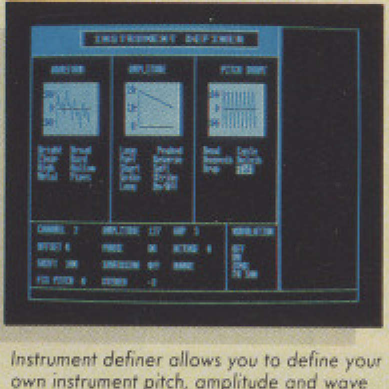
Studio Desk menu with mouse driven record, play, rewind options



Music Editor menu, light pen & mouse driven with complete menu options at top



Sound Shaper allowing you to create your own waveforms, envelopes, mouse, lightpen or keyboard driven



Instrument definer allows you to define your own instrument pitch, amplitude and wave forms

MUSIC 87
SYNTHESISER

MUSIC 87 software to upgrade your Music 500 or 5000 only **£39.95**

*Music 5000 is supplied by Hybrid Technology Limited

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V. BUNCE, OXFORD. DEC 86.

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

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This is COURIER
This is ITALIC
This is GOTHIC
This is COMPTS
This is BOLD
This is SHADOW
This is OUTLINE
This is BROWAYE
This is THEATRE

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BEEBUG MAY 87.

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

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(MICRO USER JUNE 87)

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

NOW – Solidisk 256K version is also available.

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CJE micro's

CJE Micro's (Dept MU1), 78 Brighton Road, Worthing, W. Sussex BN11 2EN. Tel: 0903-213361.

SOFTWARE PRICE LIST

All prices include VAT, but please add £1.00 for postage/packing and state 40, 80 track or 3½" ADFS when ordering.

MFNLQ	**£30.00**
Font Discs B, C & D each	**£15.00**
Fontaid	**£30.00**
Fontaid with 6264 RAM	**£36.00**
Font Discs A, B, C, D, EA & Lang each	**£15.00**
Inform	**£20.00**

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

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

Panasonic KXP1081	**£180.00**
Canon PW1080A	**£260.00**
Star NL10	**£230.00**
Star NX15	**£410.00**
Star NB24/10 (216cps)	**£599.00**
Juki Daisywheel	**£330.00**

Free delivery on printers

CJE Printer packs
The CJE packs include; Cable, delivery, paper, plug, utility software and booklet. Please ask for further details.
The Printer packs cost £15.00 with printer: e.g. NL10 + pack = £260 + £15 = £275 inc. VAT.
BBC Cable if purchased separately is £8.00. Software on its own: £11.00 + £1 p&p.

Software for the BBC Micro

MEGA-ROM
A single 128K chip containing INTER-WORD, INTER-SHEET and INTER-CHART. The package contains all manuals, keystrips and quick reference cards supplied with the individual packages, but the software is *all* on a single chip, occupying just one ROM socket.

MEGA 3

MEGA-ROM is compatible with the entire range of BBC Micros, Model-B, B+, B+128, Master and Master Compact. A version will shortly be available for the new Archimedes.

Price: full package £85.00+VAT (£97.75 incl.)

128K ROM

INTER-SERIES

INTER-WORD

A full-feature 'What You See Is What You Get' word processor. This is menu driven, simple to use and offers a whole host of advanced features including:

- **On-screen highlights—bold, underline and dotted underline**
- **Ruler-controlled margins and tabulation**
- **Page breaks, headers and footers shown on-screen**
- **Information can be transferred directly to or from INTER-SHEET**
- **40, 53, 80 and a unique 106 column screen mode**
- **Ability to handle documents longer than BBC memory**
- **Fully integrated with SPELL-MASTER via a special menu**
- **Multi-column printing**

INTER-CHART

A comprehensive chart and graph plotting package. Data can be entered directly at the keyboard, transferred from INTER-SHEET, INTER-WORD or INTER-BASE, or read from file. This data may then be displayed in a variety of graphical forms, edited, printed, saved, etc.

Features include:

- **Up to 16 graphs in each INTER-CHART package**
- **Bar and Line graphs can be overlaid on each other**
- **Pie chart plotting: One segment can be highlighted by pulling it out from the rest of the pie chart**
- **Bar graph plotting: Individual bars can be different colours**
- **Line graph plotting: Points can be marked by a cross or unmarked; joined by a line or marked individually; shown in any colour**
- **Adjustable scales allow you to show all or only part of a graph**
- **Graphs can be displayed with logarithmic scales**
- **Labelling: text may be placed at any position on the graph, allowing very flexible labelling.**
- **Printing: an in-built screen dump is provided for Epson and compatible printers. Access to other screen dump programs is also supported (and documented). Compatible with the Plotmate Plotter.**

INTER-SHEET

The fastest spreadsheet available for the BBC Micro, suitable for home or business use—anything from calculating the home budget to financial forecasting.

INTER-SHEET is driven by prompts and provides a full 'help' list. Some of its main features include:

- **Columnm widths individually adjustable**
- **Text or formula/number in any box**
- **Full range of mathematical formulae**
- **48, 80 and unique 105 column screen modes supported**
- **Information can be transferred directly to INTER-CHART for display as a graph, or to INTER-WORD for inclusion within documents. Data can also be read from INTER-WORD, or from a file**
- **Fast re-calculation and replication of boxes**
- **Any row, column or box can be locked to prevent accidental erasure**

SPELL-MASTER

128K

A totally ROM-based spelling checker for use in conjunction with INTER-WORD. This allows checking of the entire text, just a marked section of the text, an individual word, instant checking as-you-type, browsing through the dictionary, etc.

A single 128K ROM, occupying just one ROM socket. This contains a standard vocabulary of almost 60,000 words (extendable in sideways RAM) and can check at an astounding speed of 10,000 words per minute.

Price: £51.30+VAT (£59.00 incl.)

Computer Concepts Ltd

Gaddesden Place, Hemel Hempstead
Herts HP2 6EX. Tel C442 63933

Access & Visa welcome
Orders despatched within 24 hours

64K

INTER-BASE

A database programming language with simple card index' interface. This will interface directly to all packages in the MEGA ROM. It allows data/results produced by INTER-SHEET to be used, output can be sent to INTER-CHART, and complex mail-merging with INTER-WORD documents can be achieved.

This is a 64K ROM, occupying just one socket. Compatible with the entire BBC Micro range (not compatible with the Archimedes).

Price: £60.00 +VAT (£69.00 incl.)

MICRO MEDIA
Computer Supplies Ltd.

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Potters Bar, Herts EN6 3BR (NO STAMP REQUIRED)

0707 52698 (5 lines)

HEAD CLEANERS

	5.25"	3.5"
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	10	30	50	100	250
SS/DD	6.55	18.55	29.05	53.10	118.00
DS/40T	7.90	22.30	34.90	64.60	144.50
DS/80T	9.40	26.50	40.20	75.15	165.90
DS/HD for PCAT	20.10	57.20	90.10	168.60	385.55

5¼ Reversible discs (Flippy's)

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Suitable for 40 or 80 track drives.

10	30	50	100	250
10.55	30.00	47.40	88.10	204.55

3½ MICRO MEDIA Brand

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SS/DD	17.55	50.45	80.25	147.70	347.80
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5¼"

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PRICES INCLUDE V.A.T.

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DS/80T	19.00	35.20	64.85	148.75	276.00

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SS/DD	9.80	19.35	36.40	86.55	163.85
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DS/80T	13.55	25.65	47.85	113.55	216.20

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Pan tilt revolves around 360 degrees
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55x280x260mm for 12" Monitors		55x355x320mm for 14" Monitors	
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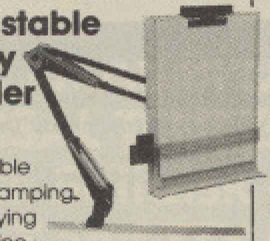
Adjustable Copy Holder



A4 adjustable desk clamping. Magnifying cursor line.
Paper thickness adjustment.
Paper height adjustable clip.

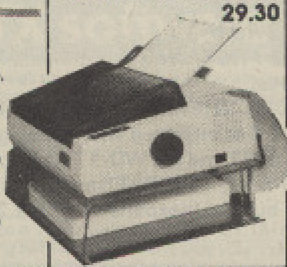
A4 Version Holds up to 300g	25.35
Desk Top Version Holds up to 1000g	13.69
A3 Version Holds up to 1400g	40.65

Printer Stand

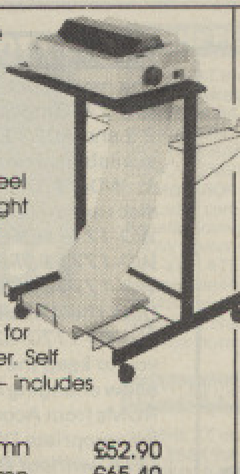
5mm perspex

80 Column Version
400 x 310 x 100mm
21.65

132 Column Version
600 x 310 x 100mm
29.30



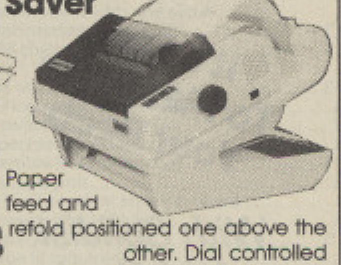
Mobile Printer Stand



Rugged steel frame. Height adjustable basket for output paper & base shelf for input paper. Self assembly – includes castors.

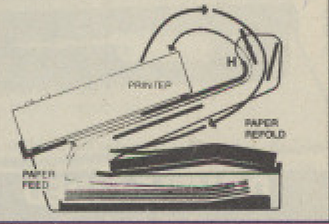
80 column	£52.90
132 column	£65.40

The Space Saver



Paper feed and refold positioned one above the other. Dial controlled paper feed with adjustable deflectors ensures smooth flow and automatic refolding.

80 column 414x380x460mm		132 column 530x380x460mm	
1	34.85	1	42.50
3+	32.75	3+	40.00
6+	31.05	6+	38.30



Printer Ribbons

	Prices (£) per each ribbon 3	6	12
Amstrad 8512/8256	5.65	5.35	4.90
R, G, BR, BL, Y	7.50	7.10	6.55
DMP 2000/3000	2.80	2.60	2.35
Brother HR15 MS	3.30	3.10	2.80
R, BR, BL	4.35	4.10	3.75
Centronics GLP	3.65	3.45	3.15
R, G, BR, BL, Y	4.65	4.40	4.00
Canon 1080/1156	3.30	3.10	2.80
R, G, BR, BL, Y	4.95	4.65	4.25
Citizen 120 D	4.70	4.35	4.15
Diablo Hytype II MS	2.80	2.65	2.40
R, BR, BL	3.80	3.55	3.25
Epson			
FX/MX/RX 80 FX 800	3.55	3.35	3.10
R, BR, BL, G, Y	4.95	4.65	4.25
MX 100/FX 1000/FX 105	4.65	4.35	4.20
R, BR, BL	5.85	5.55	5.10
LX 80/86 GX 80	2.80	2.65	2.40
R, G, BR, BL, Y	4.70	4.45	4.05
Juki 6100 MS	3.30	3.10	2.80
6100 SS	2.05	1.90	1.75
R, BR, BL	2.75	2.60	2.35
Kaga KP810/910	3.30	3.10	2.80
R, G, BR, BL, Y	4.95	4.65	4.25
M/Tally MT80 MS	4.10	3.85	3.55
Panasonic KXP110	5.50	5.20	4.75
R, G, BR, BL, Y	7.20	6.80	6.25
Qume IV MS	3.30	3.10	2.80
Fabric	3.30	3.10	2.80
Star NL 10	5.50	5.20	4.75
Shinwa CP80 MS	4.10	3.85	3.55

One off if ordered with other product
Please mix colours and types for best prices
R = Red, BR = Brown, BL = Blue, G = Green, Y = Yellow

If the ribbon you require is not listed please let us quote

The above is a small selection of the 250 different ribbons we stock. We shall be pleased to find your ribbon, however old or obscure.

MD 120

5¼" x 120
1 12.55
3+ 11.90 each
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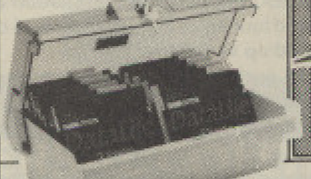
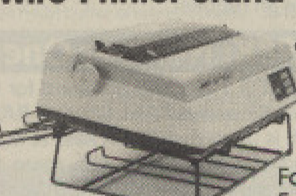


Wire Printer Stand



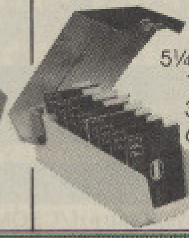
stacks print-out in document tray automatically. Suitable for most standard printers. Made of safety coated steel wire.

For 80 column £14.50
For 132 column £16.50

MD 50

5¼" x 50
1 7.80
3+ 7.40 each
6+ 7.10 each

MD 100



5¼" x 100
1 10.80
3+ 10.30 each
6+ 9.80 each

MM 40

3½" x 40

1 8.30
3+ 7.90 each
6+ 7.50 each

MM 80

3½" x 80
1 10.95
3+ 10.40 each
6+ 9.90 each

Computer Labels

Continuous fanfold, sprocket fed

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Please state no. of labels across the sheet (1, 2 or 3)

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Size	Weight gsm	1000s per box	1 box	3bxs +
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	80	2	20.90	53.55
Exact A4				
11⅔x9¼	70	2	22.50	58.50
	90	1	16.90	45.15

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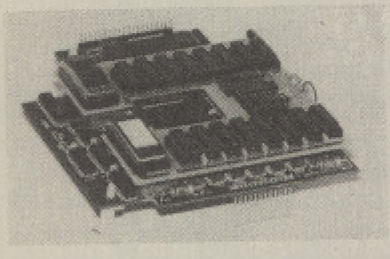
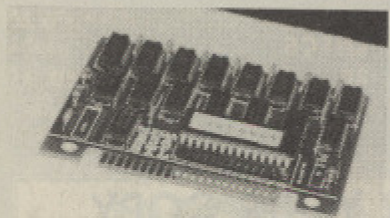




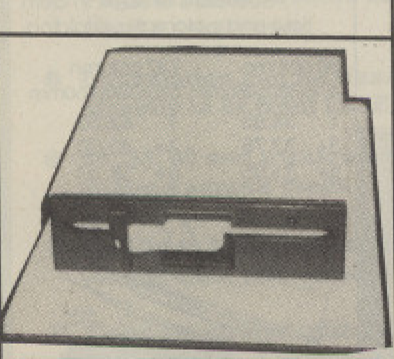
THE PC-500:
The PC-500 is just what you need to take advantage of the biggest software investment on earth: PC software, PC public domain and PC shareware.
The PC-500 is the Acorn 80186 internal co-processor for the MASTER adapted by Solidisk with an appropriate lead for use on the BEEB (and the Master).
It has a mouse, 512K of RAM, 10MHz — 16 bit CPU (around 3 times the speed of the normal PC), 4 software discs containing the Digital GEM operating system, a wordprocessor, a painting program, CPM emulator and other utilities.
Price: **£239 inclusive.** Your BEEB must have a WD-1770 and ADFS.
Data sheet available on request.

THE PC-PLUS:
The PC-PLUS is an expanded PC-500, with one Megabyte of RAM instead of 512K. The extra memory allows large applications such as Desk Top Publishing (eg Fleet Street Editor) to be used on the BEEB or the MASTER.
The PC-PLUS is supplied with the same accessories as the PC-500 including the mouse and 4 discs. Price **£339 inc.**
Upgrade from an existing Acorn 80186 costs **£119.00** but you will be required to sign a service agreement. Please ring for details.
Data sheet available on request.

MASTER MEGA CARD:
The MEGA CARD (256K) plugs into a cartridge slot on the MASTER and adds instantly 256K of RAM. The card can be used as RAMDISK, printer buffer or sideways RAM. Price **£100.00 inc.**
Data sheet available on request.

It's Easy To Masterise Your Beeb

With Solidisk Add-Ons!

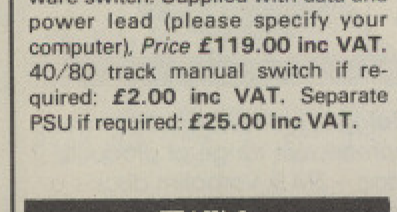


DOUBLE-SIDED 5¼" DISC DRIVE

This is a superb 80 track, double-sided, dual density, lever type and very fast disc drive. Unformatted capacity: one Megabyte. 40/80 track manual switch optional as most Acorn and Solidisk DFS have software switch. Supplied with data and power lead (please specify your computer), *Price* **£119.00 inc VAT.** 40/80 track manual switch if required: **£2.00 inc VAT.** Separate PSU if required: **£25.00 inc VAT.**

TWIN DOUBLE-SIDED 5¼" DISC DRIVES

Complete with bridge unit, suitable for both BBC and Master 128K, *Price* **£238.00 inc VAT.**



WD-1770 DFS:

The new Acorn Disc Filing Systems DFS and ADFS require both the WD-1770 chip. Solidisk offers two basic WD-1770 models which are totally compatible with the Acorn DFS/ADFS ROMs. We also offer our own DFS 2.2 and ADFS 2.1 ROMs which have a superset of utilities and commands. Data sheets on these ROMs are available on request.

1) WD-1770 DUAL DENSITY DISC INTERFACE for previously tape based BEEB. This is the standard Acorn disc upgrade since 1985. Prices are:

WD-1770 DDFS without DFS ROM	**£35.00 inc.**
WD-1770 DDFS with DFS 2.2 ROM	**£45.00 inc.**
WD-1770 DDFS with ADFS 2.1 ROM set	**£55.00 inc.**

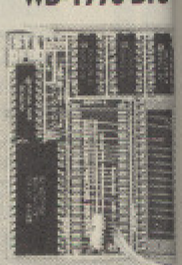
Data sheet available on request.

2) WD-1770+8271 (DFDC) DISC INTERFACE: for BEEB already equipped with the 8271. This system allows you to keep the existing 8271 disc interface while adding the new WD-1770 chip. It has a simple switch to allow changing between the 8271 and the WD-1770. To operate the hardware, you will need either the latest ROMs from Acorn (8271 DNFS 1.2, 1770 DNFS and 1770 ADFS) or Soidisk ROMs. If you are stuck with old or inappropriate DFS software, buy the inexpensive DFS 2.2 ROM. Prices are:

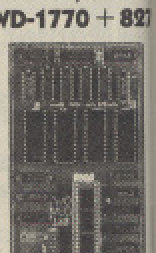
DFDC without DFS ROM	**£45.00 inc.**
DFDC with DFS 2.2 ROM	**£50.00 inc.**
DFDC with ADFS 2.1 ROM set	**£55.00 inc.**
DFDC with 2.2 and 2.1 set (3 ROMs)	**£63.00 inc.**

Data sheet available on request.

WD-1770 DFS



WD-1770 + 82



TWO MEG 12

TWOMEG 128K: Number One Best Seller!

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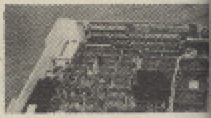

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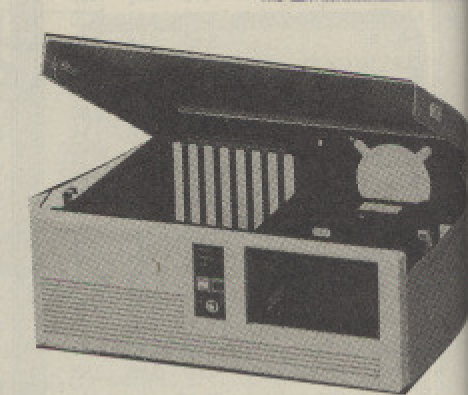

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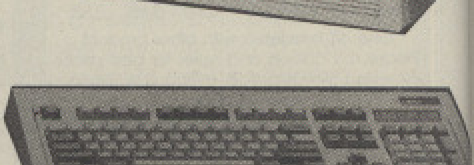

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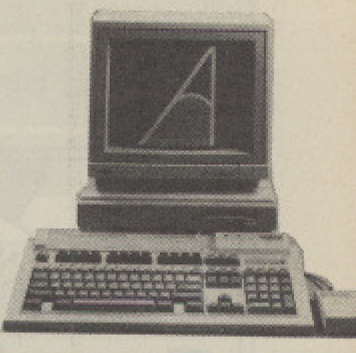

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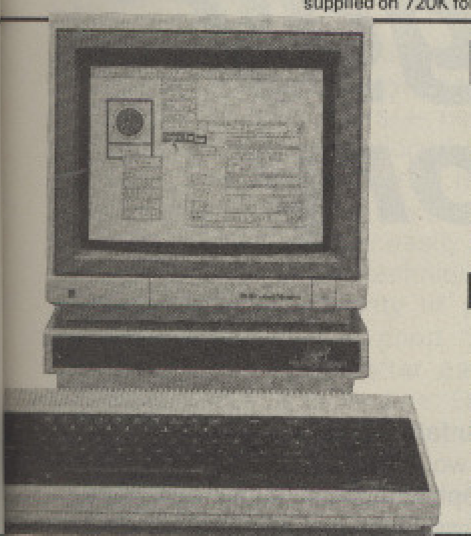
The MS DOS emulator requires at least 1MB of RAM to run and most PC software is only available on 5¼ discs. Current DOS version is 3.2 supplied on 720K format but capable of read/write 360K IBM PC format on the A305M+FD systems.



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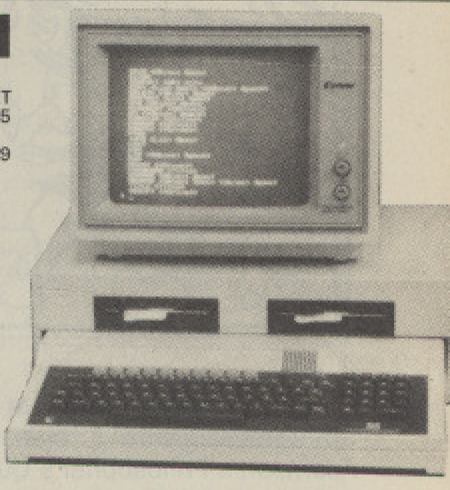
MASTER 128K:



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Master 128K:	391.00	449.65	455.00	525.25	574.00	660.00
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The MASTER 128K comes bundled with Wordprocessor (View), spreadsheet (ViewSheet), Terminal software, DFS and ADFS. The monochrome monitor is 12", can be with green (BM7022) or amber (BM 7522) phosphor, the colour monitor is 14" CM8833 with all imaginable inputs! (The Acorn colour monitor is a badged version of the latter.)
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v Ours does have a data port to connect to a wide range of computers.

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Solidisk TTX Version 1.10 supports Acorn and Solidisk Sideways RAM and Shadow RAM to increase RAM buffer of teletext pages (64 on the Master, 128 with Solidisk 128K sideways RAM, 255 with Solidisk 256K sideways RAM).
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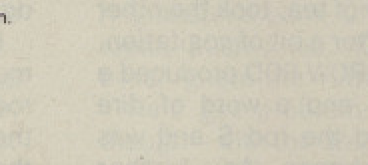

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by
The
Mad
Hatter
10/6

Solving the shaggy dog story

IT'S time to look closely at the second adventure game I ever bought – Acornsoft's Philosopher's Quest.

From my correspondence, I know that a fair number of you have also bought this game and have found it troublesome.

It's not a big adventure, but it is complicated, and it provides some quite severe puzzles, including one that I'm still not convinced was all that fair.

At the heart of Philosopher's Quest are the tasks of saving the life of a sweet little old lady who is dying for a cup of tea, finding her lost doggie, and picking up the odd treasure as you go along.

You won't get far in this game without a pencil and paper, even though it's not all that complicated to map, having less than 75 locations.

There are several move counters at work in this adventure, all of them conspiring to make life difficult, if not downright impossible.

There is a lamp, when you find it, with a limited life. There is a box of five matches, each of which lasts just long enough for you to see where you are and make one move.

Thirdly, there is a piece of gorgonzola cheese with a lethal aroma. Find a gas mask and you can then survive near it and even carry it a limited distance – three moves – before you must drop it and go away until your lungs recover.

The primary challenge of the game, therefore, is not just to learn how to solve the brain teasers, but how to do so in the least moves.

The simplest approach is to divide the adventure into coherent puzzles, solve them, piece them all together and then work out the most economical order in which to do them so as to complete the quest.

Here is the way I approached the first section of Philosopher's Quest, which involved finding one dog and taking it to the little old lady – here after referred to as the Lol.

You start off in a shop, and the description shows that it is also the place to dump any treasures. There are four items there: A cup of tea, some keys, a metal rod and an aqualung. You are told that only two items may be carried out of the shop.

I ignored the cup of tea, took the other three items, and after a bit of cogitation, figured out that THROW ROD produced a satisfactory result and a word of dire warning. I followed the rod S and was plunged into darkness. Any further moves resulted in being eaten by a spider.

I finally had to cheat here and look up the hint and answer booklet. The hint said that I needed a light source, that one was provided and the game was fair. The answer suggested typing GET and then INV.

Doing so produced a lamp which took but a moment to light and an age to extinguish. The air became nearly blue at times before I discovered the simple verbs ON and OFF were all that I needed.

I still think the hidden lamp was a grossly unfair puzzle, and certainly not one that would be tolerated today.

Philosophers Quest is an adventure that allows the use of TAKE or GET without a specific object, indicating how primitive a game it is by today's standards. Once you have the lamp, things become a little more straightforward.

You need the ruby amulet from the curly passage, so take it to Piccadilly Circus, go N and rub it to raise the portcullis, JUMP N into the Danger Room, take the mask and RUN S to the gloomy room, move S again to Piccadilly, SE to the short angular passage, (ignore the cheese for the moment) and go S to get the silver chain at the dead end.

Back you go, get the cheese this time, and start counting: Remember, you can do only three things before you must drop the cheese and move away to let your lungs recover.

Return now to the passage outside the shop where you dump the chain and amulet, take the rod, go S and THROW ROD again. You can turn the lamp off safely here since the next move S takes you into daylight.

Leave the cheese at the west end of the beach and follow the path to the cottage. You'll need the lamp here once again. When you are in the kitchen, unlock the larder door, enter the larder and take the cup of tea. If you take it to the Lol she will beam, tell you to get doggy and throw you out.

Back you go to the beach, where you must carry the cheese N into the small room with the mouse. Once there, take the mouse, drop the cheese and go N to the larger room with the pink star. After the mouse has scared the elephant, drop it, enter the graveyard and go to the alcove.

Take the shaggy dog you'll find there and return to the cottage, picking up the tusk from the graveyard on the way. Take the dog to the Lol who'll beam once more, say it isn't her doggy and throw you out to try again. Just as you leave you hear something horrible happen to the shaggy dog. More next time.

Next month I'll be including a review of Yes Prime Minister. Until then, happy adventuring.

Problem Corner

R. Chapaneri has a problem in Ducksoft's **Castle Dracula** – whenever he tries to strike a match the response is: I don't know how to. Who has the answer, please?

Mark Outten wants help in dealing with the troll the second time round in **Wheel of Fortune**.

At 13, Gavin Reid is suffering from memory loss. How can he enter the dungeons via the trapdoor in **Gisburne's Castle**?

Ian Morland has **Claymorgue Castle** problems – can someone tell him how to stop dying in the magic fountains and what all the spells are for?

Another **Lord of the Rings** problem: Andrew McLernan finished part 1 and saved it, but can't load the data into part 2. Has any one found and conquered this bug?

What use is the purple worm in **Ghost Town**? Mark Hilton would like to know.

J. Morrison wants to know how to pass Herbert to see if there are energy cells inside the mystery crate in the follow up to **Strykers Run**.

Elite Tips I

I get lots of letters asking for playing tips on Elite these days, so for the benefit of all players – especially those who have abandoned it out of sheer frustration – here is how I prepared for the first Mission.

What I can't do very easily is teach docking and combat techniques: All I can suggest is plenty of practice combined with the good habit of saving your status after each successful docking procedure. Early purchase of a docking computer will help.

Right at the very start, when you are at Lave, buy a ton of furs and you should have enough to buy 13 tons of food. Launch and use hyperspace to travel to Zaonce.

Once you have sold your cargo, before you do anything else refuel the ship. Make it a golden rule in the early stages of the game always to refuel before buying cargo, otherwise you could finish up in the embarrassing situation of having a full cargo hold, no fuel and no cash either.

At Zaonce you should be able to buy one ton of computers and one ton of machinery. Your next destination is Isinor, a poor agricultural world with a stable Confederacy government, which should help keep pirate attacks down.

Buy furs at Isinor, using any balance of cash for wines and head for Ensoreus, a high-tech rich industrial world which, as a Corporate State, is as safe from pirates as can be.

Now you must trade between Ensoreus and Isinor as profitably as you can while you start to equip your ship with everything you need.

On Isinor buy furs so long as the price is below 60 credits, otherwise buy food or wines. On Ensoreus buy computers, remembering that if you don't quite have enough for a ton of computers, machinery will give a modest profit.

On either world, once you have filled your cargo hold, check the price of platinum and gems. Buy platinum if the price is under 70 credits and sell at that level or above – you'll usually make enough to pay the fuel bill. Gems should be bought when under 20 credits and sold when higher than that.

Trading policy should always be to maximise profit and minimise interference at this stage: Needless combat is a waste of time until your ship is fully equipped – you'll finish up with a Poor rating at least by the time you have bought everything.

I would suggest you equip your ship in the following order, buying equipment the moment you can afford it and still have a couple of tons of computers: ECM system, fuel scoops, front beam laser, front military laser, energy unit, energy bomb, large cargo bay, docking computer, galactic hyperspace, escape capsule, left mining laser.

Some players might wish to put the docking computer higher up the list, but the ECM system is still vital early on for the simple reason that you will be attacked by Ferdelances and Mambas. These pirate ships will fire missiles at you, and in the early days it is not easy to pick a missile off with a laser.

If you are in dire straits, fire a missile at the Ferdelance or Mamba from close range.

This forces the pirates to use their ECM, which knocks out both your missiles and theirs. But don't forget – every time you do this, you are eating into your profits.

Once you are fully equipped, make your way to Vetitice and trade from there to Anarlaqu, a Feudal system, so that you have plenty of combat opportunities, and plod away until you receive your first *Right on Commander!* message. At that point you are ready to start the first mission.

● *More next month, when I'll deal in detail with how to tackle the first mission with the minimum of fuss.*

Helpline

Mark Outten supplies help for the Hoy brothers in **Old Father Time**. Go S from the marble room to the waiting room and wait several turns until a secret passage is opened. Go through, open the chest with the key and get the hourglass.

Mark then says you are meant to go N – but he keeps getting killed. So, what next, please? Another reader who would like help here is Norman Wilkinson.

If Tony Marter can let me know a little bit more about his failure to achieve a full score in **Hampstead**, I can probably help: I trust he's read the motto.

Tony offers a tip to escape the classroom area in **Wizard's Challenge**: Go to the music room and sing. He wonders what to get next – I'd suggest Robico's **The Hunt**.

Mark Hilton solves Bryan Gorman's problem in **Circus**: To open the maintenance wagon you need the metal bar which can be found by walking across the tightrope.

Mark can also help Marcus Turner in **Spiderman**. Here's how to get the ringmaster's gem: Close eyes, enter room, push knob, turn knob, open eyes. Ignore the mirror.

He's got problems in **The Hobbit** though – with the dragon. He ought to try SAY TO BARD PLEASE KILL DRAGON.

Nine-year-old Stuart Quinn offers an interesting way of killing the dragon – throw the ring at him. Has anyone else tried this?

J.Cornish offers aid in **Classic Adventure**: The plover emerald can be got if you go N from the oriental room, drop all, and enter the plover room. You can then carry the emerald out.

James Harwood offers a couple of pokes for the Simon Hessel management simulation **Inheritance**. Change line 9070 to read:

```
9070IFL>=10000THENPROCSPA
CE:PROCWIN
```

and you immediately enter part 2 of the game.

Line 17290 starts:

```
IFL>200000ANDTW=1...
```

Change the number to 1000000 and you'll no longer be faced with storms in part 2.

John Chinery has troubles here and there: In **Return to Eden** he gets fried by Snowball's engines – you have to wear the radsuit and dig your way out of trouble here.

In **Adventure Quest**, he can't pass the giant – you need the sling and the silver ball. After that the story of David and Goliath should help. To deal with the Djinn you need to open the wind-bag in his presence.

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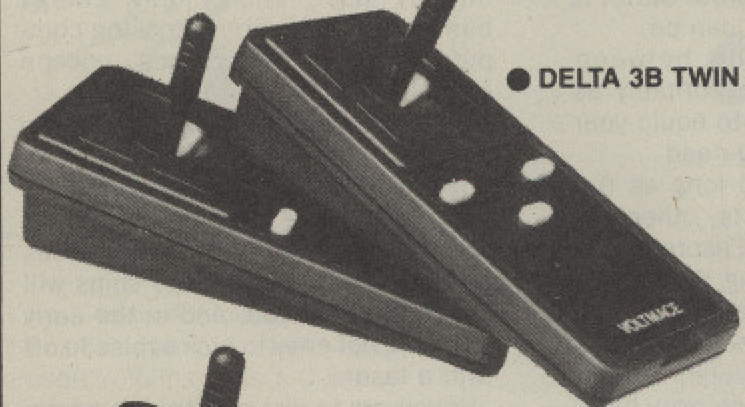
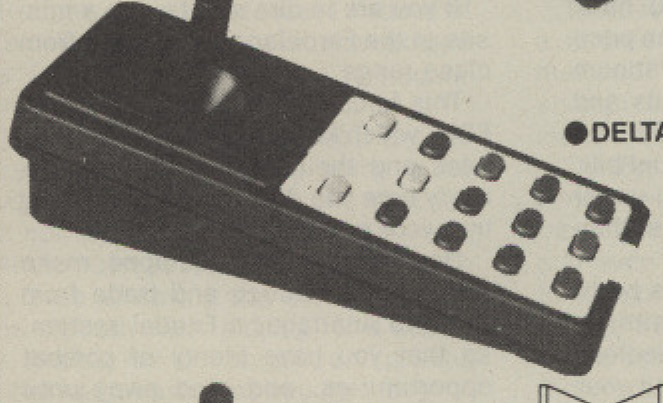


● DELTA 3B TWIN



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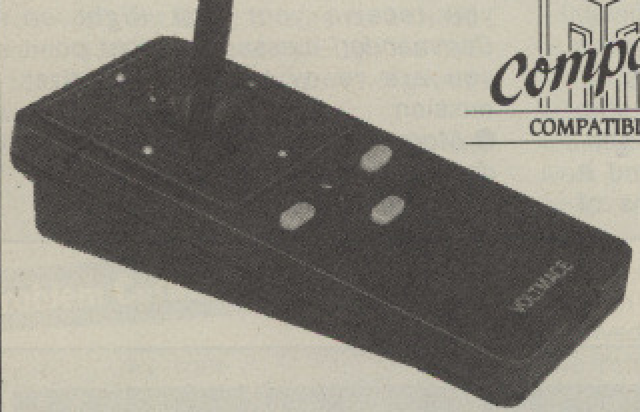
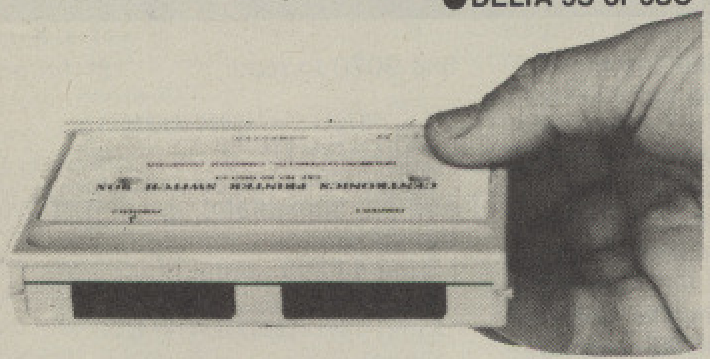


● DELTA 3S or 3SO



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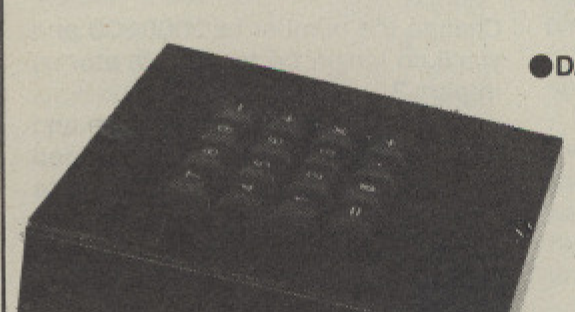

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SOFTWARE SCENE

IMPACT . . . a classic game revisited

Price: £9.95 (cassette), £12.95 (disc)
Supplier: Audiogenic, Winchester House, Canning Road, Wealdstone, Harrow, Middx, HA3 7SJ.
Tel: 01-861 1166.

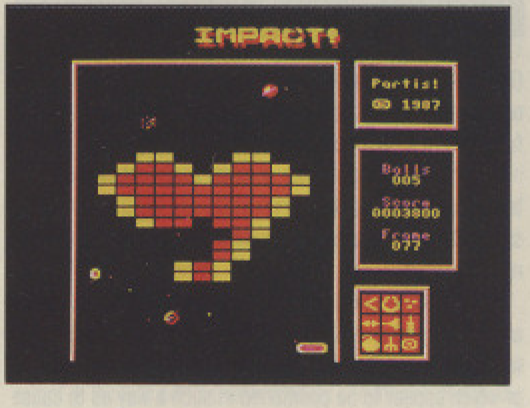
BREAKOUT was one of the first games in the arcades. Even today, nearly a decade on, it still has a dedicated following. The idea is very simple: Using a bat and ball, you must knock out all the bricks from a multi-coloured wall.

With the advent of home computers, Breakout took on an even greater popularity, overtaken eventually by more sophisticated offerings until Peter Johnson's Arkanoid brought respectability back to the old favourite.

Now Impact offers 80 screens of the same winning formula. It has been converted to the BBC Micro by clone-master Gary Partis. Inevitably Impact will be compared to the original.

My first impression is a contradiction in terms – a Gary Partis game that doesn't start off too fast for human reflexes. Despite this, Impact leaves no doubt as to the identity of its author. It has the familiar Partis touches – Demo mode, high score table and cheat mode. It also features a screen editor, so that you can change the pre-defined layouts or design your own.

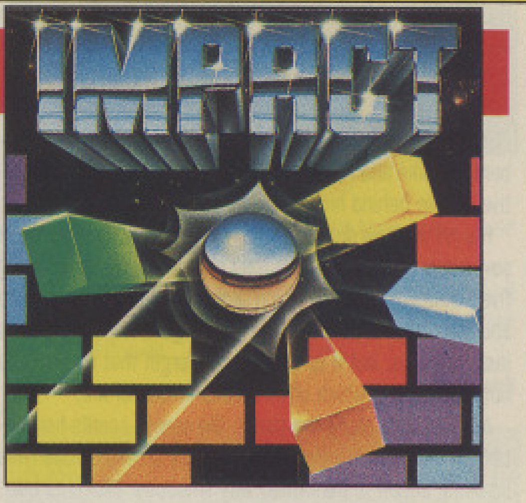
Like Arkanoid, Impact has special effect tokens – hidden inside some of the bricks. These float down the screen when the brick is destroyed and you collect them to add extra features to your game, such as a double-width bat, a facility to catch the ball or free passage to the next screen.



Impact allows you to choose which feature you require and for each token you collect you gain access to more powerful features – these include lasers, smart bombs and rockets.

When you complete the screen after destroying all the bricks, you are given a bonus and a screen editor code. The bonus equates to 1000 points multiplied by the number of tokens collected but not used. The editor code allows you to modify the screen and to start the game on that level.

Impact has to go some way to match Arkanoid – to my mind it doesn't quite make it. The essential difference in playability is the speed. Impact is far too slow, a fact emphasised by the dawdling ball movement when only a few bricks are left. Even on the higher levels it does not really warm up.



The sound effects are basic and the graphics smaller than we have come to expect from Gary. These faults rather spoil the game, which is a pity because other aspects of Impact, notably the editor, are excellent. Speed it up!

Hac Man

Sound	4
Graphics	6
Playability	5
Value for money	5
Overall	5

URIDIUM . . . good speedy fun

Price: £9.95 (cassette), £14.95 (disc)
Publisher: Hewson, 56B Milton Trading Estate, Milton, Abingdon, Oxon.
Tel: 0235 832939

URIDIUM is a superb high-speed shoot-'em-up, with super-smooth sideways scrolling. And if that sounds like Psycastria from Audiogenic, then it will be no surprise to learn that both are conversions from the same game on another machine.

However, Psycastria achieved such a high level of technical excellence that it is now considered the standard by which all other such games are judged. So I approached Uridium with more than a little trepidation.

It is compatible with all BBC machines from Model B to Master, and can be controlled using either keyboard or joystick. It includes all the features I consider essential, such as pause/restart, sound on/off and a quit facility, as well as a high-score table and demonstration mode.

From the outset, the game features a number of pleasant surprises. After the first section has loaded, you are presented with a rarely seen option of redefining the playing keys. What makes this feature even more welcome is that the default keys are not a set I have ever seen used on a BBC Micro.

The rest of the game then loads, accompanied by a short passage of multi-channel music that repeats at intervals. Once loaded, the game alternates between the title page, high-score table and demo mode.

After playing Uridium for a while, I actually came to appreciate that there is no introductory music when beginning the game, or death anthem after losing the last life. Just pressing Return takes you straight back into the action and your final demise returns you almost instantly to the title page.

Uridium is certainly easier to play than Psycastria. In both games you must clear each level in one go – but the latter is so fast, with so many obstacles, that all but the most determined of games players can be put off.

Uridium, however, starts off much more gently: I cleared the first level in a relatively short time. Although I have only got to the third level a couple of times so far, I can normally now get to the second without losing a life.

On the surface there is relatively little to choose between the two games. Psycastria is certainly flashier and more of an instant challenge to the geniuses, but Uridium is – to my mind – more playable.

If you enjoy shoot-'em-ups and haven't already got Audiogenic's offering, buy Uridium without hesitation. If you do have Psycastria, and want a variation on a theme – or is it the theme of the variation? – then buy it too.

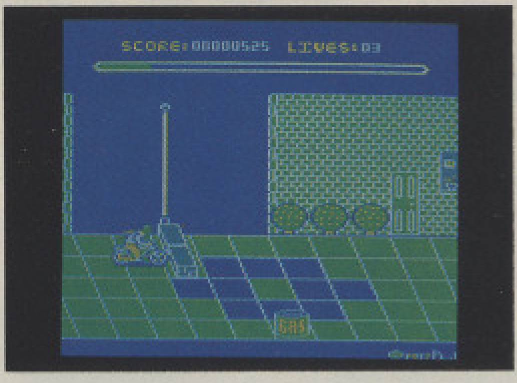
In short, Uridium is excellent – I can recommend it wholeheartedly.

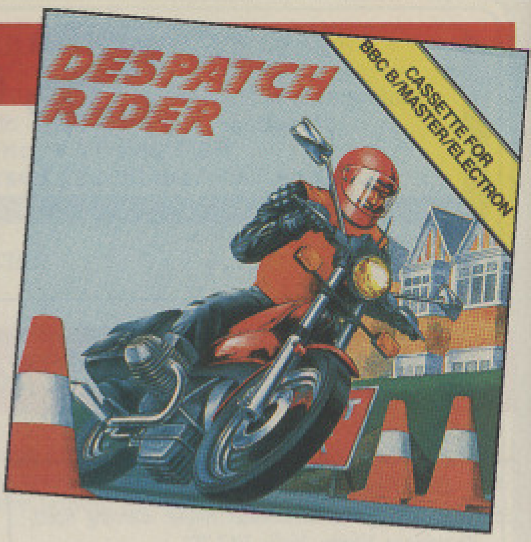
Hac-Man

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

DESPATCH RIDER . . . gives you a testing trip

Price: £8.95 (cassette), £10.95 (disc)
Supplier: ASL, 12 Chiltern Enterprise Centre, Station Road, Theale, Berkshire RG7 4AA.
Tel: 0734 302600





DICK Decker is one of life's failures. Veteran of a dozen previous jobs, his fiancee has given him an ultimatum – get a steady job, or the wedding is off.

The Derek Dorkin Despatch Agency provides Dick with a 750cc Yamasaki speed machine, and a further warning – bend my bike and I'll bend your head! With two such supportive people behind him, how can Dick possibly fail?

His job involves delivering mail to the Royal Snail offices in seven separate streets. The road is divided grid-style, giving five distinct lanes along which Dick can ride. Pressing the up and down keys causes the bike to change lanes: Response is instantaneous, but it is very easy to forget that the keys do not auto-repeat, which often results in loss of life.

As Dick rides along the street, the screen scrolls horizontally – the faster he rides, the faster the screen scrolls. This scrolling action is performed very smoothly. Dick, his bike, and all the other characters, are good examples of what can be achieved using Mode 5 graphics.

ASL provides a generous seven lives, which are lost through collisions and lack of fuel. Across the top of the screen is a fuel gauge and the bike is kept topped up by riding through the barrels labelled Gas.

A bell rings as you touch a barrel, indicating refuelling. Often you will encounter four barrels in a row, but the bell will only ring once. To take full advantage of this abundance of fuel you must perform some rapid lane changing.

The Yamasaki has rather unusual fuel economy characteristics – it uses petrol at a constant rate regardless of your speed. Therefore the faster you ride, the less likely you are to run out of fuel.

I don't know where this town is, but its roads are an absolute nightmare. Each street is strewn with cones, burst water mains, concrete blocks, tacks and greasy patches – all of which appear to be positioned in such a way as to cause the most inconvenience.

In many instances the obstacles block all five lanes – in such cases there is fortunately a ramp accompanying the roadblock. Hitting this ramp, at any speed, will take you into the air and over the hazard. It is this aerial aspect which can become confusing. Due to a combination of no shadow on the ground and the length of time spent airborne, you can never be quite sure whether the rider has moved up one lane, or is still in flight. As you have so little time to manoeuvre you must guess whether he is in the air or on the ground, and make your next move.

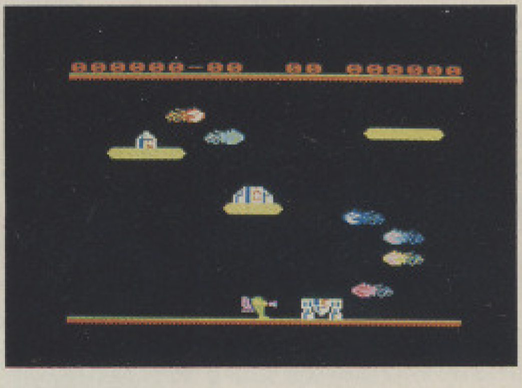
This minor niggle aside, I found Despatch Rider a very testing and enjoyable game.

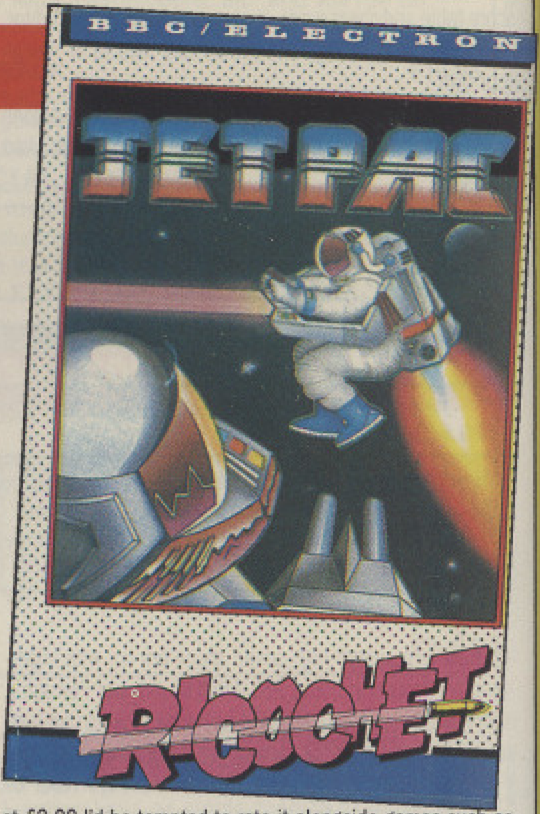
Jon Revis

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

JETPAK . . . addictive and good value

Price: £2.99 (cassette)
Supplier: Ricochet, 8-10 Paul Street, London EC2A 4JH.
Tel: 01-377-8411





IF I were the type of person to judge a book by its cover then I would not have had very much to say in favour of Ricochet's new zap-the-aliens effort , Jetpak.

The cassette inner sleeve doesn't tell you enough about how to play the game. Once loaded, a menu provides options such as joystick or keyboard controls, sound on or off or view high score table – but still nothing much about the game itself. Once you've made your selection, hit the spacebar to begin.

As a result of the poor instructions I spent the first few attempts being wiped out almost instantly by flying fireballs. It took a while, but I finally figured out how to survive.

So there you are, standing on the ground next to the bottom stage of a rocket. On a ledge above you is the middle stage and the third and final stage is on a second ledge near the top left of the screen. There's also an empty third ledge at the top right of the screen. You don't have much time to realise this before alien fireballs start flying across the screen.

Fortunately you are equipped with a jetpack for movement and a laser which obliterates them. The idea is to pick up the upper rocket stages, then fly over the first stage and drop them in place, all the while avoiding or shooting the fireballs.

Other items drop down from the top of the screen at the same time. These are valuable and if you land on them your score increases. These objects come in various shapes. remain for a few seconds where they have landed – then vanish.

Once the rocket is assembled, fuel canisters start dropping at random as well as the other objects. You must collect these and position them over the rocket. Once you have successfully refuelled, you can land on the rocket and it will take you to the next screen. The number of aliens increases once the rocket is fully fuelled.

The next screen is similar, but you do not have to assemble the rocket this time, just collect the fuel. The aliens are still present, but they move differently.

The sound is loud and there's a catchy little tune which plays when you are about to start a game. The graphics are good and the hero looks a bit like Commander John Stryker, but I'm not complaining: At least he isn't an unidentifiable blob of colour.

All in all, this turned out to be a jolly game. Even though it looks like a (very good) magazine listing, it is addictive and at £2.99 I'd be tempted to rate it alongside games such as Dunjunz when it comes down to value for money.

Desmond

Sound	*6*
Graphics	*8*
Playability	*9*
Value for money	*9*
Overall	*9*

LIFE-LINE . . . a character generator to break the ice

Price: £14.95 (cassette), £19.95 (disc)
Supplier: William Stuart Systems, Quarley Down House, Cholderton, Near Salisbury, Wiltshire SP4 0DZ.
Tel: 098 064 235

LIFE-LINE purports to use proven psychological methods to measure four personality characteristics: Autocracy is your tendency to take the initiative and get results, Social Skills is your ability to make friends and influence people. Persistence is the ability to join with others to finish the task in hand, while Precision is attention to detail and ability to finish a job to a high standard.

The program measures these by displaying sets of four words from which you must pick the word which is most like you and the one which is least like you. The choice is not always easy as the words are chosen at random, but the program does tell you not to think too hard.

Your results are plotted in a clever Mode 7 bar chart and are applied to the three sides of your character: Assumed is the image you would like others to see, Natural is your real self and Self-Image is how you see yourself.

When the final results have been displayed, the three aspects are scored against 17 character types. These include categories such as Leader, Advertiser, Tactician, Helper, Convincer and Forceful – one or two types will usually dominate. The manual describes them in more detail, and also suggests possible careers and ways to improve yourself.

Your three character types may not have the same characteristics, but the closer they all are, the more balanced and at ease with yourself you are.

I tried the program on myself several times. The word lists are different each time you run it so you still have to think about each set. Each run produced slightly different results too, but they were close enough to show a definite trend towards one personality type with shades of another.

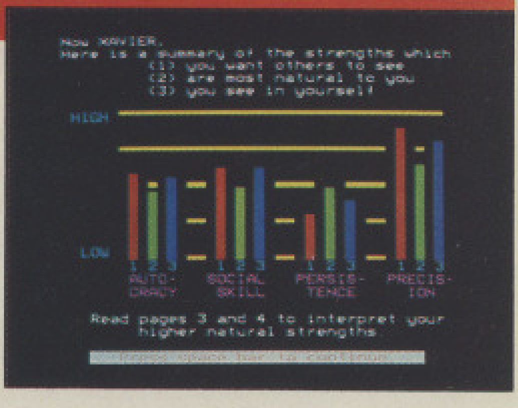
All my friends who tried it agreed that the results were fairly accurate, although the careers advice was usually way off target – or was it their chosen professions that were wrong?

The program can produce a printout of the analysis and comparing all our results showed a fairly close similarity of types between all my guinea pigs – sorry, friends. Which either proves that birds of a feather... or that the program has a bias towards normal, well-balanced people.

Life-Line is great fun although you would only use it once or twice. You need lots of friends to get your money's worth out of it. It could find a use in schools or colleges: Not giving career advice – it's nowhere near sophisticated enough for that – but to promote discussion of social skills or even raise money at fairs.

If you enjoy filling in questionnaires you'll enjoy this. It could be used to break the ice at parties and even take over from Trivial Pursuit.

Ian Waugh



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Now XAVIER,
Here is a summary of the strengths which
        (1) you want others to see
        (2) are most natural to you
        (3) you see in yourself!

Read pages 3 and 4 to interpret your
      higher natural strengths.

    press space bar to continue
```

Sound	*n/a*
Graphics	*4*
Playability	*8*
Value for money	*7*
Overall	*7*

WAREHOUSE . . . the place to blast a monster

Price: £2.99 (cassette)
Supplier: Top Ten, 12 Chiltern Enterprise Centre, Station Road, Theale, Berkshire RG7 4AA.
Tel: 0734 302600

ARCADE adventures show no signs of losing their popularity and we have managed to sneak a look at a pre-production version of Warehouse, a new game programmed by Pillar Graphics.

You are Fred, storeskeeper to Big Alf, the Interstellar Trader. The stores have recently been moved to Tymorg but this has left a backlog and six irate customers.

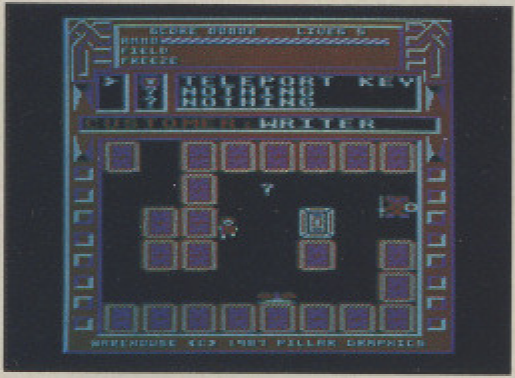
Keeping alive the belief that the customer is always right – whoever said that did *not* work in the retail trade – your task is hampered by the fact that the warehouse is crawling with lots of nasties and littered with tricks and traps. Added to this you don't know what you're looking for.

Like other games of this ilk you have to search a maze for certain items. The screen doesn't scroll, but instead flicks rather quickly from one room to another.

Controls are left, right, up, down and fire – yes, your thoughtful employers don't leave you completely defenceless. You can carry three items at once and apart from the goods there are other items you will need to complete your task.

Your first challenge, sorry, customer, is a writer and for him you need to find – hint, hint! – a notebook and some ink. When you find them, take them to the office and put them on a conveyer belt.

Monsters emerge on every screen from a portal – does the Department of Health know about these? – but a quick blast will close it for good, if you can get to it. Help is provided by Portal Blasters, extra ammo, transporter keys, alien freeze devices and other handy bits and pieces which you collect on the way.



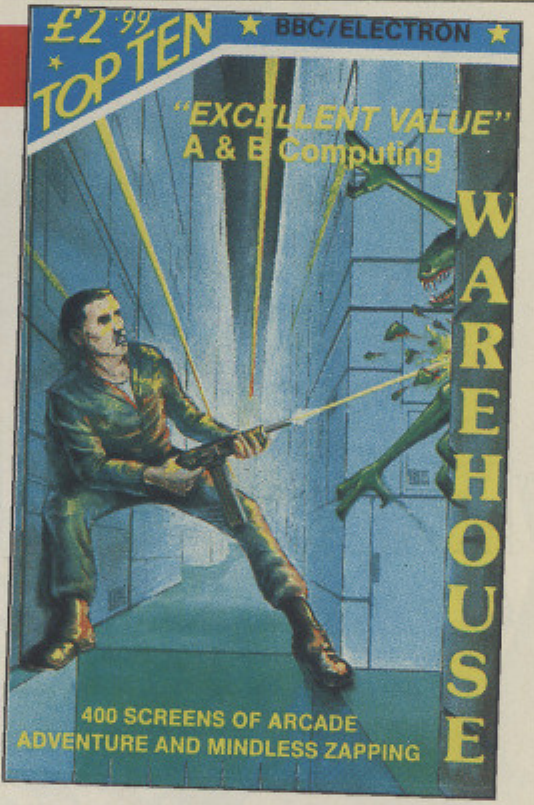
You get five lives, which is considerably better than two verbal warnings and one written one, but when you're reincarnated – oh no! Not another warehouse assistant! – you find you're in a different part of the warehouse.

There are four different starting points in all, which gives you a bigger overall picture of the maze than if you were plonked back at screen one every time.

The sprites are big and chunky and movement is smooth, though you do seem to get zapped by the baddies a little before they actually touch you, which I resented.

Also, it was rather frustrating to find that you can't move and fire at the same time. So to attack a portal with all guns blazing, to knock out emerging aliens, requires some dexterous key manipulation. Otherwise movement is well-controlled.

Your other customers include a priest, a lockmaker, a mechanic and an assassin. A word of warning – the warehouse is also the headquarters of Zorg, the most wanted man in the universe.



Warehouse is not going to do the reputation of the MSC, YTS or JTS any good at all. You don't even get any money, just a place in the Hall of Fame – when you're dead. But it's fun while you're alive!

Now, where do they keep the ammo?

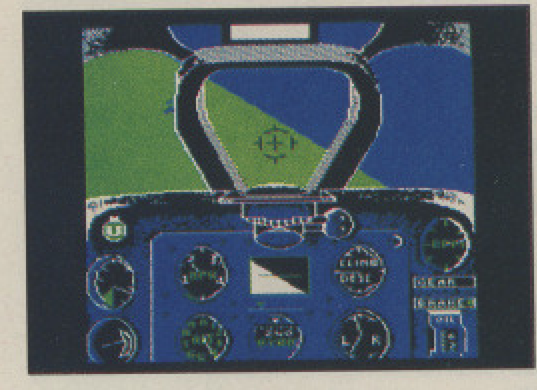
Ian Waugh

Sound	*4*
Graphics	*8*
Playability	*8*
Value for money	*10*
Overall	*9*

SOFTWARE SCENE

SPITFIRE '40 . . . you too can be an air ace

Price: £9.95 (cassette), £12.95 (disc)
Supplier: Mirrorsoft, Athene House, 66-73 Shoe Lane, London EC4P 4AB.
Tel: 01-377 4645



Spitfire
40
A FLIGHT SIMULATION PROGRAM
BBC B/ MASTER DFS DISK
MIRRORSOFT
For use on BBC B/ Electron

ALL you lovers of those old World War II films can now train to become a Spitfire pilot with Spitfire '40, a new flight simulation game from Mirrorsoft. With plenty of practice, skill and good luck you can rise to the rank of Group Captain and be decorated with the VC, DSO and DFC.

On starting, you are presented with a list of five pilots' names from which you must select one – a logbook for the pilot is then displayed. This shows his name and rank, the number of flying hours, the number of victories and any medals awarded. In this section I would have preferred to be able to enter my own name.

Finally, a menu is displayed which shows the three game options.The first is Practice which enables you to learn how to fly a Spitfire without the worries of being shot at. A successful landing adds the flying hours to your log. Once you've got the hang of flying and landing, you can try your hand at aerobatics in preparation for combat.

Combat Practice places you in a situation where you can practice your fighting techniques, the point of this being that if you crash or are shot down, it does not count on your log so you do not lose any flying hours or gain any victories.

Once you've had enough practice, selecting Combat gives you your mission instructions. These tell you how many enemy planes there are and where they are situated in relation to the runway.

When airborne, you can have a map of the area you are flying over displayed. In Combat mode the map will also show the position of the enemy planes, together with their height above ground.

My favourite part of the game is the dogfight. I found it difficult to hit the enemy at first since it takes about a second for the shots to reach the point your sights were aimed at – success requires skill, anticipation and a bit of luck.

The graphics are a vast improvement on earlier flight simulators, and the instrument panel, ground and sky are all full colour. The sound is adequate and you can hear the pitch of the engines rise and fall dependent upon the amount of work you are making them do. There is also a warning tone if you go into a stall or are having other problems.

The game is fairly easy overall apart from the landing. The dogfights can be quite tense and the first time you destroy an enemy plane you get a real feeling of achievement.

The instruction manual is clear and tells you all you need to know about the game. Not only that, but it also gives a brief, but interesting, background history to the Spitfire and even includes a small bibliography of books for anyone wishing to learn more about this great aircraft.

The one thing I found lacking was that almost undefinable something which makes games addictive. I enjoyed playing it for short periods, but it isn't one of those I would automatically reach for when sitting down for a gaming session.

Desmond

Sound	5
Graphics	7
Playability	8
Value for money	8
Overall	7

PETER SCOTT TRILOGY . . . they make you jump to it

Price: £2.99 (cassette)
Supplier: Top Ten, 12 Chiltern Enterprise Centre, Theale, Berkshire RG7 4AA.
Tel: 0734 302600

AS the name implies, the Trilogy consists of three titles from the prolific arcade-adventure specialist Peter Scott. All three titles – Pandemonium, Network and Yoyo – were originally written a good few years ago, but never released. Superficially they show their age, but are quite good fun once you get into them.

All three are variations on the collect-and-jump theme, and are fairly similar in appearance. A word of warning for Master owners – Yoyo works perfectly with the CONVERT utility, but Pandemonium and Network both crash after the first game has ended.

Network looks very similar to another Scott offering, Hunkidory, even down to the same blob-like central character – Peter originally planned it to be Hunkidory II.

But it does have one major advantage over its predecessor – you are armed with a gun capable of blasting your many adversaries into oblivion with a single shot. Such a feature was rarely seen in Peter's early games, but the added firepower means that you can now go looking for trouble with little fear of retribution.

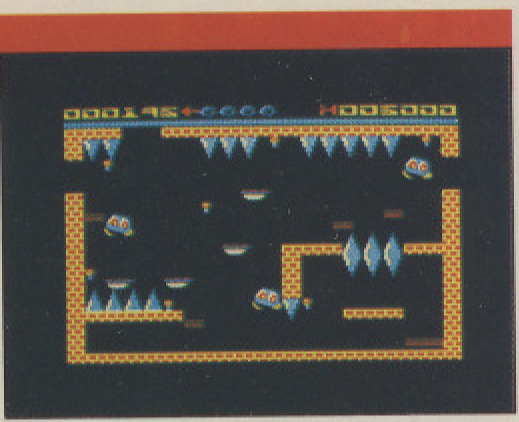
The game features 104 screens and the overall idea is to collect the parts of a central core, together with energy pills, lasers and anything else you find along the way. You will occasionally find phone boxes dotted around – these are teleporters to transport you around the maze.

Yoyo follows the same basic idea as Network, but you are now a strange creature looking something like a duck. The gun has gone, but you can now call on a protective shield in times of need.

This makes a world of difference as you can wander around freely, knowing you can actually defend yourself. You have to use it fairly often – without it your six lives would rapidly disappear. Yoyo features 75 screens from which you must collect over 600 valves.

Take the best bits from both games, mix them together and you've got Pandemonium. The plot is similar and includes the telephone kiosks, but Yoyo's duck is now armed with a Network-style gun. Another similarity is that you have a certain amount of energy – once that's gone, you're dead. Eighty screens of simple fun make this one my favourite.

While the games can hardly be called original, each one features nice touches. Network has a snatch of Aaron Copland's Fanfare for the Common Man after the title page has loaded, while a catchy rendering of the Airwolf theme accompanies you through Pandemonium. Yoyo even features its own version of the Can-Can.



The Peter Scott Trilogy is worth a look, if you like jump-and-collect games, or want to see what led to games like Omega Orb and Ransack.

If you aren't and don't, the collection really doesn't offer anything particularly remarkable. The extra pennies for a more recent Scott offering such as Thunderstruck II will be money well spent.

Hac-Man

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

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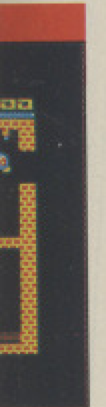

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Hac-Man

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Get knitting on your micro with Knitwear Designer

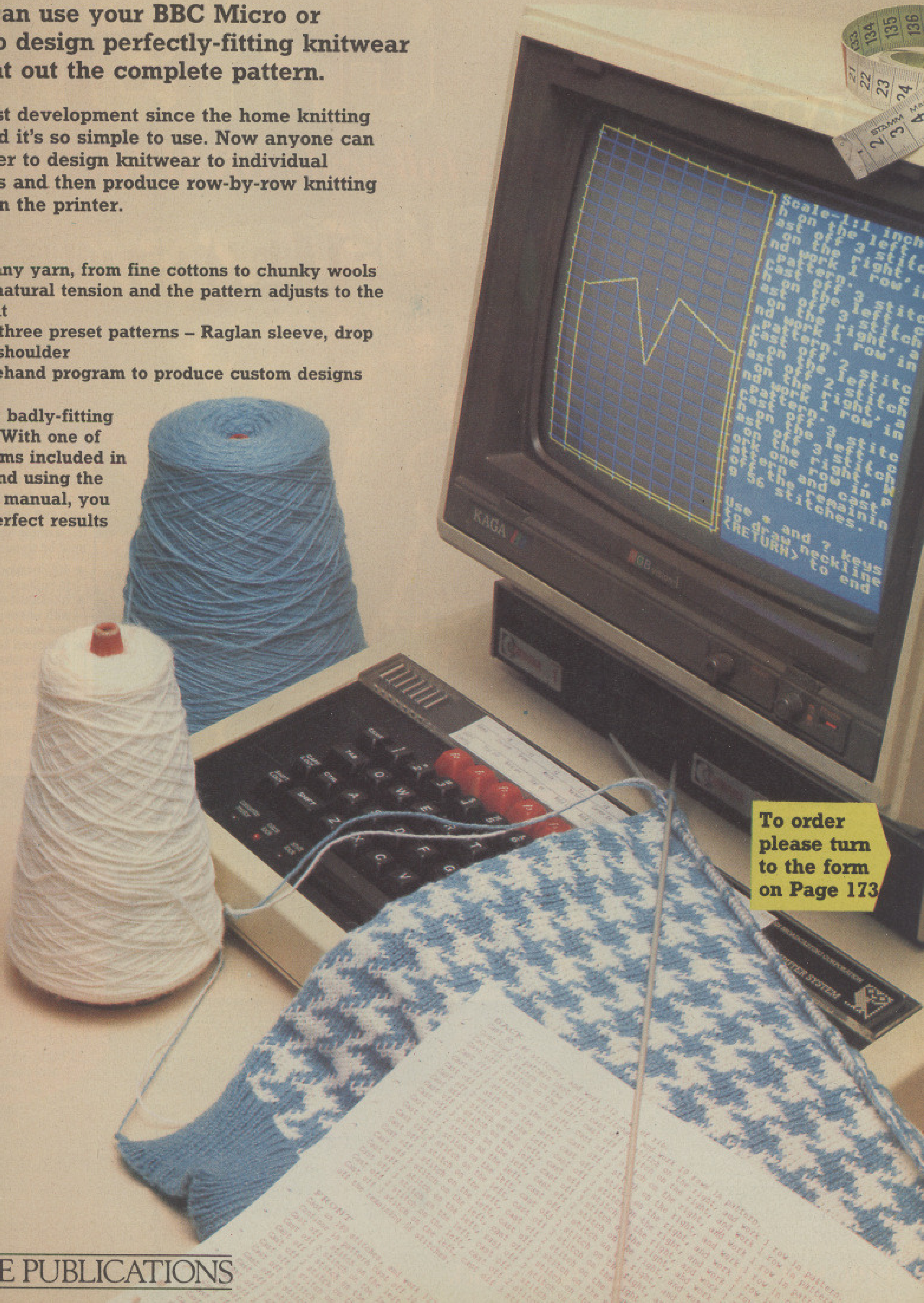
Now you can use your BBC Micro or Electron to design perfectly-fitting knitwear – then print out the complete pattern.

It's the biggest development since the home knitting machine – and it's so simple to use. Now anyone can use a computer to design knitwear to individual measurements and then produce row-by-row knitting instructions on the printer.

YOU CAN:

- Work with any yarn, from fine cottons to chunky wools
- Enter your natural tension and the pattern adjusts to the way you knit
- Select from three preset patterns – Raglan sleeve, drop and square shoulder
- Use the Freehand program to produce custom designs

Say goodbye to badly-fitting home knitting. With one of the five programs included in the package, and using the clearly written manual, you can produce perfect results every time.



The program itself produces a plain knit, leaving you to use your own favourite stitch pattern, such as the Fair Isle design featured here.

To order please turn to the form on Page 173

£8.95
Cassette
Also available on disc for use on the Advanced Plus 4 and Slogger SEDFS.
£9.95
5¼" disc

DATABASE PUBLICATIONS

MORE THAN AN ADVENTURE . . .

EPIC ADVENTURES

THE LOST CRYSTAL

A full-scale GRAPHIC adventure

MORE THAN AN ADVENTURE . . .

This exciting game has been specially designed to be played either as a true puzzle adventure or, by using the help book provided, as a piece of interactive fiction that can be enjoyed by complete beginners.

The Rainbow Crystal, which has protected the people of Zaloria for many years, has been shattered into seven pieces by a mysterious bolt of lightning. Your task is to seek out the missing pieces and find a way to re-create the magical Rainbow Crystal.

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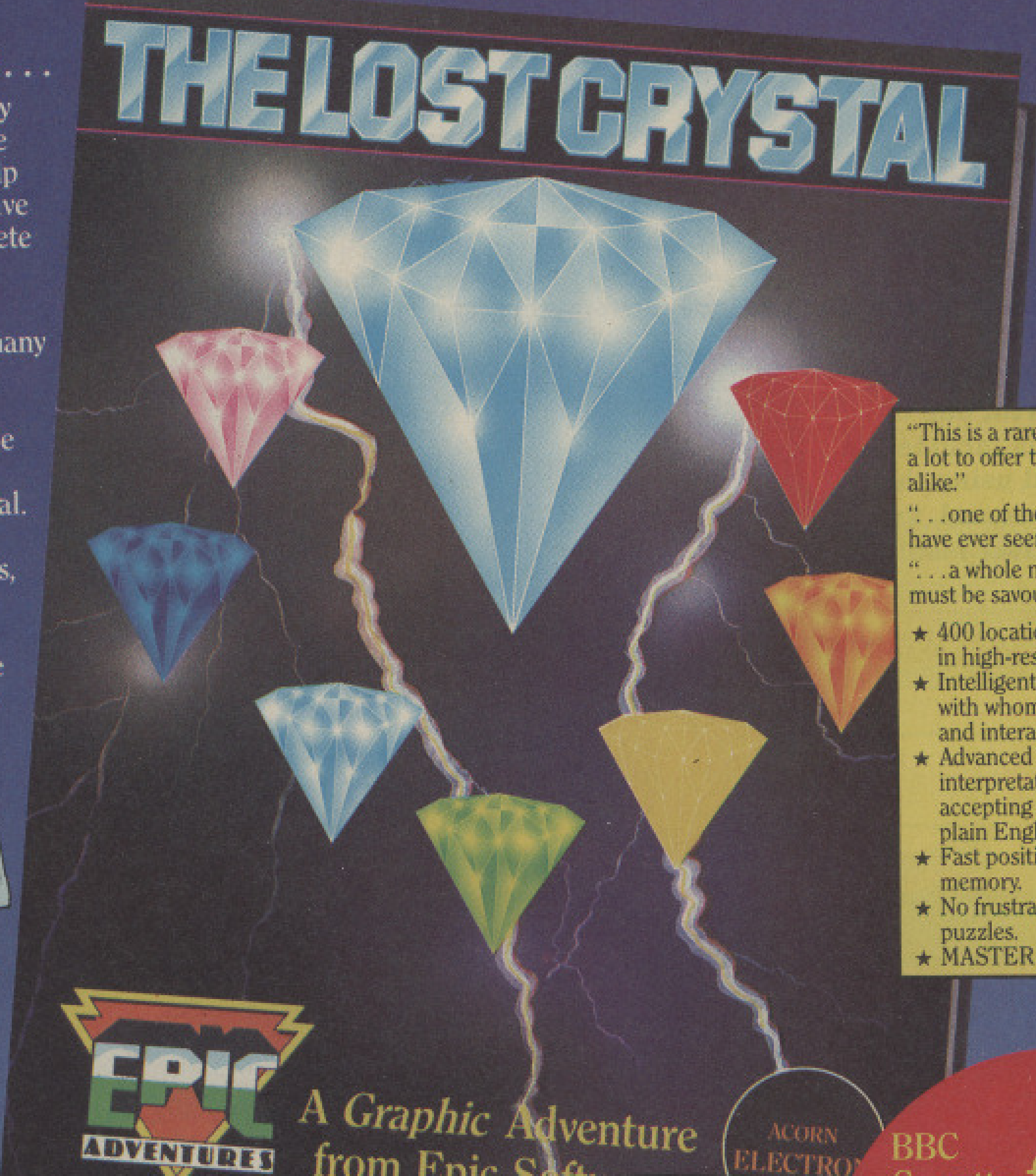
Only when the Crystal is complete once more will peace be restored to the Free Lands.



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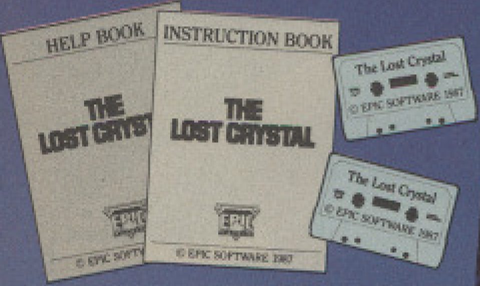

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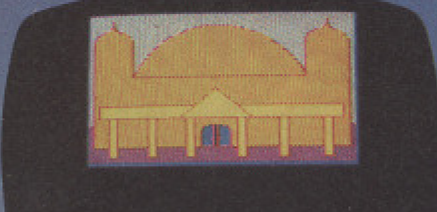
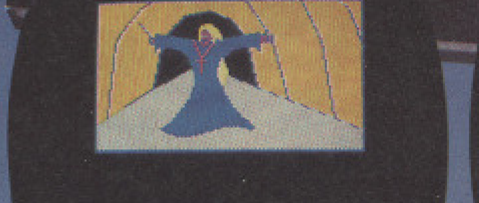
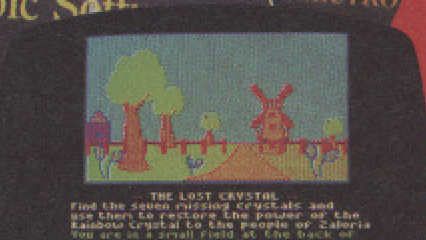


```
You are on a road leading to a
magnificent temple
A double-headed hydra slithers across
the temple road in front of you
You can go north, south
What now?
```



```
You are in a secret passage. A large
statue of a priestess springs to life
You can go east
There is here:
A magic monacle
A paddle
What now?
```



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What now?
```

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Mike Cook looks at two mathematical packages

REVIEW

Making waves

YET another two packages from Golton Verwer & Partners – Sigma and Harm. The company specialises in high-tech educational software and also produces the excellent Codas servo-control package that was reviewed in the December 1986 issue of *The Micro User*.

This time the company is exploring the world of signals and signal processing. By its nature this is a very mathematical subject and the graphics that come with these packages will be a great aid to anyone trying to get to grips with it.

The smaller of the two programs, Harm, concentrates on reinforcing the principles behind Fourier synthesis – the use of harmonics to build up a waveform. The program is quite simple and allows you to build up a waveform by specifying each harmonic in turn.

Both the amplitude and phase of each harmonic can be specified. The resulting waveform can then be plotted using up to 256 points and printed using the Epson printer screen dump in the program. In addition to specifing individual harmonics Harm allows you to specify a harmonic series for both the odd and even harmonics.

This is done by inputting a function where the variable *K* stands for the harmonic function. So, for example, a square wave – which consists of all odd harmonics in the pattern, one third of the third harmonic plus one fifth of the fifth harmonic and so on – can be written simply as *1/K*. You can also specify the phase function in a similar way.

Sigma is by far the more substantial package of the two and tackles the problem of signal manipulation, allowing up to four signals to be simulated and manipulated. With a standard Model B, 32 points specify each signal: An enhanced system will double this.

By reducing the number of signals you are using you can increase the number of points used to represent them. The signals can be composite sinusoidal, noise or tailor-made and transformed between frequency and time domains.

Once you have the signals you can pass them through user-defined functions which can include non-linearities, difference equations or filters. Also, quantisation and the effects of sample and hold circuits can be simulated.

At each stage you can look at the effects of your processing on the signal in both frequency and time domains. The frequency domain allows you to look at the power series and can be displayed linearly or logarithmically.

With more than one signal present you can view the results of adding or subtracting as well as multiplying them together. In addition you can obtain the complex convolution and as before, a hard copy option is available.

I have only had time to outline the operations you can perform with Sigma and not why you would want to do such things. Basically the study of signals and signal processing is central in many higher educational courses in all branches of engineering, be they mechanical or electrical.

By using the BBC Micro to draw the pictures for them, students of these subjects can quickly get a feel of these difficult-to-grasp topics.

Sigma and Harm are not self-study packages, and they will not teach you the fundamentals of the subject. What they will do, however, is help anyone studying the topic of signal processing to turn mathematical equations into concepts.

Both programs have versions for the BBC B and for memory-enhanced BBC Micros. The enhancement can take the form of shadow ram or second processor, and an Archimedes version is also available.

With the larger memory machines more data points can be used to specify and analyse the waveforms. It is good to see commercial software making use of these extra functions.

Both manuals follow the same form – a brief introduction to the scope of the package followed by a sample session. Finally, there's a reference section which includes all the commands and features. This is a good idea as you can run through the sample session and get a feel for what is going on.

These programs aren't cheap, but they're not the type of software that you can throw together yourself in a few hours. Being specialist programs they are not for everyone, but if you are involved in this field they are well worth seeing.

Products: Sigma, Harm
Price: Sigma £190; Harm £40 – £20 if bought with Sigma.
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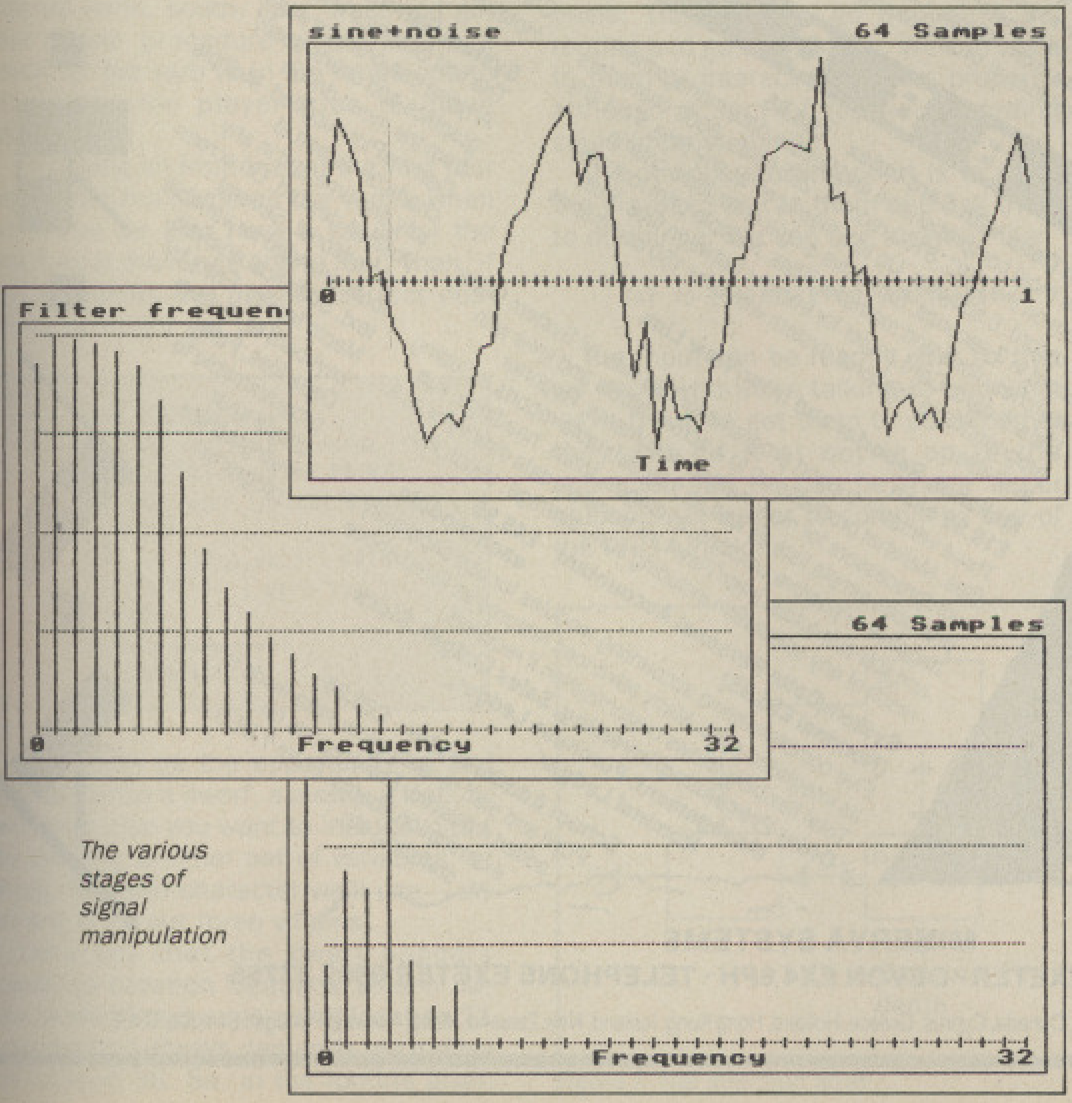

The various stages of signal manipulation

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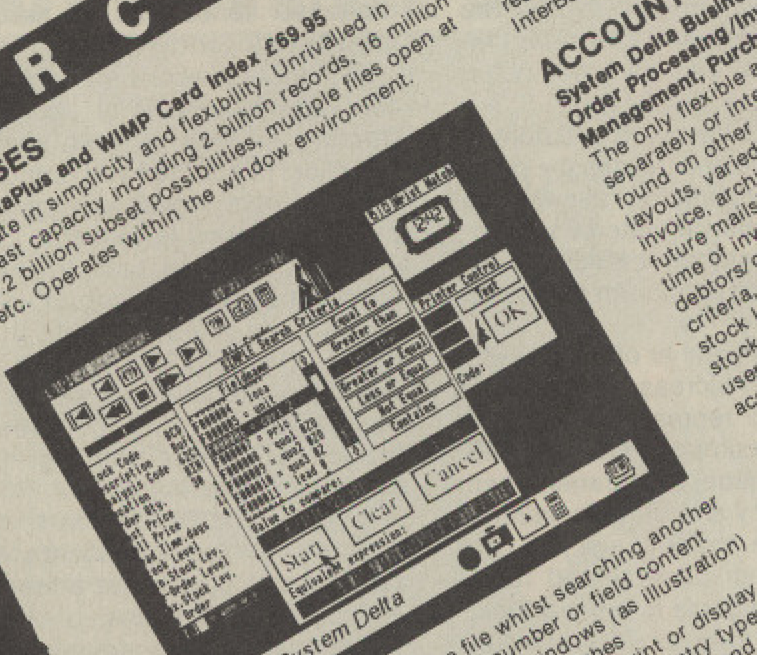

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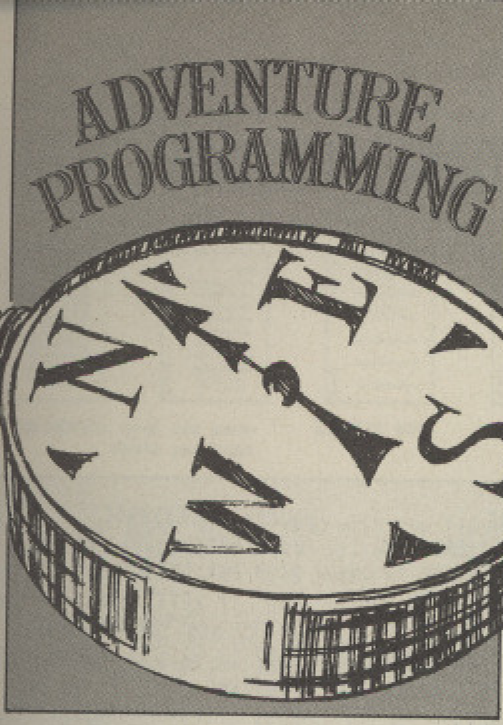


Getting into character

Peter Gerrard takes you into your subconscious

OVER the past few months we've looked at objects and locations in adventures. Now let's look at how to populate them.

There are three types of character in an adventure – the static problem who does nothing except get in your way until you solve him, such as the troll on the toll bridge, the type who performs one action, like the axe-throwing dwarf, and the self-motivated character which inhabits *The Hobbit*.

First we have to look at how movement works. Let's consider a 38-location adventure in which the player can move north, south, east and west. We must have some way of deciding which way he can go and to do this we use an array P%(38,4).

Figure I shows how this relates to direction.

If the first five verbs in our vocabulary list are north, south, east, west and go, our parser procedure would return a value for the verb *vb* in the range one to five when the player tries to move somewhere.

Following on from that, if the first four nouns are the same as the verbs, when *vb* is five we also have a value for the noun *na* in the range one to four. Then, if *cp* represents the player's current position, we might get this:

```
 1040 DEFPROCmove
 1050 dp=cp:IF vb=5 vb=na
 1060 IF p%(cp,vb)=0 PRINT"
You can't move in that way!
":ENDPROC
 1070 IF p%(cp,vb)=-1 PRINT
"I wouldn't if I were you."
:ENDPROC
 1080 cp=p%(cp,vb)
 1090 ENDPROC
```

This gives us the opportunity to add creatures like a dwarf, a pirate, a troll, or whatever else you want to include. Start by defining another set of variables, or flags, for each character we'll use – *df*, *pf* and *tf* for our three villains.

Let's say that the dwarf appears randomly between locations 10 and 30, the pirate always pops out at location 21 and the troll always demands his money at location 36. So, in the routine given earlier, we can now include these lines:

```
 1082 IF df=0 IF (cp>10 AND
cp<30) IF RND(100)>80 df=1
 1084 IF pf=0 IF df=0 IF cp
=21 AND RND(100)>40 pf=1
 1086 IF tf=0 IF cp=36 tf=1
```

Having finished PROCmove and gone back to the main program we can include lines that check if the flags are set and invoke PROCdwarf, PROCpirate or PROCtroll to take care of events.

The only problem is that we are treating characters on a very superficial basis: They appear, go through a set routine and go away again. We can't talk to them or interact with them properly, although a spot of judicious wording could improve things.

The obvious starting point is to allow the player to talk to them and ask them to do things. We can use a syntax like:

```
SAY TO CHARACTER "DO SOMETHING"
```

The input can be readily split so that we know who we're talking to and what we're trying to get them to do. Whether they will do it or not is up to the character and he can be made either stubborn, or eager to comply by use of the RND function.

Some characters do nothing other than add to the flavour of the game, while others are essential to the completion of it. Bearing that in mind we'll consider both possible types, while trying to keep things simple.

The three example listings are from a game of my own. In it you play the part of Dimli Gloing, who has a particular problem to solve. He gets help from time to time from his trusty companion Strombrigner the wizard, who's a bit stubborn, not too good at casting spells, and too fond of going off to the pub. Hence Strombrigner is the character that is essential to the solving of the game, and you can request him to do various things.

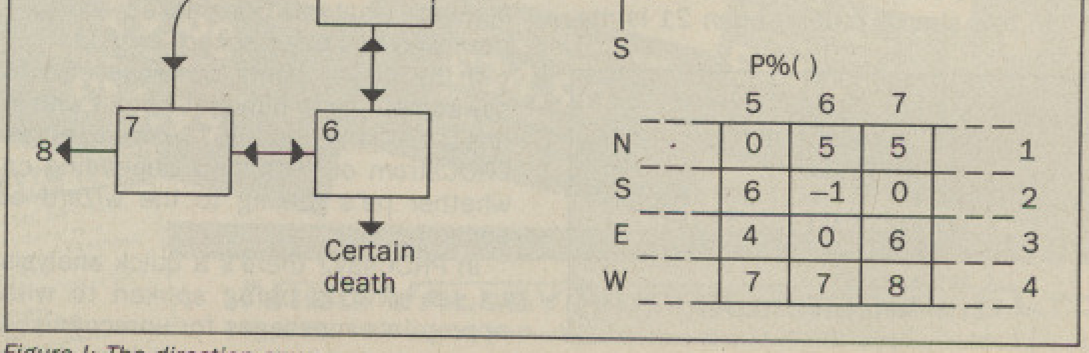
His first appearance in the game is shown in Listing I where *wf* is the wizard flag.

This is the equivalent of our dwarf flag

Turn to Page 40 ▶

```
 1080 IF (cp>11 AND cp<18)
PRINT:LL=LL-(LL<10):PROCmsg
(99+LL)
 1081 IF cp=12 IF ww=0 ww=1
:wf=1:FOR Q%=1 TO 3:PROCmsg
(Q%):PRINT:PROCdelay:NEXT
 1082 IF wf=1 IF RND(100)>5
0 IF ss<11 PROCmsg(8+RND(3)
) ELSEIF ss>10 IF (cp<11 OR
 cp>17) vp=vp+1:ob%(17)=0:w
f=0:ss=0:PROCmsg(4)
 1083 IF cp=12 IF ww=1 IF w
f=0 wf=1:PROCmsg(5)
```

Listing I: Controlling the wizard



P%( )

	5	6	7	
N	0	5	5	1
S	6	–1	0	2
E	4	0	6	3
W	7	7	8	4

Figure I: The direction array

◀ *From Page 39*

and program control comes here after we've moved the player and printed the new location description. Line 1080 checks to see that the player is in the pub, then increments the variable *LL*, which is used to keep a check on how much a local elf has had to drink. The statement:

```
LL=LL-(LL<10)
```

may look a bit confusing, but the section (LL<10) converts to –1 if *LL* is less than 10 (the comparison is true) or 0 if it is equal to or greater than 10 (the comparison is false). So as long as *LL* is less than 10 then the statement is:

```
LL=LL-(-1)
```

which is the same as:

```
LL=LL+1
```

And when *LL* is equal or greater than 10 it becomes:

```
LL=LL+(0)
```

So, *LL* counts up to 10 and then stops. We use *mess* to determine which message number is printed by PROCmsg.

If the player is at location 12, and the wizard has never appeared before – ww=0 – we make him arrive and mark him as present – wf=1 – and print up three messages.

At line 1082 we are testing to see if the wizard is present and whether he is bored – *ss* is incremented each turn unless you talk to him or ask him to do something. If he's just waiting around he'll make a comment, but eventually he'll slope off to the pub. The wizard is object 17 so is removed from the current location, and relevant variables are reset. Line 1083 finds the wizard back in the pub where we can get him to follow again.

Having put characters into the game players will inevitably try to TALK to them, so we have to deal with it and a method is shown in Listing II.

In this simple routine noun 21 is *me*, so a suitable response is given to that.

```
 3450 DEF PROCtalk
 3451 IF na=21 PRINT"Why sh
ould I?":ENDPROC
 3452 m%=75+(na<>7 AND na<>
8 AND na<>9 AND na<>17 AND
na<>19 AND na<>30 AND na<>3
1 AND na<>55)
 3453 PROCmsg(m%):ENDPROC
```

Listing II: Talking to characters

Line 3452 is another example of using comparisons within calculations to provide a value 0 or -1.

If the player tries to talk to any other normal character *m%* is 74 and he is ignored, otherwise *m%* is 75 and a message is displayed.

There's only one character the player can actually have a conversation with – Strombrigner – so take a look at Listing III which handles it.

```
 2350 DEF PROCsay:LOCAL I%,
J%,K%,L%
 2351 cm$=FNlo(cm$):L%=LEN(
cm$):spw=0
 2352 IF MID$(cm$,6,5)="pot
zz" spw=1:ENDPROC ELSEIF MI
D$(cm$,6,6)="tetley" spw=2:
ENDPROC
 2353 I%=INSTR(cm$,CHR$(34)
):IF I%=0 OR I%=L% spw=-1:E
NDPROC
 2354 J%=INSTR(cm$,CHR$(34)
,I%+1):IF J%=0 J%=L%+1
 2355 talk$=MID$(cm$,I%+1,J
%-1):man$=MID$(cm$,8,5)
 2356 IF LEFT$(man$,2)="me"
 VDU34:PRINTtalk$""! There
, satisfied?":ENDPROC
 2357 IF man$="strom" PROCs
trom ELSE PROCsay2
 2358 ENDPROC
 2360 DEF PROCsay2:K%=0
 2361 FOR I%=1 TO nn:na$=na
$(I%)
 2362 IF LEN(na$)>=5 IF INS
TR(na$,man$)=1 K%=I%:I%=nn
 2363 NEXT:IF K%=0 PROCmsg(
133):ENDPROC
 2364 IF(K%=7 OR K%=8 OR K%
=9 OR K%=17 OR K%=19 OR K%=
30 OR K%=31 OR K%=34 OR K%=
55 OR K%=62) PRINT"You are
ignored.":ENDPROC
 2365 PROCmsg(74):ENDPROC
 2370 DEF PROCstrom
 2371 IF wf=0 PRINT"He's no
t even here.":ENDPROC
 2372 ss=0:IF LEFT$(talk$,9
)="follow me" PRINT"I'm her
e! I'm here!":ENDPROC
 2373 IF RND(2)=1 PROCmsg(7
):ENDPROC
 2374 PRINT"He's thinking a
bout it...":PROCdelay
 2375 I%=INSTR(talk$," "):I
F I%=0 PROCmsg(150):ENDPROC
 ELSE vb$=MID$(talk$,1,I%-1
):IF I%=LEN(talk$) na$="" E
LSE na$=MID$(talk$,I%+1)
 2376 PRINT"He might...":P
ROCdelay
 2377 IF vb$="go" PROCw_go
ELSEIF vb$="cast" PROCw_cas
t
 2378 K%=0:L%=LEN(vb$):FOR
I%=1 TO nv:v$=vb$(I%)
 2379 IF LEN(v$)>=L% IF INS
TR(v$,vb$)=1 K%=I%:I%=nv
 2380 NEXT:IF K%=0 PROCmsg(
7):ENDPROC
 2381 IF (K%=19 OR K%=20 OR
 K%=22) PROCmsg(111):ENDPRO
C
 2382 IF K%=14 PRINT"Do it
yourself!":ENDPROC
 2383 PROCmsg(7):ENDPROC
 2390 DEF PROCw_cast
 2391 IF LEFT$(na$,5)<>"spe
ll" PROCmsg(10):ENDPROC
 2392 IF cp<>37 PROCmsg(126
):ENDPROC
 2393 IF cs=1 PROCmsg(127):
ENDPROC
 2394 IF vp<1 PROCmsg(128):
ENDPROC
 2395 IF vp>4 PROCmsg(129):
ENDPROC
 2396 sc=sc+90:cs=1:p%(37,2
)=38
 2397 PROCdelay:CLS:PROCdel
ay
 2398 PRINTTAB(18,12)"BOOM!
":spw=-2
 2399 PROCdelay:PROCdelay:C
LS:ENDPROC
 2400 DEF PROCw_go
 2401 IFna$<>"east"PROCmsg(
130):ENDPROC
 2402 IF cp<>35 ORbt=1PRINT
"No":ENDPROC
 2403 ab=1:sc=sc+90:PROCmsg
(110)
 2404 p%(35,3)=36:bt=1:ENDP
ROC
```

Listing III: Chatting with the wizard

First we take care of housekeeping, the command string *cm$* is converted to lower case and a special variable *spw*, which communicates special situations back to the main program, is reset.

Line 2352 deals with the special cases of saying magic words and the next line deals with the case of nothing being spoken. Lines 2354 and 2355 separate what has been asked – *talk$* – from who has been asked – *man$*.

If the player wants someone else to say something to him that's dealt with in line 2356, and line 2357 jumps to either PROCstrom or PROCsay2 depending on whether he's talking to the wizard or someone else.

In PROCsay2 there's a quick analysis to see who is being spoken to with appropriate messages for unrecognised nouns, or game objects which might be able to answer.

By now you should be getting the hang of it. Lines 2371 and 2372 deal with special cases: Either the wizard's not around or the player is stating the obvious.

At 2373 there is a 50 per cent chance that the wizard will be stubborn and just won't do it and line 2375 divides the spoken request into verb and noun – using the INSTR function to find a space in the *talk$* string.

The wizard will only respond to two verbs – *go* and *cast* – and the appropriate jump is made depending on what was requested. If neither was asked lines 2378 to 2383 analyse which verb was requested and responds appropriately – he certainly won't carry anything.

It's easy to see what PROCw–cast and PROCw–go do, all you need to know is that the new variables are *cs* which is a flag for whether a spell has been cast and *vp* stands for visits to pub. In PROCw–go *bt* marks which solution was used to solve the current problem, and *ab* marks it solved.

● *Well that's that for now. Next month we'll take in more characters, more problems, and more verbs with a view to producing a marketable game that is different from the others available.*

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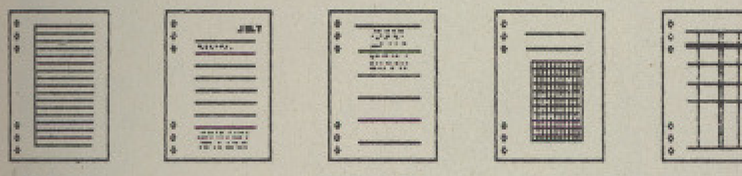
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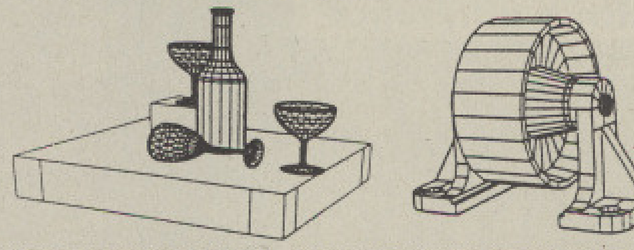

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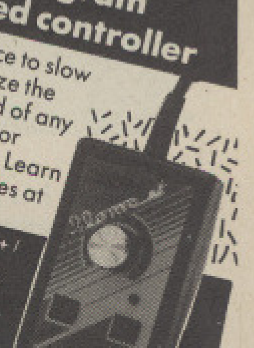

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Battle for the ram!

Mark de Weger
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with a difference

RAM Wars is a game in which two computer programs battle against each other for domination of the computer's memory – the ram.

It is open-ended because you create the battle programs yourself, and they can become more complex and intelligent – only your skill is the limiting factor.

You write the battle programs in Redcode, which looks like assembly language, but only has eight instructions – so it is quite easy to learn. They are compiled by the Redcode Compiler into M-code to be loaded into the Mars program (Memory Array Redcode Simulator).

The two battle programs are loaded in a memory array with 1024 elements within Mars. It then runs each routine, carrying out one instruction from each alternately.

Each battle program is trying to make the other crash, and the one that does this first is the winner. If, after 2000 moves, neither has succeeded in wiping out the other, the longer is declared the winner.

The Redcode instructions are shown in Table I and, as you can see, they are more reduced than the Acorn Risc Machine. But like the ARM, each instruction uses relative commands and occupies just one memory location (four bytes) no matter what it is.

Mars puts each battle program in a random location in its memory, and there is no way that the routine can find out its location. So each instruction, each load, save and jump can only be relative to the current memory position. The Mars memory wraps around, so if you count past 1023 you go round to zero, and vice versa.

Three addressing modes can be used for *X* and *Y* in each instruction. The first is immediate mode and is indicated by preceding the argument with #. It causes the argument to be treated as an integer. For example:

```
MOV #0 100
```

This means put a zero in the location 100 addresses from here. In direct addressing mode the argument is taken as an address so the command:

```
MOV 3 100
```

means copy the contents of the address 3 forward from here into the address 100 forward from here.

The final mode is indirect addressing, and takes the following form:

```
MOV (3) 100
```

This means find the contents, which we'll call *N*, of the address 3 locations from here, then take the contents of the address *N+3* locations from here and put it in the address 100 locations from here. This differs from indirect mode in other languages because it adds the initial offset value as well. This is done because in Redcode the final address is taken from the offset address not the instruction address. It's actually more logical this way.

To make programming in Redcode easier you can use labels and constants in a similar way to assembly language in BBC Basic. For constants you use the form:

```
first=-21
```

Labels are represented exactly the same way as in assembly language:

```
.loop
```

Constants and labels can be used in any argument as addresses, but not in immediate mode. In other words:

```
MOV #loop first
```

is not permitted. Simple calculations are allowed using + and –, but don't put any spaces between the symbols.

Now we've had a look at the instructions let's move into battle and look at Figure I to see how they are put together into a program – Dwarf.

This program tries to destroy its opponent by bombing the whole memory with zeroes. These are not instruction codes, and if one gets planted inside the other program, which then tries to execute it, it crashes. This is an example of a static program, with aggressive attack.

The instruction in line 30 adds 5 to the data (–4) in line 70, the first time it becomes 1, then 6 and so on. Line 40 moves a zero to a memory location whose address is determined by indirect addressing: First Mars counts forward two addresses from address 147 (in this case), arriving at address 149. It then takes the data in this address, 1 the first time round, and adds this reaching 150. So the first zero-bomb falls at address 150.

The JMP loop instruction (JMP –2) at line 50 creates an infinite loop, so it goes back, increments the bomb location again and this time the program bombs memory location 155. Remember, the addresses given here are just examples, because the program could be anywhere from memory location 0 to 1023.

Longer more interesting programs can be written using different strategies, such as mobile programs which copy themselves into different parts of the memory, or defensive programs that wait until they see trouble coming and then move themselves out of the way – the possibilities are endless.

The simplest battle program is only one line and is called Imp:

```
MOV 0 1
```

It copies the contents of the current location into the next location, then Mars executes the next location. In other words, Imp keeps copying itself into the next location which then gets carried out.

It is interesting to see what happens if the Imp fights the Dwarf: Dwarf throws bombs, so there is a chance that one of these bombs will hit Imp – but it's not very likely. But Imp just ploughs through memory and will eventually drive straight through Dwarf. But Dwarf doesn't crash, it executes Imp's own *MOV 0 1* instruction, and so Dwarf gets subverted into an Imp itself.

Neither program crashes, but Dwarf is given the win because it is a larger program. This scoring method is used to encourage bigger, more intelligent programs.

Redcode programs can be written directly using a word processor which creates pure Ascii files, or using Basic, in which case you must save the program using the *spool option.

All the source files should be in directory S and from there the Ascii file is loaded into the Redcode compiler, compiled and the executable code for loading into Mars saved in directory X.

This month we are including the Redcode compiler so you can start writing programs and practising with it. Type it in, correct any typing errors using Get it Right! and save it. When you run it follow the instructions for loading and compiling the battle programs.

Next month we'll publish the Mars program with more examples and explanations. Then the real battle can start.

But for those of you who just can't wait until then, you'll find both the Redcode Compiler and Mars on this month's disc.

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Instruction	Arguments	Meaning
DAT	X	Non-executable statement, X is the data value.
MOV	X Y	Move the value X to the location Y.
ADD	X Y	Add the value X to the contents of address Y.
SUB	X Y	Subtract the value X from the contents of address Y.
JMP	X	Transfer control to address X.
JMZ	X Y	If value of X is zero, jump to address Y.
DJZ	X Y	Decrement contents of address X by 1. If the result is zero jump to location Y.
CMP	X Y	Compare value of X with value of Y. If they are not equal skip the next instruction.
Pseudo-Instructions		
REM		Remark, not compiled.
END		End of program, stop compilation.

Table I: Redcode Instruction Set

Source code	In memory
10 REM Dwarf	144 .
20 .loop	145 .
30 ADD #5 target	146 ADD #5 3
40 MOV #0 (target)	147 MOV #0 (2)
50 JMP loop	148 JMP –2
60 .target	149 DAT #–4
70 DAT #–4	150 .
80 END	151 .

Figure I: The Dwarf

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```
   10 REM Redcode compiler
   20 REM By Mark de Weger
   30 REM (c) The Micro User
   40 ON ERROR CLOSE#0:PRINT:REPORT:PRIN
T" at ln ";ERL:END
   50 DIM tba(7,2),tbb(7,2),styp$(9),cl%
(50),er$(6)
   60 DIM lbl$(50),lbl(50),ins$(50)
   70 @%=&904:maxmem=1024:lcnt=0
   80 CLOSE#0:MODE 7
   90 PRINT'"Redcode compiler"
  100 PRINT"================"'
  110 PRINT"Converts Redcode programs"
  120 PRINT"into M-code to enable Mars"
  130 PRINT"to execute them."'
  140 REPEAT
  150 INPUT'"Enter filename: S."f$
  160 of$="X."+f$:f$="S."+f$
  170 FOR O%=0 TO 7:FOR I%=0 TO 2
  180 tba(O%,I%)=TRUE:tbb(O%,I%)=TRUE
  190 NEXT:NEXT:READ N%
  200 FOR L%=1 TO N%:READ a,x,y
  210 IF a=0 tba(x,y)=FALSE ELSE tbb(x,y
)=FALSE
  220 NEXT
  230 FOR L%=0 TO 9:READ styp$(L%):NEXT
  240 FOR L%=1 TO 6:READ er$(L%):NEXT
  250 PRINT'"Loading...":PROCload
  260 PRINT'"Compiling..."
  270 FOR pass=1 TO 2
  280 ctr=0:lnnr=0:gtln=0
  290 REPEAT lnnr=lnnr+1
  300 gtln=gtln+1:P%=1:ins$=ins$(gtln)
  310 IF gtln=1 AND MID$(ins$,P%,1)=">"
THEN 300
  320 PROCskp_dlm
  330 IF pass=2 PRINT',lnnr;
  340 PROCskp_lnnm
  350 type=FNgv_type
  360 IF type<>8 AND type<>9 AND pass=2
PROCmake_list ELSE cl%(lnnr)=-1
  370 IF type<>8 AND type<>9 ctr=ctr+1
  380 UNTIL type=9:NEXT:PROCwrt_cl
  390 IF FNyes("Compile another program?
") RUN
  400 IF FNyes("Chain Mars? ") CHAIN "MA
RS"
  410 END
  420 DEF FNyes(t$):PRINT't$;:G%=GET
  430 VDUG%:=(G%AND&5F)=ASC"Y"
  440 DEF PROCmake_list
  450 m_a=FNgv_mode:fld_a=FNgv_fld(m_a)
  460 IF type<>0 AND type<>4 PRINTTAB(23
);:m_b=FNgv_mode:fld_b=FNgv_fld(m_b) ELS
E m_b=m_a:fld_b=fld_a:m_a=0:fld_a=0
  470 cl%(lnnr)=FNmake_int:ENDPROC
  480 DEF PROCer(E%):IF E%=3 P%=2
  490 PRINT'ins$'SPC(P%-1);"^"
  500 PRINT"Error ";E%;" at ln ";lnnr;":
"er$(E%)'
  510 END
  520 DEF FNnm(c$)
  530 =(NOT(c$<"0" OR c$>"9")) OR c$="-"
  540 DEF FNalfnum(c$)
  550 =FNnm(c$) OR (c$>"A" AND c$<"z")
  560 DEF PROCskp_dlm
  570 P%=P%-1:REPEAT P%=P%+1
  580 c_c$=MID$(ins$,P%,1)
  590 UNTIL NOT(c_c$=" " OR c_c$="," OR
c_c$=")")
  600 ENDPROC
  610 DEF PROCspace:*FX21
  620 PRINT'"Press the spacebar."
  630 REPEAT UNTIL GET=32:ENDPROC
  640 DEF FNgins:REPEAT G%=BGET#ch%
  650 UNTIL NOT(G%=10 OR G%=13) OR EOF#c
h%
  660 IF EOF#ch% THEN =""
  670 a$=CHR$G%:REPEAT G%=BGET#ch%
  680 IF G%>31 AND G%<127 a$=a$+CHR$G%
  690 UNTIL G%=10 OR G%=13:=a$
  700 DEF FNvalid_modes
  710 =tba(type,m_a) AND tbb(type,m_b)
  720 DEF PROCwrt_cl
  730 PRINT''"Saving M-code to tape/disc
 as file"of$
  740 PROCspace
  750 ch%=OPENOUT(of$)
  760 FOR L%=1 TO lnnr
  770 IF cl%(L%)<>-1 PRINT#ch%,cl%(L%)
  780 NEXT:CLOSE#ch%:ENDPROC
  790 DEF PROCskp_lnnm
  800 P%=P%-1:REPEAT P%=P%+1
  810 c_c$=MID$(ins$,P%,1)
  820 UNTIL NOTFNnm(c_c$):ENDPROC
  830 DEF FNmake_int
  840 IF NOTFNvalid_modes PROCer(3)
  850 =fld_b+(fld_a*2^12)+(m_b*2^24)+(m_
a*2^26)+(type*2^28)
  860 DEF FNgv_type
  870 PROCskp_dlm:type=10
  880 eqps=INSTR(ins$,"=")
  890 IF eqps>1 AND pass=2 PROCset_const
:=8 ELSE IF eqps>1 =8
  900 IF MID$(ins$,P%,1)="." PROCset_lbl
:=8
  910 ctyp$=MID$(ins$,P%,3)
  920 FOR L%=0 TO 9
  930 IF ctyp$=styp$(L%) type=L%
  940 NEXT
  950 IF type<>8 AND type<>10 AND pass=2
 PRINT"  ";styp$(type);" ";
  960 IF type=8 AND pass=2 PRINT"  ";:P%
=P%-1:REPEAT:P%=P%+1:c$=MID$(ins$,P%,1):
PRINTc$;:UNTIL c$=""
  970 IF type=10 AND pass=2 PROCer(1)
  980 P%=P%+3
  990 =type
 1000 DEF FNgv_mode:mode=4:PROCskp_dlm
 1010 m_char$=MID$(ins$,P%,1)
 1020 IF m_char$="" PROCer(4)
 1030 IF m_char$="#" mode=0:PRINTm_char$
;
 1040 IF FNalfnum(m_char$) mode=1
 1050 IF m_char$="(" mode=2:PRINTm_char$
;
 1060 IF mode=4 PROCer(2)
 1070 IF mode<>1 P%=P%+1
 1080 =mode
 1090 DEF FNgv_fld(mode)
 1100 fld=0:sgn=1:PROCskp_dlm
 1110 fld_char$=MID$(ins$,P%,1)
 1120 IF fld_char$="" PROCer(4)
 1130 IF NOTFNnm(fld_char$) AND FNalfnum
(fld_char$) fld=fld+sgn*FNglbl:GOTO 1210
```

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Get it right!

```
  10 =    0 0 | 310 = BDC9 3 | 610 = 4EEE 2 |  910 = E99D C | 1210 = DFBC 0 | 1510 = A711 7
  20 =    0 0 | 320 =  AC6 3 | 620 = C31C 5 |  920 = E58B 0 | 1220 = 701A B | 1520 = 1AEA 6
  30 =    0 0 | 330 = D88F E | 630 = BF3A 5 |  930 = 3F5C D | 1230 = CE7A 4 | 1530 = 578D F
  40 = CDAA A | 340 = 64B1 3 | 640 = 6AB9 4 |  940 = 2C83 2 | 1240 =  6C2 8 | 1540 = 5E83 C
  50 = CBE3 B | 350 =  123 0 | 650 =  912 F |  950 = B8C2 B | 1250 = BACA 9 | 1550 = 6A79 5
  60 = 29DC A | 360 = 8620 5 | 660 = B3BC C |  960 = C5A2 1 | 1260 = 5EC1 8 | 1560 = D603 A
  70 = C09D F | 370 = C719 E | 670 = DE5B 1 |  970 = A4E0 F | 1270 = 503A 6 | 1570 = 2764 2
  80 = C974 9 | 380 = 24CC A | 680 = C0BD 6 |  980 = 752B A | 1280 =    0 6 | 1580 = 2C83 5
  90 = C4BB C | 390 = 678D A | 690 = B8DB 7 |  990 = D7D3 7 | 1290 = DFAC 6 | 1590 = 3BF6 D
 100 = 16A3 1 | 400 = C933 0 | 700 = 4BC5 0 | 1000 = 618A 2 | 1300 = A612 3 | 1600 = A9F8 0
 110 = EBAD D | 410 = FD2E 3 | 710 = B5F4 7 | 1010 =  D85 0 | 1310 = E9FB 1 | 1610 = 352B 2
 120 = 7952 0 | 420 = FD78 D | 720 =  445 2 | 1020 = FA08 C | 1320 = A66B 6 | 1620 = CAC1 1
 130 = A03A D | 430 = 27F3 C | 730 = 39BD 1 | 1030 = 7CC5 5 | 1330 = 3015 9 | 1630 = 8B7E 5
 140 = BFBA C | 440 = 9264 A | 740 = 65FC E | 1040 = B54B 0 | 1340 = 6F4D 9 | 1640 = 86C3 6
 150 = 6CC1 9 | 450 = B1BD 8 | 750 = 1BDF C | 1050 = 3E48 B | 1350 = FEA3 1 | 1650 = 1EBD D
 160 = 5FC4 3 | 460 = AE2B 1 | 760 = F494 5 | 1060 = 5730 C | 1360 = 5569 E | 1660 = 2C83 A
 170 = 7209 C | 470 = 3131 B | 770 = 563E 8 | 1070 = 6E2A F | 1370 = 90DE F | 1670 = 9E7A A
 180 = 222B 8 | 480 = ED58 6 | 780 = 1E36 7 | 1080 =  177 F | 1380 =  AC6 8 | 1680 = ED0F 9
 190 = DBF6 1 | 490 = 1245 C | 790 = EE7E D | 1090 = A451 3 | 1390 = DA4D B | 1690 = 6100 7
 200 = 7080 9 | 500 =  E56 B | 800 = 61C5 D | 1100 = 9FAB 6 | 1400 = BE06 D | 1700 = 68C1 5
 210 = 9AF6 A | 510 = FD2E D | 810 = B161 7 | 1110 = 89A1 8 | 1410 = F40D C | 1710 = 799D 1
 220 = 2C83 2 | 520 = 7AC5 5 | 820 = BD2B 9 | 1120 = 247C 5 | 1420 = 8EEB F | 1720 = DE4C 7
 230 = 15C2 1 | 530 = 6DED 8 | 830 = CAE1 D | 1130 = 6115 0 | 1430 = DF6A C | 1730 = 4870 9
 240 = 4A08 E | 540 = 7A05 1 | 840 = 8696 6 | 1140 = 7DE3 9 | 1440 = B493 C | 1740 =  C18 3
 250 = 5844 0 | 550 = 2D37 7 | 850 = 5F18 6 | 1150 = 64E4 E | 1450 = 826F 3 | 1750 = 5695 8
 260 = 5EBC 0 | 560 = 27B9 E | 860 = 4C54 2 | 1160 = 89A1 D | 1460 = 3BFF 2 | 1760 = 45FD F
 270 = E92E 8 | 570 = 61C5 0 | 870 = A627 D | 1170 = 7B86 C | 1470 = 90DE 5 | 1770 = 3666 F
 280 = 9D77 0 | 580 = B161 1 | 880 = 310A 5 | 1180 = 75D8 4 | 1480 = DC7E A | 1780 = DF48 2
 290 = A139 7 | 590 = 36B9 9 | 890 = C77E 4 | 1190 = E876 8 | 1490 = ED0F D | 1790 = BA33 5
 300 = E59A 3 | 600 = ED0F 6 | 900 = 7117 C | 1200 = 1429 9 | 1500 = 1B99 B | 1800 = 2479 4
```

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```
 ELSE IF NOTFNnm(fld_char$) PROCer(2)
 1140 IF fld_char$="-" fs$=MID$(ins$,P%+
1,1):IF NOTFNnm(fs$) AND FNalfnum(fs$) f
ld=fld+sgn*FNglbl:GOTO 1210
 1150 start=P%:P%=P%-1:REPEAT P%=P%+1
 1160 fld_char$=MID$(ins$,P%,1)
 1170 UNTIL NOTFNnm(fld_char$) OR (fld_c
har$="-" AND P%>start)
 1180 fld1=EVAL(MID$(ins$,start,P%-start
))
 1190 fld=fld+sgn*fld1
 1200 IF pass=2 PRINT;fld1;
 1210 IF fld<0 fld=fld+maxmem
 1220 fld=fld MOD maxmem
 1230 dum$=MID$(ins$,P%,1)
 1240 IF INSTR("+-",dum$) AND pass=2 AND
 dum$<>"" P%=P%+1:PRINTdum$;:sgn=2*(dum$
="-")+1:GOTO 1110
 1250 IF mode=2 PRINT")";
 1260 =fld
 1270 DEF PROCload
 1280 REM Basic 1: OPENIN for OPENUP
 1290 ch%=OPENUP(f$)
 1300 L%=0:REPEAT L%=L%+1
 1310 ins$(L%)=FNgins
 1320 UNTIL EOF#ch%:CLOSE#ch%:ENDPROC
 1330 DEF PROCset_const
 1340 lcnt=lcnt+1:lbl$(lcnt)="":REPEAT
 1350 lbl$(lcnt)=lbl$(lcnt)+MID$(ins$,P%
,1)
 1360 P%=P%+1
 1370 UNTIL NOTFNalfnum(MID$(ins$,P%,1))
 1380 PROCskp_dlm
 1390 IF MID$(ins$,P%,1)<>"=" PROCer(2)
 1400 P%=P%+1:PROCskp_dlm
 1410 PRINT"  ";lbl$(lcnt);" = ";
 1420 PROCcheck_lbl(lbl$(lcnt))
 1430 lbl(lcnt)=FNgv_fld(0):ENDPROC
 1440 DEF PROCset_lbl
 1450 P%=P%+1:lb$="":REPEAT
 1460 lb$=lb$+MID$(ins$,P%,1):P%=P%+1
 1470 UNTIL NOTFNalfnum(MID$(ins$,P%,1))
 1480 IF pass=1 lcnt=lcnt+1:PROCcheck_lb
l(lb$):lbl$(lcnt)=lb$:lbl(lcnt)=ctr ELSE
 PRINT".";lb$;
 1490 ENDPROC
 1500 DEF FNglbl
 1510 lb$="":fnd=0:a$=MID$(ins$,P%,1)
 1520 IF a$="-" sign=-1:PRINT"-";:P%=P%+
1:a$=MID$(ins$,P%,1) ELSE sign=1
 1530 REPEAT lb$=lb$+a$:P%=P%+1
 1540 a$=MID$(ins$,P%,1)
 1550 UNTIL NOTFNalfnum(a$) OR a$="-"
 1560 FOR L%=1 TO lcnt
 1570 IF lb$=lbl$(L%) fnd=L%
 1580 NEXT
 1590 PRINTlb$;
 1600 IF fnd=0 AND pass=2 PROCer(5) ELSE
=(sign*lbl(fnd)-ctr+maxmem) MOD maxmem
 1610 DEF PROCcheck_lbl(l$)
 1620 lfnd=FALSE
 1630 IF lcnt<2 ENDPROC
 1640 FOR cnt=1 TO lcnt-1
 1650 IF lbl$(cnt)=l$ lfnd=TRUE
 1660 NEXT
 1670 IF lfnd PROCer(6)
 1680 ENDPROC
 1690 DATA 10
 1700 DATA 1,0,1, 1,0,2, 1,1,0, 1,2,0
 1710 DATA 1,3,0, 1,4,0, 0,5,0, 1,5,0
 1720 DATA 0,6,0, 1,6,0
 1730 DATA "DAT","MOV","ADD","SUB","JMP"
 1740 DATA "JMZ","DJZ","CMP","REM","END"
 1750 DATA "Unrecognised instruction"
 1760 DATA "Bad character"
 1770 DATA "Bad instruction mode"
 1780 DATA "Parameter missing"
 1790 DATA "Undefined label"
 1800 DATA "Multiple label definition"
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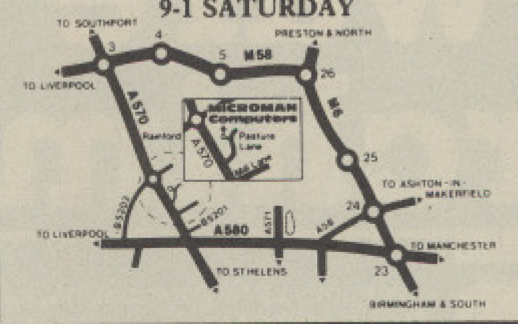

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Broken micro

I HAVE a fault on my series 7 BBC Micro. Just before the present problem started my micro crashed after a few lines of programming. All the keys were disabled except Escape and Break.

Now all the keys work until I press Return. At this point the cursor disappears and only Break functions. When I press Break all keys are restored until Return is pressed again. – **Brian J. Sands, Stourton, West Midlands.**

● *The reason for your problem is that your computer is broken. Seriously though, it would seem that the bulk of your computer is operating if you see keystrokes echoed on the screen. This means that the operating system is reading the keyboard and controlling the display correctly.*

Where it goes wrong is when you press Return. At this point the text that you have just entered is passed over to Basic, so it would seem that your Basic rom is not working.

While the chip could be faulty, the more likely cause is that not all the address line connections are being made to the chip. This would be caused by a faulty socket, cracked tracks on the printed circuit board or the chip not being seated correctly in the socket.

Eight ways

I AM writing to you concerning the Beeb Body Building Course Part 17, User Port Expansion Board, in the August 1984 issue of *The Micro User*. I wish to build this project because I am designing a piece of hardware that requires more than eight data lines and this board would solve my problems.

I can obtain all the necessary parts from Maplin but am not sure about the circuit board. I do not have any experience in circuit board layout but your article implies that construction is easy. Is a circuit board available with the layout of components marked on it? – **David R.H. Buxton, Sale, Cheshire.**

● *Unfortunately all the printed circuit boards for that project have been sold, and demand does not warrant having a new batch made. But do you need the VIAs as such, because the multiplexer project (December 1985) will allow you to have 32 inputs and 32 outputs all from the user port? These are still available from Musbury Consultants as Pack 29 price £23 for the kit or £26 assembled.*

However if you do require VIAs you can make up the circuit using a Vero wiring pencil. This is a technique I use to make the prototypes of most of my projects. The pencil contains a small spool of enamel insulated wire which you thread about on plastic guides making the required connections.

Then when it is all wired up you solder them – the insulation melts and forms a connection. This requires a hot soldering iron (400 degrees C). You should be able to get one at your nearest electronics shop.

Some people find it a little tricky at first to make a neat job, so practice before you start any large project. The great advantage is that you can always unpick the wires if you make a mistake.

Flipped screens

MY BBC B, OS 1.2 has recently developed a fault. When you go left, in most of my Mode 2 or 5 games, you are shown at the right, and vice versa. And when I go right after about 30 seconds the bottom of the screen becomes the top. Could this problem be caused by the memory? – **J. Jordan, Bath, Avon.**

● *Many arcade type games directly access the CRT controller – the 6845 – to obtain fast sideways scrolling. It sounds as though this chip in your computer is on the blink.*

It could be that the normal values the operating system pokes into the chip are fine but the fault only comes to light when the games tap hitherto unused areas of the chip. You can get a replacement from Watford Electronics.

Busy disc

AS I didn't need it for some time, I packed all the components of my BBC Micro system into boxes for six months. When I assembled them again I had trouble with the disc drive.

After switching on the micro, the red light on the drive is on even with the disc door open. As I insert a disc and close the door, it is rotating continuously.

Also if I switch to a double density DFS will I need to buy a new disc drive? – **K. Klaczynski, Bury, Lancs.**

● *The problem is almost certainly to be in the connecting leads from the BBC Micro to the disc drive.*

First of all make sure you haven't plugged the ribbon cable into the BBC Micro upside down. If this is OK open the drive case and make sure the cable is connected to the circuit properly. Also test that the lead has continuity from one end to the other.

As to your second point, all disc drives are capable of double density operation. This simply refers to how the disc controller interprets the pulses recorded on the disc.

I do not recommend using a double density system as it can cause some incompatibility with commercial software and it makes moving your programs between computers difficult.

Multiple motors

PLEASE could you explain how I can control up to 10 small motors from a BBC Micro? – **Neil Burgess, East Barnet, Herts.**

● *It is only feasible to control eight circuits directly from the user port. There are techniques for increasing this number, like the multiplexed board described in the December 1985 issue of The Micro User?*

The control of DC motors was covered in the November 1985 issue.

Font of knowledge

WE have bought an Omni-Reader intending to use it to read in your listings. On trying to input them we found that it does not accept the typeface used.

We understand from the manual that new styles can be loaded. Could you please explain how to do this via the RS232 port? We would be very grateful for any help you or other readers can offer. – **George Styles (age 11), Welling, Kent.**

● *As far as I know the feature of reading a new font into the Omni-Reader was never implemented. As the company have now ceased trading there is no way to find out. Can any reader help?*

Wave front

I HAVE made your multi-channel oscilloscope as featured in the February 1987 issue of *The Micro User*. However on connecting a signal generator to it I get only half a sine wave displayed. What is wrong? – **J.P. Wright, Kingston-upon-Thames, Middx.**

● *The fast A/D converter will translate a voltage into a digital number with respect to the reference voltage. This is set on the board to be between zero and five volts. When you connect up a signal generator it drives the input alternately from a positive to negative voltage. The latter is below the lower point of the voltage and gives a zero value.*

Incidently feeding in voltages outside

Turn to Page 50 ▶

the power rails (0 to +5v) can damage the input multiplexer and blow the channel. In order to see a signal from a signal generator you must bias the input to a mid-voltage.

This can be done by connecting two resistors (say 1M) to the input and connecting the other ends to 5V and 0V respectively. Then connect your signal generator to the input via a capacitor (say 0.1μF).

Screen shift

I HAVE a BBC Master Compact with mono monitor. When I have my micro in Modes 0 to 6 the picture is shifted over to the left-hand side of the screen. I centralise the picture using the panel on the back of the monitor and then go into Mode 7. I find that this is when I shifted over to the right. If I adjust this to be correct I am back where I started.

Could you please tell me how I can get all the modes in the correct position on the monitor screen? – **M. Fearon, Warrington, Cheshire.**

● *This sounds like it is a fault either in the 6845 CRT controller or in the custom memory management chips. You should get it looked at by a service centre.*

Plural riddle

WE have just added 13 of Acorn's new machines to our Econet system. This already has 60 BBC model Bs and a variety of second processors. It all works fine but we are left with a problem. What do we call the new machines? Just what is the plural of Archimedes? – **P. Hut, Manchester Polytechnic.**

● *After some guesses around the office, like Archimedii, Archimedeses and Archimedum. I asked an expert and apparently the plural of Archimedes is Archimedes – the reason, I am told, is because it is of the fourth declension.*

Title screens

I HAVE designed some colour graphic displays for use as headers to video camera recordings and as credit displays afterwards.

I attempted to save these to VHS video tape using the BNC composite video socket on my BBC B to the Video in socket on my video recorder, only for them to turn out in black and white. Is it likely that there is some fault or am I missing out some control instruction? – **Anthony Thomas, Birkenhead, Merseyside.**

● *The composite video output from the BBC Micro is black and white. To change it into colour make link S39 located next to the UHF modulator.*

Disc dilemma

FIRSTLY, thank you very much for an excellent magazine. Secondly, I have been given some discs used on a different make of computer.

I immediately rushed home and began to format them. They all formatted OK except for one, which must have had a lock of some kind as it would not let me copy, or write to the disc.

I tried everything, but all I got was *Disc read only*. – **Tim Plaice, Richmond, N.Yorks.**

● *The only way to get the Disc read only message is if the write protect notch is covered up. Some Master discs do not have any notch in the disc and so are*

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Your technical questions answered by MIKE COOK

PROBLEM SOLVED

permanently write-protected. If you have one of these you could cut a notch very carefully with a sharp knife.

Incidentally, you can have trouble using discs from other micros, because areas of the disc could be written on that your micro requires to be clear. This applies particularly to the space between tracks.

To remedy this you could try using a bulk eraser. This is simply an AC electromagnet which you wipe over the disc cover. However, I have had just as good results using a strong permanent magnet. Keep the disc moving in a random circular motion and slowly move it further away from the magnet.

Drive deficiency

AFTER about five minutes of operating my disc drive refuses to work. The red LED on the front of the drive comes on but the drive motor does not.

If the micro is then switched off for 15 minutes the drive will then function normally for about 10 minutes.

Cooling the micro with a hairdryer all the time eradicates the problem, but this is very inconvenient. — **Gavin Friend, Arundel, West Sussex.**

● *The motor on signal is derived from IC79 and you should make sure this is a 7438 and not a 74LS38. If you replace this chip it will probably do the trick.*

Poorly printer

I AM having a spot of bother with my Epson FX-80 printer which sometimes occurs as I switch it on. When it is working normally, as I turn it on there are the odd clicks and self-adjustments, which sounds as if the printer head is finding the right place to start and the paper getting ready to advance.

Sometimes, however, I turn on the printer and although the lights show that the power is on, the machine ready and on line, there are no comforting noises and no response when I want something printed. Fortunately, so far at least, if I leave the printer switched on it warms up and sorts itself out.

What worries me though is the thought that I am only having a temporary reprieve and my printer will eventually need costly repairs. Is there anything I can do? — **Samuel Courtauld, Earls Colne, Essex.**

● *A printer is really a dedicated micro, so the problem you are having is that it is not resetting when it is turned on. This could be due to the rise time of the power supply inside the printer or the reset circuit itself. However if the printer does get worse the repair costs will probably be less, as you would have a permanent fault and that is easier to trace than the intermittent one.*

Half step

IS it possible to convert a 40T disc drive to a 40/80 switchable? — **P. Turnbull, Little Eversden, Cambridge.**

● *The recording head on a 40 track drive is twice the width of one on an 80 track drive, so there is no simple way of converting a 40 to 80.*

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Robin Nixon reviews a powerful language upgrade from Tubelink

Archimedes Basic?

I WAS pleased to be given Advanced Basic to review as it's claimed to give BBC Micros the power of Archimedes Basic – remembering that any program running on a BBC Micro will not run anywhere near as fast as on an Archimedes and will not have the full graphics facilities.

The package comprises a utilities disc, a rom and a comprehensive manual. On the disc you get Hi Basic, while the rom contains Advanced Basic.

To run the program you need a model B or B+ and a 6502 or PMS B2P-6502 second processor, or you can use a Master fitted with a 65C102 co-processor.

Getting started is as easy as plugging in the rom, inserting the supplied disc and, if you have both Advanced Basic and Hi Basic on rom, typing *ABASIC.

Otherwise, the first time you use the program you type *EXEC ABSAVE which creates a disc copy of Advanced Basic called ABASIC which can be simply run typing *ABASIC in future.

This is done because only part of the program is resident within the second processor at any time. When certain routines are needed they are loaded into it from the rom. This technique leaves more room for you to run your own programs.

The first thing that impressed me about Advanced Basic was the new command, HELP. Typing this on its own presents you with a screen full of information on the computer's current status, an example of which can be seen in Figure 1. HELP followed by a keyword brings up a paragraph of information on that keyword – provided you have the supplied help file on the disc.

On the structural side, the new command CASE is very powerful, allowing you to write code such as in Listing 1. This is similar to the C SWITCH . . . CASE . . . DEFAULT structure.

Another useful option is multi-line IF statements. The usual IF...THEN...ELSE structure is supported, but there is now the addition that if you end an IF statement with THEN as the last keyword on a line, you put the Basic into multi-line mode – which allows you to write code as shown in Listing II.

```
CASE fred OF
  WHEN 1    : PROCfirst
  WHEN 7    : PROCseventh
  WHEN <9   : PROCless_than_nine
  OTHERWISE : PROCnone_of_the_above
ENDCASE
```

Listing I

```
IF gameover=TRUE THEN
  PROCend_screen
  PROCwinner
  PROCreset
ELSE
  PROCmain_loop
  PROCcheck
ENDIF
```

Listing II

Also included is the WHILE . . . ENDWHILE structure. This is similar to REPEAT . . . UNTIL except that the condition is tested at the start rather than the end.

The facility to return values from procedures is a new one which I am sure will be appreciated by many people, as will the command SWAP, which swaps the contents of two variables.

Error handling has been improved with the addition of local error conditions and a REPORT$ which contains the last error message. You can also generate your own errors and report strings.

Lots of additions have been made on the graphics side. However, many of them can only be used on a BBC B or B+ if you have the GXR rom.

The new graphics commands include BY which adds relative moving to MOVE, DRAW and PLOT. So:

```
MOVE BY 100,100
```

moves the cursor by that amount from its current position.

To help with programming there is the command LVAR which lists all currently defined variables. TRACE has been extended so that you can specify the range of lines to be traced, or print procedure and function names as they are encountered.

One of the more useful debugging features available on the Master is also included for BBC B and B+ users. It is the good old LIST command, but it's now been extended so that it can be followed by an IF, so that:

```
LIST IF result
```

lists all lines containing the string *result*.

The commands INSTALL and LIBRARY allow you to load in previously saved – and tokenised – program libraries.

Those which are INSTALLed remain resident until the computer is switched off or a Control+Break occurs, while those loaded in with LIBRARY only stay resident until the variables are cleared. This could be useful as a means of using overlays.

String handling is also more powerful, with the ability to manipulate strings directly using MID$, LEFT$ and RIGHT$. The command:

```
LEFT$(A$,2)="123"
```

changes the left two characters of *A$* to 12.

As if this weren't enough there are new operators for both arithmetic and string expressions. These include += and −=, which will again be familiar to C programmers and enable you to increment or decrement a variable by a specified amount.

So, to increment *A%* you could use the form:

```
A%+=1
```

Or, to subtract *fred* from *B%* you could type:

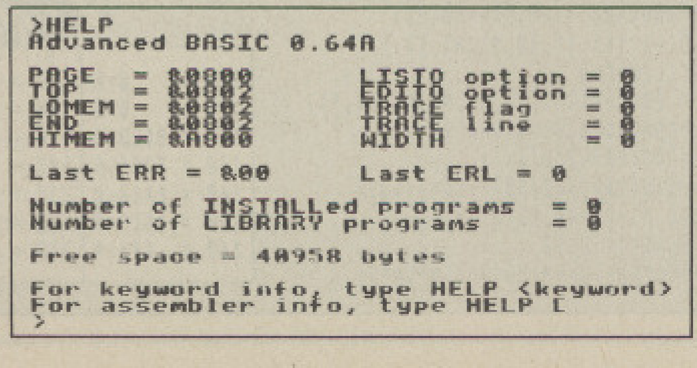
```
B%-=fred
```

The keywords I've outlined are just a taster as there are many more new and enhanced features in Advanced Basic, which are sure to make for more structured and enjoyable programming.

The only drawback I can see with Advanced Basic is that although all commands are correctly tokenised to make programs fully compatible with standard and Archimedes Basic, if you use any of the extra commands your programs will not run on a standard BBC B, B+ or Master.

However, once you've started using Advanced Basic you won't want to go back to the old one. If you have a setup which will run it, I thoroughly recommend it as a valuable programming tool.

Product: Advanced Basic
Price: £34.95 or £29.95 without the eprom
Supplier: Tubelink, PO Box 641, London NW9 8TF
Tel: 01-205 9393



```
>HELP
Advanced BASIC 0.64A

PAGE  = &0000        LISTO option = 0
TOP   = &0002        EDITO option = 0
LOMEM = &0002        TRACE flag   = 0
END   = &0002        TRACE line   = 0
HIMEM = &A000        WIDTH        = 0

Last ERR = &00       Last ERL = 0

Number of INSTALLed programs    = 0
Number of LIBRARY programs      = 0

Free space = 40958 bytes

For keyword info, type HELP <keyword>
For assembler info, type HELP [
>
```

Figure I: An Advanced Basic help screen

THE MICRO USER

PROGRAM Library No.11

Compiled by Steve Turnbull

THIS month we have another varied selection of routines including a slightly longer than usual label print procedure which demonstrates good programming and is a very useful utility for a common problem.

With some trepidation I included yet another input routine but what makes this one different is that you can see the length of input required. On the display side is a trendy print routine and finally a simple Wordwise Plus set up routine which you can easily adapt to your own requirements.

Title: Clear input
Language: Basic
Author: John Lynagh

This is a fairly safe input routine which allows you to see how many characters of input are expected.

The whole string is shown initially as a line of solid blocks which change into letters as they are entered. The Delete and Return keys work normaly. The function should be incorporated into your own program with a line similar to line 110.

The parameter *i%* is the maximum length of the input string.

```
   80 REM Clear Input
   90 REM by John Lynagh
  100 MODE7:PRINT"Enter your name:"
  110 A$=FNin(30):CLS
  120 PRINT"Your name is..."A$:END
  130 DEF FNin(i%):LOCAL a$,i$,a%
  140 PRINTSTRING$(i%,CHR$255);STRING$(i
%,CHR$8);
  150 REPEAT REPEAT a%=GET:a$=CHR$a%
  160 UNTIL a%=13 OR (a%>31 AND a%<128)
  170 IF a%=13 OR a%=127 ELSEIF LENi$=i%
 SOUND1,-7,3,2 ELSE i$=i$+a$:VDUa%
  180 IF a%=127 IF i$>"" VDU8,255,8:i$=L
EFT$(i$,LENi$-1)
  190 UNTIL a%=13:PRINT:=i$
```

Get it right!

```
 80 =    0 0 | 120 = A3CE 7 | 160 = D3BD B
 90 =    0 0 | 130 = E668 B | 170 = 4BFD 1
100 = F004 4 | 140 = 46AF 5 | 180 = BBE5 4
110 = AFAA C | 150 = 82EF 1 | 190 = 3C59 F
```

Title: Fast ellipses
Language: Basic
Author: Cliff Blake

Drawing ellipses can be annoyingly slow since it requires the repeated use of the SIN and COS functions. Even using an array to provide pre-calculated sines and cosines is slow and can take up an enormous amount of memory.

However, all is not lost, as there is a technique in trigonometry where the next sine or cosine value can be calculated from the last value, requiring only two multiplies and an add or subtract.

The routine given here uses this technique to draw filled or unfilled ellipses. The parameters for the procedure are:

X%	X coordinate of the centre.
Y%	Y coordinate of the centre.
S%	Number of sides used.
M%	Length of the major axis.
N%	Length of the minor axis.
T%	Angle of tilt of the ellipse.
F%	Flag for filled or unfilled.

If you're not sure what each of these numbers do you can experiment, or find a text book that describes the geometry of ellipses.

```
  100 REM Fast Ellipse
  110 REM by Cliff Blake
  120 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL:END
  130 MODE 2:Z%=RND(-TIME)
  140 REPEAT T%=RND(180):F%=RND(2)-2
  150 GCOL RND(3)-1,RND(7)
  160 X%=RND(1000)+100:Y%=RND(800)+100
  170 M%=RND(400)+100:N%=RND(M%)
  180 PROCell(X%,Y%,30,M%,N%,T%,F%)
  190 UNTIL 0:END
  200 DEF PROCell(X%,Y%,S%,M%,N%,T%,F%)
  210 Ct=COSRADT%:St=SINRADT%
  220 Ca=COS(RAD(360/S%))
  230 Sa=SIN(RAD(360/S%)):Cp=1:Sp=0
  240 MOVE M%*Ct+X%,M%*St+Y%
  250 FOR A%=1 TO S%
  260 CA=Cp*Ca-Sp*Sa:SA=Sp*Ca+Cp*Sa
  270 x%=M%*Ct*CA-N%*St*SA+X%
  280 y%=M%*St*CA+N%*Ct*SA+Y%
  290 IF F% MOVE X%,Y%:PLOT 85,x%,y% ELS
E DRAW x%,y%
  300 Cp=CA:Sp=SA:NEXT:ENDPROC
```

Get it right!

```
100 =    0 0 | 170 = F63B 4 | 240 =  26C F
110 =    0 0 | 180 = 6E0A A | 250 = AD3E B
120 = BC2B B | 190 = FBB7 B | 260 = 6AB3 4
130 = C166 5 | 200 = 32BB D | 270 = 148E 8
140 = EA12 0 | 210 = 1AFC 3 | 280 = 6A3F C
150 = A4C9 2 | 220 = 5845 7 | 290 = 7C8D B
160 =  478 9 | 230 = CCBC 9 | 300 = 322C 8
```

Send your routines – with full details of the language it is written in and the hardware/software requirements – on disc or tape to:

Steve Turnbull, Library, The Micro User, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Remember to enclose a stamped addressed envelope for the return of your media. Five blank discs will be sent to the authors of any routines published.

Title: Trendy print
Language: Basic
Author: Richard Walmsley

A popular print technique used today is to have a whole line of text appear from the top down (or bottom up) rather than from left to right.

At first glance this looks like a very complex and clever thing to do, but in fact it's simple. Using a screen mode with four or more colours (1,2 and 5) define colours one and three to be black and then write your message on the screen in colour one. It's invisible because you've just written black on black.

Now draw lines across the screen in colour three with an Exclusive OR operation. The background colour zero changes to colour three (which is defined as black) and the writing in colour one changes to colour two which is not black and so miraculously appears, from the top down.

The routine given below demonstrates this technique.

```
  100 REM Trendy Print
  110 REM Richard Walmsley
  120 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL:END
  130 FOR M%=1 TO 5:IF M%=3 M%=5
  140 MODE M%
  150 PROCt(900,"Trendy print routine")
  160 PROCt(700,"For any graphics mode")
  170 PROCt(600,"With 4+ colours")
  180 PROCt(300,"Robert Walmsley"):*FX21
  190 REPEAT UNTIL GET=32:NEXT
  200 MODE7:END
  210 DEF PROCt(Y%,t$)
  220 LOCAL A%,L%,M%,P%,X%,!&70
  230 A%=135:!&70=USR(&FFF4):M%=?&72
  240 P%=32:IF M%=2 OR M%=5 P%=64
  250 VDU19,3;0;0;19,1;0;0;5:GCOL0,1
  260 L%=LENt$:X%=(1280-L%*P%)/2
  270 MOVEX%,Y%+28:DRAWX%+L%*P%,Y%+28
  280 MOVEX%,Y%+64:PRINTt$:GCOL3,3
  290 FORK%=64TO0STEP-4
  300 PROCd(.03):MOVE X%,Y%+K%
  310 DRAW X%+L%*P%,Y%+K%:*FX19
  320 NEXT:VDU4,23,1,0;0;0;0;:ENDPROC
  330 DEF PROCd(t):LOCAL T%:T%=TIME
  340 REPEATUNTILTIME>T%+t*100:ENDPROC
```

Get it right!

```
100 =    0 0 | 190 = 7EB6 8 | 280 = 7F5A 1
110 =    0 0 | 200 = CDB0 E | 290 = 1300 6
120 = BC2B B | 210 =  AB3 A | 300 =  5A6 6
130 = 1BEF 5 | 220 = 8954 E | 310 = 1898 B
140 = 1364 C | 230 = FE10 8 | 320 = DD45 1
150 = E628 2 | 240 = 1939 D | 330 = 1F89 C
160 = D2B7 2 | 250 = 6778 A | 340 = 84FD F
170 = 1CA4 D | 260 = AB2C F |
180 = F43D 0 | 270 = 3EB9 4 |
```

Title: Address print
Language: Basic
Author: Graham Crow

Adprint prints addresses in columns across the page – an obvious application is the printing on adhesive labels. This is not as easy as it sounds, since if we want to print three columns across the page the data must be sent to the printer in the following order: For the first line – record 1/field1, record2/field1, record 3/field1, then for the next line record1/field2, record2/field2 . . . and so on.

PROCadprint is written for an Epson-compatible printer, and has seven parameters to give lots of flexibility. These are:

first	Record number to start print.
last	Record number to end print.
fields	Number of fields per record.
margin	Width of left margin.
widthofcol	Width of column.
columns	Columns per page.
rows	Records per column.

Line 130 calls PROCinit which reads some records, each containing six fields, from DATA statements into the array *file$(record,field)*.

In line 140 PROCadprint is called with parameters set to print all the records with a left margin of 10, a column width of 30, four columns per page and in blocks of three records per column.

The structure of PROCadprint is a set of three nested FOR . . . NEXT loops, contained within a REPEAT . . . UNTIL loop. The innermost FOR . . . NEXT controls the columns, the middle one the fields and the outer one the records. The REPEAT . . . UNTIL loop controls the pages. Line 390 prints a row of dashes between pages, or could be changed to cause a page throw.

```
  100 REM Address Print
  110 REM by Graham Crow
  120 VDU12,2,1,27,1,64
  130 VDU1,15:PROCinit
  140 PROCadprint(1,records,fields,10,40
,3,3)
  150 VDU1,27,1,64,3:END
  160 DEF PROCinit
  170 READ records,fields
  180 DIM file$(records,fields)
  190 FOR record=1 TO records
  200 FOR field=1 TO fields
  210 READ file$(record,field)
  220 NEXT:NEXT:ENDPROC
  230 DEF PROCadprint(first,last,fields,
margin,widthofcol,columns,rows)
  240 IF last<first PRINT "Last record i
s smaller than first!":ENDPROC
  250 m=margin:w=widthofcol
  260 VDU1,27,1,68,1,m,1,m+w,1,m+(w*2),1
,m+(w*3),1,m+(w*4),1,0
  270 record=first:end=FALSE
  280 countback=columns
  290 REPEAT FOR row=1 TO rows
  300 FOR field=1 TO fields
  310 FOR column=1 TO columns:VDU1,9
  320 PRINT file$(record,field);
  330 IF record=last end=TRUE:countback=
column-1:column=columns
  340 IF record<>last record=record+1
  350 NEXT
  360 IF field<fields record=record-coun
tback
  370 PRINT
  380 NEXT:PRINT:IF end row=rows
  390 NEXT:PRINT STRING$(130,"-")
  400 UNTIL end:ENDPROC
  410 DATA 11,6
  420 DATA Advanced Computer Products,6
Ava House,High Street,Chobham,Surrey,
GU24 8LZ
  430 DATA Opus Supplies Limited,55 Orms
ide Way,Holmthorpe Estate,Redhill,Surrey
,""
  440 DATA Viglen Computer Supplies,Unit
 7,Trumpers Way,Hanwell,London W7 2QA,""
  450 DATA Akhter Computer Group,Akhter
House,Perry Road,Harlow,Essex CM18 7PN,"
"

  460 DATA Pace Micro Technology,Juniper
 View,Allerton Road,Bradford BD15 7AG,""
,""
  470 DATA Technomatic,17 Burnley Road,L
ondon NW10 1ED,"","",""
  480 DATA Computer Concepts,Gaddesden P
lace,Hemel Hempstead,Herts HP2 6EX,"",""
  490 DATA Minerva Systems,69 Sidwell St
reet,Exeter,Devon EX4 6PH,"",""
  500 DATA Peartree Computers Ltd,Falcon
 House,70c High Street,Huntingdon,Cambs
PE18 6SS,""
  510 DATA Watford Electronics,Jessa Hou
se,250 Lower High Street,Watford,England
,""
  520 DATA Micro User,Europa House,68 Ch
ester Road,Hazel Grove,Stockport,SK7 5NY
```

Get it right!

```
100 =    0 0 | 250 = 9841 5 | 400 = 7163 8
110 =    0 0 | 260 = 5912 3 | 410 = 1A35 E
120 = 8C19 9 | 270 = 91C1 8 | 420 = C7DB 3
130 = 6A14 F | 280 = 8FBF C | 430 = 90F4 1
140 = 179D 9 | 290 = CD32 B | 440 =  44E E
150 = 6997 1 | 300 = 8D89 D | 450 = D37B C
160 = 40D7 E | 310 = 21D7 2 | 460 = C8CB 4
170 = 3635 8 | 320 = BD37 F | 470 = 60C0 8
180 = 2309 2 | 330 = 5143 A | 480 = 3F07 F
190 = EC27 7 | 340 = CD76 C | 490 =  560 A
200 = 8D89 4 | 350 = 2C83 0 | 500 = 84E4 7
210 = 5A1A C | 360 = 53D5 0 | 510 = 1492 4
220 = BB05 6 | 370 = FF3E 6 | 520 = 1D6B F
230 = 87BC 2 | 380 = F057 D |
240 = C0ED 9 | 390 = 85AB 6 |
```

THE MICRO USER PROGRAM Library No.11

Compiled by Steve Turnbull

Title: Wordwise startup
Language: Wordwise Plus
Author: David Peddie

This routine for Wordwise Plus, will conveniently set up the function, cursor and Copy keys for your printer codes and provide an options menu to select previously written and formatted skeleton Wordwise files at the touch of a button.

For instance, the file named HOMEltr is an empty letter consisting of your own address at the top, Dear Sir under that and Yours sincerely at the bottom. The file named HOMEenv is a formatted blank ready to fill in which prints the envelope or address label. You'll have to write the actual blanks yourself to suit your style.

The Option menu can be returned to at any time with Shift+f9.

```
REM Wordwise Startup
REM by David Peddie
*KEY0 OC27,77
*KEY1 etc...
.menu
CLS
PRINT"OPTIONS MENU"
PRINT"============"
PRINT
PRINT"C = *CAT"
PRINT
PRINT"W = Wordwise main menu"
PRINT
PRINT"B = Business letters"
PRINT
PRINT"D = Daily paper letters"
PRINT
PRINT"M = M.P. letters"
PRINT
PRINT"P = Personal letters"
PRINT
PRINT"-----------------------"
PRINT
PRINT"Shift+f9 for Options at any time"
REPEAT
G%=(GETAND&DF)
UNTILG%=67ORG%=66ORG%=77ORG%=68ORG%=87OR
G%=80
IF G%=67 THEN GOTO cat
IF G%=87 THEN GOTO main
IF G%=66 THEN GOTO business
IF G%=68 THEN GOTO daily
IF G%=77 THEN GOTO mp
IF G%=80 THEN GOTO letters
.cat
CLS
*CAT
PRINT
PRINT"Press any key to continue"
K%=GET
GOTO menu
.main
SELECT TEXT
END
.business
J$="BUS"
GOTO load
.daily
J$="DALY"
GOTO load
.mp
J$="MP"
GOTO load
.letters
J$="HOME"
.load
SELECT SEGMENT 0
F$=J$+"ltr"
K$=J$+"env"
LOAD TEXT K$
SELECT TEXT
LOAD TEXT F$
END
```

PINEAPPLE SOFTWARE

Programs for the BBC model 'B', B+, Master and Master Compact with disc drive

DIAGRAM II

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

Summary of Diagram II features:-

1. Works on all model BBC computers and makes use of Shadow memory if poss.
2. Rapid line drawing routines with automatic joins for circuit diagrams.
3. Rubber band line and circle drawing modes.
4. Makes use of the Acorn GXR rom to produce ellipses, arcs, sectors, chords and flood filling.
5. Pixel drawing mode allows very fine detail to be added.
6. Defined areas of screen may be moved, copied, deleted or saved to disc.
7. On-screen cursor position indication allows scale drawings to be made.
8. Keyboard keys may be defined to print User Defined Characters allowing new character sets to be used.
9. Wordprocessor files may be loaded and formatted into defined areas.
10. Up to 880 UDC's if shadow memory available, 381 without shadow.
11. Compatible with Marconi Trackerball and most makes of 'mouse'.
12. All 'Diagram Utilities' are included.
13. Completely 'scaleable print routines allow any area of the diagram to be printed either horizontally or through 90deg. in scales that may be varied in 1% steps allowing up to 18 mode 0 screens to be printed on an A4 sheet (still with readable text).
14. Smooth scrolling over the whole area of the diagram.

Diagram II consists of a set of disc files and a 16k Eprom. The disc is formatted 40T side0 and 80T side2. Please state if this is unsuitable for your system, or if you require a 3.5" Compact disc

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PCB

Pineapple's now famous PCB drafting aid produces complex double sided PCB's very rapidly using any model BBC micro and any FX compatible dot-matrix printer.

The program is supplied on Eprom and uses a mode 1 screen to display the two sides of the board in red and blue either separately or superimposed. Component layout screens are also produced for a silk screen mask.

The print routines allow a separate printout of each side of the board in an expanded definition high contrast 1:1 or 2:1 scale. The print time is typically about 5 mins. for a 1:1 print of a 7" * 5" board. This program has too many superb features to adequately describe here, so please write or 'phone for more details and sample printouts.

Price £85.00 + vat

PCB Plotter Driver

A new addition to the PCB software is the PCB plotter driver program. This enables files produced by PCB to be used in conjunction with most types of plotter to produce plotted output rather than the normal dot-matrix printer output. The program is suitable for use with most makes of plotter including Hewlett Packard, Hitachi and Plotmate M. The program can also be configured to work with other plotters by entering suitable plotter instructions.

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ADFS Utilities Rom

ADU is an invaluable utility for all ADFS users. It adds over 20 new *commands to the ADFS filing system as well as providing an extensive Menu facility with over 35 sub commands covering areas such as repeated disc compaction, saving and loading Rom images, auto booting of files and many more.

Copying of DFS discs onto ADFS discs can be made in one pass with automatic creation of the required directories on the ADFS disc. All functions are fully compatible with Winchester drives including *BACKUP which allows backing up of Winchesters onto multiple floppies.

New *commands are as follows:- *ADU, *BACKUP, *CATALL, *CHANGE, *DFSADFS, *DIRALL, *DIRCOPY, *DIRDESTROY, *DIRRENAME, *DISCEDIT, *DRIVE, *FILEFIND, *FORMAT, *KILLADU, *LOCK, *MENU, *PURGE, *PWRBRK, *UNLOCK, *VERIFY, *VFORMAT

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When you join MicroLink you've got the world of communications at your fingertips – 24 hours a day. You'll have immediate access to ALL the facilities offered by Telecom Gold ... and a great deal more besides.

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We have provided a list of possible combinations below, ranging from the very cheapest to ones which can automatically dial the MicroLink telephone number and connect you to the service – all you have to do is type in your personal security password.

Whichever equipment you use, you will be able to call MicroLink, open your mailbox, save to disc any messages waiting for you, and disconnect in as little as two minutes.

	Typical comms packages
A	*Watford: Apollo V21, V23 auto-dial, auto-answer modem + Comms rom (£96.60)*
B	*Dataphone: Demon V21, V23 auto-dial, auto-answer modem + Z-ROM + Disc-Connect software (£96.49)*
C	*Pace: Nightingale V21, V23 manual dial modem + Commstar II rom (£98.90)*
D	*Beebug: V21, V23 auto-dial, auto-answer modem + Comms rom (£104.20)*
E	*Miracle: WS4000 V21, V23 auto-dial, auto-answer modem + Dialup (£285.39)*

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Discover the inner secrets of arcade games with . . .

HERE we are again with more goodies than a Christmas stocking – almost entirely due to the amazing quality of the tips and pokes I keep receiving. Keep 'em coming.

I was very sad to receive a letter from Gary Partis saying that he is giving up writing computer games. His full story can be read on Page 141.

Certainly Gary will be a great loss, not least because he always provides something interesting to write about. Let us hope that his withdrawal is not permanent.

When I receive letters asking me for rewrites of my Snapper upgrade to work on copied versions of the game, and pokes that, obviously refer to copied programs, I also tend to get a little disillusioned – surely anyone can see that stealing anything or accepting stolen goods is illegal and unethical.

On a lighter note, I mentioned that the star of November's column, Cholo, does not run on the Watford DDFS. I have since learned from Adam Christie of Stockport that it does not run on the Opus DDOS system either.

There's no sign of a compatible version of Cholo on the horizon, but Slogger, authors of the Opus DDOS rom, are promising a major rewrite of the rom, which should be available shortly after Christmas.

To round off this month's column, Matthew and Paul Newton have a few hints that will be useful to anyone having difficulty with Spy Hunter or Airwolf.

In the former, try to use your gun as little as possible, because you do not gain any points from shooting your opponents – ram them instead. However it is best to shoot the blue cars, as they have spikes that can drive you off the road.

If by the time you reach the helicopters, you have not picked up a supply of anti-copter missiles, avoid following them directly as they will drop bombs on you. Finally, try to stay on the water all the time – it's a lot less dangerous than the road.

In Airwolf, when using a cursor key to scroll the screen, keep your finger pressed down on that key and everything will stop moving. This allows you to shoot the switches and break down the walls at your leisure, without the danger of anything homing in on you.

● *Next month's column will include a map and full solution to Airwolf. Until then, happy zapping!*

Invulnerable screen jumper

Jonathan Temple has a mini-upgrade for ***Contraption,*** *a platform game that stands out from the rest by virtue of its superb cartoon-like graphics. The upgrade provides facilities for infinite lives, invulnerability and a screen-jump.*

*To start, enter the listing and *SPOOL it to a blank cassette as shown in the March or August 1986 columns. Put the original Contraption cassette, fully rewound, into your player and type LOAD"".*

*When the first file has loaded, *EXEC the upgrade file back into memory from your own tape, to merge it with the original. Put the Contraption tape back into the recorder and type RUN. After asking which pokes are required, the rest of the game will automatically load and run. To use the screen-jump facility simply press Delete to advance to the next screen.*

Thank you very much, Jonathan. Now, can anyone devise a routine to convert the game to run on the B+ and Master?

```
   3 :
   4 GOSUB 1000
   5 :
1000 REM Contraption mini-upgrade
1010 REM Jonathan Temple
1020 REM (C) Micro User
1030 oscli=&FFF7
1040 !&2F40=&20202E4C
1050 !&2FAF=&0809004C
1060 CLS:P%=&900:[OPT2:JSR oscli:]
1070 IF FNyn("infinite lives") THEN [OP
T2:LDA#169:STA 6546:]
1080 IF FNyn("a level jump") THEN [OPT2
:LDA#240:STA 6519:LDA#35:STA 6520:]
1090 IF FNyn("invulnerability") THEN [O
PT2:LDA#16:STA 6531:LDA#230:STA 6532:]
1110 [OPT 2:JMP 4352:]
1110 RETURN
1120 :
1130 DEFFNyn(A$):PRINT'"Do you want ";
A$;" (Y/N)";TAB(34);"? ";:REPEAT A%=GET
AND 223:UNTIL A%=78 OR A%=89:VDU A%:=(A%
=89)
```

So you want to live forever?

The ***Stryker's Run*** *routines published in the May 1986 issue proved very popular, but I have since received many requests for an infinite lives poke for the game. I did not include one at the time because it makes the game rather pointless; but, having died a few times myself after starting with 127 lives, here are the appropriate pokes for each version of the game.*

BBC B version:

```
   95 LDA#&A9:STA &2893:ST
A &2C32:LDA#1:STA &2894:ST
A &2C33
```

Master 128 version:

```
   175 !&2FDF=&CE6001A9:!&3
320=&200801A9
```

Master Compact version:

```
   95 LDA#&A9:STA &25DF:ST
A &2920:LDA#1:STA &25E0:ST
A &2921
```

Simply add the appropriate line to the relevant routine from the May issue. Now everyone will be able to obtain the password required for last year's Stryker's Run competition. Logical, isn't it?

This month featuring
Contraption
Stryker's Run
Galaforce
Dunjunz
Starquake
Arkanoid

Tips from the horse's mouth

Kevin Edwards, author of the Crazee Rider, has also sent me a comprehensive list of pokes for the disc version of his game, ***Galaforce****, that cover virtually every aspect of the game. Over to the man himself:*

To begin, enter:

```
PAGE=&5000
LOAD"GFORCE"
210 *LOAD GAME
220 ?&9B4=&60:CALL &970
500 CALL &4000
```

Now add any of the following pokes, giving line numbers starting at line 230, and incrementing by 1 only:

```
?&1C9B=&4C:?&1C9C=&A7
:?&1C9D=&C                Infinite lives
?&295B=1                  Increase firing
                          speed
?&29E5=&EA:?&29E6=&EA     Increase bombs
?&2A7F=x                  x=wave number
                          (less 1) when
                          aliens drop bombs
```

```
?&1F9C=x                  x=number of aliens
                          processed each
                          game loop (moves
                          aliens faster)
?&23F6=&38:?&23F8=&69     Disable collision
                          detection (aliens)

?&25C8=&38                Ship further up
                          the screen

?&1D45=x                  Starting wave
                          (0 to 15 only)

?&24DB=&EA:?&24DC=&EA     Disable collision
                          detection (bombs)

?&2A12=&EA:?&2A13=&EA
:?&2A15=7                 Slow down bombs

?&2A48=&38:?&2A49=&EA     Make bombs home in
```

The value of x can be anywhere between 0 and 255 unless otherwise stated.

Get into bottom gear

R.W.Wills of Gunville, Isle of Wight, has written in with a useful routine for ***Dunjunz****, based on Ian Robertson's joystick conversion utility published in the October Micro User, it is designed to work with the cassette version of the game.*

This routine leaves the playing keys unaffected, but uses the left-right position of the joystick to slow the game down.

To start, enter the listing, making sure you save a copy to tape before proceeding. Next, wind the Dunjunz tape to the beginning of the Dunk file and type RUN and the game will load.

```
 10 REM Dunjunz speed control
 20 REM by R.W.Wills
 30 REM (C) Micro User
 40 REM ==============
 50 :
 60 oscli=&FFF7:bytev=&20A
 70 PROCassem
 80 FOR T%=0 TO 2 STEP 2:P%=&900
 90 [OPT T%:LDY #0:.loopy LDA &A00,Y
100 STA&0,Y:INY:CPY#O%MOD256:BNEloopy
110 LDA #0:STA bytev:STA bytev+1
120 LDX #def MOD256:LDY #def DIV256
130 JMP oscli:.def
140 ]:$P%="/DUNK":NEXT:CLS
150 PRINT "Loading DUNJUNZ from DUNK"
160 *TAPE
170 CALL &900
180 :
190 DEFPROCassem
200 Z%=!&20A AND &FFFF
210 FOR T%=0TO2 STEP2:P%=&00:O%=&A00
220 [OPT T%+4:CMP#&81:BEQ go
230 .ret JMP Z%:.go CPY#&FF:BNE ret
240 PHA:TXA:PHA:TYA:PHA
250 LDA#&80:LDX#2:JSR Z%:INY
260 .loop1 LDX#0
270 .loop2 INX:BNEloop2:DEY:BNE loop1
280 PLA:TAY:PLA:TAX:PLA:JMP Z%:]:NEXT
290 ENDPROC
```

Teleporter tips

Starquake *by Bubble Bus is a game I reviewed many moons ago, and one to which I often return on the rare occasions when I have a spare moment. Matthew Hall of Ripley offers the following tips for the game: The teleporter access codes are:*

```
ARLON    QUARK
ASOGE    ROGAL
DARAQ    SAMAL
HARIA    TAMIS
KOPEX    URIAH
LEXIA    VILGA
MISES
```

Entering a code while in a teleporter will transport you to another area of the maze. QUARK is particularly useful as you materialise in the immediate vicinity of the planet's core: Go up then right and right again to get to the core itself. Once there, any core elements you may be carrying will be stored in their correct places.

You can pass through the large green boxes if you are carrying the passcard (the small white object). The gates can be opened by walking into them with a key.

The green blocks with flashing arrows are ascending lifts. Matthew also reports that the joysticks give you an extra life. As far as movement goes, some areas can be explored only by buggy, while many sections of the maze are linked by gaps so narrow that they can only be navigated on foot. In short a map is essential – can anyone oblige?

Built-in cheat

Alpesh Patel has a tip for ***Wizzy's Mansion****. 'I haven't seen the game, but apparently if you type the phrase "like a virgin" you will enter a "cheat mode". Does anyone know what it does?*

Following last month's tip to slow down ***Arkanoid,*** *James Rodriguez of Hartlepool has discovered that Arkanoid does actually have a built-in cheat facility.*

When the game is paused (after pressing Delete), press the keys @, P, U, Y, N, M and Space simultaneously, to advance one level. After level 32 you return to level 1. James' tip does work, but it leaves me wondering if Peter Johnson's hands are designed in the same way as mine.

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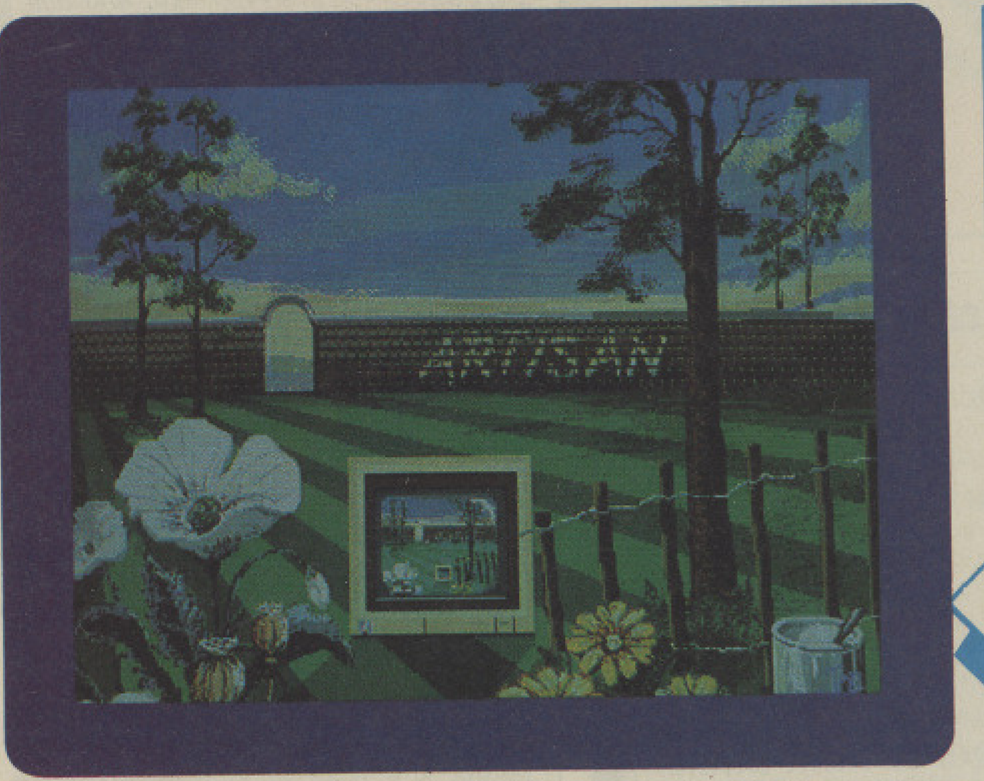

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—COMPETITION—

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Alpha-Base is the successor to the hugely successful Beta-Base, the top selling database for the BBC micro. Beta-Base files can even be transferred to Alpha-Base.

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Cut and paste

David Easey shows how to avoid losing chunks of your graphics

IF you have used AMX Stop Press you will know that when you load a graphics screen created with another graphics package its border is stripped. This means that you can easily lose part of a picture you wanted to keep.

Listings I and II are a solution to this problem. The first lets you save cutout parts of a screen and the second lets you retrieve them.

The former is the more useful for Stop Press users as it enables you to save as a cutout, the part of the screen that would be stripped off.

Stop Press, saves a cutout in a special format once you have defined its boundaries. First it saves the width in pixels – low byte first, followed by the high byte – then it saves the height in the same way. The rest is saved in columns of bytes from left to right.

Listing I, Savecut, allows you to select a picture from which you wish to make a cutout. The selection can then be saved to disc in directory C – ready for use by Stop Press.

The cutout is selected by a system of crosshairs, using the cursor keys and Return to select the first corner and Copy to select the second. A cutout can be saved in the same way as with Stop Press.

The second listing, Loadcut, loads a cutout into the top left hand corner of the screen. To do this just follow the instructions you are given.

The programs have been written in such a way that they are simply adapted and could be easily included in your own programs, allowing you to create your own cutout library.

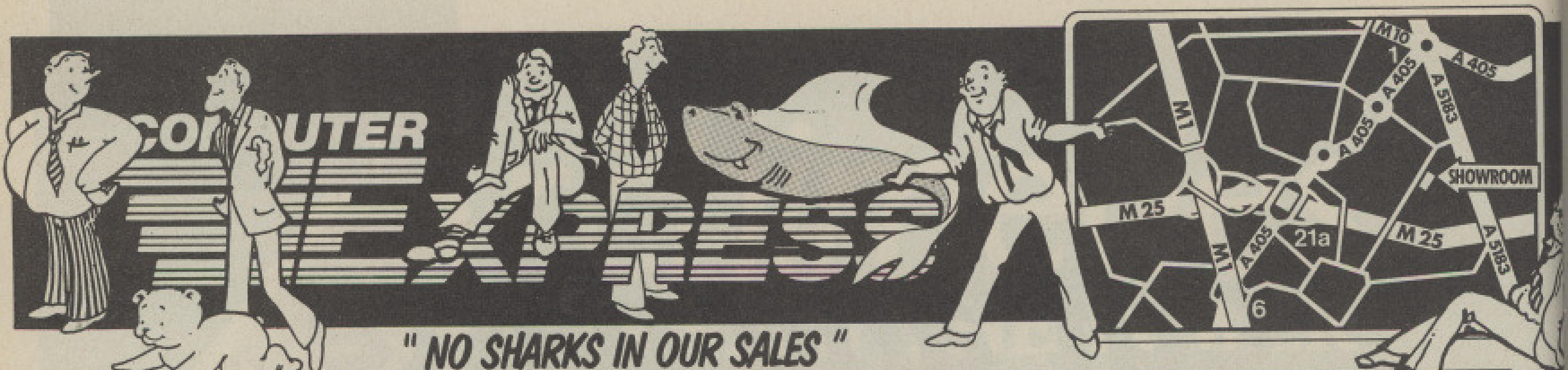
Listing I

```
  100 REM SAVECUT
  110 REM By David Easey
  120 REM (c) The Micro User
  130 REM
  140 MODE 7:*DIR $
  150 INPUT"From which file to you wish
to take a""cutout? "screen$
  160 INPUT'"View screen (Y/N)? "vw$
  170 IF vw$="Y" THEN MODE 0:PROCdisplay
  180 INPUT'"Please enter cutout filena
me? "cut$
  190 PROCloadscrn
  200 *DIR C
  210 X=320:Y=352:X1=X:Y1=Y
  220 *FX4,1
  230 GCOL3,1
  240 MOVE X,0:DRAW X,1024
  250 MOVE 0,Y:DRAW 1280,Y
  260 REPEAT:PROCcheck_keys:UNTIL INKEY(
-74)
  270  FTX=X1:FTY=Y1
  280 MOVE X,0:DRAW X,1024:MOVE 0,Y:DRAW
 1280,Y
  290 REPEAT:PROCcheck_keys:UNTIL INKEY(
-106)
  300 BTX=X1:BTY=Y1
  310 PROCbytes
  320 X%=ZX%/16:Y%=256-(ZY%/4)
  330 LOC%=&3000+(X%*8)+&280*(Y% DIV 8)+
(Y% AND 7)
  340 PROCsave_cutout
  350 GOTO140
  360 END
  370 DEFPROCcheck_keys
  380 IF INKEY(-58) THEN Y1=Y1+32:PROCmo
ve_hairs
  390 IF INKEY(-42) THEN Y1=Y1-32:PROCmo
ve_hairs
  400 IF INKEY(-26) THEN X1=X1-16:PROCmo
ve_hairs
  410 IF INKEY(-122) THEN X1=X1+16:PROCm
ove_hairs
  420 ENDPROC
  430 DEFPROCmove_hairs
  440 GCOL3,1
  450 MOVE X,0:DRAW X,1024
  460 MOVE 0,Y:DRAW 1280,Y
  470 MOVE X1,0:DRAW X1,1024
  480 MOVE 0,Y1:DRAW 1280,Y1
  490 X=X1:Y=Y1
  500 ENDPROC
  510 DEFPROCbytes
  520 WIP=BTX-FTX:ZX%=FTX:IF WIP<1 THEN
WIP=FTX-BTX:ZX%=BTX
  530 HIP=BTY-FTY:ZY%=BTY:IF HIP<1 THEN
HIP=FTY-BTY:ZY%=FTY
  540 WIB=WIP/8
  550 ENDPROC
  560 DEF PROCsave_cutout
  570 channel=OPENOUT(cut$)
  580 BPUT# channel,WIP MOD 256
  590 BPUT# channel,WIP DIV 256
  600 BPUT# channel,HIP MOD 256
  610 BPUT# channel,HIP DIV 256
  620 Q%=8:W%=0:Y%=0:Z%=0
  630 MOVE FTX,0:DRAW FTX,1024:MOVE 0,FT
Y:DRAW 1280,FTY
  640 MOVE BTX,0:DRAW BTX,1024:MOVE 0,BT
Y:DRAW 1280,BTY
  650 REPEAT
  660 FOR loop=1 TO HIP/4
  670 BPUT# channel,?(LOC%+Y%+Z%)
  680 Y%=Y%+1
  690 IF Y%=Q% THEN Y%=Y%-8:Z%=Z%+&280
  700 NEXT
  710 Y%=Q%:Q%=Q%+8:Z%=0
  720 W%=W%+1
  730 UNTIL W%=WIB/2
  740 CLOSE# channel
  750 ENDPROC
  760 DEF PROCdisplay
  770 CLS
  780 PROCloadscrn
  790 PRINT"Press a key"
  800 K$=GET$
  810 CLS
  820 ENDPROC
  830 DEF PROCloadscrn
  840 $&C00="LOAD "+screen$+" 3000"
  850 X%=&C00:Y%=&C00 DIV 256
  860 CALL &FFF7
  870 ENDPROC
```

This is one of hundreds of programs available FREE for downloading on
MicroLink
In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

Listing II

```
  100 REM LOADCUT
  110 REM By David Easey
  120 REM (C) The Micro User
  130 REM
  140 MODE7:*DIR C
  150 *.
  160 PRINTSPC(80);"Which cutout do you
wish to load"
  170 INPUT FI$
  180 MODE 0
  190 channel=OPENIN(FI$)
  200 ?&78=BGET# (channel)
  210 ?&79=BGET# (channel)
  220 ?&7A=BGET# (channel)
  230 ?&7B=BGET# (channel)
  240 WIP=?&79*256+?&78
  250 HIP=?&7B*256+?&7A
  260 WIB=WIP/8
  270 Q%=8:W%=0:Y%=0:Z%=0
  280 REPEAT
  290 FOR loop=1 TO HIP/4
  300 ?(&3000+Y%+Z%)=BGET# (channel)
  310 Y%=Y%+1
  320 IF Y%=Q% THEN Y%=Y%-8:Z%=Z%+&280
  330 NEXT
  340 Y%=Q%:Q%=Q%+8:Z%=0
  350 W%=W%+1
  360 UNTIL W%=WIB/2
  370 CLOSE# channel
  380 END
```



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NOTE: The minimum quantity for ribbon orders is three (3) units.

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Pretty good stuff!

Roland Waddilove assesses a 64k printer buffer designed to increase your system's efficiency

HAVE you ever sat twiddling your thumbs while waiting for the printer to produce a long document or listing? Well, MicroStuffer is designed to avoid this holdup by providing a massive 64k printer buffer.

One problem of using a computer with a printer is that they run at different speeds. Computers like the BBC Micro, process information at quite a high speed, yet printers can only print the data provided by the micro relatively slowly. This forces the micro to reduce its speed to that of the printer.

The effect is apparent when printing long documents or screen dumps – the micro is tied up for several minutes while the printer clatters away, preventing you from getting on with your work.

To make matters worse, the better the quality of print, the slower the printer runs and the longer the micro is tied up. This is why many printers, and even some software packages, have a draft and final quality print mode.

If you want a rough idea of what the document looks like on paper you use draft mode for speed. When everything is to your liking you use final quality – which may take up to twice as long to print, but the finished article is much more presentable.

A printer normally has a very small amount of ram on board, typically 1k or so, which it uses as a buffer. When there's room a signal is sent to the micro telling it to send some more text. The micro sends characters until the printer again signals the buffer is full and then waits for it to print more text.

When the buffer has space again the printer requests more text from the micro. It sends this so quickly the buffer fills in no time and consequently spends most of its time waiting for the printer. This time is wasted as the micro can't be used for anything else.

The larger the printer's buffer the more text the micro can dump in it before it becomes full. If it is very large, say 64k as in the MicroStuffer, the whole of the text will fit in easily.

The micro quickly dumps all the text into the buffer and you can start on your next task straight away. The printer will print all the text in the buffer regardless of what the micro is doing (in fact you can even switch it off) so you can get on with the rest of your work.

This is the idea behind the MicroStuffer – a large buffer is added between the computer and printer and the micro dumps all the output into it. The printer prints while the micro is free to process the next document, screen dump or report.

The unit is small, unobtrusive and can be tucked away in a corner of the desk. It comes complete with its own power supply.

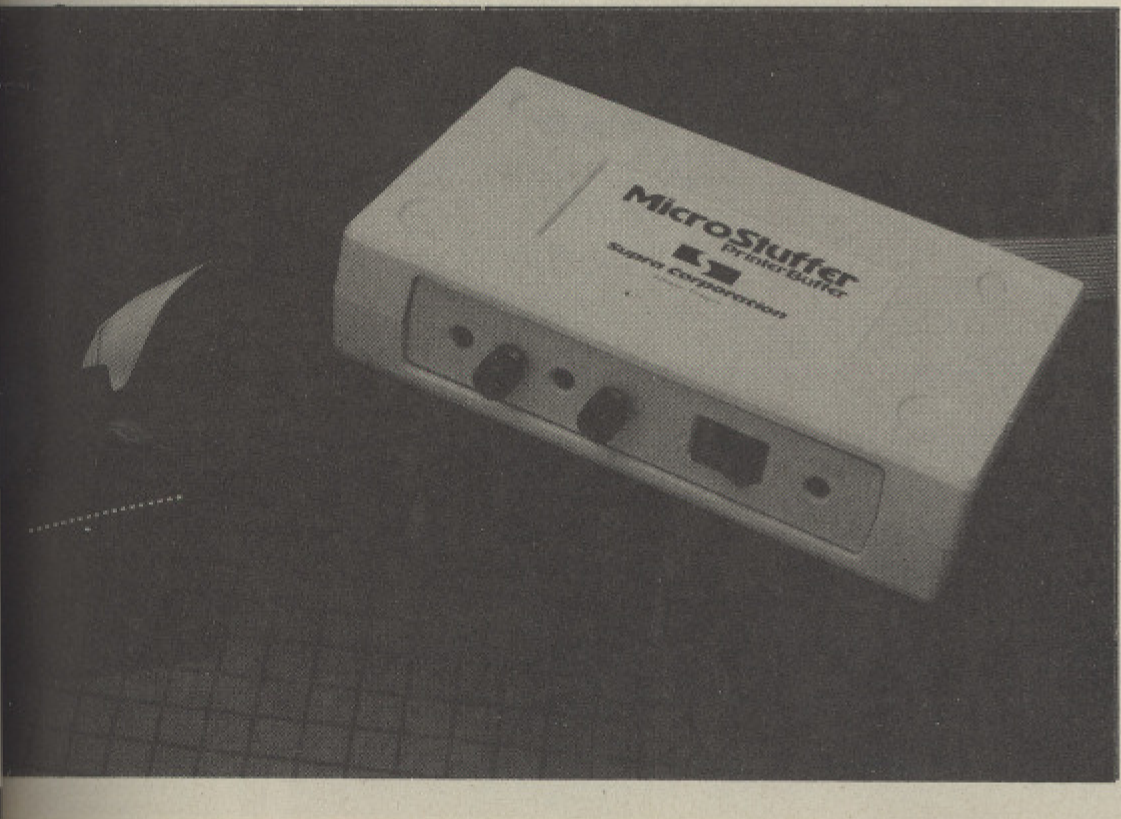
The socket on the back of the cream coloured case is identical to the one on the printer and this is where you plug in your printer lead. A short cable runs to a plug which fits into the printer's socket.

All you do is plug in, switch on and it's ready to go – it couldn't be simpler. In fact you won't notice it's there – except for the time saved.

There is an on/off switch plus two buttons on the front of the unit. One is a repeat button which reprints the contents of the buffer and the other is a panic button.

If you fill the buffer with text and suddenly discover an error you can hit the Clear button and flush it. You can't do this from the computer.

MicroStuffer isn't cheap, but if you find your time is being wasted waiting for the printer it could improve your efficiency. If you rarely use your printer it isn't necessary, but if you print large documents regularly it could repay itself in time saved very quickly. To its credit, it isn't micro-specific and will work with any computer and printer combination with Centronics type ports.



Product: MicroStuffer
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- Macros nestable to any depth
- Excellent error diagnostics
- Linker
- Editor and symbolic disassembler provided

A comparison of three 65C12 assemblers

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

ADE+

Versions and prices

Recommended for Master Compact..
ADE+ MMU and 65C00 series assembler on disc (3.5" ADFS). 32K sideways RAM required.
£42.00 + vat

Recommended for BBC B, B+ ...
ADE+ MMU and 65C00 series assembler on 2 16K EPROMS with DFS 5.25" utilities disc.
£46.00 + vat

Recommended for Master 128, turbo..
ADE+ MMU and 65C00 series assembler on EPROM cartridge with 5.25" DFS utility disc.
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ADE+

The Ultimate Assembly Language Development Tool

ADE+ is a 65C00 series assembler system supporting all the mnemonics of the 65C12 used in the latest BBC microcomputers plus the additional 'Rockwell' instructions. ADE+ is fast, faster in fact than the in-built BASIC assembler and all rival products that we have tested. The assembler produces absolute code that can be *RUN or linker modules that can be merged with the output from other programs using the ADE+ linker. ADE+ supports a powerful linker which drastically cuts assembly time; a feature normally only found on minis and mainframes. The linker will even link the output from compilers with your assembly language programs. Full library support for both the linker and the assembler is provided - fast searching for unknown instructions in a random access macro library. ADE+ is a modular system with many modules to add later; i.e. a mouse based editor & a Z80 cross assembler! A print spooling system uses sideways RAM as a print buffer to eliminate waiting time; your listing runs off as a background job! Use the print spooler from BASIC or your own programs. ADE+ uses ALL available memory. With a second processor attached the IO processor spare memory is used as a buffer to reduce the amount of disc access. All available memory is handled by ADE+'s intelligent memory management module. Use your own favourite editor or the one provided. Assemble from disc or memory. Full utilities including librarians, converter for BBC BASIC etc. ADE+ must be *the bargain of 1986/7!*

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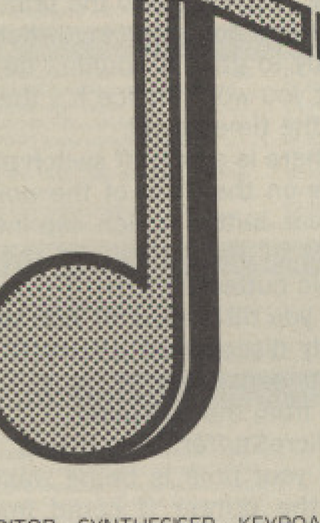

a note

NOTE: THE MUSIC SYSTEM

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SYSTEM SOFTWARE

SYSTEM

EDUCATION UPDATE

Micro hotel

PRACTICAL exercises for teenage computer students are the main feature of a new package from Reeves Software.

Hotel Reception is designed to present clear menus and screen layouts and easy-to-follow prompts.

It is based on a hotel with 20 bedrooms of various types.

The program presents many opportunities for data retrieval exercises, and students can get hands-on experience of entering data while operating a system which they can easily comprehend, says Reeves (0252 614674).

A series of facilities and the option to print out various forms are available.

The package, which costs £46.50 for the program disc and £3 for extra copies, is accompanied by teaching notes and a booklet of students assignments.

Design tool

A SOPHISTICATED design tool for creating 3D solid or wireframe objects is how Silicon Vision is describing its latest graphics package for the BBC Micro.

SV (01-422 2274) says that, unlike other packages, this system can perform full colour hidden-surface removal for any solid object at high speed. Colour hardcopy of the designs can then be reproduced on a range of popular pen-plotters or printers for professional results.

Realtime Solids Modeller consists of a 32k graphics rom, six discs and a 150-page manual.

The package is available at £89.95.

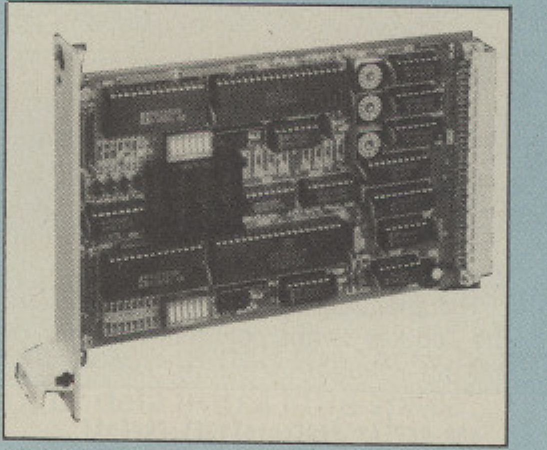
Cobweb grows

A BATCH of new products to complement the Spider 2 real-time package and make it work with the Archimedes has been announced by Paul Fray Ltd.

"Already Spider 2 is found in motorcar endurance testing, sawmill management, robot supervision, wind speed measurement, satellite telemetry, nutritional analysis, behavioural pharmacology and many other fields", said Alasdair Hayden of Paul Fray (0223 66529).

A new version of the Cobweb 1Mhz expansion card allows the BBC Micro, Master and Archimedes as well as the Acorn Cambridge Workstation, to address up to 16Mb on an industry-standard Cambridge Bus backplane, which can make use of a growing range of interface and memory cards.

A four-channel serial interface card provides a large degree of flexibility – connectors and termination characteristics are available to customer order. Full modem support is implemented.



Cobweb expansion card

A 16-channel serial interface card allows "bomb proof" connection to laboratory experiments and such at up to 30V DC. Each opto-isolated channel may be an input or an output, selected under software control.

An eight input, two output analogue interface card gives 12 bit resolution at high speed.

Degree studies

BBC Micro owners will soon be able to use their machines to study for degrees.

Pioneering education software house LCL has introduced Home College which it claims marks a new era in learning.

A spokesman for LCL (0491 579345) explained that Home College brought the best in lecturers and teachers into the student's home. Techniques used were similar to those in colleges, with lectures by video, and tutorials by software, books and tapes.

"This revolutionary and exciting way of learning enables adults – both beginners and exam candidates – to pass the exams essential for most interesting careers", said the spokesman.

"With Home College they can choose the subject they require and progress to degree level, passing GCSE and A-level on the way".

The project is the most ambitious ever undertaken by LCL.

The first releases are Foundation Level courses in Maths, English Language and French. Advanced Maths will follow soon.

The company is aiming the course at adults working at home, students needing extra help before exams, teachers and industry.

Home College users need their computer, a video and a cassette player.

Each course consists of a video of around 24 complete sections, two discs or tapes of 24 programs, books and tape.

An introductory offer of £49.99 per course is available.

Twin markets

EDUCATIONAL spreadsheet package Logistix is being published as part of the Acornsoft range for the Archimedes.

"The new machines offer the kind of power that spans the business market as well as the needs of users in our traditional sectors", said Steve Bratt, Acornsoft's production manager.

"Because of this, software selection is an important part of our strategy for positioning the Archimedes in the business market.

Marketing director for Logistix producers, Grafox (01-922 8807), Ian McCalla said: "Logistix has a substantial presence in the education sector which makes it an ideal choice for the Archimedes range".

Priced at £99, Logistix is an integrated package comprising spreadsheet and project management modules. It has a powerful graphics capability.

New in library

THE library and cataloguing program SIR, for the BBC Micro and Master, has resurfaced.

The British Library package has recently become available from BP Education Service (0937 84377). It costs £30 to UK educational institutions.

SIR requires twin double-sided 80 track discs. The maximum number of records per disc is 797, provided that the fields are not very long.

The package is designed for small specialised databases rather than a full library catalogue.

It can be used with any kind of verbal information, field lengths can be varied, and a complete listing of words used in the database can be viewed or printed easily. It also uses inverted file indexes and Boolean logic for searches.

EDUCATION PROGRAM

Measure for measure

Barry Wood

converts himself

to imperial

CONVERTING from one form of measurement to another is awkward when you can't remember the conversion factor – or can't find it.

With this short routine you can have a high-powered conversion program at your fingertips – easy to use and accurate. Just type in the listing – use the checksums to correct any typing errors – and save it.

When you run it you are presented with the different conversion units, metric on the left, imperial on the right. Arrows indicate the current selection, and at the bottom is the conversion factor. At the top of each column block is a window – these are the data input and output areas.

The spacebar alters the unit selection, the Tab key swaps column and the < > keys specify the direction of conversion.

For example, to perform a conversion from grams to pounds, select the right hand column and select pounds with the spacebar. Then select the right column and grams, type in a number and press Return.

Finally, to perform the conversion press Copy and the value in pounds will appear in the box at the top of the right column.

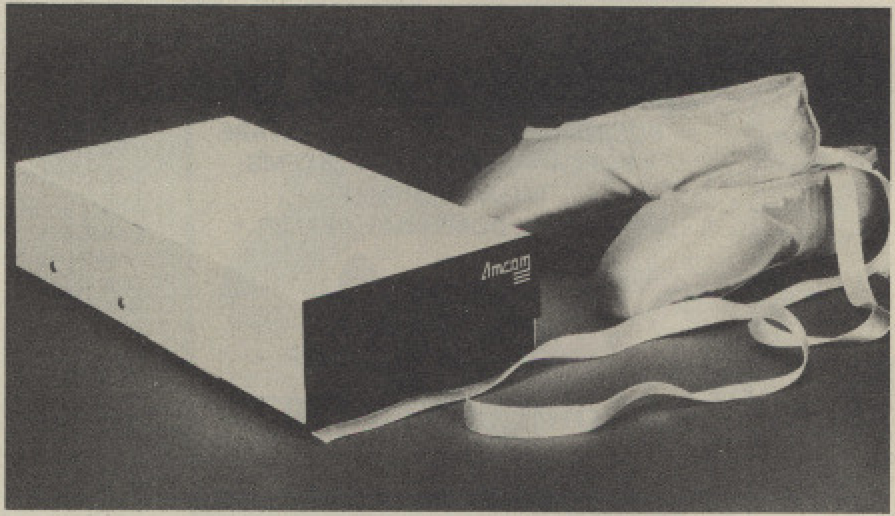
You'll never need hunt around to do those simple conversions again.

```
  100 REM Computing in Action
  110 REM Conversion Factors
  120 REM by Barry Wood
  130 REM (c) The Micro User
  140 ON ERROR MODE7:PROCerr:END
  150 MODE1:@%=&20205:PROCoff:*FX4,1
  160 VDU&E017;&381C;&FF70;&70FF;&1C38;
  170 VDU&E117;&1C38;&FF0E;&0EFF;&381C;
  180 PROCbx("Conversion Factors",1)
  190 FORX%=5TO25STEP20:PROCb(X%,10,10,1
7)
  200 PROCb(X%-2,6,14,1):NEXT:DIM f(9,9)
  210 PROCbx(STRING$(20," "),30)
  220 FORY%=1 TO 9:READa$,b$
  230 PRINTTAB(5,Y%*2+8)a$TAB(25,Y%*2+8)
b$
  240 NEXT:FORX%=1TO9:FORY%=1TO9:READ a$
  250 IF a$="*" f(X%,Y%)=-1:ELSE f(X%,Y%
)=VALa$
  260 NEXT:NEXT:Z%=TRUE:Q%=0
  270 LY%=1:RY%=1:NL=0:NR=0
  280 REPEAT COLOUR 2:COLOUR 129
  290 VDU31,19,15,225+Q%225+Q%225+Q%
  300 PRINTTAB(4,6)FNf(NL);TAB(24,6)FNf(
NR);
  310 f=f(LY%,RY%):IF Q% f=1/f
  320 IF f<0 f$=FNs(">>Error<<") ELSE f$
=FNs(STR$f)
  330 PRINTTAB(10,30)f$;:PROCp(224):G%=G
ET:PROCp(32)
  340 I%=INSTR("<,>.",CHR$G%):IF I%<1 EL
SE Q%=I%<3
  350 IF G%=9 Z%=NOTZ%
  360 IF G%<>32 ELSEIF Z% RY%=FNic(RY%)
ELSE LY%=FNic(LY%)
  370 IF G%>&2F IF G%<&3A PROCnum
  380 IF G%<>&87 ELSEIF f=-1 ELSEIF Q% N
L=NR/f ELSE NR=NL/f
  390 UNTIL FALSE:END
  400 DEF PROCp(C%):VDU31,12,LY%*2+8,C%
  410 VDU31,32,RY%*2+8,C%:ENDPROC
  420 DEF FNic(Y%)REPEATY%=Y%+1:IFY%=10Y
%=1
  430 UNTIL Y%<>4 AND Y%<>7:=Y%
  440 DEF PROCnum:LOCAL X%,Y%,V%,N
  450 Y%=6:IF Z% X%=4 ELSE X%=24
  460 REPEAT N=N*10+(G%AND15)
  470 PRINTTAB(X%,Y%)FNf(N);
  480 REPEAT PROCon:G%=GET:PROCoff
  490 UNTIL G%=13 OR G%=46 OR (G%>&2F AN
D G%<&3A)
  500 UNTIL G%=13 OR G%=46:IF Z% NL=N EL
SE NR=N
  510 IF G%=13 ENDPROC ELSE V%=10
  520 REPEAT PROCon:G%=GET:PROCoff
  530 UNTIL G%=13 OR (G%>&2F AND G%<&3A)
  540 IF G%=13 ENDPROC
  550 REPEAT N=N+(G%AND15)/V%:V%=V%*10
  560 PRINTTAB(X%,Y%)FNf(N);
  570 REPEAT PROCon:G%=GET:PROCoff
  580 UNTIL G%=13 OR (G%>&2F AND G%<&3A)
  590 UNTIL G%=13:IF Z% NL=N ELSE NR=N
  600 ENDPROC
  610 DEF FNf(N)=RIGHT$(STRING$(12," ")+
STR$N,12)
  620 DATA cm,inch,m,yd,km,mile,-----,--
---
  630 DATA g,ounce,kg,pound,-----,-----
  640 DATA litre,pint,litre,gallon
  650 DATA 2.54,91.44,160934.4,*,*,*,*,*
,*
  660 DATA .0254,.9144,1609.344,*,*,*,*,
*,*
  670 DATA .0000254,.00091,1.61,*,*,*,*,
*,*
  680 DATA *,*,*,*,*,*,*,*,*
  690 DATA *,*,*,*,28.35,450,*,*,*
  700 DATA *,*,*,*,.02835,.45,*,*,*
  710 DATA *,*,*,*,*,*,*,*,*
  720 DATA *,*,*,*,*,*,*,0.57,4.55
  730 DATA *,*,*,*,*,*,*,0.57,4.55
  740 DEF FNs(t$):LOCAL L%
  750 t$=STRING$(8," ")+t$+STRING$(10,"
")
  760 L%=LENt$DIV2:=MID$(t$,L%-10,20)
  770 DEFPROCbx(t$,Y%):LOCAL L%,X%
  780 L%=LENt$:X%=20-L%DIV2
  790 PROCb(X%,Y%,L%,1):COLOUR 129
  800 PRINTTAB(X%,Y%)t$;:ENDPROC
  810 DEFPROCb(X%,Y%,L%,D%):LOCAL U%,V%
  820 U%=(X%+L%)*32:V%=(32-Y%-D%)*32
  830 X%=X%*32:Y%=(32-Y%)*32
  840 PROCg(2,X%,V%,U%,Y%,20)
  850 PROCg(1,X%,V%,U%,Y%,16):ENDPROC
  860 DEFPROCg(C%,Q%,R%,S%,T%,O%)
  870 VDU24,Q%-O%;R%-O%;S%+O%;T%+O%;
  880 GCOL0,128+C%:CLG:ENDPROC
  890 DEFPROCon:LOCALB%:B%=1
  900 DEFPROCoff:LOCALB%:B%=0
  910 VDU23,1,B%;0;0;0;0;:ENDPROC
  920 DEFPROCerr:@%=10:PROCon:REPORT
  930 PRINT" at line ";ERL:ENDPROC
```

Get it right!

```
100 =    0 0
110 =    0 0
120 =    0 0
130 =    0 0
140 = 5779 9
150 = 5DBC 9
160 = AD98 6
170 = E9EB F
180 = 3E7F 7
190 = AB83 3
200 = CADF 3
210 = AC6D F
220 = A6EF 1
230 = 69DD 9
240 = F239 D
250 = 4E96 7
260 =  922 6
270 = 249C 2
280 = AB9E 3
290 = EFAC B
300 = 8871 2
310 = 8573 B
320 = 98D1 C
330 = 441D 8
340 = EFB5 0
350 = BEE3 1
360 = 7B17 B
370 = 62F6 E
380 =  474 9
390 = DADE 5
400 =  81C C
410 = 2311 C
420 = D7FC A
430 = 6A0D C
440 = F407 4
450 = 3276 8
460 =  5BB B
470 = 60BB B
480 = 913B F
490 = 7FB7 7
500 = 5F23 4
510 = 8BE1 0
520 = 913B 0
530 = F4E0 E
540 = 3F20 A
550 = BAD7 9
560 = 60BB 0
570 = 913B C
580 = F4E0 0
590 = 9622 F
600 = ED0F 3
610 = 5EF5 D
620 = D926 5
630 = A732 4
640 = 9B62 B
650 =  63C F
660 = 2C92 D
670 = 313C 5
680 = ED34 E
690 = E236 8
700 = 2EE7 9
710 = ED34 E
720 = 4DDA 7
730 = 4DDA 9
740 = 3F30 3
750 = C750 2
760 = FF43 5
770 = 996F
780 = 92BC
790 = AF81
800 = DF37
810 = BD97
820 = D641
830 = B016
840 = 29C9
850 = 4801
860 = 9652
870 = D92B
880 = AE01
890 = 4D34
900 = DEC2
910 = 1149
920 = BFA6
930 = 7580
```

HALF HEIGHT WINCHESTERS



Amcom have simplified winchester design.

The result is a range of half-height winchester drives, packing a lot of data into a little space.

Amcom have also made winchesters simpler to use.

Amcom winchesters are supplied ready formatted: just plug into the 1 MHz bus and switch on.

Amcom winchesters use the Acorn ADFS to ensure software compatibility. And to make full use of this, Amcom include powerful utilities software to manage the megabytes of storage space.

And Amcom have also simplified the price:

20 MByte Unit	£430
40 MByte Unit	£699
ADFS tapestreamer	£599

As official Acorn dealers Amcom also retail the full range of Acorn products.

(All prices exclude VAT and carriage)

Amcom

To order, or request further details, about winchesters, tapestreamers and networking, contact:

Amcom Software Ltd
35, Carters Lane
Kiln Farm
Milton Keynes
MK11 3HL
Tel: (0908) 569212
(Major credit cards accepted)

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Master 128 with dual drive on plinth, games selection, Citizen 120D, Paper and Phillips mono monitor	**£820.00**
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as above with colour monitor	**£799.00**

(all above specials £10.00 carriage).

Printers (Dot Matrix)

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Citizen MSP10E 80c/160cps + 40 cps NLQ	£225.00 (a)
Citizen MSP50 80c/250cps + 60cps NLQ	£379.00 (a)
Star NL10 80col/120cps + 30cps NLQ	£199.00 (a)

Printers (Daisy Wheel)

Juki 6000 80col 12cps	£182.00 (a)
Juki 6100 110col 20cps	£280.00 (a)
Citizen Premier 35 132col 35cps	£554.00 (a)

Printers (Laser)

New Citizen Laser Overture 110 10 pages/min 250 Sheet cassette dual interface.	**£1650.00 (a)**

All printers include Free BBC cable or plus £5.00 for IBM lead.

AMX Mouse and Software

AMX Mouse + Super Art	£60.00 (d)
AMX Pagemaker	£37.00 (d)

SPECIAL OFFERS

Printers – Dot Matrix

MP 165 80col/165cps + 38cps NLQ	£166.00 (a)
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MP 201 136col/200cps + 40cps NLQ	£274.00 (a)

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2 Year Warranty on MP Printers

Gaken 16cps	**£189.00**

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Direct Drives all with full 3 yr. Warranty

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MD 802 E Dual 40/80T DS 800K Inc PSU	£244.00 (a)
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20 mb incl. PSU and ADFS	£549.00 (a)
40 mb incl. PSU and ADFS	£869.00 (a)

Disc Drives

Misc

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Discs 5.25" (Boxed in 10's Lifetime guarantee)

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B & S Label 96TPI in see through LIB. Case DS/DD	£13.00 (d)
Disc Cleaning Kit (state 5¼" or 3½")	**£9.00 (d)**

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All Monitors include BBC Lead

Phillips Range of high resolution Mono Monitors with Audio Input Green Amber or Paper White.

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UK Customers: please add 15% VAT to all prices (including carriage).
Government and educational establishments official orders welcomed. When ordering please enclose a cheque or postal order for the appropriate amount. UK Carriage Rates (a) £8.50 – courier insured delivery (b) £3.50 (c) £2.50 (d) £1.50 (e) £1.00. All prices are correct at time of going to press. All offers are subject to availability, all prices are subject to change without prior notification and are available on request. Current price list is available on request.

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All Modems inc BBC Lead

Miracle WS2000	£95.00 (c)
Miracle WS4000 Hayes Compat	£144.00 (a)
Pace Nightingale + Commstar II	£94.00 (c)
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Pace Commstar II ROM	£28.00 (e)

NB BABT APPROVAL ON MODEMS ONLY

50ft. Telephone Extn. Cable on Wind up Reel	£9.50 (d)

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Acorn Soft

Micro Prolog	£50.00 (d)	ISO Pascal	£42.00 (d)
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Forth Disc	**£14.00 (e)**	Comal	£32.00 (d)
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View Printer Driver Gen. Tape	£7.00 (e)	Disc	£8.00 (e)
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Mirrorsoft			
Fleet Street Editor	£31.00 (d) -	Fonts and Graphics	£11.75 (e)
Clares			
Fontwise +	£16.00 (e)	Replica III	£11.00 (e)
VINE MICRO REPLAY (State M/C and Disc Interface)			£30.00 (e)

NB It is essential to state machine and 40/80T when ordering software

Books (No VAT on books)

Master Ref. Manuals Pt1	£14.00 (d)	Pt 2			£14.00 (d)
Advanced Master Ref. Manual					£POA
Lisp	£7.00 (e)	Forth	£7.00 (e)	ISO Pascal	£7.00 (e)
BCPL	£14.00 (d)	View Guide	£6.00 (e)	Into View	£6.00 (e)
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Please state Single or Twin Row, when ordering labels

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£2.89 (e)
£2.50 (e)
£2.50 (e)
£3.75 (e)
£3.74 (e)
£2.30 (e)
£5.00 (e)
£7.00 (e)
£6.00 (e)
£8.00 (e)
£10.00 (d)
£11.00 (c)
£15.00 (d)
£39.00 (c)
£95.00 (c)
£144.00 (a)
£94.00 (c)
£52.00 (d)
£28.00 (e)
£9.50 (d)
£42.00 (d)
£39.00 (c)
£32.00 (d)
£37.00 (d)
£39.00 (d)
£37.00 (d)
£21.00 (e)
£84.00 (d)
£8.00 (e)
£39.00 (d)
£55.00 (d)
£47.00 (d)
£37.00 (d)
phics £11.75 (e)
£11.00 (e)
£30.00 (e)
40/80T
£14.00 (d)
£POA
Pascal £7.00 (e)
View £6.00 (e)
w Store £9.00 (e)
£11.00 (c)
£12.50 (c)
£9.00 (c)
£17.00 (b)
£4.00 (d)
£6.00 (d)
£5.00 (d)

EDUCATION PROGRAM

Paul Lewis presents a fun way to improve mental arithmetic

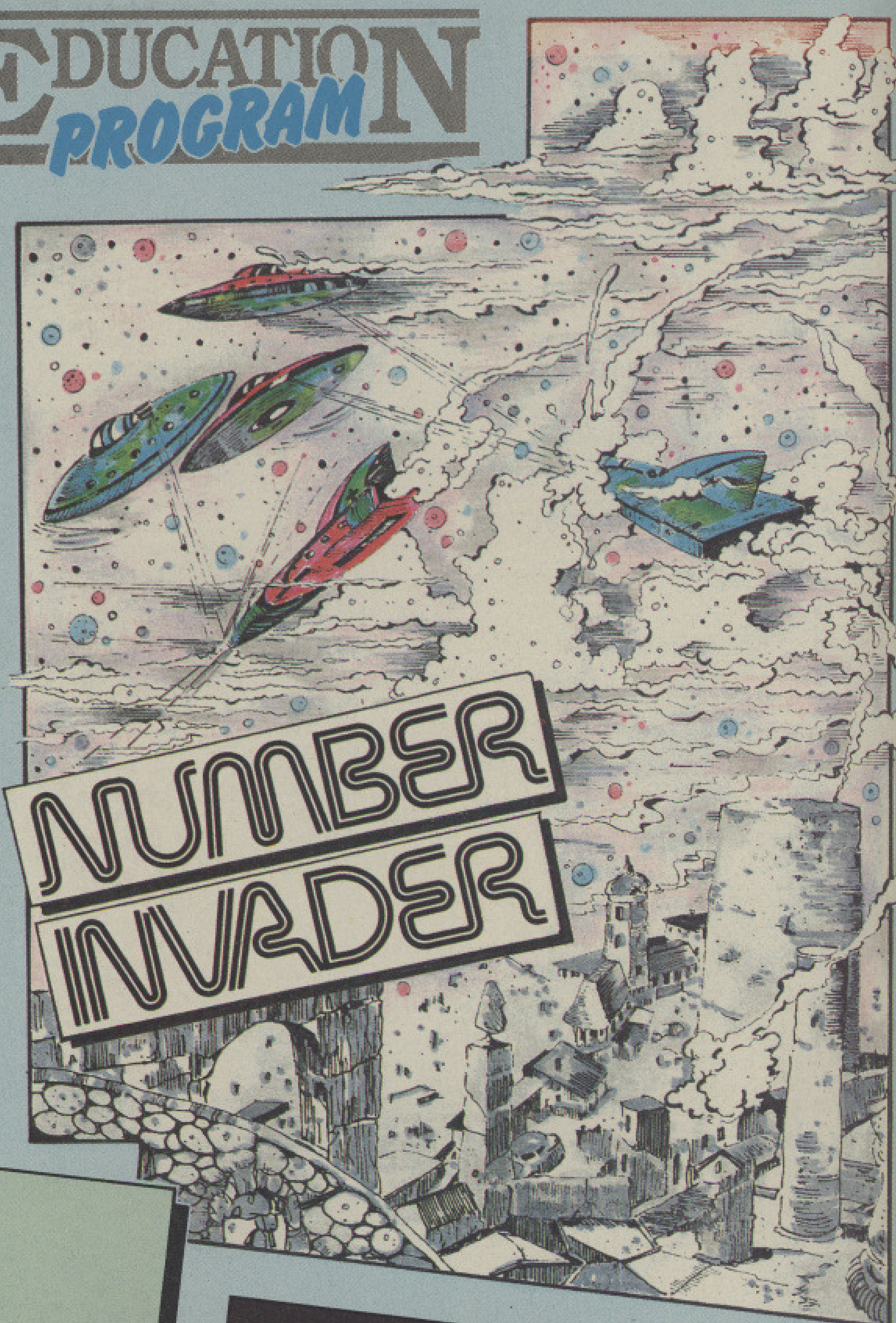
STARDATE MU2001, and a new breed of invader is descending on the planet Earth. The only way in which they can be stopped is to destroy their secret formation code.

Luckily, our intelligence beams us these codes in advance before a major attack.

Your task, in a series of three missions, is to change the code SCORE into the formation code TOTAL by shooting invaders and bases.

You have been given the latest armed spaceship, the Oaryrrep which is moved by a remote control device connected to unsuspicious objects such as BBC Micros.

You, as one of the top pilots on your planet, have a remote control device at your disposal. Now go into action.



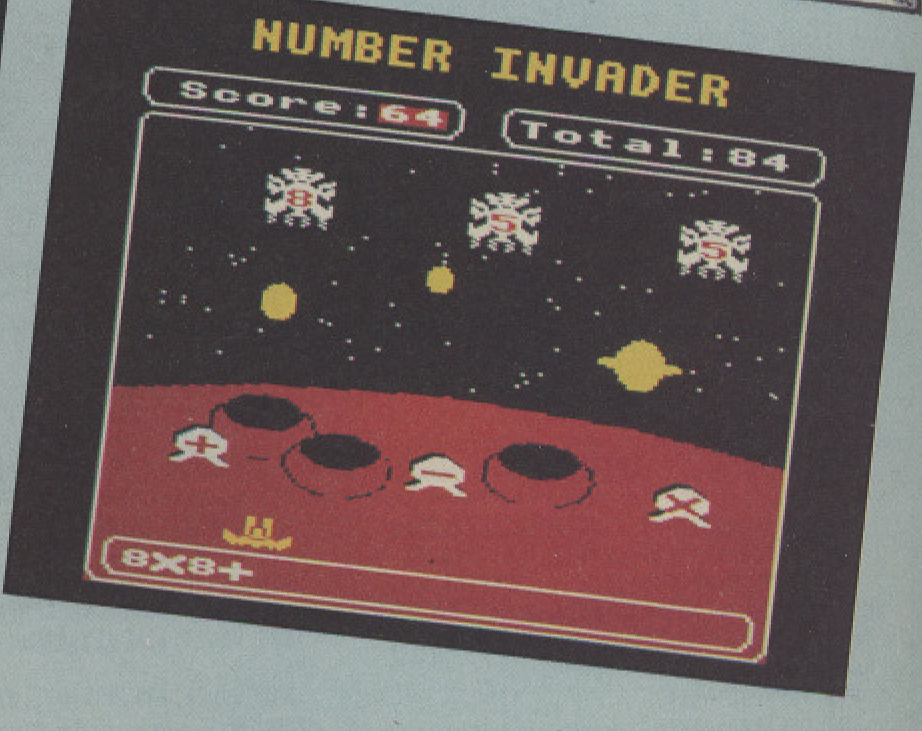
NUMBER INVADER

KEYS

Z	Left
X	Right
Return	Fire

MAIN VARIABLES

X	Position of gun
G	Number of missions
total	Your current score
ttg	Total to get
R$	String of invaders
RR$	Used in manipulation of *R$*
B$,G$	Assembled characters for base and gun
LI$,RI$	Left and right assembled characters for invader



NUMBER INVADER
Score:64
Total:84
8
5
5
8X8+

MAIN PROCEDURES

chars	Defines characters
init	Initialises variables and envelopes
instr	Prints instructions
game	Main routine
screen	Sets up screen (box,backdrop,circle,crater)
key	Checks for key presses
db	Mode 5 double height
fire	Firing routine
invaders	Processes string of invaders
printinv	Prints invaders
sense	Determines if number or sign is required
maths	Calculates total
check	Checks for number
end	Total not obtained in space
finish	Total is made
cong,fail	Sound effects
score	Final score

EDUCATION PROGRAM

◀ From Page 69

```
  10 REM Number Invaders
  20 REM   by Paul Lewis
  30 REM ***************
  40 ONERROR MODE7:REPORT:PRINT;" at li
ne ";:PRINTERL:END
  50 *TV0,1
  60 MODE5
  70 VDU23;8202;0;0;0;
  80 PROCchars
  90 COLOUR1:PRINTTAB(2,16);"Please wai
t....":COLOUR3
 100 PROCinit
 110 IFFNchoice("Instructions ?") PROCi
nstr
 120 CLS
 130 PROCscreen
 140 REPEATG=G+1
 150 ttg=RND(99):IFttg<10GOTO150
 160 COLOUR128
 170 PRINTTAB(1,5);"Score: 0";TAB(11,5)
;"Total:";ttg:t=0:K=0:end=0
 180 COLOUR129:PRINTTAB(1,30);SPC(18)
 190 PROCgame
 200 UNTILG=3
 210 PROCscore
 220 IFFNchoice("Another game ?") RUN
 230 END
 240 DEFPROCchars
 250 VDU23,250,24,24,24,255,255,24,24,2
4,23,251,0,0,0,255,255,0,0,0
 260 VDU23,252,195,231,126,60,60,126,23
1,195,23,224,0,3,7,15,31,63,63,63,23,225
,0,192,224,240,248,252,252,252
 270 VDU23,226,63,63,31,15,15,28,56,112
,23,227,252,252,248,240,240,56,28,14
 280 VDU23,228,0,0,0,6,6,6,6,4,23,229,0
,0,0,96,96,96,96,32
 290 VDU23,230,5,5,133,195,236,255,127,
41,23,231,160,160,161,195,55,255,254,148
 300 VDU23,232,3,25,31,13,143,226,115,1
51,23,233,223,255,111,79,15,15,159,191,2
3,234,251,249,241,99,36,66,36,66
 310 VDU23,235,192,152,248,176,225,71,2
06,233,23,236,251,255,246,242,240,240,24
9,253,23,237,223,159,143,198,36,66,36,66
 320 ENDPROC
 330 DEFPROCinit
 340 ENVELOPE1,1,-4,127,10,131,101,141,
127,-1,0,-127,126,126
 350 ENVELOPE2,4,0,0,0,5,2,3,10,-5,0,-1
,100,70
 360 DIMS(36),C(36),d 10
 370 FORI=0TO36:S(I)=SIN(RAD(I*10)):C(I
)=COS(RAD(I*10)):NEXT
 380 R$="":K=0:S1$="":N1=0:P$="":rg=0
 390 a$=CHR$224:b$=CHR$10+CHR$8:c$=b$+C
HR$8+CHR$8
 400 B$=CHR$224+CHR$225+c$+CHR$9+CHR$22
6+CHR$227
 410 G$=" "+CHR$228+CHR$229+" "+c$+CHR$
8+" "+CHR$230+CHR$231+" "
 420 LI$=CHR$232+b$+CHR$233+b$+CHR$234
 430 RI$=CHR$235+b$+CHR$236+b$+CHR$237
 440 R$="+"+STR$(RND(9))+"....+"+STR$(R
ND(9))+"....+"+STR$(RND(9))+"...."
 450 X=8:G=0
 460 ENDPROC
 470 DEFPROCinstr
 480 CLG:PROCtitle
 490 PROCdb("Use your",0,6,1):COLOUR1:P
ROCdb("ROCKET SHIP",9,6,1):COLOUR3
 500 PROCdb("to shoot the",0,10,1):COLO
UR1:PROCdb("ALIENS",13,10,1):COLOUR3
 510 PROCdb("and",0,14,1):COLOUR1:PROCd
b("BASES",4,14,1):COLOUR3:PROCdb("to mak
e",10,14,1)
 520 PROCdb("the",0,18,1):COLOUR2:PROCd
b("TOTAL",4,18,1):COLOUR3:PROCdb("shown
on",10,18,1)
 530 PROCdb("the screen.",0,22,1)
 540 PROCcont:CLS:PROCtitle
 550 COLOUR1:PROCdb("FIRE:",4,12,1):PRO
Cdb("Left:",0,19,1):PROCdb("Right:",11,1
9,1):COLOUR2:PROCdb(" RETURN",9,12,1):PR
OCdb("Z",6,19,1):PROCdb("X",18,19,1)
 560 PROCcont
 570 ENDPROC
 580 DEFPROCgame
 590 REPEAT
 600 PROCinvaders
 610 PROCkey
 620 UNTILend=1
 630 ENDPROC
 640 DEFPROCscreen
 650 PROCbackdrop
 660 PROCbox(0,0,1276,800)
 670 PROCbox(680,816,1276,880)
 680 PROCbox(0,816,600,880)
 690 PROCbox(32,16,1244,80)
 700 PROCtitle
 710 COLOUR129:VDU5
 720 FORI=0TO2
 730 FORJ=0TO1
 740 GCOL0,J*3
 750 MOVE(1.875+I*7)*64+8*J,296-8*J:PRI
NTB$
 760 NEXT
 770 GCOL0,1
 780 MOVE(2.5+I*7)*64,272
 790 PRINTCHR$(250+I)
 800 NEXT:VDU4
 810 COLOUR2:PRINTTAB(X,27);G$:COLOUR3
 820 ENDPROC
 830 DEFPROCbox(X1,Y1,X2,Y2)
 840 MOVEX1,Y1+16:DRAWX1+16,Y1:DRAWX2-1
6,Y1:DRAWX2,Y1+16:DRAWX2,Y2-16:DRAWX2-16
,Y2:DRAWX1+16,Y2:DRAWX1,Y2-16:DRAWX1,Y1+
16
 850 ENDPROC
 860 DEFPROCkey
 870 COLOUR129
 880 IFINKEY-74:IFX<>2ANDX<>7ANDX<>9AND
X<>14:PROCfire
 890 IFINKEY-98:IFX>1:X=X-1:COLOUR2:PRI
NTTAB(X,27);G$:COLOUR3
 900 IFINKEY-67:IFX<15:X=X+1:COLOUR2:PR
INTTAB(X,27);G$:COLOUR3
 910 ENDPROC
 920 DEFPROCdb(M$,x,y,s)
 930 COLOUR128
 940 X%=d MOD256:Y%=d DIV256:A%=10
 950 C$=CHR$254+CHR$8+CHR$10+CHR$255
 960 FORN=1TOLEN(M$)
 970 b$=MID$(M$,N,1)
 980 SOUND0,-10,4,s:SOUND0,0,0,s
 990 ?d=ASC(b$):CALL&FFF1
1000 VDU23,254,d?1,d?1,d?2,d?2,d?3,d?3,
d?4,d?4
1010 VDU23,255,d?5,d?5,d?6,d?6,d?7,d?7,
d?8,d?8
1020 PRINTTAB(x+N-1,y);C$:NEXT
1030 ENDPROC
1040 DEFPROCcont
1050 COLOUR3:PROCdb("Press",0,28,0):COL
OUR1:PROCdb("C",6,28,0):COLOUR3:PROCdb("
to continue",8,28,0)
1060 *FX21,0
1070 REPEATA=GET:UNTIL A=67
1080 ENDPROC
1090 DEFPROCfire
1100 IFX=1ORX=8ORX=15 H=224:ELSE H=630
1110 GCOL3,2
1120 FORI=1TO0STEP-1
1130 MOVEX*64+136,160
1140 DRAWX*64+136,H
1150 MOVEX*64+116,160
1160 DRAWX*64+116,H
1170 SOUND1,1,0,3
1180 NEXT
1190 PROCsense
1200 ENDPROC
1210 DEFFNchoice(Q$)
1220 CLS
1230 *FX21
1240 PROCdb(Q$+" (Y/N)",0,15,1)
1250 Q$=GET$:IFINSTR("YyNn",Q$)=0 THEN
1250
1260 IFQ$="Y" OR Q$="y" =TRUE ELSE =FAL
SE
1270 DEFPROCinvaders
1280 RR$=RIGHT$(R$,1)
1290 IFASC(RR$)>46 AND ASC(RR$)<58 RR$=
STR$(RND(9))
1300 IFRR$="*" RR$="+"
1310 R$=RR$+LEFT$(R$,17)
1320 PROCprintinv
1330 ENDPROC
1340 DEFPROCprintinv
1350 COLOUR128
1360 FORI=1TO17
1370 P$=MID$(R$,I,1)
1380 IF FNcheck(P$) PRINTTAB(I,9);RI$
1390 IFP$="+" PRINTTAB(I,9);LI$
1400 GCOL0,1
1410 IFI>1:IFFNcheck(P$):VDU5:MOVE(I-.5
)*64,696:PRINTP$:VDU4
1420 GCOL0,3
1430 IFP$="." PRINTTAB(I,9);" ";TAB(I,1
0);" ";TAB(I,11);" "
1440 NEXT
1450 ENDPROC
1460 DEFPROCsense
1470 C$=MID$(R$,X+2,1)
1480 OK=K
1490 IFK=0:IFH=630:IFFNcheck(C$):K=1:t=
ASC(C$)-48:PRINTTAB(K,30);t;TAB(8,5);t:R
$=LEFT$(R$,X)+"*/"+RIGHT$(R$,16-X)
1500 IFH=224:IFK/2<>INT(K/2):K=K+1:S1$=
MID$("+-*",(X+2)/5,1):SG=INSTR("+-*",S1$
):PRINTTAB(K,30);CHR$(249+SG)
1510 IFK/2=INT(K/2):IFH=630:IFFNcheck(C
$):N1=ASC(C$)-48:K=K+1:PRINTTAB(K,30);N1
:R$=LEFT$(R$,X)+"*/"+RIGHT$(R$,16-X)
1520 IFS1$<>"":IFN1<>0 PROCmaths
1530 IFOK<>K SOUND0,-15,2+2*(K MOD2+1),
2
1540 IFend=1 GOTO1560
1550 IFK=17 PROCend:end=1
1560 ENDPROC
```

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EDUCATION PROGRAM

◀ From Page 70

```
 1570 DEFPROCmaths
 1580 F=0
 1590 IFS1$="+":IFt+N1<100:t=t+N1:ELSE I
FS1$="+":F=1
 1600 IFS1$="-":IFt-N1>-1:t=t-N1:ELSE IF
S1$="-":F=1
 1610 IFS1$="*":IFt*N1<100:t=t*N1:ELSE I
FS1$="*":F=1
 1620 IFF=1 K=K-2:PRINTTAB(K+1,30);"  "
 1630 N1=0:S1$="":IFt<10 PRINTTAB(7,5);"
";t ELSE PRINTTAB(7,5);t
 1640 IFt=ttg PROCfinish:end=1
 1650 ENDPROC
 1660 DEFFNcheck(CH$)
 1670 IFASC(CH$)>47 AND ASC(CH$)<58 =TRU
E ELSE =FALSE
 1680 DEFPROCbackdrop
 1690 FORI=1TO100
 1700 PLOT69,RND(1200)+50,RND(400)+400
 1710 SOUND1,-4,144+RND(12)*8,1
 1720 NEXT
 1730 PROCcircle(640,-512,2000,900,1)
 1740 SOUND0,2,100,20
 1750 PROCcrater(300,300)
 1760 SOUND0,2,100,20
 1770 PROCcrater(450,250)
 1780 SOUND0,2,100,20
 1790 PROCcrater(820,275)
 1800 SOUND1,1,36,2
 1810 PROCcircle(304,512,28,28,2)
 1820 SOUND1,1,36,2
 1830 PROCcircle(600,580,20,20,2)
 1840 SOUND1,1,36,2
 1850 PROCcircle(980,480,70,8,2)
 1860 PROCcircle(980,480,40,40,2)
 1870 GCOL0,3
 1880 ENDPROC
 1890 DEFPROCcircle(XP,YP,R1,R2,C)
 1900 GCOL0,C
 1910 OX=XP:OY=YP
 1920 FORT=0TO360STEP10
 1930 X1=XP+S(T/10)*R1
 1940 Y1=YP+C(T/10)*R2
 1950 MOVEXP,YP
 1960 MOVEOX,OY
 1970 PLOT85,X1,Y1
 1980 OX=X1:OY=Y1
 1990 NEXT
 2000 ENDPROC
 2010 DEFPROCcrater(CX,CY)
 2020 PROCcircle(CX,CY,100,50,0)
 2030 PROCcircle(CX,CY,92,48,1)
 2040 PROCcircle(CX,CY+28,72,28,0)
 2050 ENDPROC
 2060 DEFPROCend
 2070 PROCdb("You ran out of space",0,1,
0)
 2080 PROCfail
 2090 FORI=1TO1500:NEXT
 2100 PROCtitle
 2110 ENDPROC
 2120 DEFPROCfinish
 2130 PROCdb("CONGRATULATIONS",2,1,0)
 2140 rg=rg+1
 2150 PROCcong(1)
 2160 FORI=1TO500:NEXT
 2170 PROCtitle
 2180 ENDPROC
 2190 DEFPROCtitle
```

```
 2200 COLOUR2:PROCdb("   NUMBER INVADER
 ",0,1,0):COLOUR3
 2210 ENDPROC
 2220 DEFPROCcong(mo)
 2230 ENVELOPE2,1,0,0,0,0,0,0,126,-1,0,-
2,126,80
 2240 ENVELOPE3,1,0,0,0,0,0,0,5,-1,0,-2,
100,80
 2250 ENVELOPE4,1,0,0,0,0,0,0,5,-1,0,-2,
85,70
 2260 pi%=0
 2270 du%=2
 2280 SOUND2,0,0,3:SOUND3,0,0,6
 2290 FORI%=0TO16
 2300 FORD%=3TO5STEP1
 2310 pi%=(pi%+D%*mo)AND31
 2320 SOUND1,2,pi%*4,du%
 2330 SOUND2,3,pi%*4,du%
 2340 SOUND3,4,pi%*4,du%
 2350 NEXT:NEXT:ENDPROC
 2360 DEFPROCfail
 2370 co=0
 2380 du%=72
```

```
 2390 de%=6
 2400 ENVELOPE2,10,28,20,-48,1,1,1,126,-
1,-1,-1,126,0
 2410 REPEAT
 2420 co=co+1
 2430 pi%=(RND(2)-1)*12+(RND(2)-1)*7
 2440 SOUND1,2,pi%*4,du%
 2450 SOUND&1002,0,0,de%
 2460 SOUND2,2,pi%*4,du%-de%
 2470 SOUND&1003,0,0,de%*2
 2480 SOUND3,2,pi%*4,du%-de%*2
 2490 UNTILco=2
 2500 ENDPROC
 2510 DEFPROCscore
 2520 CLS
 2530 PROCtitle
 2540 COLOUR3:PROCdb("You got",2,10,1):C
OLOUR1:PROCdb(STR$(rg),10,10,1):COLOUR3:
PROCdb("right.",12,10,1)
 2550 IFrg=3 PROCcong(-1)
 2560 FORI=1TO500:NEXT
 2570 ENDPROC
```

Get it right!

```
  10 =    0 0 | 440 = 15E4 8 |  870 = B74A D
  20 =    0 0 | 450 = 8FD3 5 |  880 = B2F9 D
  30 =    0 0 | 460 = ED0F 4 |  890 = ADA0 F
  40 = 7AA7 7 | 470 = E0A0 0 |  900 = EE39 7
  50 = DDC0 E | 480 = 5F0F 7 |  910 = ED0F D
  60 = AABE 2 | 490 = 5DA4 D |  920 = 224A 8
  70 = F716 6 | 500 = 3642 1 |  930 = A76B 0
  80 = BD77 7 | 510 = A6AE 1 |  940 = D6BE D
  90 = 9FB8 C | 520 = CCC1 1 |  950 = 38D8 4
 100 = DEBB E | 530 = 1662 F |  960 = 25F8 5
 110 = 282E 1 | 540 =  502 4 |  970 =  7C9 5
 120 = 7A16 3 | 550 = 378D B |  980 = 3402 6
 130 = 9538 3 | 560 = 18B7 A |  990 = 87C7 4
 140 = D53D 8 | 570 = ED0F 3 | 1000 = 3822 2
 150 = C81C 9 | 580 = 74F3 3 | 1010 = B722 B
 160 = A76B E | 590 = BFBA 4 | 1020 = DBC5 2
 170 = 7A05 4 | 600 = 3FAA 9 | 1030 = ED0F 0
 180 = FB81 9 | 610 =  2DE 4 | 1040 = F240 3
 190 = 9E04 A | 620 =  CEC F | 1050 = 1E73 6
 200 = 4B0F 5 | 630 = ED0F E | 1060 = 2B9A 2
 210 = CEC4 B | 640 = F5B9 E | 1070 = C9DC 4
 220 = 3833 D | 650 = FF78 1 | 1080 = ED0F 4
 230 = FD2E 2 | 660 = 9C74 9 | 1090 = B8AB 7
 240 = 1613 3 | 670 = 81FA 5 | 1100 = 4064 F
 250 =  755 4 | 680 = 355C F | 1110 = 6A1C 3
 260 =   C1 5 | 690 = 6685 4 | 1120 = D868 3
 270 = FF93 3 | 700 = 5255 9 | 1130 = 5C7C C
 280 = BE76 F | 710 = FD76 F | 1140 = B3EC E
 290 = D719 8 | 720 = ADB3 8 | 1150 = D73C 3
 300 = 92A8 0 | 730 = 7302 0 | 1160 = 5E84 3
 310 = 70C7 E | 740 = 473A 6 | 1170 = B852 E
 320 = ED0F 9 | 750 = 69EA 5 | 1180 = 2C83 A
 330 = 344C 9 | 760 = 2C83 0 | 1190 = ED5C 0
 340 = D221 5 | 770 =  32F E | 1200 = ED0F 8
 350 = 7B17 9 | 780 = D887 8 | 1210 = CFE8 D
 360 = 133D 7 | 790 = 3C9C F | 1220 = 7A16 A
 370 = 11E8 7 | 800 = C953 1 | 1230 = B5F5 4
 380 = E759 3 | 810 = D1B9 2 | 1240 =  510 7
 390 = 9F98 A | 820 = ED0F 9 | 1250 = E90D B
 400 =  205 E | 830 = EB81 2 | 1260 = 1C81 9
 410 = 9D49 9 | 840 = 44B1 0 | 1270 = B529 6
 420 = C7B0 F | 850 = ED0F 4 | 1280 = DCF2 5
 430 = A8D1 9 | 860 = 1446 5 | 1290 = EFDE 6
```

```
1300 = 922F 0 | 1730 =  E2B D | 2160 = 847B 4
1310 = CFEC 7 | 1740 = 6FBD 6 | 2170 = 5255 1
1320 = FC04 B | 1750 = 993C E | 2180 = ED0F 4
1330 = ED0F 5 | 1760 = 6FBD 9 | 2190 = F931 3
1340 = 7687 A | 1770 = BAC7 A | 2200 = C15A 0
1350 = A76B 4 | 1780 = 6FBD D | 2210 = ED0F 4
1360 = B214 C | 1790 = 23A1 0 | 2220 = 40E8 0
1370 = B482 A | 1800 = 6EF1 8 | 2230 = 196B 1
1380 = 4111 A | 1810 = F699 4 | 2240 = 5341 6
1390 = E1C6 F | 1820 = 6EF1 F | 2250 = B149 5
1400 =  32F 1 | 1830 = 91E9 0 | 2260 = 9F8F F
1410 = 9735 1 | 1840 = 6EF1 7 | 2270 = 6604 B
1420 = 236D A | 1850 = 24C0 9 | 2280 = 8C7E B
1430 = 58E0 F | 1860 = 818D 0 | 2290 =  E77 E
1440 = 2C83 1 | 1870 = 236D 4 | 2300 = E9C8 1
1450 = ED0F C | 1880 = ED0F A | 2310 = 54A5 C
1460 = 4638 8 | 1890 = 3048 0 | 2320 = 2212 4
1470 = 7121 2 | 1900 = 5DFA 3 | 2330 = 35FE 5
1480 = DD48 E | 1910 = C44C C | 2340 = 5920 8
1490 = 1F15 1 | 1920 = 4790 0 | 2350 = BB05 B
1500 = 90E9 4 | 1930 = 7C77 2 | 2360 = 5FAA 6
1510 = B4E4 0 | 1940 = 35C5 0 | 2370 = 30CE C
1520 = DC4F 8 | 1950 = FF8A 9 | 2380 = E184 9
1530 = CD67 6 | 1960 = 213B 3 | 2390 = 3D27 5
1540 = 7521 9 | 1970 = 7E1E 7 | 2400 = 25EC D
1550 = 866C 6 | 1980 = B3B0 A | 2410 = BFBA F
1560 = ED0F C | 1990 = 2C83 6 | 2420 = 552D E
1570 = 6EE7 B | 2000 = ED0F 4 | 2430 = 6A55 A
1580 = EA97 D | 2010 = 4EAE 7 | 2440 = 2212 5
1590 = 2AF7 2 | 2020 = C5F3 A | 2450 = 6134 0
1600 = 160A 8 | 2030 = 237D 6 | 2460 =  F78 8
1610 = F3A5 7 | 2040 = 1CEE D | 2470 = 69B9 E
1620 = 9A9C 2 | 2050 = ED0F 5 | 2480 = CE82 9
1630 = F82C D | 2060 = 1021 F | 2490 =  EA0 4
1640 = 9CC7 F | 2070 = CAB5 D | 2500 = ED0F 6
1650 = ED0F C | 2080 = B55D 4 | 2510 = 65A0 9
1660 =  AB5 9 | 2090 = E808 E | 2520 = 7A16 A
1670 = CAFD A | 2100 = 5255 C | 2530 = 5255 C
1680 = 75FB 6 | 2110 = ED0F 0 | 2540 = 9497 7
1690 = 3C5D 8 | 2120 =  275 9 | 2550 = A852 7
1700 = A14C 7 | 2130 = 1572 6 | 2560 = 847B F
1710 = 6E9A F | 2140 = 13C7 D | 2570 = ED0F 4
1720 = 2C83 B | 2150 = 41AB 0 |
```

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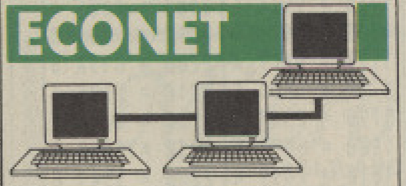

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N D S

EDUCATION REVIEW

Few false notes in this program

Product: Music Theory Hints and Tests, Volumes 1 and 2
Price: £17.20 each
Supplier: Independent Software, 26 Eason Drive, Abingdon, Oxon.
Tel: 0235 35035

NO, I can't think of a more boring title, either. Let's face it, music theory *is* boring, at least until you understand it all.

The software is not as uninviting as its name however, and it serves a very useful purpose. Music has always been an ideal candidate for computer assisted learning programs. Pupils may need a lot of practice before they feel confident about music theory, and a computer can give them a constant supply of new questions on any given topic.

These programs cram quite a lot on to each disc. Volume 1 covers key signatures, time signatures, scales and musical terms.

If you boot the disc and select key signatures the first thing you get is a hint – notes are sharpened in the order of: Father Charles Goes Down And Ends Battle and flattened in the order: Battle Ends And Down Goes Charles' Father.

You then have three options: Recognition of key signatures, writing key signatures and key signatures in C Clefs. You then decide upon the level of difficulty: 0 to 4 sharps or flats, 4 to 7 sharps or flats, or mixed keys.

The recognition program draws a key signatures and key signatures in C clefs. is and what its relative minor is, choosing from a multiple-choice selection. Writing key signatures involves placing sharps or flats on a treble and bass clef using the cursor keys.

If you get stuck, pressing H for Help reveals the order in which the sharps or flats are added to the stave. Escape is supposed to leave the program but the Escape key had apparently been disabled in Volume 1 – it worked on Volume 2.

You can have as many tries at the question as you wish but the program keeps a tally of your right and wrong responses. It also gives you an overall percentage score which reflects a trial and error approach.

The time signature tests give you the choice of easy examples, simple time, compound time or mixed times. It prints a rhythm on the treble clef and you must identify the time signature. You can play the rhythm but it uses a rather wishy-washy burst of white noise (is there an envelope definer in the house?).

Other sections of the program ask you to insert bar lines and rests – very good practice. Pressing H here only gives you the answer.

The scales program includes the following: Elementary scales, major, harmonic minor, melody minor, all scales, scales not starting on the tonic, relative major and minor scales and harder relative scales. Your task is to construct a given scale. If you get stuck, H inserts the next note for you. If you press H all the time the program still gives you a good report. I wish I'd had a teacher like that!

The final program in Volume 1 tests your knowledge of musical terms both in English and Italian. Again, the questions are multiple choice and you must select the correct meaning from a list of five possibilities. This is fine, except that you may not know that softer and slower is *calando* in Italian.

You could probably guess that it's not *a tempo, cantabile* or *mezzo piano (mp)*. In other words this multiple choice procedure gives you a pretty good chance of making an educated guess, more here than in the other tests, where nearly all the possibilities are on screen. Having said that, it's a far more interesting way to learn musical terms than reading them from a book.

Volume 2 covers the more difficult subjects of intervals, tonic triads, chords recognition and transposition. As in Volume 1, you can choose the difficulty level within each topic.

Intervals and tonic triads contain recognitions and writing tests. There was a small bug in the triad program which caused the cursor keys to produce a string of characters along the bottom of the screen after using the Help key – serves you right, you shouldn't need it!

In the chord recognition program the computer composes a short four-part passage and asks you to identify a chord, its inversion and the degree of the scale the root is on.

Transposition takes you from simple transposition by a second right up to orchestral transpositions. If you can do that you really know your stuff.

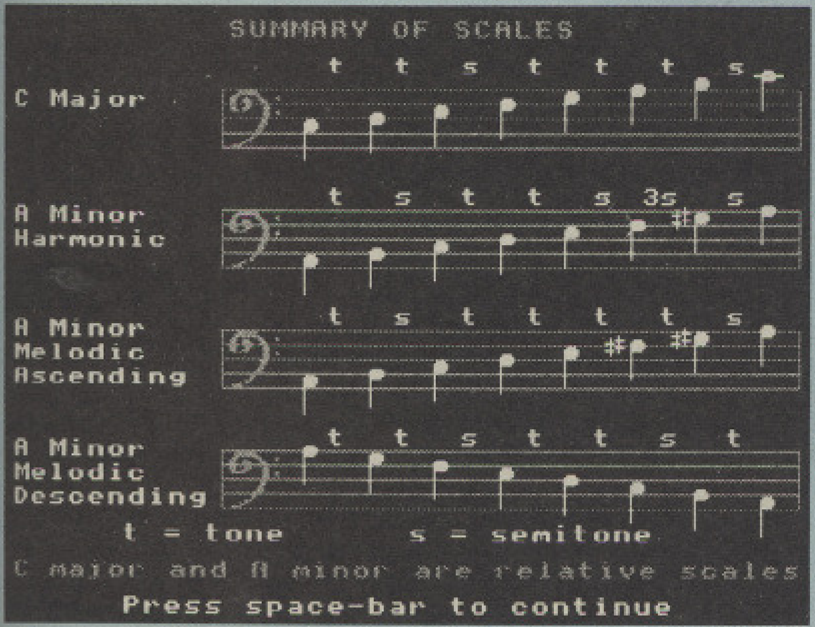
You can sound the notes in most of these programs although there are no aural training questions as such – another area of music in which the computer can be used to good effect. IS, however, are currently developing aural test programs.

Music theory is aimed at Grade V students, but by selecting the easy or the hard options they can also be used by Grades II to VII.

Apart from the odd bug, these are excellent programs and can be recommended to schools and individual students alike. Schools can buy a licence to copy the programs or use them on a network for an additional 50 per cent of the program cost.

I would have been a little happier if some of the questions had required a manual input rather than giving you a multiple-choice selection, but that doesn't detract from their value. They are thorough in their chosen areas and they make learning music theory as interesting as it can be.

Ian Waugh



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SUMMARY OF SCALES

C Major

A Minor
Harmonic

A Minor
Melodic
Ascending

A Minor
Melodic
Descending

t = tone          s = semitone
C major and A minor are relative scales
Press space-bar to continue
```

Summary from the scales program

Product: Sand Harvest
Price: £31.60
Supplier: Longman, Burnt Mill, Harlow, Essex CM20 2JE.
Tel: 0279 26721
Requirements: BBC B, B+ and Master series computers. Network (Econet II and III) version available.

Sand Harvest
NOMAD'S HANDBOOK
GOVERNMENT OFFICER'S HANDBOOK
THE ORGANISER'S MANUAL
a computer based role play simulation of life in the Sahel

STIMULATING SIMULATIONS

THE plight of the Third World in general, and the drought areas of Africa in particular, are still matters of concern to all thinking people.

Children in Britain, while showing plenty of interest and being more than willing to part with their cash for Third World charities, often lack understanding of the problems which inhabitants of the areas face. We all see the harrowing TV pictures of starving, desperately ill children in the refugee camps, and there is an assumption that the problem is merely the result of natural circumstances.

The Sand Harvest package from Longman is designed to give children, probably of secondary age, a better insight into the complex causes – partly natural, but too often those of human greed – which have led to the present day difficulties for much of sub-Saharan Africa.

The scene is set in Northern Mali. For those people who have no idea as to its whereabouts, the loading screen shows a good, high resolution map of North Africa pinpointing the location. Groups of participants take on one of three roles – nomad, government officer or villager.

Their different opinions and requirements can cause problems of overgrazing and shortage of time. The aim of the nomad, a member of the Tuareg tribe, is to lead his people, sheep, goats, cattle and camels for a year. From time to time the nomads may enter villages and trade with the static villagers. The animals can also graze the young arable crops and make use of the good water supplies.

As spring turns to summer, the tribe must wander the sub-desert area, ensuring that the animals and people do not starve, or, more likely, die of thirst. If areas of good grazing are used too much, they lose quality. Similarly, it is all too easy to dry up a well by over-drinking. At the end of the year, some money will be needed to pay tax, so some successful trading is essential.

The villagers, must be able to make their living in areas close to home. A well-organised scheme is required. The team of children taking on the role of chief villager provide the scheme. This involves dividing the day up into periods of time allocated for all of the required tasks.

A minimum of four hours is required for sleep, and, if you want more, you will almost certainly not get enough food, water or firewood. The year is divided into two periods (preparation and harvesting). Time allocations will need to be different in each period.

The government officer is provided with a budget from the central government. Part of this is in the local currency (Sa) and part is in dollars. The team with this role must decide how to spend its budget.

The members have three aims which tend to conflict with one another. Firstly, the villagers must produce enough food to feed themselves and have surplus for the urban population. Secondly, the general health of the local population must be maintained or, better, improved. Finally, the government experts pressure for cash crops so that much needed foreign exchange can be earned.

Each group takes a turn at the computer, while the others consider strategy. The nomads move themselves across a map which indicates the terrain. Their turn lasts quite some time since each move represents two days, and they keep going for a year. At appropriate points they are invited to participate in the government officer's schemes. As this will take some time, they should expect some benefit to themselves.

The government officer then plans his budget for the coming year. He has no way of knowing how the nomads or villagers will react to his schemes. If they take no part in them, he will have a disaster. The schemes must be of use to nomads and villagers.

The last turn involves the villagers who allocate their times. This is done with the help of a clear screen with suitable menu options. It would probably be reasonable to get through the three roles for one year within a lesson of forty minutes. A position can be saved on disc and returned to on a future occasion.

The software is equipped with a vast number of options. At a simple level, there is no need to involve all three roles. The range of government schemes can be minimal or can run to over a dozen. The budgets can be altered, and the exchange rate (dollar to Sa) can be fixed at any level or it can float. The rainfall can be selected and so can random events.

These "disasters from on high" may simulate reality, but can make survival a

Turn to Page 79 ▶

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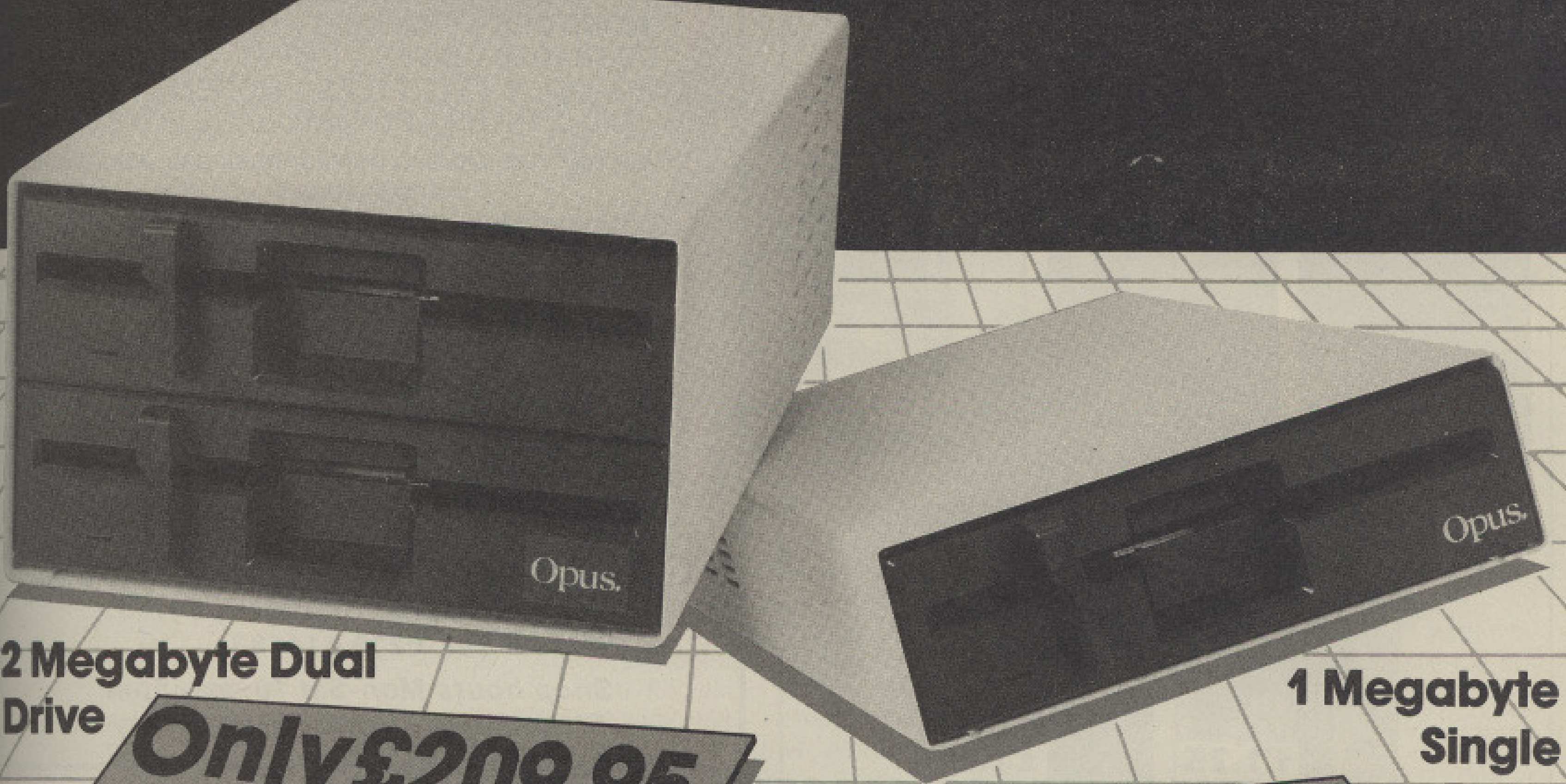

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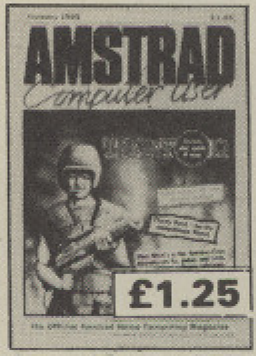

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EDUCATION REVIEW

◀ *From Page 76*

real problem. These options are selected by the teacher before the pupils start work. The pupils need never know that an options editor exists, which does give the teacher an opportunity to tailor the simulation to the ability of his/her charges.

Sand Harvest is robust and well-organised. It is menu-driven throughout, which means that there is no problem remembering commands. Using the software makes little demand upon pupils' brains, which means they are free to think about the issues involved. To help them in this task there are some excellent support materials. These have been produced by the Centre for World Development Education who have sponsored the entire pack.

Manuals for each of the three roles will give the pupils a feel for their position. These are excellent and informative booklets.

A fourth manual is provided for the organiser. This helps with all of the options and gives extra background information. Each manual is also condensed on to a quick read card. In addition, a wall chart and potted history of Mali and its problems can provide stimulus away from the computer.

The reality behind Sand Harvest: water gatherers in the Southern Niger

Sand Harvest is a first rate educational pack, both thorough and thought provoking. While it will probably appeal mostly to geographers, it has scope in many areas of the curriculum.

Longmans offer a "view on approval" service to schools. I feel if you get and see this, you will certainly wish to buy the entire package.

Rog Frost

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Extra Master version features : Saving from 32k to 128k of RAM (you specify how much); Completely invisible to other software ('clashes' are impossible); To date it will save ANYTHING loaded into the computer; Enables Master to B conversion kit to be fitted.

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ROMboard '3' for Master 128, was £19.95, now £16

The first ROMboad ever to be produced for the Master computer, and by far the most popular. Its ease of installation and use makes it ideal for anyone who finds they need more ROM sockets in their Master. At its new price, who can resist it? Simply deselect the computer's built-in ROM software and plug in your own. Takes 3 ROMs including the Inter-series of ROMs by Computer Concepts.

ROMboard '4' for Master 128, was £29.95, now £25

This ROMboard allows up to 4 extra ROMs to be fitted inside the computer, replacing either the cartridges or the sideways RAM. The board also includes a read/write proctect switch. Ideal for those users who dislike cartidges but require extra ROM space, or for the school environment where cartridges tend to disappear.

Write Protect Switch for Master 128, now £7.95

Again, Vine Micros were the first with their device to write-protect either 2 or all 4 of the sideways RAM banks of the Master computer.

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Term of endearment

John Millington takes a break from teaching

"DO you fancy being seconded to the Teachers' Centre for a term?" asked our Head of Computing. "They're looking for someone to work on a program. I said you'd be interested." Indeed I was.

I've been using BBC Micros for about four years, both in teaching and at home, and I decided it would be a pleasant change to concentrate on education in a pupil-free environment.

Our Education Authority encourages the use of computers by teachers who are neither specialists or enthusiasts. Each term complementary pairs of teachers are seconded for one day a week to produce teachers' notes and pupils' worksheets for a commercial program. The basic requirements are shown in the panel. After duplication the whole package is distributed to the Authority's schools.

Before starting work we received copies of the program and its documentation. By the time I met Anne, the other seconded teacher, we found we both had reservations about the vocabulary used and the facts given. The program was trying to do too many things at once and we could see kids becoming confused – so we told John, the warden of the Teachers' Centre about our misgivings.

His response was that since they'd spent so much money for the right to distribute the software throughout the Authority we'd have to use it. Later we discovered that the package had been bought on the basis of its pretty graphics, by someone who had no experience in the subject.

Idiot-testing

So, we planned our campaign. Anne concentrated on preparing the new texts while I modified the program to make it usable. General strategy would be decided jointly.

At successive sessions we cross-checked the latest versions of program and text, each idiot-testing the other's work. Then we agreed on further changes to ensure consistency, scientific accuracy and, above all, clarity.

The original program was long, using a Mode 1 screen and relocating itself in memory. My major task was to simplify the program – this was a great bonus as the memory released allowed us to add help pages.

I have to admit I was frustrated by the section of code that contained the key algorithms and I still don't know how they achieved their effect. The documentation was no help, merely implying that any modification was likely to upset all the results. In the end I let it be, but I'm sure if all the redundant code were cut out the *Calculating, please wait...* message could be cut as well.

Test drives

As the text and program reached version numbers in the teens, Anne recruited some of her pupils to test drive the new software and worksheets. At first only reliable kids were involved, but as we moved into version numbers in the 20s (and were more sure that we were close to what we wanted) error-trapping was restored, and other pupils were turned loose on the software.

Between them they came up with some very sensible observations about screen layout, labels on graphs, and so on – the type of inconsistencies that adults accept without thinking, but which children find puzzling.

They thoroughly enjoyed being involved in the development process, giving us compliments as they saw the improvements that we made each week. The commitment of one young tearaway kept him out of trouble for many lunchtimes and he even took to writing down what changes I should make.

We also put out copies to specialists in the subject, and they came up with many useful comments on the content and how it would apply in teaching.

BASIC PROGRAM REQUIREMENTS

- *Usable by a total novice with minimum familiarisation.*
- *Easily incorporated into GCSE teaching and assessment schemes.*
- *Master copies of all pupils'* through.
- *Essential (if not central) positioning within teaching context.*
- *Encourages use of other packages.*

Eventually the teachers' notes, the pupils' worksheets and the program were ready and we passed it all back to John.

Within a couple of weeks the whole package had been printed and it was the afternoon of the Introductory Course for Teachers. Though both of us spend the majority of our time standing up in front of pupils, facing even a small audience of adults was daunting.

After a brief introduction, we showed them how to insert the discs and autoboot the program – then we just let them play.

This helped them overcome any keyboard phobia and let them see what screens were available, and that they could always return to a particular screen if they wanted to. Computer screens are basically repetitive, whereas TV is ephemeral – the distinction is not always clear to novices.

Once they were all familiar with the basic outline, we put the program into its teaching context and issued the worksheets and let them follow it through.

Anne and I then just kept an eye on the proceedings, answering any questions that came up. Very soon our class settled down and all we heard was the quiet buzz of pupils at work. The number that stayed on after going home time to work through to completion was very gratifying.

Lessons learnt

The process of developing the software certainly made me think very critically about the form of programs in relation to children, and I hope I have incorporated the lessons in my own programming.

I view the modifying of a commercial package with mixed feelings: As an intellectual exercise it gave me the satisfaction of achievement. But I wonder what the author of the original may think if he ever finds out what has happened to his work.

And as to that blissful pupil-free environment – forget it. A local school had burnt to the ground and its little perishers were housed in the Teachers' Centre. Have you ever tried de-bugging a program with a French horn blasting in your ear?

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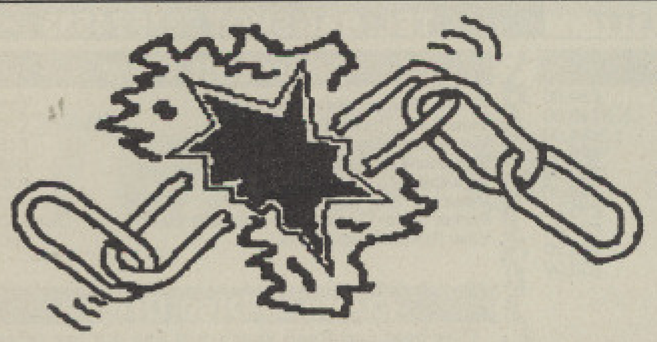

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Mike Cook brings a bleary eye to bear on the festivities

The pan-galactic cocktail bar

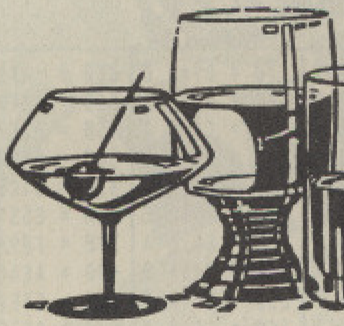
COCKTAILS are always popular, especially at this time of year, so here is a program to help you create new and exciting drinks. Well, to be perfectly honest, some of the creations sound awful, but then, you never know until you try.

In the world of the cocktail bar, the rule is that almost anything goes, so this program is not terribly reticent about what it mixes.

Every cocktail must have its own unique name, so PROC—Name designs one on a modified random basis. The process is open-ended so it can generate extremely long names on occasions. However, they should all be pronounceable—at least before trying the drink. And endless party fun can be had attempting to say the name after having imbibed.

The program classifies drinks according to type, for example spirits, liqueurs, fortified wines and soft drinks. The recipe for the cocktail is generated by choosing a random number of items – maybe zero – from each category.

Some drinks should never be mixed and these are separated into groups in the spirit and liqueur sections. The program will only match group A and B spirits and liqueurs, never drinks from the same group. Basically group A spirits are grain-based and group B spirits grape-based. Similarly group A liqueurs are generally fruit-based with group B being herb-based.



The data statements defining the available ingredients can be modified to remove anything you disapprove of, or to add your own particular favourites. All sections end with a null string which tells the program that the end has been reached. Therefore all you need to do is add or remove items from the data statements in the appropriate section.

That's enough theory, happy mixing.

WARNING: It ish an offensh, under the 1876 Home Compu(hic)ter Act, to operate a compu(hic)ter while under the influensh of this prog...

How to make a Tirebehu

2 Measures of Kirsh
2 Measures of Madeira
2 Measures of Pineapple Juice
1 Measure of Lemon Juice

and some raisins
and some ice cubes
and some fresh pineapple cubes

How to make a Quagozadoke

1 Measure of Kirsh
1 Measure of Sloe Gin
1 Measure of Sweet Sherry
1 Measure of Apricot Juice
2 Measures of Pepsi

and some apple slices

How to make a Poquaguaqua

1 Measure of Schnapps
2 measures of Slow Gin
3 Measures of White Wine
3 Measures of Pear Juice

and some apple slices

How to make a Kemeju

3 Measures of Whisky
1 Measure of Sweet Vermouth
3 Measures of Red Wine
1 Measure of Apricot Juice
1 Measure of Pepsi

and some fresh pineapple cubes
and some lime peel
and some dried apricots

```
   10 REM The Pan Galactic Cocktail Bar
   20 REM         by Mike Cook
   30 MODE7:vow$="aeiou"
   40 con$="bcdfghjklmpqrstvwxyz"
   50 DIM drink$(7,50),max%(7)
   60 FOR A%=0 TO 7:M%=0:REPEAT
   70 M%=M%+1:READ drink$(A%,M%)
   80 UNTIL drink$(A%,M%)=""
   90 max%(A%)=M%-1:NEXT
  100 drunk=FALSE:REPEAT A%=RND(-TIME)
  110 CLS:PRINT"The Pan Galactic Cockta
il Bar"
  120 PRINT"By Mike Cook"
  130 PRINT''"How to make a ";
  140 PROC_Name:PRINT
  150 IF RND(2)>1 PROC_ING(1):PROC_ING(2
) ELSE PROC_ING(0):PROC_ING(3)
  160 FOR A%=4 TO 6:PROC_ING(A%)
  170 NEXT:PRINT:PROC_ING(7)
  180 PRINTTAB(0,22)"Press P to print"
  190 PRINTTAB(0,23)"Press space for ano
ther Drink"
  200 REPEAT A$=GET$:UNTIL INSTR(" Pp",A
$)>0
  210 IF A$=" " ELSE PROC_Print
  220 UNTIL drunk
  230 DEF PROC_ING(C%):LD%=0
  240 T%=RND(4)-1:IF T%=0 ENDPROC
  250 IF C%=7 PRINT"and some ";:GOTO 280
  260 PRINT TAB(4);T%;" Measure";
  270 IF T%>1 PRINT"s of "; ELSE PRINT"
 of ";
  280 REPEAT D%=RND(max%(C%))
  290 UNTIL D%<>LD%:PRINT drink$(C%,D%)
  300 IF RND(100)<10 LD%=D%:GOTO 240
  310 IF C%=7 AND RND(100)<10 LD%=D%:GOT
O 240
  320 ENDPROC
  330 DEF PROC_Print:FOR Y%=0 TO 19
  340 L$="":FOR X%=0 TO 39:VDU31X%Y%
  350 A%=135:!&70=USR(&FFF4)
  360 L$=L$+CHR$?&71:NEXT:*FX3,10
  370 PRINT L$:*FX3,4
  380 NEXT:ENDPROC
  390 DEF PROC_Name:R%=RND(20)
  400 VDU ASCMID$(con$,R%)-&20
  410 IF R%=12 v$="u":VDU ASCv$
  420 IF R%=15 IF RND(5)=1 VDU ASC"h"
  430 REPEAT REPEAT v$=FNv(v$)
  440 VDU ASCv$:UNTIL RND(15)>1
  450 R%=RND(20):VDU ASCMID$(con$,R%)
  460 IF RND(15)=1 VDU ASCMID$(con$,R%)
  470 IF R%=12 v$="u":VDU ASCv$
  480 IF R%=1 IF RND(20)=1 VDU ASC"b"
  490 IF R%=2 IF RND(2)=1 VDU ASC"k"
  500 IF R%=15 IF RND(9)=1 VDU ASC"h"
  510 IF R%<>12 IF RND(10)=1 VDU ASC"r"
  520 UNTIL RND(5)>3
  530 IF RND(9)<5 VDU ASCFNv(v$)
  540 PRINT:ENDPROC
```

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```
  550 DEF FNv(x$):LOCAL V%,v$:REPEAT
  560 V%=RND(5):v$=MID$(vow$,V%,1)
  570 UNTIL v$<>x$:=v$
  580 REM Spirits group A
  590 DATA Gin,Whisky,Vodka,Kirsh,Saki
  600 DATA White Rum,Tequila,Schnapps,""
  610 REM Spirits group B
  620 DATA Brandy,Dark rum,White rum
  630 DATA Armagnac,""
  640 REM Liqueurs group A
  650 DATA Apricot brandy,Peach brandy
  660 DATA Advocaat,Abricotine
  670 DATA Blackberry Liqueur,Cassis
  680 DATA Moka,Cherry Brandy,Cointreau
  690 DATA Creme d'Ananas,Creme de Cassi
s,Creme de Fraise
  700 DATA Creme de Mandarin,Creme de No
yau,Curacao,Drambuie
  710 DATA Framboise,Glayva,Grand Marnie
r,Maraschino
  720 DATA Van der Hum,""
  730 REM Liqueurs group B
  740 DATA Sweet vermouth,Dry vermouth,S
trega,Sloe gin
  750 DATA Millefiori,Creme de Menthe,Ye
llow Chartreuse
  760 DATA Green Chartreuse,Campari
  770 DATA Dubonnet,""
  780 REM Wines & Fortified Wines
  790 DATA White wine,Red wine,Rose wine
,Cider,Port,Sweet sherry
  800 DATA Dry sherry,Medium sherry,Made
ira
  810 DATA ""
  820 REM Soft drinks
  830 DATA Lemon juice,Apple juice,Pinea
pple juice,Tomato juice,Apricot juice
  840 DATA Orange juice,Mixed fruit juic
e,Lime juice,Pear juice
  850 DATA ""
  860 REM Fizzy drinks
  870 DATA Coke,Pepsi,7 Up,Lemonade,Bitt
er Lemon,Tonic water
  880 DATA Ginger ale,Soda water,""
  890 REM Floaters
  900 DATA orange peel,ice cubes,cloves,
lemon peel,lime peel
  910 DATA cherries,crushed ice,apple sl
ices,raisins,dried apricots
  920 DATA dried peaches,fresh pineapple
 cubes,orange slices
  930 DATA ""
```

Get it right!

```
 10 =    0 0 | 170 = D9A0 0 | 330 =  4AE 0    490 = BFCA 5 | 650 = 686E 2 | 810 =  553 0
 20 =    0 0 | 180 = 9945 D | 340 = 46FB 8    500 = 2FF7 E | 660 = 3C1C 5 | 820 =    0 0
 30 = 7486 6 | 190 = CA6D 1 | 350 = 62E7 0    510 = 39E3 2 | 670 = CC6F E | 830 = 9E77 2
 40 = E889 1 | 200 = 7943 7 | 360 = 8000 B    520 = E29B A | 680 = D2C9 1 | 840 = 4A18 7
 50 = 1C5A 3 | 210 = 5811 8 | 370 = D1C5 0    530 =  3FB 1 | 690 = 7E75 8 | 850 =  553 C
 60 = DA81 F | 220 =  94D E | 380 = E531 6    540 = D333 1 | 700 = C159 9 | 860 =    0 C
 70 = AEBC 4 | 230 = EE76 A | 390 = F09A 0    550 = 53E3 2 | 710 = 5F79 8 | 870 = B0DB B
 80 = 4BCC A | 240 = 775F 8 | 400 = AEAC 0    560 = C8F6 6 | 720 = E0AB 5 | 880 = DBB2 1
 90 =  31D F | 250 = 111A 7 | 410 = E3EF 6    570 = F6E2 8 | 730 =    0 5 | 890 =    0 1
100 = 2F00 2 | 260 = 1BD1 C | 420 = DC3E 5    580 =    0 8 | 740 = 8981 7 | 900 = 2010 2
110 = E2F1 1 | 270 = B25C A | 430 = DEEE 9    590 = 28BA 3 | 750 = A860 1 | 910 = C2D8 B
120 = FC23 D | 280 = 48D3 9 | 440 =  8C5 2    600 = CEE9 1 | 760 = B6F5 5 | 920 = B6D8 5
130 = 5E3E 7 | 290 = EEDE 0 | 450 = B630 F    610 =    0 1 | 770 = 80ED B | 930 =  553 D
140 = FEC4 1 | 300 = 4789 9 | 460 = 34B3 2    620 = 4888 B | 780 =    0 B |
150 = 67C3 0 | 310 = B54A 1 | 470 = E3EF 7    630 = FB1C B | 790 = 9A0B 9 |
160 = 70B7 B | 320 = ED0F C | 480 = 4C09 5    640 =    0 B | 800 = C98A F |
```

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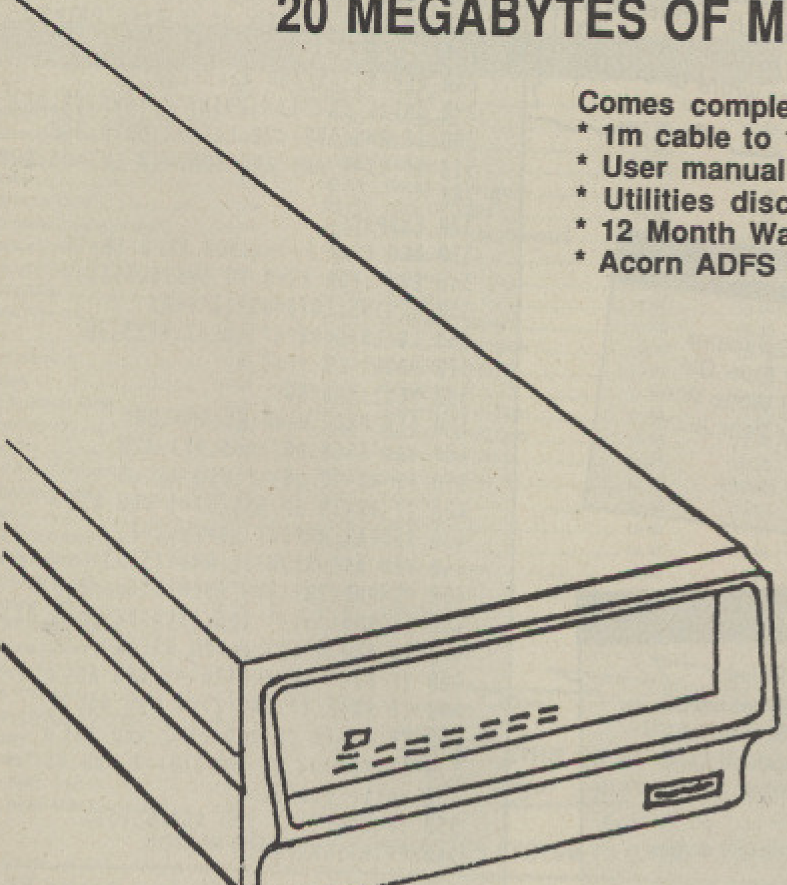

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B B+

An enjoyable children's game by Barnaby Short

BARNY BEE

WE'VE had lots of letters complaining about the lack of commercial software for young children. So to fill this gap we present Barny Bee: A game intended for youngsters. But we're sure all the family will enjoy it.

At the bottom of the garden lives Barny Bee and every day he has to collect pollen from the flowers and take it back to the hive.

But unfortunately for Barny Bee, his hive is on the flight path of a local airport, and the air is thick with planes. Not only that, when he has been working for a while an evil spiker appears, and he's out to get Barny Bee at all costs.

The keys used to control Barny are:

left	Z
right	X
up	*
down	?

To collect the pollen from the centre of the flowers you must touch them with Barny Bee's feelers or mouth. But don't touch either the plane or the vicious spiker otherwise you'll lose one of your three lives.

Once you've typed in the listing you can correct any typing errors using Get it right! The program relocates itself when you run it, so make sure you save it first.

You can change the start level by adjusting the value of *lev%* at line 80 to one less than the level you want to start on.

MAJOR PROCEDURES

I	Controls the spiker's movements
colis	Detects any collision
Q	Prints the score
delay	Waits for a certain time
K	Prints the instructions
E	Sets variables for current level

MAIN VARIABLES

lev%	Current level
sc%	Current score
hi%	Current high score
li%	Number of lives left
TI%	Amount of time left

```
   10 REM Barny-Bee
   20 REM by Barnaby Short
   30 REM (c) The Micro User
   40 IF PAGE>&E00 GOTO860
   50 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL:END
   60 VDU23,255,66,36,60,90,126,90,102,6
0:hi%=200:ENVELOPE1,1,0,0,0,0,0,0,0,0,0,
-1,127,127:ENVELOPE2,1,0,0,0,0,0,0,0,0,0
,-3,127,127:MODE2:FORA%=1TO15:VDU19,A%,0
;0;:NEXT:VDU19,14,6;0;:COLOUR14:PRINTTAB
(4,6);"Please Wait":VDU23;8202;0;0;0;
   70 RESTORE770:FORA%=0TO&C8:READB$:B%=
EVAL("&"+B$):A%?&A00=B%:NEXT:PROCN:FORA%
=0TO31:B%=A%*&2E0:?(&900+(A%*2))=B%DIV25
6:?(&901+(A%*2))=B%MOD256:NEXT:PRINTTAB(
4,6);SPC12:FORA%=1TO15:VDU19,A%,A%;0;:NE
XT:g=&A65:B=&A96:C=&A9D:K=&AA7
   80 VDU19,9,5;0;19,8,1;0;19,14,7;0;19,
4,7;0;19,10,5;0;19,13,7;0;19,11,1;0;19,0
,4;0;23;6,19;0;0;0;23;7,28;0;0;0;23;1,92
;0;0;0;23;2,102;0;0;0;23;8,2;0;0;0;:PROC
R:lev%=0:PROCE:PROCK:sc%=0:li%=3
   90 CALLK:PRINTTAB(10,0);:COLOUR1:PRIN
T"Level:";:COLOUR3:PRINT;lev%:PROCflower
s(F%):COLOUR7:PRINTTAB(19,0);STRING$(li%
,CHR$255):PROCQ:TI%=250:PROCH
  100 X%=77:Y%=159:d=&6700:?&9A7=69:?&9A
```

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```
8=170:?&9A6=0:?&990=1:?&991=230:?&992=0:
dead=0:REPEATZ=d:PROCF:PROCD:PROCcolis(1
2,8,?&9A7,?&9A8):IFR PROCI:PROCcolis(4,8
,?&990,?&991)
  110 SOUND0,-8,2,1:SOUND1,-8,0,1:E%=X%:
G%=Y%:PROCJ:K%=X%:M%=Y%:X%=E%:Y%=G%:PROC
F:Z=d+&C0:X%=K%:Y%=M%:*FX19
  120 PROCF:PROCD:PROCcolis(12,8,?&9A7,?
&9A8):E%=X%:G%=Y%:PROCJ:K%=X%:M%=Y%:X%=E
%:Y%=G%:IFX%>=67ANDY%<=159PROCO
  130 TI%=TI%-1:COLOUR6:PRINTTAB(0,0);TI
%;" ":IFTI%=0 dead=2
  140 PROCF:X%=K%:Y%=M%:PROCL:UNTILdead>
0:*FX15,1
  150 IFdead=1PROCdelay(50):PROCE:PROCS:
GOTO90
  160 IFdead=2SOUND0,2,6,2:SOUND0,0,0,1:
SOUND0,1,6,5
  170 VDU19,0,0;0;:PROCD:PROCdelay(10):V
DU19,0,7;0;:PROCD:PROCdelay(10):J=0:REPE
ATVDU19,0,7;0;:PROCdelay(J):PROCD:VDU19,
0,0;0;:PROCdelay(J):PROCD:J=J+2:UNTILJ=2
0:VDU19,0,4;0;:li%=li%-1:IFli%=0PROCT:GO
TO80
  180 PROCdelay(50):lev%=lev%-1:PROCE:GO
TO90:END
  190 DEFPROCK:CALLK:PROCH:COLOUR3:PRINT
TAB(9,1);"Barny-Bee  ":COLOUR1:PRINTSPC1
3;"By Barnaby Short";:COLOUR15:PRINTSPC2
8;"Z-left";SPC6;"X-right";SPC6;"*-up";SP
C6;"?-down";SPC4;:COLOUR6:PRINT;SPC23;:P
RINT"Help Barny to collect ";
  200 PRINT" the pollen from the   HONEY
 flowers and then back to the hive.Don't
 SMACK into any flying  objects and be q
uick oryou'll get exhausted.";:COLOUR7:P
RINT";STRING$(7,CHR$8);"Press Space":*F
X15,1
  210 PRINTTAB(3,0);"Hi Score = ";hi%
  220 REPEATA$=GET$:UNTILA$=" ":ENDPROC
  230 DEFPROCE:lev%=lev%+1:R=FALSE:IFlev
%<4 F%=5
  240 IFlev%>=4ANDlev%<10 F%=9
  250 IFlev%>=10 F%=12
  260 IFlev%<6 ?&9B3=2ELSE?&9B3=4
  270 IFlev%>2 R=TRUE
  280 IFlev%>=6 AND lev%<=9 R=FALSE:ENDP
ROC ELSE ENDPROC
  290 DEFPROCP:IFX%>67ANDY%<=159GOTO310
  300 IFY%>131 Y%=Y%-2
  310 ENDPROC
  320 DEFPROCdelay(A%):TIME=0:REPEATUNTI
LTIME>A%:ENDPROC
  330 DEFPROCO:IFF%=0 dead=1:ENDPROC
  340 DEFPROCL:IFd<&6880PROCM:ENDPROC
  350 X%=X%+7:Y%=Y%-22:CALLC:?&8E=?&8F:Y
%=Y%+20:CALLC:Y%=Y%+2:X%=X%-7:N%=X%+7:IF
?&8E=&C3 I%=Y%-22:PROCC:ENDPROC
  360 IF?&8F=&C3 I%=Y%-2:PROCC:ENDPROCEL
SEENDPROC
  370 DEFPROCM:Y%=Y%-22:CALLC:?&8E=?&8F:
Y%=Y%+20:CALLC:Y%=Y%+2:N%=X%:IF?&8E=&C3
I%=Y%-22:PROCC:ENDPROC
  380 IF?&8F=&C3 I%=Y%-2:PROCC:ENDPROC E
LSE ENDPROC
  390 DEFPROCC:F%=F%-1:D%=0:Y=FALSE:REPE
ATO%=?(&66A0+(D%*2)):Q%=?(&66A1+(D%*2)):
D%=D%+1:IFN%>=O%ANDI%<=Q%ANDN%<O%+4ANDI%
>Q%-16 Y=TRUE
  400 UNTILY:E%=X%:X%=O%:G%=Y%:Y%=Q%:?&A
0B=&40:?&A10=&6A:?&A01=16:?&A07=4:CALLB:
?&A0B=&80:?&A10=&6A:CALLB:X%=E%:Y%=G%:sc
%=sc%+25:SOUND2,1,140,1:PROCQ:ENDPROC
  410 DEFPROCF:?&A01=24:?&A07=8:?&A0B=ZM
OD256:?&A10=ZDIV256:CALLB:ENDPROC
  420 DEFPROCH:COLOUR3:VDU23,224,-1,-1,-
1,-1,-1,-1,-1,-1:GCOL0,1:A%=4:FORB%=18TO
21:PRINTTAB(A%,B%);STRING$(3,CHR$224):A%
=A%+3:NEXT:A%=440:FORB%=415TO319STEP-32:
IFB%>319MOVEA%,B%:DRAWA%+200,B%
  430 MOVEA%-192,B%+4:DRAWA%-168,B%+32:M
OVEA%-18,B%+32:DRAWA%+12,B%+4:A%=A%+192:
NEXT:GCOL0,15:VDU19,15,2;0;:B%=352:FORA%
=900TO1279STEP8:MOVEA%,B%:DRAWA%,B%+RND(
16):NEXT:B%=320:FORA%=0TO1086STEP8:MOVEA
%,B%:DRAWA%,B%+RND(16):NEXT:ENDPROC
  440 DEFPROCJ:I=FALSE:IFINKEY-73ANDY%<2
47 Y%=Y%+4:I=TRUE
  450 IFINKEY-105ANDY%>131 Y%=Y%-4:I=TRU
E
  460 IFX%>67ANDY%<159 Y%=159
  470 IFINKEY-67ANDX%<83 X%=X%+1:IFd<&68
80 d=&6880
  480 IFX%>67ANDY%<159 X%=67
  490 IFINKEY-98ANDX%>1 X%=X%-1:IFd>&67C
0 d=&6700
  500 IFI=FALSEPROCP
  510 ENDPROC
  520 DEFPROCN:VDU23;8202;0;0;0;:RESTORE
660:C%=&6700:REPEATREADA$:A%=EVAL("&"+A$
):READB$:B%=EVAL("&"+B$):FORC%=C%TO((C%-
1)+A%):?C%=B%:NEXT:UNTILC%=&6BE1:ENDPROC
  530 DEFPROCflowers(A%):D%=0:FORB%=4TO(
4+(6*(A%-1)))STEP6:H%=120+RND(74):?&A0B=
&E0:?&A10=&6B:?&A01=1:?&A07=1:FORJ%=104T
OH%:X%=B%:Y%=J%:CALLB:NEXT
  540 X%=X%-2:Y%=Y%+16:?&A0B=&40:?&A10=&
6A:?&A01=16:?&A07=4:CALLB:?(&66A0+(D%*2)
)=X%:?(&66A1+(D%*2))=Y%:D%=D%+1:NEXT:END
PROC
  550 DEFPROCD:CALLM:ENDPROC
  560 DEFPROCR:FORA=0TO2STEP2:P%=&6C00:[
OPTA:.M:JSRE:LDA#&40:STA&A0B:LDA#&6B:STA
&A10:LDA#8:STA&A01:LDA#12:STA&A07
  570 LDA&9A6:CMP#0:BEQh:LDX&9A7:LDY&9A8
:JSRB:JMPS:.h:LDA#1:STA&9A6:.S:SEC:LDA&9
A7:SBC&9B3:STA&9A7:LDA&FA:CMP#128:BCST:L
DA&9A8:CMP#190:BCCF:DEC&9A8:DEC&9A8:JMPF
:.T:LDA&9A8:CMP#240:BCSF:INC&9A8
  580 INC&9A8:.F:LDA&9A7:CMP#1:BNEU:LDA#
77:STA&9A7:.U:LDX&9A7:LDY&9A8:JSRB:JSRN:
RTS
  590 .E:STX&9A4:STY&9A5:LDA&A0B:STA&9A0
:LDA&A10:STA&9A1:LDA&A01:STA&9A2:LDA&A07
:STA&9A3:RTS:.N:LDX&9A4:LDY&9A5:LDA&9A0:
STA&A0B:LDA&9A1:STA&9A0:LDA&9A2:STA&A01:
LDA&9A3:STA&A07:RTS
  600 .V:LDA&9AA:CMP&9B4:BCCe:LDA&9B4:CL
C:ADC&9AF:CMP&9AA:BCSH:RTS:.e ADC&9B0:CM
P&9B4:BCSH:RTS:.H:LDA&9AB:CMP&9B5:BCCf:L
DA&9B5:CLC:ADC&9AF:CMP&9AB:RTS:.f ADC&9B
0:CMP&9B5:RTS:.D:CLC:JSRV:BCSi:RTS:.i:LD
A#1:STA&9AC:RTS
  610 .O:JSRE:LDA#8:STA&A01:LDA#4:STA&A0
7:JSRL:LDA&992:CMP#2:BEQP:CMP#0:BNEP:LDA
#1:STA&992:JMPQ:.P:LDX&990:LDY&991:JSRB
  620 LDA&9A4:CMP&990:BCSa:LDA#1:STA&992
:DEC&990:JMPW:.a:LDA#2:STA&992:INC&990:.
W:LDA&9A5:CMP&991:BCSb:DEC&991:DEC&991:J
MPX:.b:INC&991:INC&991:.X:.Q:JSRL:LDX&99
0:LDY&991:JSRB:JSRN:RTS:.L:LDA&992:CMP#2
:BEQc:LDA#&0:STA&A0B:LDA#&6A:STA&A10:RTS
  630 .c:LDA#&20:STA&A0B:LDA#&6A:STA&A10
:RTS:]:NEXT:M=&6C00:D=&6CEB:ENDPROC
  640 DEFPROCcolis(R%,S%,T%,U%):?&9AC=0:
?&9AA=X%:?&9AB=Y%:?&9AF=R%:?&9B0=8:?&9B1
=S%:?&9B2=24:?&9B4=T%:?&9B5=U%:CALLD:IF?
&9AC=1 dead=2
  650 ENDPROC
  660 DATA 2,0,1,2A,1,2B,1,1,3,0,2,1,1,1
7,3,3,2,17,2,1,6,0,2,2A,2,1,1,0,2,2,3,3,
2,2B,1,3,1,17,2,3,1,3F,2,3,7,0,2,15,1,17
,3,2,2,3,1,3F,1,17,2,3,2,17,1,2B,1,3,1,2
,2,0,1,5,2,0,2,2A,1,0,2,15,1,2A,1,2B,1,3
,2,B,5,7,1,3,2,0,1,1,1,2,1,3,1,1,1,5
  670 DATA 1,0,1,15,6,3F,1,1F,9,7,1,3,1,
1,1,3,2,1,2,0,7,3F,A,7,1,3,2,2,1,1,1,0,1
,A,2,0,2,2A,4,3F,1,2B,1,3,5,7,2,3,1,2,2,
3,1,2,1,B,1,1,B,0,5,2,4,0,1,A,3,0,1,A,2,
0,2,15,1,1,4,0,2,1,1,17,3,3,2,17,2,1,6,0
,2,15,1,1,1,0,3,2,3,3,2,2B,1,3,1,17,2,3
  680 DATA 1,3F,2,3,7,0,6,2,2,3,1,3F,1,1
7,2,3,2,17,1,2B,1,3,1,2,1,0,1,5,7,0,1,15
,1,2A,1,2B,1,3,2,B,5,7,1,3,2,0,1,1,2,2,1
,1,6,0,1,2A,1,15,2,3F,1,2F,1,3F,1,17,6,7
,1,3,1,1,1,2,1,3,1,1,1,A,6,0,5,3F,1,2F,1
,3F,5,7,1,3,1,2,1,3,1,1,1,A,8,0,2,2A
  690 DATA 2,3F,1,2F,3,7,2,3,2,2,1,3,1,2
,1,1,1,A,B,0,5,2,3,0,1,A,2,0,1,A,C,0,5,1
,3,0,1,5,2,0,1,5,9,0,2,15,2,3F,1,1F,3,B,
2,3,2,1,1,3,1,1,1,2,1,5,7,0,5,3F,1,1F,1,
3F,5,B,1,3,1,1,1,3,1,2,1,5,6,0,1,15,1,2A
,2,3F,1,1F,1,3F,1,2B,6,B,1,3,1,2,1,1
  700 DATA 1,3,1,2,1,5,5,0,1,2A,1,15,1,1
7,1,3,2,7,5,B,1,3,2,0,1,2,2,1,1,2,4,0,6,
1,2,3,1,3F,1,2B,2,3,2,2B,1,17,1,3,1,1,1,
0,1,A,3,0,2,2A,1,2,1,0,3,1,3,3,2,17,1,3,
1,2B,2,3,1,3F,2,3,6,0,2,2A,1,2,4,0,2,2,1
,2B,3,3,2,2B,2,2,F,0,5,1,4,0,1,5,3,0
  710 DATA 1,5,2,0,2,15,4,3F,1,17,1,3,5,
B,2,3,1,1,2,3,1,1,1,7,1,2,2,0,7,3F,A,B,1
,3,2,1,1,2,1,0,1,5,1,0,1,2A,6,3F,1,2F,9,
B,1,3,1,2,1,3,2,2,2,0,2,15,1,0,2,2A,1,15
,1,17,1,3,2,7,5,B,1,3,2,0,1,2,1,1,1,3,1,
2,1,A,3,0,2,2A,1,2B,3,1,2,3,1,3F,1,2B
  720 DATA 2,3,2,2B,1,17,1,3,1,1,2,0,1,A
,2,0,2,15,2,2,1,0,2,1,3,3,2,17,1,3,1,2B,
2,3,1,3F,2,3,7,0,1,15,1,17,1,2,3,0,2,2,1
,2B,3,3,2,2B,2,2,7,0,2,1,1,4,1,15,2,3F,1
,2A,1,C,2,9,2,2E,1,C,2,0,1,5,1,F,1,1F,1,
2F,1,1D,1,5,2,0,1,A,1,2F,1,1F,1,2F,1,1F
  730 DATA 1,2A,2,0,1,5,1,1F,1,2F,1,1F,1
,2F,1,15,2,0,1,A,1,F,1,2F,1,1F,1,2E,1,A,
2,0,1,C,2,6,2,1D,1,C,3,0,2,2,1,8,1,2A,2,
3F,1,15,1,0,2,41,A,C3,2,41,1,0,5,C3,1,87
,4,F,1,87,A,C3,1,4B,4,F,1,4B,5,C3,1,0,2,
```

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

MicroLink

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

Turn to Page 88 ▶

◀ From Page 87

```
82,A,C3,2,82,2,0,2,44,A,CC,2,44,1,0,20,C
C
  740 DATA 1,0,2,88,A,CC,2,88,2,0,1,40,2
,C0,1,40,2,0,1,55,3,FF,1,55,5,0,1,80,4,C
0,1,40,4,FF,1,AA,6,0,1,80,3,C0,1,3F,1,BF
,2,FF,1,AA,8,0,1,80,1,C0,4,3F,1,BF,1,0,1
,A,1,5,2,0,1,5,3,0,1,15,1,95,5,3F,2,15,1
,3,1,B,1,A,1,0,1,15,1,3F,3,2A,1,3F,2,2A
  750 DATA 3,3F,2,2,3,0,1,2A,1,3F,1,15,2
,17,2,3F,B,0,3,2A,C,0,1,11,1,33,2,F,1,5,
3,0,2,1B,3,F,3,0,2,27,3,F,3,0,4,F,4,0,2,
F,1,A,2,5,3,0,1,A,1,F,1,5,1,A,1,F,1,5,3,
0,2,F,1,0,2,F,3,0,2,F,1,0,3,F,2,0,2,F,1,
5,1,A,2,F,2,0,3,F,1,0,2,F,1,5,4,F,1,0
  760 DATA 1,A,1,0,4,A,44,0,1,A
  770 DATA A9,18,85,75,85,78,A9,8,85,74,
A9,C0,8D,26,A,A9,2A,8D,27,A,A2,0,A5,76,2
9,F8,85,70,A5,77,85,71,A5,76,29,7,A8,BD,
C0,2A,51,70,91,70,E8,F0,19,C8,E4,78,F0,1
A,C0,8,D0,ED,A5,70,69,DF,85,70,A5,71,69,
2,85,71,A0,0,F0,DD,EE,27,A,4C,2F,A,18
  780 DATA A5,76,69,8,85,76,90,2,E6,77,1
8,A5,78,65,75,85,78,C6,74,D0,B2,60,A9,30
,85,81,A9,0,85,82,98,49,FF,A8,29,7,85,80
,98,4A,4A,4A,A,A8,8A,A,26,82,A,26,82,A,2
6,82,65,80,79,1,9,85,76,A5,82,65,81,79,0
,9,85,77,60,20,65,A,20,0,A,60,20,65,A
  790 DATA A0,0,B1,76,85,8F,60,A9,0,85,7
0,A9,30,85,71,A0,0,A9,0,91,70,E6,70,D0,2
,E6,71,A5,71,C9,66,D0,F0,A5,70,C9,A0,D0,
EA,60,A
  800 DEFPROCI:CALLO:ENDPROC
  810 DEFPROCQ:COLOUR6:COLOUR129:PRINTTA
B(4,0);sc%:COLOUR128:ENDPROC
  820 DEFPROCS:sc%=sc%+TI%:PROCdelay(50)
:PROCQ:PROCdelay(50):ENDPROC
  830 DEFPROCT:CALLK:VDU30:PRINT'''':COLO
UR6:IFsc%>hi%PRINTSPC15;"Congratulations
!";SPC28;"You have set the new";SPC9;"Hi
score!";SPC33;:COLOUR3:PRINT"New Hiscore
 = ";:COLOUR6:hi%=sc%:PRINT;hi%:GOTO850
  840 IFsc%<=hi%PRINTSPC17;"The Hiscore
";SPC31;"still stands at ";:COLOUR3:PRIN
T;hi%
  850 PROCdelay(400):ENDPROC
  860 REM DOWNLOAD
  865 *TAPE
  870 *K.0 FORA%=0TO&2000STEP4:A%!&E00=A
%!PAGE:NEXT|MPA.=&E00|MO.|MDEL.860,880|M
DEL.10,40|MRUN|M
  880 *FX138,0,128
```

This listing is included in this month's tape & disc offer. See order form on Page 173.

Get it right!

```
 10 =    0 0   160 = 81E4 D   310 = ED0F B
 20 =    0 0   170 = E0ED 6   320 = 9DC0 6
 30 =    0 0   180 = 1994 C   330 =   CE 5
 40 = CBAF F   190 = AEBB D   340 = E8A1 8
 50 = BC2B 9   200 = 796C D   350 = 8A9B 3
 60 = 2AE5 8   210 = AD02 0   360 = 7913 7
 70 = 288D 1   220 = 11CC 9   370 =  7B0 9
 80 = 6723 0   230 = 69DA E   380 = D3B9 1
 90 = F53C 1   240 = 3466 B   390 = CF5C 8
100 = FDDE A   250 =  3D9 5   400 = E1FF 6
110 = 4638 8   260 = 6AE6 0   410 = 5322 7
120 = 3071 6   270 = EF37 9   420 = BE56 6
130 =  247 2   280 = 9106 3   430 =  855 E
140 = CE4C E   290 = 44E4 2   440 = ADCB 0
150 = 80D8 7   300 = 8A1E 4   450 = 991D E
```

```
460 = 746E B   610 = AEF4 1   760 =  11B 2
470 = 7510 6   620 = 95AC 1   770 = 3A6C C
480 = 8E05 F   630 = 9A3C 3   780 = 573D 0
490 = 3AE6 F   640 = 5BFD 7   790 = 6B2E 2
500 = 2498 2   650 = ED0F 4   800 = FE1F E
510 = ED0F 0   660 = 163B 3   810 = ADEF 5
520 = A787 D   670 = 2C88 9   820 = B31B D
530 = 672B A   680 = 9390 0   830 = A8B4 C
540 = B3CC E   690 = CBCF 0   840 =  1C3 A
550 = DE3C 5   700 = C240 7   850 = 3AE2 3
560 = A848 5   710 = FE3B 5   860 =    0 3
570 = 5746 6   720 = F40E 7   865 = CD93 3
580 = 5DA1 D   730 = 6B23 6   870 =  37F 3
590 = 4C86 D   740 = FCF5 C   880 = 5DEC C
600 = 34BE 6   750 = 426E 0
```

The truth about TELEX

How much does it cost to go on Telex?

You could go the conventional way and buy a dedicated Telex machine. The cheapest will cost you £1,604 (the Whisper), the dearest £2,892 (the Cheetah). You will also need a separate telephone line, costing £101 to install, plus £404 a year rental. That's a total outlay over the first year of a minimum of £2,109. (All prices include VAT.)

Or you could do what more and more BBC Micro users are doing – use your BBC Micro to double as a Telex machine. And just use your ordinary telephone!

How do I turn my BBC Micro into a Telex machine?

All you need is a modem and appropriate communications software (see the advertisements in this issue), a telephone, and a subscription to *MicroLink*.

Telex is just one of a growing number of services available to micro users on *MicroLink*. You can also read the news as it happens, go teleshopping, create your own closed user group, send telemessages and electronic mail right round the world, download free programs directly into your micro . . . and much more.

But why use Telex?

Because it's a standard means of instant communication between businesses. Today there are 150,000 Telex machines in use in Britain – and more than 2 million worldwide. It's used to dramatically speed up business communications – it's just as quick as using the phone but far more efficient, because you have a hard copy of every "conversation" for your records.

But there's a big bonus you get when you use *MicroLink* for Telex that the conventional way doesn't offer.

With *MicroLink* you don't HAVE to be in your office to send or receive Telex messages. You can just as easily use your computer at home (or even a portable). So now you can check whether there are any Telex messages waiting for you – anywhere, anytime. How's that for your business efficiency?

How to join: See Page 57

Shut out the outside world... and lose yourself in a totally new dimension!

NOW you can experience all the fun and excitement of your favourite games without disturbing the rest of the household

The SoundMaster consists of a cleverly designed interface and the very latest high-velocity lightweight headphones.

- The precision-engineered interface is encased in tough plastic with a graded volume control. It connects easily to your micro (leads included), and sits discreetly behind it while in use.
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MU1

TELETEXT ADAPTER

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

The answer is Teletext. Yes the same system everyone has seen incorporated into television sets, but with a difference. When Teletext is read by a computer you can actually use the data.

The MORLEY TELETEXT ADAPTER introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than ten years ago, will be fully compatible with any future advances in the Teletext system.

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

FEATURES:

* Advanced design uses the latest technology, will handle ANY future enhancements to the Teletext system e.g.: full field; 8 bit data transfer; 2k pages etc.

* Simply plugs into the user port.

* Low power consumption, less than 200ma. Optional power supply available.

* User friendly menu driven software including extended OSCLI and OSWord commands for access from BASIC programs.

* Supplied with 16k ATS (Advanced Teletext Software) and 16k support ROM software inc. printer dumps, page spoolers etc.

* FREE Telesoftware, no access charges (updated weekly).

* Save selected pages to disc/tape for later retrieval.

* Full access to all Teletext services and channels e.g.: CEEFAX, ORACLE, 4-TEL.

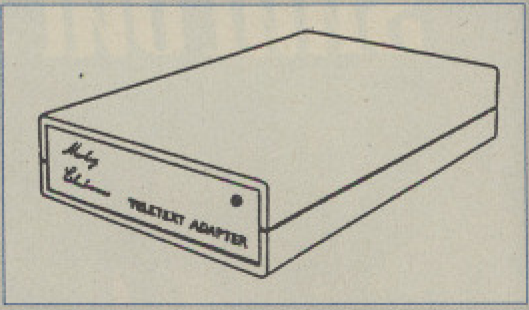
* Gives you a real-time clock at your disposal (*TIME).

* Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).

* Easy to follow comprehensive user guides.

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

* Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).



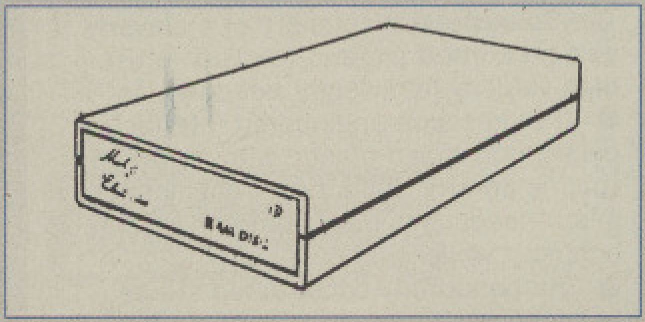
WHAT THE REVIEWERS SAID:

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

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

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

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



RAMDISC

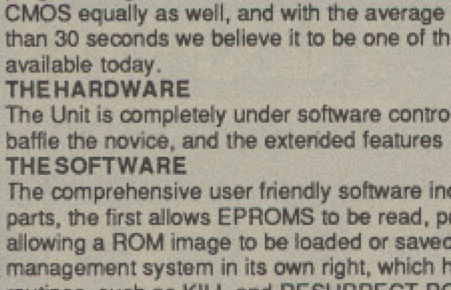
Now available! The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers. This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, and a comprehensive user guide.

FEATURES:

One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' *commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.

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

EPROM PROGRAMMER V2



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc.

This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.

THE HARDWARE

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

THE SOFTWARE

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

The whole system is available now for less than the price of one WORDWISE chip. So get yourself the all new MORLEY EPROM PROGRAMMER V2 today and start using those expansion boards for what they were made for! ROMS.

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MASTER CARTRIDGE

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

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

MASTER SMART CARTRIDGE

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

The **Smart** cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.

The **Smart** cartridge will prive useful to the novice, allowing him to do the simple things like dump any screen to printer, and make backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.

BUILT IN FEATURES (at the press of a button)

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

ALL CARTRIDGES COME WITH A 12 MONTH NO QUIBBLE WARRANTY

MORLEY MASTER BOARD 'AA'

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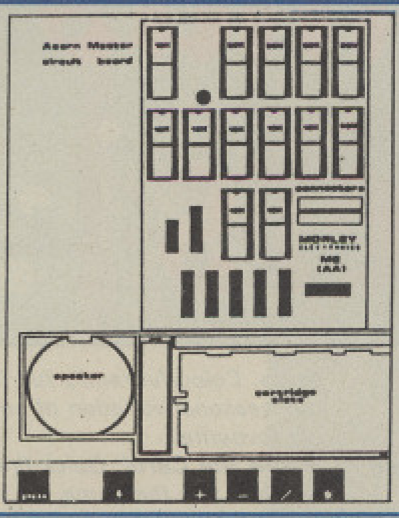
At long last the add-on all MASTER users have been waiting for, an internal ROM board.

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

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



A staggering 32 ROM images installed and accessible at any time

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

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

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

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

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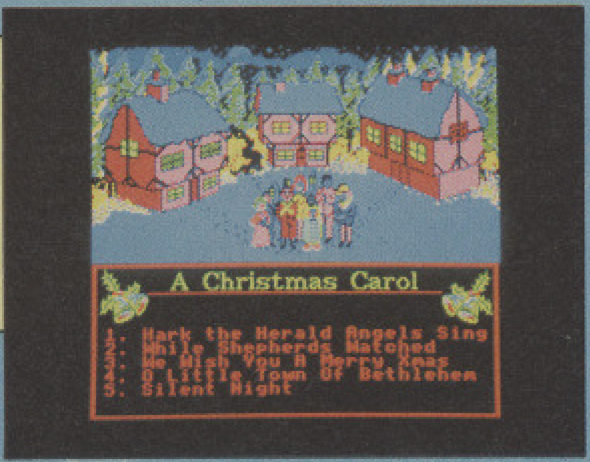

A Christmas Carol

1. Hark the Herald Angels Sing
2. While Shepherds Watched
3. We Wish You A Merry Xmas
4. O Little Town Of Bethlehem
5. Silent Night

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MU12

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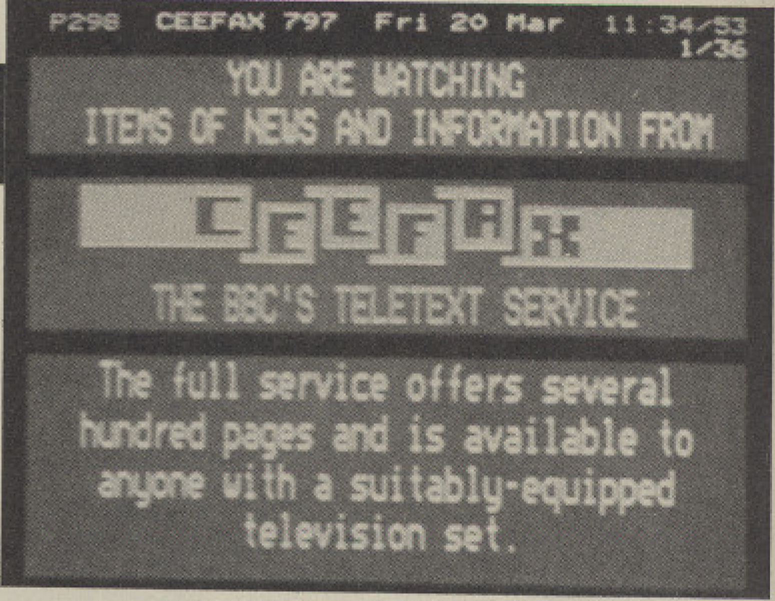

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December 4 to 10

T/SWR07
OSWord
OSWDemo
Trace
Part seven in the series explaining how to make use of sideways ram (SWR) in the BBC Micro discusses how to add extra osword calls. The demonstration software adds a new routine to your computer to perform the equivalent of a PRINT @ routine.

SD
DD
Two different Mode 7 screen dump routines giving a single density or a double density printout of the screen using an Epson-compatible printer. These routines are updated versions of a previous broadcast.

Procon
Pr/Info
A rom image, suitable for loading into sideways ram or blowing into an eprom. It offers a range of useful additional star commands:
*AMEND changes the load or execution addresses of any file held on disc.
*CONV converts between decimal, hexadecimal and binary numbers.
*DKEY displays the Ascii, hexadecimal or binary value of any key pressed.
*MSEED fills a specified section of memory with any given byte.
*RCOPY and *SCOPY give very versatile file copying facilities.

OSBITS
Part seven of the OSBITS series guiding you through the complexities of assembly language programming on the BBC Micro. This module gives details of the four bit-shifting instructions, and also discusses temporary storage of variables using both memory and the stack.

Software is currently transmitted for a period of one week. The teachers' notes for the TV series Issues *are transmitted from Wednesday to the following Tuesday and all other files are updated on Fridays. There will be periods during the update day when the files are unavailable. The program details given are provisional. To allow schools to make use of the OSBITS course, it will not be transmitted during the school holidays.*

Dune Hunter
Fast, scrolling-screen arcade action from the November 1987 issue of *The Micro User*.

Notes
Teachers' notes for a variety of BBC TV and radio educational programmes.

December 11 to 17

T/OSB08
B/OSB08
OSBITS part eight describes the logical operators AND, ORA, EOR and also BIT which is similar to AND. These instructions can be used to affect individual bits of a byte.

K–Print
KeyPrint
Print your own keystrips for the function keys. Once it has been defined, it can be printed out in any quantity, then saved to disc for future use. A range of prepared keystrip definitions are included with the program.

T/SWR08
Error
Continuing the study of sideways ram, module eight shows how roms and utilities deal with commands that are accompanied by out of range or unexpected parameters.

7Card
A computerised card game.

MOT
Refresh your discs with this utility – Mend and Overhaul Tracks – from the October 1987 issue of *The Micro User*.

December 18 to January 1 1988

A wide range of games and utilities herald the approach of Christmas and the New Year.

DT
Data1
Data2
Text
Title
Decode
Docum
Hint

Work off your Christmas dinner with this traditional adventure. It's based on role-playing fantasy games where you have to fight monsters, use magic, collect treasure, solve puzzles, stay alive as long as possible, and finally escape from the labyrinth. You move in a maze that is also inhabited by evil things such as monsters, thieves, rats and computers.

PSquare
Square2
After your adventure in the Demon's tomb, you may care to test your skill and powers of logic with this intriguing game.

DatBase
WWfkeys
This database program allows a collection of records to be created and processed in a variety of ways. The accompanying comprehensive text file not only describes the Basic program, but also provides a good introduction to database systems in general giving an insight into how they work.

T/SWR09
Peek
Part nine of the series designed to make more use of your sideways ram facilities continues its look at the arguments accompanying a star command, and how to interpret them.

Santa's Sleigh
Seasonal entertainment from the December 1986 issue of *The Micro User*.

ClkSet
SetClk
An invaluable utility to ensure the internal clock of a BBC Master computer is set correctly. The routine takes the current time of day from the Ceefax transmissions and automatically sets the Master's clock. Your computer will be able to see in the New Year with complete accuracy.

VidiEd
The ultimate in Mode 7 teletext screen designing system. This is the software used by Ceefax to create its entire magazine. Communications protocols are also offered for those with Acorn Prestel adapters and access to the Prestel computer on an Information Provider level.

Globe
A unique electronic Christmas card from BBC Telesoftware to wish you all a very merry Christmas and a happy New Year.

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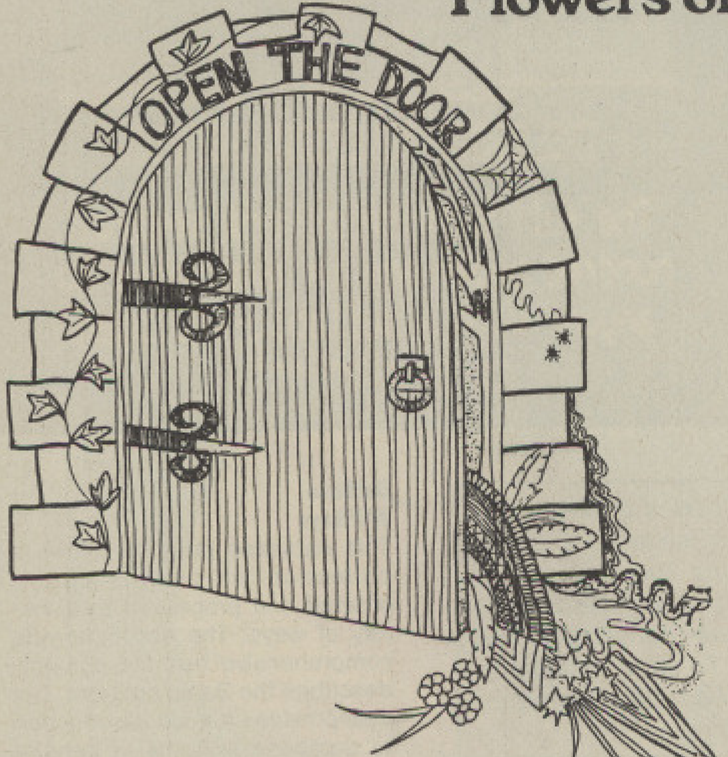

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AVENGENCE

Escape the ultimate safe in this superb logic puzzle by Mark Smiddy

ONCE upon a time, in a land far away, there lived a horrid little thief. No vault was safe from his grubby paws, no lock too secure.

Then one day he got a little too greedy, and was caught rifling the Queen's jewel box. When told, the King was, understandably, quite livid.

Next day, the King summoned the dark and mystical gnome Guilder to his side. They studied the vile creature for a while, then the King turning to his friend said softly: "What would you have me do with this halfwit?"

"Your majesty, for you I will design the stongest vault in the history of the land, construct it from finest steel and lock him in it!" the gnome screamed.

You feel a sudden tugging and are dragged away to the cells. Night falls and when you awake you find yourself confronted by a gigantic metal door with a small numeric keypad on it.

Rubbing your eyes wearily, you stagger to your feet then a huge voice bellows: "A full pardon and a reward if you can break out of this one, thief, but you won't!" The voice fades into echoing, gnomish laughter . . .

When the program is run the screen will be drawn and you will be presented with a menu. The Play option returns you to the game or begins play. View Moves displays the last few entries.

In Normal mode the status indicator displays the status of each tumbler directly, in Blitz mode the output is scrambled. The game has seven levels, zero the easiest and seven the hardest. The Quit option neatly exits the game.

While in menu mode, each option is selected by moving the blue bar with the cursor up/down keys. To confirm or alter the highlighted option press Return.

In play, the code is entered like this: Left n, right n, right n and so on, where n is a digit from 0 to 9, for example:

R1L2R4L2L2

MAIN VARIABLES

S%	Current level of play
bz%	Blitz or normal mode
V	Operating system version
M$	Scrolling message

MAIN PROCEDURES

mode1	Select Mode 1 without clearing the screen
showpad	Draw numeric keypad
view	Show all the moves
fi	Fill in multicolours
exam	Check the player's entry

Press C to cancel the last digit entered.

When the full 10 digits have been entered press Return. The tumbler status lights, located above the safe, indicate how close your guess was. Blue means correct code, correct place; red means right code, wrong place; and black means wrong code. The object of the game is to turn all the lights blue.

Note that when the View Moves option is selected from the menu, incorrect codes are displayed in white. This is an unfortunate limitation of the teletext display.

The options page can be selected at any time by pressing the Copy key. The screen will change between Mode 1 and Mode 7 without clearing the Mode 1 screen. This is performed by the procedure PROCmode1, used here for the first time in a magazine games listing.

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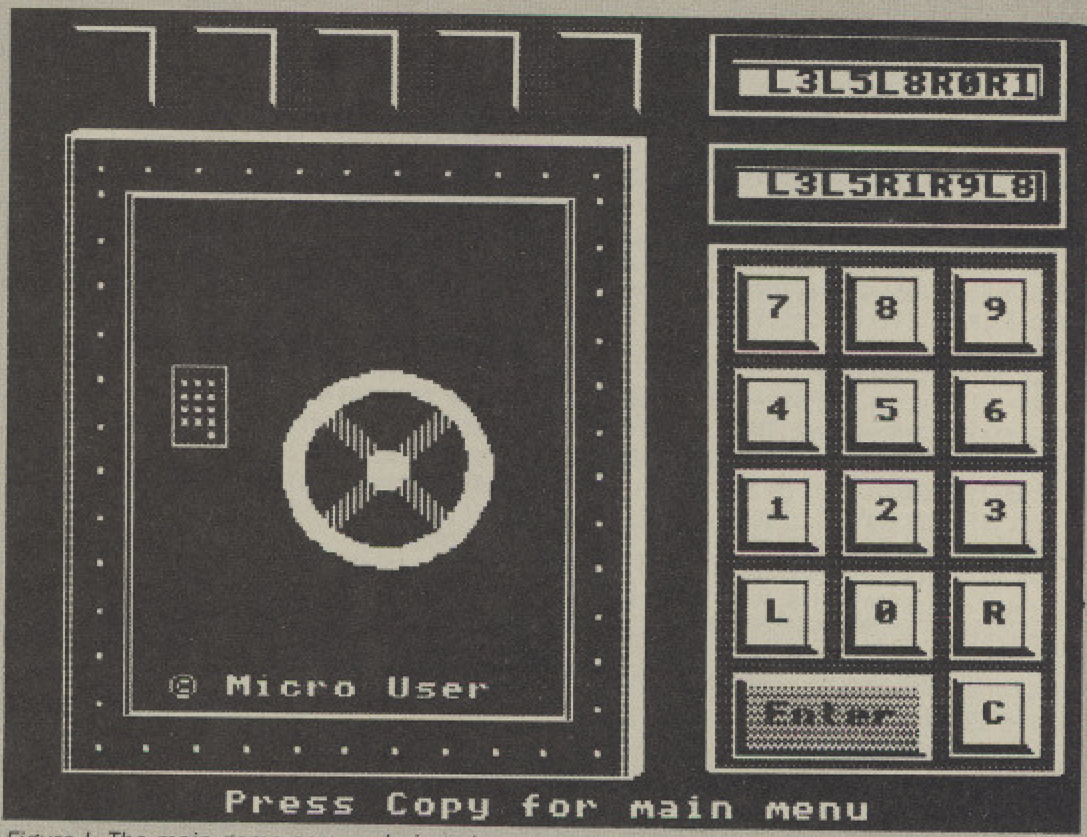

Figure I: The main game screen during play

```
   10 REM Avengence
   20 REM by Mark Smiddy
   30 REM (c) The Micro User
   40 PROCreloc(&1100)
   50 *FX200 1
   60 GOTO90
   70 *FX4,0
   80 REPORT:PRINT" IN LINE ";ERL:END
   90 ONERRORGOTO70
  100 *FX4,1
  110 HIMEM=&2FFF:GOSUB880:VDU19,2,4;0;2
3,224,60,66,157,161,161,157,66,60:ENVELO
PE1,1,0,0,0,0,0,0,126,-5,0,-1,126,20
  120 art%=7
  130 PROCinit:PROCsafe:PROCshowpad:PROC
display:PROCinit1
  140 PROCmu:PROCmode1
  150 REPEATG$=GET$
  160 IFG$=CHR$135PROCmu:PROCmode1
  170 IFi$<>""ANDG$=CHR$13ANDLENi$=10PRO
Cexam:PROCread:PRINTTAB(27,6)STRING$(11,
" ")TAB(27,2)STRING$(11," ")TAB(28,2);i$
:i$="":M%=M%-10:ELSEIFG$=CHR$13ANDLENi$<
>12ANDLENi$<>0PRINTTAB(27,2)STRING$(11,"
 ")TAB(28,2);"Error?":VDU7
  180 IF G$=CHR$13 ANDpy%=2PROChkd:PROCi
nit1:PROCmu:PROCmode1:COLOUR131:COLOUR0:
PRINTTAB(27,2)STRING$(11," "):PROCread:P
ROCinit1
  190 PROCpush(G$):UNTILpy%=0
  200 END
  210 DEFPROChkd:IFM%<0 M%=0
  220 VDU22,7:FORN%=0TO1:PRINTTAB(7,11+N
%)CHR$141;CHR$130;"You Win! The safe ope
ns!"TAB(7,14+N%)CHR$141;CHR$131;"It cont
ains:- £";M%*R%:NEXT:*fx15
  230 PRINTTAB(12,23)"Press any key.":G=
GET:ENDPROC
  240 DEFPROCinit:DIMt(6),cs(2):cs(0)=7:
cs(1)=1:cs(2)=4:R%=3:bz%=1
  250 DIMtb 153
  260 DEFPROCinit1
  270 py%=5:i%=0:S%=5:c$=STRING$(12,".")
:i$=c$:t$=i$:i$="":M%=1000:FORN%=0TO6:t(
N%)=0:NEXT:PROCsetcode
  280 ENDPROC
  290 DEFPROCread:N%=0:A%=0:FORX%=72TO68
2STEP144:PROCgx2(X%,1000,96,96,0,3):PROC
gx(X%+8,992,80,80,t(N%)):SOUND0,-10,6,1:
N%=N%+1:A%=A%+t(N%):NEXT:IFA%=8py%=2
  300 $(tb+i%)=i$:i%=i%+10:FORN%=0TO4
  310 ?(tb+i%+N%)=(144+cs(t(N%))):NEXT
  320 i%=i%+5:IFi%=135i%=0
  330 ENDPROC
  340 DEFPROCsafe
  350 FORN%=0TO16STEP4:PROCotl(64+N%,864
+N%DIV2,672,800,3):NEXT
  360 PROCfl(64,864,672,800,1,1):PROCgx(
128,800,546,672,0):PROCgx(138,792,532,65
6,2)
  370 PROCfl(64,1016,690,116,2,3):PROCre
ad
  380 PROCcrc(440,446,125,0):PROCcrc(448
,450,125,3):PROCcrc(452,458,89,0):PROCcr
c(446,446,94,2):PROCcrc(440,446,25,0):PR
OCcrc(448,450,25,3):PROCspk(448,450)
  390 FORX%=96TO694STEP59:PROCrv(X%,824)
:PROCrv(X%,96):NEXT:FORY%=96TO824STEP58:
PROCrv(96,Y%):PROCrv(688,Y%):NEXT
  400 PROCotl(138,792,532,656,3):PROCotl
(146,788,516,648,3):PROCotl(64,864,672,8
00,3):PROCotl(72,860,656,796,3)
  410 PROCgx(184,572,64,100,0):PROCfl(19
2,576,64,100,1,3):PROCotl(192,576,64,100
,3)
  420 GCOL0,3:FORX%=192TOX%+44STEP16:FOR
Y%=576TOY%-70STEP-16:MOVEX%,Y%:VDU5,ASC"
.",4:NEXT:NEXT:GCOL0,1:FORX%=192TOX%+20S
TEP4:MOVEX%,512:VDU5,ASC".",4:NEXT
  430 COLOUR3:COLOUR130:PRINTTAB(6,26);:
VDU224:PRINT" Micro User":ENDPROC
  440 DEFPROCshowpad:PROCfl(832,732,412,
660,1,3):PROCotl(828,736,420,660,3):PROC
keypad:ENDPROC
  450 DEFPROCdisplay
  460 PROCfl(832,860,420,96,2,2):PROCotl
(832,860,412,96,3):PROCotl(828,864,420,1
00,3):PROCotl(860,836,364,36,3):PROCgx(8
56,832,364,36,2)
  470 PROCfl(832,1000,420,96,2,2):PROCot
l(832,1000,412,96,3):PROCotl(828,1000,42
0,100,3):PROCotl(856,968,364,36,3):PROCg
x(852,964,364,36,2):ENDPROC
  480 DEFPROCkeypad
  490 PROCotl(832,732,412,660,3):PROCotl
(836,732,404,654,3):PROCreturn(864,192)
  500 RESTORE550:FORy%=10TO23STEP4:FORx%
=27TO35STEP4
  510 READnumber$:IFASC(number$)>47ANDAS
C(number$)<58tc%=2ELSEtc%=0
  520 PROCbu(x%*32,y%*32,number$)
  530 NEXT:NEXT:ENDPROC
  540 ENDPROC
  550 DATA L,0,R,1,2,3,4,5,6,7,8,9
  560 DEFPROCbu(X%,Y%,m$)
  570 PROCgx2(X%,Y%,96,96,0,3):PROCgx(X%
+8,Y%-8,72,80,3):VDU5:GCOL0,tc%:MOVEX%+3
2,Y%-32:PRINTm$:VDU4:PROCotl(X%+8,Y%-8,7
2,80,1):PROCotl(X%-4,Y%+4,104,104,3)
  580 ENDPROC
  590 DEFPROCpush(k$)
  600 RESTORE650:I%=25:REPEAT:READx%,y%,
m$:I%=I%+8:IFI%=65I%=69ELSEIFI%=93I%=89
  610 UNTILm$=k$ORm$="?":IFASC(m$)>47AND
ASC(m$)<58tc%=2ELSEtc%=0
  620 IFm$="?"ENDPROC:ELSEX%=x%*32:Y%=y%
*32:IFk$="C"i$=LEFT$(i$,LENi$-1):PRINTTA
B(27,6)STRING$(11," ")TAB(38-LENi$,6)i$:
k$=""
  630 IFLENi$<S%*2i$=i$+k$:COLOUR131:COL
OUR0:PRINTTAB(38-LENi$,6)i$
  640 SOUND1,1,I%,1:PROCgx(X%+8,Y%-8,72,
80,0):PROCbu(X%,Y%,m$):ENDPROC
  650 DATA 35,6,C,27,10,L,31,10,0,35,10,
R
  660 DATA 27,14,1,31,14,2,35,14,3
  670 DATA 27,18,4,31,18,5,35,18,6
  680 DATA 27,22,7,31,22,8,35,22,9,0,0,?
  690 DEFPROCreturn(X%,Y%)
  700 tc%=0:PROCbu(1120,196,"C"):PROCgx2
(X%,Y%,224,96,0,3):PROCfl(X%+12,Y%-8,200
,80,3,2):VDU5:GCOL0,0:MOVEX%+32,Y%-32:PR
INT"Enter":VDU4:PROCotl(X%-4,Y%+4,232,10
4,3)
  710 ENDPROC
  720 DEFPROCgx(X%,Y%,XL%,YL%,C%)
  730 GCOL0,C%:MOVEX%,Y%:MOVEX%,Y%-YL%:P
LOT85,X%+XL%,Y%-YL%:MOVEX%+XL%,Y%:PLOT85
,X%,Y%
  740 ENDPROC
  750 DEFPROCgx2(X%,Y%,XL%,YL%,C1%,C2%)
  760 GCOL0,C1%:MOVEX%,Y%:MOVEX%,Y%-YL%:
PLOT85,X%+XL%,Y%-YL%:MOVEX%+XL%,Y%:GCOL0
,C2%:PLOT85,X%,Y%
  770 ENDPROC
  780 DEFPROCotl(X%,Y%,XL%,YL%,C%):GCOL0
,C%:MOVEX%,Y%:DRAWX%+XL%,Y%:DRAWX%+XL%,Y
%-YL%:DRAWX%,Y%-YL%:DRAWX%,Y%:ENDPROC
```

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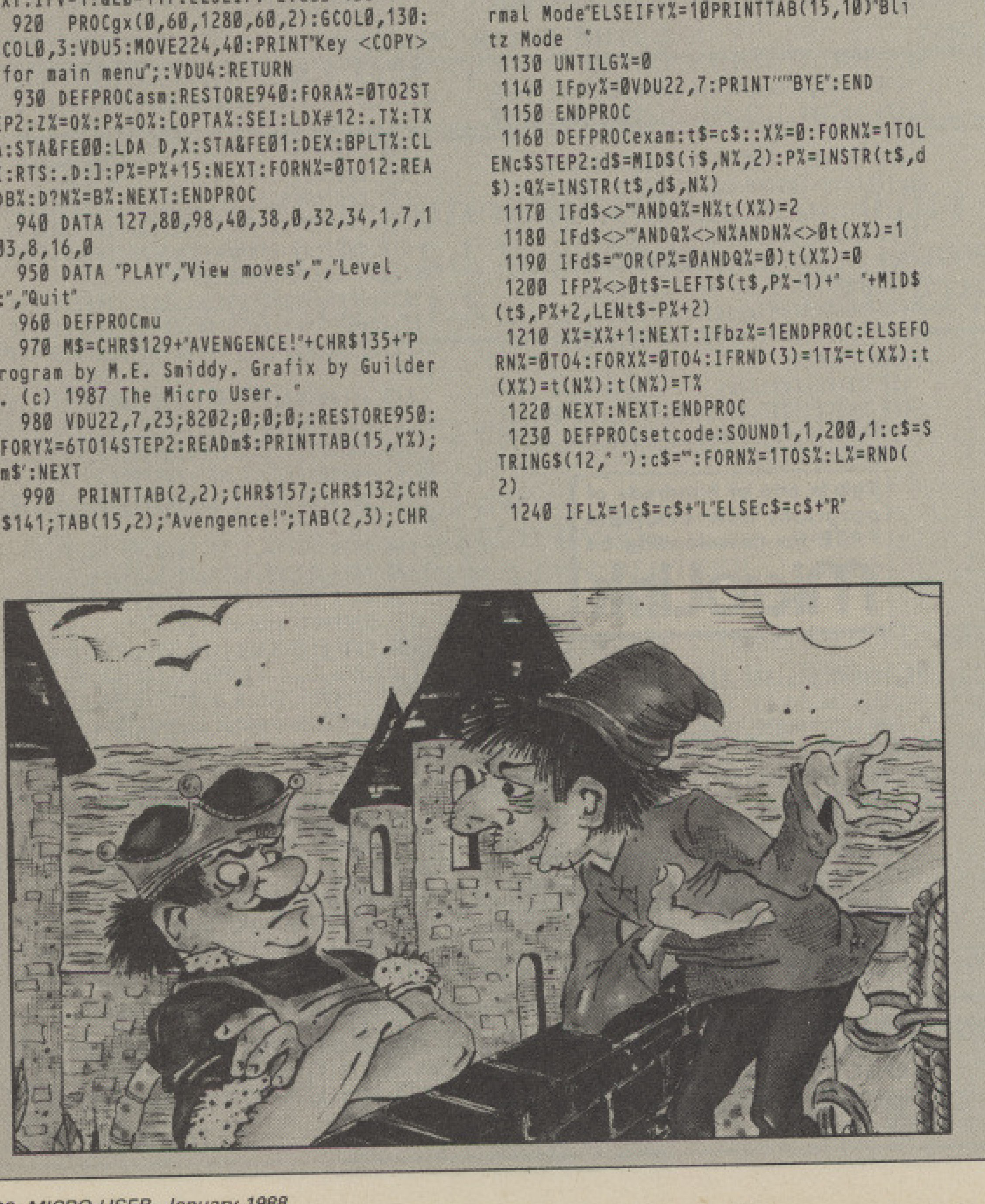
```
 790 DEFPROCfl(X%,Y%,XL%,YL%,C1%,C%):PR
OCgx(X%,Y%,XL%,YL%,C1%)
 800 LOCALy%:y%=Y%:REPEAT:y%=y%-4:F%=F%
EOR1:IFF%=1GCOL3,C%:GCOL3,128:MOVEX%,y%:
PLOT21,X%+XL%,y%:ELSEGCOL3,128+C%:GCOL3,
0:MOVEX%+art%,y%:PLOT23,X%+XL%,y%
 810 UNTILy%<=Y%-YL%:ENDPROC
 820 DEFPROCcrc(X%,Y%,R%,C%)
 830 F%=1:VDU29,X%;Y%;:i=0.1:MOVE0,0:N%
=0:GCOL0,C%:FORI=2.2*PITO0STEP-i:MOVE0,0
:PLOT85,R%*COS(I+i),R%*SIN(I+i):NEXT:VDU
29,0;0;:ENDPROC
 840 DEFPROCspk(X%,Y%)
 850 y%=Y%:GCOL1,3:C%=80:FORN%=-16TO16S
TEP4:Y%=y%+N%:MOVEX%+C%,Y%+C%:PLOT21,X%-
C%,Y%-C%:MOVEX%-C%,Y%+C%:PLOT21,X%+C%,Y%
-C%:NEXT:ENDPROC
 860 DEFPROCrv(X%,Y%):PROCgx(X%,Y%,8,8,
0):PROCgx(X%+8,Y%,4,4,3):ENDPROC
 870 DEFPROCmode1:FORN%=0TO3:VDU19,N%,0
;0;:NEXT:GOSUB900:VDU20,19,2,4;0;:ENDPRO
C
 880 DIMmode1%&80:A%=0:X%=1:V=(USR&FFF4
AND&FFFF)DIV256:MODE1:FORN%=0TO&7F:N%?mo
de1%=N%?&300:NEXT:VDU22,7
 890 DIMP%40:O%=P%:PROCasm
 900 CALLZ%:*FX154,216
 910 FORN%=0TO&7F:N%?&300=N%?(mode1%):N
EXT:IFV=1?&E0=117:ELSEIFV=2?&E0=108
 920  PROCgx(0,60,1280,60,2):GCOL0,130:
GCOL0,3:VDU5:MOVE224,40:PRINT"Key <COPY>
 for main menu";:VDU4:RETURN
 930 DEFPROCasm:RESTORE940:FORA%=0TO2ST
EP2:Z%=O%:P%=O%:[OPTA%:SEI:LDX#12:.T%:TX
A:STA&FE00:LDA D,X:STA&FE01:DEX:BPLT%:CL
I:RTS:.D:]:P%=P%+15:NEXT:FORN%=0TO12:REA
DB%:D?N%=B%:NEXT:ENDPROC
 940 DATA 127,80,98,40,38,0,32,34,1,7,1
03,8,16,0
 950 DATA "PLAY","View moves","","Level
:","Quit"
 960 DEFPROCmu
 970 M$=CHR$129+"AVENGENCE!"+CHR$135+"P
rogram by M.E. Smiddy. Grafix by Guilder
. (c) 1987 The Micro User. "
 980 VDU22,7,23;8202;0;0;0;:RESTORE950:
FORY%=6TO14STEP2:READm$:PRINTTAB(15,Y%);
m$':NEXT
 990  PRINTTAB(2,2);CHR$157;CHR$132;CHR
$141;TAB(15,2);"Avengence!";TAB(2,3);CHR
$157;CHR$132;CHR$141;TAB(15,3);"Avengenc
e!";:X%=0:Y%=6:PRINTTAB(1,Y%);CHR$132;CH
R$157;CHR$135;TAB(22,12);R%-3
 1000 IFbz%=1PRINTTAB(15,10)"Normal Mode
"ELSEPRINTTAB(15,10)"Blitz Mode  "
 1010 REPEAT:REPEAT:REPEATX%=X%+1:A$=MID
$(M$,X%,36):IFLENA$<36A$=A$+MID$(M$,1,36
-LENA$)
 1020 IFLEFT$(A$,1)="A"PRINTTAB(1,23);CH
R$129;:ELSEIFLEFT$(A$,1)="!"PRINTTAB(1,2
3);CHR$135;
 1030 PRINTTAB(3,23);A$;:G%=INKEY(7):UNT
ILX%=LENM$ORG%<>-1:IFX%=LENM$X%=0
 1040 IFG%=139ANDY%>6PRINTTAB(2,Y%);CHR$
128:Y%=Y%-2:PRINTTAB(1,Y%);CHR$132;CHR$1
57;CHR$135;
 1050 IFG%=138ANDY%<14PRINTTAB(2,Y%);CHR
$128:Y%=Y%+2:PRINTTAB(1,Y%);CHR$132;CHR$
157;CHR$135;
 1060 UNTILG%=13
 1070 IFY%=14py%=0:G%=0
 1080 IFY%=12 ANDpy%=5R%=R%+1:IFR%>9R%=3
:PROCsetcode:ELSEIFY%=12ANDpy%=5PROCsetc
ode
 1090  IFY%=12PRINTTAB(22,Y%);R%-3:ELSEI
FY%=6G%=0:py%=1
 1100 IFY%=8PROCview:G%=0
 1110 IFY%=10bz%=bz%EOR1
 1120  IFY%=10ANDbz%=1PRINTTAB(15,10)"No
rmal Mode"ELSEIFY%=10PRINTTAB(15,10)"Bli
tz Mode  "
 1130 UNTILG%=0
 1140 IFpy%=0VDU22,7:PRINT''"BYE":END
 1150 ENDPROC
 1160 DEFPROCexam:t$=c$::X%=0:FORN%=1TOL
ENc$STEP2:d$=MID$(i$,N%,2):P%=INSTR(t$,d
$):Q%=INSTR(t$,d$,N%)
 1170 IFd$<>""ANDQ%=N%t(X%)=2
 1180 IFd$<>""ANDQ%<>N%ANDN%<>0t(X%)=1
 1190 IFd$=""OR(P%=0ANDQ%=0)t(X%)=0
 1200 IFP%<>0t$=LEFT$(t$,P%-1)+"  "+MID$
(t$,P%+2,LENt$-P%+2)
 1210 X%=X%+1:NEXT:IFbz%=1ENDPROC:ELSEFO
RN%=0TO4:FORX%=0TO4:IFRND(3)=1T%=t(X%):t
(X%)=t(N%):t(N%)=T%
 1220 NEXT:NEXT:ENDPROC
 1230 DEFPROCsetcode:SOUND1,1,200,1:c$=S
TRING$(12," "):c$="":FORN%=1TOS%:L%=RND(
2)
 1240 IFL%=1c$=c$+"L"ELSEc$=c$+"R"
 1250 B%=RND(R%+1)-1:c$=c$+STR$(B%):NEXT
:FORN%=0TO152:tb?N%=32:NEXT:i%=0:ENDPROC
 1260 DEFPROCview
 1270 VDU28,0,23,39,5,12:N%=i%:REPEAT
 1280 FORU%=0TO1:PRINTCHR$141;CHR$132;CH
R$157;CHR$131;:FORI%=0TO9:IF(tb?(I%+N%))
<>13PRINT;CHR$(tb?(I%+N%));
 1290 NEXT:PRINT;CHR$130;CHR$157;:FORI%=
0TO4:PRINT;CHR$((tb?(I%+N%+10)));CHR$154
;CHR$255;CHR$255;:NEXT:PRINT:NEXT:*FX15
 1300 N%=N%+15:IFN%=135N%=0
 1310 UNTILN%=i%:VDU26:PRINT'TAB(15,24)"
Hit a key";:G=GET:ENDPROC
 1320 DEFPROCreloc(Q%)IFQ%>=PAGE ENDPROC
 1330 L%=TOP-PAGE-1:P%=PAGE:*FX138,0,128
 1340 FORS%=0TOL%STEP4:Q%!S%=P%!S%:NEXT
 1350 PAGE=Q%:*K.0OLD|MRUN|M
 1360 END
```



Get it right!

```
  10 =    0 0 | 470 = 71DD 2 | 920 = 1A85 E
  20 =    0 0 | 480 = F4F8 3 | 930 = B599 D
  30 =    0 0 | 490 = 934B 6 | 940 = 8410 4
  40 = FE6F F | 500 =  2C5 8 | 950 = CB33 F
  50 = 6ABE 1 | 510 = C83D 9 | 960 = 4FF3 8
  60 = 9438 F | 520 = C22E 5 | 970 = 87BE D
  70 = F3A2 3 | 530 = BB05 F | 980 = 7704 D
  80 = 13DD 6 | 540 = ED0F 3 | 990 = 8948 5
  90 = 6F6C 2 | 550 = C0B7 6 |1000 = 3D6B 0
 100 = E383 5 | 560 = 9A0A 3 |1010 = 216D 1
 110 = 44A1 5 | 570 = 658B F |1020 = A6F8 B
 120 = 9372 8 | 580 = ED0F F |1030 = F999 7
 130 = 5DD5 3 | 590 = 23B4 6 |1040 = 848A 7
 140 = 2B38 8 | 600 = E294 1 |1050 = A447 D
 150 = 4C6A 4 | 610 = FA03 F |1060 = 9528 8
 160 =  A3B F | 620 = 3F62 6 |1070 = 9C28 9
 170 = 9F24 A | 630 = 5D54 D |1080 = BF6A 8
 180 = FF5D D | 640 = DE9D E |1090 = 8F0A 8
 190 = 2669 D | 650 =  BC1 2 |1100 = 40AC 7
 200 = FD2E 7 | 660 = 70DD 8 |1110 = 6583 0
 210 =  1E3 8 | 670 = 9C30 2 |1120 = 483B 3
 220 = 4C42 A | 680 = 6F44 6 |1130 =  931 2
 230 = BA96 0 | 690 = 730E 8 |1140 = 23E6 2
 240 = 4BBF 2 | 700 = 884B D |1150 = ED0F D
 250 = 540F 9 | 710 = ED0F 5 |1160 = 1B08 2
 260 = 1CA5 A | 720 = 140E F |1170 = 55E4 E
 270 = 3B21 1 | 730 = 2A72 1 |1180 = F5C4 D
 280 = ED0F C | 740 = ED0F B |1190 = D3BE 3
 290 = 5E33 0 | 750 = 7090 7 |1200 = E566 1
 300 = 83BF C | 760 = 68B1 6 |1210 = 4480 B
 310 = 749B 8 | 770 = ED0F 6 |1220 = BB05 1
 320 = BEA6 7 | 780 = 645C 6 |1230 = 72D9 6
 330 = ED0F D | 790 = 695F 7 |1240 = 949E 4
 340 = 795F B | 800 = 82F3 D |1250 = 2FAB 1
 350 = 4B4E 9 | 810 = C805 7 |1260 =  B9B 0
 360 = 88CA 8 | 820 = 7272 7 |1270 = C999 7
 370 = 6EB3 8 | 830 = D538 E |1280 = 97E2 D
 380 = 939D 2 | 840 =  6A4 F |1290 = 9BFF 0
 390 = 7F1B 9 | 850 = FABB 5 |1300 =  6A7 5
 400 = 7542 A | 860 = 89A1 2 |1310 = 2284 E
 410 = 9E8A 1 | 870 = 109A 6 |1320 = 7D0D 3
 420 = A885 6 | 880 = 20EB C |1330 = 24B8 1
 430 =  274 6 | 890 = 9F9C 4 |1340 = 70C4 1
 440 = 1FA9 E | 900 = 27F0 3 |1350 = 24BE 6
 450 = C225 9 | 910 = 7803 4 |1360 = FD2E B
 460 = B6BE F |
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Inter-base Database	@ £58.00	£66.70c

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Philips 1010 TV/Monitor	@ £228.00	£262.20a
Philips 1210 Remote TV/Monitor	@ £250.00	£287.50a

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Archimedes-6 pin RGB	1.2mt	@ £7.60	£8.74c
Archimedes-7 pin Hitachi RGB	1.2mt	@ £8.00	£9.20c
Archimedes-7 pin Ferguson RGB	1.2mt	@ £8.00	£9.20c
Archimedes-Scart (Euro)	1.5mt	@ £10.00	£11.50c
Archimedes Serial to BBC RS423	1.2mt	@ £8.00	£9.20c
Archimedes Printer Lead (fully screened)	1.2mt	@ £14.00	£16.10c
Printer (BBC to Centronic)	1.5mt	@ £7.00	£8.05c
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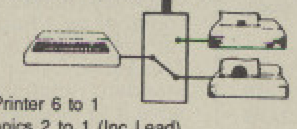
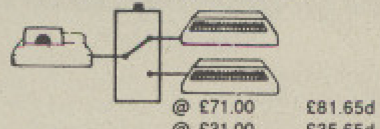


1 PRINTER INTO 2 MICROS



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BBC Printer 6 to 1	@ £71.00	£81.65d
Centronics 2 to 1 (Inc Lead)	@ £31.00	£35.65d
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User Port 2 way & Off Posn (Inc Lead)	@ £33.00	£37.95d
User Port 6 way & Off Posn (Inc Lead)	@ £72.00	£82.80d
RGB Switcher 2 to 1	@ £20.20	£23.23d
RS423 2 to 1	@ £20.20	£23.23d
MORLEY ELECTRONICS PRODUCTS:		
Teletext Adaptor ATS Software on ROM	@ £86.94	£99.98d
Eprom Programmer Software on ROM	@ £30.00	£34.50d
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Archimedes micro

A Computer for BUSINESS, RESEARCH, EDUCATION & HOME USE

The Acorn Archimedes range of microcomputer comprises of four machines – the 305 and 310 with 0.5 and 1 MB of RAM, and the 410 and 440, with 1 and 4 MB. All have 0.5 MB of ROM and one 3.5" floppy disc drive of 800K as standard. The 440 also has a Winchester drive of 20MB – all mounted internally.

They have separate keyboard and a three button mouse as standard. The Keyboard is compatible with the new IBM ATE layout, with 12 function keys.

The standard display is a high resolution mono colour monitor. A colour, multifrequency monitor is optional.

The screen modes include:

- 80 × 25 or 32 characters, in 2, 4 or 16 colours for wordprocessing, etc.
- 132 × 25 or 32 characters, for spreadsheets, etc.
- Up to 640 × 256 dots × 256 colours (with single frequency monitor) and up to 640 × 512 dots × 16 colours (with a multi frequency monitor), for graphics, etc.

The sound system can have upto eight channels playing at once, from up to 32 instruments or voices, using waveform synthesis and stereo output.

The outlets for the monitor, printer, serial port and audio are all at the rear, and have industry standard connectors.

The 410 and 440 have a backplane for four expansion podules and the circuitry for a Winchester disc drive as standard.

The complete operating system – including Window Manager and Desktop – is in 0.5 MB of ROM. It can access directly all the RAM that can be fitted (upto 4 MB).

The Advanced Disc Filing System uses robust, pocket-sized 3.5" discs with a new 800K format, but also reads, writes and formats the 640K discs used by the Master series. As well as 25⅔ more capacity, the new format allows almost four times the data transfer rate.

A batter-backed clock-calender, and CMOS RAM to hold configuration setting is standard.

Expansion is via internal plug-in boards (podules), which connect with the backplane.

ARCHIMEDES PRICES

305 Series	
● Entry System	£699
● with Green Monitor	£749
● with Colour Monitor	£899
310 Series	
● Entry System	£775
● with Green Monitor	£825
● with Colour Monitor	£975
310M Series	
● Entry System	£835
● with Green Monitor	£885
● with Colour Monitor	£1035
410 Series	
● Entry System	£1399
● with Green Monitor	£1449
● with Colour Monitor	£1599
440 Series	
● Entry System	£2299
● with Green Monitor	£2349
● with Colour Monitor	£2499

● 0.5 Mb RAM for 305	£85
● Podule Backplane	£37
● ROM Podule	£37
● Archimedes Ref Manual	£20
● ARM Assem. Lang Prog Manual	£12

(Securicor carr. £7 on Micros)

Podules expected this year (from Acorn unless stated) include:

● 2nd 800K floppy disc drive (for 305, 310 & 410)	£125
● Econet Network Board	£43
● Backplane for 2 podules, with fan (305, 310)	£499
● I/O Podule (with User port, Analogue port & 1MHz bus)	£79
● MIDI add-on to I/O Podule	£29
● ROM Podule (takes five 8 bit ROMs, of 16, 32, 64 or 128K)	TBA
● Modem Podule (Beebug)	TBA
● Real time Video Digitiser (Watford)	TBA
● Sound Sampler (Armadillo)	£78
● Speech Podule (Tubelink)	TBA

Due in the 2nd quarter 1988

PC Podule, with 10 MHz 80186, 640K and floppy disc interface, (for all models). This should run about 3.5 times as fast as an IBM-PC. Fully IBM compatible.

XMAS OFFER

With every Archimedes Micro purchased from us, we are giving away absolutely **FREE** a 5¼", double sided disc drive with PSU, (1 Megabyte unformatted), plus the special Archimedes interface cable, worth **£125**.
(P.S. This offer does not apply with 0% finance scheme mentioned below).

0% (APR) FINANCE

For a limited period, Watford Electronics are able to offer the Archimedes range of microcomputers at 0% (APR) finance. Credit facility available for up to 12 months, subject to status. Please inquire for further details. (Watford Electronics are Licenced Credit Brokers)

What Archimedes does and can do

The software on the welcome disc includes four applications.

"PAINT" is a simple mouse driven art package, operating in the 640 × 250 × 16 colour screen mode. Images can be produced without any programming and saved to disc for use elsewhere.

The sprite editor allows sprites to be created pixel by pixel in the 640 × 256 × 16 and 256 colour screen modes. It can also be used to edit pictures from "Paint". The results can be used in Basic programs for animated graphics.

The Font Designer allows you to design individual letters and symbols – and save them together as a font". They may be "anti-aliased", for even better appearance on screen.

The Music Editor allows you to enter music in standard notations, with upto four "parts", and save it to disc. It may be played via the internal speaker (in mono) or via external headphones or hi-fi (in stereo). The voices or instruments (or which there are nine as standard), and their volume, tempo and stereo position may all be varied while playing.

BBC Basic 5

This is upwards compatible with earlier versions, so most programs written in them will run – though far faster. Even using a 305, upto 370K is available in Basic. It also affords access to all the new graphics, windowing and sound facilities – as shown by the applications on the welcome disc. As well as being in the system ROM, BBC Basic 5 is provided on Disc for loading into RAM because it then runs about 40% faster. This speed makes it the FASTEST MICRO IN THE WORLD".

WORDPROCESSORS

Wordwise +	£29
Interword ROM	£39
Image-Writer	£26
View	£52

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System's Database	£26
Alphabase	£43
Viewstore	£52

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Intersheet ROM	£39
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Interchart ROM	£25
System's GammaPlot	£30

INTEGRATED PACKAGES

Logistix – Database, Spreadsheet time management & Business Graphics	£99

ACCOUNTS PACKAGES

Medow Computers' suite of 4 Modules Minerva's suite of 5 Modules	P.O.A.

ART & DESIGN

Artisan	£34

GAMES

Zarch	£77

EDUCATION

A great many packages are expected in early 1988. The topics include: Business Studies, Maths, General Science, Biology, Physics, Chemistry, Economics, Geography, History & Music.

PC EMULATION

The Acorn PC Emulator (for 310, 410 & 440), includes MS-DOS 3.21 and is available NOW at £99. It runs most MSDOS and many PC-DOS applications (which number over 10,000). Compared with IBM PC, this all-software emulator can calculate about half as fast, and write to the screen about a quarter as fast. This makes it more suitable for running spreadsheets (such as Lotus 1-2-3) than wordprocessors (such as Wordstar). However it includes utilities for copying disc files between DOS and ADFS formats, so that data may be transferred to and from Archimedes applications. The 3.5" discs used by the new IBM PS/2 models, and by many DOS portables, may be read, written and formatted directly. 5.25" discs require an additional, external drive, which is available as an option. The PC Podule (due second quarter '88), will run very much faster.

LANGUAGES

Acornsoft ANSI "C", ISO-Pascal, Fortran 77, Cambridge LISP and PROLOG X are all available now at £97 each, as is the Twin Editor, at £29. These require at least a 310. The ANSI "C" affords access to all the graphics, windowing and sound facilities of the Archimedes and execute at exceptional speed – 14 to 26 times that of a PC, 5 to 10 times that of an AT, and as fast as most 386 machines.
(For demonstration, call in at our retail shop. If you require technical literature, then simply telephone us).

Archimedes to BBC SERIAL LINK

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with two disks, one 5.25" for the BBC, the other 3.5" format for the Archimedes, and the necessary cable to connect the two computers. Using this package it is possible to transfer any data from the BBC to Archimedes at upto 19200 baud.
By far the easiest way to transfer data to your new computer.

Only £25

Archimedes 5¼"/3½" Disc drive Interface

With this interface it is possible to connect almost any 5¼"/3½" disc drive with its own power supply to the Archimedes. Upto FOUR drives can be connected and NO SOLDERING is involved. Supplied complete with necessary lead.

Only £25

Note: This is not simply a lead. Attempting to connect an external disc drive by direct connection may result in damage to your Archimedes.

BBC MASTER

BBC MASTER 128K Micro incl. Acorn's: View, Viewsheet, ADFS, BASIC Editor & TERMULATOR **£379**

SPECIAL OFFER

FREE . . . £105 worth of Hardware & Software

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control and ***Watford's*** *3½", double sided 1 Megabyte (unformated) single disc drive complete with cables, ready to connect to the micro – with every BBC Master purchased from us this month.*

BBC MASTER with Turbo Board + above SPECIAL OFFER	**£475**
512K Processor Add on Board "inc. Mouse and GEM package"	**£185**
BBC AIV (Domesday) System	**£4479**

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	**£95**
Econet Module for the Master	**£40**
Twin ROM Cartridge for Master	**£7.50**
Quad ROM Cartridge for Master	**£12**
Universal Processor Adaptor	**£75**
Reference Manual I	(No VAT) **£14**
Reference Manual II	(No VAT) **£14**
Advance Ref. Manual	(No VAT)**£19**
64K Upgrade Kit for B+	**£32**
Acorn 1770 DFS Kit complete	**£41**
ECONET Upgrade Kit for BBC	**£42**
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Z80 Acorn 2nd Processor package	**£325**
ARIES' Professional IEEE Interface	**£238**
Acorn IEEE Interface Complete	**£265**
Morley Teletext Adaptor with ATS Rom	**£99**

BBC MASTER COMPACT

All Master Compact Microcomputers are supplied complete with an integral 3½" Disc Drive and various educational and professional bundled software.

System 1	Standard Package	**£310**
System 1A	System 1 + TV Modulator	**£322**
System 2	System 1 + Green Hires Monitor	**£364**
System 3	System 1 + Medium Res Colour Monitor	**£478**
RS232 Kit for BBC Compact		**£25**
Additional 3½" Drive for BBC Compact		**£90**

(Securicor carriage £7)

The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, 1770 Disc Upgrade and Acorn ADFS. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

£259

CO-PRO Adaptor

CO PRO ADAPTOR

Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.
Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.
With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.
To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.
Master owners may use Co-Pro to add a second Co-processor externally.
Watford, brings power to your BBC at only:

£35.00 (carr £5)

MEGABUFFER 256

CLEAR
PAUSE/COPY
STATUS EMPTY FULL
256K PRINTER BUFFER

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £125 (carr. £3)

65C102 2nd PROCESSOR

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B.

£135

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 BBC connecting leads FREE.**

MICROVITEC 14"

● 1431 – Medium resolution as used on the BBC television computer programme	£175
● 1451 – High resolution, suitable for word processing in mode 0	£225
● 1441 – High res, exceeds the capabilities of the BBC micro	£359
● 1431AP RGB + PAL and AUDIO	£199
● 1451AP RGB + PAL and AUDIO	£255
● **2030 CS 20" Med Res**	£380
● **204 CS 20" Hi Res**	£675
● Dust Cover for Microvitecs	£5.50
● Touchtec 501 Touch Screen	£239

XMAS OFFER

This month, we are giving away absolutely FREE, our 14" Swivel Base unit, with every 14" Microvitec Monitor purchased from us.

KAGA-TAXAN 12"

● TAXAN KX117 Hi-res Green Monitor	£75
● TAXAN KX118 Long persistence Hi-Res Green Monitor	£80
● TAXAN KX119 Ultra-Hi-Res Amber Monitor	£85
● TAXAN Super Vision 2 **Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing	£269
● **TAXAN Super 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue	£319

STAR BUY

- **PHILIPS 14** Hi-Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono connectors. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

ONLY £209

SWIVEL BASES FOR MONITORS

Please see Page 4 of advert

ZENITH

"Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Systems.)

Green (New Design) Hi-res	£69
Amber (New Design) Hi-res	£74

LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for KAGA	£3

N.B. carriage on Monitors **£7** (securicor)

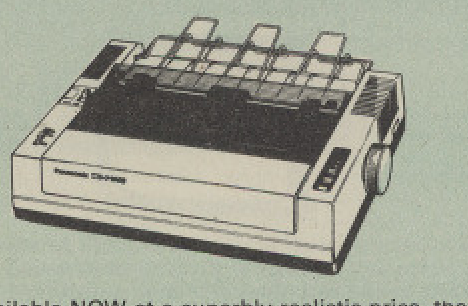
Continued →

Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users.

£12

Panasonic KX-P1081



Available NOW at a superbly realistic price, the KX-P1081 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy **120 cps** of clear Draft text backs up the crisp 24 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX compatible control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters and IBM special characters as well as IBM block graphics characters. A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£149** (carr. £6)

Panasonic KX-P1082

To complement the hugely popular Panasonic KX-P1081, Watford Electronics are proud to announce the launch of Panasonic KX-P1082. This superb letter quality printer has all the features of the KX-P1081, plus a draft speed of 160 cps, making it ideal for high through-put users. This is a similar speed to the Epson EX800, but has an adjustable tractor feed built in and all the incredible facilities of the KX1081, such as variable sized NLQ between 5 and 17 cpi. KX-P1082 represents truly outstanding value at only £175, way below the price of its nearest competition. The price includes the FREE Cable & Dump Out 3 AAROM.

Introductory Offer: **£175** (carr. £6)

Panasonic KX-P3131 Daisy-Wheel Printer

This low-cost high-performance Daisy Wheel printer is ideal for anyone wishing to produce clear, immaculate letters or reports. It delivers, flawless text at 10, 12 & 15 CPS. Supports proportional spacing. Is Bi-directional. logic seeking. Printing speed: 17CPS. Has 6k printer Buffer. A printer of similar spec could cost a lot more than our ridiculously low price of:

Only **£239** (carr. £7)

Single Sheet Feeder	**£175**
Tractor Feed	**£90**
Spare Ribbon	**£3.00**

VARIOUS PRINTERS & ACCESSORIES

● Brother HR15 RS232 Daisy Wheel	**£275**
● Brother HR20 Daisy Wheel	**£349**
● Epson EX800 Printer	**£399**
● Epson EX1000 Printer	**£545**
● Epson FX800 Printer	**£295**
● Epson FX1000 Printer	**£405**
● Epson LQ800 Printer	**£390**
● Epson LQ1000 Printer	**£529**
● Epson LQ2500 Printer	**£790**
● Epson LX800 Printer	**£180**
● Epson SQ2500 Printer	**£899**
● Epson Paper Roll Holder	**£17**
● EX800/1000 Colour Option	**£55**
● EX800/1000 Colour Ribbon	**£18**
● EX800 Cut Sheet Feeder	**£130**
● EX1000 Cut Sheet Feeder	£195
● FX/LQ/LX800 Single Sheet Feeder	**£135**
● FX/LQ1000 Single Sheet Feeder	**£169**
● Hi-80 Refills – Set of 4 Pens	**£7**
● LX800 Cut Sheet Feeder	**£75**
● LQ800 Tractor Feed	**£44**
● LQ1000 Tractor Feed	**£50**
● LQ2500 Cut Sheet Feeder	**£195**
● LX1000 Cut Sheet Feeder	**£305**
● **Hitachi 672 Colour Plotter**	**£495**

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	**£27**	RS232 + 2K Buffer	**£55**
IEEE 488	**£65**	RS232 + 8K Buffer	**£75**

KAGA/TAXAN PRINTERS

(IBM/Epson compatibles)

Kaga KP815 Printer	**£269** (carr £7)
Kaga KP915 Printer	**£350** (carr £7)
RS232 Interface	**£49**
RS232 Interface with 2K Buffer	**£69**
RS232 Interface with 16K Buffer	**£89**

PRINTER LEADS

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

Standard length (4 feet long)	**£6**
Extra long (6 feet long)	**£8**
Compact's Special Centronics Lead	**£9**
RS232 Cable	**P.O.A.**
IBM Parallel 1 metre Cable	**£9**

PRINTER SHARERS

(Ideal for School environment)

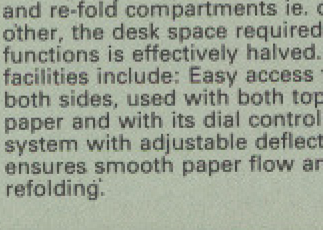
Connects	Serial	Centronics
2 BBC Micros to 1 Printer	£26	£25
3 BBC Micros to 1 Printer	£36	£35
6 BBC Micros to 1 Printer	–	£99

PRINTER CHANGER

3 Printers to 1 Micro (Centronics) **£65**

(Cables extra, specify type required when ordering)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

£26

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

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

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

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

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

£5.95 (No VAT)

SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

2764-250nS £3.00
27128-250nS £3.50

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

6264LP (8K) £2.50
2 × 6264LP (16K) £4.80

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Brother HR15/20	£3.00	£5.00
EX/LQ800	£7.50	£4.50
EX/LQ1000	£8.00	£5.00
FX80/85/800/MX80	£4.00	£4.95
FX100/1000	£7.00	–
Kage/Texan KP810/815	£5.25	£4.00
LQ2500	£9.00	£5.50
LX80/86/800	£4.00	£4.50
M1009/GLP	£4.00	£3.00
Panasonic KX1080/81	£4.50	£4.75
SQ2500	£25.00	£5.50
Star NL10	£4.00	£4.50
Microvitec Metal	–	£5.50

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

Listing Paper (Perforated)

1,000 Sheets 9½" × 11" Fanfold Paper	**£7**
2,000 Sheets 9½" × 11" Fanfold Paper	**£12**
1,000 Sheets 15" × 11" Fanfold Paper	**£9**
1000 Sheets true A4 Fanfold Paper	**£11**
2000 Sheets true A4 Fanfold Paper	**£20**
Teleprinter Roll (Econo paper)	**£4**

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

PRINTER LABELS

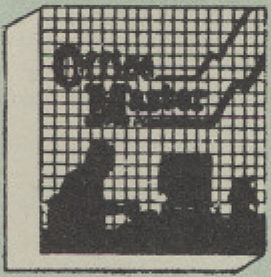
(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	**£5.00**
1,000 90 × 36mm (Twin Row)	**£4.90**
1,000 90 × 49mm (Twin Row)	**£7.50**
1,000 102 × 36mm (Twin Row)	**£6.25**

Carriage on 1,000 Labels £1.00

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

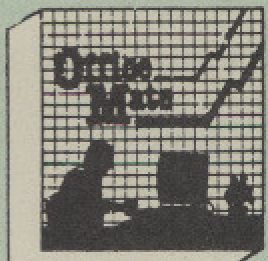
EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

All prices in this advert include VAT

SWIVEL BASES

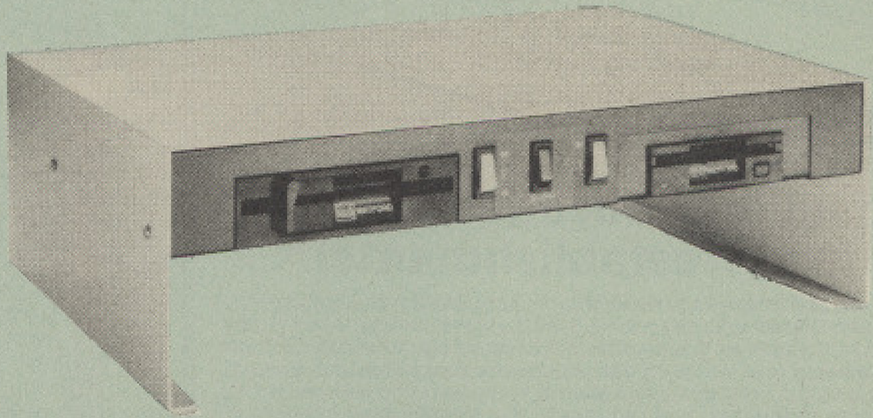
for Video Monitors

By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress. Front adjustable without lifting the monitor. (See drawing on left).

for 12" Monitors **£10** (carr. £2.50)
for 14" Monitors **£14** (carr. £2.50)

NEW LAUNCH OFFERS

Type DP35-800S



In response to customer demand, Watford Electronics have released this new combined 3½" & 5¼", twin, double sided 800K, Disc Drive unit. The drives are mounted in a sturdy BBC Master Plinth unit, attractively finished in BBC beige. They are powered from an in-built power supply unit. The 5¼" Drive is 40/80 track switchable. With this unit, users can transfer data between different BBC machines very easily. Supplied complete with Cables and a utilities disc.

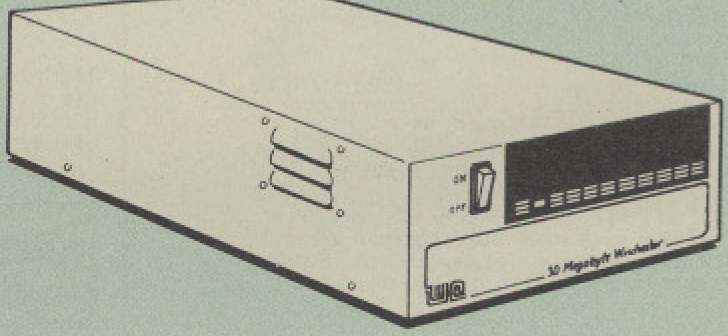
Launch Offer: **£165** (Securicor carr. £7)

CSPM 400/S DISC DRIVE

A single (1 Megabyte unformatted), double sided, 40/80 track switchable 5¼" disc drive mounted in a BBC Master Plinth (same as DP35-800S) but with a blanking plate to add a second disc drive at a later date. The in-built Power Supply is capable of running two disc drives. The unit is supplied complete with cables and a utilities disc.

Launch Offer: **£139** (carr. £7)

30Megabyte Winchester Drive



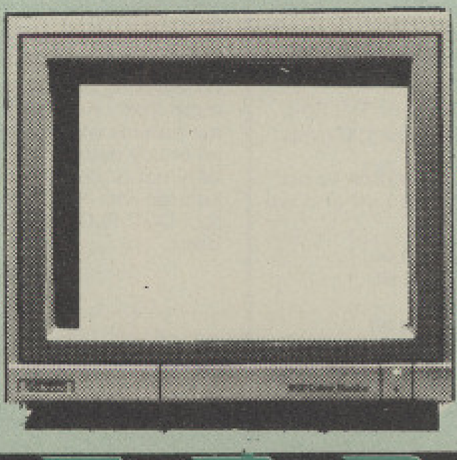
Watford Electronics 30Megabyte Winchester Drive

This completely new Hard Disk Drive, designed using the latest technology, is offered at a previously unthinkable price for such a high capacity drive. Just compare the price with our competitors' 20 or 28Mbyte Hard Disks.

Attractively finished in BBC beige the drive is supplied complete with Acorn ADFS ROM, a full user guide and format, copy and high density 1000K per disk archive utilities.

Special Launch/Xmas Offer **£449.00** (Carr. £12)

Phillips 12" PAPER WHITE Monitor Type BM7542

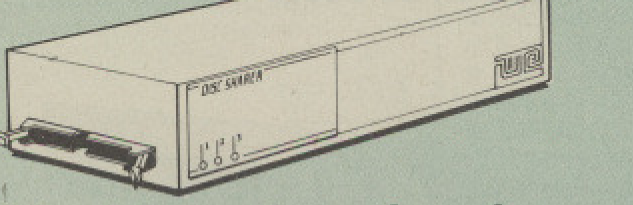


This attractively finished high resolution Phillips monitor, incorporates an anti-glare screen and tilt stand, making it ideal for both word processing and graphics. The paper white display is especially suitable for desktop publishing and CAD packages. It also has a Video/Audio input.

Only: **£75** (carr. £7)

NEW

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not compatible with ADFS.)

Launch Price: **£59** Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for five years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)***

Complete Disc Interface Kit including DFS ROM and fitting instructions	**£46**
Acorn's 0.90 DFS Kit complete	**£45**
DFS Manual (Comprehensive) (no VAT)	**£6.95**
(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).	
Watford's sophisticated DFS ROM only	**£16**
We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only	**£12**
DNFS ROM only	**£17**
ADFS ROM only	**£25**

- *Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.*

NEW WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our MkII DDFS board has been adapted to allow the use of Acorn ADFS.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

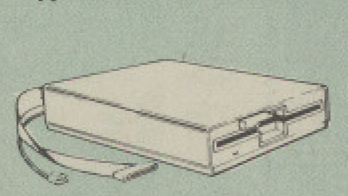
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£25.00.**

Special introductory offer	**£39.00**
DDFS Manual (No VAT)	**£6.95**
We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

SPECIAL DISC DRIVE/DDFS OFFER

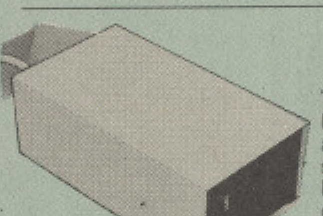
Type CLS400



- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)

3½" DISC DRIVE OFFER



These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

Single 400K Drive	**£69**
Twin 800K Drives	**£126**

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

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

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

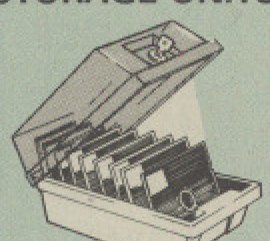
FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

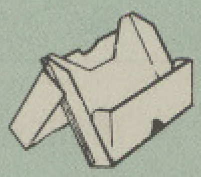
£7

ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



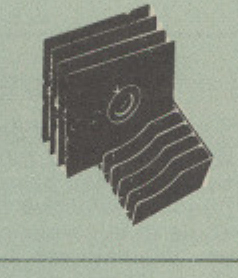
M35 - holds upto 50 5¼" discs	**£6.00**
M85 – holds upto 95 5¼" discs	**£8.00**
M25 – holds upto 25 3 ½" Discs	**£5.50**
M50 – holds 50 3½" Discs	**£7.50**



PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK



When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.

Protection at Only: **£2**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

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

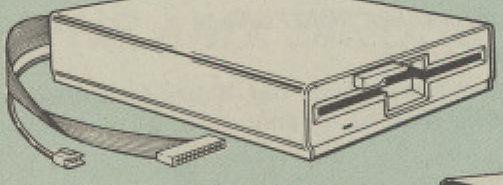
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

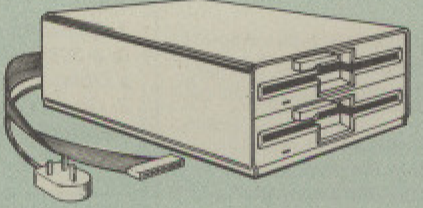
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 6th page of our advert for the Plinths).

P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.





Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £98	
400K (720K)	CLS400S £89	CLD 400 £168	CS 400S £99	CD400 £188
800K (1.44M)		CLD 800S £169		CD 800S £188

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

*Prefix **C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

*Suffix **S** = 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

● *10 × 5¼" S/S D/D 40 Track Diskettes*	***£8.25***
● *10 × 5¼" D/S D/D 40 Track Diskettes*	***£10.20***
● *10 × 5¼" S/S D/D 80 Track Diskettes*	***£12.75***
● *10 × 5¼" D/S D/D 80 Track Diskettes*	***£13***
● *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT*	***£28***
● *10 × 3½" S/S D/D 40/80 track Discs*	***£15***
● *10 × 3½" D/S D/D 40/80 track Discs*	***£19.50***

TOP QUALITY 3½" & 5¼" DISKETTES

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

DON'T SETTLE FOR LESS, BUY THE BEST

● *10 × **M3** 3½" D/S D/D 80 Track Discs*	***£18***
● *10 × **M4** 5¼" S/S D/D 40 Track Discs*	***£6.50***
● *10 × **M5** 5¼" D/S D/D 40 Track Discs*	***£8***
● *10 × **M7** 5¼" D/S D/D 80 Track Discs*	***£9***
● *3" Double Sided Discs*	***£3 each***

Special BULK OFFER on 5¼" DISCS

PRICES SLASHED

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48

ACORN WINCHESTER DRIVES

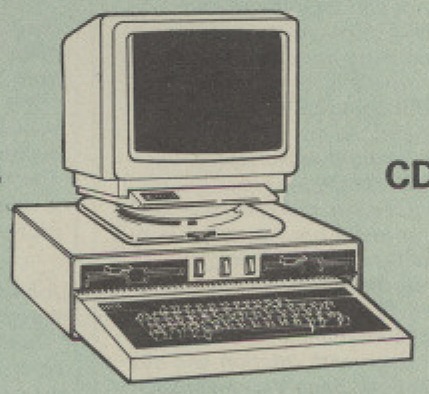
FILESTORE E01	£825
FILESTORE E20	£705
Acorn 30MB Unit incl. Level III Software	£1520

WATFORD's WINCHESTER DRIVES

PRICES SLASHED

● 10 Megabyte Unit with ADFS	**£399**
● 20 Megabyte Unit with ADFS	**£499**
● 30 Megabyte Unit with ADFS	**£449**
● 40 Megabyte Unit with ADFS	**£749**

CDP800S **CDPM800S**



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

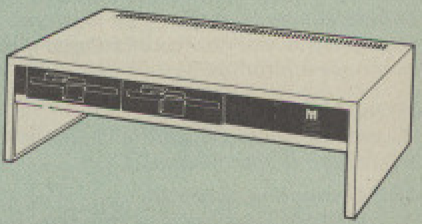
CDP 800S for BBC Micro £198
CDPM 800S for Master £199
(Securicor Carr. £7)
(The above drive units are 2 Megabytes unformatted)

ACORN'S Twin 800K Disc Drives

Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.

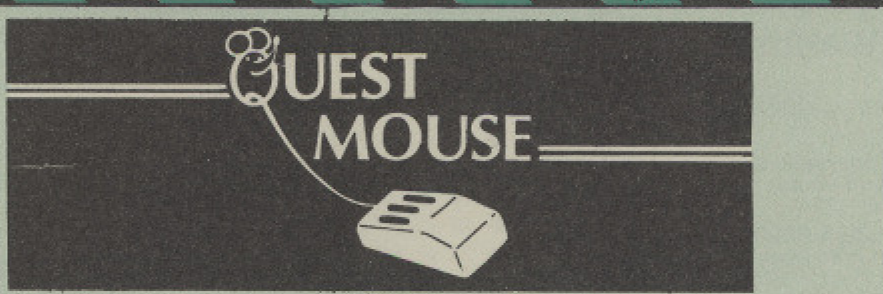
RRP £350

Our Price: Only £189
(carr £7)



Continued

NOMINATED FOR
MICRO
BRITISH COMPUTING AWARDS
1987



QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and is smooth and easy to use on most work surfaces. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package

With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87
"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."
"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87
"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87
". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package. . ." ". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."
"Quest Paint is a major leap forward in BBC programming. . ."
"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87
"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest . . ."
". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".
"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".
"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".
"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".
"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".
"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."
"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".
"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program".
The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:
"Quest has been an excellent piece of equipment, far superior to the AMX mouse that we have been using for the past 12 months. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".

Beeblet User Group, New Zealand Oct '87:
"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".

"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing".

"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required".

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

QUEST MOUSE & QUEST PAINT	**£59**
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT	**£85**
QUEST MOUSE ONLY	**£29**
QUEST PAINT SOFTWARE	**£32**
QUEST FONT DISC	**£12**
ConQuest 32K ROM Package	**£29**
QUEST MAT	**£3**
Part-exchange your old Mouse for a New QUEST MOUSE for only	**£23**

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

MARK II LIGHT PEN + PENPAL 2

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.
With every lightpen, we supply our sophisticated Penpal 2, lightpen software (Disc) FREE.

Price Only £19

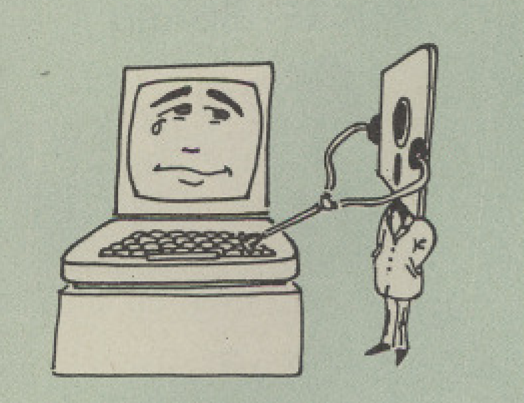
RB2 Marconi Tracker Ball

RB2 (AMX/Quest compatible)	£59
RB2 including Quest Paint	£85

FLEET STREET EDITOR

Software pack for BBC Micro	£31
Software pack for the Master	£39
Software Pack for Compact	£40
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

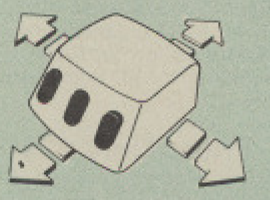
DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

THE AMX MOUSE



ONLY: £59 **Inc. Super Art package**
(carr £1.50)
(Please specify for BBC or Master Computer)

FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

AMX MAT	£3
AMX MOUSE ONLY	£29
AMX DESK Package	£19.00
AMX UTILITY Package	£11.00
AMX SUPERART Package	£39
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	£32

We are giving away absolutely FREE, our PAGE-GONTS disc with every purchase of STOP PRESS from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£9.50
AMX DESIGN (ROM)	£59
AMX 3D ZICON Disc	£19
AMX Database Disc	£19
AMX Stop Press	£39
AMX XAM Educational	£15
AMX MAX A gem of desktop	£15

TED

THE ULTIMATE TELETEXT SYSTEM

TED is one of a new generation of powerful 32K ROMs for the BBC B, B+ and Master computers and is compatible with disc, tape and network systems. It is in everyday use in schools, colleges and universities, Programmers, Prestel I.P.'s, Micronetters and exhibitors have also found it indispensable.

TED includes the most comprehensive teletext (Mode 7) screen editor ever written for the BBC micro, combining flexibility with ease of use. Its sophisticated facilities include line, column and block copying within AND between frames; text, in a variety of styles and sizes, entered directly from the keyboard; graphics and line drawing modes; search and replace; margins; printer dump routines and a library of in-built icons and typefaces. TED will edit ANY mode 7 screen and can even convert high-res graphics screens to mode 7! Included within the ROM is a fully Epson compatable mode 7 graphics dump routine giving a grey scale printout of exactly what appears on the screen.

Using '*SHOW' (a versatile carousel), collections of mode 7 screens may be 'routed' or displayed sequencially, making it ideal for creating and running 'Viewdata' information systems. Over 1200 frames may bestored on a twin 80 track drive. A unique feture of TED is '*SCROLL', which lets you create pages of up to 600 lines which may be viewed 'Wordwise style', automatically or manually. SHOWs and SCROLLs may be freely mixed and even used from within a BASIC program.

The package comprises a 32K ROM, a 117 page manual, a function-key strip and a demonstration disc containing examples of real-time animation and a sample 55-frame database. A stand-alone machine code routine is provided allowing SHOWs and SCROLLs to be displayed on machines not fitted with TED.

Price: £35

ROM-SPELL

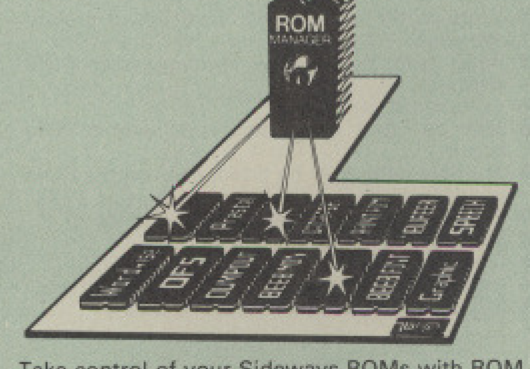
ENGLISH DICTIONARY
ROMSPELL

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

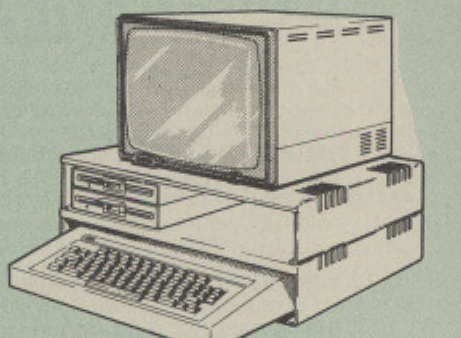
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

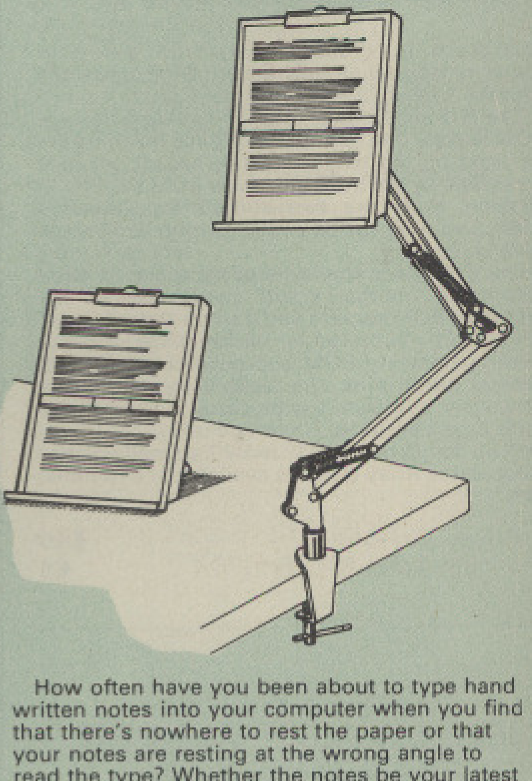
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £3.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£24** (carr £3.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only
Desk Top **£10** (carr. £2)

Angle poise **£14** (carr. £3)

Continued →

ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets

Price: **£80** (carr. £2(

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:	
Aries B-12	£40
Aries B-12C	£5

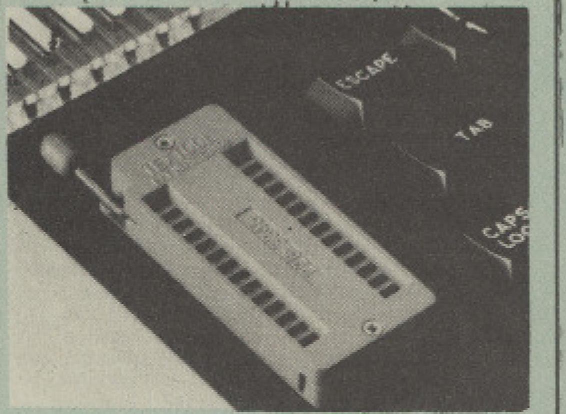
ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

● Complete System	£11
● Spare Cartridges	£2.50
● Spare Rack	£1.50

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

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

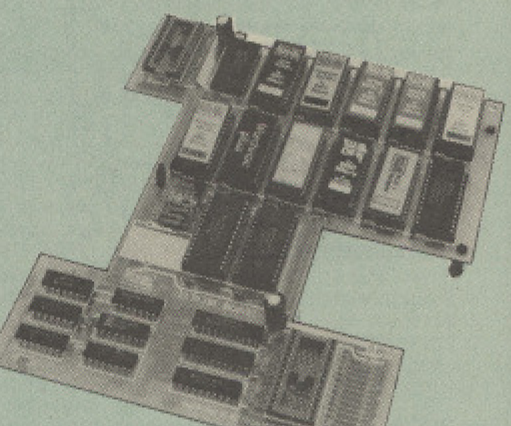
Only: **£24** (carr £2)

Optional extras

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

All prices in this advert are exclusive of VAT.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery baskup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

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

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

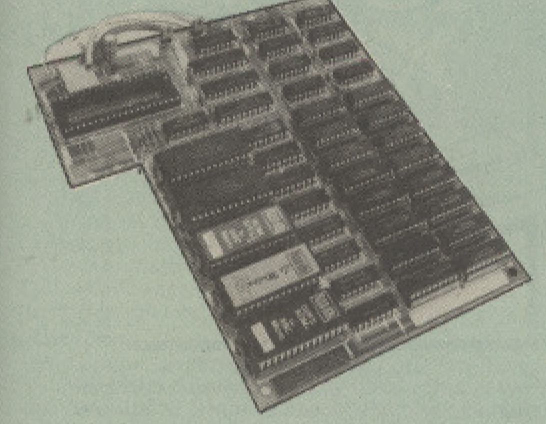
USER PORT SPLITTER UNIT

User Port Splitter
A
B

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£19**

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- *ROM/RAM card with 32k dynamic RAM*......***£39***
- ROM/RAM card with 64k dynamic RAM......***£52***
- ROM/RAM card with a massive 128k dynamic RAM......***£80***

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- *16k plug-in Static RAM kit*......***£6***
- *16k Dynamic RAM for Upgrade*......***£7.50***
- *Battery backup*......***£3***
- *Read and Write protect switches*......***£2*** *each*

Complete ROM-RAM board
All options installed......***£89***

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £10 less

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

SPECIAL OFFER

Price: ***£84***
(carr £3)

(Price includes, Le Modem, Software ROM Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£82

(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

Nightingale Modem without software	**Only £75**
COMMSTAR ROM package only	**£29**

(P&P on modem £3.00)

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**
- **£6.50 off annual Membership to Micronet, Prestel and Telecom Gold.**

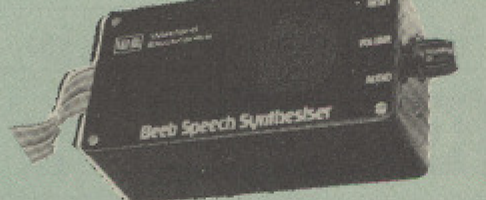
The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£84** **(Carr £3)**
(Write in for full specification)

Minerva Systems Software

System Delta with Card Index	**£55**
System Programmers Ref. Guide	**£19**
System Gamma	**£43**
System Gamma Prog, Ref, Guide	**£19**
System Mailshot	**£17**
System Reporter	**£17**
System Intrer/View Link	**£17**
System Sales Ledger	**£39**
System Purchase Ledger	**£39**
System Nominal Ledger	**£48**
System Stock Management	**£39**
Order Processing/Invoicing	**£39**

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
DISC DOCTOR	£28
Graphics ROM	£23
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£24

Wordwise £24

Wordwise plus

£40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC:	**£5**
SPELL MASTER	**£45**

Inter SHEET ONLY £37

INTER CHART ONLY: £26

Inter-WORD

Only: **£39**

INTERBASE £55

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	**£35**
VIEW 3.0 ROM	**£48**
VIEW PROFESSIONAL	**£79**
HI-VIEW (for use with 6502 2nd Processor)	**£36**
VIEW Printer Driver Generator Please specify Disc or Cassette)	**£9**
VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£22**
VIEW-INDEX	**£12**
OVERVIEW Packs 1 & 2 for the Master	**£75**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

Micros in Business (Disc)

An introduction to Business software for the BBC Micro from Acorn **£43**

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	£29
Adv 1770 DFS for Mast/Compact	£29
Adv 1770 DFS for BBC/BBC+	£29
Adv Disc Investigator	£24
Adv. Control Panel	£29
Adv. Rom Manager	£13

MINI OFFICE II

Disc Version	£14.50
ROM Version	£48.00

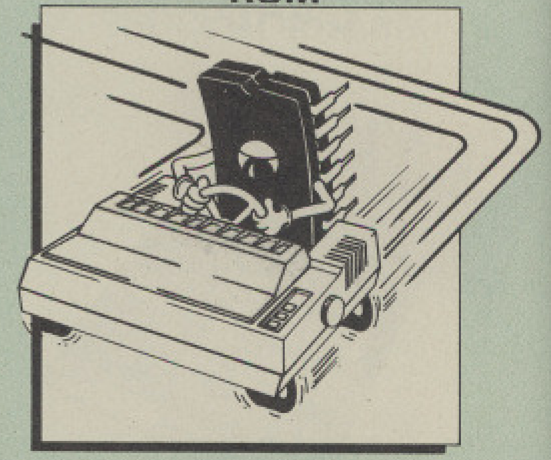
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

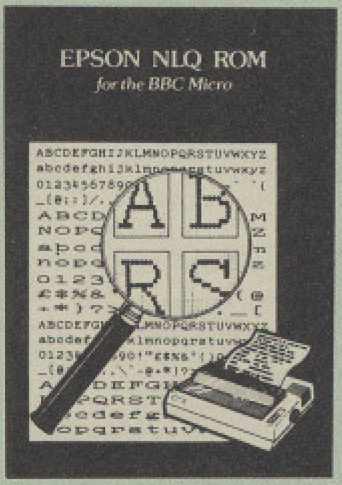
The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33



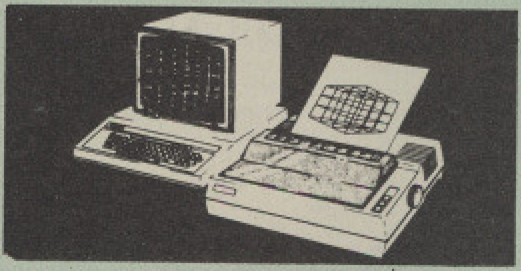
Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM £7

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- *Vertical and horizontal scaling in all graphics modes and mode 7*
- *Rotation of image by 90, 180 or 270 degrees*
- *Left hand margin setting*
- *Screen dump window setting*
- *Colours appear as grey scale*
- *Two tone fast dump*
- *Colour mask*
- *Mode 7 contrast expansion*
- *Mode 7 contiguous dump*
- *Key triggered and User Port triggered dumps*

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1080, Mannesman Tally and compatibles.

Only: £25

(Write in for further details on all above ROMS)

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24.**

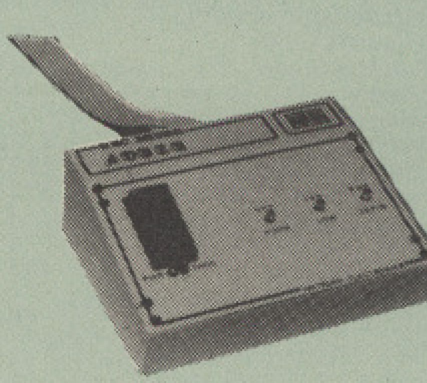
THE NLQ DESIGNER

(The First & still the Best)
Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.
Supplied with disc containing over 25 example fonts. Please specify 40 or 80 track. Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

- *NLQ Designer ROM & FONT Disc* ***£25***

ADDER



Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£75 (£3 Carr)

TEX EPROM ERASERS

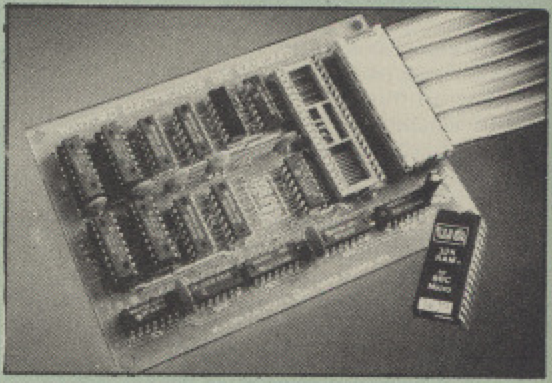
EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16chips. **£28**(carr£2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30**(carr£2)
- Spare UV tubes. **£9**

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only**£89** (carr £2)

Continued ⟶

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£4.95
15 Hr Wordprocessing BBC/WW & WW+	£4.95
30 Hour BASIC (BBC Micro)	£9.25
40 Best machine Code Routines	£7.95
50 Programs in BBC BASIC	£6.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development Package	£7.50
6502 Reference Guide	£10.95
68000 Assembly Lang. Programming	£19.95
68000 Machine Code Programming	£13.00
68000 Microprocessor Handbook	£14.95
68000 Programming the	£22.95
68000 User Guide	£8.95
6809, Programming the	£16.95
6809 Machine Code Programming	£7.95
8086/8088 Assembly Language Prog.	£11.95
8086/8088 Programming the	£16.95
Advanced Disc User Guide	£16.95
Advanced Programming Guide to BBC	£9.95
Advanced Sideways RAM User Guide	£10.95
Advanced User Guide for BBC	£10.95
Advanced FORTH	£9.95
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£11.50
Adventure into BBC BASIC	£6.95
Applied Assembly Lang. for BBC	£9.95
ARM Assem, Lang, Programming	£12.95
Art of Microcomputer Graphics	£14.95
Assembly Language Programming FOR the BBC Micro	£9.50
Basic ROM User Guide	£11.95
BBC B Compendium	£5.95
BBC BASIC for Beginners	£7.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Micro & the small Business	£5.75
BBC Micro Advance Programming	£8.95
BBC Micro Basic Sound & Graphics	£7.95
BBC Micro Programming Tips	£8.95
BBC Micro ROM Book	£10.95
BBC Master 128 for High Flyer	£10.95
BBC Micro Disc Companion	£8.95
BBC Software Projects	£6.95
BCPL User Guide	£14
BCPL The Language & its Compiler	£7.95
C for Beginners	£10.95
C for Programmers	£9.95
Complete FORTH	£6.95
Computer Graphics & CAD fundamentals	£9.95
CP-M - 86 User's Guide	£19.95
CP-M Bible	£16.50
CP-M Handbook with MPM	£9.95
CP-M Plus Handbook	£13.95
CP-M Soul of	£16.50
CP-M The software BUS	£8.95
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
DBASE Programming Language	£14.95
Disc Programming Techniques	£9.95
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File Handling on BBC Micro	£7.50
FORTH on the BBC Micro	£7.50
Functional Forth for the BBC Micro	£5.95
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Graphics for Children	£6.95
Hackers Handbook - New	£6.95
Inside Information (Computers, Interfacing & Control o/t BBC Micro	£9.95
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Introduction to LOGO	£6.95
Introducing 'C'	£9.95
Introducing LOGO	£5.95
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Introduction to PASCAL	£17.95
ISO-PASCAL Reference Manual	£9.95
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LISP, A Beginners Guide to	£10.95
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LISP the Language of Artificial Intelligence	£9.95
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Logo Programming	£10.95
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Structured Basic	£7.95
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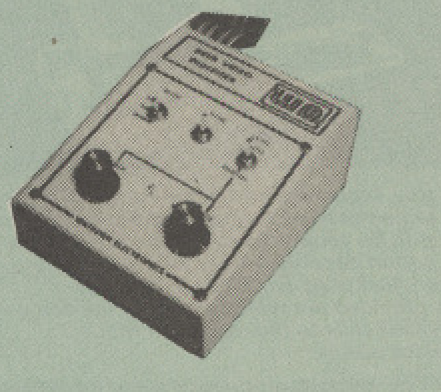
Toolbox 2	£10.95
Towers Int. Transistors Selectors	£12.95
Turtle Graphics on BBC Micro	£7.50
Understanding Interword – A Beginners Guide	£6.50
View 3.0 User Guide	£10
View Guide	£4.50
Mastering View, Viewsheet & Viewstore	£12.95
VIEW Dabhand Guide	£12.95
VIEW incl. ViewSpell & ViewIndex	£12.95
Viewsheet User Guide	£10
Viewstore User Guide	£10
Within the BBC Micro	£13.95
Writing Interactive Interpreters & Compilers	£8.45
Wordprocessing BBC Beginners Guide	£7.95
Wordstar & CP/M made easy	£9.95
Wordwise + A User Guide	£9.95
Z80 Applications	£15.95
Z80 Assembly Language Programming	£19.95
Z80 Reference Guide	£9.95

BBC SOFTWARE'S
Popular Educational Software

● Maths with a Story 1 (Cassette). 4 primary level maths programs	**£9.95**
● Maths with a Story 2 (Cassette) 4 further maths programs	**£9.95**
● Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs	**£19.95**
● WAVES: Science Topics (Disc) CSC O Level Physics program.	**£14.95**
● RELATIONSHIP: Science (Disc) O Level Biology program.	**£14.95**
● BONDING: Science (Disc) O Level Chemistry program.	**£14.95**
● ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program.	**£14.95**
● ELECTRONICS IN ACTION (Disc) O Level program	**£14.95**
● NEWTON & THE SPACE SHUTTLE (Disc) O Level program.	**£20**
● ECOLOGY (Disc) O Level program.	**£20**
● POLYMERS (Disc) O Level program.	**£20**
● Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	**£20**
● FOOD & POPULATION (Disc) O Level program.	**£20**
● MICROTECHNOLOGY (Cassette) O Level program.	**£6.95**
● A VOUS LA FRANCE (2 Cassettes) A French language home study aid.	**£17**
● DEUTSCH DIREKT! (Disc & Audio Cassette)	**£20**
● Modem Master (Disc)	**£11.25**
● ADVANCED TELETEXT SYSTEM	**£9**
● PERIOD TABLE SOFTWARE	**£20**
● USING YOUR COMPUTER (Cassette) 8-12 age	**£24**

BEEB
VIDEO DIGITISER



Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

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Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

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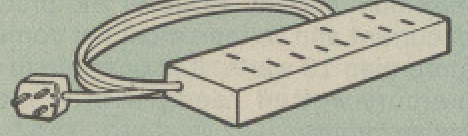

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Mike Cook's high-tech approach to bar games

Down among the reeds

THE BEEB BODY BUILDING COURSE

BACK in the June 1986 issue of *The Micro User* we looked at two forms of non-contact switches, the inductive and capacitive switch. However, there is another form of switch that requires no physical contact at all – the magnetic reed insert.

This normally consists of two metal strips held in a glass tube such that there is no contact between them – see Figure I. However, under the influence of a magnetic field the metal strips are bent so that contact is made and electricity can flow.

The magnetic field can be supplied by an electromagnet, usually in the form of a coil. The reed switch is inserted into the coil to form what is called a reed relay.

Relays constructed in this way need much smaller currents to operate them than conventional relays. This is because the movement required to make a contact is very small and so requires only a small amount of energy from the energising coil.

The other great advantage of a reed relay is that the contacts are sealed in glass, making them intrinsically safe – there is no danger from any spark produced by opening and closing current carrying contacts.

This is vital where explosive vapours might be about, such as down a mine, in a hospital or when the editor breathes over your shoulder.

Another advantage with reed relays is that they can be switched much more rapidly than other types of relays. Nowadays you can get reed relays encapsulated in many different-shaped packages, you can even get them the size of 14 pin ICs. They are lightweight and very popular for controlling motors.

The reeds are not restricted to simple on and off modes – you can get multipole changeover relays as well.

Unfortunately the output from the user port is insuffcent to drive a reed relay directly. These outputs can only sink 1.6mA and the most sensitive relay I have encountered requires 5mA. So while you could drive a reed relay directly from the user port you would be exceeding the limits if you did so.

However, it is a simple matter to arrange a buffer, using a transistor as shown in Figure II. The diode across the coil is used to prevent any back-EMF, generated by the collapsing magnetic field when the coil is turned off, from affecting the rest of the circuit.

The amount of current and voltage that can be switched by a reed is known as its contact rating. The type of relay I have used has a contact rating of 200V DC maximum voltage and 0.5A maximum current. However the product of current and voltage must not come to more than 10 watts. It is possible to get mercury-wetted reeds with a much higher rating.

The most convenient way of connecting this up to the computer is by using Body Build Pack No.1 – a transition board which allows screw connections to be made to the lines of the user port. This board is connected to the computer by Body Build Pack No.2, the ribbon connector and sockets.

In order to switch the relay you must program the user port bit it is attached to as an output. This is simply done by writing a logic one to the appropriate bit in the data direction register at address &FE62.

I find it much easier to work in hexadecimal when doing this as the hex numbers are easily converted into the binary bit pattern I am really working with. So, for example, if I wanted bits 0 to 3 to be outputs I would use the expression:

```
?&FE62=&0F
```

This line reads "make the contents of address &FE62 equal to the value &0F". Note that in binary this is 0000 1111, which places ones in the bits I want to use as outputs.

To control these outputs you simply need to write the appropriate bit pattern to address &FE60. For example, to turn

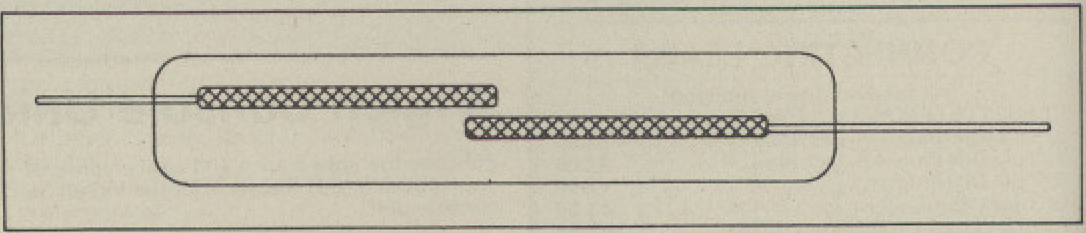

Figure I: A reed switch

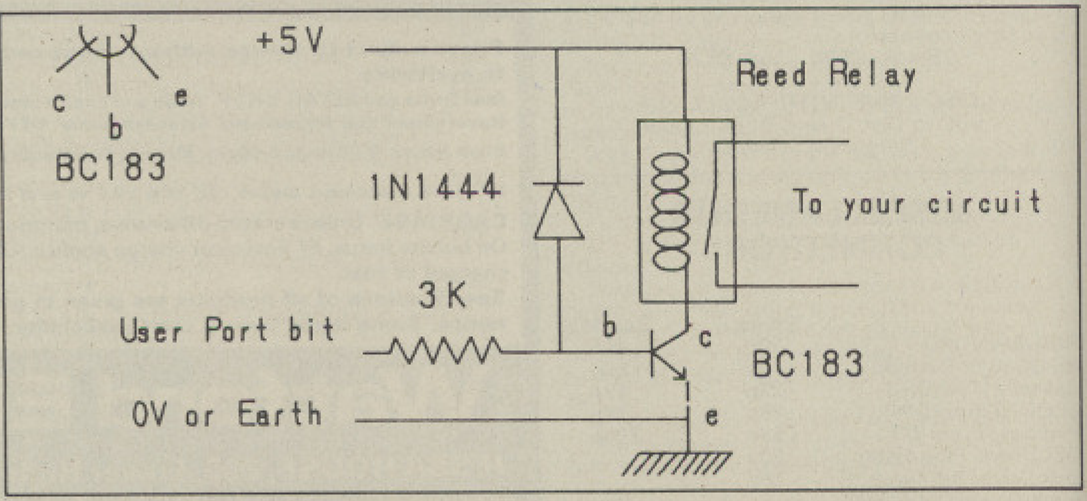

Figure II: Controlling a reed relay

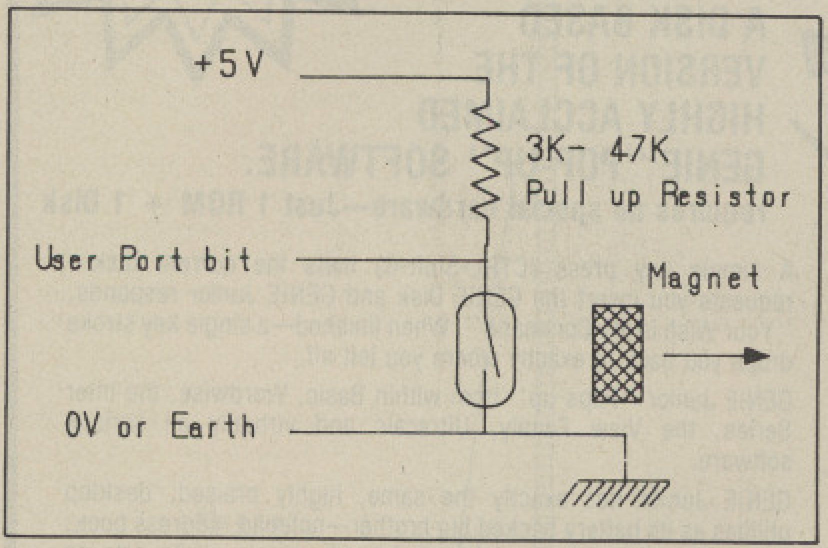

Figure III: Reading a reed switch

all the relays off you would use:

```
?&FE60=0
```

However, if you want to alter just one relay and leave the others unaffected you need to use a logical operator. First get the number that corresponds to a 1 in the bit position you want to control, that is 8 for bit 3, 4 for bit 2, 2 for bit 1 or 1 for bit 0. Let's say we want to turn bit 3 on. We simply OR the number 8 with what is already on the user ports:

```
?&FE60=?&FE60 OR 8
```

If we need to turn this bit off then we need to use an AND operation with the logical inverse of the number this can be done simply like this:

```
?&FE60=?&FE60 AND (NOT 8)
```

In this way we can affect any single output without altering any other. Incidently, if you want to change the state of the switch, that is turn it on if it is off or vice versa, you can use:

```
?&FE60=?&FE60 EOR 8
```

That's how to use a reed relay as an output device, but the reed can also be used as an input device. As the reed can be made to switch in the presence of a magnetic field, a permanent magnet may be mounted on any object and the reed switch will detect its presence.

This technique can be used in intruder alarms for doors or windows. Simply mount a magnet on, or in the door, and a reed switch in the door frame. When the door is opened the contact is broken and you can set off the alarm.

You can also use this for turning on lights or monitoring movement. In fact some domestic appliances like refrigerators now use reed switches to turn the light on when you open a door instead of the more conventional contact microswitches. Getting your computer to read these is simplicity itself, as shown in Figure III.

First you need to configure the user port to be an input on the bits you want to read. This is done simply by storing a logic zero in the bits you want as inputs, in the data direction register (address &FE62).

The resistor connected to the five volt line is called a pull-up resistor. Its job is to make sure that the input to the user port appears to have a logic one on it. If you are using Body Build Pack No.1 this pull-up is already on the board. Its value however is not critical and is normally anything between 3k and 47k.

When the reed switch is closed by the presence of a magnetic field the user port input is connected to earth or a logic zero potential. Hence if you were to look at the value in the memory location corresponding to the user port you would see the value of the bit changing from a one to a zero as you bring the magnet close to your switch.

As the data direction register of the user port can configure separately whether each individual bit is an input or output, you can have any combination on the eight user port bits. The program in Listing I is a simple example of reading all the bits on the user port and displaying them separately.

Line 160 sets all user port bits to be inputs and line 180 reads them. The variable *P%* is used as a mask to test the state of the individual bits. It is initially set to have a single logic one in bit 7.

To test whether we have a logic one in this position on the user port we AND them together. If this is the case, a value of TRUE is returned by the IF statement and a 1 is printed on the screen. If we do not have a logic one a zero is printed.

We need to change our mask in *P%* to move the logic one into the next least significant bit, and then we can test that. This is repeated until our mask is zero, by which time all eight bits will have scanned.

Finally the value in the user port is printed in hex and in decimal. You will see that the decimal does not make much sense, and that it is easer to visualise the bit pattern you are dealing with from the hex notation.

Having got over the serious part, it is time to make a game with what we have learnt. I remember being fascinated by the pub game Nine Pins. However it was always a bind setting the pins up once you had knocked them down so I have designed a computer version called Eight Pins.

The pins or skittles are replaced by reed switches and the ball is replaced by a magnet. The basic arrangement is shown in Figure IV. For the electrical circuit simply make up Figure III eight times and connect each to a different bit on the user port. Remember the pull-up resistors are already included on the Body Build transition board, if you are using that.

Construction is quite simple. I took a piece of 5in square ¼in thick Perspex and drilled a ¼in diameter hole in the centre of one side. Then a 15in piece of ¼in dowel was sanded at the end until it

Listing I

```
100 REM User port monitor
110 REM by Mike Cook
120 REM (c) The Micro User
130 MODE 1:VDU23;8202;0;0;0;0;
140 PRINTTAB(0,3)"Input Monitor"
150 PRINT"by Mike Cook"
160 ?&FE62=0:FOR N%=7 TO 0 STEP -1
170 PRINTTAB(29-N%*3,7);N%;:NEXT
180 REPEAT A%=?&FE60:P%=&80
190 PRINTTAB(8,9);:REPEAT
200 IF P%ANDA% a$="1" ELSE a$="0"
210 PRINTa$SPC2;:P%=P%DIV2
220 UNTILP%=0:PRINT:PRINT:PRINT
230 PRINT"Hex     value is"~A%
240 PRINT"Decimal value is"A%
250 UNTIL FALSE
```

Get it right!

```
100 =    0 0 | 160 = 5ACE C | 220 = DFF8 A
110 =    0 0 | 170 = A4F0 A | 230 = DBB8 9
120 =    0 0 | 180 = 852A A | 240 = D6A1 F
130 = A532 2 | 190 = 6767 5 | 250 = 226C 0
140 = D652 B | 200 = 4733 B |
150 = D14B E | 210 = 3DED A |
```

Turn to Page 117 ▶

NEW

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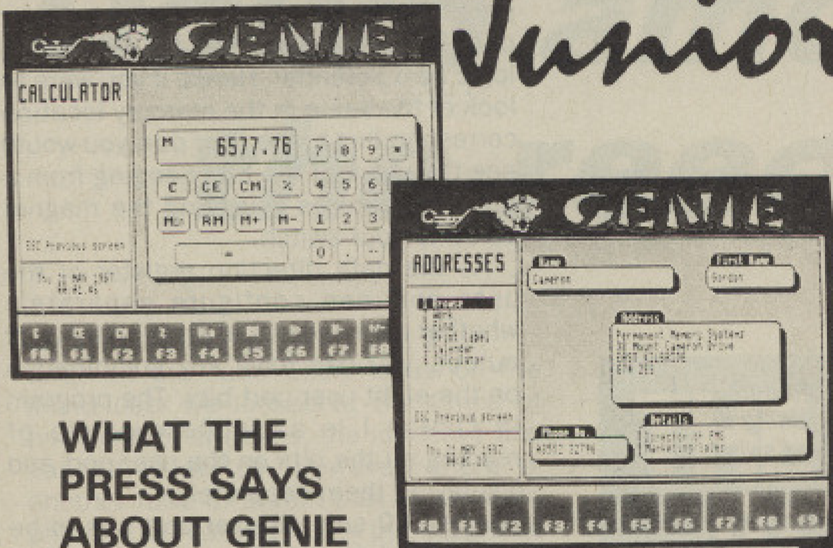
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M 6577.76
7 8 9
C CE CM % 4 5 6
M= RM M+ M- 1 2 3
0 .
ESC Previous screen
GENIE
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38 Mount Cameron Drive
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ESC Previous screen
f0 f1 f2 f3 f4 f5 f6 f7 f8 f9

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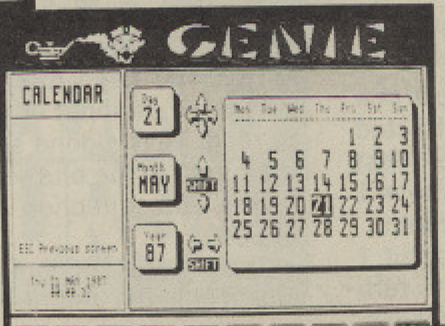
GENIE
CALENDAR
Day 21
Month MAY
Year 87
Mon Tue Wed Thu Fri Sat Sun
1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 31
SHIFT
ESC Previous screen

GENIE Junior is available for all BBC Micros — B, B+, Master 128, Compact.

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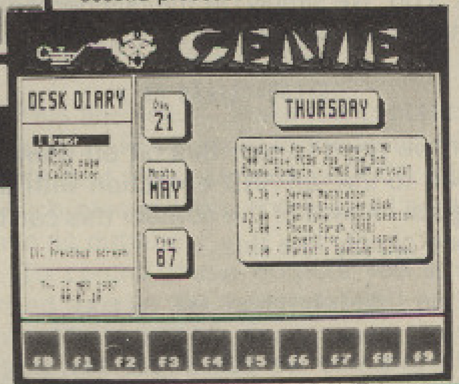
GENIE
DESK DIARY
Day 21
Month MAY
Year 87
THURSDAY
ESC Previous screen
f0 f1 f2 f3 f4 f5 f6 f7 f8 f9

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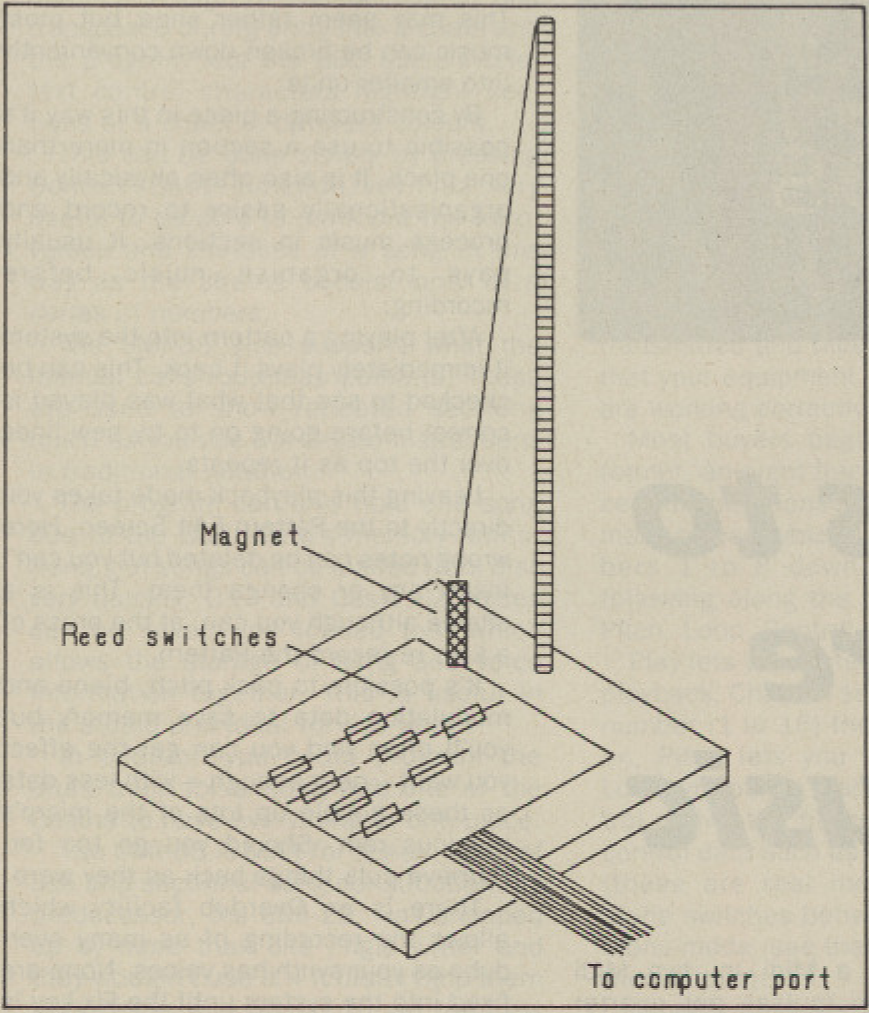

Figure IV: The new game of Eight Pins

Listing II

```
 100 REM Eight Pins
 110 REM by Mike Cook
 120 REM (c) The Micro User
 130 MODE 1:PRINTTAB(0,3)"EIGHT PINS"
 140 PRINTTAB(0,4)"a computer game"
 150 ?&FE62=0:REPEAT
 160 PRINTTAB(0,12)"Take up magnet"
 170 REPEAT UNTIL ?&FE60=&FF
 180 PRINTTAB(0,12)"Swing when ready"
 190 REPEAT A%=?&FE60:UNTIL A%<>&FF
 200 TIME=0:REPEAT A%=A%AND?&FE60
 210 UNTIL A%=0:T%=TIME/100
 220 PRINTTAB(0,12)"Your time was ";T%"
seconds"
 230 PRINT"Press space for next game";
 240 REPEAT UNTIL GET=32
 250 PRINTTAB(0,12)SPC(80):UNTIL 0
```

Get it right!

```
100 =    0 0 | 160 = 9FFD 1 | 220 = A4D4 A
110 =    0 0 | 170 = C9DB 3 | 230 = 76B7 A
120 =    0 0 | 180 = 7210 B | 240 = 2B9E 4
130 = 73F5 5 | 190 = BFFC B | 250 = 9E74 D
140 = BEE8 A | 200 = 45CC 1 |
150 = BB20 7 | 210 = 238A C |
```

◀ **From Page 115**

made a snug fit in the hole. A piece of twine was attached to the magnet with a hot-melt glue gun, although epoxy resin would have done just as well.

The reed switches were laid out on a piece of veroboard and wired up to the user port transition board. One point to note: Be sure to hold the end of the wire next to the glass with a pair of long nosed pliers when you bend the reed. If you just try to bend the wire against the glass seal the glass will break and ruin the switch.

You can try a different arrangement of the reeds if you like, but I stuck to the traditional inverted pyramid.

Now mount the veroboard under the dowel and cut a slot in the top of the dowl. Thread the twine through the slot and carefully adjust the length so that the reed closest to the dowel is not touched and that the ones furthest away can still be switched by the magnet.

You will find that running the first listing helps you with this. When you have found the optimum position, a little glue in the slot will secure the position.

Now on to the software, shown in Listing II. Note it is a simple program which times how long it takes you to knock down all the pins. There are no graphics, sound effects or best score record. I thought it would be fun for you to implement what you wanted in that department.

Line 170 holds until the magnet is clear of all the switches. Line 190 then waits until the first pin is knocked down. Then we can begin timing and lines 200 to 210 wait until all the pins are down.

The interesting point here is that we use a logical AND instruction to add logic zeros into the variable *A%*. When all inputs have at some time been zero we finish the loop. Note that this is not the same as all inputs being zero at the same time.

The remaining lines inform you of the time taken and allow you to catch the magnet again before pressing any key to have another go. You see, you don't have to set them up before you have another go.

Remember that magnets and discs do not mix, so keep the reed switching magnet away from your discs and tapes to avoid magnetic damage.

All the electrical parts and the magnet are available, as are the components for a reed relay, as Body Build Pack No. 46 – see the order form below.

So as you can see, we can all have fun down among the reeds.

BEEB BODY BUILDING PACK ORDER FORM

Body Build Packs:

☐	**46a** *8 reed switches, vero board and a magnet*	*£8.99*
☐	**46b** *1 reed relay, transistor, resistor & diode*	*£6.00*

Also available are packs:

☐	**1** *User port transition board*	*£9.99*
☐	**2** *User port ribbon cable*	*£8.99*

All prices include VAT and P&P.
Educational establishment orders accepted.

Name:...

Address:...

....

....

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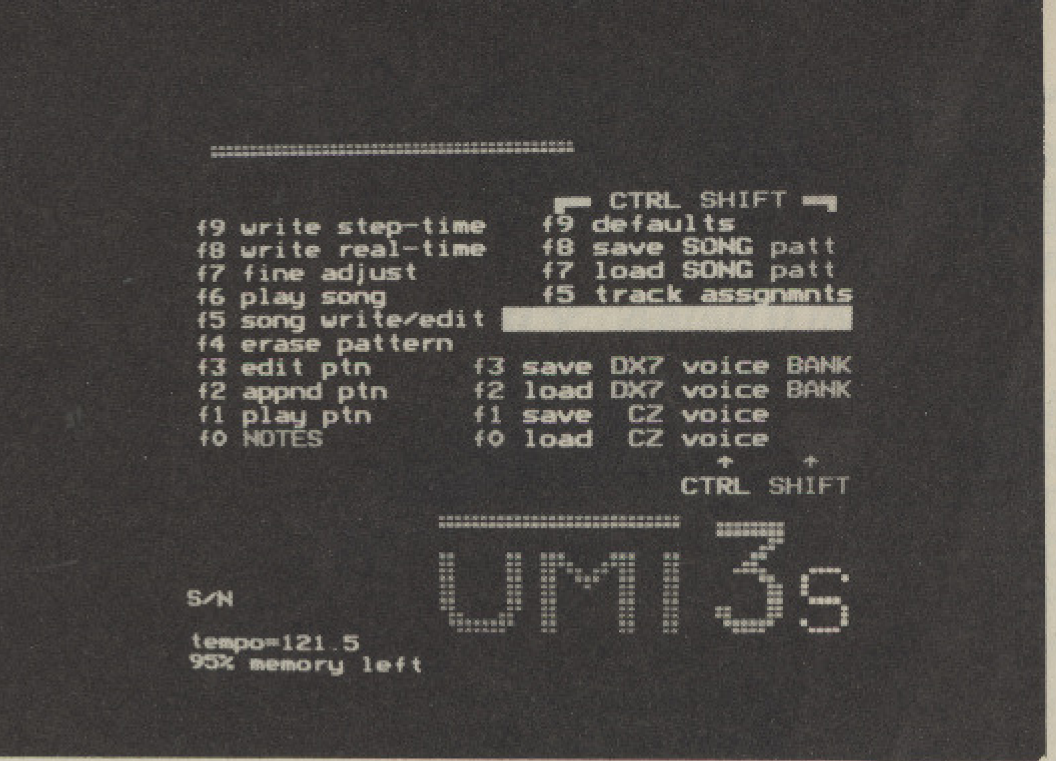
Make cheques payable to Musbury Consultants and send to: 8 Fairhill, Helmshore, Rossendale, Lancs, BB4 4JX. Foreign orders add £3.00 if airmail delivery is required.



```
                              ▬ CTRL SHIFT ▬
f9 write step-time      f9 defaults
f8 write real-time      f8 save SONG patt
f7 fine adjust          f7 load SONG patt
f6 play song            f5 track assgnmnts
f5 song write/edit
f4 erase pattern
f3 edit ptn          f3 save DX7 voice BANK
f2 appnd ptn         f2 load DX7 voice BANK
f1 play ptn          f1 save  CZ voice
f0 NOTES             f0 load  CZ voice
                                 ↑     ↑
                               CTRL SHIFT

S/N                         UMI3s

tempo=121.5
95% memory left
```

Two ways to get more out of music

Ian Waugh looks at two Midi packages for the BBC Micro

IN the August issue of *The Micro User* we looked at what Midi is and what can be achieved with it. Now we'll look at two Midi packages especially for your BBC Micro.

Let's start with U-Music. About two years ago – a long time in computer terms – U-Music launched a sequencing package for the BBC Micro called the UMI-2B. It was developed primarily for the working musician involved in the big bad commercial world of song writing.

It was seized by many bands including Blancmange and Depeche Mode and was, as they say in the best reviews, feature packed. It's main disadvantage – to those of us with less money than ideas – was the price. A UMI-2B wouldn't give you much change from £500.

The UMI-3S was developed after listening to feedback from UMI-2B owners. The 2B has more sockets but the 3S has enough for most applications and in many ways the software and operation is superior to the 2B.

The package consists of an interface plus software. The interface is housed in an attractive metal case of professional design and two ribbon cables plug into the BBC Micro's user port and 1MHz bus. Sockets include a Midi In, two Midi Outs, a 24 ppqn (pulses per quarter note) Sync Out (to drive Roland equipment), a Start/Stop socket and Clock/Sync In and Out.

All those sockets should enable it to synchronise with just about any piece of equipment, Midi-compatible or not, and the Clock/Sync sockets can be used to sync to tape – a near essential feature of any pro or semi-pro studio.

Sync to tape involves recording a series of clicks on to one of the tracks on a multi-track tape recorder. This click is read back from tape into the system and used to control the sequencer. In this way one instrument can be used to play several parts all in perfect time with each other.

The software has been neatly coded into two eproms and all operations can be accessed by one or two keypresses. It has been designed for speed and ease of use. After installing the system, a *UMI command will present the main menu. All screens are in Mode 7 to conserve memory.

In time-honoured sequencing tradition, the final product – in this case a song – is built from smaller sections called patterns. The length of a pattern is defined in beats which can be either crotchets or quavers and a pattern can contain from 1 to 64 beats. A Song is constructed by combining up to 127 patterns, more than enough for most pop-type and modern music applications.

You must specify the length of a pattern before recording and the maximum pattern length is 16 bars in 4/4 time. This may seem rather short but most music can be broken down conveniently into smaller units.

By constructing a piece in this way it's possible to use a section in more than one place. It is also often physically and organisationally easier to record and process music in sections. It usually pays to organise music before recording.

After playing a pattern into the system it immediately plays it back. This can be checked to see that what was played is correct before going on to try new lines over the top as it repeats.

Leaving this playback mode takes you directly to the Pattern Edit Screen. Here wrong notes can be deleted but you can't insert any or change them. This is a shame although you can, at the press of a key, re-record the Pattern.

It's possible to pack pitch, blend and modulation data to save memory but you'll often find you can get the effect you want – near enough – with less data as these gobble up lots of the micro's precious ram. Should you go too far, Retrieve puts things back as they were.

There is an Overdub facility which allows the recording of as many overdubs as your synth has voices. None are fixed into the system until the Fix key is pressed. It's all very thoughtful.

You can enter a pattern in step time, too. The step time screen shows all the notes in a five-octave range and when a note on the keyboard is played, the relevant note is highlighted on screen. To cancel a note simply press it again.

Each note can be assigned a gate time to produce different staccato effects and a velocity level to control the volume. With a DX7 you can use its data entry slider to control the velocity.

Step time isn't quite as easy to handle as real time and if you're not careful you could get bogged down in numbers but the finished result will be perfect. The UMI is more at home as a real time sequencer but the step time features allows entry in a very difficult or impossible part. One day you'll be glad it's there.

The editing facilities are fairly comprehensive and although they never get down to the level of bits and bytes you can pick out and manipulate a single beat.

A micro editor for the UMI-2B which does delve into the Midi nitty gritty has been developed and this may eventually find its way across to the 3S. You can copy full or parts of patterns to others and they can be appended and transposed – ideal for repetitive bass lines.

On recording all patterns move on to the Write/Edit Chain screen to put the song together. You can create up to 16 chains each with its own Midi channel number. A pattern can be copied and transposed during entry into a chain and the program lets the BBC Micro's teletext control characters highlight sections of a chain in different colours.

This can be done simply by pressing Control+Shift+function key. It's very useful to be able to mark out the intro, verses and choruses of a song in this way as the chains consist only of a series of numbers.

The UMI-3S also supports what the manual calls routemap pointers. These are used to show repeated sections much as you use *Dal Segno* instructions in traditional notation.

The program can only hold one song due to the BBC Micro's memory limitations, but songs can be loaded from disc very quickly. DX7 and Casio CZ voices can be saved and loaded too, which allows the storage of song and voice information together. This is useful in the studio and ideal for live work.

In addition you could program the drum track for a Song into one of the Chains to have everything in one place.

The UMI-3S is built for speed, ease of use and sectional song construction. Its predecessor, the UMI-2B, was snapped up by more than one jingle writer and they wouldn't use it if it didn't help them work better and faster. To get the best out of the system, though, it does help if you're just a little organised.

EMR

EMR has followed a rather different route to U-Music. It produced one of the first Midi interfaces for any computer back in 1983 (it just happened to be for the BBC Micro) and have formulated a unique policy resulting in the development of several programs under the generic title of Miditrack.

EMR has aimed it's products squarely at the home user and actively encourages the use of Midi in education. It produced a special four track version of its Midtrack Performer for primary schools which works like a cassette recorder and only requires one finger to operate.

That does not exclude its use by professional musicians, however, and Keith Winter of Shakatak has been using EMR software to help write his latest album.

As computers can be used in so many areas of music, it's sometimes difficult for a software developer to know what to include in a particular program. EMR solved this problem by producing a different program for each type of operation.

For example, if you prefer real time note entry then you don't need to buy a program with step time facilities and vice versa. There's also less to learn about using an individual package – and less chance of things going wrong.

To run any piece of EMR software you need its Midi interface. This has a Midi In, two Midi Outs and a Clock Start/Stop socket. Like the UMI-3S, it plugs into the User Port and 1MHz bus.

Optionally, a joystick can be plugged into the analogue port and used to control start and stop operations. Two LEDs on the interface show when data is being transmitted and received; a good check that your equipment – and the cables – are working correctly.

Most buyers begin with EMR's Performer, an eight track real time sequencer. All operations are selected from one main screen which lists the track numbers 1 to 8 down the left and the following along the top: Play, Channel, Pitch, Loop, Control and Mode.

Play lets you mute a recorded track on playback, Channel sets the Midi channel number (1 to 16) the track will transmit on, Pitch lets you transpose a track, Loop will play a track indefinitely, Control allows the filtering out if unwanted control data such as velocity or pressure (these are real memory eaters) and Mode switches between Midi's Poly and Mono mode (see the Midi article for further details).

Other options are selected by pressing the relevant key: G is time siGnature, Y is number of plaYs, C is Count-in, T is Tempo, M is Metronome, K is clocK, B is start Bar and X is teXt input. There are also Save, Load, Verify, Delete, Arrange (which allows make up to 64 arrangements of the recorded tracks), Catalogue, auto Note correct (quantisation) and Zap (clear memory) commands. EMR's Editor program (coming up) can be called from this screen, too.

It's possible to perform track merges by connecting the Midi Out to the Midi. This, for example, would allow the combining of the right and left hand parts of a piano performance on to one track.

To record a really complicated part set a slow tempo and record it slowly in the Performer, speeding it up on playback or entering the notes in step time with the Composer.

This has six tracks only and each track is monophonic so there's not room for great washes of chords. But the program works a treat with multi-timbral instruments.

You can enter notes from the computer or from the synth keyboard and the function keys are used to select the note durations, velocity and style (staccato or legato). You can also copy track to track and transpose.

Of course, there may be times when ideally you'd like to record a piece using a combination of real and step time methods. EMR's Music Editor bridges the gap between the Performer and the Composer. One or more step time Composer tracks can be converted to a real time Performer track and added to an existing recording.

It also allows full editing of a polyphonic Performer track including insertion and deletion of Midi events. It produces a continuous display of all the parameters of each Midi event in a particular track and Midi output of these events operates as they appear on screen so you can hear what each event is doing.

The Music Editor has its own playback

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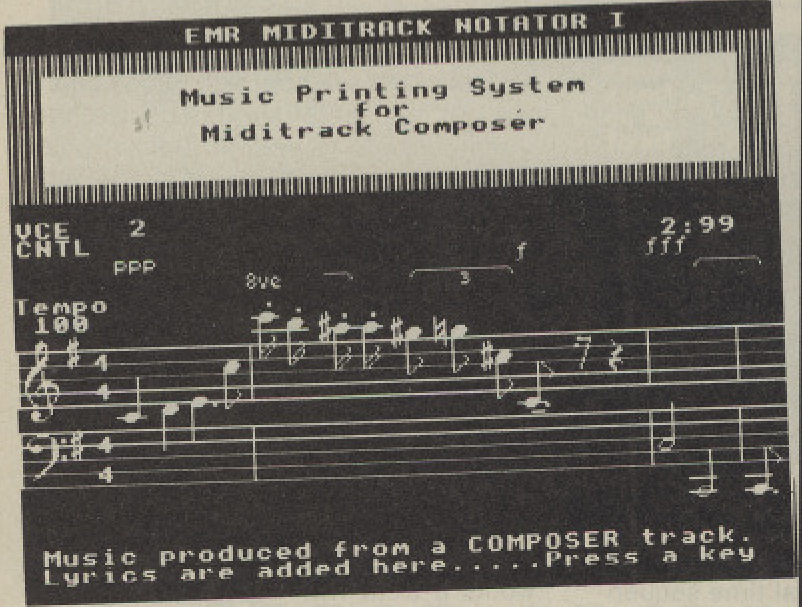
electromusic research
BBC B MIDI
electromusic research
BBC B
PRO SERIES
MIDITRACK COMPOSER
PROGRAM FOR CONTROL OF MIDI INSTRUMENTS
softmusic
DISK VERSION
electromusic research
MIDITRACK

Part of the Midi Track family

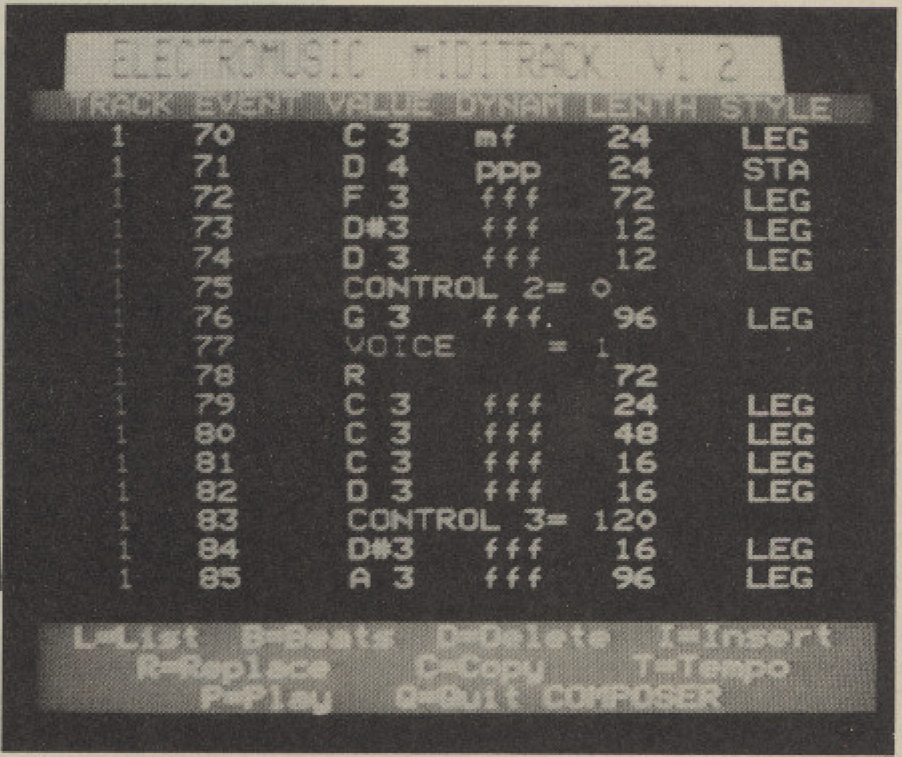


```
EMR MIDITRACK NOTATOR I

Music Printing System
for
Miditrack Composer

VCE    2                                    2:99
CNTL
Tempo
 100

Music produced from a COMPOSER track.
Lyrics are added here.....Press a key
```



```
ELECTROMUSIC  MIDITRACK  V1.2
TRACK EVENT VALUE DYNAM LENTH STYLE
  1    70    C 3    mf     24    LEG
  1    71    D 4    ppp    24    STA
  1    72    F 3    fff    72    LEG
  1    73    D#3    fff    12    LEG
  1    74    D 3    fff    12    LEG
  1    75    CONTROL 2= 0
  1    76    G 3    fff.   96    LEG
  1    77    VOICE     = 1
  1    78    R             72
  1    79    C 3    fff    24    LEG
  1    80    C 3    fff    48    LEG
  1    81    C 3    fff    16    LEG
  1    82    D 3    fff    16    LEG
  1    83    CONTROL 3= 120
  1    84    D#3    fff    16    LEG
  1    85    A 3    fff    96    LEG

L=List  B=Beats  D=Delete  I=Insert
   R=Replace     C=Copy    T=Tempo
      P=Play   Q=Quit COMPOSER
```

Screens from EMR packages

◄ ***From Page 119***

system so that edited files can be quickly checked. It also allows several Performer files to be linked together to playback one after the other allowing different files to have different tempo settings as well as their own loops and arrangements.

One of the most difficult aspects of music to implement on a computer is the presentation of traditional music notation. The Notator program will convert a Composer track into traditional notation, display it on screen and print it out.

It can use the treble or bass clef – or both – and can perform a transposition on the whole track if required.

It needs a little help during the process, however, and options must be defined such as key and time signature but it checks the notes against the time signature and reports any errors. In addition, you can adjust the note spacing on screen and add lyrics to the part.

The program displays the original dynamics, voice changes and modulation controls, too. Operation is very easy, most functions only requiring the press of a single key.

Digital synthesisers are great but can be quite awkward to program. Parameters are usually selected one at a time and it's usually impossible to alter more than one parameter at once. This makes it very difficult to get an overall picture of the sound.

Voice editors come to the rescue by giving an on-screen representation of the synth's parameters that can usually be edited without too much button pushing. They also allow the storing of banks of voices on disc which is far cheaper than buying ram packs.

EMR currently has two voice editors – one for Yamaha's famous DX7 (and TX7) synth and one for Casio's CZ-101 and CZ-1000. It is also working on an editor for Yamaha's FB-01, a multi-timbral expander module. This has programmable voices but no built-in means of programming them and will be welcomed by many FB-01 owners.

Finally, a rather novel program revelling in the name of Vu-Music responds to Midi signals entering the system and produces graphic displays on screen. It will only work with live music and not a Performer or Composer file, but it's fascinating to watch.

You can select classical, jazz, pop and rock styles and choose one of three response speeds. EMR also offers a customised screen designer service and intends to produce a library of sprite shapes to expand the package.

It's worth briefly mentioning EMR's other pieces of Midi hardware. Its Midilink is a Midi Thru box which distributes one Midi Out signal to six other units and its Sync to Tape Unit lets you do just that. The company has also just published a small booklet called Choosing Midi Instruments which costs £1.50.

EMR is committed to Midi and the BBC Micro in a big way, reflected by the sheer number of its programs. It may not have all the features you would find in a professional program but they are easy to use and well documented and should provide a comparatively painless introduction to Midi.

Conclusion

It's a good idea to decide exactly what you want from a Midi system before spending your money. EMR's programs are quite inexpensive but if you want sync to tape, real and step time input and full editing facilities it could cost you as much or more than a UMI-3S system. But then the UMI's editing facilities don't let you get down to Midi event level.

On the other hand, its real time system is ultimately more flexible. But then it can't print your music in traditional notation. You see the decisions you have to make.

The philosophies behind the two products are clearly different and that's why it's important to pick the system most suited to your way of working.

Product: UMI-3S
Price: £230
Supplier: U-Music, 17 Parkfields, London, SW15 6NH.
Tel: 01-788 3729.

Whatever your decision, remember that as a computer user you have an advantage over the non-computerate musician when it comes to using Midi systems. Don't let any of the jargon put you off – it soon falls into place. Both these systems will help you do more and get more out of music.

Product	*Price*
Midi Interface	*£79.90*
Performer	*£49.95*
Composer	*£44.95*
Editor	*£39.95*
Vu-Music	*£24.95*
Notator	*£39.95*
Yamaha DX7 Editor (eprom)	*£46.00*
Yamaha DX7 Editor (Disc)	*£29.95*
Casio CZ-101 Editor (Disc)	*£29.95*
Midilink	*£34.95*
Sync-to-Tape Unit	*£39.95*

Specify model B, B+, Master or Master Compact when ordering.

Supplier: Electromusic Research, 14 Mount Close, Wickford, Essex, SS11 8HG. Tel: 0702 335747.

Save your precious programs to tape in one go with Wim van der Vaart's utility.

Backing up to tape

ONE of the safest ways of storing your programs is on tape, but copying from disc to tape is a very slow and tedious operation. And if your discs do get damaged copying back is just as bad. What is needed is a program that can do the transfer job without you having to stand over it.

This menu-driven Basic program, Transfer, makes the job easy – if you have a cassette with motor control. It transfers one file, all files of a directory (ADFS) or all files of a floppy (DFS), either to or from tape. The transfers are complete with load and execution addresses and any size of file can be handled. If you are doing a backup a C90 cassette tape will accept about 150k of files.

To help with DFS to ADFS transfer via the CFS (cassette filing system) when a DFS disc file on tape is being loaded on to an ADFS disc the full stop between directory letter and filename is replaced by a hyphen, for example B.Program would become B-Program. This ensures that one DFS disc goes into one ADFS directory.

The program will not transfer subdirectories from ADFS, and when saving on to tape the ADFS pathname is omitted.

When saving from DFS you are asked for the first directory to save from. The files are saved in Ascii order of directory, the first being the ! directory!.

Wherever you are in a save or load you can press Escape to return to the main menu (the program always finishes the block it's on first when saving to tape). And by pressing Shift+Escape you can terminate the program.

Enter the program, remove any typing errors using Get it Right! and then save it. Make sure you do some test runs on unimportant data first.

```
   10 REM TRANSFER  TAPE <===> DISC
   20 REM      By  W.v.d.VAART
   30 REM Suitable for ADFS and DFS
   40 REM    (c) The Micro User
   50 MODE6:F%=FNsys
   60 ttl$="TAPE <===> DISC"
   70 IF F%<>4 IF F%<>8 PRINT'TAB(12)ttl
$'"No DISC filing sys!":VDU7:END
   80 PROCinitialise:E%=0:L%=0
   90 ON ERROR VDU6:E%=ERR:L%=ERL
  100 IF O%=TRUE PROCclose
  110 IF (E%=17 AND INKEY-1) PROCe(1)
  120 IF (E%<>17 AND L%>0) PROCe(0)
  130 IF F%<>FNsys IF C%<>-6 PROCdisc
  140 REPEAT MODE6:HIMEM=&5000
  150 E%=0:L%=0:PROCmenu
  160 IF C%<>-6 THEN *FX21
  170 C%=GET-48
  180 IF C%=-6 PROCcommand
  190 IF C%=1 PROCwdw:PROCtape_disc
  200 IF C%=2 PROCwdw:PROCcpy_tape
  210 IF C%=3 PROCwdw:PROCdisc_tape
  220 IFC%=4 IFF%=4 PROCwdw:PROCcpy_disc
  230 IFC%=4 IFF%=8 PROCwdw:PROCcpy_dir
  240 UNTIL C%=0:REM end of main loop
  250 MODE6:PROCend:END
  260 DEF PROCclose:PROCtape:CLOSE#0
  270 PROCdisc:CLOSE#0:O%=FALSE:ENDPROC
  280 DEF PROCcmnd:INPUT"*"c$
  290 VDU28,0,17,39,4:CLS
  300 VDU28,0,24,39,4:VDU14
  310 PRINTTAB(0,19);:PROCos(c$)
  320 IF VPOS=19 ENDPROC
  330 PRINT:PROCesc:ENDPROC
  340 DEF PROCcpy_dir
  350 IF F%=8 PROCinput_dir
  360 PROCos("DIR "+dir$)
  370 ptr%=0:REPEAT PROCget_name
  380 IF i$<>"" IF F%=4 PROCdisc_tape
  390 IF i$<>"" IF F%=8 IF FNf_type(i$)=
1 PROCdisc_tape
  400 IF i$<>"" IF F%=8 IF FNf_type(i$)=
2 PRINT'i$;" is a directory"
  410 UNTIL i$="":IF F%=8 PROCesc
  420 ENDPROC
  430 DEF PROCcpy_disc
  440 INPUT"First directory?"dir$:PRINT'
  450 dir$=LEFT$(dir$,1):IF dir$="" dir$
="!"
  460 IF dir$>="a" IF dir$<="z" dir$=CHR
$(ASC(dir$)-32)
  470 FOR dir%=ASC(dir$) TO ASC"£"
  480 IF INSTR("""#*.:",CHR$(dir%))=0 di
r$=CHR$(dir%):PROCcpy_dir
  490 NEXT:PROCesc:ENDPROC
  500 DEF PROCcpy_file
  510 IF C%>2 PROCdisc:PROCos("INFO "+i$
):PRINT
  520 REPEAT
  530 IF C%>2 PROCdisc ELSE PROCtape
  540 PROCread_blks
  550 IF C%>2 PROCtape ELSE PROCdisc
  560 PROCwrt_blks:UNTIL ?eof=true
  570 PROCclose:ENDPROC
  580 DEF PROCcpy_tape
  590 INPUT"First file name on TAPE",i$
  600 PRINT':REPEAT o$="":PROCtape_disc
  610 PRINT':first%=FALSE:i$=""
  620 UNTIL FALSE:ENDPROC
  630 DEF PROCdisc:PROCos("OPT")
  640 IF F%=4 a$="DISC" ELSE a$="ADFS"
  650 PROCos(a$):ENDPROC
  660 DEF PROCdisc_name
  670 IF F%=4 PROCos("DIR $"):o$=LEFT$(o
$,9)
  680 IF F%=4 IF MID$(o$,2,1)<>"." o$=LE
FT$(o$,7)
  690 IF F%=8 IF MID$(o$,2,1)="." o$=LEF
T$(o$,1)+"-"+MID$(o$,3)
  700 ENDPROC
  710 DEF PROCdisc_tape
  720 IF C%=3 INPUT"File name? "i$
  730 IF i$="" REPEAT VDU7:INPUTTAB(11,V
POS-1)""i$:UNTIL i$<>""
  740 PROCf_check:O%=TRUE
  750 ?hdl_in=OPENINi$:?eof=false
  760 PROCtape_name:PROCtape:*FX21
  770 IF first%=TRUE PRINT'"Press RECOR
D""then RETURN";
  780 IF first%=0 PROCos("FX138,0,13")
  790 VDU21:?hdl_out=OPENOUT o$
  800 VDU6:PRINT':!&38C=!&80:!&390=!&84
  810 PROCcpy_file:IF C%=3 PROCesc
  820 IF C%=4 first%=FALSE:PRINT
  830 ENDPROC
  840 DEF PROCend
```

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Citizen MSP15E (160 cps 136 col.)	£322
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Pace Series 4 2123S V21/23	£255
Miracle WS3000 professional V21/23	£290

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◀ From Page 121

```
  850 PRINT''TAB(8)"End of ";ttl$'
  860 IF FNsys=1 PROCdisc
  870 PROCos("KEY10"):ENDPROC
  880 DEF PROCe(K%):PRINT'
  890 REPORT:PRINT" at ";L%'
  900 IF K%=0 PROCesc:ENDPROC
  910 END
  920 DEF PROCesc
  930 PRINT'"Please press Escape";
  940 VDU7:REPEATUNTILFALSE:ENDPROC
  950 DEF PROCf_check
  960 IF FNf_type(i$)=0 PRINT'i$;" doesn
't exist":PROCesc
  970 IF FNf_type(i$)=2 PRINT'i$;" is a
directory":PROCesc
  980 ENDPROC
  990 DEF PROCget_name
 1000 !&81=&C00:!&85=1:!&89=ptr%
 1010 A%=8:X%=&80:Y%=0
 1020 name%=USR(&FFD1)AND&1000000
 1030 ptr%=!&89
 1040 IF name%=0 ?(&C00+?&C00+1)=13:i$=$
&C01 ELSE i$=""
 1050 ENDPROC
 1060 DEF PROCinitialise
 1070 *KEY10CLOSE#0:O%=0|MOLD|M
 1080 PROCassembler
 1090 C%=0:DIM menu$(4):FOR M%=1 TO 4
 1100 READ menu$(M%):NEXT:ENDPROC
 1110 DATA One file from TAPE to DISC
 1120 DATA Files from TAPE to DISC
 1130 DATA One file from DISC to TAPE
 1140 DATA Files from DISC to TAPE
 1150 DEF PROCinput_dir
 1160 INPUT"Directory name? "dir$
 1170 IF dir$="" dir$="@"
 1180 ENDPROC
 1190 DEF PROCinput_name:REPEAT
 1200 PRINT''o$;" exists already":VDU7:
*FX21
 1210 INPUT"File name? "New$:PRINT
 1220 IF New$<>"" o$=New$:PROCdisc_name
 1230 UNTIL New$="" OR FNf_type(o$)=0
 1240 ENDPROC
 1250 DEF PROCmenu
 1260 PRINT'TAB(12)ttl$
 1270 VDU28,0,24,39,4
 1280 PRINT'TAB(3)"*"SPC3"Command"''
 1290 FOR M%=1 TO 4
 1300 PRINTTAB(3);M%SPC3menu$(M%)':NEXT
 1310 PRINT'TAB(3)"0"SPC3"End of ";ttl$'
 1320 PRINT'TAB(3)"Your choice: ";
 1330 ENDPROC
 1340 DEF PROCos($&700):LOCAL X%,Y%
 1350 X%=0:Y%=7:CALL &FFF7:ENDPROC
 1360 DEF PROCread_blks
 1370 ad_in?1=&50:?ad_in=0
 1380 REPEAT CALL read_blk
 1390 UNTIL ?eof=true OR ad_in?1=&60
 1400 ENDPROC
 1410 DEF PROCread_name
 1420 FOR char%=&3B2 TO &3BD
 1430 IF ?char%=0 THEN ?char%=13
 1440 NEXT:i$=$&3B2:ENDPROC
 1450 DEF PROCset_addrs
 1460 read_attrs%=FNf_type(o$)
 1470 IF!&80=!&3BE IF!&84=!&3C2 ENDPROC
 1480 !&80=!&3BE:!&84=!&3C2
 1490 A%=1:X%=&7E:Y%=0
 1500 set_addrs%=USR(&FFDD):ENDPROC
 1510 DEF PROCsplit_name:REPEAT
 1520 o$=MID$(o$,INSTR(o$,".")+1)
 1530 UNTIL INSTR(o$,".")=0:ENDPROC
 1540 DEF PROCtape:*TAPE
 1550 PROCos("OPT1,2")::*OPT2,1
 1560 PROCos("OPT3,10"):*OPT3,35
 1570 ENDPROC
 1580 DEF PROCtape_disc
 1590 IF C%=1 INPUT"File name on TAPE",i
$'"File name on DISC",o$'
 1600 PROCtape
 1610 IF first%=TRUE PRINT"Press PLAY"'
 1620 O%=TRUE:REM set open file flag
 1630 ?hdl_in=OPENINi$:?eof=false
 1640 IF i$="" PROCread_name
 1650 PROCdisc:IF C%=2 OR o$="" o$=i$
 1660 PROCdisc_name
 1670 IF FNf_type(o$)<>0 PROCinput_name
 1680 ?hdl_out=OPENOUT o$
 1690 PROCcpy_file:PROCset_addrs
 1700 PRINT:PROCos("INFO "+o$)
 1710 IF C%=1 PROCesc
 1720 ENDPROC
 1730 DEF PROCtape_name:o$=i$
 1740 IF F%=4 IF C%=4 o$=dir$+"."+o$
 1750 IF F%=4 IF LEFT$(o$,2)="$." o$=MID
$(o$,3)
 1760 IF F%=8 IF INSTR(o$,".")>0 PROCspl
it_name
 1770 IF F%=8 IF MID$(o$,2,1)="-" o$=LEF
T$(o$,1)+"."+MID$(o$,3)
 1780 ENDPROC
 1790 DEF PROCwdw
 1800 CLS:PRINTTAB(5)menu$(C%)
 1810 VDU28,0,24,39,7:first%=TRUE
 1820 IF (C%=3 OR C%=4) IF FNsys=1 PROCd
isc
 1830 ENDPROC
 1840 DEF PROCwrt_blks
 1850 ad_out?1=&50:?ad_out=0:REPEAT
 1860 IF ad_out?1<ad_in?1 THEN ?len=&100
:CALL wrt_blk
 1870 UNTIL ad_out?1=ad_in?1
 1880 IF ?ad_in>0 THEN ?len=?ad_in:CALL
wrt_blk
 1890 ENDPROC
 1900 DEFFNf_type($&700)
 1910 !&7E=&700:A%=5:X%=&7E
 1920 Y%=0:=USR(&FFDD)AND&FF
 1930 DEFFNsys:A%=0:Y%=0
 1940 =USR(&FFDA)AND&FF
 1950 DEF PROCassembler
 1960 false=0:true=&FF:hdl_in=&70
 1970 hdl_out=&71:eof=&72:len=&73
 1980 ad_in=&74:ad_out=&76:osbget=&FFD7
 1990 osbput=&FFD4:DIM code% 60
 2000 FOR opt%=0 TO 2 STEP 2
 2010 P%=code%:[OPT opt%
 2020 .read_blk LDA #0:STA len
 2030 .next_read LDY hdl_in:JSR osbget
 2040  BCS set_eof:LDY len:STA(ad_in),Y
 2050  INC len:BNE next_read
 2060  INC ad_in+1:RTS
 2070 .set_eof LDA len:STA ad_in
 2080  LDA #true:STA eof:RTS
 2090 .wrt_blk LDX #0
 2100 .next_wrt TXA:TAY
 2110  LDA (ad_out),Y:LDY hdl_out
 2120  JSR osbput:INX:CPX len
 2130  BNE next_wrt:INC ad_out+1:RTS
 2140 ]:NEXT:ENDPROC
```

Get it right!

```
  10 =    0 0 | 370 = 58B4 F |  730 = CAB1 B
  20 =    0 0 | 380 = CA8D 9 |  740 = BD76 2
  30 =    0 0 | 390 = CBA4 F |  750 = B303 7
  40 =    0 0 | 400 = D727 E |  760 = F1A2 E
  50 = 5733 3 | 410 = 77B3 2 |  770 = BD94 7
  60 = 38B2 A | 420 = ED0F 6 |  780 = 6CD0 B
  70 = E94F 9 | 430 = 73CE 4 |  790 = FC0D 3
  80 = DD9C 5 | 440 = 1761 7 |  800 = C8F6 4
  90 = FB7B D | 450 = CE61 A |  810 = 577F F
 100 = 59F9 E | 460 = 1271 E |  820 = 3180 2
 110 = A8DE E | 470 = BFED D |  830 = ED0F 0
 120 =  437 A | 480 = 62A2 6 |  840 = E4FA 5
 130 = E696 6 | 490 = B02A 0 |  850 = 1315 3
 140 = FC9A 9 | 500 = ED2D 9 |  860 = E252 5
 150 = 186C B | 510 = 4829 F |  870 = 8E38 9
 160 =  276 2 | 520 = BFBA 1 |  880 = 50E5 E
 170 = B25D 1 | 530 = C041 E |  890 = B420 F
 180 = 8BA1 A | 540 = AC18 F |  900 = BDC3 9
 190 =  A52 3 | 550 = 394B F |  910 = FD2E 5
 200 = E6CC C | 560 = 3EAB 3 |  920 = E132 3
 210 = B442 D | 570 = 2F0E F |  930 = 4F99 0
 220 = 6313 4 | 580 = F45D 3 |  940 = 19EB D
 230 = BB8B 0 | 590 = 19DD 6 |  950 = 90CC 1
 240 = 9153 0 | 600 = B81B 7 |  960 = 1987 A
 250 = A4DC 3 | 610 = 41B0 1 |  970 = 35AE 6
 260 = DCB0 F | 620 = CAFF 4 |  980 = ED0F 3
 270 = 7D44 B | 630 = 859C 5 |  990 = FD8C 3
 280 = 63A6 7 | 640 = E947 9 | 1000 = 7069 7
 290 = 6E9E F | 650 = B3E9 4 | 1010 = D670 2
 300 = DA71 4 | 660 =  1F0 1 | 1020 = ECC4 A
 310 = C2BE 1 | 670 = 7C2D D | 1030 = F57F F
 320 = EE8C 5 | 680 = 176D 6 | 1040 = 5AC6 D
 330 = 9C29 1 | 690 = DF45 A | 1050 = ED0F 5
 340 = 7DB3 3 | 700 = ED0F A | 1060 = EC42 2
 350 = 2CBD 2 | 710 =  7D3 8 | 1070 = 580C 5
 360 =  2D2 1 | 720 = D8F2 E | 1080 =  6A6 A
```

```
1090 = 2F3A E | 1450 = EE9E A |
1100 = ECD3 4 | 1460 = 2608 F |
1110 =  752 8 | 1470 = B058 D | 1810 = 9DDC 9
1120 = 8E20 E | 1480 = 656F 2 | 1820 = E107 5
1130 = FE58 9 | 1490 = 143D A | 1830 = ED0F 6
1140 = 772A C | 1500 = 11A5 8 | 1840 = 3B35 7
1150 = 2CC8 2 | 1510 = BB10 A | 1850 = C746 7
1160 = C8C6 F | 1520 =  191 0 | 1860 = 2634 E
1170 = 5841 7 | 1530 = 2997 0 | 1870 = F74B 6
1180 = ED0F A | 1540 = 3165 6 | 1880 =  F19 3
1190 =  243 9 | 1550 = 1510 2 | 1890 = ED0F 4
1200 = 5E3A 2 | 1560 = 685F C | 1900 = 6955 B
1210 = 862D D | 1570 = ED0F B | 1910 = 4717 A
1220 = A764 C | 1580 = 9807 D | 1920 = B706 5
1230 = 4086 9 | 1590 = EBE4 1 | 1930 = 22FF 4
1240 = ED0F 5 | 1600 = 6B50 0 | 1940 = 5A33 F
1250 = F361 3 | 1610 = 56A7 A | 1950 = F964 F
1260 = 6D5F C | 1620 = 4BE2 9 | 1960 = 61A2 F
1270 =  BB6 6 | 1630 = B303 3 | 1970 = 64A3 E
1280 = 4DFD 9 | 1640 = 7A90 5 | 1980 = 243B 6
1290 = D9A4 E | 1650 = 4D40 1 | 1990 = CD8B C
1300 = 4381 1 | 1660 = FE32 6 | 2000 = 5221 3
1310 = 38F1 E | 1670 = 44F5 E | 2010 = C0CC B
1320 = 81B2 9 | 1680 = A339 B | 2020 = A32F 3
1330 = ED0F 4 | 1690 = 5A9D 5 | 2030 = F0B9 2
1340 = 61B0 3 | 1700 = 50CF 3 | 2040 = 4513 4
1350 = 655D D | 1710 = E490 A | 2050 = D012 1
1360 = 53DA 8 | 1720 = ED0F C | 2060 =  E56 C
1370 = DC4C 5 | 1730 = 6138 5 | 2070 = 99E2 2
1380 = E410 7 | 1740 = 49F4 A | 2080 = D260 F
1390 = 87C6 7 | 1750 = C1A2 A | 2090 = 93C2 E
1400 = ED0F 5 | 1760 = 5102 D | 2100 = 471A B
1410 = 86E8 2 | 1770 = 5D1C B | 2110 = 4E22 2
1420 = CCC4 B | 1780 = ED0F 3 | 2120 = F2F0 D
1430 = BEDA C | 1790 =  460 9 | 2130 = 88C6 2
1440 = 6E05 B | 1800 = 2183 4 | 2140 = 953B B
```

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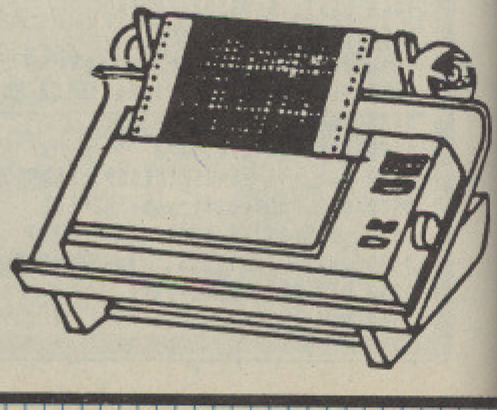

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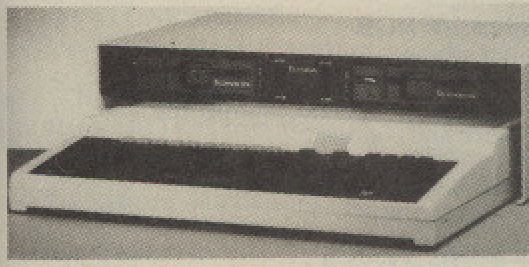

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These units let you share a Winchester drive between a number of computers. Full details on request.

TWM2 for two computers.	£99 (b)
TWM4 for four Computers.	£149 (b)

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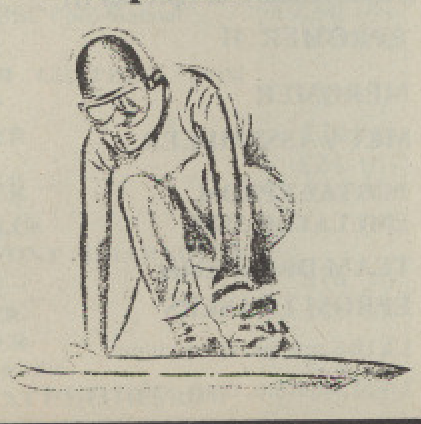

5.25" Discs in packs of 10

744 40T SS DD	£8.50 (d)
745 40T DS DD	£10.50 (d)
746 80T SS DD	£11.50 (d)
747 80T DS DD	£13.25 (d)

(Add £1 for library case packing)

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80T DS DD	£19.50 (d)

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50 5.25" 40 T single sided discs with sleeves in lockable box.	£25 (b)
50 5.25" 80 T double sided discs with sleeves in lockable box.	£36 (b)
50 3.5" 80 T double sided discs with sleeves in lockable box.	£60 (b)

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25" Kit with 20 disposable discs	£12.50 (d)
3.5" Kit with 20 disposable discs	£14.00 (d)

DISC STORAGE BOXES

DB340 Lockable 40 x 3.5"	£8.50 (c)
DB550 Lockable 50 x 5.25"	£6.50 (c)
DB570 Lockable 70 x 5.25"	£8.50 (c)
DB5100 Lockable 100 x 5.25"	£10.50 (c)

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE
17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

PRINTERS

EPSON LX800	£189 (a)
EPSON FX800 An enhanced version of FX85. Call for details.	£299 (a)
EPSON FX1000 An enhanced version of FX105. Call for details.	£405 (a)
EPSON EX800	£409 (a)
EPSON EX1000	£549 (a)
Colour option for EX800/EX1000.	£59 (b)
EPSON LQ800	£399 (a)
EPSON LQ1000 As LQ800 but wider carriage for 136 columns.	£529 (a)
TAXAN KP815 Enhanced KP810 with 160cps and full IBM compatibility.	£269 (a)
TAXAN KP915 Enhanced KP910 with 180cps and full IBM compatibility.	£369 (a)
National Panasonic KXP1081 Now supplied with a BBC printer lead and our WYSIWYG Rom. This rom provides one of the most powerful and versatile printer drivers for WP and BASIC. (see description elsewhere in the directory)	£149 (a)
STAR NL 10 (Parallel Interface)	£190 (a)
STAR NL 10 (Serial Interface)	£219 (a)
INTEGREX Multicolour Inkjet printer. Ideally suited for high res colour VDU screen dumps. Quiteness & consistent output are major characteristics.	£549 (a)
BBC Screen dump for Integrex.	£15 (d)
BROTHER HR20 8K buffer standard expandable to 16K. Parallel & Serial ports as standard.	£349 (a)
NAT PANASONIC KX P3131 Daisy wheel printer with 38K buffer, 17 cps, bi-directional, parallel interface	£249 (a)
JUKI 6100 Daisy wheel printer 15 cps, 2K buffer, switchable 10/12/15 cpi proportional spacing, underlining. Parallel interface.	£295 (a)
Parallel Printer Lead (1.2m)	£5 (d)

MODEMS

All modems listed below will be supplied with BBC Publications ModemMaster comms package and a BBC data lead.

MIRACLE WS4000 V21/23	£135 (b)
MIRACLE WS3000 V21/23	£244 (b)
MIRACLE WS3000 V22	£409 (b)
MIRACLE WS3000 V22 bis (All modems are BABT approved)	£537 (b)
BBC Data Cable for WS3000/4000	£7 (d)
MIRACLE WS2000V21/23 & BELL stds	£92 (c)
WS2000 Auto Dial Card	£27 (d)
WS2000 Auto Answer Card	£27 (d)
WS2000 SK1 Kit	£5 (d)
WS2000 User Port Lead	£5 (d)

TIME WARP

Real Time Clock. Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program	£29 (d)

PLOTTERS

Hitachi 672XD A3 4 Colour HPGL (variety of pens available)	£465 (a)
Plotmate A4S	£282 (a)
Plotmate A3M	£431 (a)

Larger Plotters available. Please enquire.

PRINTER SHARERS & BUFFERS

TSB256 Printer Sharer Buffer Provides a massive buffer size of 256K and connects three computers to one printer. Autoswitching between computers, facility to print copies.	£189 (b)
BUFFALO PB Buffer Parallel buffer for internal fitting to most Epson printers. Simple to instal. **PB128** (128K)	£89 (c)

PERIPHERAL & COMPUTER SHARERS

High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases. all lines fully switched.

	Parallel		Serial
2 Computers to 1 Printer 36v36-2	£25(c)	25v25-2	£25(c)
3 Computers to 1 Printer 36v36-3	£39(c)	25v25-3	£39(c)
4 Computers to 1 Printer 36v36-4	£45(c)	25v25-4	£45(c)
2 Computers 2 Printers X-over 36v36-x	£49(c)	25v25-x	£49(c)
BBC Cable set 3 to 1 (1m ea)	£24(c)		
BBC Cable set 4 to 1 (1m ea)	£30(c)		

BBC Computer Sharer: TCS26 1 computer to 2 printers fitted with BBC cable	£17 (c)

Paper & Labels

Plain fanfold paper with microperforation:

2000 sheets 9½ × 11"	£12 (£3.50)
2000 sheets 14½ × 11"	£18.50 (£4.50)
1500 sheets A4 90gsm	£18.00 (£4.00)

Labels/1000

Single Row 3½ × 1 7/16"	£5 (d)
Triple Row 2 7/16" × 1 7/16"	£5 (d)

PROGRAMMING ACCESSORIES/SOFTWARE

Compatible with B, B+ and Master

EpromRyter (Epromer II) Eprom Ryter is compatible with BBC Master only. See page 7.	£119 (b)
Upgrade of Epromer II to Eprom Ryter (Please return your Epromer II)	£49 (b)
EPROMER II	£89 (b)
MPROMER	£49 (c)
META ASSEMBLER	£145 (b)
PORTAL EPROM EMULATOR 512K	£245 (b)
TEAM Disassembler	£145 (b)

EPROM ERASERS

UV1B 6 eproms, safety cutout	£47 (b)
UV1T 6 eproms, timer, safety cutout	£59 (b)

MONITORS

BBC lead incl with all monitors

MICROVITEC 14" RGB Monitors

Please specify plastic or metal case.

Microvitec 1431 Standard Resolution 453 pixels	£179 (a)
Microvitec 1431AP As 1431 + composite video and sound input	£199 (a)
Microvitec 1451 Medium Resolution 653 pixels	£225 (a)
Microvitec 1451AP As 1451 + composite video and sound input	£255 (a)
Microvitec 1441 High Resolution 895 pixels	£359 (a)
Philips 14" RGB Med Res, high contrast screen, TTL/Linear Input, Mono/Colour Switch Sound Input. Seperate controls for brillance and contrast.	£195 (a)

Microvitec 20" RGB/PAL/Audio Monitors

Microvitec 2030CS Standard Resolution RGB/Comp Video	£380 (a)
Microvitec 2040CS High Resolution RGB/Comp Video	£685 (a)
TOUCHTEC-501 Brings genuine touch screen operation on metal cased Microvitec monitors, incl utilities disc with starter and development programs	£239 (b)
TAXAN SUPER VISION 620 12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible	£269 (a)
TAXAN SUPER VISION 625 12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible.	£319 (a)

12" MONOCHROME MONITORS

TAXAN KX 117 Hi Res green etched screen	£85 (a)
TAXAN KX 118 Hi Res Long Persistence (P39)	£90 (a)
TAXAN KX 119 Hi Res amber etched screen	£90 (a)
PHILIPS BM 7502 Hi Res green screen.	£69 (a)
PHILIPS BM7522 Hi Res amber screen.	£75 (a)
PHILIPS BM 7542 Hi Res White screen.	£79 (a)

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£17 (c)
Philips Swivel Base	£10 (c)
Monitor Stand Models B & B+	£10 (c)
Monitor Stand Master	£13 (c)
Double Tier stand Models B, B+ or Master	£24 (b)
Taxan RGB Lead	£5 (d)
Microvitec Lead	£3.50 (d)
Monochrome BNC/Phono Lead	£3.50 (d)

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(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

CAD/DRAWING PACKAGES

NOVACAD
Cad Package for B, B & MASTER.
(See page 5 for specification)

Tracker Ball/Mouse Version (TM)	£49 (d)
TM Version plus Tracker Ball	£94 (d)
TM Version plus Mouse	£79 (d)
Plotter Driver Generator	£15 (d)

MOUSE

AMX MOUSE with SUPER ART (psc specify B, B+ or Master)	£59 (d)
STOP PRESS (Pagemaker)	£32 (d)
EXTRA/EXTRA (utility for the Pagemaker)	£19 (d)
MAX	£17 (d)
STAND ALONE MOUSE (includes horizontal scroll lock)	£34 (c)
RB2 TRACKER BALL RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£59 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR	£35 (d)

CP/M SOFTWARE

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

Please send for details on our range of CP/M software for Acorn/Torch Z80 2nd Processors

BBC SOFT/FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE	£37 (d)
STARdataBASE	£39 (d)
MASTERFILE II	£17 (d)
ACORN OVERVIEW PACKAGE Special Offer (RRP £86)	£69 (b)

WORD PROCESSORS

**Free VU Type Typing Tutor with any W.P.*

ACORN VIEW PROFESSIONAL (BBC)	£85 (c)
VIEW 2.1*	£35 (d)
VIEW 3.0*	£48 (c)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR	£7 (d)
VIEWSPELL	£29 (d)
DOT PRINT PLUS	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS*	£38 (d)
WYSIWYG PLUS*	£21 (d)
SPELLMASTER*	£47 (d)
INTERWORD*	£39 (d)
WORDEASE	£24 (d)
SPELLCHECK III	£31 (d)
EDWORD II*	£43 (c)

SPREADSHEETS

VIEWSHEET	£37 (d)
WINDOWMATIC	£15 (d)
VIEWPLOT	£22 (d)
INTERSHEET	£37 (d)
INTERCHART	£26 (d)
ULTRACALC	£26 (d)
MINI OFFICE II DISC Version	
For B & B+ 40T or 80T	£14.75 (d)
For Master 80T	£17.30 (d)
For Compact	£19 (d)
MINI OFFICE II ROM Version For Master, Compact, B+ & B	£48 (c)

LANGUAGES

META ASSEMBLER	£145 (b)
TEAM DISASSEMBLER	£145 (b)
MACROM	£33 (d)
ACORN MICRO PROLOG	£62 (d)
ISO-PASCAL	£51 (c)
ISO-PASCAL STAND ALONE GENERATOR	£30 (d)
OXFORD PASCAL (40 or 80T) Specify B or B+	£36 (d)
OXFORD PASCAL for Master	£52 (d)
ACORN LOGO	£46 (c)
LOGOTRON LOGO	£55 (c)
BBC PUBLICATIONS OPEN LOGO	£59 (c)
ACORN LISP ROM	£39 (d)
ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£39 (d)
MICROTEXT	£52 (c)
MICROTEXT PLUS	£229 (b)

COMMUNICATIONS

TERMULATOR	£25 (d)
COMMSTAR II	£28 (d)
COMMUNICATOR	£49 (d)
MODEM MASTER	£11 (d)
COMMAND	£34 (d)
MASTER TERMULATOR	£34.75 (d)

UTILITIES

ACCELERATOR	£49 (d)
ACORN BASIC EDITOR	£24 (d)
MONITOR (BBC Pub)	£19 (d)
BROM PLUS	£26.50 (d)
SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
TOOLBOX 2 (BBC Pub) Manual	£9.50 (d)
Cassette	£9 (d)
ACORN GXR GRAPHICS ROM specify B or B+	£24(d)
PRINTMASTER	£24 (d)
PRINTWISE	£24 (d)
DUMPMASTER	£26 (d)
FONTWISE PLUS	£17 (d)
HERSHEY FONT CHARACTER GENERATOR	£18 (d)
ICON MASTER	£29 (d)
MOVIE MAKER Two Roms + Cassette	£26 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

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ARTROOM	£27 (d)
FONTWISE+	£22 (d)
FONT EDITOR	£22 (d)
RAMROD	£37 (d)
BROM PLUS	£32 (d)
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WHITE KNIGHT MKII	£16 (d)
BBC PUBLICATIONS BUNDLED SOFTWARE	£18.50 (d)

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

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

PRIMARY EDUCATION

ASTRONOMY	£11 (d)
COMPUTERS AT WORK	Aud/EC/disc£16 (c)
PICTURE CRAFT	Disc£17 (d)
INTRODUCING GEOGRAPHY	Disc£16 (d)
MATHS WITH A STORY 1	Cass£8 (d)
MATHS WITH A STORY 2	Cass£8 (d)
NUMBER GAMES	Cass/EC£7.50 (d)
USING YOUR COMPUTER	Cass£24 (c)

SECONDARY LEARNING

TECHNOLOGY & DESIGN Pt1	£21.50 (c)
ELECTRIC FIELDS	£10.50 (d)
ADVANCED LEVEL STUDIES: STATISITICS	Disc£23 (d)
ADVANCED STUDIES: GEOGRAPHY	Cass£10 (d)
INSIDE INFORMATION	Prog Cass£10 (d)
Book£8 (d)	Audio Cass£5 (d)
SCIENCE TOPICS (ST)	
S.T.:WAVES	Disc£14 (d)
S.T.:RELATIONSHIPS	Disc£14 (d)
S.T.:BONDING	Disc£14 (d)
S.T.:ELECTROMAGNETIC SPECTRUM	Disc£14 (d)
S.T.:ELECTRONICS IN ACTION	Disc£14 (d)
S.T.:NEWTON & THE SHUTTLE	Disc£19 (d)
S.T.:ECOLOGY	Disc/EC£19 (d)
S.T.:POLYMERS	Disc/EC£19 (d)
S.T.:CLASSIFICATION & PERIODIC TABLE	Disc£20 (d)
S.T.:FOOD & POPULATION	Disc£20 (d)
SEC.SCIENCE MICROTECHNOLOGY	Cass£7 (d)
SEC.SCIENCE:THE MOLE CONCEPT	Disc/Aud/EC£16 (c)

GENERAL

VU-TYPE PROFESSIONAL	Disc£19 (d)
WHITE KNIGHT MK II (for compact)	Disc£16 (d)
BATTLEFIELDS	Cass£8.50 (d)
A VOUS LA FRANCE	Cass/EC£17 (d)
	Book£5.25 (d)
	Audio Cassettes (2) £7.50 (a)
Additional charges for discs	£9.00 (d)
DEUTSCH DIREKT	Disc/aud/EC£16 (c)
	Book£5.95 (d)
MODEM MASTER	£11 (d)

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.

TECHNOMATIC

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BOOKS

No VAT Carriage Code (c)

LANGUAGES	
6502 Assy Lang Prog	£19.95
6502 Programming	£13.95
8086 Book	£23.95
Acorn BCPI User Guide	£15.00
Acorn FORTH	£7.50
Acorn LISP	£7.50
Acorn ISO Pascal Ref Manual	£10.00
Intro to COMAL	£10.00
Intro to LOGO	£7.50
Micro Prolog Ref Manual	£10.00
Introduction to Turbo Pascal	£14.95
Prog the Micro with Pascal	£8.50
The Supervisor's BBC Micro	£10.95
BBC MICRO GUIDE BOOKS	
Inside Information	£8.95
Maths Prog in BBC Basic	£7.95
The Friendly Computer Book	£4.50
Toolbox 2	£10.95
PROGRAMMING/UTILITY	
Advanced Sideways Ram User Guide	£9.95
Advanced User Guide (BBC)	£15.95
Applied Assembly Language on the BBC	£9.95
BBC Micro Advanced Programming	£9.95
BBC Micro Ref Guide (B. Smith)	£10.95
BBC Micro Sideways ROM's RAM's	£9.95
Guide to the BBC Rom	£9.95
Beginners Guide to W.P.	£7.95
Mastering Assembly Code	£8.95
Mastering Interpreters & Compilers	£14.95
Master Operating System	£12.95
Mastering View, Viewsheet & Viewstore	£12.95
View by B. Smith	£12.95
View 3.0 User Guide	£9.00
Viewstore User Guide	£9.00
Viewsheet User Guide	£9.00
Wordwise Plus	£9.95
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Computer Graphics & CAD Fundementals	£9.95
Mastering Music	£6.95
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Advanced Disc User Guide	£16.95
Disc Book	£3.50
Disc Programming Techniques	£7.95
Disc Systems	£6.95
File Handling on the BBC	£6.95
Discovering Disc Drives	£POA
Practical Disc File Techniques	£5.95
Mastering the Disc Drive	£12.95
Mastering DOS plus	£12.95
APPLICATIONS	
Interfacing Proj for BBC	£6.95
BBC and Small Business	£5.75
The Software Business	£5.50

Mastering Operating System
(David Atherton) £12.95

WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

WYSIWYG PLUS is designed to work with the following systems:

BBC Model B
BBC Model B+
BBC Master 128
BBC Compact

6502 Second processor,
Turbo coprocessor
All printers (Except lasers)

WYSIWYG PLUS workspace is relocatable.

WINDOWMATIC

All users of Acorn's VIEWSHEET spreadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in up to 10 seperate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although VIEWSHEET allows configurations to be saved to the media, it does not have provision for deciphering them.

WINDOWMATIC has been produced with the intention of rectifying these shortcomings and to bring out the very best from VIEWSHEET.

WINDOWMATIC provides a quick and easy way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate graphic representation of the screen and printer output.

The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.

WINDOWMATIC is compatible with BBC Master and BBC B+. A 6502 2nd processor must be fitted to a model B to run Windowmatic. Windowmatic is fully compatible with Turbo and 6502 2nd processor.

The program is supplied on disc with a comprehensive manual.

VU-TYPE

Do you have finger trouble when typing?
Do you letters look like this?

Dear Sor,
I wuold like to .....

then you need:

VU-type, a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

Available at a special price of £7.50(d)
instead of the usual £15. Offer valid while stocks last

EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover
Wordplay
Pantry Antics
Drawstick
Locomotion

These programs are supplied from the BBC Publications Educational Software range and will be supplied on a 5.25" disc for BBC Master, B+ and B and on a 3.5" disc for the Compact.

5.25" Disc	£17.50(d)
3.5" Disc	£18.50(d)

(Normal RRP over £40)

PRINTER ACCESSORIES

EPSON ACCESSORIES:	
Interfaces	
8143 RS232	£30 (d)
8148 + RS232 + 8k	£65 (d)
8177P NLQ for FX80 +/FX100 +	£99 (d)
Parallel & Serial Buffers of various size also available.	
LQ800 Tractor Feed	£47 (b)
LQ1000 Tractor Feed	£52 (b)
SHEET FEEDERS:	
LQ800	£135 (b)
LQ1000	£179 (b)
EX800	£135 (b)
EX1000	£309 (b)
FX800	£135 (b)
FX1000	£179 (b)
Ribbons:	
RX/FX100/100 +, FX105	£7 (d)
RX/FX80/80 +, FX85	£4 (d)
LX80/LX800	£4.50 (d)
LQ800	£8.50 (d)
LQ1000	£10 (d)
EX800/1000	£7.50 (d)
H180 Pen Set (Aqueous/Ball point)	£8.25 (d)
HITACHI 672 Plotter	
Aqueous Pen Set six pens	£18.50 (d)
Oil Based Pen Set six pens	£25.00 (d)
TAXAN CANON Accessories:	
Ribbon, KP810/815/910/915	£6 (d)
Star Printer	
NL10 Sheet Feeder	£52 (b)
NL10 Ribbon	£4.50 (d)
National Panasonic KX P1080/81	
Spare Ribbon	£4.50 (d)
KXP3131 Tractor	£90 (a)
KXP3131 Sheet Feeder	£189 (a)
JUKI 6100	
Tractor Feed	£149 (a)
Ribbon (Carbon)	£2.00 (d)
Sheet Feeder	£219 (a)
BROTHER HR20	
Tractor Feed	£116 (a)
Spare Ribbon Nylon	£3.00 (d)
Spare Ribbon Carbon	£4.50(d)
INTEGREX INK JET COLOUR PRINTER	
Spare Ink Cartridge Black	£9 (d)
Spare Ink Cartridge Colour	£15 (d)
Paper Roll	£7 (d)
Printer Leads:	
BBC Parallel Lead (1.2m)	£6 (d)
PAPER & LABELS	
Plain Fanfold paper with micro perforations:	
2000 sheets 9½" × 11" 60 gsm/sq m	£12 (£3.50)
2000 sheets 14½" × 11" 60 gsm/sq m	£18.50 (£4.50)
1500 sheets A4 90 gsm	£18 (£3.50)
Labels/1000:	
Single Row 3½ × 1$\frac{7}{16}$"	£5.25 (d)
Triple Row 2$\frac{7}{16}$" × 1$\frac{7}{16}$	£5 (d)

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(d) £1.00

NOVACAD

Computer Aided Draughting for the BBC Micro

> *"Novacad can drive a plotter to provide drawings of a high quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use."* **Beebug December 1986**

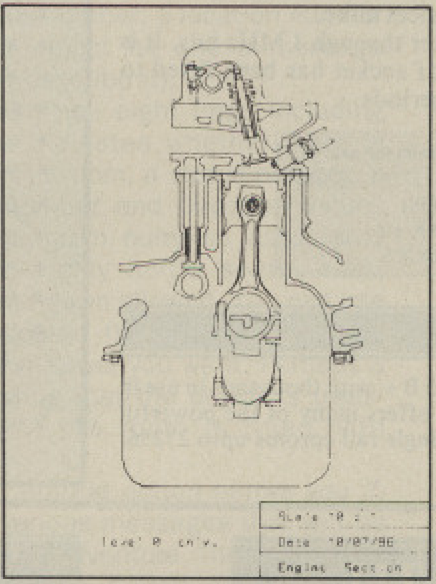
> *"Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, "the best on the market"."* **A&B Computing August 1986**

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

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

NOVACAD'S MAJOR FEATURES

- Simple and easy to use with logical command sequence.
- A large drawing area (approx 15 screens).
- The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
- A zoom facility allowing magnification of up to 20 times to insert finer details.
- Block copy of shapes on the screen for repetitive use.
- Text entry at any 90° orientation at any position on the screen.
- Create multi layer drawing with 8 levels available.
- Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
- Printer routine for Epson 80 and 136 column printers.
- A unique optional facility to output to any BBC compatible plotter.
- Cursor control from keyboard, tracker ball or mouse.



NOVACAD is compatible with all BBC models fitted with Acorn DFS. It has minimum hardware requirements of a single drive and a Epson compatible printer to get started though NOVACAD will utilise fully a dual drive system and 6502 2nd processor or the shadow ram on the B+ series. To obtain high quality drawings we recommend a BBC compatible plotter and our plotter driver generator.

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC+ or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

NEW REDUCED PRICE

£49(d)

Plotter Driver Generator £15(d)

OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

BBC SPARE PARTS

BBC B & General

Power Supply	£52.00 (b)
Keyboard Connector	£5.00 (d)
Complete Keyboard	£52.00 (b)
Keyswitch (state type)	£1.75 (d)
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PAL16RH	£18.00 (d)
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Keyboard	£65.00 (b)
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CF30058 ULA	£15.00 (d)
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2nd PROCESSORS

ULA (512)	£34.00 (d)
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TECHNOMATIC
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EpromRyter

*Highly sophisticated & Advanced Programmer

*Handles all current single rail Eproms

*State of the Art Programming Algorithms

EpromRyter is a powerful eprom programmer designed for use with the BBC Master Computer. It takes full advantage of the latest developments in the eprom technology and the extra facilities on the Master to provide fast, simple and efficient programming and editing facilities.

The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1 MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

The single rail eproms handled by the EpromRyter are:
●2716 2732 2764 27128 27256 27512 27513 27011
2516 2532 2564 (NMOS & CMOS)
●One time eproms P27XXX, 87CXXX etc.
●Also A suffix eproms such as 27XXXA

EpromRyter

The main features of the programming software are:
- Device, function and voltage selection from the computer keyboard.
- Continuous display of the options selected.
- All eproms upto 27512 (64K) programmed in single pass.
- Automatic Intelligent identifier support for eproms able to respond.
- Selectable programming voltage 25/21/12.5V
- 3 programming methods: Normal, Intelligent & Pulse (30 sec for a 27128).
- Serial port protocols supported incl Intel Hex & Motorola S.
- DFS, NFS, ADFS and Rom Filing System Supported.
- BASIC/Machine Code programming using RFS.
- Powerful editor with input in HEX or ASCII. * Full editable 64K file.
- Block move of data within the address range.
- User can select any section of the eprom from single byte to the full address range to blank check/burn/verify. Facility to program single bytes makes program development/amendment simpler.
- Multiple loading for ROM Filing System

Some of the above features apply to Master Computers only

EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request.

META Version III

"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach."
Acorn User October 1986

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF supression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second — No "erase" time.
- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-post cable.
- Complete with all cables, manual and disc.

PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512).

TEAM DISSASSEMBLER

The third part of the Universal Development System: a Meta labelling dissassembler.

Supports 1802, 8080, 8085, HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc):

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
- Pre-editing stage allows marking of object code areas as byte, string, word, long word etc, tables. These areas dis-assembled into appropriate directives instead of garbage mnemonics.
- Reconstituted source code ready for immediate re-assembly by META.
- Omniversal search/replace for re-naming arbitary label names with meaningful ones.

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Return to Technomatic Ltd, 17 Burnley Road, London NW10 1ED

Steve Turnbull examines a new way of writing adventures

Quest for a language

WRITING high-quality adventure games has always required both brilliant creativity and great expertise in machine code programming. This apparent conflict in abilities has resulted in few truly original adventure games and even fewer skilled adventure writers.

It has also resulted in the development of adventure-writing packages to make it easier for those with more ideas but less skill.

There are two ways these packages have developed. To one extreme are the hand-holding programs which limit what you can do but require an absolute minimum of programming skill (although logical thought is always required). At the other extreme are new programming languages which contain commands and functions to make the adventure writer's life easier, but still allow free expression.

The latest example of the latter is Alps (adventure language and programming system) from Summit Software. It comes on a 16k rom with a utilities disc and a manual of 32 photocopied A5 pages with a card cover. The manual contains everything you need to know about Alps, but sometimes it's a bit hard to find the relevant information.

The best way to test a system like this is to write a game on it and I chose the small adventure from Peter Killworth's book on writing adventures. Though short, the four-room scenario contains the main elements of a good adventure. You simply need to find the crown and put it on before you drown in the rising water. Converting this adventure proved that it is quite easy to use Alps.

There are four editing sections in the program – objects, rooms, text and program. Each object can have eight true/false flags, of which two are already defined to indicate *object is a light source* and *object can be taken*. There is also a status number, a location number (where the object is) and a message number (to describe it).

Product: Adventure Language Programming System
Price: £28.95 (disc) £27.95 (cassette)
Supplier: Summit Software, 58 Oakdene Park, Craigavon BT63 5SB.
Tel: 0762 42510

Each room has eight flags including one which indicates whether light is present in the room, a status number, a message number and direction values with exit program numbers associated with each – only north, south, east, west, up and down allowed. You can use the undedicated flags for objects and rooms for whatever you want: Perhaps a flag indicating that the object is treasure, or that the room is filled with smoke.

The text editing option allows you to write the various messages that will be printed by the adventure. The first 12 are reserved by the system for particular messages like *You can't do that!* – but you can change the wording to suit your style.

One special feature of the text system is the message switching option which allows different wordings to be printed depending on the status value of the object or room being described. For example in the little adventure I wrote the shield is usually described as:

```
an old Anglo-Saxon shield
```

But when the shield is worn the status value is altered to two and the message becomes:

```
an old Anglo-Saxon shield
(which you are wearing)
```

And finally when the shield is destroyed by the whirling knives the message:

```
an old anglo-saxon shield
which has been cut into a
thousand pieces.
```

is used. Only 10 switches are allowed, but this is unlikely to be a problem and more than two messages can be chained together.

The compression technique for the text is perhaps the worst feature of the system. It's not automatic and it's up to you to find the most frequently occurring strings and replace them with a single character using two keywords COUNT and REPLACE.

Up to 128 contractions of this type can be used and while the author claims up to 55 per cent compression can be achieved, it would take a lot of effort to attain this and an automatic system would be nicer.

The sections of Alps just described take in the data storage aspect of adventure games. The other section is writing the program itself without which the data is nothing.

The adventure is written with a primitive line editor, but I have been assured that you can use an Ascii word processor in the latest version.

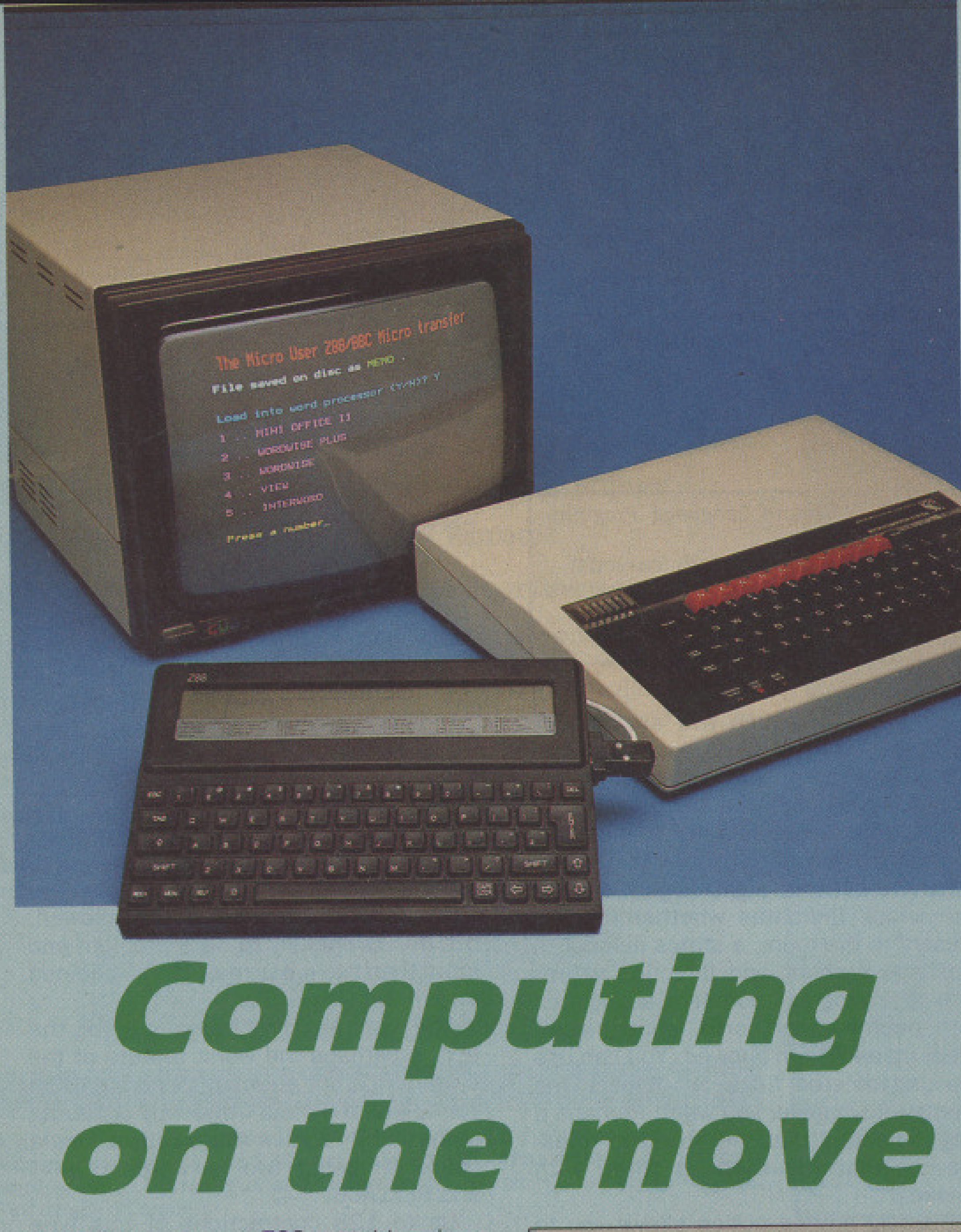
Some of the commands are shown in Figure I and they are uniquely suited to writing adventures. They allow you to print specific messages, adjust object or room flags and status values and so on. You have 52 system variables *A%* to *Z%* and *a%* to *z%* that you can use, some of which have a special meaning. For example *Z%* generates a random number.

Once you have completed your game you can produce a stand-alone commercial version with one of the disc utilities – it was a pleasant experience to find a well-written program which reminded me to put the utilities disc back in the drive when I'd taken it out at the wrong moment.

Apart from the compression technique and the program editor I found the whole of Alps to be friendly and easy to use and of all the systems I've used definitely the one I prefer.

	Flow control
IF...THEN...ELSE **REPEAT...UNTIL** **DEFPROC(n)**	Conditional statement execution. Loop control. Procedure definition.
	Commands
INC(var) **SETOS(o,v)** **SETRF(r,f,v)**	Increment a variable *var* by one. Set status value of object *o* to value *v*. Set flag *f* of room *r* to value *v*.
	Functions
OSTATE(o,v) **EQ(var,v)**	Gives TRUE if the status value of the object *o* is the same as the value *v*. Gives TRUE if the value of variable *var* is the same as value *v*.

Figure I: Some program commands from Alps


The Micro User Z88/BBC Micro transfer
File saved on disc as MEMO
Load into word processor (Y/N)? Y
1 .. MINI OFFICE II
2 .. WORDWISE PLUS
3 .. WORDWISE
4 .. VIEW
5 .. INTERWORD
Press a number_
Z88

Computing on the move

Dave Watts shows how to transfer files from a Z88 to a BBC Micro

CLIVE Sinclair's new Z88 portable micro has much more to offer the BBC Micro user than a very reasonable implementation of BBC Basic.

You'd look pretty silly on the train with a BBC Micro on your lap. But the Z88 lets you word process documents, create spreadsheets or write Basic programs anywhere you wish and then transfer them to your trusty BBC Micro when you get home.

For £24.95 Cambridge Computers will sell you a cable and software to transfer files between the two machines. But, as this article shows, it can be done for much less.

First of all, however, you will need a cable with a series D 9-pin plug at one end to connect to the Z88 and a 5-pin DIN C domino plug at the other to go in the RS423 socket on the BBC Micro.

Figure I shows the wiring. Both connections are from the point of view of looking at the sockets on the machines.

The software you need is a standard terminal program, adapted from a listing in the Advanced User Guide but with a few handy additions.

The default serial rates for the BBC Micro and the Z88 are both 9600 baud, so there are no problems in that respect. The Z88 sends files as follows:

```
ESC"N"
  Filename
ESC"F"
  File
ESC"E"
```

Our listing – IMPORT – asks for a filename, opens it on the BBC drive, then starts SPOOLing the file from the Z88 after ESC"F" has been detected. When ESC"E" is received the file is closed automatically.

Once you have entered the listing and made the lead, transferring files just involves the following simple steps:

- Type your text on the Z88. It makes sense to use the same line length that you use on your BBC Micro word processor.
- Save the text to the Z88's ram, ensuring that the Save Plain Text option is set to Yes. This means that no control codes will be in the saved file.
- Run the program IMPORT on your BBC micro.
- When you are prompted, send the file from the Z88, using the Import/Export facility.
- You are then offered the option of going straight into a word processor. If you press Y you will be presented with the options shown in Figure II.
- Just select the appropriate one and you'll be taken to the Edit mode with the file ready loaded.

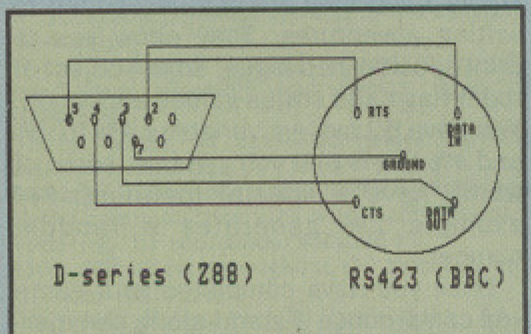


Figure I: The wiring diagram for BBC Micro to Z88 file transfers

```
1 .. MINI OFFICE II
2 .. WORDWISE PLUS
3 .. WORDWISE
4 .. VIEW
5 .. INTERWORD
```

Figure II: Word processor options available

Z88 specifications at a glance

Processor:	CMOS Z80 (3MHz)
Rom:	128k (includes dos, applications software and BBC Basic)
Ram:	Battery backed and expandable by 32k, 128k, and 1Mb cartridges to 3Mb
Screen:	Epson super-twist LCD, 8 x 80 characters, 64 x 640 pixels
Keyboard:	Qwerty 64-key membrane
Power:	4 alkaline cells or optional mains adapter (£9.95)
Size:	293mm(11.5in) x 209mm(8.25in) x 23mm (.87in)
Weight:	.85kg(1.87lb)
Interfaces:	RS-232 serial port, Z80 expansion bus plus slots for three expansion cartidges
Software:	Word processor, spreadsheet, database, diary, calendar, clock and alarm
Price:	£249.95

AUTO
RENUMBER
CLS
FN
INPUT#
OSCLI
REPEAT
STEP
ABS
COS
EXP
LN
PAGE
INKEY$
LOMEM
POS
SQR
TRUE
EOR

DELETE
TRACE
DATA
FOR
LET
PRINT
REPORT
STOP
ACS
COUNT
EXT#
LOG
PI
INSTR
MID$
PTR#
STR$
USR
NOT

LIST
BPUT#
DEF
GOSUB
LOCAL
PRINT#
RESTORE
TAB
ASC
DEG
FALSE
SGN
TIME$
INT
OPENIN
RAD
STRING$
VAL
OR

LISTO
CALL
DIM
GOTO
NEXT
PROC
RETURN
THEN
ASN
EOF#
GET
SIN
TOP
LEFT$
OPENOUT
RIGHT$
TAN
VPOS
WIDTH

LOAD
CHAIN
ELSE
IF
ON
PUT
RUN
TO
ATN
ERL
GET$
MOD
AND
LEN
OPENUP
RND
TIME
DIV

NEW
CLEAR
END
INPUT
ON ERROR
READ
SAVE
UNTIL
BGET#
ERR
HIMEM

OLD
CLOSE#
ENDPROC
INPUTLINE
OPT
REM
SPC
VDU
CHR$
EVAL
INKEY

Not supported:
CLG
ENVELOPE
DRAW
ADVAL
MOVE
*COMMANDS
COLOUR
SOUND
GCOL
MODE
PLOT
POINT

Figure III: The Z88 Basic commands

BBC Basic on the Z88

BBC Basic is accessed from the Z88 menu, and most of the commands you know and love are supported. Enter:

```
PRINT HIMEM-PAGE
```

and you get:

```
7424
```

Type:

```
AUTO
```

and the line numbers appear for you to start programming – seems familiar?

A serious omission is the lack of any line editing facilities, so most users will probably write programs in the Pipedream word processor rather than in the Basic environment, for transfer later to a BBC Micro. The Z88 manual explains a fix that will enable you to do this.

The 100-column, 8-line LCD screen won't run graphics, of course, and if you issue a graphics command you see a polite:

```
Sorry, not implemented
```

This doesn't stop you writing programs with graphics commands – you just can't test them until you've transferred the file to your BBC Micro.

For simple number-crunching and statistical applications, however, a BBC Basic program running on the Z88 would be fine. The commands PRINT#, INPUT# and so on are supported so data storage (to the Z88's ram) is possible. A list of which commands are recognised and which are not is shown in Figure III.

```
   10 REM IMPORT
   20 REM By Dave Watts
   30 REM (c) The Micro User
   40 CLOSE#0
   50 *FX2,2
   60 *FX7,7
   70 MODE3
   80 INPUT"Filename to save on BBC dis
 c ";:INPUT file$
   90 osbyte=&FFF4
  100 lastchar%=0:newchar%=0:textstart%=
 FALSE:eof%=FALSE
  110 PRINT''"Now send file from Z88.... "
  120 OSCLI("SPOOL "+file$)
  130 REPEAT
  140 A%=138:X%=2
  150 IF ADVAL(-1)>0 AND ADVAL(-3)>0 THE
 N Y%=GET:CALL osbyte
  160 *FX2,1
  170 IFADVAL(-2)>0 THEN newchar%=GET
  180 IF lastchar%=27 AND newchar%=70 te
 xtstart%=TRUE:GOTO230
  190 IF NOT textstart% GOTO230
  200 IFlastchar%=27 AND newchar%=69 eof
 %=TRUE:GOTO230
  210 IFnewchar%=27 GOTO 230
  220 IFADVAL(-2)>0 THEN VDU newchar%
  230 lastchar%=newchar%
  240 *FX2,2
  250 UNTIL eof%
  260 *SPOOL
  270 MODE7:PRINT
  280 FORI%=1TO2:PRINT CHR$141CHR$129"Th
 e Micro User Z88/BBC Micro transfer":NEX
 T
  290 PRINT'" File saved on disc as";CHR
 $130;file$;CHR$135;"."
  300 PRINT''CHR$134"Load into word proc
 essor (Y/N)?";
  310 REPEAT:G$=GET$:UNTILG$="Y"ORG$="N"
  320 PRINT" "G$:IFG$="N" END
  330 PRINT'CHR$133"1 .. MINI OFFICE II"
  340 PRINT'CHR$133"2 .. WORDWISE PLUS"
  350 PRINT'CHR$133"3 .. WORDWISE"
  360 PRINT'CHR$133"4 .. VIEW"
  370 PRINT'CHR$133"5 .. INTERWORD"
  380 PRINT''CHR$131"Press a number";
  390 ONGET-48GOTO400,410,420,430,440
  400 command$="*WP"+CHR$13+CHR$143+CHR$
 143+CHR$13+file$+CHR$13+CHR$27:GOTO450
  410 command$="*W."+CHR$13+":N."+CHR$13
 +"2"+file$+CHR$13+CHR$27:GOTO450
  420 command$="*W."+CHR$13+"N"+CHR$13+"
 2"+file$+CHR$13+CHR$27:GOTO450
  430 command$="*WORD"+CHR$13+"L"+file$+
 CHR$13+CHR$27:GOTO450
  440 command$="*IW."+CHR$13+"2"+file$+C
 HR$13+CHR$27:GOTO450
  450 MODE7
  460 FORprocess%=1TOLEN(command$)
  470 Y%=ASC(MID$(command$,process%,1)):
 X%=0:A%=138:CALLosbyte
  480 NEXT
  490 END
```

The Z88 itself

Is it worth shelling out £249.49 to get a Z88? If you're often away from your BBC Micro I'd say yes.

You can have instant access to a few spreadsheets in a meeting, type the minutes as the meeting progresses, then at home or in the office transfer the file to a BBC Micro for further processing and print-out. You can also knock up Basic procedures on the train, then transfer them at home.

Another point of interest to the BBC Micro owner is that Pipedream has the same file structure as View Professional and the files are compatible.

It has to be said, though, that the Z88 doesn't sport the sturdiest physical construction ever and I don't think it would last long in the average classroom or on a building site. But it's an elegant machine, reasonably priced, and with 128k of excellent software on rom.

Irreverent note

The first Z88s came with a temporary operating system containing a few bugettes. Cambridge Computers wrote to customers offering to upgrade their machines – free of charge.

I remember in the early days of the BBC Micro having to pay extra for an operating system that actually worked.

Not only that, but those nice people at Cambridge Computers sent an eprom cartridge, also free, to save any important data on before the machine was sent away for upgrading. A few Brownie points to Sir Clive.

Get it right!

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = 9EE3 3
 50 = 6140 9
 60 = DA15 D
 70 = CA78 F
 80 =  46F C
 90 = 7966 4
100 = 9CE9 5
110 = EC4D 0
120 = 6CE3 E
130 = BFBA 4
140 = DD48 1
150 = 2404 7
160 = 5123 0
170 = 8BC8 1
180 = FE27 E
190 = 3F49 1
200 =  256 3
210 = 88E7 B
220 = 482B C
230 = 4C8A 1
240 = 6140 3
250 = 50CD D
260 = 98F7 8
270 = CFA0 F
280 = 85EF C
290 = 100B 4
300 = 7D42 3
310 = 54CB C
320 = 2E37 B
330 = 6D2E E
340 = D6FA 9
350 = 7706 F
360 = 8833 F
370 = 1FC9 6
380 = 474C 3
390 = CF4C 5
400 =  F54 0
410 = C91D D
420 = A5DE 8
430 = D1B6 0
440 = E80C 8
450 = 8AFC F
460 = CEA0 4
470 = 3712 A
480 = 2C83 8
490 = FD2E 7
```

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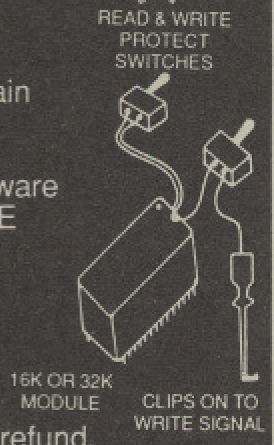
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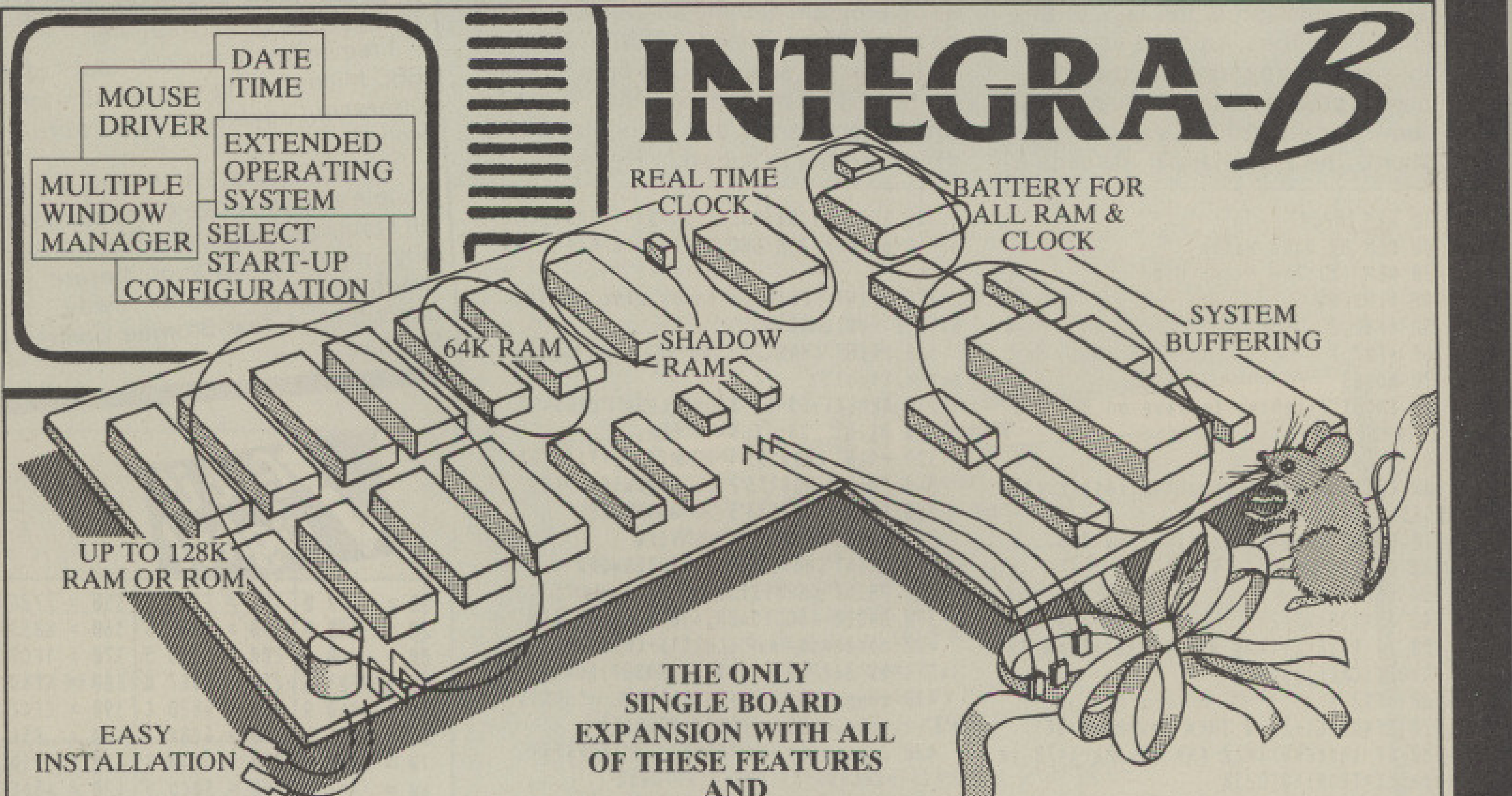
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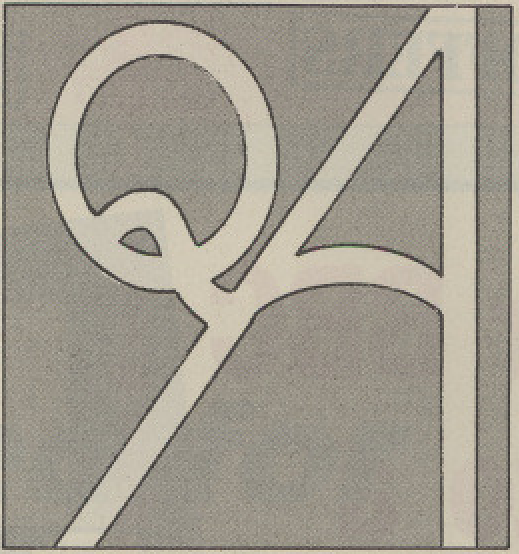

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Q **I have heard that the maximum number of colours on the Archimedes is 256. Does this mean I can select 256 shades of blue?**

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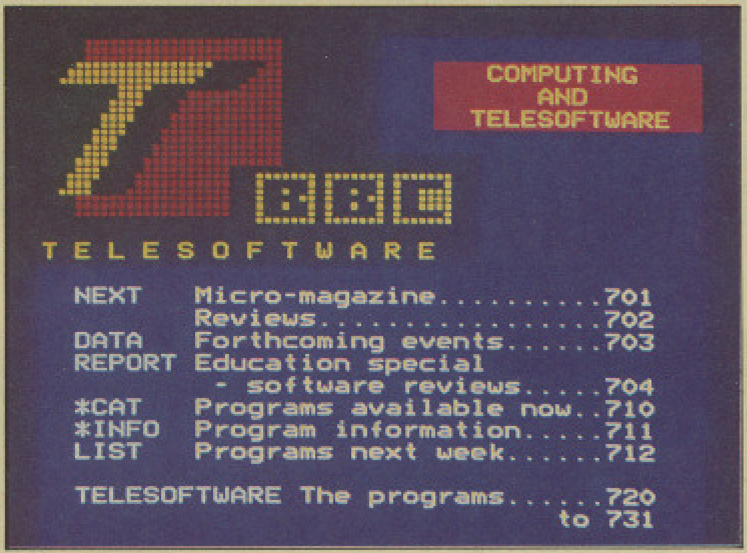

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TO ORDER TURN TO THE FORM ON PAGE 173

Spoiled for choice?

Steve Gold explains what to look for when buying your first quality modem

WHEN I bought my first modem – way back in 1983 – my choice was fairly limited, mostly in terms of price. In 1983 the modem market for BBC Micros was split into the sub-£100 bracket for acoustic 300/300 and 1200/75 baud modems, while you had to look at spending £300 or more even for a simple direct-connect no frills model.

Today the situation is very different. Modems are even being given away by some online services in a bid to get subscribers to sign on the dotted line for a year or more.

So what criteria should the beginner apply when he sets out to choose a modem?

To my mind (and I would stress this is a personal opinion only – based on several year's usage), the key factors to be borne in mind when choosing a modem are – in no particular order – price, Hayes compatibility, ease of use, and reliability of construction.

As with most things, price is a major factor in the modem market. Ignoring the freebie modems (which are generally costed in with your first year's subscription to the service offering it), the cheapest modems on the market today start at around the £20 mark.

For your money you usually get a direct-connect unit (a modem that plugs straight into a telephone socket) that has a simple switch taking it on or off line as required. Most of the modems in this price bracket work at 1200/75.

For the beginner, such modems are ideal for the first few months, but automated logons – so necessary for the smooth operation of communications programs – save a lot of time and effort for the ex-novice. The route to automated logons is good communications software and Hayes compatibility.

The Hayes standard – sometimes called the Hayes protocol – is a simple modem control language first used by the Hayes modem corporation in the US. Developed by Dennis Hayes, the modem company's owner, it first appeared in Hayes modems in the early part of this decade.

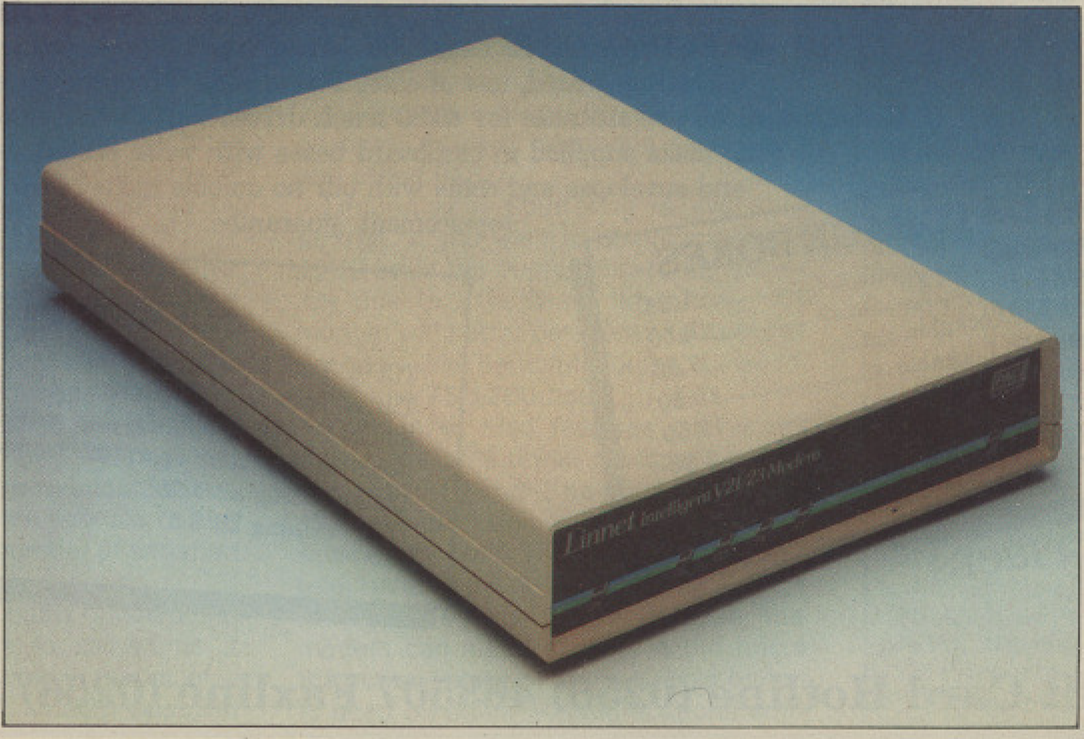
As is so with all good ideas, the Hayes command language is fairly simple by design. All commands to the modem (whilst in an off-line state) are prefixed by the command AT (short for ATtention) and subsequent commands are mnemonic. A list of the basic commands

Turn to Page 139 ▶

A	*Answer call*
C	*Carrier control C0=OFF, C1=ON*
D	*Modem dialing prefix*
E	*Echo commands E0=OFF, E1=ON*
F	*Echo data F0=ON, F1=OFF*
H	*Take modem off line (hang up – used in conjunction with +++ command prefix – see below)*
I(n)	*Display identity (n=0,1,2)*
L(n)	*Speaker loudness (n=1,2,3)*
M(n)	*Monitor status (n=0,1,2)*
N	*Display/set number store*
O	*Go online*
P	*Pulse dialing prefix*
R	*Reverse to answer after dialing*
T	*Tone dialing prefix*
W	*Wait for secondary dial tone*
Z	*Modem resets*

+++ Instructs modem to interpret next command string locally and not transmit the string. Usually used to take modem off line using the H command above. For example +++ ATH. This command set may vary from modem to modem.

Figure I: The basic Hayes command set



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in the Hayes command language set is given in Figure I.

Unlike several other proprietary modem control systems of its genre, the Hayes command set was placed into the public domain by Hayes, so that other modem manufacturers might adopt the standard – thereby making it universal.

The idea caught on and by 1983 the majority of medium to high-priced modems on sale in the US had some form of Hayes command language built into them.

At that time modems were only just beginning to penetrate the home and small business user market in the UK. As with most American originated ideas (good or bad) it took a few years for the idea of Hayes compatibility to percolate through to the UK modem market.

By 1985, the Hayes command language was beginning to appear in several high-end (£300 plus) modems and – at last – people were beginning to realise what a useful facility the Hayes command set is.

Today, most modems priced above the budget market (£20 to £50) are Hayes compatible, or have a low-cost option for the facility to be fitted by the modem manufacturer.

Ease of use is another important criteria that is often overlooked by many modem buyers and, amazingly, modem designers themselves.

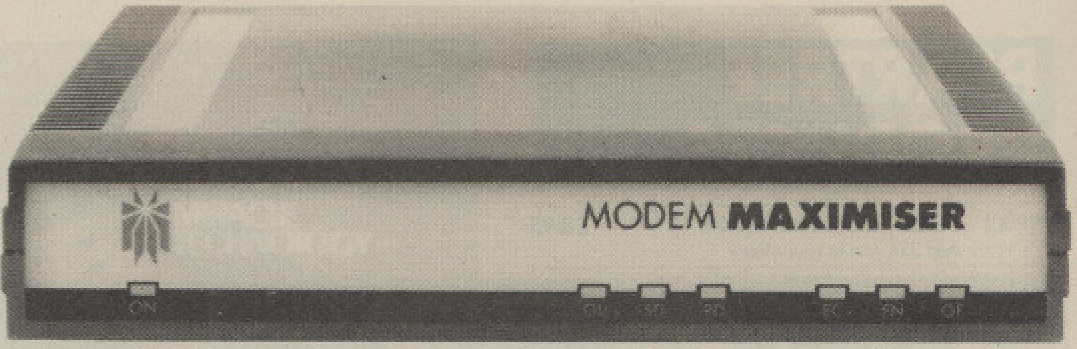
Hayes compatibility is a major step towards ease of use, but some modems (which shall remain nameless) have a front-panel control system that defies all logical explanation.

Because the Hayes command language is so comprehensive, most of the modems on sale today only need one control switch on the unit itself – the on/off switch – the remainder of the modem controls can easily be handled by a series of Hayes commands piped down the modem's serial port.

Like a good car, the quality of a modem's construction – its pedigree if you like – can usually be spotted by careful examination of the case.

Tell-tale signs such as slippage marks at the point where screws or retaining clips are fitted, along with a bad finish generally, tend to indicate a modem is not professionally produced. If it is relatively new on the market, the casing's lack of finish may be due to the modem being hand-built, but you should question your dealer thoroughly as to the number sold and the number of satisfied customers.

If the modem looks badly finished and has been on the market for some time, it is best to reject the unit in favour of a better one. The BABT modem approval regulations – as well as your guarantee rights – forbid you to open up the modem box, so the internal construction can only be easily assessed by its outward appearance.



The Miracle Modem Maximiser

For illustrative purposes only I've chosen the Pace Linnet Hayes compatible modem to look at and explain how the theory behind this article comes into practice.

The Linnet comes in a small beige box about half the height of a modern BBC Micro disc drive, and with about the same footprint. On the front of the unit is a grey-green display panel along with six red status lights, which indicate the current state of the modem.

> **'Outward appearances count for a lot'**

As well as using the Hayes command set, the Linnet is capable of pulse and tone dialing – useful for speed-dialing on more modern telephone exchanges and office PABXs.

Limited speed-buffering is available so that, if you wish to communicate at 1200 baud full duplex constantly (possibly due to a software limitation), the modem will buffer data down to its three speeds – 300 baud full duplex, 1200/75 baud and 75/1200 baud.

The Linnet also features call monitoring. Via an internal loudspeaker and semi-intelligent line sensing, the modem can recognise dial, engaged and number unobtainable tones found on the telephone network. By returning special result codes via its serial port, the modem can signal to your Acorn micro the current state of the call. This option is used on some communications software packages for unattended auto-dialing.

As with many modems in the £139 to £195 price bracket, the Linnet is auto-answer and can thus be used in a computer-based bulletin board system.

Also like several of the latest generation of modems, the Pace Linnet is entirely software controlled. Commands sent via its serial port are interpreted by an onboard eprom and translated into specific modem commands. The software – which occupies a single 16k eprom on the modem's PCB – functions in a similar fashion to your BBC Micro's Basic interpreter, translating the Hayes commands into direct instructions to the modem components.

Modems are changing all the time and recently another manufacturer – Miracle Technology – unveiled an add-on, the Modem Maximiser.

Designed to complement any Hayes-compatible modem, the Maximiser costs £225-00 (£99-00 extra for the data encryption option), and adds a range of features to even the most basic of Hayes-compatible modems.

Features of the Maximiser include: Error-correction to Mpad, Epad and Xmodem protocols, data compression and encryption, data storage – a 16k serial buffer comes as standard, 9600 baud speed buffering, and a centronics printer port for connection to a printer in the absence of your computer being switched on.

Although the Maximiser is a rather pricey add-on for many modem owners, it does indicate the way that the modem market is going. It seems more than likely that at least some of the facilities found on the Maximiser will be incorporated in future generations of modems, in much the same way that the Hayes command set is almost universal in today's quality modems.

Further details are available from:
Pace Linnet: Pace Micro Technology, Allerton Road, Bradford, BD15 7AG.
Tel: 0274 488211.
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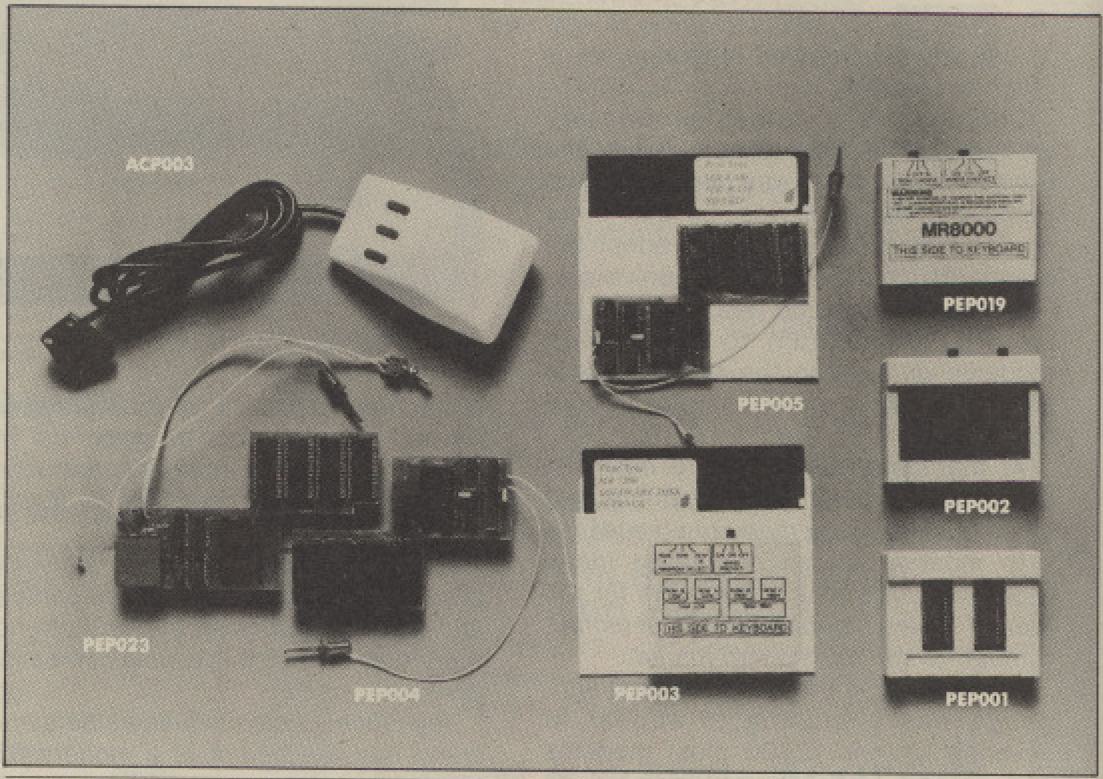
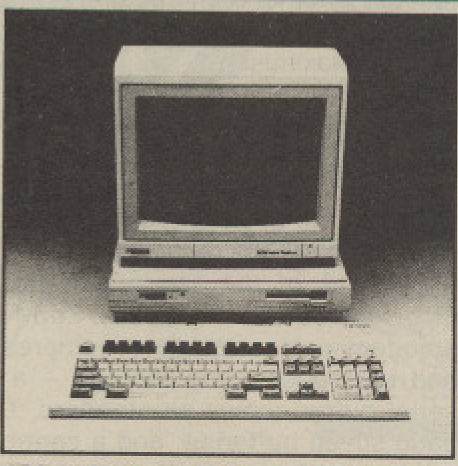


Archimedes



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State of the art

Gary Partis on writing commercial software

IMAGINE the scene: It is a humid day in the summer of 1983 and a 16 year-old youth sits in front of a hot, overworked BBC Micro pondering over what to devise next.

Within hours a basic conception is forming, with the main program structure beginning to take shape. In a couple of days, a fully working and tested version is posted to several software houses for evaluation.

A few weeks later the contract is signed and the programmer's work is finished. Months later, it would be on the shelves, selling thousands of copies, and earning its creator a handsome sum.

Unfortunately, this was over four years ago, and times have changed. Multiply the time scale by a factor of 10 to 20 and divide the earned income by 2 to 10 and we arrive at the present situation.

Today's programmers seem to be carrying out much more work for a lot less reward. In any other line of business this would provoke an outcry from those affected, but not, strangely, in the computer industry.

It's not because the quality of programming is deteriorating – but because the market expects products which are pushing programmers to their creative limits, and does not expect to pay extra for the results.

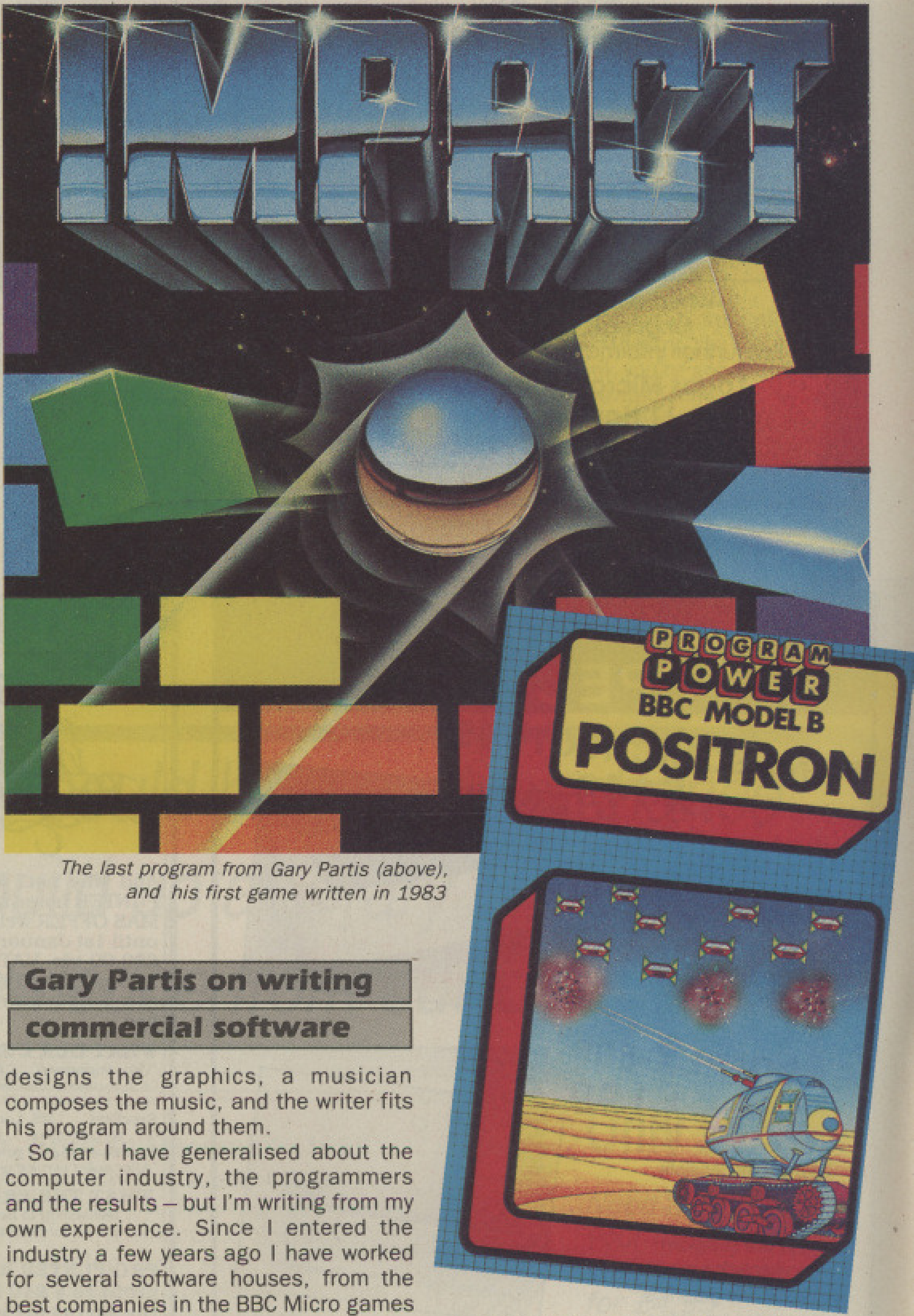
Although most software houses give the programmer a fair deal, in many cases he is hyped by them and this creates an artificial impression which can result in the public coming to expect more from him than is reasonably possible.

I think that programmers from the 1982/3 era of the BBC Micro games market were, in most cases, *real* programmers who produced *real* games. They then inserted some graphics and audio effects to provide the final touch.

That breed of programmer has all but disappeared – I think most have just given it up as a bad job.

Now it seems that the way to write a game is to design some graphics, arrange a couple of sound effects, write a bit of code to pull the whole thing together – then add a lot of hype.

Today's games programs certainly require more creative input in the form of sound and graphics. This is evolving into a new art and the skills needed are usually beyond the programmer himself, so a team is involved: A computer artist designs the graphics, a musician composes the music, and the writer fits his program around them.



The last program from Gary Partis (above), and his first game written in 1983

So far I have generalised about the computer industry, the programmers and the results – but I'm writing from my own experience. Since I entered the industry a few years ago I have worked for several software houses, from the best companies in the BBC Micro games market to the worst.

For the benefit of budding authors, here are a few things to watch out for. But remember: Not all software houses are bad, and some are good at one thing and not so good at others.

- Royalties are often very late for a variety of reasons – or excuses – and often do not agree with sales figures.
- Poor, if any, technical support is given to the programmer.
- On the management front, there is often a poor turnaround time for correspondence. It's vital that all major decisions and agreements are written down because software companies fre-

Turn to Page 143 ▶

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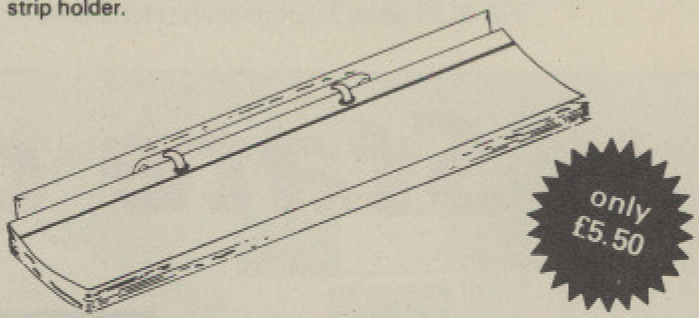

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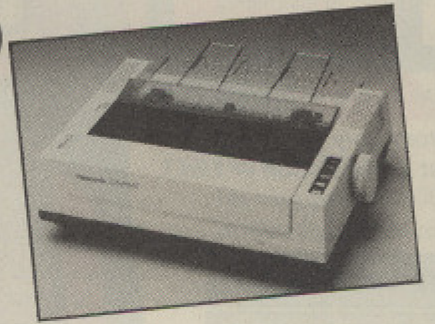

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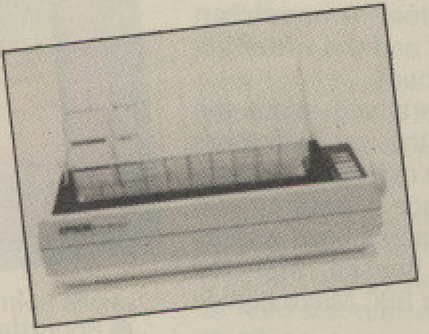

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◀ From Page 141

quently change their minds and fail to be decisive over important matters.

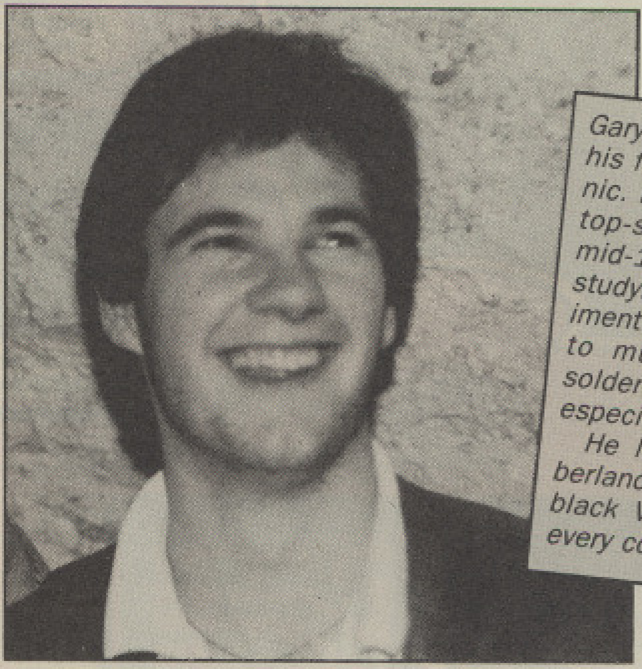
- The use of ambiguous contracts can land the programmer in trouble over what's happening with a product.
- Bad personal relations within the software house can interfere with marketing, even when the programmer himself has nothing to do with it.
- There are areas that the programmer can't control himself, but which can affect him directly, such as when the software house doesn't market the goods in an acceptable form, or uses too much hype.

I have three general rules for being a successful computer games programmer and I think they are realistic: First, never allow affairs of the heart to interfere with programming – or vice versa. It can be very embarrassing.

And don't, under any circumstances, sign any long term contracts – you will regret it. Finally, don't sign the first contract offered: Shop around to find the best deal and take recommendations from other programmers about which software house to work for.

As you may have gathered, I'm pulling out of the games writing business. But I will continue to work as a consultant/troubleshooter so I can still make a living out of the industry.

But, if you think you're good, and you can take the inevitable hassle, by all means go ahead. And good luck to you – you'll need it.



Gary Partis is a 20-year-old student in his final year at Newcastle Polytechnic. He is the author of a number of top-selling games dating back to mid-1983 with Positron. When not studying, he enjoys driving, experimenting with car engines, listening to music, waving around a hot soldering iron, karate training and especially socialising.

He lives in Bedlington, Northumberland, with his parents and drives a black Vauxhall Cavalier SRi – with every conceivable extra.

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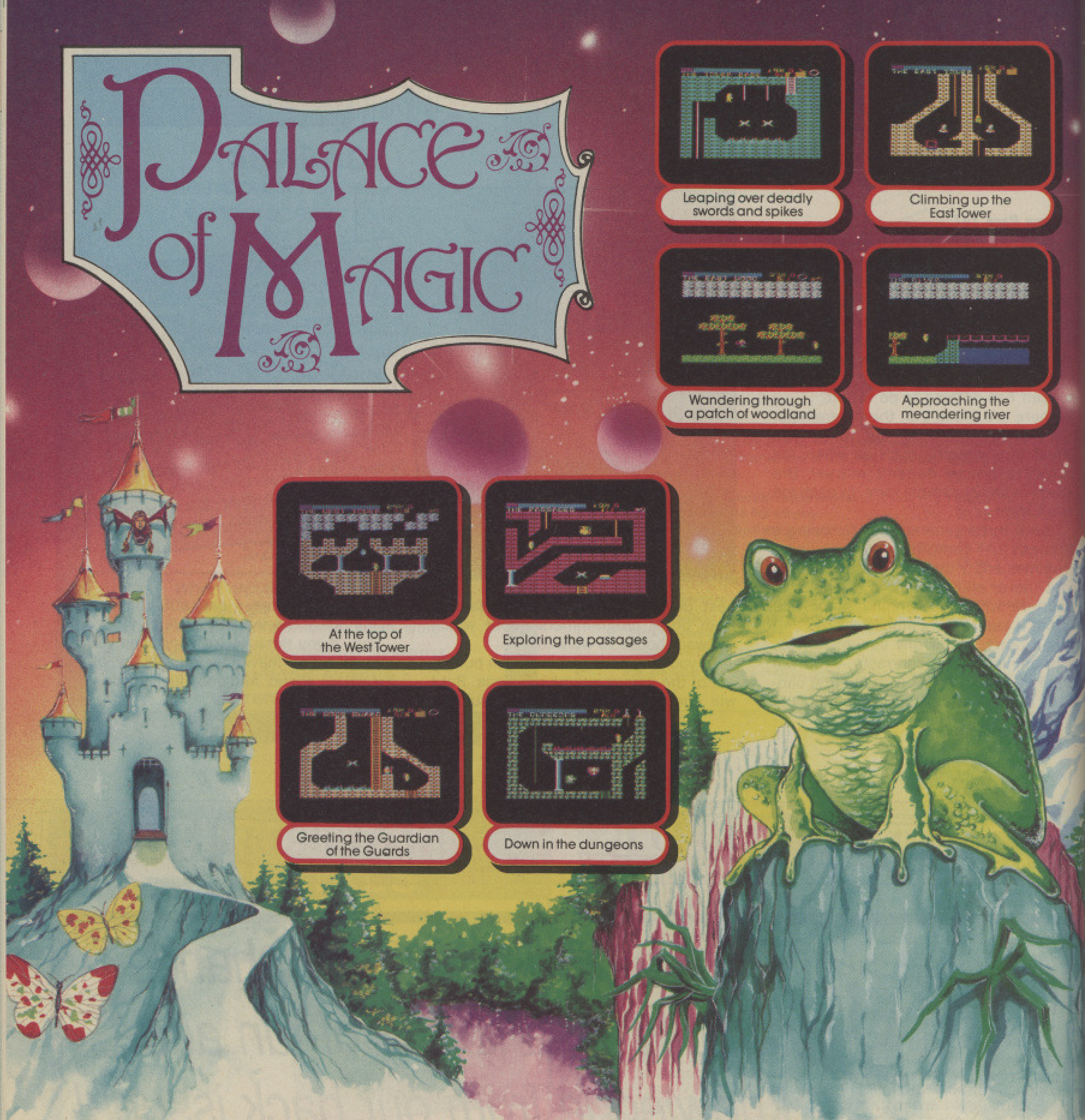
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Nine screens into one

Rob Anderson demonstrates a unique graphics menu system

WITH a multitude of graphics packages available for BBC Micros it's likely you have a number of pictures stored away on various discs – more often than not with indecipherable filenames.

This program – Gallery – will help you to tidy your pictures for easy display or even allow you to access programs represented by them. It gives a graphical menu system where you can display up to nine of your pictures at a time.

Using a cursor you can select any one to be loaded and displayed full size or you can easily modify the program so that, for example, choosing a picture loads it automatically into a CAD (computer aided design) package.

The gallery is created by squashing pictures by a third in each direction allowing nine to be displayed on screen at one time. Although this cuts the resolution to a third, the main form of a picture is retained. The compression routines have been written in a modular form so they can be incorporated in your own programs. The system is fully menu driven and any user errors are handled sensibly.

To get the system going type in and save Listing I, Source, and correct any typing errors using the Get it Right! checksums. When you run it a machine code file called Object is created. This will be used by the main Gallery program and must be copied on to any discs which are to use it.

Next type in Listing II, Main, sort out any typing errors and save it. Finally create a !boot file containing the following:

```
PAGE &1300
CHAIN"MAIN"
```

and initialise the disc for booting with:

```
*OPT4 3
```

Provided everything has been typed in correctly, you will have a disc which is now ready to use and can be booted using Shift+Break.

To prepare a gallery, copy any pictures (all in the same screen mode) into the S directory of your gallery disc then run Main. Select option two and enter a gallery name to create an empty gallery.

Using option one from the main menu select the new gallery from the catalogue with the cursor keys and Return. It is then displayed with a box cursor in the top left of the screen.

Now you can insert, delete or display a particular picture, or change gallery using the keys shown in Table I. Pressing Return displays the selected picture but you could modify the program to do whatever you require at this point.

For example, you could set up a function key to load your favourite CAD program along with the selected picture. So, if your CAD package is called EDITOR and pictures can be loaded into it using the command LOAD, you could enter the following lines:

```
  630 PROCoscli("*KEY0 CHA
IN "+CHR$34+"EDITOR"+CHR$3
4+"|MLOAD "+f$+"|M")
  640 *FX 138,0,128
  650 END
```

An actual example which you can try for yourself works with the Pixel Editor published in the November issue of *The Micro User*. To run the Pixel Editor automatically and load the selected picture into it, add the following lines to Main:

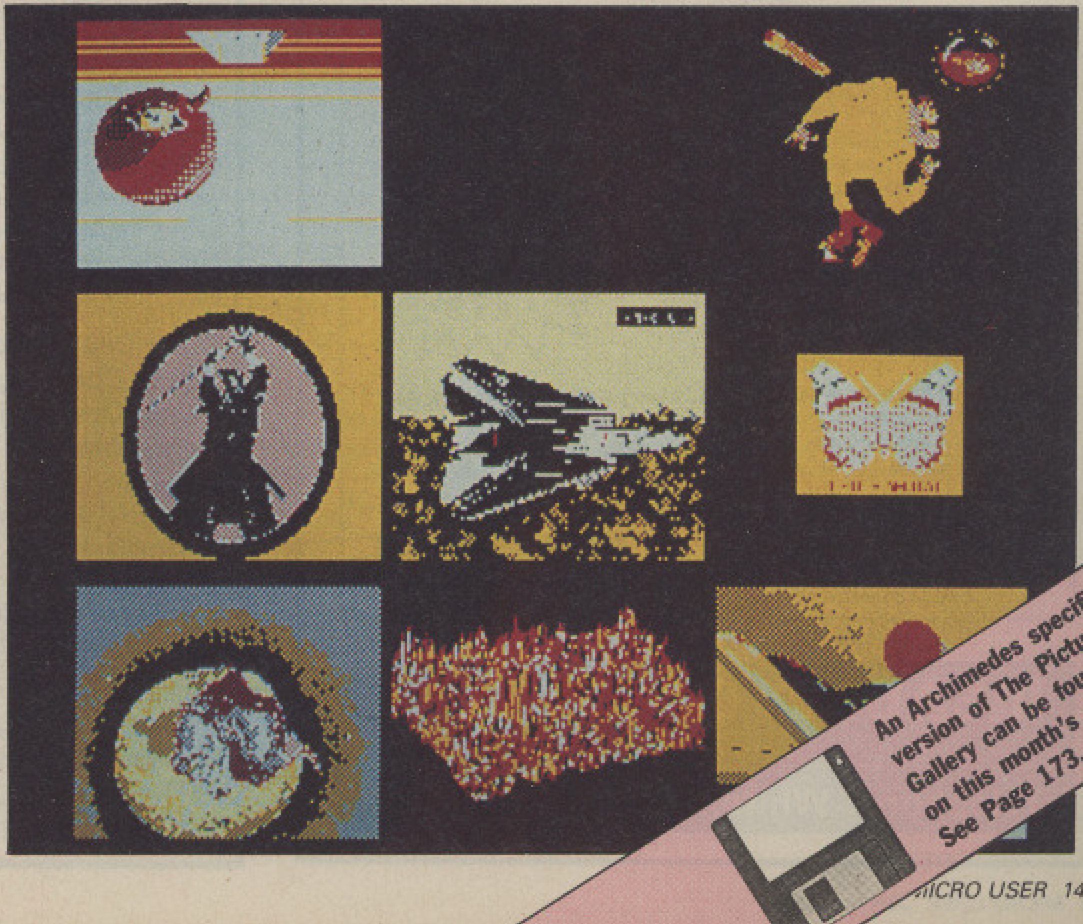
```
  630 PROCoscli("*KEY0 PAG
E=&1D00|MCHAIN"+CHR$34+wrk
dir$+".Pixel"+CHR$34+"|M"+
STR$(mode%)+"|M :"+STR$(dr
%)+"."+scrdir$+"."+f$+"|MN
ewScr|M")
  640 *FX 138,0,128
  650 END
```

The compression of the screen is achieved by removing two out of every three rows and lines of pixels and squashing the remaining ones together.

Once compressed, a squashed version of the picture remains in the top left hand corner of the screen. This is automatically saved to disc with the filename Work. The gallery screen is then reloaded, the Work file is merged into it and then finally deleted.

To fit everything in memory and to ensure that all DFS commands required by the program operate correctly, the machine code occupies memory between &900 and &AFF while the Basic program is located at &1300. This ensures that the BPUT and BGET function properly.

You'll find the Picture Gallery a useful addition to your collection and there's now no excuse for not finding your pictures quickly.



An Archimedes specific version of The Picture Gallery can be found on this month's disc. See Page 173.

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Keys	Use	Description
I	Insert	Prompts for a filename and inserts the selected picture at the cursor position.
Control+D	Delete	Deletes the picture at the current cursor position.
Return	Select	Displays the picture at the cursor position full size. Press any key to return to the gallery.
Arrow keys	Move	Moves the cursor around the gallery.
Shift+horizontal arrows	New gallery	Displays the next or previous gallery depending on whether right or left arrow is used.
Escape	Exit	Returns you to the start-up menu.

Table I: The control keys to use while the gallery is displayed

Listing I

```
  100 REM Graphics Gallery System
  110 REM by Rob Anderson
  120 REM (c) The Micro User
  130 HIMEM=&2F9B:ONERRORPROCerror
  140 REPEAT PROCinitial
  150 PROCtitle("start up")
  160 PRINT"CHR$134"1) Enter Existing G
allery."'CHR$134"2) Create New Gallery.
"'CHR$134"3) Exit."'CHR$131"Enter opti
on"
  170 REPEATK%=GET-48:UNTILK%>0ANDK%<4
  180 IF K%=1 PROCentergal
  190 IF K%=2 PROCcreate
  200 UNTIL K%=3:PROCfinish:END
  210 DEF PROCinitial:dr%=0:*FX4,1
  220 A%=0:Y%=0:fs%=USR(&FFDA)AND&FF
  230 IF fs%=8 A$="$." ELSE A$="":*DR.0
  240 galdir$=A$+"G":scrdir$=A$+"S"
  250 wrkdir$=A$+"$"
  260 PROCcli("DIR "+wrkdir$)
  270 fasty%=&A31:*LOAD Object
  280 slowy%=&900:sqshx%=&99A
  290 key1$=CHR$131+"CURSOR KEYS ]"+CHR$
134+"move cursor.":key2$=CHR$131+"RETURN
 ]"+CHR$134+"make selection."
  300 ENDPROC
  310 DEF PROCtitle(A$):VDU22,7
  320 FOR A%=1 TO 2:VDU31,4,A%,141,131
  330 PRINT"Graphics Screen Compressor"
  340 NEXT:VDU31,17-LENA$/2,3,131
  350 PRINT"("A$")":VDU28,0,24,39,4
  360 ENDPROC
  370 DEF PROCentergal
  380 PROCtitle("Enter Gallery")
  390 gal$=FNgetfile(galdir$)
  400 maxgal%=nosfiles%:gal%=file%
  410 mode%=FNgtmd
  420 PROCtitle("Gallery:"+CHR$134+gal$+
CHR$131+"Mode "+STR$(mode%))
  430 PRINT'''CHR$131"I ]"CHR$134"insert
 picture into gallery."'CHR$131"CTRL-D
]"CHR$134"delete picture from gallery."
'key1$"key2$"CHR$131"SHIFT-CURSOR KEY
]"CHR$134"next gallery."
  440 PROCanykey:PROCshowgal(gal$)
  450 REPEAT REPEAT GCOL3,7
  460 bx%=0:by%=341:obx%=0:oby%=341
  470 PROCsquare(bx%,by%)
  480 REPEAT O%=GET:*FX15
  490 IFO%=136IFbx%>0 bx%=bx%-426
  500 IFO%=137IFbx%<852 bx%=bx%+426
  510 IFO%=138IFby%>0 by%=by%-341
  520 IFO%=139IFby%<682 by%=by%+341
  530 IF bx%<>obx% OR by%<>oby% PROCsqua
re(obx%,oby%):PROCsquare(bx%,by%):obx%=b
x%:oby%=by%
  540 UNTILO%=13ORO%=4ORO%=73ORINKEY-1
  550 PROCsquare(bx%,by%)
  560 boxpos%=bx%/426+(2-by%/341)*3
  570 IFO%=4 PROCdelete
  580 IFO%=73 PROCinsert
  590 IFO%=137IFgal%<maxgal% gal%=gal%+1
:gal$=FNmemfile(gal%,galdir$):PROCshowga
l(gal$)
  600 IFO%=136IFgal%>1 gal%=gal%-1:gal$=
FNmemfile(gal%,galdir$):PROCshowgal(gal$
)
  610 UNTILO%=13:f$=FNgetname(boxpos%)
  620 dr%=A%?10:UNTILf$<>STRING$(10," ")
  630 REM Customise here
  640 IFfs%=4PROCcli("DR."+STR$dr%)
  650 PROCcli("LOAD "+scrdir$+"."+f$)
  660 IFfs%=4THEN*DR.0
  670 REPEATUNTILGET=32:ENDPROC
  680 DEF PROCinsert:VDU22,7
  690 PROCtitle("insert - mode "+STR$(mo
de%))
  700 IFFNgetname(boxpos%)<>STRING$(10,"
 ") PRINT"CHR$131CHR$136"Overwrite curr
ent picture (Y/N) ?":IFGET<>89 PROCshowg
al(gal$):ENDPROC
  710 IFfs%=4 PRINT'CHR$134"Which drive
(0 or 2)?":REPEAT:dr%=GET-48:UNTILdr%=0O
Rdr%=2:PROCcli("DR."+STR$(dr%)) ELSEdr%=
0
  720 picture$=FNgetfile(scrdir$)
  730 VDU22,mode%
  740 PROCcli("LOAD "+picture$)
  750 PROCsquashiny(1024,670,3,0,1280)
  760 PROCsquashinx(0,430,3,680,1024)
  770 IFfs%=4THEN*DR.0
  780 PROCcli("DIR "+galdir$)
  790 IFmode%>3 st%=&5800:s%=2 ELSE st%=
&3000:s%=1
  800 *SAVE"WORK"3000 39A0
  810 F%=OPENOUT("WORK"):M%=st%
  820 FORA%=1TO10:FORB%=1TO208/s%
  830 BPUT#F%,?M%:?M%=&FF:M%=M%+1:NEXT
  840 M%=M%-208/s%+640/s%:NEXT
  850 CLOSE#0:PROCcli("LOAD "+gal$)
  860 F%=OPENIN("WORK"):M%=st%+(boxpos%M
OD3*8*(27DIVs%))+(boxpos%DIV3*640*11DIVs
%)
  870 FORA%=1TO10:FORB%=1TO208/s%
  880 ?M%=BGET#F%:M%=M%+1:NEXT
  890 M%=M%-208/s%+640/s%:NEXT
  900 CLOSE#0:*DELETE WORK
  910 A%=start%+1+boxpos%*11
  920 $A%=picture$:A%?LENpicture$=32
  930 A%?10=dr%:PROCsavegal:ENDPROC
  940 DEF PROCdelete
  950 A%=start%+1+boxpos%*11
  960 $A%=STRING$(10," "):A%?10=0
  970 PROCblkout(bx%,by%,bx%+426,by%+341
)
  980 PROCcli("DIR "+galdir$)
  990 PROCsavegal:ENDPROC
 1000 DEFPROCcreate:PROCtitle("create")
 1010 PRINTTAB(0,2)CHR$134"Mode 0,1,2,4
or 5?";
 1020 REPEAT mode%=GET-48
 1030 UNTILmode%>=0ANDmode%<6ANDmode%<>3
 1040 PRINTCHR$131;mode%:REPEAT
 1050 PRINT'CHR$134"Enter the new galler
y filename (or *)"CHR$131;
 1060 INPUTgal$:L%=LENgal$
 1070 IFLEFT$(gal$,1)="*" PROCcli(gal$)
 1080 UNTILL%>=0ANDL%<11ANDLEFT$(gal$,1)
<>"*"
 1090 IFmode%>3 start%=&579C ELSE start%
=&2F9C
 1100 VDU22,mode%:?start%=mode%
 1110 FORA%=start%+1TOstart%+&63STEP11
 1120 $A%=STRING$(10," "):A%?10=0:NEXT
 1130 PROCcli("DIR "+galdir$)
 1140 PROCsavegal:ENDPROC
 1150 DEF FNgetfile(dir$):CLS
 1160 f$=FNmemfile(1,dir$):M%=&3000
 1170 X%=3:Y%=1:nosfiles%=0
 1180 FOR B%=0 TO 46:f$=""
 1190 IF ?M%<>0 nosfiles%=nosfiles%+1
 1200 FOR C%=1 TO ?M%:M%=M%+1
 1210 f$=f$+CHR$(?M%):NEXT:M%=M%+1
 1220 PRINTTAB(X%,Y%)f$;:X%=X%+13
 1230 IF X%=42 X%=3:Y%=Y%+1
 1240 NEXT:PRINT'key1$'key2$
 1250 PRINTTAB(1,1)CHR$131"]"
 1260 PRINTTAB(13,1)"["CHR$135;
 1270 ox%=1:oy%=1:x%=1:y%=1
 1280 REPEAT K%=GET
 1290 IFK%=139IFy%>1 y%=y%-1
 1300 IFK%=138IFFNf_nos(x%,y%+1)<nosfile
s% y%=y%+1
 1310 IFK%=136IFx%>1 x%=x%-13
 1320 IFK%=137IFx%<27IFFNf_nos(x%+13,y%)
<nosfiles% x%=x%+13
 1330 IFox%<>x%ORoy%<>y% PRINTTAB(ox%,oy
%)SPC2TAB(ox%+12,oy%)SPC1TAB(x%,y%)CHR$1
31"]"TAB(x%+12,y%)"["CHR$135;:ox%=x%:oy%
=y%
 1340 UNTILK%=13:CLS
 1350 file%=FNf_nos(x%,y%)+1
 1360 =FNmemfile(file%,dir$)
 1370 DEFFNf_nos(x%,y%)=y%*3+(x%-1)/13-3
 1380 DEFFNmemfile(N%,dir$)
 1390 PROCcli("DIR "+dir$)
 1400 FORA%=&70TO&7DSTEP4:!A%=0:NEXT
 1410 FORA%=&3000TO&3205STEP4:!A%=0:NEXT
```

MAIN VARIABLES

mode%	Screen displayed mode
f$	Screen filename
scrdir$	Screen directory
dr%	Screen drive number
wrkdir%	Work directory

Turn to Page 149 ▶

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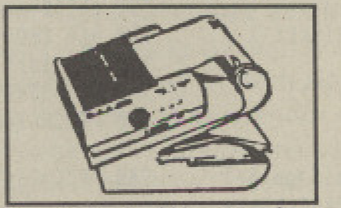

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```
 1420 ?&71=0:?&72=&30:?&73=&FF:?&74=&FF
 1430 ?&75=47:A%=8:X%=&70:Y%=0:CALL&FFD1
 1440 M%=&3000:C%=0:REPEATf$=""
 1450 IF?M%<>0 FORA%=1TO?M%:M%=M%+1:f$=f
$+CHR$?M%:NEXT
 1460 M%=M%+1:C%=C%+1:UNTILC%=N%:=f$
 1470 DEFPROCerror
 1480 IFERR<>17 VDU22,7:PRINT'"ERROR:"
:REPORT:PROCanykey:RUN ELSE RUN
 1490 ENDPROC
 1500 DEFPROCfinish:*FX4
 1510 VDU22,7:*DIR $
 1520 ENDPROC
 1530 DEFPROCshowgal(gal$)
 1540 mode%=FNgtmd:VDU22,mode%
 1550 PROCcli("LOAD "+gal$)
 1560 PROCcli("DIR "+wrkdir$)
 1570 IFmode%>3 start%=&579C ELSEstart%=
&2F9C
 1580 ENDPROC
 1590 DEFFNgtmd:PROCcli("DIR "+galdir$)
 1600 F%=OPENIN(gal$):mode%=BGET#F%
 1610 CLOSE#0:=mode%
 1620 DEFPROCsavegal
 1630 PROCcli("SAVE "+gal$+" "+STR$~star
t%+" 8000")
 1640 ENDPROC
 1650 DEFPROCsquare(x%,y%):MOVEx%,y%
 1660 DRAWx%,y%+341:DRAWx%+426,y%+341
 1670 DRAWx%+426,y%:DRAWx%,y%:ENDPROC
 1680 DEFPROCanykey
 1690 PRINT"TAB(17)CHR$136CHR$134"(any
key to continue)"
 1700 REPEATUNTILGET:ENDPROC
 1710 DEFPROCsquashinx(dst,dend,srcstp,y
lo,yhi)
 1720 IFmode%=2ORmode%=5 S%=8 ELSEIFmode
%=4ORmode%=1 S%=4 ELSE S%=2
 1730 !&75=srcstp*S%:!&77=dst
 1740 !&79=dend:!&7B=ylo
 1750 !&7D=yhi:?&7F=S%:CALL sqshx%
 1760 PROCblkout(dend,ylo,1280,yhi)
 1770 ENDPROC
 1780 DEFPROCsquashiny(dst,dend,srcstp,x
lo,xhi)
 1790 IFdst=1024IFxlo=0IFxhi=1280 ?&74=s
rcstp:CALLfasty%:PROCblkout(0,dend,1280,
0):ENDPROC
 1800 IFmode%=2ORmode%=5 S%=8 ELSEIFmode
%=4ORmode%=1 S%=4 ELSE S%=2
 1810 !&75=srcstp*S%:!&77=dst
 1820 !&79=dend:!&7B=xlo:!&7D=xhi
 1830 ?&7F=S%:CALL slowy%
 1840 PROCblkout(xlo,dend,xhi,0):ENDPROC
 1850 DEFPROCblkout(x1,y1,x2,y2)
 1860 GCOL0,0:MOVEx1,y1:MOVEx1,y2
 1870 PLOT85,x2,y1:PLOT85,x2,y2:ENDPROC
 1880 DEFFNgetname(pos%):f$=""
 1890 A%=start%+1+pos%*11
 1900 FORM%=A%TOA%+9:f$=f$+CHR$?M%
 1910 NEXT:=f$
 1920 DEF PROCcli($&700):LOCALX%,Y%
 1930 Y%=7:CALL&FFF7:ENDPROC
```

Listing II

```
  100 REM Screen Compressor Source
  110 REM By Rob Anderson
  120 REM (c) The Micro User
  130 PROCass
  140 PROCcli("SAVE OBJECT "+STR$~start%
+" "+STR$~P%)
  150 PRINT'"slowsquashiny = "~slowsquas
hiny
  160 PRINT'"fastsquashiny = "~fastsquas
hiny
  170 PRINT'"slowsquashinx = "~slowsquas
hinx
  180 END
 190 DEFPROCass
 200 start%=&900
 210 osbyte=&FFF4
 220 osword=&FFF1
 230 oswrch=&FFEE
 240 FOR pass%=0 TO 2 STEP 2
 250 P%=start%:[OPT pass%
 260 \Squash in y plane
 270 .slowsquashiny
 280  LDA &77:SEC:SBC &75:STA &72
 290  LDA &78:SBC &76:STA &73
 300 .outerlp1:LDA &7B:STA &70
 310  LDA &7C:STA &71
 320 .innerlp1
 330  LDA #&9:LDX #&70:LDY #0
 340  JSR osword:LDA &74:CMP #&FF
 350  BNE colok2:LDA #0:STA &74
 360 .colok2
 370  LDA #18:JSR oswrch:LDA #0
 380  JSR oswrch:LDA &74:JSR oswrch
 390  LDA #25:JSR oswrch:LDA #69
 400  JSR oswrch:LDA &70:JSR oswrch
 410  LDA &71:JSR oswrch:LDA &77
 420  JSR oswrch:LDA &78:JSR oswrch
 430  LDA &70:CLC:ADC &7F:STA &70
 440  LDA &71:ADC #0:STA &71
 450  LDA &70:CMP &7D:LDA &71:SBC &7E
 460  BCCinnerlp1:LDA &77:SEC:SBC #4
 470  STA &77:LDA &78:SBC #0:STA &78
 480  LDA &72:SEC:SBC &75:STA &72
 490  LDA &73:SBC &76:STA &73:
 500  LDA &77:CMP &79:BNE ntequal:CLC
 510 .ntequal:LDA &78:SBC &7A
 520  BCS contlp2:JMP out2
 530 .contlp2:JMP outerlp1
 540 .out2:RTS
 550 .slowsquashinx
 560  LDA &77:CLC:ADC &75:STA &70
 570  LDA &78:ADC &76:STA &71
 580 .outerlp2:LDA &7B:STA &72
 590  LDA &7C:STA &73
 600 .innerlp2
 610  LDA #&9:LDX #&70
 620  LDY #0:JSR osword
 630  LDA &74:CMP #&FF:BNE colok1
 640  LDA #0:STA &74
 650 .colok1
 660  LDA #18:JSR oswrch:LDA #0
 670  JSR oswrch:LDA &74:JSR oswrch
 680  LDA #25:JSR oswrch:LDA #69
 690  JSR oswrch:LDA &77:JSR oswrch
 700  LDA &78:JSR oswrch:LDA &72
 710  JSR oswrch:LDA &73:JSR oswrch
 720  LDA &72:CLC:ADC #4:STA &72
 730  LDA &73:ADC #0:STA &73
 740  LDA &72:CMP &7D:LDA &73
 750  SBC &7E:BCC innerlp2:LDA &77
 760  CLC:ADC &7F:STA &77:LDA &78
 770  ADC #0:STA &78:LDA &70:CLC
 780  ADC &75:STA &70:LDA &71
 790  ADC &76:STA &71
 800  LDA &77:CMP &79:LDA &78
 810  SBC &7A:BCC contlp1:JMP out1
 820 .contlp1:JMP outerlp2
 830 .out1:RTS
 840 .fastsquashiny
 850  LDA #0:STA &70:LDA #1:STA &72
 860  LDA #&87:JSR osbyte:CPY #4
 870  BCS mode45:LDA #120:STA &79
 880  LDA #128:STA &77:LDA #2:STA &78
 890  LDA #80:STA &76
 900  LDA #&30:JMP endmode
 910 .mode45:LDA #56:STA &79:LDA #64
 920  STA &77:LDA #1:STA &78:LDA #40
 930  STA &76:LDA #&58
```

Turn to Page 150 ▶

Get it right!

```
100 =    0 0
110 =    0 0
120 =    0 0
130 =  D78 8
140 = 7290 F
150 = C430 6
160 = 2CB1 8
170 = B75F 4
180 = 8E16 5
190 =  61A F
200 = 424C E
210 = 4F69 8
220 = EA85 A
230 = 7D8E 9
240 = 40CF A
250 = 9CA4 4
260 = B50A C
270 = E4AD F
280 = 82A7 2
290 = D808 7
300 = ED0F A
310 =  EEA 2
320 = F046 D
330 = 4BC8 6
340 = 4A18 D
350 = CC42 4
360 = ED0F C
370 = 4134 8
380 = 58DE 3
390 = 3EC5 4
400 = 4990 C
410 = F1DA 0
420 = B691 1
430 = 4C48 7
440 = FE8F 4
450 = 8B75 4
460 = 7828 D
470 = 6357 9
480 = DBED 3
490 = FA08 2
500 = 55CD 4
510 = 5326 5
520 = 5F49 C
530 = 2562 5
540 = 51F7 E
550 = 6357 7
560 = 54AF 5
570 = 614E D
580 = DAEC 8
590 = E453 3
600 = EC7A 9
610 = 2080 9
620 = 14F0 4
630 =    0 4
640 = 4E6D A
650 = AF5E 9
660 = 2E7C D
670 = 54BD 5
680 = F47D 4
690 = D5E2 7
700 = 2871 D
710 = 7A5D 2
720 = 113A 1
730 = 6315 8
740 = E553 9
750 = 4B0C C
760 = ECF6 0
770 = 2E7C 2
780 = AF06 A
790 = 9F09 D
800 = 6E34 C
810 = DAAD C
820 = 5FA6 8
830 = 5433 9
840 = 6213 4
850 = E02E 0
860 = 12DF E
870 = 5FA6 5
880 = 343C C
890 = 6213 D
900 = 8D0A 8
910 = 208B 8
920 = 9EB8 D
930 = FB53 4
940 = 2462 F
950 = 208B 7
960 = 2AB9 1
970 = 4326 9
980 = AF06 5
990 = 28A3 B
1000 = 7571 9
1010 = 40EF 4
1020 = D6CC 2
```

```
1030 = 892E 7
1040 = 4D0B 1
1050 = 5909 D
1060 =  860 C
1070 = 1070 0
1080 = 61B0 D
1090 = A8DF F
1100 = 4874 9
1110 = 5692 0
1120 = 1902 0
1130 = AF06 0
1140 = 28A3 8
1150 = 55AB F
1160 = C29F 4
1170 = 2437 F
1180 = 4A1C 2
1190 = 18F6 5
1200 = DF60 4
1210 = 5230 3
1220 = 538D 2
1230 = 9E7F 1
1240 = 9640 8
1250 = BC47 6
1260 = CAB9 5
1270 = F7B5 2
1280 = 513A 9
1290 = A603 5
1300 = 3CC0 D
1310 = 272F 5
1320 =  714 E
1330 = 304B 6
1340 = 8057 1
1350 = 74D0 5
1360 = 58D0 F
1370 = 47FD 8
1380 = C12E 1
1390 = 323D 8
1400 = 9210 E
1410 = 4154 C
1420 = 225C F
1430 = 6738 8
1440 = 5E6A D
1450 = CB07 6
1460 = 7683 6
1470 = D7A7 C
1480 = 4AE1 0
1490 = ED0F 5
1500 = F1DA A
1510 = FB8D C
1520 = ED0F 4
1530 = C974 3
1540 = 52B2 C
1550 = B36F 0
1560 = B50A 5
1570 = AE4B 9
1580 = ED0F 0
1590 = 6674 F
1600 = A31F B
1610 = 52F7 A
1620 = D788 0
1630 = 54AD 1
1640 = ED0F 5
1650 = 6715 B
1660 = CC5A D
1670 = CAB2 4
1680 = 22CF 5
1690 = 4A91 D
1700 = EBF7 7
1710 = 1B51 1
1720 = 5BFF 5
1730 = 76A8 3
1740 = 741E 7
1750 = 1332 9
1760 = E933 1
1770 = ED0F 8
1780 = 8657 A
1790 = BB8F C
1800 = 5BFF 2
1810 = 76A8 6
1820 = 1B7F B
1830 = BB03 B
1840 = 2711 A
1850 = 21F5 F
1860 = 73EF 8
1870 = 8EA3 C
1880 = 9648 D
1890 = B455 3
1900 = 9C1F 7
1910 = 1CAA A
1920 = E7E2 1
1930 = 50E0 B
```

◀ From Page 149

```
 940 .endmode:STA &71:STA &73:LDY #0
 950  LDA #0:STA &75:
 960 .outerlp3:LDX &76
 970 .innerlp3:LDA &73:CMP #&80
 980  BCC notblack:LDA #0:JMP strbyte
 990 .notblack:LDA (&72),Y
1000 .strbyte:STA (&70),Y:LDA &70
1010  CLC:ADC #8:STA &70:LDA &71
1020  ADC #0:STA &71:LDA &72:CLC
1030  ADC #8:STA &72:LDA &73:ADC #0
1040  STA &73:DEX:BNE innerlp3:LDA &70
1050  SEC:SBC &77:STA &70:LDA &71
1060  SBC &78:STA &71:LDA &72:SEC
1070  SBC &77:STA &72:LDA &73:SBC &78
1080  STA &73:LDX &74
1090 .inclp:INC &72:LDA &72:AND #7
1100  BNE ok1:LDA &72:CLC:ADC &79
1110  STA &72:LDA &73:ADC &78:STA &73
1120  CMP #&80:BCC rangeok
1130  LDA #&80:STA &73
1140 .rangeok
1150 .ok1:DEX:BNE inclp:INC &70
1160  LDA &70:AND #7:BNE ok2:LDA &70
1170  CLC:ADC &79:STA &70:LDA &71
1180  ADC &78:STA &71
1190 .ok2:DEC &75:BEQ finishedy
1200  JMP outerlp3
1210 .finishedy:RTS
1220 ]:NEXT:ENDPROC
1230 DEF PROCcli($&700):LOCAL X%,Y%
1240 Y%=7:CALL&FFF7:ENDPROC
```

This listing is included in this month's tape & disc offer. See order form on Page 173.

Get it right!

```
100 =    0 0 | 290 = 81B5 7 | 480 = 96F9 1
110 =    0 0 | 300 = 51E7 4 | 490 = 52AD 7
120 =    0 0 | 310 = 3864 8 | 500 = 61B1 C
130 = CD80 0 | 320 =  BA4 8 | 510 = 2E21 5
140 = E927 E | 330 = 955E 0 | 520 = 9AAB 4
150 = BE9A 0 | 340 = 481E E | 530 = 2259 A
160 = EC01 3 | 350 = 305F 8 | 540 = AA66 9
170 = 70A4 8 | 360 = D1D8 C | 550 = BB2A 0
180 = FD2E 8 | 370 = 2D91 4 | 560 = 3DC1 1
190 = DB18 4 | 380 = 43F0 9 | 570 = A9C3 7
200 = FB6F 5 | 390 = 59EE E | 580 = 4083 A
210 = 7966 A | 400 = 4E24 5 | 590 = 1826 4
220 = 4EF9 1 | 410 = CEF9 1 | 600 = 3BC7 2
230 =   78 2 | 420 = 558C E | 610 = CE46 B
240 = F87C C | 430 = B2DE A | 620 = E40C 5
250 = 272B A | 440 = F998 F | 630 = 4494 E
260 =    0 A | 450 = B576 3 | 640 = ABC7 B
270 = AB0B F | 460 = D72A D | 650 = E1BB 4
280 = 24B4 D | 470 = 69B2 D | 660 = 2D91 0
```

```
670 = 43F0 D |  870 = B01A 0 | 1070 = C67A 6
680 = 59EE 5 |  880 = 9AF9 F | 1080 = 1F85 C
690 = 466F 2 |  890 = 11A3 D | 1090 = 5E4E 9
700 = 1656 2 |  900 = 46B5 9 | 1100 = 7B84 3
710 = 4BBB 9 |  910 = 45A1 E | 1110 = 8362 5
720 = 8003 2 |  920 =  56C 2 | 1120 = 833E 2
730 = 99B3 9 |  930 = BAB4 F | 1130 = 43B2 B
740 = E13D A |  940 = 89A1 A | 1140 = 738A A
750 = BEC8 6 |  950 = 67A9 C | 1150 = EB8F A
760 = 78BD B |  960 = 6F38 4 | 1160 = B337 D
770 = A755 9 |  970 = 3A35 E | 1170 = F786 5
780 = 8DB5 F |  980 = FEED 8 | 1180 =  FC9 3
790 = 7CBE 8 |  990 = 4152 1 | 1190 = E2B3 4
800 = F6D4 9 | 1000 = F323 2 | 1200 = 7153 0
810 = 22AC C | 1010 = 2A54 8 | 1210 = 12E3 9
820 = 9F99 C | 1020 = ADEF 8 | 1220 = 953B 6
830 = 44B4 4 | 1030 = 92AB F | 1230 = E297 7
840 = FF43 B | 1040 = 45CC E | 1240 = 50E0 E
850 = 1853 F | 1050 = 4DC6 D |
860 =  356 0 | 1060 = 5BD1 7 |
```

Set up your own closed user group on

MicroLink

MicroLink is ideal for transferring instant information between groups of people – between branches of a company, members of a club or just friends with like-minded interests.

Whether there are five or 500 people in the group, they can all be sent the same information in one operation . . . instantly.

And each recipient can immediately send a reply, or his own comments, to every other member of the group.

Head offices of companies use MicroLink to send daily memos to their regional offices. Chains of shops use MicroLink to receive daily trading reports from their branches.

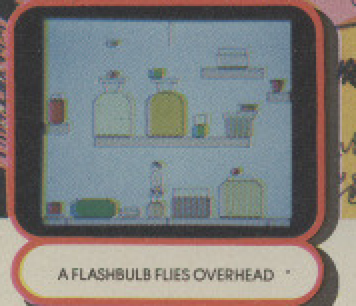
It's cheap, reliable – and it's 100 per cent secure, because information sent via MicroLink can only be seen by the person for whom it is intended.

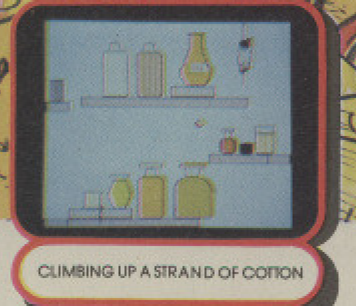
Details from 061-456 8383.

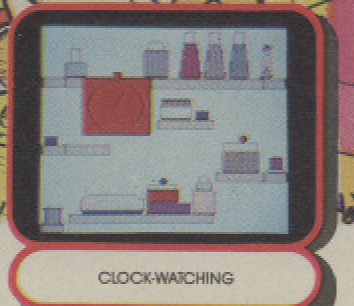
MicroLink electronic mail and much, much more!

CHRISTMAS SPECIAL OFFERS
EPROMS & D RAMS
27128-250N/S 21V .... (While stocks last) £3.55ea
27128-250N/S 'A' 12V £3.20ea
27128 (One time programmable) £2.80ea
27256 .... £4.30 ea
2764-250 N/S 21V .... (While stocks last) £2.60ea
6264-150N/S £2.29ea
4164-150N/S £0.99ea
41256-150N/S £2.20ea
41257-15 N/S .... (While stocks last) £2.20ea
5.25" DS/DD 96tpi £0.55
Minimum quantity sold in 10 (supplied individually sleeved, all labels and tags with a white cardboard box for storage)
3.5" Branded Disc DS/DD 135tpi £1.55
3" DS/DD Disc £3.00
20Mb Winchester Hard Disc Drive complete with WX2 Western Digital Controller Board (connection cable etc.. etc..) .. £299.00
TTL & CMOS chips (excl. DFS ROM) to be used with 8271 Disc Drive Controller .... each set £2.95
WD1772 .... £13.50ea
2732 .... £2.20ea
2716 .... £2.50ea
All prices include P&P
Send your order by post with cheque or postal order. Or phone through your order by quoting your Access number
HOT LINE
24 Hrs Service 01-550 6514 24 Hrs Service
Please phone for special price on bulk purchase
If any products purchased from this advert fails to give complete satisfaction. Please return to us unused within 30 days for a full refund or free replacement. This guarantee is offered in addition to your statutory rights.
No VAT is charged (Not VAT Registered)
J & J MICROCHIPS LIMITED
PO Box 18, Essex IG8 0RB
Co. Reg. No: 1965704

Elixir
ACID


A FLASHBULB FLIES OVERHEAD


CLIMBING UP A STRAND OF COTTON


CLOCK-WATCHING

KEEP CLEAR OF THE BUNSEN BURNER FLAME

Help Poor Old Cyril to Find the Magic Elixir

Imagine the scene:
You are Cyril, a likeable old gentleman — the proprietor of a small but busy chemist's shop. One evening, after a hard day's work, you accidently take a swig of a potent liquid: a strong reducing agent.

Within minutes you have shrunk down to the size of a bottle of aspirins. Frightened and alone, at first you panic... then you remember the magic elixir which is stored at the back of the shop on the top shelf.

The elixir just might restore you to your normal size... it's your only hope. But can you possibly reach it; you'll have to work out a suitable route by climbing up and down and across the shelves.

A fascinating, humourous game packed with strategical puzzles and problems. Keep clear of the lipstick missiles, leap over the exploding flash-bulbs, dodge the dripping acid, and watch out for the curious "circulasaurus" creature!

BBC Micro Cassette	£9.95	Acorn Electron Cassette	£9.95
BBC Micro 5¼" Disc	£11.95	Acorn Electron 5¼" Disc	£11.95
BBC Master Compact 3½" Disc	£14.95	Acorn Electron 3½" Disc	£14.95

(Compatible with the BBC B, B+ and Master Series computers).

The screen pictures show the BBC Micro version of the game.
The graphics of other versions may vary.

PRIZE COMPETITION

If you complete Elixir (by restoring Cyril The Chemist to his normal size), you can enter our competition. Prizes include an impressive trophy, 10 chemistry sets, and signed certificates for runners-up.

Closing Date: 30th June, 1988.

SUPERIOR SOFTWARE
Limited

ACORNSOFT

Please make all cheques payable to "Superior Software Ltd".

Access VISA

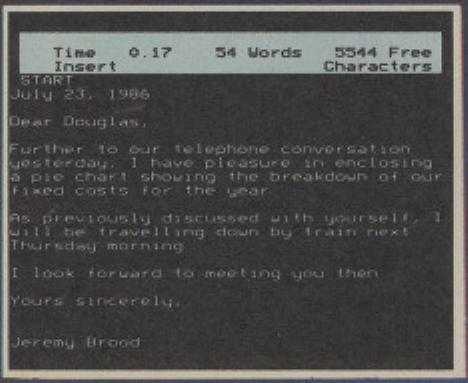
24 HOUR TELEPHONE ANSWERING SERVICE FOR ORDERS

OUR GUARANTEE
- All mail orders are despatched within 24 hours by first-class post.
- Postage and packing is free.
- Faulty cassettes and discs will be replaced immediately.

(This does not affect your statutory rights)

Dept. EL5, Regent House, Skinner Lane, Leeds LS7 1AX. Telephone: 0532 459453

All this in just



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

Dear Douglas,

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

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

I look forward to meeting you then

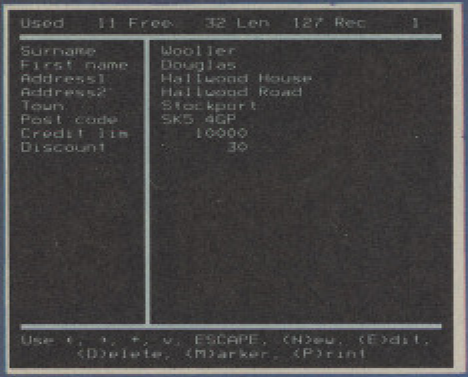
Yours sincerely,


Jeremy Brood
```

WORD PROCESSOR

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

70
60
50
40
30
20
10
0
J F M A M J J A
N D
PRODUCTION COSTS
CUB
DATABASE SOFTWARE
Mini Office II
Mini Office II



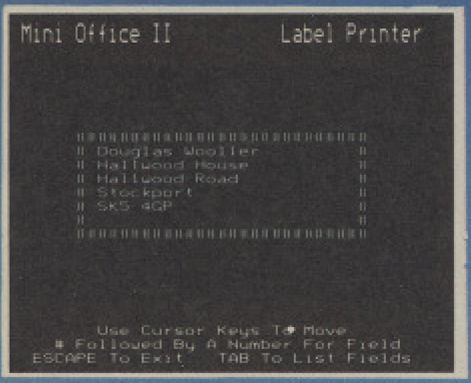
```
Used    11 Free   32 Len  127 Rec     1

Surname        Wooller
First name     Douglas
Address1       Hallwood House
Address2       Hallwood Road
Town           Stockport
Post code      SK5 4GP
Credit lim        10000
Discount             30

Use ←, →, ↑, ↓, ESCAPE, (N)ew, (E)dit,
     (D)elete, (M)arker, (P)rint
```

DATABASE

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



```
Mini Office II            Label Printer



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



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

LABEL PRINTER

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

...and at a price th

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

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

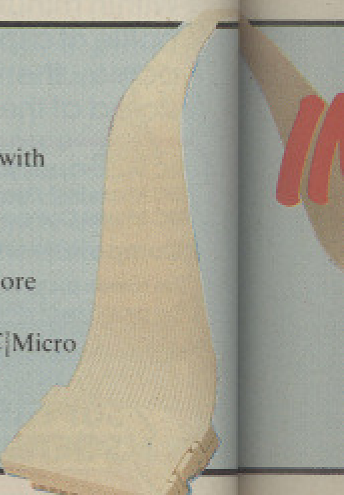
Mini Office II takes over where the original, highly successful Mini Office left off, with numerous extra features, two additional modules, a program to convert existing Mini Office files to Mini Office II format, and a 60 page, easy to follow manual.

And it's at a price everyone can afford!

DATABASE SOFTWARE **Europa House, 68 Chester Road,**
Hazel Grove, Stockport SK7 5NY

Now available on a power-packed rom board!

- Four 32k roms on one board packed with 128k of super fast machine code.
- Easy to install – no soldering needed.
- Split second application selection.
- Frees valuable ram space for much more data.
- Fully compatible with the whole BBC Micro range, Aries or Watford shadow ram board, and tape, DFS, ADFS and ECONET filing systems.

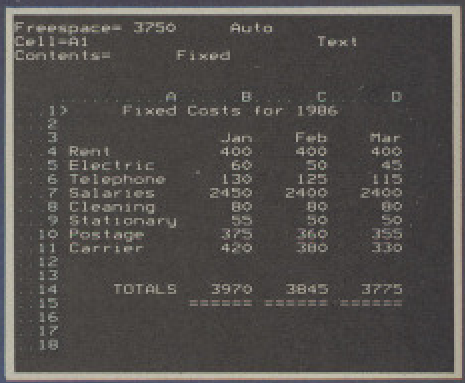


t ONE package!

Mini Office II
CUMANA

SPREADSHEET

Prepare budgets or tables, total columns or rows with ease, copy formulae absolutely or relatively, view in either 40 or 80 column modes, recalculate automatically – and more!



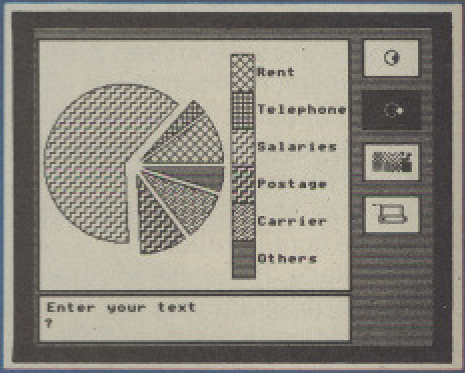
```
Freespace= 3750      Auto
Cell=A1                       Text
Contents=       Fixed

           A          B          C          D
  1>      Fixed Costs for 1986
  2
  3                  Jan        Feb        Mar
  4 Rent             400        400        400
  5 Electric          60         50         45
  6 Telephone        130        125        115
  7 Salaries        2450       2400       2400
  8 Cleaning          80         80         80
  9 Stationary        55         50         50
 10 Postage          375        360        355
 11 Carrier          420        380        330
 12
 13
 14      TOTALS     3970       3845       3775
 15                ======     ======     ======
 16
 17
 18
```

MASTER DISC
NOW AVAILABLE

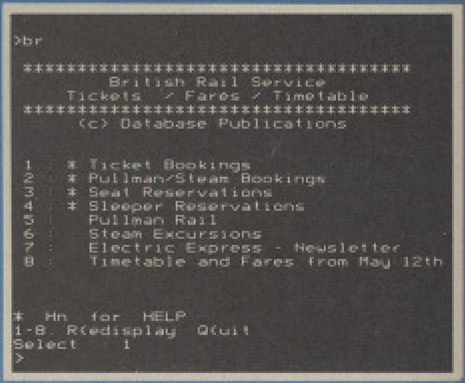
GRAPHICS

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



COMMS MODULE

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



```
>br

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

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


*  Hn  for  HELP
1-8  R(edisplay  Q(uit
Select    1
>
```

ce that can't be matched!

INSTANT Mini Office II

INSTANT
Mini Office II
DATABASE SOFTWARE

Mini Office II	
BBC B, B+	
Cassette	£14.95
5¼″ disc	£16.95
MASTER	
5¼″ disc	£19.95
COMPACT	
3½″ disc	£21.95
INSTANT MINI OFFICE II	
On rom for full BBC range	£59.95

Turn to order form on Page 173

Art in colour

Steve Turnbull dons his artist's smock and tries out Artisan

IF it's true that a micro is only as good as the software written for it then the new art package Artisan, from Clares, makes the Archimedes superb. The basic simplicity of the software package coupled with the sheer power of the micro results in a truly professional product.

Artisan comes on disc with a simple manual and it boots up with the usual Shift+Break. If you own an Archimedes 305 then you may have some space problems because Artisan uses 160k for screen memory – two mode 12 screens – and needs at least 40k of system space as well as a big sprite area and application work area.

But the boot-up routine selects the machine configuration that is needed for the package. If you use the standard exit from the program your normal machine configuration is reset.

Once booted up you are presented with a large grey rectangle, shaded to look three dimensional, with smaller squares containing the actual operation icons set into the block. The icon menus always appear on the left of the screen with any sub-menus or selection windows on the right.

For such a powerful package the manual seems depressingly slim, especially when its 38 pages include a three-page index, a glossary of terms – useful for someone new to this type of mouse-driven art package – and various appendices covering colour dumps, problems and hard disc configuration.

However, I spent the first few hours using Artisan without the manual at all because there is a help facility which displays in three lines at the bottom of the screen what the currently selected icon is for.

Once an option has been selected the help window displays what the individual mouse buttons do – in almost all cases the left hand Select button does the donkey work like plotting points and the right hand Adjust button cancels the last effect you've used. The middle Menu button brings up the current set of menu icons.

You can get rid of the help window with the exclamation mark icon on the main menu allowing you to use the full screen. The other main menu icon options are Paint, File, Rubber-band, Move/copy, Sprite, Toolkit and Exit.

Artisan allows you to load and save four different types of file: There is the whole screen, which uses standard SAVESCREEN files which can easily be imported to or exported from Artisan and the current colour palette can also be held on disc – one of the Paint menu options allows you to change the shades of the current 16 colours.

Extended colour fill – ECF – patterns can be saved, so that if you have designed a special set, you can load it again later for use in another picture. And finally you can save all the currently defined sprites in one block – the use of sprites is one of the most powerful elements of Artisan, hence the need to load and save them.

All the files are held in a directory called Artisan – if it doesn't exist on the current disc then the package asks you if you want to add it. There is no problem with MOUNTing discs in the drive because Artisan does it automatically every time it accesses the disc.

The Paint menu allows you to draw freehand with pen nibs of different shapes – circle, square, triangle and oval – filled or unfilled, and in various sizes. There are also pen designer and user pen icons which allow you to design your own shape of pen and have it in various colours.

There is a screen fill option so that you can wash large areas with solid colour or one of the ECF patterns. This feature is a little unpredictable if your area has a small hole in the border as the fill will spill out into the surrounding area, but you can instantly undo the whole effect by pressing the Adjust button.

The most complex option on this menu is the Magic brush, represented by the rainbow icon. What this effectively does is to allow you to change one or more screen colours, but not across the whole screen – just in the areas where you brush with the pointer.

This option will find most use in shadows and shading, where you can draw an object in its main colour then use the magic brush to do tints and highlights.

The last icon on this menu is the three stage zoom. You can close in on any area of the screen at x2, x4 or x8 magnification and edit individual screen pixels in any of the 16 colours. It is a pity that the other paint options don't work within the zoom, but perhaps that would be a bit much to ask.

The Move and Copy menu allows various parts of the screen to be shifted, while a second option allows you to change the vertical and horizontal scaling of the copied area. A group of arrows in the centre of the menu can select vertical and horizontal flipping whenever a move or copy is carried out.

Because two copies of the screen are

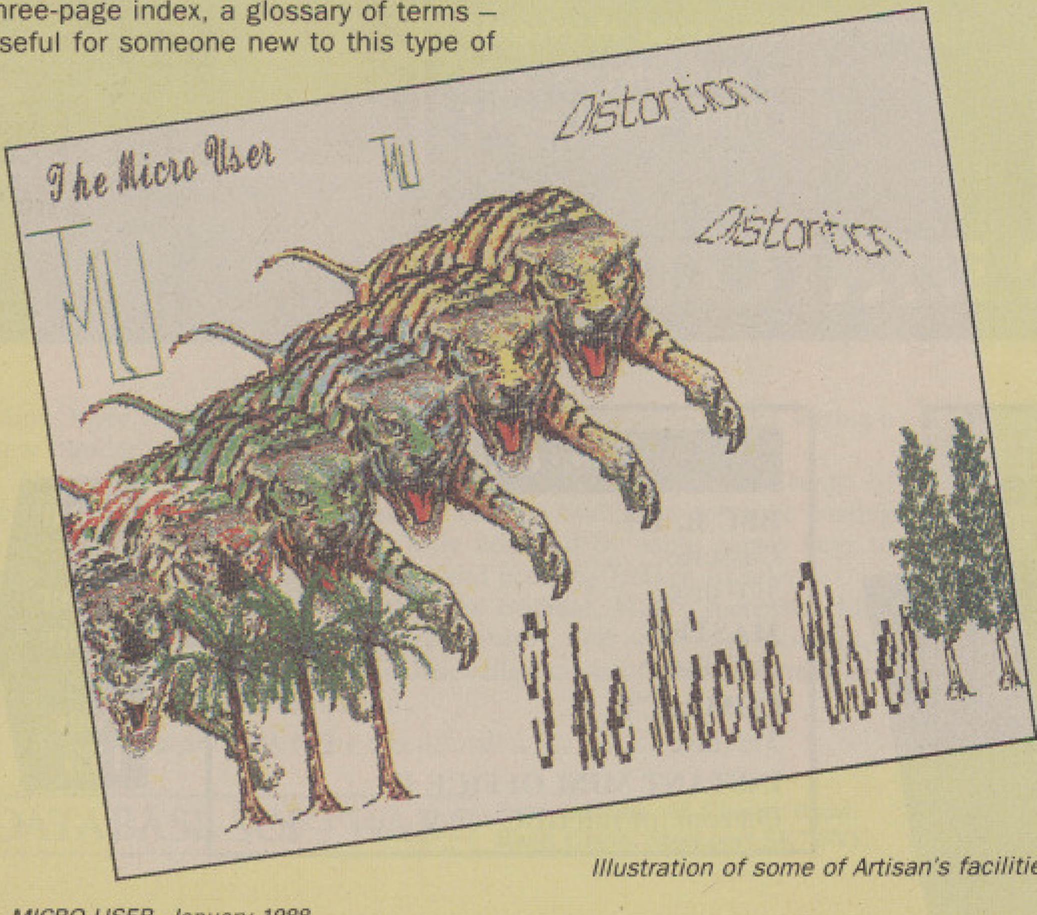


Illustration of some of Artisan's facilities held it means that the new shape can overwrite the old without any part of the picture being lost.

On this menu, and the Sprite menu, there is an X icon: This is the Exclude option, which allows a particular colour to be selected as transparent. This means that this colour is not copied when the rest of the area is being moved and so anything under the transparent colour will show through the newly copied area.

The final option in this menu is Rotate, which allows a selected area of the screen to be copied and rotated at the same time. There are some problems with this – because the pixels in the mode used are not square, some loss of resolution when rotating through 90 degrees is inevitable.

Rubber-banding is a system where shapes can be positioned, adjusted in size and finally fixed when you are satisfied. All the normal shapes available via the standard Archimedes operating system are there, plus one special user-defined shape called the Rubber pen.

First you design an outline shape of up to 64 lines, then using the ? icon you can place it on screen and enlarge or distort it with the pointer.

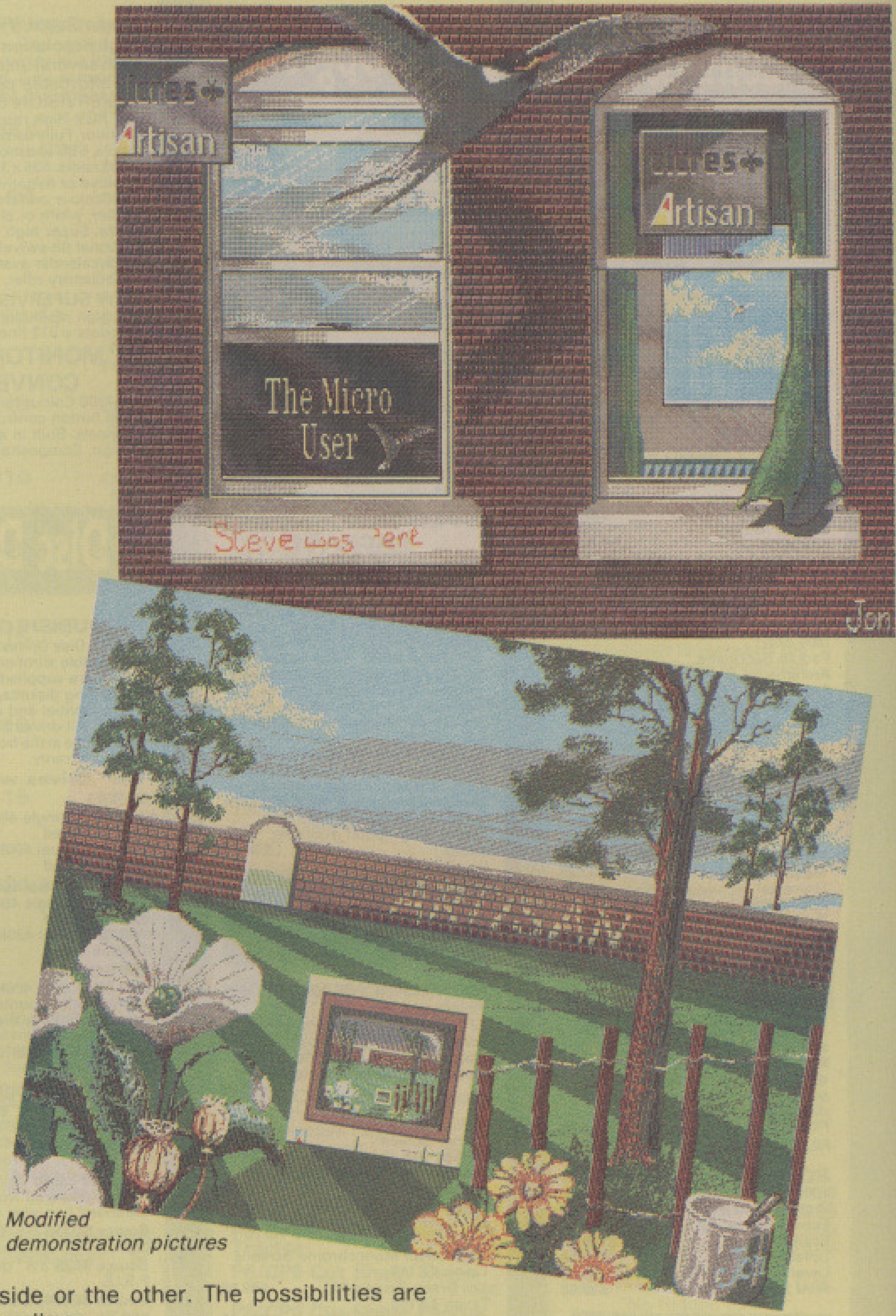
The Toolkit menu contains all those options that don't fit elsewhere. There are two dumps, one for part of the screen and the other for the full screen. Both are black and white Epson-compatible dump routines and use 16 character definitions for colour shading. You'll have to define your own patterns if you change the colours, and a pattern editor is supplied on disc.

There is a mouse speed control, which affects the ratio of mouse to screen pointer movement: At the fastest rate this becomes a bit uncontrollable.

If you want to do colour dumps – essential for any serious work with a system like this – you need a colour printer and Clares has provided a dump for the Integrex Colourjet 120 which will be reviewed in *The Micro User* soon. All the pictures in this review were produced with the Colourjet.

You can take a small step into the world of desktop publishing, because there is a text option which allows you to use any one of 26 disc-based fonts, 10 of which are supplied by Clares with the package. The text is written in the currently selected screen colour.

There is one more major feature in this menu: Distort, which allows you to alter the horizontal shape of any part of the screen. With this function straight vertical columns can be made wasp-waisted, or expanded, or bent off to one side or the other. The possibilities are endless.



Modified demonstration pictures

I have left the Sprite menu to last because in some ways it contains the most powerful features of the whole package. While you need the other menus and options to draw original pictures, with the sprite menu you can collect pieces of pictures for re-use later.

There are two ways of getting sprites on to the screen: The Get sprite option is slow, but allows you to flip the design in the X and Y axes, or you can use sprites. For example, select an eye and use it as a pen to create other shapes.

The number of sprites available on the 305 is limited, but on all other machines you have plenty of space. They are all kept in the sprite list and are loaded and saved in blocks.

There was one thing that I missed from the package: There is no true spray-can with random spotting of colour, although you can define a spray-can to draw with the user pattern.

But that really is the only missing feature: Everything else you could possibly want is there and the sample pictures supplied with the package demonstrate the quality that is possible. I can certainly recommend Artisan.

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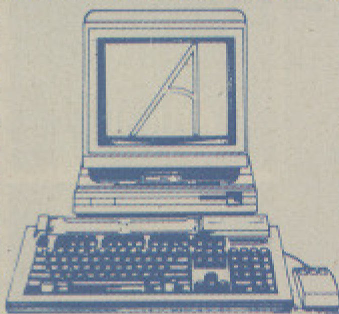

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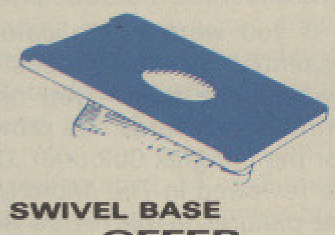

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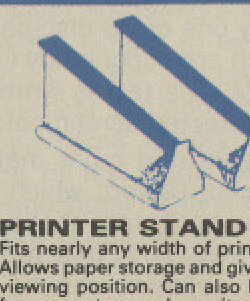

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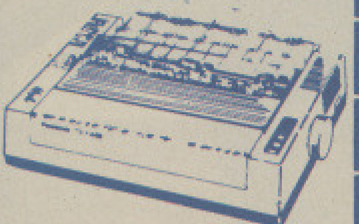

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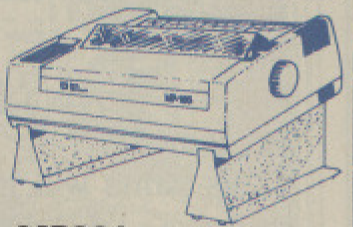

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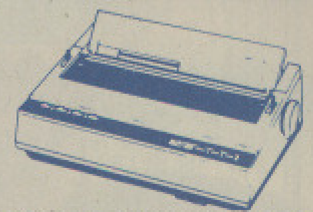

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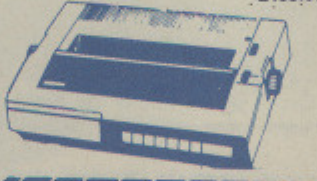

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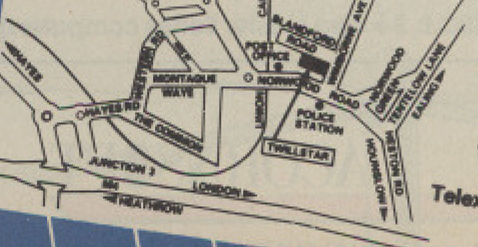

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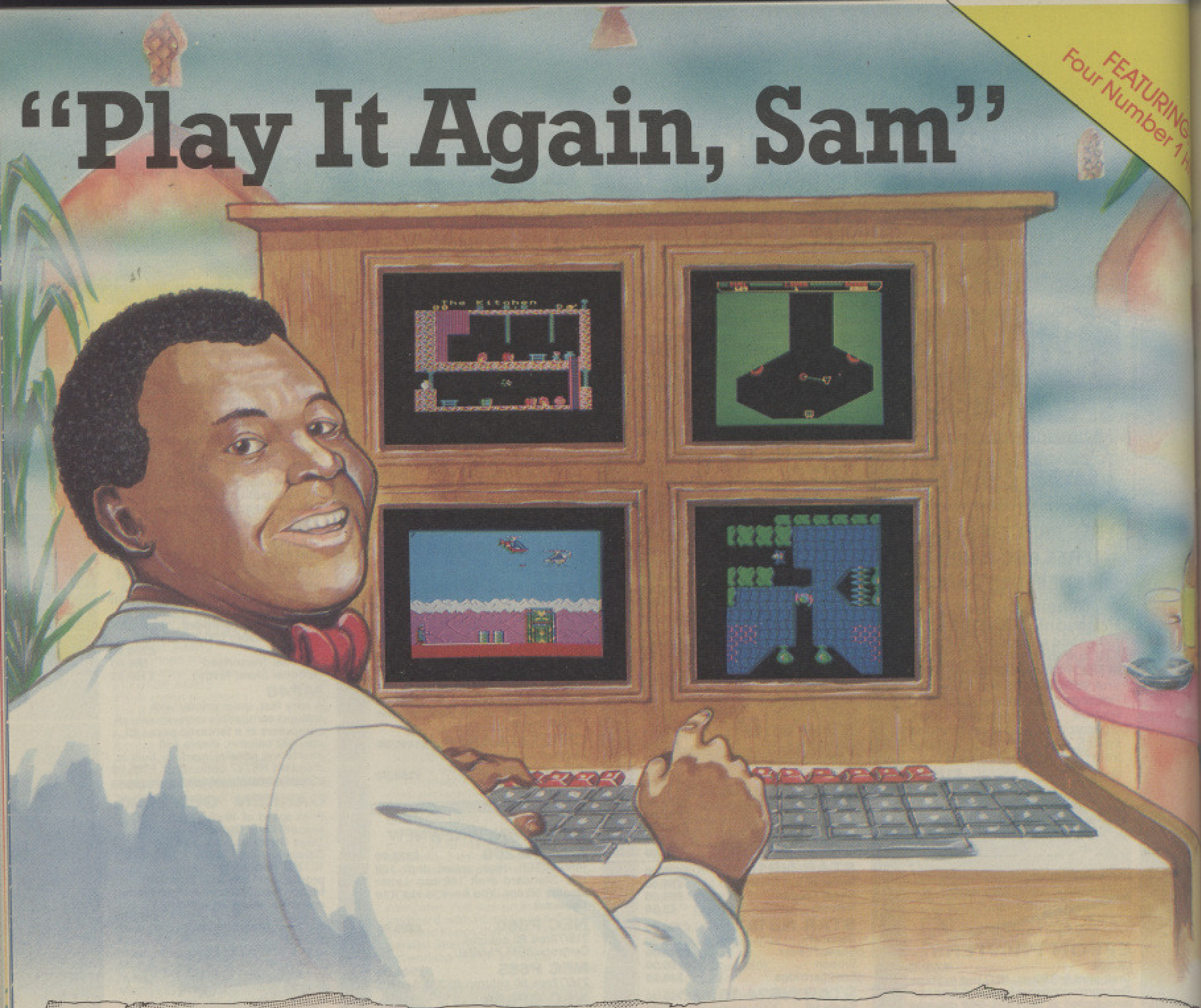

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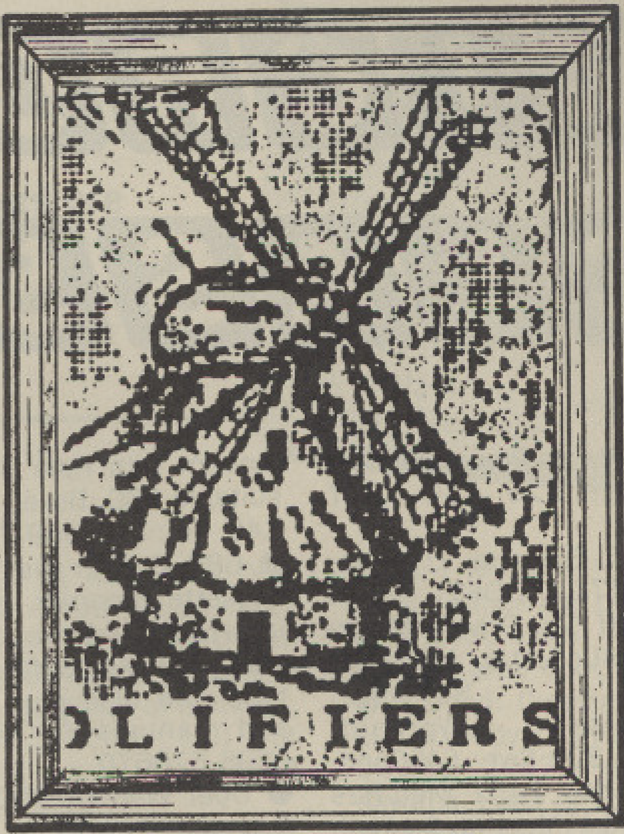
GALLERY

No. 9

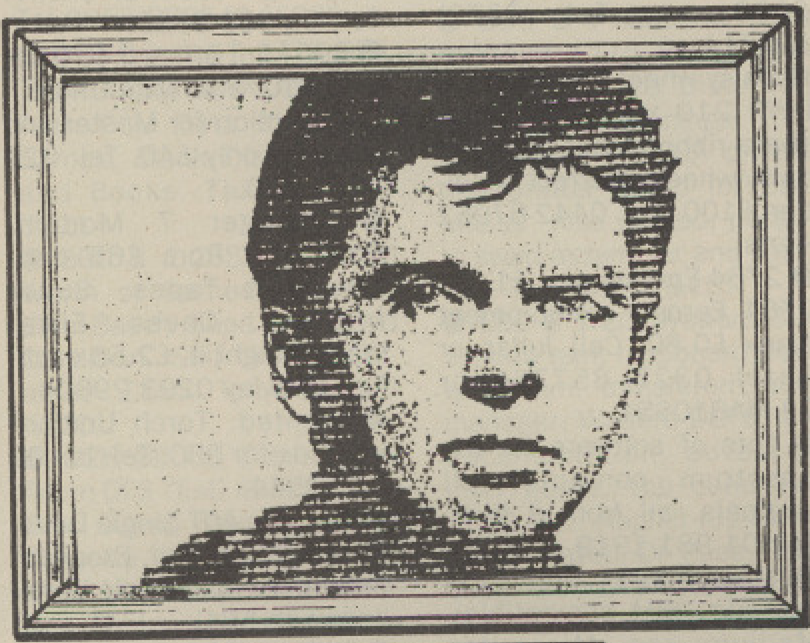
WE have been sent some excellent pictures again this month – windmill by Theo Olifiers and four stunning pictures by Darren Barber.

We don't mind whether it's just one masterpiece or a whole gallery you send – if the pictures are good, you'll see them in print. Please send your screens on tape or disc and don't forget to say which package they were drawn with.

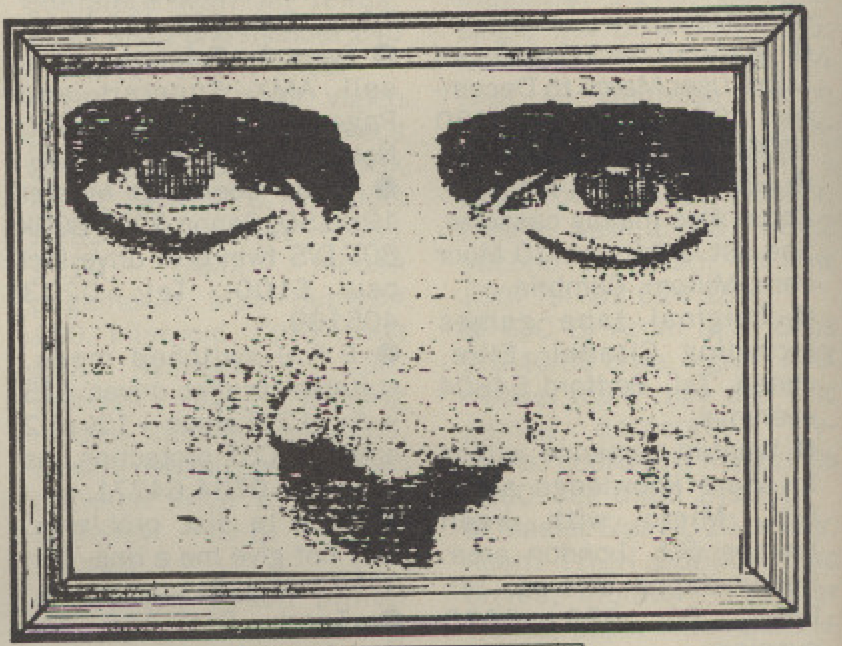
The address to send them is: Gallery, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.



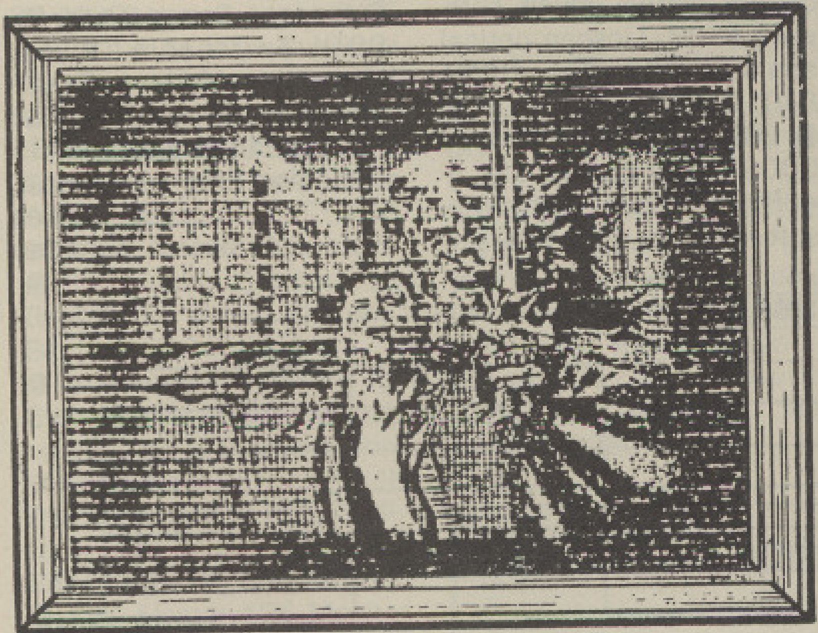
Windmill by Theo Olifiers



Peter Gabriel by Darren Barber



Watching by Darren Barber



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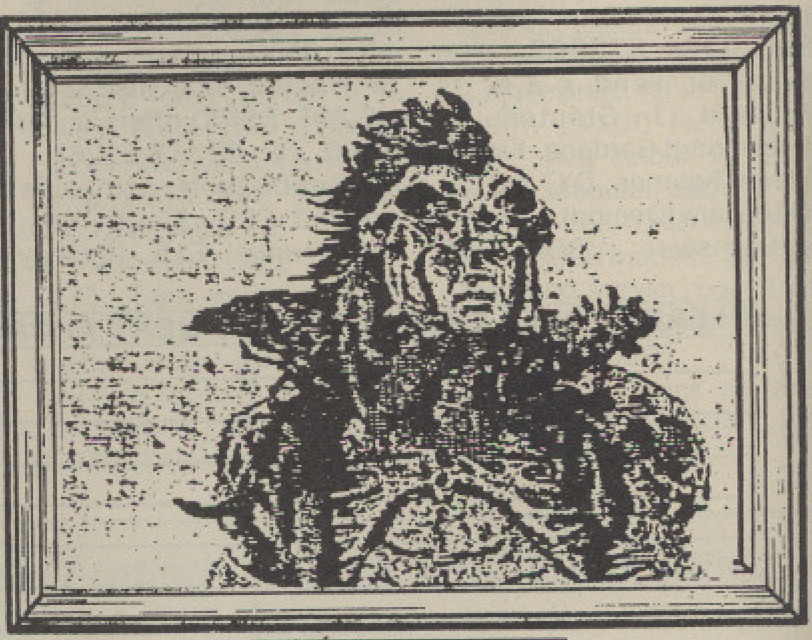

Kurgan by Darren Barber

MICRO USER CLASSIFIEDS

- Wordwise Plus, complete package £25. Tel: 0347 4338.
- BBC B Issue 7:1.2os, SOL1770 DDFS, dual 40T/80T 5¼ Drives, Magazines AUs&MUs, Manuals, Books, Software, Wordwise+, Wordaid, Leads, 32k Swr, £450ono; Microvitec 1451 Med/Res Colour 14" Monitor, 1 month old, £225. Tel: 09074-2305, Wolverhampton, after 4pm (Garry).
- Wanted back issues of Micro User March to December 1983. Tel: 051 480 3923 ask for Paul Rigby.
- BBC Software for sale. Some disc mainly cassette. Sae list. J Prinner, 10 Moor Park, Millom, Cumbria.
- Original tape games including Citadel, Elite, cheap. Tel: Bedford 54804 evenings.
- Wanted someone willing to share knowledge about BBC Micro with keen learner. S.E. London area. Remuneration offered. Tel: Peter 01 659 0035 evenings.
- Original software for sale, includes Modem Master. Tel: 0384 873507 (after 6pm) or send s.a.e. to Richard J Stanton, 4 Rockmount Gardens, Kinver, West Midlands, DY7 6JT.
- Unicom (Demon) autodial/autoanswer 300/1275 modem with Rom software suitable BBC. Boxed as new £45. Tel: 041 959 7265.
- BBC B with disc drive, cassette recorder, speech interface, volume control and joysticks. Software on tape and disc plus books and manuals £300. Tel: 0895 678670.
- Duel Watford 800k 5¼ Drives, £100; 8271 chip, £25; R.H. Light Pen, £20ono. Wanted Moreley T/Text. Dave 061-430 2060.
- Swap for Teletext unit or sell AMX Superart and Pagemaker packages. Tel: Nottingham (0602) 723914.
- Turbo board for Master 128 £50, Canon 220A 800k 80T D/S twin disc drive incl psu £100. Tel: 0203 405109.
- P.S.U switched mode, suitable for disc drives £15 + 5v at 2.5 amps +12v at 2 amps, S/CCT protection, as new. Tel: 0734 64271.
- Tape to disc problems. Why not give me a ring. Tel: 02572 65912.
- Tandy DMP-110 dot matrix printer, perfect working order £65. Tel: Brentwood (0227) 219331 after 6pm.
- Wanted dual disc drive 40/80T, DS/DD offers under £100. Tel: 07375 51261.
- Beebugsoft printwise unused £20, Sleuth Rom with manual £15, Hershey characters disc unused £7, Wordwise plus with manuals tape and userguide, BT SM17H £30. Tel: 0925 811420 evenings.
- Bargain! BBC B+ 128k with Acorn speech kit, discdoctor, Exmon, Acorn Z80 second processor with software and manuals £495. Tel: 0274 678920 after 5pm. (still boxed).
- AMX Mouse, Superart + Rom, utilities, paint pot £100 o.n.o. Tel: (0379) 898714.
- Daisy wheel printer Tandy DWP 210 with BBC lead, spare ribbon, four styles of daisy wheels, perfect condition £100. Tel: 0442 67952 Herts.
- 2764 Eproms new £1.00, 2764 Eproms exequipment blank £0.80. Call Julian or Hazel 0327 857766 or 72:MAG10951.
- Lots of software for the Spectrum computer all originals, all from a fiver. Tel: 01 981 1919.
- Master 128k with 512k upgrade (IBM compatible). Medium res Microvitec 1451AP monitor, twin drives, extras, much software £800. Linscan optical scanner £90. Tel: 0924 840129 evenings.
- BBC B 1.20S Iss7 Opus DDOS (Acorn compatible) + 4080 DSDD drive (Imbyte) + software Elite, Red Arrows + 17 discs + tapedeck + tapes £300. Tel: 0325 481933.
- Master compact, companion (U/port, ZMHZ, A-D 1770 DFS), discs, lockable box, printer lead £200 or games, £350. Tel: 0274 590021.
- Seikosha printer £65 o.n.o. two full-height disc drives one cased £70 o.n.o. the pair or swap for teletext adapter, modem or W.H.Y. Tel: 01 868 3825.
- BBC Mini Office II 40 track disc £10, also Mini Office II Rom version for Master and compact only £40. Tel: 021 427 6960.
- Voyager 7 Modem/Commsoft Rom £65 ono. Acornsoft Tapes, Super Invaders, Chess, Elite, White Knight II. £2.50 each. Tel: Crawley 0293 29604.
- Wanted: Torch Unicorn Upgrade for BBC. Tel: Ian 01 206 0544.
- Cumana 40T Single Drive. Recently Serviced. Excellent Condition. £55. Tel: Wreslingworth 581.
- As New. BBC "B", Basic II OS1.2, 32K SWR 6502 2nd Processor Canon Dual DS 80TK Switchable Drives, Mircovitec Medium Resolution Monitor with Pal, RGB TTL Sound Inputs. £735 ono. Also Free with above, Z80 2nd Processor, Boxed Elite, Aviator, View,Iso

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● BBC B+ 64K 1770 DFS. Little Used in Original Box. Tel 0285 860549. £280.

● BBC B Issue 7 1770 DFS, Tape to Disk, Disk Drive, 40T With PSU Data Recorder, Games, Blank Disks, Tapes and Books. Tel: (09282) 5221.

● BBC B 1.20S Plus £150 Worth of Games Including Elite Beach Head etc. Good Condition. Still Under Guarantee. £250. Tel: 051 336 4330.

● 32K BBC B Disc Doctor Acorn DFS TEAC 40/80 DS/SD Disc Drive. Few Games on Cassette. Six new Games on disc. Monitor Stand instruction books. Loads of Micro Users. Tel: 0772 634122 After 5pm.

● BBC B With Cumana 5.25 and 3" Drives. ATPL Sideways Board with Interword Commstar Beebase 3. Solidisk WD-1770 and 8271. Games Galore. Bargain at £350 ono. Tel: 0633 858314, Newport, Gwent.

● BBC Master 128 Absolute Bargain for only £349 ono. Bedford (0234) 67067.

● Sharematic Software for BBC Master. Automatically updates all 170 Shares from BBC Ceefax Service Each Day, Plots graphs P&F, Oscillator and More £35 ono. Bedford (0234) 856050.

● BBC Master 128 Monitor Dual 40/80T Double Sided Drives View Software, Reference Manuals, Cartridge, Roms £650 ono. Tel: 0962 54183.

● 65C102 Turbo Co-Processor, £60; 512 Co-Processor, £140. Tel: Portsmouth (0705) 693398.

● BBC B Viglen Console 256K MHZ Solidisk DFS/ ADFS 1770/8271 RTC Double Disc Drives 40/80 Cassette Recorder AMX Mouse 50 Disc with Software worth more than £3000, and manuals only £1150. Tel: 0572 57212.

● BBC B 7 Issue & Data Recorder £175 I/Word Rom £30 O/Mate £5 Disc. Tel: 0233 38300 Evenings.

● Wanted 6P100A printer and printer dump for BBC Master. Also wanted, penpal to swap assembler and basic tips. Tel: 04254 3410.

● BBC B 1.20, Watford 32k shadow ram, rom board sideways ram, transferom, rom manager, Watford DDFS, full documentation, advanced user guide, top condition £350. Tel: Naphill (024024) 5371 (days). Dr Pace, 112 Greenwood, Walters Ash, High Wycombe, Bucks.

● BBC B 40/80 DS/DD software, cub monitor £500. Dual 80T drive £165. HCR rom box (new) £70. Tel: 01 363 7114.

● BBC B Issue 7, Acorn DNFS, Solidisk 4 meg 256k board. Mitsubishi 5¼ D/S 40/80 Disc Drive, Delta 14B Joystick, Stack Light Pen, over £500 Software including Dr Who Disc & Rom, complete with manuals, boxed as new, worth £1400+. Accept £550. Tel: 0443 430355.

● BBC B OS 1.20, Acorn DFS, double sided 40/80 track disc drive, Taxan KP810 printer, hi-res colour (!) monitor and over £1000 of software, worth £2500+ sell for £1650 o.n.o. Tel: 0442 52476 Herts.

● Disc drive, good condition, single, 40t, SS complete with all leads, utility discs and manual £45 o.n.o. Tel: 09074 4832.

● BBC Issue 7/1.02, Viglen consol, twin DS/80T discs DFS/ADFS Solidisk 256k 4MHZ SWR, RTC, manuals £395. Microvitec 1451 £190, AMX mouse pagemaker, Max, Superart £90, Interword, Spellmaster £65. Wordwise+ £30. ExmonII £25. Beebug modem, command rom £65, all with manuals etc. Bargain package price £750. Tel: Skingley (9-5) 0666 822861.

● Wanted Epson printer model RX80 FT cash waiting. Tel: 061 740 7708.

● Master 128 twin 40/80 double sided discs £600. Tel: 01-897 8831.

● BBC B Torch Z80 two 400k drives, Kaga 12in monitor, Epsom FX80 perfect software basic £500. Tel: (09276) 6365 evenings.

● Microvitec 1451 monitor £175. Tape and disc software from £1 to 5 pounds Beebug mags Vol 1 to Nov 1987 in binders £25. Tel: Eastbourne 764016.

● BBC B Opus challenger 3 256k + joysticks + cassette + Mini Office and other software £300 o.n.o. Tel: 0633 880032 after 6pm.

● Wanted: Creative Assembler book by J. Griffiths. Tel: 06285 24977 ext 247 daytime, Peter or Tony.

● Acorn Z80 second processor plus seven discs and manuals, £175; Cumana single 5¼ Disk Drive, £45; Mini-Office II 40 Track 5¼ Disk, £8; Wordwise Plus on Rom, £35, manuals, packaged. Tel: 0536 741814.

● Microvitec 1451 monitor, nearly new £190. 6502 second processor as new £90. Tel: 01 524 2593.

● BBC B, Acorn DFS, Opus D/S 40/80 drive, replay, AMX mouse, many tape and disc games, datacorder, joysticks, books and magazines £500. Tel: 0580 241306.

● Master Star NL-10 printer, Acorn TWZN DS800K disc drives, monitor + printer stands, paper W.E. Apollo + comms rom lots of roms, Interword, Viewsheet etc. Lots of games Elite, Cholo etc. Joysticks manual ref 1 + 2 magazines. All in mint condition £1100 for a quick sale. Also colour TV £125. Both computer and TV deal £1200. Tel: 0245 420045.

● WS2000 modem, SK1 chip set, auto answer, boxed with manuals little used. Offers? Tel:0901 30101.

● Opus 40 track s/s drive £40 good condition. Tel: 04577 5354.

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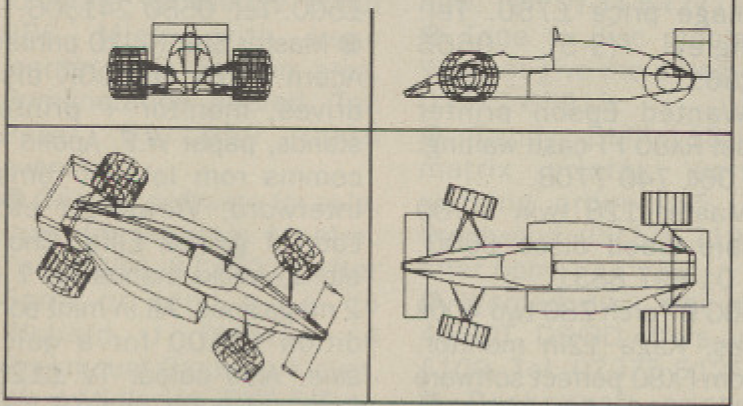

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For BBC B, B+ and MASTER series.

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- * Licenced to Education Authorities
- * Sold in nearly 20 different countries worldwide
- * Probably the most powerful 3D CAD system for any home micro, and at an unbelievably low price

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MODE-00 DUMP

640 X 512

RESOLUTION BREAKTHROUGH!

The BBC computers have quite high resolution graphics. The maximum horizontal resolution of 640 is good but the overall effect is spoilt by the mediocre vertical resolution of 256, even in MODE 0. The same limitation applies to normal screen dumps, so the only way to obtain smooth curves has been an expensive plotter.

Nothing can be done about the screen resolution, but now our unique software, MODE-00 DUMP, provides a means of outputting graphics to a dot-matrix printer at an amazing 640 x 512 resolution. All you have to do is add two simple *SPOOL statements to your BASIC or machine code program. All the VDU data used to plot the picture are then saved to disc for use later by MODE-00 DUMP. Your program can run in any MODE - even MODE 7! (although then you won't see the results until you run MODE-00 DUMP). The dump is in one colour (i.e. as MODE 0) and covers most of an A4 page.

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£12.95 disc only (state 40 or 80 track)

Please note: MODE-00 DUMP works with most dot-matrix printers, but if ESC"*" is not available (check your printer manual) then you have to omit from the dump 6% of the screen height (either top or bottom).

SPECIAL OFFER: (40 or 80 track disc only)
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The Micro User Index

The complete guide to all software and hardware products for the BBC Micro reviewed in these pages in the last 12 months

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Dabhand Guide – View	Dabs Press	B		Nov 87
ADE Plus	System	U	R	Jan 87
ATS Rom	BBC Soft	U	R	May 87
Advanced Control Panel	ACP	U	R	Sep 87
Apocalypse	Command	G	CD	Sep 87
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Big Calculator	4Mation	E	D	Dec 87
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C	Beebug	EU	D	Nov 87
C	Brasscourt	EU	D	Nov 87
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First Filer	Chalksoft	E	D	Apr 87
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Folio	Tediman	E	D	Feb 87
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Goal!	Tynesoft	G	C	Apr 87
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Grand Prix Construction Set	Superior	G	CD	Jun 87
Great Wall	Artic	G	C	Dec 87
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Imogen	Micro Power	G	CD	Jun 87
Impossible Mission	US Gold	G	CD	Feb 87
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Jet Set Willy II	Tynesoft	G	CD	Mar 87
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Living Daylights	Domark	G	CD	Nov 87
Lost Crystal	Epic	G	C	Jul 87
Mad Painter	R. Soft	E	D	Feb 87
Master Console	Viglen	H		Apr 87
Mastering View	Sigma Press	B		Nov 87
Max	AMS	U	R	Jan 87
Measure and Tell	Clwyd Technics	E	D	May 87
Mechanics and Electricity	Soft-Teach	E	D	Dec 87
Megarok	Bug-Byte	G	C	Nov 87
Micro Power Magic One	Micro Power	G	CD	Jan 87
Micro Power Magic Two	Micro Power	G	D	Sep 87
Microcodil	Codil Language Systems	EU	D	Feb 87
Mind Games	AMS	G	D	Apr 87
Minotaur	Minerva Systems	G	AD	Dec 87
Music 5000	Hybrid Technology	H		Sep 87
Mystery Squad	Chestnut	E	C	Nov 87
Nine Dancers	Larsoft	G	C	Mar 87
Omega Orb	Audiogenic	G	CD	Aug 87
Palace of Magic	Superior	G	CD	Nov 87
Panik	Atlantis	G	C	Oct 87
Paperboy	Elite Systems	G	CD	Jul 87

Key: A – Archimedes B – Book C – Cassette D – Disc E – Educational G – Game H – Hardware R – Rom U – Utility

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Product	Company	Type	Media	Issue
Phantom	Tynesoft	G	CD	Aug 87
Plan B	Bug-Byte	G	C	Jun 87
Play it Again Sam	Superior	G	CD	Dec 87
Puppet Man	Larsoft	G	C	Nov 87
Quest Mouse and Quest Paint	Watford Electronics	U	D	Jul 87
Ransack	Audiogenic	G	CD	Nov 87
Ravenskull	Superior	G	CD	Feb 87
Rays and Waves	Soft-Teach	E	D	Dec 87
Revs	Acornsoft	G	CD	Mar 87
Rik the Roadie	Alternative	G	C	Nov 87
Rising of Salandra	Larsoft	G	C	Mar 87
Romboard 4	Vine Micros	H		Nov 87
Samantha Fox Strip Poker	Martech	G	D	Feb 87
Sentinel	Firebird	G	CD	Feb 87
Sink the Bismark	Design People	G	D	Jan 87
Smack	Daco	E	D	Mar 87
Spell Master	Computer Concepts	U	R	Apr 87
Sphere of Destiny	Audiogenic	G	C	Jun 87
Spy vs Spy	Tynesoft	G	C	Dec 87
Star Clash	Gremlin Graphics	G	C	Nov 87
Starquake	Bubblebus	G	CD	May 87
Suds	Riverdale	G	C	Nov 87
Superior Collection One	Superior	G	CD	May 87
Superior Collection Two	Superior	G	CD	May 87
Survivors	Atlantis	C		Aug 87

Product	Company	Type	Media	Issue
TV Director	Squirrel	U	D	May 87
Tanks!	Design People	G	D	Jul 87
Tarzan	Martech	G	CD	Jul 87
Teaching with a Micro	The Shell Centre	E	D	Mar 87
Ted	Watford Electronics	U	R	Dec 87
Tish on Tush	Jack and Jill	E	D	Jun 87
Transform	Chalksoft	E	D	Jun 87
Trivial Pursuit (young player's edition)	Domark	G	CD	Mar 87
Tudor England	Akadimias	E	CD	Mar 87
Twin Orbs of Aalinor	Potter Programs	G	C	Jan 87
Typesetter!	Sherston	E	D	Nov 87
Unbelievable Ultimate	US Gold	G	C	May 87
Video Pinball	Alternative	G	C	Aug 87
W.A.R.	Martech	G	CD	Apr 87
Winter Wonderland	Incentive	G	C	May 87
Wychwood	Larsoft	G	C	Mar 87
Xor	Logotron	G	CD	May 87
Xor Designer	Logotron	G	D	Jul 87
Yie Ar Kung Fu	Imagine	G	CD	Apr 87
Zap-Pak	Players	G	D	Sep 87
Zarch	Superior	G	AD	Dec 87
Ziggy	Audiogenic	G	C	Oct 87
Zoopak	4Mation	E	D	Sep 87

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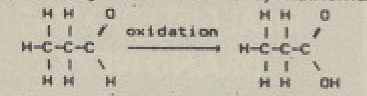

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LETTERS

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Ten tips for Wordwise Plus

THE following hints should be useful for anyone who uses Wordwise Plus:

● *If you wish to delete the entire text it can be tedious using the markers and the NEW command kills the segments as well. It is faster to go to the main menu and type:*

```
:DELETE TEXT
```

or shorter:

```
:DE.TE.
```

● *If you have a Word-Aid chip fitted, holding down Shift+* while switching the computer on automatically loads Word-Aid and Wordwise Plus.*

● *You can always type in filenames in either upper or lower case.*

● *The problem of underlining starting at the left hand margin and stretching out to a centred title is solved by putting a space between the CE and US commands, as follows:*

```
f1DHf1CEf2■f1USf2Title
```

● *If you have a second file and wish to continue the word count remember the number from the first file, load up the new file and from the main menu type:*

```
:W%=X
```

where X is the number of words you wish to be displayed. The maximum word count is 6435.

● *Be careful when using disc filing system star commands because *COPY, *FORM, *COMPACT or *BACKUP will destroy your current text.*

● *When you want to preview part of a long text it may take quite a while to get to the chosen piece. Instead place markers around it and select preview. The micro will then prompt:*

```
Marked section only? (Y/N)
```

● *Similarly you can select a specific section using markers when printing.*

● *On standard BBC Bs without shadow screen Wordwise Plus switches to 40 column screen preview when the characters free count gets to 15313. So watch for its approach – it is a good idea to have shorter files.*

● *When editing program listings you can switch off the annoying word-wrap with Control+F.* – **Giles Armitage, Chester.**

Transformation scene

FIRST I would like to congratulate you on The Micro User. *It has been transformed with your Gallery, Library and Letters pages.*

Secondly, I have just finished learning Basic and have a suggestion to make. Why don't you have a monthly test or project to keep programmer's Basic up to scratch or to show them just how much they know?

You could also do this with machine code and other languages. – **Nicholas Ford, Chichester, West Sussex.**

● We like the idea and next month you'll find Leaky Listings – a short program with errors for you to find.

Hunter hunted

IN lines 290, 390 and 1390 of Dune Hunter in the November issue of The Micro User *the command SPC is used. This is followed by a number which determines the number of spaces to be printed.*

After running the Checksum program, I found there was a mistake in these lines, so I went back and checked the line with the listing.

There was nothing wrong with the line I had typed in and I was bewildered.

I then tried substituting SPC1 with " " and ran the checksum program and found the checksums matched. Could you please explain this error? – **Mark Watling, (age 14), Lumbertubs, Northampton.**

● As it's difficult for you to see how many spaces are between quotes, we prefer to use SPC. Unfortunately we changed this one after generating the checksums.

Also a part of a line was lost at the end of Dune Hunter. Line 3560 should read:

```
 3560 IFPAGE>&1900:*KEY0FO
RT%=0TOTOP-PAGE STEP4:T%!&
1900=T%!PAGE:N.¦MPAGE=&190
0¦MOLD¦MRUN¦M
```

This line is not needed on most BBC Micros.

Environmental problem

THERE is a small error in the Environment program featured in the Library in the November 1987 issue of The Micro User.

On the Master I found that it returned the message Computer unknown. When I examined the listing I found that line 320 should read:

```
320 IF C%=253 THEN ="BBC
Master"
```

I have enjoyed using programs from The Micro User. *Keep up the good work.* – **Ashley Frieze, Leeds.**

That helpful Formfiller

AS a visually handicapped Micro User, I was particularly interested in Formfiller from Steve Turnbull's Library. I came across it in the June issue of The Micro User *which I receive from TNAUK – the Talking Newspaper Association of the United Kingdom.*

You will readily appreciate, I think, that such a facility can be of enormous use to blind and partially-sighted people in either business or domestic correspondence, as we now have suitable synthetic speech routines to assist the use of word processors.

I should also very much like to draw the attention of any reader who knows of a blind or partially-sighted BBC Micro user to the VDU group (Visually Disabled User group) founded by David Calderwood, and its tape magazine, Computer Talk, edited by Michael Nyman, 12 Ainsdale Gardens, Grange Road, Erdington, Birmingham. – **J.M. Dunlop B.A. MCSP, Pennsylvania, Exeter.**

Win a tenner

● Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Writers of the most interesting letters receive a £10 prize.

Panasonic printer power

I BOUGHT a Panasonic KX-P1081 dot matrix printer the day before I came across the review of it in the October 1987 issue of The Micro User.

*I agree with most of the points raised, although you made a mistake with regard to the use of the *FX3 command.*

*I've tried using *FX3,2 to*

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LETTERS

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*enable the printer but this doesn't seem to work. The instruction should be *FX3,10, unless there is something I have overlooked.*

One minor criticism about the KX-P1081 which you failed to point out concerns the transparent top lid. It's a shame that it isn't of the easily detachable, hinged variety. Otherwise this printer is a delight to use compared to the overpriced and noisier Epson LX86.

In the letters section of the September 1987 issue there was a useful program which allows you to change the Ascii code that is sent to the printer. This does not work with Wordwise Plus 1.49 as it stands.

However, if all the zero page locations (&70, &71) and so on are changed to &80, &81 and so on the program will work.

Keep up the good work. – **W. Leung, Harlow, Essex.**

Not entirely converted

ACORN's ADFS version of Viewstore incorporates the program Convert, for which one of the stated purposes is to make available the file space used by deleted records.

Obviously you need this when the data disc is nearly full. But that's exactly when Convert will not work, because it insists on putting the Converted data on the same disc as the original file. But there is no room for both.

In fact it can only recover the wasted space if the disc is slightly over half full. In other words, more space can be made only if there is already plenty available already.

I have tried every trick I can think of to send the converted file to a blank disc, but Viewstore always thinks of yet another error report to foil me. Do you know of any method that will work? – **Robert Blowers, Northallerton, North Yorks.**

● Sorry, we don't know the answer to this one. Can any of our readers help?

Closer look at Encounter

IN the November 1987 issue of The Micro User there seems to be an error in Close Encounter and included in the checksum. Line 110 calls an undefined PROCcli.

This was presumably to be a procedure for people with Basic I. With Basic II, replacing PROCcli with OSCLI results in everything operating correctly.

Important items not mentioned in the article are that either Object1 or Object2 (according to the screen mode) must be on the disc holding the screen for editing.

If this is not so the screen will load and then immediately revert to the prompt screen without any error message.

In addition the disc being used for the revised screen save must have sufficient room for the new screen. Failure to ensure this point will result in all of your editing being wasted, as there is no second chance after pressing Escape.

These comments aside, what an absolutely brilliant program this is, enabling as it does precision in either modifying or producing complete screens.

Rob Anderson must be congratulated on producing a very useful utility.

Finally, rather than have to remember to reset PAGE before chaining the program you can just add the line:

```
   35 IF PAGE<>&1D00 PAGE=
&1D00:CHAIN"PIXEL"
```

– **D.P. Dyer, Constantine, Cornwall.**

● As you correctly concluded, in the process of changing the Basic II OSCLI command to the Basic I equivalent, PROCcli, the actual procedure was omitted. To correct the listing enter these amendments:

```
 2520 DEF PROCcli($&700):L
OCAL X%,Y%
 2530 Y%=7:CALL&FFF7:ENDPR
OC
```

and in Listing II:

```
  770 PROCcli("LOAD "+file
$)
 1450 PROCcli("SAVE "+file
2$+A$+" 8000")
 1470 DEF PROCcli($&700):L
OCAL X%,Y%
 1480 Y%=7:CALL&FFF7:ENDPR
OC
```

Incidentally, Basic I users can use PROCcli in their own programs whenever they need to access the command line interpreter.

Printing Ceefax pages

EARLIER this year I took advantage of the special offer in The Micro User and bought an Acorn Teletext Adapter.

I have found it a very worthwhile investment and use it regularly for downloading telesoftware and generally, as a source of information.

One thing I would like to be able to do is to obtain a printed copy of certain pages from Ceefax or Oracle, such as the daily TV channel listing.

Saving a page to disc, then listing it to a printer, reproduces the page as a continuous stream of text characters interspersed with blank spaces and control characters, making the output rather difficult to read.

Is it possible to convert Jeremy Brayshaw's Ceefax News Program from the October 1987 issue to produce a hard copy of pages other than the news pages (103-118)? If so, can you suggest how this can be done? – **Clive Bonsall, University of Edinburgh.**

● *Jeremy Brayshaw replies:* It is possible to change the program, but not easily. At present it is set up for the format of the news pages, and this is always constant.

If the program was changed to read the TV pages there are more sub-pages in the morning than the evening so it would have to be changed as the day progressed. Other problems occur because the program ignores the graphics on the news pages and prints a heading – taken from page 102 – on each page.

There are too many changes to print on the Letters page, but by changing the loop from line 270 to 290 you can get other Ceefax pages. However, graphics will cause corruption and each printed page will have a strange heading.

In PROCsetgrabber the parameters are as follows: *N%* is the number of the grabber. You can use 0 to 19 on the ATS, but note that this program only reserves room for 16.

The magazine number is set to 1. Pages are numbered form 0 to 99 and the first number is the magazine number. So to access, say, Page 301 change this to 3.

The function EVAL is used to evaluate the page number; *N%+2* starts at page 102. Simply changing this to *N%+70* gives the TV pages, but with the problems mentioned before clearly visible.

&3F7F left as it is will grab the first sub-page it meets. The page storage address is calculated by *U%+...*, so shouldn't be changed.

Indian connection

WE are a non-profit, non-commercial organisation of computer users, many of whom are using the SCL-Unicorn (Indian version of the BBC B).

Our members find your

LETTERS

magazine to be most useful, comprehensive and informative. However it is not regularly available here and we get only random issues.

We would like you to publish the name and address of our association in your magazine, with an appeal to other user associations to get in touch with us, as we would like to exchange ideas and resources with other user groups. — **Ramrao B. Nalavade, President, Computer Users' Association, Dutta Chhaya, 9th Lane, Rajarampuri, Kolhapur-416 008, India.**

Checksums on Basic I

£10 Prize letter

I HAVE a problem with Soccer Manager from the September issue of The Micro User. I typed it in and thanks to the checksums I have got it to work.

But why can't I get the checksums for lines 540 and 4540 to correspond to those printed in the magazine? For line 540 I have typed:

```
X=OPENIN(file$)
```

Is this correct? It is such a short command that it is almost impossible to get wrong, and yet I get 516B D for the checksum.

The Save Game option works fine, so I assume that the command is correct. For line 4540 I get a checksum of 184A 2. Whatever I try the sums don't tally. — **S. Cannon, Geneva, Switzerland.**

● You have managed to identify the one place that checksums can really go wrong. The problem lies in the difference between the tokens for OPENIN in Basic I and Basic II which allows for the new command OPENUP in Basic II.

This means the checksums will not tally for these lines on Basic I micros – because we use Basic II to create the checksums.

Squaring up to circles

I WAS interested to see Steve Turnbull's article on drawing circles in the November issue of The Micro User.

Here is a short Basic routine which draws circles very quickly. I doubt that any machine code version could be quicker.

```
  100 MODE 0:DIM X%(9),Y%(9
):TIME=0
  110 PROCcirc(640,512,400)
  120 PRINT"Time taken=";TI
ME/100:END
  130 DEF PROCcirc(X%,Y%,R%
)
  140 LOCAL N%:VDU29,X%;Y%;
  150 MOVE 0,R%:X%(0)=0:Y%(
0)=R%
  160 FOR N%=1 TO 9:X%(N%)=
X%(N%-1)*.9848+Y%(N%-1)*.17
36
  170 Y%(N%)=Y%(N%-1)*.9848
-X%(N%-1)*.1736:NEXT
  180 FORN%=0TO9:DRAWX%(N%)
,Y%(N%):NEXT
  190 FORN%=9TO0STEP-1:DRAW
X%(N%),-Y%(N%):NEXT
  200 FORN%=0TO9:DRAW-X%(N%
),-Y%(N%):NEXT
  210 FORN%=9TO0STEP-1:DRAW
-X%(N%),Y%(N%):NEXT
  220 ENDPROC
```

I won't attempt to explain the theory, it would take too long, but line 110 gives the parameters for the centre of the circle and a radius of 400 pixels.

In Mode 0 the routine draws the circle in about 0.35 seconds. — **B. Conway, Upper Norwood, S.E.19.**

● *Steve Turnbull replies:* There are many different ways of drawing circles. If Mr Conway's routine was converted into machine code it would be bound to be faster.

I've done a speed comparison for drawing a number of circles of various radii and this version only becomes faster when dealing with circles with a radius over 400 pixels – for small circles it is significantly slower. It could be made faster by doing the calculation at line 160 just once in the main routine rather than every time a circle is drawn.

Also it may be pedantry but my routines draw circles whereas this routine draws a 40-sided polygon and doesn't have a fill option. The routine could be made significantly faster if only a 20-sided polygon was drawn, and if it was just four sided...

By the way, it uses the same sine and cosine calculation technique as that in the Fast Ellipse routine in this month's Library feature on page 54.

Key to some great games

AFTER some difficulty typing in Dino I finally corrected all my mistakes. What an entertaining game it proved to be – I always enjoy the offerings produced by Gordon Key.

In fact I've just been playing Dune Hunter – yet another addictive monster game on the lines of Hunkie-Egg. Many thanks for such entertaining programs.

Can I ask for your help once again? Have you ever published a procedure that might be added to published listings allowing sound to be switched on or off at will? — **Trevor Skelton, Ross-on-Wye.**

● Typing *FX210,1 switches sound off and *FX210,0 turns it back on again. Insert these commands at the start of a program, or as an option in your games menu program.

Other options are to use the sound control routine in the December issue of *The Micro User* or you can solve all your problems with a Sound Master – see page 89.

Stringing along

THE functions STR$ and VAL will convert a number to a string and vice versa.

However, although STR$ can convert to a hexadecimal string, VAL gives a zero result when converting back.

Is there any way to convert a hexadecimal string to a number? — **Peter Tewlyer, High Wycombe, Bucks.**

● The reason VAL is returning with zero is that the string being converted starts with a letter, but if it starts with a number you get a different effect. For example:

```
>P.VAL("FFF1")
      0
>P.VAL("4DFE")
      4
>P.VAL("38CA")
     38
```

However, to convert a hex string to a number you can use the EVAL function, like this:

```
>P.EVAL("&"+"FFF1")
   65521
>P.EVAL("&"+"4DFE")
   19966
>A$="38CA":P.EVAL("&"+A$)
   14538
```

Help with the homework

WITH regard to Sarah Capper's Slow answer in the December issue of The Micro User, the main fault with her program was with the analysis of her problem.

If you state the problem simply as a formula then it is $A/B = 0.612015$ or, in other words, $A = B*0.612015$.

This considerably reduces the range of numbers we need to search for B. Likewise, if B cannot be greater than 1000 then A must be less than 612.

Therefore, the range of numbers to be searched lies in the range of $1 < A < 612$ and INT(A/0.6121) < B <

Turn to Page 170 ▶

LETTERS

◀ **From Page 169**

INT(A/0.6120).

There are without doubt many more ways to tackle this problem, but this was my quick answer to it:

```
   10 FOR A=3 TO 612
   20 FOR B=INT(A/.6121) TO
 INT(A/.612)
   30 C=B*.612015
   40 D=ABS(INT(C)-C)
   50 IF D<.0001 PRINT "RES
ULT IS "A" AND "B
   60 NEXT:NEXT
```

Line 50 doesn't end the program because there may be more than one possible solution. Likewise, altering the divisors in line 20 will search a larger range of numbers, some of which may fulfil the criterion selected – depending on the precision required.

I hope this will make Sarah's homework easier. – **John O'Regan, City of Cork Education Committee.**

Santa scramble

PLEASE can you advise me what the variable is in line 1370 of Santa in the December issue of The Micro User.

We spent an hour trying different combinations. – **J.Powell, Halewood, Merseyside.**

● We're not too sure what your problem is, but the calculation inside the TAB brackets is *x* plus *n* minus one, followed by *y* and *C$* outside the brackets.

Moving markets

RECENTLY I was in the UK on holiday and had an opportunity to observe the BBC Micro market. I was astonished to find the Acorn range almost completely absent from the shops – a total reverse from the situation in 1984, so I feared the worst.

However a visit to Watford Electronics put things in perspective. I would like to thank Mr. Jessa for the time he took to explain the situation and to show me around.

In New Zealand we rely heavily on mail order to the UK, mainly due to the poor performance of the local distributors.

I have been able to tell the local users in Wellington at least that we can rely on support from the UK for a good while yet. – **Brian Cattermole, Upper Hutt, New Zealand.**

Soup served in the bar

SEVERAL people have asked what the bar code forming the border around our advertisement in The Micro User *represents.*

We believe it decodes to a number representing Heinz tomato soup.

We are sorry if you were expecting something a little more profound! – **Brian Beattie, Managing Director, Nebulae Computer Supplies, Co. Antrim.**

Masterful game play

I OWN a BBC Master 128 and have recently bought the Leisure Genius game, Computer Scrabble.

I know that it says on the box that the game is for the BBC B, but I also own Computer Monopoly and have had many hours of pleasure playing, even though it too says it is for the BBC B only.

I would be most grateful if anyone has any information on how to get scramble running on my Master. – **Alison Winter, Rivermead, Coventry.**

● You could try running it through Acorn's Convert program, but if that fails . . . Does anyone else have any ideas?

Saving grace

I DON'T seem to be able to save to drive two when using the Mini Office II word processor. How do I do it? – **Tom Tinkler, Huddersfield.**

● You can either prefix the filename with *:2.* or issue the command:

```
*DRIVE 2
```

before you start loading and saving. Of course you must have a double sided disc drive and make sure that the disc is formatted on side two as well.

Unknown gem revealed

I HOPE your proposed list of good educational software catches on. Like Shelley Gibson, I find such material very thin on the ground.

By far the best I have used in the classroom is a set of six primary maths programs called the Kestrel First Collection, which I bought after reading a rave review of them in The Micro User.

I have never seen them in use in other schools, at any exhibition or on any list of approved software. But they are streets ahead of most of the rubbish we are offered.

Any one of the six is worth the £12 they cost together. They can be tailored to suit any primary school child from the slowest to the brainy, and never go wrong.

There may be many other unknown gems like these around and if readers write in, perhaps we can help each other to spend our money wisely, despite all those experts and advisers who don't seem to understand what really works in the classroom.

The best of luck with your list – it will be another good reason for buying The Micro User – **M.Usher, Bradford.**

● The Kestrel First Collection is available by post from BESS, Ellesmere House, Keyingham, Hull, HU12 9SP

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Using printers

I WAS interested in the Panasonic KX-P1081 printer review in the October 1987 issue of The Micro User.

I bought one from Watford Electronics earlier in the year and am very pleased with it, particularly as mine has a tear bar.

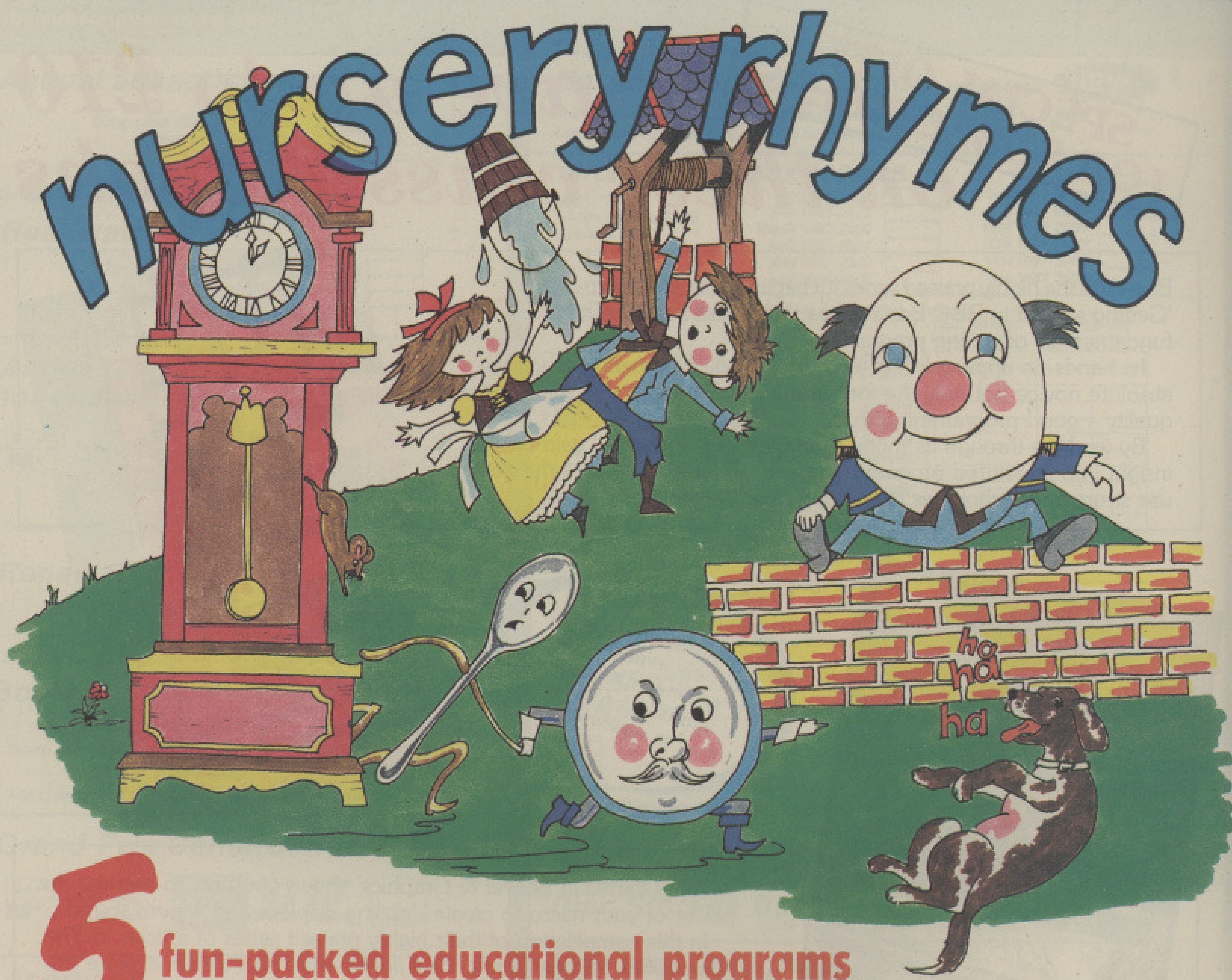
I find it very handy to have a printed list of all the programs on my double sided discs. So here is a short program to print a list using the free Watford Electronics dumpout rom given away with the printer:

```
   10 CLS
   20 *cat 0
   30 *TIMAGE X 0 39
   40 PRINT"Rewind paper n
ow"
   50 REPEAT UNTIL GET=32
   60 CLS
   70 *cat 2
   80 *TIMAGE X 0 39 I 40
```

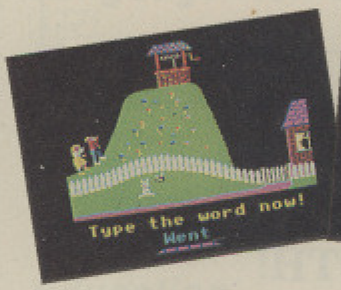
'The second dump is indented 40 characters so that the two catalogues sit side by side on the paper.

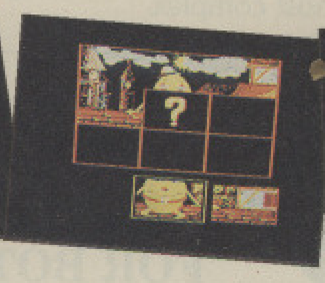
Updating is very quick as more programs are added to your discs. – **Eileen Shone, Wirral, Merseyside.**

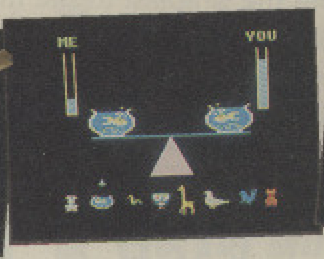
nursery rhymes

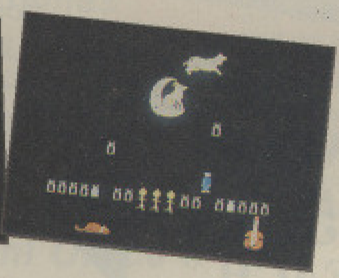


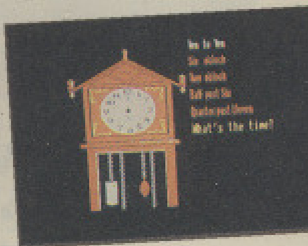
5 fun-packed educational programs ... for young children everywhere











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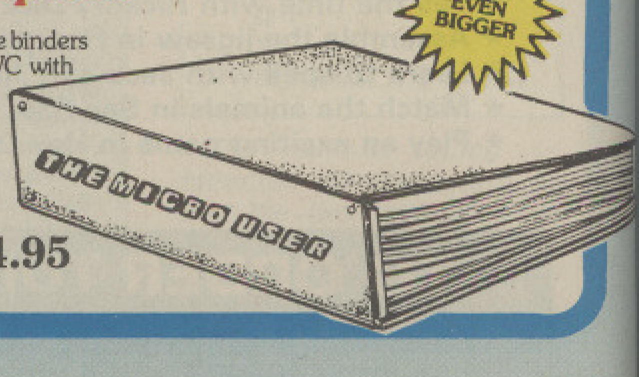
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	Duck's Dinner	May	*2476/79*	☐	☐	☐	☐
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Nursery Rhymes

(see page 171)

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(see page 152 & 153)

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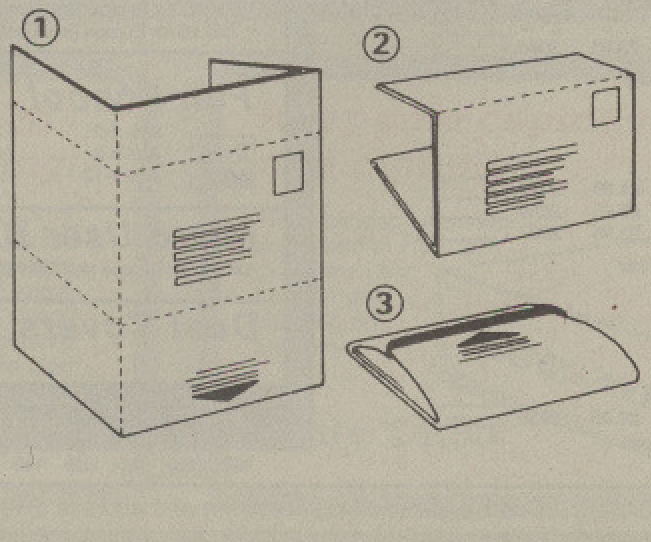

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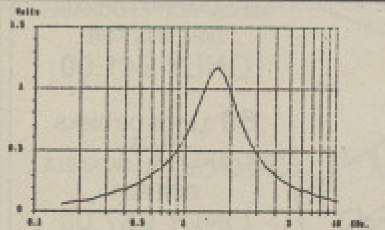

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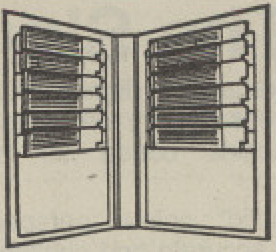

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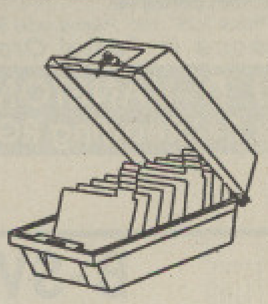

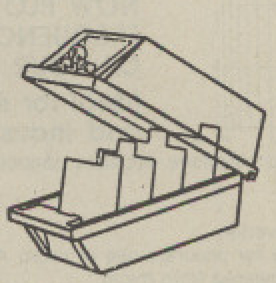

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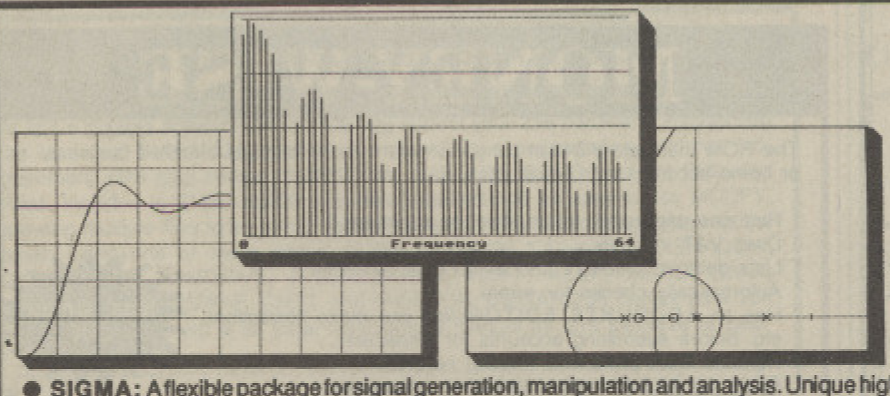

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REPTON AS A BABY

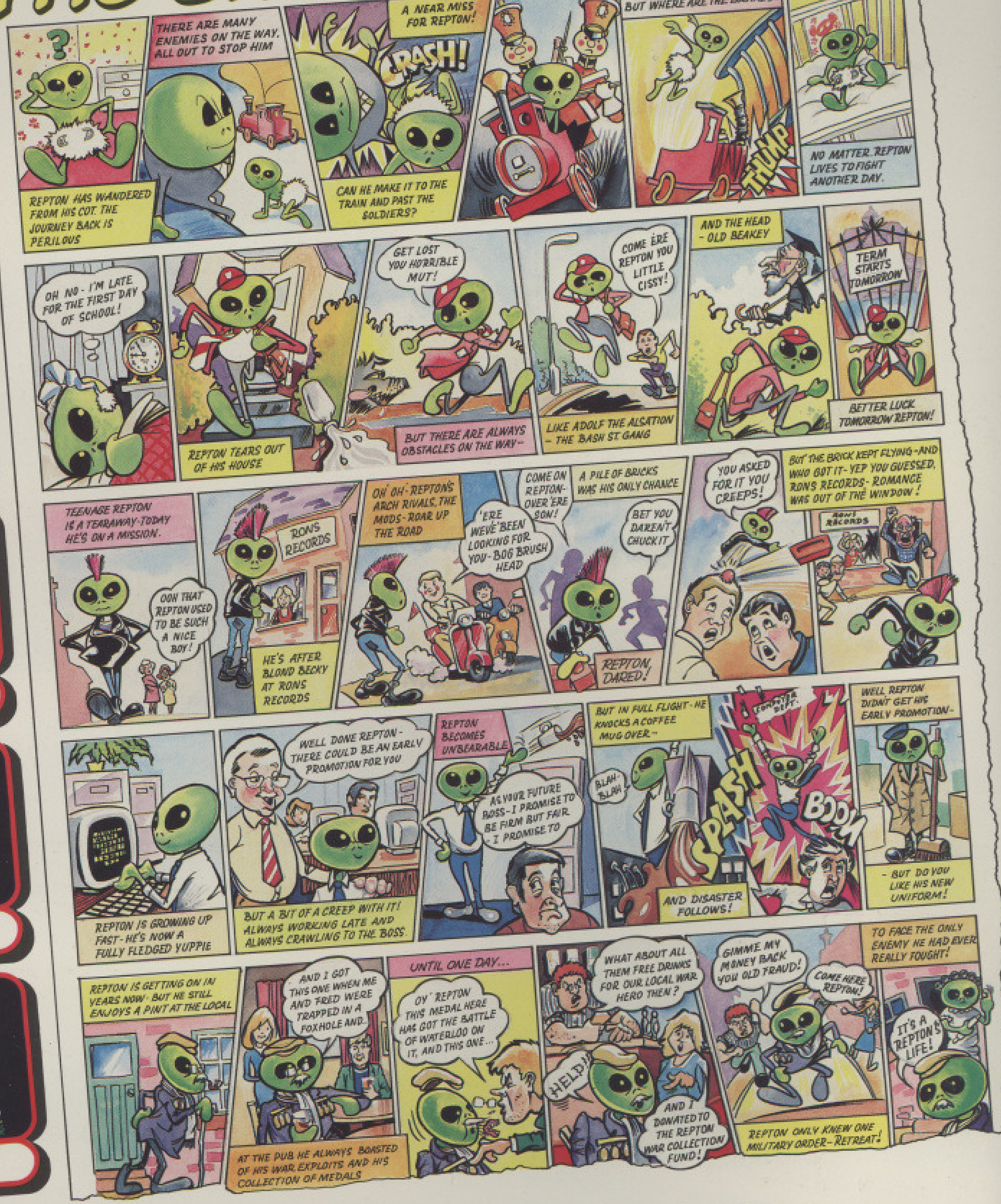
REPTON AT SCHOOL

REPTON AS A TEENAGER

REPTON AT WORK

REPTON AS AN OLD MAN

The Life Of Repton


REPTON HAS WANDERED FROM HIS COT. THE JOURNEY BACK IS PERILOUS
THERE ARE MANY ENEMIES ON THE WAY, ALL OUT TO STOP HIM
A NEAR MISS FOR REPTON!
CRASH!
CAN HE MAKE IT TO THE TRAIN AND PAST THE SOLDIERS?
HE'S PASSED THE SOLDIERS, BUT WHERE ARE THE BRAKES?
THUMP
NO MATTER. REPTON LIVES TO FIGHT ANOTHER DAY.
OH NO - I'M LATE FOR THE FIRST DAY OF SCHOOL!
REPTON TEARS OUT OF HIS HOUSE
GET LOST YOU HORRIBLE MUT!
BUT THERE ARE ALWAYS OBSTACLES ON THE WAY—
COME 'ERE REPTON YOU LITTLE CISSY!
LIKE ADOLF THE ALSATION - THE BASH ST GANG
AND THE HEAD - OLD BEAKEY
TERM STARTS TOMORROW
BETTER LUCK TOMORROW REPTON!
TEENAGE REPTON IS A TEARAWAY-TODAY HE'S ON A MISSION.
OOH THAT REPTON USED TO BE SUCH A NICE BOY!
RONS RECORDS
HE'S AFTER BLOND BECKY AT RONS RECORDS
OH' OH'- REPTON'S ARCH RIVALS, THE MODS- ROAR UP THE ROAD
'ERE WE'VE BEEN LOOKING FOR YOU- BOG BRUSH HEAD
COME ON REPTON- OVER 'ERE SON!
A PILE OF BRICKS WAS HIS ONLY CHANCE
BET YOU DAREN'T CHUCK IT
REPTON, DARED!
YOU ASKED FOR IT YOU CREEPS!
BUT THE BRICK KEPT FLYING - AND WHO GOT IT - YEP YOU GUESSED, RONS RECORDS - ROMANCE WAS OUT OF THE WINDOW!
RONS RECORDS
WELL DONE REPTON - THERE COULD BE AN EARLY PROMOTION FOR YOU
REPTON IS GROWING UP FAST - HE'S NOW A FULLY FLEDGED YUPPIE
BUT A BIT OF A CREEP WITH IT! ALWAYS WORKING LATE AND ALWAYS CRAWLING TO THE BOSS.
REPTON BECOMES UNBEARABLE
AS YOUR FUTURE BOSS - I PROMISE TO BE FIRM BUT FAIR - I PROMISE TO
BUT IN FULL FLIGHT - HE KNOCKS A COFFEE MUG OVER—
BLAH-BLAH
SPLASH
COMPUTER DEPT.
BOOM
AND DISASTER FOLLOWS!
WELL REPTON DIDN'T GET HIS EARLY PROMOTION—
- BUT DO YOU LIKE HIS NEW UNIFORM!
REPTON IS GETTING ON IN YEARS NOW - BUT HE STILL ENJOYS A PINT AT THE LOCAL
AND I GOT THIS ONE WHEN ME AND FRED WERE TRAPPED IN A FOXHOLE AND..
AT THE PUB HE ALWAYS BOASTED OF HIS WAR EXPLOITS AND HIS COLLECTION OF MEDALS
UNTIL ONE DAY...
OY' REPTON THIS MEDAL HERE HAS GOT THE BATTLE OF WATERLOO ON IT, AND THIS ONE...
WHAT ABOUT ALL THEM FREE DRINKS FOR OUR LOCAL WAR HERO THEN?
HELP!
AND I DONATED TO THE REPTON WAR COLLECTION FUND!
GIMME MY MONEY BACK YOU OLD FRAUD!
COME HERE REPTON!
REPTON ONLY KNEW ONE MILITARY ORDER—RETREAT!
TO FACE THE ONLY ENEMY HE HAD EVER REALLY FOUGHT!
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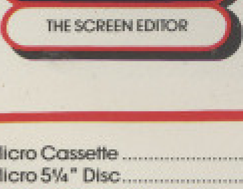
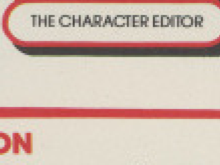


THE SCREEN EDITOR



THE CHARACTER EDITOR

Each copy of The Life Of Repton includes:
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The screen pictures show the BBC Micro version of the game.

PRIZE COMPETITION

If you complete all 40 screens of The Life of Repton, you can enter our competition. Prizes include £200 in cash, with Repton mugs, badges, pens and certificates for runners-up.

Closing Date: 30th June 1988.

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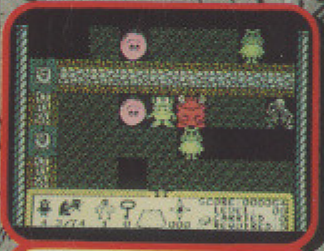
Bono takes the skeletons to a cauldron



Bono's partner Fozzy restrains a monster

BONO'S BATHING CO
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A PRIZE FOR EVERYONE WHO COMPLETES THE GAME

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Bono's partner Fozzy restrains a monster
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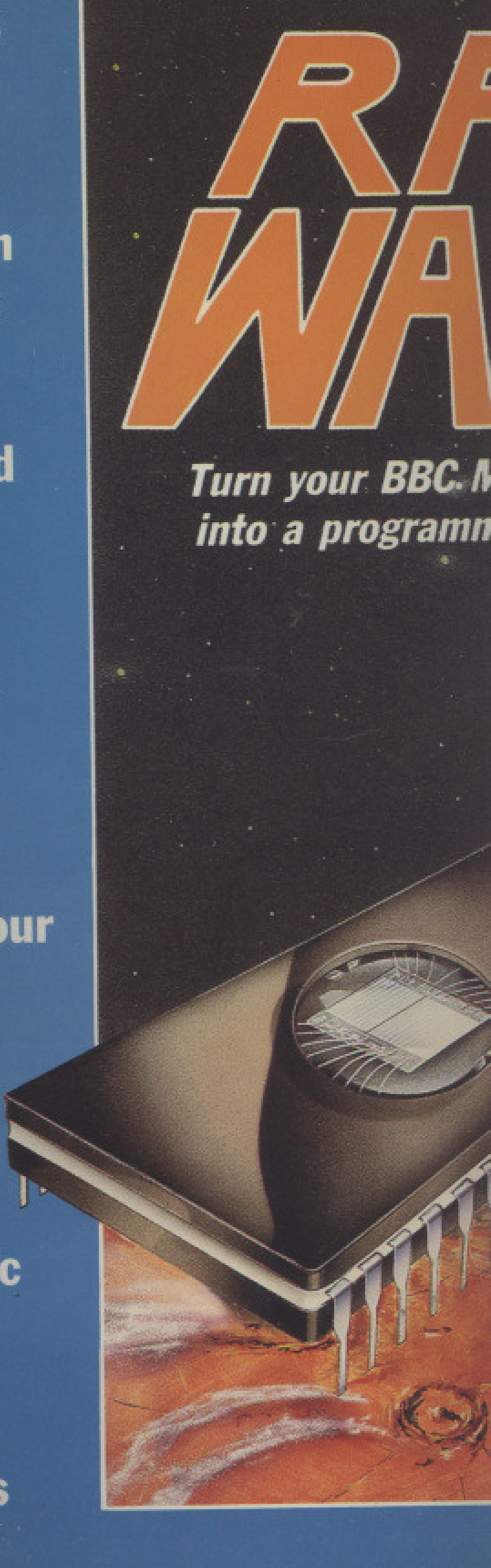

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