PERSONAL
# COMPUTER NEWS
50p Jan 7, 1984 No 43 BRITAIN'S BIGGEST WEEKLY

**BBC TOUCHLINE**
The typing tutor that gets fast with qwerty

**SPECTRUM SUITE**
Assembler, editor & monitor in one new package

**TEST PLAY . . .**
. . . new games for the Dragon, 64, Spectrum & Genie

**ORIC EXTRA**
We pick up the tabs . . .




**!FREE INSIDE!**
Your guide to the Electron

**SHOULD WE WAIT FOR IBM'S JUNIOR?**

January 7, 1984 — No 43

**Pull-out and keep Micropaedia**

First of a three-part in-depth look at Acorn's Electron. This week, inside the machine, electron history and a first look at the Electron's BBC Basic.

## REGULARS


**Monitor** 2
Dragon 64 trade-in shock, *page 2*; full report from the last pre-Christmas show, *page 3*; new directions in software, *page 4*; Newbrain software producer acts on bugs, *page 5*; door-to-door micro selling in prospect, *page 6*.

**PCN Charts** 9
Find out how your favourite game is selling in our shop-based Top 30.

**Random Access** 10
Columns for your comments . . . and a £10 prize for a star letter.

**Routine Inquiries** 13
Let our experts solve your micro problems in this Q and A page.

**Microwaves** 14
Packed with clever bits and pieces to help all micro users.

**Readout** 16
A first look under the covers of new books.

**PCN Programs** 65
**Oric:** Escape from man-eating plants in Jungle Chase.
**BBC:** 68
This routine gives a two-tone graphics dump.

**Databasics** 74
Complete hardware buyer's guide in easy-to-follow lists.

**Billboard** 82
Buy it, sell it, exchange it FREE in this page of readers' ads.

**Quit/Datelines** 88
Quips, quibbles and what to queue for.


*Cover illustration by Michael O'Brian*

## PCN HARDWARE


### IBM Junior 18
With massive publicity, the PCJr, code-named Peanut, has been unveiled in America to not totally rapturous applause. Ian Scales looks at Big Blue's latest progeny and assesses whether or not it will make waves in the UK.


## PCN SPECIALS





### Jargon Jungle 23
There may be place for an interface in our overdeveloped computerspeak, but integrated solutions, acronyms and 'problems' are definitely out of vogue, says David Guest. (And any idea what COD or SSSS could mean?)





### Weighty Spectrum 24
Keep up with Kevin Ball's series on souping up Spectrum characters. Here's how to get double-width letters.

### Tabs on Oric 29
If you've had presentation problems, this series of programs might solve them.


## PCN PRO-TEST: PERIPHERALS




### BBC Artist 36
The British Micro Grafpad at under £150, brings screen art into the home user's range. Richard Gold tested his talent on this new graphics pad.

### Less Pricey Printer 38
At £240, the Walters WM80 is an attractive prospect. But does saving money mean losing facilities? Roger Howorth investigates.


## PCN PRO-TEST: SOFTWARE




### BBC Tutor 50
For all one-fingered typists . . . here's a package that'll zap up the keys by teaching you to type. Colin Cohen reports.

### Spectrum Assembly 53
Ted Ball tests an assembler and machine code monitor for the 48K Spectrum, and highly recommends it.


## GAMEPLAY


**Dragon:** On your bikes with Trace Race, and Pinball. 54
**Colour Genie:** Good new games to cheer forlorn Genie owners. 59
**Spectrum:** Sub simulation and burger break-out. 61
**Commodore 64:** Caveman antics in two new cassettess. 63


**EDITORIAL: Editor** Cyndy Miles **Deputy editor** Geof Wheelwright **Managing editor** Peter Worlock **Sub editors** Harriet Arnold, Leah Batham **News editor** David Guest **News writers** Ralph Bancroft, Sandra Grandison **Hardware editor** Ian Scales **Features editor** John Lettice **Software editor** Bryan Skinner **Programs editor** Kenn Garroch **Listings Editor** Wendie Pearson **Editor's assistant** Nickie Robinson **Art director** Jim Dansie **Art Editor** David Robinson **Assistant art editor** Floyd Sayers **Publishing manager** Mark Essen **Assistant publishing manager** Sue Clements **ADVERTISING: Group advertisement manager** Pat Dolan **Advertisement manager** Nic Jones **Assistant advertisement manager** Mark Satchell **Sales executives** Christian McCarthy, Marie-Therese Bolger, Julia Dale, Dik Veenman, Alison Hare, Deborah Quinn **Production manager** Eva Haggis **Microshop Production** Nikki Payne **Advertisement assistant** Jenny Dunne **Subscription enquiries** Gill Stevens **Subscription address** 53 Frith Street London W1A 2HG 01-439 4242 **Editorial address** 62 Oxford Street London W1A 2HG 01-636 6890 **Advertising address** 62 Oxford Street London W1A 2HG 01-323 3211 **Published by** VNU Business Publications, Evelyn House, 62 Oxford Street London W1A 2HG. © VNU 1983. No material may be reproduced in whole or in part without written consent from the copyright holders. Photoset by Quickset, 184-186 Old Street, London EC1. Printed by Chase Web Offset, St Austell, Cornwall. Distributed by Seymour Press, 334 Brixton Road, London SW9, 01-733 4444. Registered at the PO as a newspaper

# Dragon rumpus

*By David Guest*

Dragon Data faces a revolt by its users over the terms of its 32 to 64 trade-in.

'Ridiculous' was how one Dragon 32 owner described it. 'I can't see many people being too keen,' said Paul Kennedy, the organiser of a Dragon owners' club. What they are both objecting to is the £85 valuation that Dragon has put on the 32, leaving users to find £140 to move up to the 64.

'At the moment you could probably expect to get £110 or £120 for a 32,' said one owner. 'Not only that, but when you're buying a new system you can normally get a discount somewhere.'

The trade-in deal was unveiled to users just before Christmas; Dragon's Richard Wadman said: 'We have already had some indication that it will be accepted, but we don't expect much feedback until January.'



**The Dragon 64 — focus of users' discontent over trade-in terms.**

The transition from the 32 to the £225 64 has been a thorny subject ever since the 64 appeared on the horizon. In the last few months of 1983 it became clear that Dragon planned a trade-in rather than an upgrade for people wanting to move to the bigger machine, but at the same time it maintained compatibility in the 64 with many of the 32's features.

Mr Kennedy commented: 'I think that in order to keep compatibility they may have sacrificed a lot of potential customers — it is a missed opportunity to enhance the graphics and sound of the 32.' This echoes a common view.

If Dragon 32 users do choose to ignore the trade-in they could effectively extend the life-expectancy of the machine, which otherwise might have begun to fade from the scene later this year.

# Memotech disks due

*By Wendie Pearson*

Memotech's long-awaited disk drives for the MTX 500 should be released at the end of this month.

Originally planned for release in October, one month after the micro's launch, the drives have apparently been held up because of heavy demand for the MTX 500, priced at £275.

The disk drives come in two versions — a double floppy unit storing 500K per drive on 5¼in disks will be £870, giving a total 1Mb of storage, and enabling the machine to run CP/M.

The second version at £995 consists of a single floppy 500K 5¼in drive, and instead of a second drive you get a 256K silicon disk, which is formatted like a disk, and, according to Memotech, is faster than a Winchester.

The company also plans a Winchester drive with up to 32Mb of storage, due out in about six months. A price is not yet fixed.

# Winners score a Spectrum

1984 starts well for 20 readers who have each won a 48K Spectrum in our eight-part Micropaedia competition. Congratulations to:

Brian Battye, of Feltham, Middlesex; G Coombs, of Market Deeping, Peterborough; Anna Smith, of London; Brian Shearer, of West Lothian, Scotland; Duncan Williams, of Abingdon, Oxon; R S Holmes, of Breightmet, Bolton; Anthony Breeds, of Eastbourne, East Sussex; Dorothy Leddy, of Linlithgow, West Lothian, Scotland; M D Goddard, of Dereham, Norfolk; A W A Ewence, of Bradford-on-Avon, Wiltshire; Michael Glickman, of Glasgow; Anthony Wood, of Haslingfield, Cambridge; David Hambly, of Hainault, Ilford, Essex; Nigel Mellor, of Oakes, Huddersfield, W Yorkshire; G A W Storer, of Warmley, Bristol; Hin Keung Ling, of Liverpool, Merseyside; Ian Garner, of Shepshed, Loughborough, Leicestershire; David Parkes, of Warley, W Midlands; John A Bell, of Quarndon, Derbyshire; David Ratcliffe, of Narborough, Leicestershire.

Commiseration to all unlucky entrants, but we'll be publishing many more competitions for you to try again. The correct answers to the Micropaedia competition were: 1, 6502; 2, Beginners' All-purpose Symbolic Instruction Code; 3, Numeric and string; 4, £960; 5, Charles H Moore; 6, 1976; 7, Wumpus; 8, First In First Out.

# Queen's gift to India — Acorn's second processors

*By Ralph Bancroft*

As 1984 starts there is still no sign of Acorn's promised second processors for the BBC micro. Unless, that is, you happen to be in India.

The Queen has made a special gift to the Indian government of six Econet systems. Intended for use in universities and other institutions, the systems have been treated as a showcase for Acorn's products and included with the BBC micros was a number of specially assembled 6502 second processors.

An Acorn spokesman confirmed the second processors were included in the package, and said the company is still not in a position to say when the processors will be generally available in the UK.

'All the production plans have been finalised including the detailed designs,' he said. 'However, the company has yet to announce which company will be doing the assembly of the products.'

One major hurdle to be overcome is the building up of an adequate supply of chips. 'These days you have to place your orders six months ahead,' he said. Several UK micro makers are facing the same difficulty.

Since this is the time for New Year's resolutions, how about it Acorn?




**BACK-PACKING — Time was you could cop for a handful of games and put them all in the pockets of your mac. These days, a trip to your local software dealer involves a rucksack and two carrier bags. Where will it all end? Soon you'll have to go accompanied by a porter. Cassette packaging, as you can see, is something of a boom industry, an unexpected spin-off from the growth and profit made over the last few months in software production. Based on the tried-and-true American ideal of bigger is better, publishers are now literally trying to edge each other off the shelves. Presumably this expansion will bring more work to flagging Britain as other associated trades are roped in to help supply the voracious demands of promotion.**

# TI: prospects improve for '84

*By Sandra Grandison*

The new year could bring glad tidings for beleaguered TI 99/4A users after the shock late last year of their supplier's withdrawal from the home computer business.

At the moment Texas Instruments is in the throes of deciding whether it will hand over its property rights to let other companies in the UK continue production of hardware and software for the 99/4A — and eventually come out with a new generation of machines.

Clive Scally of the TI-994A UK user group said: 'Since TI has stated it's no longer going to produce home computers and software, user groups have put a lot of pressure on the company, so perhaps something will come out of it.

'To my knowledge, users in the US can buy third party add-ons and software from companies, but this facility is not available here. Hopefully, by January TI will have made a decision as to whether it shall let it happen in the UK.

'With regards to servicing machines, TI says that it will continue to support its range of home micros indefinitely,' Mr Scally said.

# Fair play rules...

*By Geof Wheelwright*

Add-ons were the big movers at the Your Computer Christmas Fair — with keyboards, light pens, light rifles and joysticks heading the list.

The most popular items at the show were probably 'real' keyboards for the Sinclair Spectrum and ZX81. DK'tronics was doing a roaring trade selling its full-travel Spectrum keyboard — a popular number, with paste-on labels for the keys and a £46.25 price-tag.

Even cheaper — and looking somewhat sturdier — was Ricoll Electronics' metal-encased keyboard for the Spectrum. At £37.95, the keyboard includes an all-metal box (not something you'd want to drop on your toe) and a 'proper' full-length space bar. By Friday afternoon — the second day of the four-day show — Ricoll had sold all its keyboards and had to start ordering more. It hopes to have more keyboards in stock by early January, and it anticipates a £5 price-increase combined with a step-up in production to ease the shortage.

Light pens were also shifting well, with new releases for the Spectrum, Vic-20 and BBC micros. They were so popular, in fact, that one manufacturer didn't want to give any details on his light pen for fear more people would order them than he could supply.

The light-pen manufacturers that did want to talk about their wares had a good deal to offer. Add-on Electronics has a light-pen that will work with the Spectrum, BBC, Oric, Dragon and Commodore's 64 and Vic-20 machines.

Stack Computer Services offers its light-pen for the Atari range of micros and Commodore machines as well as the BBC micro. But Stack's best-seller at the show was the light-rifle. For £29.95, it will work with the Commodore machines and Sinclair's Spectrum.

The light rifle connects to the computers by a 12-foot cable and three arcade-style games to use the gun are included with the price. Stack is also encouraging software houses to write programs that will offer the option of using the gun. So far titles include Rats and Cats, Escape from Alcatraz, Big Game Safari and Crow Shoot.

The recent appearance of Sinclair's cartridge software and joystick Interface 1 for the Spectrum seemed to cause prices of joystick interfaces from other manufacturers to plummet. Kempston's interface, for example, sold for £14.99, and was on special for £9.95 for the duration of the show.

A 'new' old peripheral also found its way to the show. The Mattel Aquarius data recorder and thermal printer were finding their way on to other machines under the brand-name of Manta. The 40-column thermal printer runs at 80 cps and will print upper and lower case letters as well as graphics. Selling for £99, the printer can be used with the Oric, Spectrum, Dragon, Aquarius and BBC micros.

The data recorder can be used with the same set of machines and sells for £30. Add-on Electronics, which is selling the equipment, is also offering free software with both the printer and data recorder: worth £30 with the recorder and £99 with the printer.

Disk drives and software were also on special offer, with a number of drives under £250. Among the more attractive deals was Opus Supplies' £180 disk drive for the BBC. The 5¼in single-sided 40-track drives have a formatted single density capacity of 200K and a double-density formatted capacity of 400K.

The company's dual drives were also relatively cheap — at £380 for the single-box dual disk drive unit. Software prices were also down, with old Atari, Vic-20 and Apple games finding ther way to the bargain barrel.

Third party 3K and 8K memory expansion cartridges for the Vic-20 also joined the bargain bin, at £5 and £10 respectively.










## VIEW FROM JAPAN



# Shake-down in the Tokyo corral

*By Serge Powell*

**What's the opposite of a shake-out?**

**Whatever it is, there seems to be a minor one happening here at the moment. Perhaps it's a shake-in; in part it must have something to do with MSX Basic, but it also bears out the old adage that the personal computer business is still full of opportunity for any company or person with an idea. The idea can be new or good, but the best ones are both.**

**I must admit that I was sceptical when the press hand-out crossed my desk, especially when I came to the line 'A bold step . . . to establish a solid base in the personal computer market based on extensive expertise in consumer audio and video products' — this at a time when some companies with extensive expertise in the PC market are having a hard time making a go of it.**

**The first reaction is to sit back and sigh: 'Ah yes, another Japanese manufacturer entering the fray.' But this one could have more to recommend it than most. Perhaps JVC is on to a good thing. Learning from its gross marketing mistake when it sponsored the inept England touring team to Australia last year, it has stuck to what it's good at.**

**The product hinges on a little unit called a Superimposing Adaptor that connects to a not particularly spectacular computer — 16K or 32K of RAM, 32K of ROM, 32 by 24 display, 256 by 192 graphics, 16 colours, and MSX Basic-compatible.**

**With JVC's well established name for video cassette recorders and VHD laser disks it isn't so much a question of the company entering the personal computer market as adding a natural extension to its existing product line.**

**Consider, for example, the use a Japanese family might make of the new device (I forgot to mention that for now, the product is destined only for the domestic market so those on holiday abroad will have to wait a while). After video-recording the family's antics on their portable VCR with scenic highlights in the background, Poppa and Momma Tanaka and all the little Tanakas hurry home, connect the family computer to the video system, and lo and behold, they start superimposing titles and integrating graphics with their video tapes just like the professionals.**

**The possibilities opened up by interfacing with a video disk are even more intriguing when you take account of the vast amount of visual information a laser disk can store; and the direct access capabilities of the laser playback system coupled with the programming possibilities of the ROM packs that slot into the JVC computer; not to mention that the Superimposing Adaptor can be coupled to joysticks.**

**Imagine caves, adventures, maps and monsters and armies of galaxies all in immediate prospect.**

**There will be more — you'll be able not only to read about them on screen but see them as (at the very least) still pictures, and possibly motion pictures that will change perspective dramatically as you interact with the game.**

**On the serious side, the potential for educational programmers is even more impressive, especially in technical fields, all of which helps to answer the never ending question of what the future might possibly be holding in store for chip-heads.**

**But it still leaves me wondering what the opposite of a shake-out might be.**

**While the western world worries about a chip shortage Japan is going through a less serious dearth; this is led not by the computer makers but by audio, VCR and television manufacturers. VCR equipment in particular is seen — as far as sales are concerned — as a heavy drain, but JVC won't be cutting its own supply lines just yet.**

**Oddly enough the demand for VCRs is linked by some industry observers to the Olympic Games next year. If it persists, you probably won't be seeing the Superimposing Adaptor overseas for several months, but Japanese visitors to the Games face an unprecedented possibility; filming everything on their video cameras, they can return home and alter things with the micro so that Japanese competitors win everything.**

# Soft change

Look out this year for a new direction in micro software. It isn't quite games, and it isn't purely educational — recreational software is on the way.

This is the prediction of Clive Digby-Jones, head of Websters Software, the company that supplies major chains such as Boots, Tesco and Ketts. 'Games are important because kids learn to use the computer through them, and there are probably valid educational reasons why we should encourage this,' he said. 'But software suppliers have got to move beyond games.'

Mr Digby-Jones referred to a computer competition in the area around Websters' former Godalming offices; it was won by a 65-year-old, and 70 per cent of the entries came from women. The image of the alien-zapping juniors obviously needs to be updated, but gardening programs and chest freezer stock control aren't the answer.

Websters' background is in books, and Mr Digby-Jones sees the software industry developing along parallel lines — especially where books and programs are packaged together.

As a distributor, taking programs from software houses and presenting them to retailers, Websters is in a good position to direct trends through its buying power — this starts from purely commercial reasons but should ultimately benefit the user. 'We look for slots in the market: we try to identify early on where there is no software and we will talk to software producers about possible ventures they could join in to fill the gaps,' he said. Some early products of this type of co-operation could be software for the disabled and for children in care.

The benefit isn't confined to the range of software available — a distributor the size of Websters helps to increase the stability of the software supplier, and Mr Digby-Jones pointed out: 'We haven't yet had a case where we've had to take out a product because the supplier is no longer in the market.' By placing its orders with software houses four or eight weeks in advance it also promotes stability, which is good news for software buyers.

# Matchmaker takes on an Octopus

Loxton Computers has launched a system to give more power to the estate agent's arm — or in this case, eight arms. Its Matchmaker package is built around the LSI Octopus.

Matchmaker is designed to automate one of an estate agent's most common jobs, matching clients' requirements with the properties on its books. It also takes on the task of arranging and addressing property details. Hardware and software together cost £5,000.

The system comes with a keyboard overlay giving such commands as Property Enquiry, Client Enquiry and others to make it easy to use.

The software design process was helped by a Tunbridge Wells estate agent, and Loxton's marketing manager Chris Roffey said that nobody would need a computer science degree to use the system.

The basic Octopus has a 400K floppy and a 5Mb hard disk that can be expanded to 40Mb. Up to 16 terminals can be supported. If you already own an Octopus, the software alone will cost £1,150.

Loxton is on 0634 243000.

# Sunny outlook for Osborne UK

Things are looking up for Osborne users as further developments in the States mean that the UK outfit will be marketing and distributing products, while the manufacturing side will be handled by an independent company.

This move strengthens Osborne UK's commitment to produce machines under the company's banner and support its users in this country despite its troubled past.

As part of its relaunch campaign in the new year, the company intends to sell the Osborne 1 with its free bundle of software for under £1,000. In addition users will be able to upgrade their Osborne 1s and Executives with an 800K floppy disk drive, and if you're in for mass storage, a 10Mb hard disk version for the Executive will also be available. And the long awaited PC compatible Executive which will run IBM PC's software is still on the cards.

Any Osborne user who joins the British Osborne Owners, Group (BOOG) can take advantage of a ten per cent discount on products. The group also offers the possibility of influencing the manufacturer.

Contact Bruce Durie on 0494 445145 for further information.

# Elstree hunts ProCalc bugs

**By Ralph Bancroft**

No sooner has Elstree Computer Centre produced a spreadsheet program for the Newbrain than it runs into complaints from users.

The program, ProCalc, costs around £40 and aims to provide the usual spreadsheet facilities for the recently rescued micro. However, a number of problems with the package have appeared that may limit its usefulness.

The first concerns the maximum size of spreadsheet the program can handle. The manual says up to 10 pages of 30 columns and 250 rows can be used, depending on the memory available. Unfortunately it gives no indication to the user of how to calculate in advance the maximum for an application.

As a result the program crashes without warning when the memory required exceeds what is available.

Alan Fish, Elstree's software manager admitted that this could make life difficult for users. 'It sometimes happens that you do not know a fault exists until a program goes out to users. In this case it is clearly important for us to write a check routine into the program and to warn users that they are running out of memory and giving them options on what they want to do next,' he said.

Another apparent problem is that the program crashes if a calculation uses for input the results of a previous calculation.



**PERIPHERAL VISION — Who knows, there may be circumstances under which you'd want to have your peripherals more than 30 metres from your micro. If you do, be warned that the signal at these distances becomes weak and less reliable. Inmac has produced a £103 booster to overcome the problem for any RS232-compatible peripheral, and all you need to install it is a screwdriver. Inmac is on 04427 74296.**




## Keep your eye on the price

Are the prices published in advertisements sacred?

The question arose when Dr John Gribben of Lewes was charged £22.90 for an item that had been advertised the previous day at £19.95. On querying the price he was told that £22.90 was right, take it or leave it. 'I took it because I did not want to disappoint my son,' he told *PCN*.

We contacted Sonic Foto and Micro Centre, the shop concerned, and it immediately admitted that Dr Gribben had mistakenly been overcharged. A spokesman said that he would contact Dr Gribben to arrange a refund. But he did point out that prices do occasionally change after they have been advertised, and that this possibility is mentioned in the advertisement.

# Basic truths

Happy Birthday Basic! Coinciding with the 20th anniversary of the birth of their now widely-used language, Professors Kemeny and Kurtz of Dartmouth College plan to rewrite the enfant terrible.

True Basic Inc, with financing from ex-Dartmouth students and three professional programmers, has been founded to perfect the language. The new version, which promises portability and greater structure, should be available by autumn 1984.

True Basic hopes that the revised version will be adopted as the new standard by personal micro manufacturers. It also hopes prices will be kept low to encourage its use in education — the original intention for Basic.

Basic, as implemented on most micros, leaves a lot to be desired. True Basic may provide some extensions and improvements, but it's doubtful that it will provide a challenge to Microsoft's well-established version.

# SOFTWARE

**PCN rounds up the software releases.**




### Games

**Spectrum:** Sinclair has brought out a new tranch of ROM cartridges for the Interface 2. At the reduced price of £9.95 are Pssst, Cookie, Hungry Horace and Horace and the Spiders. At the higher price of £14.95 are top sellers Jetpac and Tranz-am. Meanwhile on the cassette front Imagine has brought out a war strategy game called Stonkers. Written by the author of Molar Maul and Zoom, the game features elements of arcade action to present a mythical conflict somewhere in Northern Europe. Also from Imagine is Alchemist, a real time graphics adventure that has the hero with the power to turn himself into an eagle flying over the obstructions in the way of his quest to slay the dreaded warlock. Both games are priced at £5.50.

**BBC:** Papillon Software (01-518 1414) has secured the distribution rights to the highly rated shoot 'em up game Zalaga. Selling at £6.90, it is reckoned to be good enough to outsell Arcadians. Micro Power is keeping up its recent flood of software with five new arcade action games: Nemesis (£7.95), Bumble Bee (£7.95), Cosmic Combat (£6.95), Space Jailer (£6.95) and Positron (£6.95). Other new additions to its catalogue are Intergalactic Trader, a role playing game at £8.95, Draughts (six levels of play for £6.95), and Wizards Challenge, an adventure at £7.95.

**Apple:** Pete & Pam (0706 212321) is now able to offer Infocom's most recent adventure classic, Suspended. Available on disk for £33.95, the game casts you in the role of the controller of a network of computers and six robots with which you have to maintain the planets' equilibrium. You are awoken from your cryogenic sleep and the nightmare begins . . . Also from Pete & Pam is Quizagon, a game for which you will require a combination of strategy and luck if you are to answer the 6,000 questions correctly. It can handle several players at once and costs £26.95.

### Business

**Apple:** Booksellers can get a custom designed package called Book Order Register and Inventory System from Applitek, (01-995 5446).

**BBC:** Gemini (0395 265165) has combined some of the more useful business software programs to form five combination packs, each containing a selection of programs and manuals. A BBC user can obtain two of these packs for under £240 containing such programs as payroll and word processing.



# Ringing changes in micro sales

If you wake up one morning to find a freezing cold salesman flogging micros on your doorstep, don't be surprised.

Distribution of computer-related products is in trouble and new methods must be found, according to a report out from market research company Strategic Incorporated.

'Microcomputer Distribution — the Key Issues' looks at the changes in distribution that must come about due to the computer market's expected growth. This will mean even more (and perhaps better) ways of selling you a micro.

Strategic expects the number of personal computers shipped throughout the world in 1982 to double to 4·5 million in 1985, and distribution channels must be found to deal with this.

One expected method is the door-to-door approach with salesmen selling micros as they do with double glazing or encyclopaedias, while another channel likely to emerge is the PC supermarket selling a range of micros and related equipment under one roof from various manufacturers, rather like a computer fair.

A more obvious method and already a growing phenomenon is teleshopping, ie ordering products via the communications media from a giant central shopping and distribution mechanism.

Among more conventional methods is the possibility of regional or national broker sales forces, calling on individual users with complementary lines from different manufacturers.

System houses and retailers alike will expand sales forces into horizontal and vertical markets, eg, educational, medical, banking. These areas would demand customised software with sales and support staff familiar with specific markets.

Distribution of low cost home computers is expected to spread to jewellery shops, supermarkets and chemists.



**CASH MEMORY — Proving that cash registers with metal casings, cheery bells, and price tickets that pop up in a window belong to the age of white fivers, P&M Data Services (0895 52131) has designed a till with a built-in Epson HX-20. As well as the normal processing of the Epson, P&M's unit lets you adjust stock lists at the point of sale with room for 1,800 items. It calls the system the ED-20, and claims that a shopkeeper can use an unlimited number in a cluster. The one-off price is £950.**

## PERIPHERALS

**PCN rounds up the latest add-ons.**



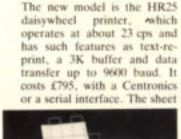
**ITT's RL2301 — choice of RGBS or PAL.**

**Printers:** The birth is announced of an addition to the Brother range — if it grows much further they'll have to find seven brides for them.

The new model is the HR25 daisywheel printer, which operates at about 23 cps and has such features as text-reprint, a 3K buffer and data transfer up to 9600 baud. It costs £795, with a Centronics or a serial interface. The sheet feeder is an extra £220 and tractor feed is £85. The distributor is Thame Systems (084421 5471).

Euroelectronics' (0242 582009) ZX Lprint Centronics interface for the Spectrum is now available in a version that will run with Interface 1 and Microdrives. If you already have ZX Lprint I or II a conversion can be carried out for £3.25.

IBM users interested in a spot of plotting can now use the Printronix MVP printer/plotter — Universal Microperipherals (01-683 0060) has inserted a modified PROM to make the unit PC-compatible. Its plotting rates are 8, 16 and 27in per minute at a maximum density of 100×100 dots per square inch. As a printer its highest speed is 600 cps. The base price is £2,960.



**Qume's Letterpro 20 daisywheel.**



**3.2Mb on a 5¼in floppy from Amlyn.**

Qume, the originator of the daisywheel, has moved into the personal computer world with its Letterpro 20, a 20 cps daisywheel. Qume will supply the printer with Centronics, serial and Qume parallel. The unit costs £747.

**Disk Storage:** HAL Computers (0252 517175) is distributing high density Amlyn floppy disk drives that will give you 3.2Mb unformatted. The price to dealers is £342 per unit, which sounds as though the cost per Mb to you will be not far off £125. The drive has its own Intel 8051 processor to handle real-time control functions. Referred to as the 1860, it measures 3.25in by 5.75in by 8in — the floppies themselves are 5.25in disks and the interface is Shugart-compatible. Average access time is 88 milliseconds.

**Monitors:** ITT Television and Video's contribution to a colourful new year is a pair of 14in monitors. The RL2301/1 takes RGBS input and costs £280; the RL2310/M is for micros that only give PAL signals and it costs £310.

For more information contact 01-930 6711.



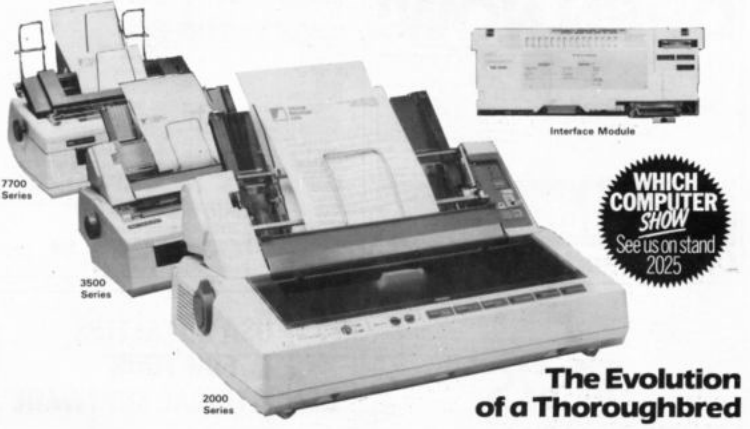
**The HR25, latest addition to the Brother family of printers.**

# Don't wait until the year

# 2000

## 21st Century technology is here today

## THE *NEC* SPINWRITER 2000




WHICH COMPUTER SHOW
See us on stand 2025

**The Evolution of a Thoroughbred**

### FEATURES:

- 4000 hours MTBF
- Linear Stepper Motor Drive
- Up to 9600 baud standard
- 256 character buffer (2048 optional)
- 5 copies
- 8 step impression control
- Detachable Interface
- Up to 203 print lines
- 10/12/15 pitch
- Auto sheet feeder and tractors available
- Auto bold, underscore, shadow print
- 20 cps optimised and bidirectional

### INTERFACES

- RS232
- Centronics/Parallel
- IBM PC
- Diablo and Qume

## LOW COST HIGH PERFORMANCE

*NEC* Business Systems (Europe) Ltd.

**THAME SYSTEMS LTD.**

TELEPHONE: 084 421 5471
TELEX: 837508
THAME PARK ROAD
THAME, OXON OX9 3XD

| | |
|---|---|
| *DISK PRODUCTS* | – Adaptec, Archive, Heurikon, NEC, Quantum, SMS, Sysgen |
| *PERIPHERALS* | – Axiom, Brother, NEC, Toshiba |
| *MICROCOMPUTERS* | – Onyx, SMS, Quorum |
| *NETWORKS* | – Quorum |

Software City

We sell the best software for all the best home and business computers

**OPEN NOW!**

Software City CENTRE
382 Kings Road, SW3




SPECIAL OFFER **£1 off** any purchase when you bring this advertisement with you

*Come in and see us, today!*



# ORIC SOFTWARE

Dept PCW(1), 118 Worcester Rd, Malvern, Worcs, WR14 1SS
**SPECIALIST SUPPLIERS OF ORIC SOFTWARE**

THE SINGLE SOURCE SUPPLY FOR **ALL** YOUR ORIC SOFTWARE PERIPHERALS AND BOOKS

FREE **CATALOGUE WITH EVERY PURCHASE OR SEND £1.00 WHICH WILL BE DEDUCTED FROM YOUR FIRST ORDER**

**SOME OF THE TITLES WE HAVE AVAILABLE**

| | | | | | |
|---|---|---|---|---|---|
| AIRLINE | 48K | 7.95 | MULTIGAMES | 16/48K | 7.95 |
| BIORYTHMS | 16/48K | 5.95 | OPERATION GREMLIN | 48K | 6.95 |
| BREAKOUT +30 MAZE | 48K | 7.50 | ORIC TREK | 48K | 9.95 |
| CANDY FLOSS + HANGMAN | 48K | 7.50 | ORISCOPE | 48K | 17.95 |
| CHESS | 16K/48K | 9.95 | REVERSE | 48K | 6.50 |
| CUBE CRAZY | 48K | 7.95 | SYNTHESISER | 48K | 7.95 |
| DALLAS | 48K | 7.95 | WORD PROCESSOR | 48K | 17.95 |
| DIGGER | 48K | 6.95 | XENON-1 | 48K | 8.50 |
| DINKY KONG | 48K | 6.95 | ZODIAC ADVENTURE | 48K | 9.95 |
| FANTASY QUEST | 48K | 6.50 | ZORGONS REVENGE | 48K | 8.50 |
| FLIGHT | 48K | 7.95 | | | |
| FORTH | 48K | 17.95 | | | |
| FRANKLINS TOMB | 48K | 9.95 | | | |
| GRAIL | 48K | 6.95 | | | |
| HARRIER ATTACK | 16K/48K | 6.95 | | | |
| HOBBIT | 48K | 14.95 | | | |
| INVADERS | 16/48K | 7.50 | | | |
| JOGGER | 48K | 6.95 | | | |
| MORIA | 48K | 6.95 | | | |

**BOOKS**

| | |
|---|---|
| THE ORIC-1 AND HOW TO GET THE MOST FROM IT | 5.95 |
| THE ORIC-1 COMPANION | 6.95 |
| AN INTRODUCTION TO PROGRAMMING THE ORIC | 1.95 |

**Postage:** Books 50p for 1 — 25p per book thereafter. Cassettes 50p for 1 to 7. FREE IF 8 OR OVER.

**ORIC SOFTWARE**
**118 Worcester Road**
**Malvern Worcs. WR14 1SS**
**Tel: Malvern (06845) 62467**
**Dealer enquiries welcome**



DSS
DISCOUNT SOFTWARE SUPPLIES

**AMAZING SOFTWARE BARGAINS BY MAIL**
TELEPHONE ORDERS WELCOME 100s OF TITLES AVAILABLE

| SPECTRUM | OUR PRICE |
|---|---|
| 1. MANIC MINER | BUG BYTE £4.95 |
| 2. JET PAC | ULTIMATE £4.50 |
| 3. ATIC ATAC | ULTIMATE £4.50 |
| 4. LUNAR JETMAN | ULTIMATE £4.50 |
| 5. PSST | ULTIMATE £4.50 |
| 6. ZZOOM | IMAGINE £4.49 |
| 7. ZIP ZAP | IMAGINE £4.49 |
| 8. ARCADIA | IMAGINE £4.49 |
| 9. HALL OF THE THINGS | CRYSTAL £6.50 |
| 10. ROMMELS REVENGE | CRYSTAL £6.50 |
| 11. THE DUNGEON MASTER | CRYSTAL £6.50 |
| 12. TRANS TOWER | RICHARD SHEPHERD £5.25 |
| 13. DEVILS OF THE DEEP | RICHARD SHEPHERD £5.25 |
| 14. KONG | OCEAN £5.20 |
| 15. PENETRATOR | MELBOURNE HSE £5.95 |

| COMMODORE 64 | |
|---|---|
| 1. KONG | ANIROG £6.99 |
| 2. SCRAMBLE | ANIROG £6.99 |
| 3. ATTACK OF MUTANT CAMELS | LLAMASOFT £6.50 |
| 4. GRID RUNNER | LLAMASOFT £6.50 |
| 5. HOOVER BOWER | LLAMASOFT £6.50 |

| VIC 20 | |
|---|---|
| 1. METALLAMA'S | LLAMASOFT £5.25 |
| 2. GRIDRUNNER | LLAMASOFT £5.25 |
| 3. ARCADIA | IMAGINE £4.75 |
| 4. BEWITCHED | IMAGINE £4.75 |
| 5. JET PAC | ULTIMATE £4.75 |

**SPECIAL OFFERS FOR SPECTRUM**
**THE HOBBIT – MELBOURNE HSE £10.95**
**VALHALLA – LEGEND £11.95**

ALL PRICES INCLUDE POSTAGE + PACKING. SEND CHEQUE/POSTAL ORDERS TO:
**DSS DISCOUNT SOFTWARE SUPPLIES**
**8 PORTLAND ROAD, LONDON W11 4LA.**
ACCESS WELCOME



# USA ROYALTIES FOR YOUR EDUCATIONAL SOFTWARE

# SEARCH FOR RIGHTS

For USA sales of published or not-yet-published education through games type software for children age 4-11. Good money and royalties.

*Write with details of your products to:*

**USA RIGHTS,**
**c/o PROMICRO LTD.,**
**5 DRYDEN STREET,**
**LONDON WC2E 9NW**

# PCN charts

## Hardware Top Twenty up to £1,000

| TW | LW | MANUFACTURER | PRICE | DISTRIBUTOR |
|---|---|---|---|---|
| 1 | (1) | Spectrum | £99 | (SI) |
| 2 | (2) | CBM 64 | £220 | (CO) |
| 3 | (3) | BBC B | £399 | (AC) |
| 4 | (6) | Sinclair ZX/81 | £45 | (SI) |
| 5 | (4) | Vic 20 | £140 | (CO) |
| 6 | (5) | Oric 1 | £99 | (OR) |
| 7 | (7) | Dragon 32 | £170 | (DD) |
| 8 | (16) | Atari 600XL | £160 | (AT) |
| 9 | (11) | Lynx 48/96 | £225 | (CA) |
| 10 | (10) | Sharp MZ700 | £240 | (SH) |
| 11 | (12) | Apple IIe | £750 | (AP) |
| 12 | (9) | TI/994a | £90 | (TI) |
| 13 | (8) | Atari 800 | £300 | (AT) |
| 14 | (13) | Colour Genie | £168 | (LO) |
| 15 | (15) | Sharp MZ80A | £349 | (SH) |
| 16 | (18) | Aquarius | £70 | (MA) |
| 17 | (14) | Tandy Colour | £180 | (TA) |
| 18 | (17) | Epson HX20 | £472 | (EP) |
| 19 | (–) | CGLM5 | £150 | (SO) |
| 20 | (19) | Newbrain A | £269 | (GR) |

**These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets in the two weeks up to December 20.**

**Neither mail order nor deposit-only orders are included in these listings. The prices quoted in the hardware charts are for the no-frills models and include VAT. Information for the stop-selling micros is culled from retailers and dealers throughout the country and like the games, is updated every alternate week.**

**PCN Charts are compiled exclusively for us by MRIB (Computers), London (01) 408 0250.**

**Top Ten over £1,000**

| TW | LW | MANUFACTURER | PRICE | DISTRIBUTOR |
|---|---|---|---|---|
| 1 | (2) | IBM PC | £2,390 | (IBM) |
| 2 | (1) | ACT Sirius | £2,525 | (ACT) |
| 3 | (6) | Apricot | £1,719 | (ACT) |
| 4 | (4) | Commodore 8000 series | £1,200 | (CBM) |
| 5 | (4) | Apple III | £2,780 | (AP) |
| 6 | (7) | Kaypro | £1,949 | (CKC) |
| 7 | (10) | Televideo TS-800 series | £1,495 | (MD) |
| 8 | (5) | HP86A | £1,570 | (HP) |
| 9 | (9) | DEC Rainbow | £2,714 | (DEC) |
| 10 | (8) | Epson QX10 | £1,995 | (EP) |

## Games Top Thirty

| | GAME TITLE | PUBLISHER | MACHINE COMPATIBLE | | | | | | | | | PRICE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SP | AC | 64 | V20 | 81 | DR | OR | AT | OTHERS | |
| ► 1 (1) | Atic Atac | Ultimate | ★ | | | | | | | | | £5.50 |
| ▲ 2 (3) | Lunar Jet Man | Ultimate | ★ | | | | | | | | | £5.50 |
| ▼ 3 (2) | Valhalla | Legend | ★ | | | | | | | | | £14.95 |
| ▲ 4 (7) | Chequered Flag | Psion | ★ | | | | | | | | | £6.95 |
| ▲ 5 (10) | Pyramid | Fantasy | ★ | | | | | | | | | £5.50 |
| ▼ 6 (4) | Ant Attack | Quicksilva | ★ | | | | | | | | | £6.95 |
| ▼ 7 (5) | Splat! | Incentive | ★ | | | | | | | | | £5.50 |
| ► 8 (8) | Flight | Psion | ★ | | | | ★ | | | | | £6.95 |
| ▼ 9 (6) | Metagalactic Llamas | Llamasoft | | | | ★ | | | | | | £6.00 |
| ▼ 10 (9) | Hobbit | Melbourne | ★ | ★ | ★ | | | | ★ | | | £14.95 |
| ▲ 11 (15) | Hunter Killer | Protek | ★ | | | | | | | | | £7.05 |
| ▲ 12 (14) | Kong | Ocean | ★ | | | | | | | | | £5.90 |
| ▲ 13 (17) | Arcadia | Imagine | ★ | | ★ | ★ | | | | | | £5.50 |
| ▲ 14 (–) | Mr Wimpey | Ocean | ★ | | | | | | | | | £6.90 |
| ▲ 15 (23) | Falcon Patrol | Virgin | | | ★ | | | | | | | £7.00 |
| ▼ 16 (11) | Horace and the Spiders | Psion/Melbourne | ★ | | | | | | | | | £6.95 |
| ▲ 17 (–) | Snooker | Visions | ★ | | | | | | | | | £8.95 |
| ▲ 18 (–) | Moonbuggy | Anirog | | | ★ | | | | | | | £7.00 |
| ► 19 (19) | Hovver Bovver | Llamasoft | | | ★ | | | | | | | £7.50 |
| ▲ 20 (–) | Dimension Destructors | Artic | ★ | | | | | | | | | £5.95 |
| ▼ 21 (13) | Manic Miner | Bugbyte | ★ | | | | | | | | | £5.95 |
| ▼ 22 (20) | Mad Martha II | Mikrogen | ★ | | | | | | | | | £6.95 |
| ▲ 23 (–) | Cuddly Cuthbert | Interceptor | | | ★ | ★ | | | | | | £8.00 |
| ▲ 24 (–) | Penetrator | Melbourne | ★ | | | | | | | | | £6.95 |
| ► 25 (25) | Zzoom | Imagine | ★ | | | ★ | | | | | | £5.50 |
| ▲ 26 (–) | Rommel's Revenge | Crystal | ★ | | | | | | | | | £5.50 |
| ▲ 27 (–) | Siren City | Interceptor | | | ★ | ★ | | | | | | £8.00 |
| ▼ 28 (22) | Gridrunner | Llamasoft | ★ | | ★ | ★ | | ★ | | ★ | | £5.00 |
| ▲ 29 (–) | Twin Kingdom Valley | Bugbyte | ★ | | | | | | | | | £5.95 |
| ▲ 30 (–) | Death Chase | Micromega | ★ | | | | | | | | | £6.95 |

## Manic Miner's marathon

Regarding the letter in Issue 39 on unlimited lives for the Spectrum game Manic Miner, I can confirm that when more than 32 lives have been reached, screen distortion does happen, increasing with each extra life received.

I have not used the POKE for unlimited lives, but have played through the stages in a proper game. My score stands at 1,033,993 and I have 33 miners.

I have been taking photographs at various stages which I hope will prove my score.

*A Sweeting,*
*Humbleton,*
*Hull.*

## Can someone defend software copyright?

William Dickinson's letter (Issue 20) has raised my ire. Now what's all this about 'software theft'? Has someone pinched someone's software which was meant for a special purpose?

Apparently not. No, it's this old bogie about paying over and over again for another person's work — something I have never quite understood because I, like so many others, perhaps the majority, only get paid once for what I do. Furthermore, I have no control over what the person who pays me does with the product. Not can I relate what proportion of his profit I get, however it might affect me.

So, what price this so-called copyright? It's an artificial barrier to enable some lucky people to go on, perhaps to infinity, reaping rewards for a job that, let's face it, can only be done once. Sorry, but I consider that dishonest.

Another interesting point is that very often your worth as a producer of original material is enhanced by these copiers. After all, to a large extent you're getting free publicity if you play your cards right. So, you have to work to reap the benefits of that publicity. OK, so do the copiers; but it's a lot harder for them because they don't know the product as well as the author does.

A last word on the subject. I think that, despite dire warnings, people will go on copying software, books, music etc. It costs someone money every time a case is brought concerning copyright. I doubt if there is any organisation which could afford to prosecute in all cases, and in any case who is to say what the limits are.

Consider for example that despite local bye-laws, statute law and others, including law on copyright, people still play radios in public places without licence. As long as radios are made with this capability, this will continue, law or no law. You try to eradicate it . . .

*L Hipkin,*
*Stevenage,*
*Herts.*

*Problem is, while it may be impossible to eradicate, software piracy is a contributor to the cost of packages. So the consumer pays anyway. —Ed.*




Don't carry a LOAD on your shoulders, unburden yourself on *PCN*'s letters page.

## Final point for micro purchasing parents

I am studying O-level computer studies at school, and I have another viewpoint on computer studies in school to add to those already offered in Random Access.

I was annoyed at the editor's reply to Mr D Wright (Issue 41) on choosing a micro for children at school. Different manufacturers tend to produce very different versions of the programming language, Basic, making it inadvisable for parents to buy mciros that are incompatible with their children's computers.

My fellow pupils rush out to buy Spectrums, Dragons and Vic-20s, learn their respective Basics thoroughly, and write excellent programs. But on discovering that they will soon need to submit a completed computer program to contribute to their final exam result, they venture into the computer room and head towards the BBCs (all computer programs for exams must be written on the school computers, in our case the BBC.)

They then attempt to program this computer, of which they have very little knowledge, unsuccessfully. Their minds are filled with Sinclair Basic, and they find this unfamiliar programming language difficult.

I think parents should consider this before purchasing a micro for their children. *eg* if the school uses BBCs then the parents could consider purchasing an Electron if the BBC itself is byond their budget.

Or would it be better to wait until a child has finished its computer education before purchasing a micro?

*R Pierrepont,*
*Horsley,*
*Derbyshire.*

*You make a good point but surely most people would agree that any computer is better than no computer at all. Also, generally speaking, young people learn computer skills quicker than the oldies, so waiting could be counter-productive. —Ed.*

## Another editorial policy required

Here is a poem written as a response to the 'Editor' type letters:

I'm talking editors again,
Some people really are insane,
To think that those whose fingers fly,
Across the keys don't curse and cry.
Their programs hold mistakes so grand,
Would take years to re-type by hand.

An editor would save the day,
But theirs does not have easy ways,
Complex commands like Is and Ds,
Useless ones like X and Es
They press RETURN and ENTER too,
Oh, and X is fine I'm told by you.

## PCN £10 Star Letter



What I would like and hope to see,
A better editor that seems friendly,
A full screen one so you don't sob,
With cursor keys that do their job,
A standard one that would be fair,
Used by Acorn and Sinclair,
And TIs, ORICs, Apples too,
That is to name just but a few.

Microsoft you are in disgrace,
From four keys you use just backspace,
If it's good like you make it seem,
Then why do some prefer full screen?
Those that try both systems out,
Won't even have the smallest doubt,
About which is best they'll all agree,
That full screen is, believe you me.

So come along, we have to change,
Before the chance is out of range.

*Julian Skidmore,*
*Trowell,*
*Nottinghamshire.*

Share your thoughts in the UK's liveliest micro weekly letters columns. Funny, feisty or fanciful, your letter could win you £10 if it's of star status.

**WRITE TO:** Random Access, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

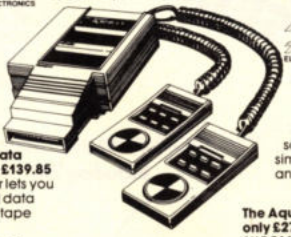
# This is the dawning of the age of Aquarius — and your computer christmas.



**The Aquarius basic computer – only £49.95**
8K ROM, 4K, RAM User expandable to 52K, full 49 keys, 16 colours, built-in-Microsoft BASIC, Sound channel.



**The Aquarius data computer – only £139.85**
The Data Recorder lets you load programs and data from the computer to tape and back again.



**The Aquarius expanded computer – only £89.90**
The Mini-expander adds two joy-sticks, two cartridge ports, two extra sound channels and allows simultaneous use of software and memory cartridges.



**The Aquarius computer system – only £279.80**
8K ROM, 4K RAM User expandable to 52K, full 49 key moving keyboard. Built-in Microsoft BASIC, 280 Microprocessor based, 2 joysticks, 2 cartridge ports, 3-channel sound, data recorder. Plus Printer to provide permanent record of screen content graphics and upper + lower characters. Prints 80 characters per second, 40 cols in width.

## DO YOU WANT TO PLAY GAMES?



**Chess**
Play the computer or an opponent.



**Melody Chase**
Hit the notes, dodge the notes – its addictive.



**Snafu**
Little lines that grow – and trap you.



**Burger Time**
Make burgers, avoid hot dogs and pickles.



**TRON Deadly Discs**
Help the Walt Disney hero win through.



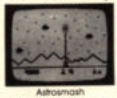
**Advanced Dungeon and Dragons**
Find the treasure, evade the dragon.



**Night Stalker**
On the run from robots in the maze.



**Lock 'n' Chase**
Rob the bank, dodge the cops.



**Astrosmash**
Falling rocks, bombs, missiles and UFO's.

## DO YOU MEAN BUSINESS?



**Logo**
The state-of-the-art programming language.



**Finform**
Word processing and file maintenance



**File Form**
Household spreadsheet program

To: Add-On Electronics Ltd. Units 2, 3 and 4, Shire Hill Estate, Saffron Walden, Essex CB11 3AQ.

Please rush me:

- ___ (qty) Aquarius basic computers at £49.95 each.
- ___ (qty) Aquarius expanded computers at £89.90 each.
- ___ (qty) Aquarius data computers at £139.85 each.
- ___ (qty) Aquarius computer systems at £279.80 each.
- ___ (qty) Data Recorder at £30.00 each.
- ___ (qty) Printer at £99.00 each.
- ___ (qty) Mini Expander at £39.95 each.
- ___ (qty) 16K Ram Pack at £29.95 each.
- ___ (qty) Chess £19.95 each.
- ___ (qty) Melody Chase £19.95 each.
- ___ (qty) Snafu £15.95 each.
- ___ (qty) Night Stalker £19.95 each.
- ___ (qty) Lock 'n' Chase £19.95 each.
- ___ (qty) Astrosmash £15.95 each.
- ___ (qty) Burger Time £19.95 each.
- ___ (qty) TRON Deadly Discs £19.65 each.
- ___ (qty) Dungeons and Dragons £16.95 each.
- ___ (qty) Logo £30 each.
- ___ (qty) Finform £30 each.
- ___ (qty) Fileform £30 each.

**PLUS NEW GAMES IN CASSETTE FORM at £5.95 each**

- ___ (qty) "N" Vaders.
- ___ (qty) Ed-On.
- ___ (qty) Grid-Bug.
- ___ (qty) Phrogger.
- ___ (qty) Chuckman.
- ___ (qty) D-Fenders.
- ___ (qty) Aliens.
- ___ (qty) One-Arm Bandit.

I enclose a cheque for £_____
or debit my Access/Visa Card No. _____

Prices include VAT & P+P

Signature _____
Name _____
Address _____
Postcode _____

Credit Card Holders ring (0799) 25014 (24 hrs) or Telex 81653. PCNS/1

Add-On Electronics Ltd.
Units 2, 3 and 4,
Shire Hill Industrial Estate
Saffron Walden
Essex CB11 3AQ.

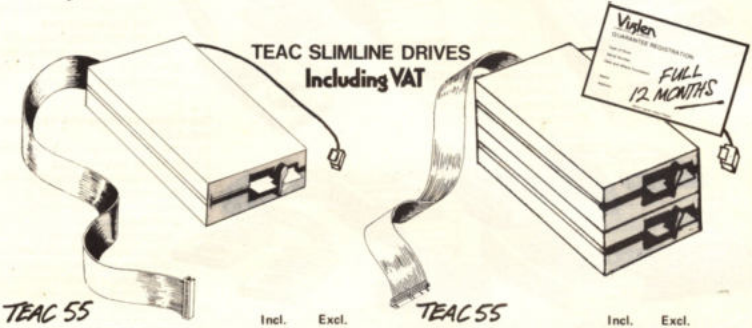
Aquarius. © Mattel Inc. 1982. All rights reserved.
Burger Time is a trademark of Data East Inc.
© 1982 Data East USA.
© TRON Deadly discs is the trademark and used under license from Walt Disney Productions
© Advanced Dungeons and Dragons is the trademark and used under license from TSR Hobbies Inc.

# YOU CAN ALSO DO IT IN 5 SECONDS!

**Replacing your Cassette with a Disk Drive, means DATA ACCESS in less than 5 seconds!**

**If you are looking for a guaranteed Disk Drive, fully BBC compatable, at a price that includes VAT, formating disk, user manual, cases and leads, then just look at our all-inclusive prices!**

## TEAC SLIMLINE DRIVES
## Including VAT




### TEAC 55
SINGLE DRIVES CASED

| | Incl. VAT | Excl. VAT |
|---|---|---|
| 40 TRACK 100K | £166 | £144.35 |
| 40 TRACK 200K | £230 | £200.00 |
| 40/80 TRACK SWITCHABLE 200K | £199 | £173.05 |
| 40/80 TRACK SWITCHABLE 400K | £257 | £223.48 |

### TEAC 55
DUAL DRIVES CASED

| | Incl. VAT | Excl. VAT |
|---|---|---|
| 40 TRACK 200K | £320 | £278.26 |
| 40/80 TRACK SWITCHABLE 400K | £402 | £349.57 |
| 40/80 TRACK SWITCHABLE 800K | £520 | £452.18 |
| DFS KIT | £75 | £65.22 |
| P.S.U. | £32.20 | £28 |

### MITSUBISHI DRIVES

| | Excl. VAT | Incl. VAT |
|---|---|---|
| 400K SINGLE DRIVE | £213.04 | £245 |
| 800K DUAL | £379 | £435.85 |
| 800K & POWER SUPPLY | £399 | £458.85 |

*These drives are fully compatable with other Computers and can be used should you change your computer.

*Check our special terms for Educational Establishments and Government Departments

SPECIAL OFFER!
FULL HEIGHT DRIVE
£145 inc VAT
READY TO PLUG IN

**HOW TO ORDER**

**BY POST**
To purchase any of the items simply fill in your requirements listed above, in the coupon. Enclose your cheque/P.O. or use your Access or Barclaycard. Please make cheque payable to; VIGLEN COMPUTER SUPPLIES and post to address below, allow 7 to 14 days for delivery & add £ 8-00 postage, package & insurance on all prices.

**BY TELEPHONE**
-(01) 843 9903
Credit Card holders (Access/Barclay Card only) can purchase by telephone. Please give Card No, Name, Address and the item required.

*DEALER ENQUIRIES WELCOME*

Post to; VIGLEN COMPUTER SUPPLIES UNIT 7 TRUMPERS WAY HANWELL W7 2QA

Please send me the following items :

I enclose Cheque/P.O. for £ _____

I prefer to pay Access/Barclaycard (Delete whichever not applicable)

CARD No _____

SIGNATURE _____

NAME _____

ADDRESS _____

Tel (Day) _____ Tel (Eve) _____

CREDIT CARDS VALID IF SIGNED BY CARD HOLDER. ADDRESS ABOVE MUST BE THE SAME AS CARD HOLDER. PCN1/84

ENQUIRE ABOUT OUR 48 HOUR GUARANTEED DELIVERY SERVICE!

**Viglen**
COMPUTER SUPPLIES UNIT 7 TRUMPERS WAY
HANWELL W7 2QA
Tel: (01) 843 9903

# ROUTINE INQUIRIES

Lost in a maze of bits and bytes, trapped in a forest of errors, bugged by Basic? Whatever the problem, CALL on us. Our panel of experts is at your command.

**Write to:** Routine Inquiries, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

## A printer for the Electron?

**Q I would like to connect my Electron to a Texas Instruments Omni 800, 810 RD Terminal Printer. The users manual that came with the micro does not say anything about connecting the micro to anything but a tape recorder. Also, what stops BBC B programs from running on the Electron?**

*Allan Hardy, Slough, Berks.*

**A** Connecting a TI thermal printer – or any other printer – to your new Electron is theoretically impossible as the machine has no printer interface and Acorn doesn't have plans for bringing one out until at least the spring.

However, there are ways of getting round this problem. A Welsh company – Sir Computers, based in Cardiff – should have a printer interface for the Electron available by now selling for about £45. The interface lets you run a parallel printer and joysticks from the Electron.

However, this doesn't help you much with your TI printer as it uses an RS-232C serial interface rather than a standard Centronics parallel to get information from the computer. There are currently no plans (at least none that we've heard of) to produce an RS232C interface for the Electron in the near future, although Acorn has said in the past that they will eventually offer all the components you need to turn the Electron into a BBC Micro – and that should include an RS232C interface.

In short, unless you are an electronics expert and willing to figure out how to solder some sort of home-built RS232 onto your machine (which is a dodgey proposition anyway), the best you can do is sell your printer and invest in a parallel interface and any one of a number of cheap thermal or dot-matrix printers on the market.

The answer to your second query is perhaps a little more cheery. Although programs will not necessarily run the same way on the Electron as the Beeb.

The major differences are in the SOUND and ENVELOPE commands, and in the lack of a Teletext screen Mode 7 on the Electron. This means that any programs that start in Mode 7 will come out scrambled on the Electron. The differences in the SOUND and ENVELOPE commands mean that the Electron can only play one musical note at a time (so any BBC program that involves playing musical chords won't work properly on the Electron); also, the Electron has no volume control.

But, if your BBC programs don't use Mode 7, rely on volume control or chords in the music or sound effects, they should run on the Electron without any modifications. For more details on this and other Electron questions look in the PCN Electron Micropaedia starting this issue.

## Buying a faulty micro from a shop

**Q About 6 months ago I bought a Spectrum. After a week it started to overheat and some of the keys wouldn't generate correct characters. My father took it back to the shop but couldn't get a replacement as they'd sold out. This carried on for three weeks, so he asked for his money back. Because the shop would only give a cheque refund, not cash, he took an Oric as a replacement. Now the Oric has broken. We took it back to the shop and it has been sent away to be fixed. I'm really cheesed off with the whole business and want to know if there's any chance of getting my money back from the shop.**

*Nicky Morris, Dunstable.*

**A** You seem to have had a run of bad luck. We don't understand why, if the shop has sent off your Oric for repairs, it didn't do the same in the first instance with your Spectrum. But, it would have been prudent to have taken the cheque offered: we don't think the shop has any obligation to refund cash. The faults in the machines are not entirely the shop's responsibility, and the management would appear to be acting in good faith so you'll just have to be patient waiting for the return of you Oric.

## Atari vs BBC – an old chestnut

**Q Considering all aspects of computers – graphics, colour, sound, memory etc – could you tell me which is the best computer out of the BBC Model B and the Atari 800?**

**Also, is there a modem built for the Atari, and if so how much is it?**

*Paul Edwards, Camberwell, London SE5.*

**A** If we were playing cricket rather than talking about micros this would be a full toss. Not because it's easy to answer – 'which is the best?' questions never are – but because much of the answer has already been written in *PCN*.

Instead of referring you to the back issues department to have a look at Issue 16, where Andrew Tollyfield compared the BBC with the Atari 800, let's see what he had to say.

Unfortunately you don't say what your main use of the micro will be. Considering all aspects, a Cray 1 might be a better computer than a Beeb or an Atari.

The Atari, according to Andrew's review, has the edge in graphics, sound and colour. The BBC, he says, has a superior Basic and is also faster. In theory it has the greater potential for expansion. The Atari 800, with 48K RAM, has more memory for you to use.

More to the point, perhaps, the Atari 800 is now considerably cheaper than the BBC but there are reasons for this that might be relevant to your choice. Atari is concentrating more now on the recent XL systems; nobody would suggest that the 800 is going to be left high and dry but your prospects of continued software, in terms of quantity and diversity, look better with a BBC.

On the subject of modems, the answer is unequivocally yes. You can get an expansion interface with an RS232 port through which you can attach a modem – the cheapest would probably be the Prism 1000, at £69.95. If you are particularly interested in modems keep an eye open for Issue 46 with a PCN Micropaedia devoted to them.

## Oric objects to colour collision

**Q I have an Oric and am puzzled by two aspects. Firstly, what is the ESC key for? It doesn't stop a program and I can't seem to use it to send escape sequences to change colours etc.**

**Secondly, as far as I can work out, using serial attributes for the colours means that you can't have a character move too close to a wall if the colours of the character and the wall are different colours.**

*M J Bryant, Knutsford, Cheshire.*

**A** The ESC key on the Oric is mostly for show. If you collect it in KEY$, then take its ASCII code, you'll find it has the value 27. You could use this in a program to provide a user with a means of 'escaping' to a previous menu, eg.

```
1000 A$=KEY$: IF A$="" THEN 1000
1010 IF A$=CHR$(27) THEN POP:RETURN
```

This assumes that you're in a subroutine called from within a previous subroutine and POP will RETURN control to the level of GOSUBs above the calling routine. This looks something like this:

```
MAIN MENU
(GOSUB)
SECOND MENU
(GOSUB)
THIRD MENU
(POP:RETURN)
```

This takes you back to the end of the main menu, rather than to the end of the second menu, which is where RETURN alone would lead.

As for your second query, you're quite right. To set the colour for a character locally you have to place an attribute to its left. This means that a character cannot get nearer than 1 byte to left and right walls of a different colour.

For the right-hand side it would overwrite the attribute of the wall, setting the wall colour to the same colour as the character.

If it were next to the left-hand wall it would overwrite the pattern of the wall itself with its own colour attribute, making a hole in the wall.

Scaled a new PEEK in microcomputing? If printed your tip will earn you a fiver.



**If you've got something to crow about . . . a bit of magic that'll make the world a better place for micro users, then send it to *PCN* Microwaves—our regular readers' hints and tips page. We'll pay you £5 if we print it. We'll pay you even more if your little gem gets our vote as microwave of the month. Think on . . . and write to Microwaves, *PCN*, 62 Oxford Street, London W1A 2HG.**

## Make your micro go Beep bleep

When the following program is run, it will enable the BBC to respond to a key being pressed, with a bleep.

```
10CODE%=&70
20P%=CODE%
30?&220=CODE% MOD 256
40?&221=CODE% DIV 256
50[
60    LDA #7
70    JSR &FFEE
80    RTS
90]
```

To switch the bleep on use *FX 14,2 and switch off with *FX13,2

If you have a more recent operating system than OS 1.2 then you will be able to vary the type of bleep you get using the following FX calls:

| | |
|---|---|
| *FX 211,X | Where X is the channel number |
| *FX 212,X | Where X is an envelope number (0 to 127 in step so of four) |
| *FX 213,X | Where X is the pitch (0-255) |
| *FX 214,X | Where X is the duration (0-255) |

*Anwar Ali and Gary Woolridge, Handsworth, Birmingham.*

## Basically breaking in a Lynx

With modification, D P Akerman's hint *(Issue 38)* on determining whether the break key has been pressed, can be used to stop a Basic program while it is executing. The following four lines of Basic, when inserted at the top of your program, will allow you to do this. On executing your program once, lines 2 to 4 can be deleted (but not line 1).

```
1 CODE OB ED 56 FB 76 AF ED 4F
FB 76 ED 5F FE 08 20 03 C3 42 1E
08 C9
2 DPOKE &6297,&4DED
3 DPOKE &622B,&6954
4 POKE &622A,&C3
```

*Clive Newton, Cwmbran, Gwent.*

## Setting your Spectrum FREE

As the Spectrum does not have a FREE command as other micros do, here is a short program to overcome it.

It gives the amount of spare memory in bytes available for your Basic program.

```
9999LETS=(PEEK23730+(256*
PEEK23731))-(PEEK23653+(2
56*PEEK23654)):
PRINT"SPARE" MEMORY =
";S;" BYTES"
```

*Mr M Groll, Rugeley, Staffs.*

## Is this how to get a tip in Microwaves?

The following routine, used on the Spectrum (16/48K) is a neat little trick to print out text on the screen. It does not use the print statement to its usual effect.

```
10 BORDER 0: PAPER 0: INK 0:
CLS
20 PRINT "This is a routine
written to flatter Personal
Computer News so that my
program gets printed in Micro-
waves"
30 FOR X=22528 TO 22657:
POKE X,7: PAUSE 5: NEXT X
```

Note that the x value determines the amount of text to be displayed. POKE x,7 sets the memory address (x) for the screen text and 7 denotes the INK colour.

Also, try this:

```
10 BORDER 0
15 FOR N=0 TO 24
20 LET L=USR 3582: PAUSE 1
:NEXT N
30 PAPER 7
40 FOR X=0 TO 24
50 LET L=USR 3582:PAUSE 1:
BEEP .008,X: NEXT X
```

*Darren Virgo, Wickham, Newcastle upon Tyne.*

## Unlocking Sinclair Forth's potential

After buying the Sinclair Forth cassette, I realised that there was no INKEY$ function other than KEY which returns the ASCII value of the key pressed to the stack.

The problem is that this waits for a key to be pressed, unlike INKEY$ which does not.

To remedy this I set about using Forth's ability to redefine words and re-wrote KEY as follows:

```
: KEY 23560 C@ ;
```

so that it no longer waits.

It uses the system variable LAST K and typing KEY. (ENTER) should make the computer respond with KEY. 13 OK, thirteen being the code for (ENTER). If KEY is used to detect a letter being pressed, the letter can be printed onto the screen using EMIT.

*Michael Perris, Great Bookham, Surrey.*

## Why not give your BBC a break?

Here is a way of turning all the keys (except BREAK and ESCAPE) on a BBC micro, into a kind of piano.

It's not exactly Beethoven but it does produce an intriguing effect. Try:

```
?&FE40=0
```

Another good trick is

```
*FX 254,7
```

which tells the computer that all the expansion slots are empty.

After you have typed this in, push CTRL and BREAK and then read the top of the screen.

*Nicholas Booth Edgerton, Huddersfield, W Yorks.*

## Does your BBC deserve decorating?

The following little routine might appeal to those BBC owners who like to see their name in lights.

```
*KEY 10LIBBC computer ¦_¦
CYOUR name¦_¦@!¦EBASIC¦_¦
@!¦G>¦J¦U¦_¦A¦G
```

Then each press of the BREAK key gives:

```
BBC COMPUTER
your name
BASIC
>_
```

This works by programming the VDU codes directly into the break key.

¦L¦J clears the text area and moves the cursor down one line.

¦_ moves the cursor to X, Y (VDU 31)

¦@¦C gives X=0, Y=3

¦@¦E gives X=0, Y=5

¦@¦G gives X=0, Y=7

¦J¦U moves the text cursor down one line and delete back to the '>' symbol.

¦_¦A¦G positions the cursor at X=1, Y=7 *ie* after the '>' symbol.

These additions do not affect the function of the BREAK key, they merely give a little personal adornment to the following display.

*David Abbot, Horsham, Sussex.*

**Would the author of the Microwave on the left please send us his/her name and address.**

## Keeping fine time

Most Commodore 64 users will be well aware of the TI$ function which allows access to the inbuilt clock for use in programs. However you are limited to hours, minutes and seconds. It is often the case that a timing system is required that will operate in tenths of a second. Well, it is possible to go one better than that and program in 100ths of a second.

The secret lies in the TI function which reads the interval clock in 'jiffies', or 1/60th second. This value is set to zero on power up and continually increments itself, except when the tape input/output routine is called. Try PRINT TI and RETURN followed almost immediately by another PRINT TI and RETURN. You will have two numbers giving the jiffy count at the moment of pressing RETURN.

The use in programs, refer to the following subroutine:-

```
1000 PRINT "{CLS}"
1020 T1=TI:REM**SET T1 AT START OF LOOP
1030 SET ##:REM**INITIATE ACTION TO BE TIMED
1040 T2=TI:REM**SET T2 TO FINISHING OR UPDATED TIME
1050 T=INT((T2-T1)/60)*100+.5):100:REM**CALCULATE TIME INTERVAL AND
     ROUND TO 2 DECIMAL PLACES
1060 PRINT"{HOME}"T:PRINT"{DOWN}{RIGHT}SECS"
1070 IF ##="":GOTO 1030:REM**RETURN FOR NEXT ACTION
```

# At £99 the Manta Printer is a bargain!

*Whatever image or text is displayed on your screen the Manta Printer can reproduce it – graphics or characters. Running quietly and quickly – at 80 characters per second – the Manta produces 40 column width print-out in upper and lower case letters and graphics.*

*Take this opportunity to upgrade your system – produce hard copy print-out of all your programs, lists, addresses etc.*

*The Manta printer is fully compatible with Spectrum 48K, Oric, Dragon, VIC 20, Commodore 64, Aquarius and BBC.*




# With £100 of FREE software its a steal!

Buy the Manta Printer and choose £100 of software free!



















## Dragon 32, Spectrum 48K, Oric 48, Commodore 64

Leopard Lord
Terror from the Deep
Ace in the Hole
Horror Atoll
Arcane Quest
Roundsby Incident
all at £10 each

## Spectrum 16K

Fisherman Fred
E × T
Penguin
Sea-battle
Cosmanoids
Diamond Mine
Golf
Toolkit
Grid Bug
all at £5 each

## Spectrum 48K

Cry Wolf
Ziggarat of Dread
Tobor
Chuckman
Lost over Bermuda
3D Star Wars
Security Shelter
One-arm Bandit
Efenders
Eteor Torn
'N' Vaders
Terroroids
Goblin Crusher
Never Trust a Blonde
all at £5 each

## Vic 20

**Games Pack 1**
Fruit Shop
Sea Wolf
Cube
Packman

**Games Pack 2**
Frogger
Invaders
Othello
Roboball

**Games Pack 3**
Head On
Apollo 8
Wobble Board
Space Attack

**Games Pack 4**
Crazy Balloon
Sea War
Mazerace
Breakout
all at £10 each

## Aquarius Cassettes

Ed-on
Grid Bug
Phrogger
'N' Vader
Chuckman
Efenders
Aliens
One Arm Bandit
all at £5.95

## Aquarius Cartridges

Chess £19.95
Melody Chase £19.95
Snafu £15.95
Night Stalker £19.95
Lock 'n' Chase £19.95
Astrosmash £15.95
Burger Time £19.95
TRON £19.65
Dungeons and Dragons £16.95
Logo £30
Finform £30
Fileform £30

## BBC

Picnic Adventure
only £5

ADD-ON ELECTRONICS

Add-On Electronics Ltd.,
Units 2, 3 and 4,
Shire Hill Industrial Estate,
Saffron Walden,
Essex CB11 3AQ

*To: Add-On Electronics Ltd., Units 2, 3 and 4, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ*

*Please rush me_____(qty) MANTA Printers at £99 each. My machine is _____*

*I enclose cheque to the value of £_____or debit my Access ☐ Visacard ☐*

*No._____*

*Name_____ Signature_____*

*Address_____*

*Postcode_____*

*I claim £100 of free software from the list above:*

*If not enough space kindly attach list. Prices include VAT and P+P.*

*Credit card holders ring (0799) 25014 (24 hours) or Telex 81653*

PCN5/1

Which book would your micro want you to buy? *PCN*'s review page helps you choose.




**'Graphic Art for the BBC Computer — Turtle Graphics And Art' by Boris Allan, published by Sunshine Books at £5.95 (paperback, 112 pages)**

At first sight this seems quite interesting, but delving deeper I found little more than a rather elaborate game with pretensions to grandeur.

That this introduces similar ideas to those propounded by Seymour Pappert in his book 'Mindstorms' is a tribute of sorts, and certainly Mr Allan takes a more practical line than Mr Pappert did, or possibly could considering the development of microcomputing at the time of writing.

The book is quite short, and academically interesting. But it's lack of origination left me dissatisfied.

**PL**




**'Using VisiCalc' by Carol Klitzner and Matthew Plociak Jr, published by John Wiley at £13.95 (paperback, 269 pages)**

This is yet another third-party tutorial on using the world's most popular program, (and one which was unfortunately not available to me). One of its most unusual features is that the worksheets used as examples in this book, as in others of its' type, are published on disk.

This is highly desirable, because although the complete models are listed at the back of the book, they are in several cases very large with many repetitive sequences, so copying them out would be excessively error-prone, albeit possible.

As models, they are quite good, if a bit unimaginative. On the one hand their very simplicity makes them relatively easy to understand, on the other they don't give much idea of the subtleties of VisiCalc.

The tutorial section of the book doesn't suffer the same fault as it's little more than a paraphrase of the VisiCalc documentation, which is itself particularly good.

Overall, I would suggest that the disk versions of the spreadsheets are rather more useful than the book, though at US$39.95, it could be rather extravagant. Of course, you could type in the listings, but since the authors list them complete, with no attempt to develop some convention for using the /REPLICATE function, this is tedious.

It's a pity that a little more thought wasn't applied to the development of the idea before the authors rushed into manuscript.

**RK**




**'The DIF File' by Donald Beil, published by Prentice/Hall at £13.55 (paperback, 233 pages)**

There are some books which really should be on the shelves of any systems or application-programmer, and this is one of them.

Though the Data Interchange Format isn't formally accepted as a standard by any major bodies, it has proved popular in the US, and at least over there, is considered to be a 'de facto' standard. However, it hasn't received the attention it should, at least not in Britain. It's obvious that the situation is different in the States, where a large number of programs either use DIF as an external utility or as a means of internal communication.

Part of the reason may be the (relative) lack of availability of the DIF Technical Specification in this country, which has meant that most information has to be gleaned at second or third-hand. Since the matter of interchanging data between different programs is a complex one, and involves many considerations not immediately apparent from examination of Basic listings, further obstacles have been put in its path.

This book, however, explains the whole subject lucidly with plenty of good examples, many of which have clearly been developed in real use. As a bonus the book gives some very useful hints and tips about how to use the DIF file-saving features of VisiCalc to overcome some of the limitations of the program.

One case which often comes up, particularly in the early stages of developing a worksheet, is that a formula or value is incorrectly placed, resulting in circular or back-referencing calculations. Moving it is a problem, but by saving the worksheet in parts as DIF and VisiCalc-files, it can be dismantled and correctly reassembled.

Though DIF is often associated with numeric data, largely as a result of VisiCalc, it also has provision for string-data, which makes it ideal for use with data-base and card-index programs, and this is also well covered.

The most interesting section is on the Special Data Values and User-Definable Items, which allow considerable expansion to the DIF, and suggest some interesting experimental ideas.

A very good book, which makes an important but neglected idea much more approachable. I can heartily recommend this treatise on DIF to any professional or serious amateur programmers.

**RK**




**'Proper Basic' by Brian Walsh, published by John Wiley at £12.50 (hardback, 397 pages)**

The title attracted me, and I hoped for a good meaty book on making Basic work reliably, but I was disappointed.

The book doesn't teach Basic 'properly' (whatever that means), since the only aspects covered are the 'legitimate' uses of the language.

For example, it describes Sinclair ZX-81 Basic as well as the use of WHILE . . . WEND and such-like in GWBasic, however the author makes little attempt to show how you can synthesise such structures perfectly adequately in dialects which don't have them.

As a result, much of the code is clumsy and has many GOTOs and other constructs for which Basic has often, and justifiably, been criticised. It's the sort of book which unfortunate Computer Science students will be instructed to read, and in my opinion exemplifies the reasons why academic instruction in this subject is not the best way to learn.

The problem is that 'real' programming as opposed to the 'theoretical' variety is as much a question of bending and creative abuse of the rules as it is of strict adherence to them, and books such as *Proper Basic* refuse to recognise this.

All is not lost, however, since the book does have some redeeming uses as a reference book concerning the differences between the many dialects of the language. Like many academic works it is extremely thorough and covers the full spectrum ranging from ZX-81 Basic through Pet and Microsoft Basics to Vax and ICL 2900 Basic.

**RK**




# Turn the tables on the Cowboys

SALOON SALLY is in a tricky situation. After an evening of drinking and gambling, four roughneck cowboys are wreaking havoc in Sally's saloon.

While the fight progresses Sally spots her chance to pick up the gold lying around. Guide her from table to table filling her pockets but watch out in case the cowboys catch her.

As the pianist pounds away regardless of the commotion, Sally can keep the cowboys at bay by hurling tables and chairs. But the action gets more hectic and the music gets faster—you'll need all your wits about you to keep up with the pace.

SALOON SALLY from Psion Software is a compulsive and addictive machine code action game exclusively for the BBC Microcomputer (Model A and B with 32K RAM).

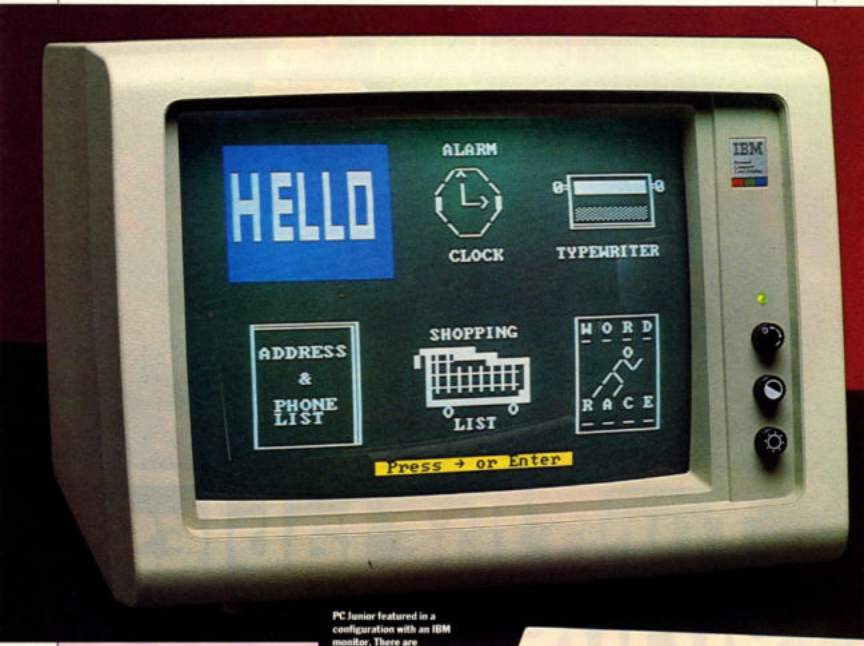
Available from W. H. Smith, Boots and all good software retailers for only £7.95.

The whole range of quality Psion Software, including the popular Va-Calc and Va-File applications programmes are available from W.H. Smith, Boots and all good software dealers.

PSION
SOFTWARE

Dealers are invited to contact Psion to find out details of substantial discounts for trade orders of our best selling software for the BBC Microcomputer.

Psion Ltd., 2 Huntsworth Mews, Gloucester Place, London NW1 6DD




PC Junior featured in a configuration with an IBM monitor. There are questions surrounding the reliability of the cordless keyboard when working with a remote control TV.

At last IBM has released details of its PC Junior, the home computer version of the IBM PC, and allowed selected North American journalists a quick hands-on experience.

However the Junior, also dubbed the IBM Peanut, doesn't seem all it's cracked up to be. If it takes the home computer market by storm, it will be through its family connections, not because it possesses any outstanding qualities of its own. In the flesh, the Junior is rather dull, and horrendously over-priced.

The PC Junior looks rather like the IBM PC. The good news is that it does use the 16-bit 8088 Intel Processor and it does run the PC's operating system, PC-DOS although it is a revamped version called 2.1. The operating system comes 'bundled' with the machine. In the US it can also be bought as an extra for the IBM PC so that machine can run the Junior's applications programs.

Some of the bad news involves the Junior's keyboard which has been described as 'rather inadequate' by our North American correspondent. It is laid out a bit like the PC's except that it lacks the IBM's 10 special function keys. By way of recompense, IBM has colour-coded the remaining 62 keys so special functions can be performed through a 'shift' operation.

The keys themselves are rubber domed arrangements rather than full-moving. This seems anomolous as it rules out effective word-processing (always a feature noticed by journalists, perhaps). But IBM does expect this to be a popular application and has already announced its Home Word package for the machine.

The costs, presumably cut by downgrading the keyboard, have been reintroduced in the form of an infra-red remote control system (the same technology that magically changes the channels on a TV remote control unit).

The keyboard can be used up to 20 feet away 'in line of sight' without a connecting cable. The system uses batteries to achieve the effect and turns itself off when the keys aren't being pressed. The batteries are supposed to last up to three months.

There are a few question-marks

Ian Scales inspects the features of IBM's latest progeny and is not impressed.

# Peanut power



surrounding the reliability of the remote keyboard when competing with home-appliances on the same frequency. The fact that IBM also offers a conventional cable arrangement (costing US$20) should tell us something, though it's always possible that users will want to manipulate the keyboard 'out of sight' of the receiver. Then again IBM expects that many of the Juniors will end up in classrooms where their IR signals would clash — cables here would be a necessity.

None of this explains why IBM bothered with an infra-red keyboard at all — we think it's an obvious gimmick but judge for yourselves.

There's more bad news surrounding upgradability. IBM naturally doesn't want the Junior to take sales away from the PC. This is a possibility if a clear upgrade path, (free of expensive obstructions) is opened up to the potential purchaser.

The Entry Model has 64K and runs cartridge software. It can display forty characters across a line and has variety of screen modes. 160×200 pixels are available in 16 colours, 320 by 200 in 4 colour mode and 640×200 in two colours.

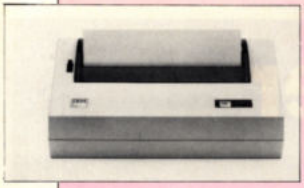
The Expanded model comes with one 360K disk drive and 128K. Users can upgrade from Entry to Expanded — a 64K RAM cartridge and 80 column display costs $140 and the disk drive costs $480. If you really want to you can apparently expand the Junior to 640K of RAM though the dollars might all tot up to send shudders down the spine.

Monitors, of course, are an additional expense. Users of the Entry Model will obviously use a TV set to display their 40 columns of text, but the Expanded model can utilise IBM's colour monitor.

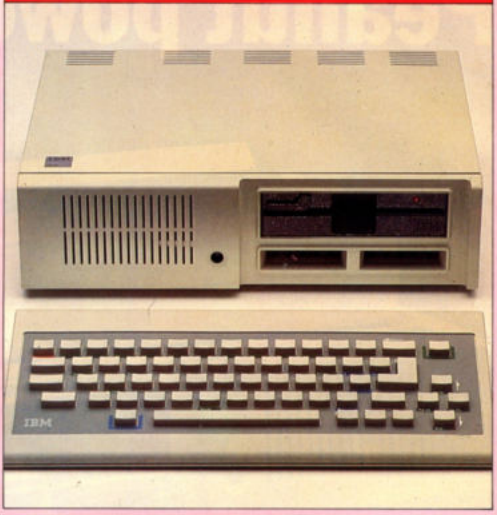
IBM has the software base off the ground already. There is a special Basic language, PCJr Basic, a Home Budget program, a Personal Communications Manager, the Home Word package, a range of games and a 'sampler' disk for the extended model which shows the users how to make the most of the system. An additional 'exploring' diskette shows them how the system works.

IBM has other options as well. In the US

20 ▶



**The IBM thermal printer does seem to be priced reasonably at $175. It's capable of a respectable 50 cps. Likewise the $199 modem seems reasonable as it has auto-dial and auto-answer as standard features. The keyboard however is a disappointment being more calculator-like than full-moving.**




◄ 19

there is to be a 300-baud hardwired modem with auto-dial and auto-answer, costing $199, plus a $175 50cps thermal printer with a $40 adaptor.

The PC Junior is not expected to appear in this country for some time yet. The IBM PC took over a year to cross the Atlantic and although IBM always plays its cards very close to its chest, the odds are that the Junior will also take a leisurely passage.

The important thing is that the machine has finally surfaced. If you are wondering whether it was worth the wait the answer could well be no, but the PC Junior is an important machine simply because it has the initials of the world's largest computer company stamped on it.

The rumours that IBM was about to launch a home computer made the other US home computer manufacturers quake in their boots. Since the release of IBM's PC, the business/personal microcomputer market in the US has been transformed and many experts expected the same process to occur with the Peanut.

The PC has become the 16-bit micro standard there, and a host of IBM compatibles from both the US and Japan have sprung up to collect IBM's crumbs — some of the crumbs have been rather substantial, espcially in the portable or luggable market. At the upper end of the micro market, if it's not IBM-compatible, it's at a very severe disadvantage.

By only releasing selected details of the Junior, IBM managed to ruin its competitors' Christmases. The stock exchange was already jittery about the future of the micro industry in the wake of Osborne's difficulties, Texas Instruments pulling out of the home micro market and losses reported by Atari, to name just a few reversals.

When IBM spent months being mysterious over a new release, investors wisely remained wary of investing in any of its competitors. According to some US spokesmen, Christmas buyers were also put off buying alternatives by IBM's decision not to start making the Jr available until early this year.

As far as users in the UK are concerned, the IBM PC Jr is bound to have some sort of impact. If things go the usual IBM way, the Junior and its compatibles will arrive on these shores eventually. The Jr will become a standard that can't be ignored by users simply because the software and expansion facilities will be huge. The pity is, the Peanut will be at least 40 per cent more expensive than it need be to prevent it from competing with the fully-blown PC.

Once Peanut owners reach the end of the Peanut's potential they will have to buy a new product to get any further — 'bait and switch' is the industry jargon for this marketing technique.

Such is IBM's status and power that it can actually afford to see the market in these terms. The possibility that users might opt for neither the PC nor the Jr doesn't seem to figure in the strategy. The annoying thing is that IBM is probably right.

Even if the Peanut is a lemon and does get a raspberry, the familiar scene seems set to unfold again. The overpriced Peanut will sell in huge quantities. Dozens of US software and 'third party' add-on manufacturers will produce supporting products. This trend will be encouraged as Peanut-compatibles arrive on the scene. IBM will sell even more Peanuts . . . and so it goes on.

If, by some miracle, this doesn't happen, IBM will hardly notice the difference — to IBM, home computers *are* Peanuts.

If the Junior fails to sell, IBM will simply lick its slight scratch . . . and come back with something better.

For example the company recently decided that a $100 million-plus research program into advanced, high-speed processors was a blind alley. It simply announced that it wasn't interested anymore, wrote off 15 years development effort and reassigned over 100 scientists — Peanuts indeed!

**SPECIFICATION**

| | |
|---|---|
| **Price** | (US dollars) Entry model with cartridge port and 64K $669, Expanded model with 128K and 360K disk drive $1269, entry can be Expanded for $620. |
| **Processor** | Intel 8088 16-bit |
| **RAM** | Entry 64K, Expanded 128K. |
| **Graphics screen** | 160 by 200 pixels in 16 colours, 320 by 200 in four colours, 640 by 200 in two colours. |
| **Keyboard** | 62 keys |
| **Storage** | Entry, cartridge. Expanded 360 360K 5.25 inch floppy disk drive, cassette interface. |
| **Interfaces** | Joystick ports, light pen socket, parallel interface, serial interface. |
| **Operating system** | PC-DOS 2.1 |
| **Distributor** | IBM |

# HIGH QUALITY GREEN SCREEN VIDEO MONITORS

Designed for use with Professional and Personal Microcomputers where a high resolution display is required. Ideal for applications requiring 80 column mode or higher, high resolution graphics, etc.

*CHECK THESE FEATURES:–*

- ANTIGLARE SCREEN
- P31 GREEN FOR MINIMUM FATIGUE
- VIDEO RESPONSE 10Hz - 22MHz ± 3db
- SUPERB RESOLUTION – UP TO 132 CHARS/LINE
- EXCELLENT GEOMETRY/LINEARITY
- HIGH STABILITY
- 230 VOLT 50Hz MAINS OPERATION
- COMPOSITE VIDEO 0.5/2.0V INPUT
- FLICKER FREE DISPLAY

**£89**



▲ 12" MODEL HM123

**£87**



▲ 9" MODEL HM910

**£85**



▲ 9" MODEL HM911

ADD £5
Carriage/Postage

DEALER ENQUIRIES WELCOME

# THE LOWEST PRICE ANYWHERE

**£389**



ADD £9 Carriage/Insurance

FOR A PC WITH THESE FEATURES.... LOOK AT THE SPEC. OF THE AMAZING **UNITRON 2200**....

Dual processors – 6502 and Z80

- 64K of RAM
- 24K ROM with softswitch control
- Selectable 80 or 40 column text display
- Detachable keyboard
- Apple® II-compatible
- CP/M® compatible
- High and low resolution graphics capabilities
- Two disk I/O for your disk drives
- Game paddles/cassette/video interfaces

*Prices exclusive of VAT*
*Same day despatch. Access welcome.*

**CHILTERN ELECTRONICS**

HIGH STREET, CHALFONT ST. GILES, BUCKS. HP8 4QH
TELEPHONE: 02407 71234 TELEX: 262284

# AGF

# PROGRAMMABLE JOYSTICK INTERFACE for Spectrum or ZX81

ONLY 32.95 +£1.00pp

MICRODRIVE COMPATIBLE

## ABOUT OUR INTERFACE

The AGF Programmable Joystick Interface is a unique design offering the use of any Atari-compatible joystick with absolutely all software, whether it is cassette or ROM cartridge, with the Sinclair Spectrum or ZX81.

The hardware programmable interface requires no additional software and accurately replicates the keys of the computer in a manner which is responsive to absolutely *ALL* key reading methods, both BASIC and Machine Code.

The interface does not interfere with key operation and can therefore be used simultaneously with the keyboard.

There is no need to remove the interface once fitted as the rear extension connector will accommodate further expansion, i.e printers or RAM packs etc. This important feature avoids excessive wear to the expansion port.

The key replication principle pioneered by AGF means that your own programs can use eight directional joystick movement by utilising simple key reading BASIC.

Two joystick sockets are provided which share the same keys, for use with the majority of two player games. Several interfaces may be used on the same computer for multiple joystick applications.

The interface is programmed by a two digit code, which is looked up on a programming chart supplied, for each direction and firing button. The two numbers are then selected on a pair of leads which are clipped onto appropriately numbered strips on the interface.

Once configured this can be marked on a Quick Reference Programming Card for storing with the game. As the programming is *not* power dependent the interface retains the last configuration made and can be immediately used when next switched on.




## KEY FEATURES

- Programmable design gives TOTAL software support.
- Accepts Atari, Competition Pro, Wico, Starfighter, Quick Shot, Le Stick etc.
- Rear extension connector for all other add-ons.
- Free demo program and instructions.

## PACKAGE CONTENTS SUPPLIED

- Programmable Interface Module as illustrated, complete with clip-on programming leads.
- Self adhesive programming chart detailing how to define which key is simulated by UP, DOWN, LEFT, RIGHT, and FIRE. This can be fixed on to the case of your computer or if preferred the protective backing can be left on. The chart is made of a very durable reverse printed plastic and is extremely easy to read.
- One pack of ten Quick Reference Programming Cards for at-a-glance setting to your games requirements. The card allows you to mark the configuration in an easy to read fashion with space to record the software title and company name.
- Video Graffiti demonstration program which is written totally in BASIC to illustrate how all eight directions and fire can be read. This is also a useful high resolution drawing program.
- 12 months guarantee and full written instructions.

## JOYSTICKS

CONTROLLERS FOR USE WITH OUR INTERFACE Module or VIC 20, Commodore 64, Atari VCS, Atari 400, Atari 800

If you require extra Joysticks for our original interface module mark order 'OLD' Joysticks

**ONLY £7.54 inc VAT + P&P**

FROM: MR/MRS/MISS

ADDRESS

SEND C.W.O. (NO STAMP NEEDED) TO: A.G.F. HARDWARE, DEPT. **PCN 1**

**FREEPOST**, BOGNOR REGIS, WEST SUSSEX, PO22 9BR

| QTY | ITEM | ITEM PRICE | TOTAL |
|---|---|---|---|
| | PROGRAMMABLE INTERFACE | 33.95 | |
| | JOYSTICK(S) | 7.54 | |
| | PACK(S) QUICK REFERENCE CARDS | 1.00 | |
| ONE | VIDEO GRAFFITI | FREE | |
| | ZX81 ☐ ZX SPECTRUM ☐ Please tick | FINAL TOTAL | |

*DEALER ENQUIRIES WELCOME* *EXPORT PRICES ON APPLICATION*

Has language taken the path predicted for 1984? John Lettice says Orwell's that ends well.

# Turning the tide

Welcome to 1984, the celebrated year of Newspeak.

And take a bow, all you owners of personal micros. You may not realise it but you are a bulwark against one form of Newspeak — computer jargon. This is the year by which English is supposed to have been distorted beyond recognition, but one of the most threatening distorting influences of recent decades, computerese, is making its last stand and looks like being overwhelmed.

The jargon that was once a form of gibberish spoken and understood only by a small elite is on its way out. English is making a comeback. You can all take some credit for this, but it's a back-handed compliment — it is the very popularity of micros that has undermined the jargon. We have taken what we need from its peculiar vocabulary and thrown the rest away.

There was a time, to be sure, when an understanding of core or binary digits would have qualified you for membership of a very exclusive club. This was when computer jargon was a creative art, finding names for new things. The BBC hardly had television in those days, let alone an overpriced micro; Sir Clive Sinclair had more hair.

As the years rolled by the jargon thrived and grew around computing like an impenetrable thicket. Acronyms sprang up everywhere, many of them with intimidating, science-fiction overtones — Cobol, for example, which may sound innocuous now but which can still send a shiver up the spines of those who knew it when it was all they had.

Some of the early machine names were acronyms as well — Leo, Eniac and so on — but in the Sixties names were dropped and numbers came into vogue, leaving people in no doubt that here was a subject best left to the experts.

The experts prospered. But where the Sleeping Beauty was content to lie around for years waiting for Mr Right to hack his way through the thicket, the computer industry found that the thicket was keeping it from Mr Right. Mr Right in this context was identifiable by his theoretical ability to afford a computer.

So it set about the thicket, made a few gaps, and fought its way out. The Seventies became the decade of the minicomputer, which carried computing to many more people than had been able to lay their trembling hands on it before.

The jargon wasn't laid waste during this period; if anything, a second protective layer was added. The original jargon had been baffling, but the second layer sounded as though it might be English. The expression 'man-machine interface' was rarely off people's lips, virtual memory became concrete fact, but above all, this was the decade of the solution.

It could almost have been the chemical industry, there were so many solutions flying around in the late seventies. Integrated solutions, single-vendor solutions, vertical solutions, nothing was insoluble. The computer industry looked at businesses everywhere, and eyewhere it saw problems — it would have been negligent not to offer solutions.

When it said 'problem' what it meant, of course, was 'job', and what a job needs is not a solution but simply a spot of elbow grease. But elbow grease is far too earthy a term to sell computers, so jobs became problems. This particular corruption of English still struggles on, especially in advertising, but bear in mind that when people talk about a solution looking for a problem what they mean is that it will take somebody with more money than sense to buy it.




Appropriately enough, it was a man by the name of Jobs who was largely responsible for exposing the pervasive lie of the 'problem'.

With microcomputers beginning to sell in thousands, then in hundreds of thousands, then in millions, it becomes obvious: surely not all of these people can have problems? Not all of them have jobs either, but that is by the by.

The Eighties is the decade of the micro. At first micros went only to hobbyists and universities, where people understood the jargon and wore their understanding like an old school tie. But the trouble with something that sells for, say, $500, as opposed to a $500,000 mainframe, is that you have to find hundreds of people willing to buy them to make the same profit. If incomprehensible jargon has left you facing a hostile and anxious market which worries that computers are bent on world domination, something has to be done about the jargon. Something was. The Californian garage proprietors were not about to let a misapprehension stop them from spreading the manifold benefits of computing to all humanity.

The jargon was not so much ditched as side-stepped. Computers acquired names again — fresh fruit proved especially popular — and the mysterious things they contained acquired one name — the chip. The difference between memory, processors, and logic gates became irrelevant. Software became 'user friendly', an impressive, though vaguely bogus, way of saying straightforward. The jargon grew in a new and fruitful direction; it became homely, which was no surprise since the micros themselves were heading in the same direction.

You can still see this process at work — take for example the latest development in the user friendly man-machine interface, the windows/mouse combination.

In the bad old days the mouse would have been given some more or less meaningless acronym — Cursor Orientation Device (Cod) perhaps. Even so, there would have been die-hards muttering darkly about the dangers of using a name that ordinary folk could understand. To a 1984 businessman it will be a matter of complete indifference whether he's pushing a mouse or a cod across his desk, but the mouse, furry and warm-blooded, scores over the cod in the homeliness stakes.

Windows are a different kettle of fish. For some reason software has never lent itself to acronyms as readily as hardware. Windows would have been called something like SSSS (Screen Segmentation Software System) in the days when men were men and mice scuttled about behind the wainscotting. SSSS would not have meant anything to anybody, but when used in conversation it could have indicated the scorn in which the speaker held the uninitiated. Nowadays, windows are perfect. All homes have them.

The phase we're entering now might be described as the Twilight of the Cods. The pace of computer development hasn't slackened but the old jargon is dying out faster than it can be replaced. Technology becomes obsolete so quickly that jargon sounds dated sometimes within a day or two of being invented. New technology, on the other hand, tends more and more to use recognisably English words.

Certainly the words it borrows are usually given a different meaning, but the point is that the flow has been reversed — technology now relies more on English to make itself understood, instead of concocting drivel to make itself unintelligible. Jargon that survives has found its way into dictionaries and gained respectability as part of the language. English is a broad church able to accommodate all sorts of heresies. God Save the Queen's English.

Put weight on your characters with Kevin Ball's routine for double-width letters.

# Spectrum s-t-r-e-t-c-h

This routine shown in the disassembly listing enables the Spectrum to display double width characters. These characters make very effective titles, screen headings, and also input prompts; being larger the user's attention is drawn to them quicker.

The method of implementing the double width characters is as follows: the coordinates of a particular screen location are POKED into two buffers, and then the machine code routine is called. This routine examines the bytes of the character in the character square and expands them horizontally to stretch out the character.

NB: Care must be taken when planning displays with double width characters as each expanded character takes up two character blocks horizontally next to each other. This means that when printing a string of characters, they must be printed in every other character position. The easiest way is to use a FOR..NEXT loop thus:

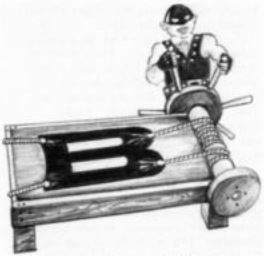
```
10 LET a$="STRING"
20 POKE 23729,5
30 FOR f=1 TO LEN a$
40 POKE 23728,f*2
50 PRINT AT 5,f*2;a$(f)
60 RANDOMIZE USR double width
70 NEXT f
```

It should also be noted that as there are 32 columns in the Spectrum's display only 16 double width characters can be fitted onto each row. The short program above illustrates the point made earlier: to display a double width characfer it is first necessary to print the character in the normal way and then to call the machine code routine. This means that you can expand anything that you care to put into a character block.

The alternative would be for the routine copy bytes from the character set in ROM to the display file in RAM. This method limits you however to ROM based characters which are the space (code 32) through to the copyright symbol (code 127).

The machine code routine preserves the attributes of the printed character and uses them for the new expanded character. The routine also includes range checking for the character position that is POKED into the buffers. The routine has been written so that it is totally relocatable ie it doesn't matter where you put it in RAM, it will still work. For integration into a Basic program you may find it most convenient to POKE the codes into a REM statement at the start of your program. The locations of the buffers used to accept the print position remain unchanged wherever the routine is placed.

If you enter the mnemonics into an assembler then you will find it easier to modify the routine and adapt it to your own needs. It is possible to use this routine in the same demonstration program as shown last week for the double height characters. All you have to do is replace the old data lines with the new bytes for the double width characters. No other alterations are necessary.



## Enlarged characters

It is possible to use the double width characters routine shown here with the double height characters routine shown last week to produce extra large characters which take up four character positions. Both routines have to be present in memory, and one has to be called twice for each character printed. To produce the enlarged characters, add this extra line to the program shown above:

65 RANDOMIZE USR double height: POKE 23728,f*2+1: RANDOMIZE USR double height and (making sure *both* routines are present in memory) run it again.

```
        LD BC,          237 75 176 92
        LD A, C         121
        CP 31           254 31
        JR C, cont a    56 1
        RET             201
cont a: LD A, B         120
        CP 22           254 22
        JR C, cont b    56 1
        RET             201
cont b: CALL CL-ADDR    205 158 14
        LD B, 0         6 0
        ADD HL, BC      9
        PUSH HL         229
        LD C,8          14 8
bgloop: LD A,(HL)       126
        INC HL          35
        LD (HL), 0      54 0
        LD B, 4         6 4
loop a: RRCA            15
        JR C, one       56 6
        RRC (HL)        203 14
        RRC (HL)        203 14
        SET 7, (HL)     203 254
        SET 6, (HL)     203 246
next a: DJNZ loop a     16 237
        DEC HL          43
        LD (HL), 0      54 0
        LD B, 4         6 4
loop b: RRCA            15
        JR C, two       56 6
        RRC (HL)        203 14
        RRC (HL)        203 14
        SET 7, (HL)     203 254
        SET 6, (HL)     203 246
next b: DJNZ loop b     16 237
        INC H           36
        DEC C           13
        JR NZ, bgloop   32 203
        POP HL          225
        LD A, H         124
        RRCA            15
        RRCA            15
        RRCA            15
        AND 3           230 3
        OR 88           246 88
        LD H, A         103
        LD A, (HL)      126
        INC HL          35
        LD (HL), A      119
        RET             201
                        999
```

```
10 REM at least 92 characters (3 lines)
20 LET a=5+PEEK 23635+256*PEEK 23636: LET aa=a
30 READ z: IF z<>999 THEN POKE a,z:LET
   a=a+1: GO TO 30
40 DATA 237,75,176,92,121,254,31,56
50 DATA 1,201,120,254,22,56,1,201
60 DATA 205,158,14,6,0,9,229,14
70 DATA 8,126,35,54,0,6,4,15
80 DATA 56,6,203,14,203,14,24,8
90 DATA 203,14,203,14,203,254,203,246
100 DATA 16,237,43,54,0,6,4,15
110 DATA 56,6,203,14,203,14,24,8
120 DATA 203,14,203,14,203,254,203,246
130 DATA 16,237,36,13,32,203,225,124
140 DATA 15,15,15,230,3,246,88,103
150 DATA 126,35,119,201
160 DATA 999
170 INPUT "Character? ";a$
180 INPUT "Row: ";r
190 INPUT "Column: ";c
200 POKE 23729,r: POKE 23728,c
210 PRINT AT r,c;FLASH 1;a$(1)
120 RANDOMIZE USR aa
130 GO TO 70
```

**To the left is the Basic loader and demonstration program. Above is the disassembled machine code listing.**

# A sound choice for your Spectrum–




**A crystal-clear sound module that simply plugs into the user port – only £30**




It generates its own sound through its own speaker, and unlike most other types, there is no need for additional programming. Make your game playing more exciting, more realistic, make your Spectrum sound output music to your ears. Also available for the BBC micro at £30.

# and a FREE choice of £30 software!

*Buy the sound module and choose £30 of software free!*




***Chuckman*** *Popular arcade game with extras. £5*




***3D Star Wars*** *Battle an entire rebel space fleet. £5*



***The Roundsby Incident*** *What is Roundsby's secret? £10*




***Tobor*** *Fight robots through 6 levels. £5*




***Lost Over Bermuda*** *Will the Triangle claim you? £5*

## PLUS

**Leopard Lord £10**
**Terror from the Deep £10**
**Ace in the Hole £10**

**Horror Atoll £10**
**Arcane Quest £10**
**Cry Wolf £5**
**Ziggarat of Dread £5**
**Aliens £5**

**One-Arm Bandit £5**
**Eteor Torn £5**
**"9" Vaders £5**
**Terroroids £5**
**Goblin Crusher £5**

**Never Trust a Blonde £5**
**Fisherman Fred* £5**
**ExT* £5**
**Penguin* £5**
**Seabattle* £5**

**Cosmanoids* £5**
**Diamond Mine* £5**
**Golf* £5**
**Toolkit* £5**
**Grid Bug* £5**

*** 16K Spectrum – everything else 48K. All prices include p & p + VAT. UK only.**

ADD ON ELECTRONICS
Add-On Electronics Ltd.,
Units 2, 3 and 4,
Shire Hill Industrial Estate,
Saffron Walden,
Essex CB11 3AQ

*To: Add-On Electronics Ltd., Units 2, 3 and 4, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ*
*Please rush me_____Spectrum/BBC sound modules at £30 each.*
*I enclose cheque to the value to £_____or debit my Access ☐ Barclaycard ☐*
*No:_____*
*Name_____Signature_____*
*Address_____*
*_____Postcode_____*
*I claim software cassettes to the value of £30 called:*

PCN 5-1

# How to progra with a VIC 2



# m your family
# 0 computer.




The VIC 20 can please all of the people all of the time because it has, quite literally, hundreds of software programs.

Programs that are exciting, fun, educational, musical and always entertaining.

There's ROM software (they're the cartridges you simply plug into the back of the computer) for only £9.99, and cassette programs (for use with the cassette unit) starting at under £5.00.

No other home computer offers such a choice.

Or, to put it another way: who in your family would have nothing to do with the VIC 20?

We suspect that the answer is no one.

Please send me Vicsoft, the free colour catalogue of VIC software.

Name

Address

Postcode

The Commodore Information Centre, 675 Ajax Avenue, Slough, Berkshire SL1 4BG. Tel: Slough (0753) 79292.

commodore

VSPCN0501

# CDS programs, the ultimate experience

**This is 'Winged Warlords' a brand new Arcade Adventure game from CDS. Just one of a new range of exciting programs for 1984....**









new.... Spectrum Education




new.... Spectrum Arcade action




new.... Spectrum Adventure

ONLY £5·95 each at W.H.Smiths, John Menzies *Boots, and other leading Computer Stores, or...

Available direct from CDS Micro Systems Send Cheque or P.O. To CDS Dept. YC1, 10, Westfield Close, Tickhill, Doncaster DN11 9LA. Tel: (0302) 744129.

* Selected titles only

Solve your presentation problems with a series of programs from B. Jaques.

# Mind your Xs and Ys

The Oric's TAB problem is well known. TAB(N) is actually TAB(N-13) for available columns on one line, so that TAB(17) = TAB(4), and anyway it does not TAB but SPACE. That is, it does not jump the cursor but prints blanks on the way to the PRINT position, so that TAB(17) = SPC(4).

Finally, it forgets where the left hand margin start is, Oric's TAB is SPC(N)-13).

That's the situation on my June 1983 Oric. Try Listing 1 to check out how TAB works on your Oric.

A true TAB function following a PRINT command is a way of presenting a command PRINT AT x on a given line and is a very useful tool in storing and number presentation format. So the Oric does not have a true TAB, but it has facilities which let you provide alternatives.

In this article the x coordinates/printing column numbers are those of the Oric, shown below, unless specified differently.

(Column sequence) 1 2 3 4 5 6 . . . 40

Oric number N/A 0 1 2 3 4 . . . 38

(See manual p154). Thus SPC(4) would cause printing to commence in column 5, as would a true TAB(4), in the apparent seventh column along.

One TAB replacement function has been suggested by C Thompson (*PCN* issue 13, page 16) in the form of SPC(N-POS(∅)) to replace TAB(N). Here are four other methods, each with their particular features and advantages, so that with the five techniques one should be able to cope.

An important criterion for a replacement TAB is that the cursor should subsequently behave as after a PRINT command — so the PLOT command is not regarded as a true alternative, although of course it is extremely valuable in its own right. I also wish to stay in fundamental Basic operations for a replacement function, so I am not including the Oric PRINT AT function which may be constructed in code from the manual (page 128), although again this is an extremely valuable function, behaving as a PLOT + cursor retention command.

## SPC (N-POS(∅))

Listing 2 provides a demonstration of the function and illustrates the importance of getting the numbers correct.

POS(∅) is a function that returns the current x position at the cursor and is thus related to PEEK (617) (see later for PEEK/POKE 616 and 617.) In the function POS(∅) the brackets are required (amend the manual P141), but the argument is a dummy, any true alphanumeric character will do, changing the number does not change the datum column ∅. So SPC (N — current cursor position) gives the function SPC(x) to print x spaces further to the right — providing the numbers are right.

Note that POS(∅) uses the left most numbered columns as datum, Oric's ∅ column. Thus, if the cursor rests at position 10 following a string of length 9, then POS(∅) will return 11. This is illustrated in the demonstration program.

Since the printing and POS(∅) are one

30 ▶

**PROGRAM 1**

```
0 REM SAVED AS'ORICTABDEMO'
1 REM  ILLUSTRATES ORIC'TAB'FUNCTION
2 REM  B JAQUES 1983
5 CLS
9 REM  FILL SCREEN WITH X,THEN'HOME'
10 GOSUB15ø
20 FORR=1TO2ø:R$=STR$(R)
25 PRINTTAB(R)"TAB("R$")"TAB(R+5)"OO"
30 IFSCRN(1,R)=32THENGOSUB25ø
35 NEXT
40 PRINT:GOSUB25ø
45 PRINT:PRINT"'TAB(R)' IS PRINTED BY'?TAB(R)""
50 PRINT"'OO' IS PRINTED BY'?TAB(R+5)""
55 PLOT12,6,CHR$(1)+"PRESS A KEY TO CONTINUE"+CHR$(ø)
60 GETC$
65 GOSUB15ø:GOSUB25ø
70 H$="HELLO":H=LEN(H$)
75 T$="THERE":T=LEN(T$)
80 P$="PCN":P=LEN(P$)
85 PRINTSPC(1)H$SPC(H+2)T$SPC(T+2)P$+"  L85"
90 PRINTTAB(13+1)H$TAB(13+H+2)T$TAB(13+1+H+2+T)P$
95 PRINTSPC(1)H$SPC(H+2)T$:PRINTSPC(T+2)P$
100 PRINTTAB(13+1)H$TAB(13+H+2)T$:PRINTTAB(13+T+2)P$+"  L1ø5"
105 GOSUB25ø
120 END
150 FORR=1TO1ø25:PRINT"X";:NEXT
155 PRINTCHR$(13ø):RETURN
200 IFC<>1THEN N=1-R
210 PRINTTAB(13+12+R+N)CHR$(11)"TAB("R$") IS TAB("STR$(R+N)")"
220 F=1
230 RETURN
250 PLOTø,PEEK(616)-1,CHR$(1)
252 PRINT"12345678ø912345678ø912345678ø912345678ø1345678"
260 RETURN
```

**PROGRAM 2**

```
ø REM  SAVED AS TABREP1DEMO
1 REM  B JAQUES 1983
2 REM  SPC(N-POS(ø)) IDEA BY C THOMPSON
3 REM  PCN,JUNE 3'83 P16
5 CLS
10 A$="THIS IS A":A=LEN(A$)
15 B$=CHR$(129)+"DEMONSTRATION"
20 PRINT"POS(ø)  PEEK(617)  P(LOOP)  A+R+'POS'"
25 FORR=5TO15STEP-1
30 GOSUB1ø
33 PLOTø,PEEK(616)-1,4
35 PRINTA+1+SPC(N-POS(ø)+PEEK(617)
40 PRINTSPC(A+R-P)B$
45 PRINTP,,PEEK(616),A+R-P
50 NEXT
55 GOSUB1ø
60 END
100 PLOTø,PEEK(616)-1,1
110 PRINT"12345678ø912345678ø912345678ø912345678"
120 RETURN
```

**PROGRAM 3**

```
1 REM  SAVED AS'TABREP2DEMO1'
2 REM  DEMO 1 FOR ERSATZ TAB FUNCTION
3 REM  B JAQUES 1983
4 REM  USE OF CHR$(11) TO'TAB'FROM ONE LINE BELOW
5 REM  'TAB'S +'9 TO B#,TO A#
10 CLS:B#="IS QUITE NICE":B=LEN(B#)
20 FORR=1TO5
25 READA#:A=LEN(A#):PRINTA#
28 REM  'SPC' ALONG UNDERNEATH A#,THEN COME UP WITH B#
29 REM  FOR DEMO PURPOSE LINES 30 & 40 ARE'SEPARATED'
30 PRINTSPC(A+1)CHR$(11)+B#
39 REM  'SPC' LONG UNDERNEATH A#+B# THEN UP CURSOR,PRINT COLOUR CODE
40 PRINTSPC(A+B+1)CHR$(11)+CHR$(129)
48 REM  PRINT * TO A RIGHT MARGIN
49 REM  COULD USE A SLICED STRING INSTEAD OF LOOP
50 FORT=A+B+2 TO 35
60 PRINTSPC(T-CHR$(11)+"*"
70 NEXT
75 NEXTR
80 DATA JOHN,BETTY,ELIZABETH,IAN,MARTHOLOMEW
```

◄ 29

column 'out' the minimum spacing, zero, between two printings is SPC(N+1−POS(∅)) where N columns have already been used. Anything less than N+1, however derived, will result in a negative spacing which is not allowed — look for the error message.

In the demo program, B$ has a 'printed' invisible colour character as its first unit; remember this when studying the screen presentation.

## CHR$(11), 'cursor up'

This is useful for normal printing in the descending manner providing that there is no important material in the line below that which is to be tabbed. A further valuable use is to insert a variably TABed PRINT between two or more fixed position 'prints' or borders.

One uses SPC(N) but on the line below that required. The cursor is then brought up with the non-printed code CHR$(11) to print on the particular line. If a subsequent line feed is allowed then the procedure can be repeated along the line up to the right hand limit. If the spacings permit one can introduce and cancel/change central codes and attributes along the way as in normal printing.

The technique is illustrated in the demonstration listings 3 and 4. Listing 3 is deliberately complex to demonstrate the method, it is well appreciated that the result could be achieved in a simpler way. The stock B$ is TABed after a DATA produced A$ of variable length, subsequently red stars are TABbed to a constant right hand margin.

Listing 4 shows the technique used in a way that has been useful, in a game situation, amongst others. Here, fixed vertical borders of varying colour blocks are printed first, then two strings are TABed, separately for demonstration purposes, between the borders.

## CHR$ (30) in columnation TABing

Especially suitable for columnation of material is the use of CHR$(30), which is Oric's reasonably well hidden non-printing code for HOME. This returns the cursor to ∅,∅ with line feed (unless suppressed), effectively putting the cursor at 1,1.

To produce columns Oric is made to produce one whole column at a time, from top to bottom, with the first set on the *right-hand side* using an appropriate SPC(N). The cursor is then brought HOME, line feed adjusted and SPC computed to produce the next column to the left and clear of the first one — and so on.

If the rows of the columns need to be identified by sequence numbers (1,2,3 — n) then you will realise that a problem occurs at 10 and at 100 because of the increase in length of the number. One simple way round this problem, a form of TABing after a numbers is to use INT(LOG)n)). The integer part of log(base 10) of ∅ to <10 is ∅, 10-<100 is 1, and so on so that SPC(1-INT(LOG(n))) will give you 2 apparent spaces after units and 1 space after tens (allowing for the apparent space used by the invisible decimal point).

If you expect to go up into the hundreds then the standard form would be SPC(2-INT(LOG(n))) for consistent columnation. Thus the general function is SPC(S-1-INT(LOG(n)) function Listing 5 uses five runs of generated random numbers (<1), numbers.

As a demonstration of method 2 and the INT(LOG(n)) function listing 5 uses five runs of generated random numbers (<1), truncated to 4 decimal places, in columns of 20. The printing sequence of columns is from right to left to avoid deletion of previous material since normal SPCing is used. If you wish to title columns then strictly speaking column 1 or run 1 is on the right.

Since CHR$(30) is followed by line feed, preliminary alignment is achieved by a PRINT in line 10. When using titles further line feed alignment is required after HOME.

Note that HOME has to be avoided after the final column, otherwise further printing will be over the columns.

**PROGRAM 4**

```
1 REM  SAVED AS'TABREP2DEMO2'
2 REM  DEMO 2 FOR ERSATZ TAB FUNCTION 2
3 REM  B JAQUE~ 1983
4 REM  FIXED VERTICAL BORDERS & VARIABLE PRINTING BETWEEN
10 CLS:PAPER0:INK6
20 A$="HELLO":B$="THERE"
30 FORR=1TO20
39 REM  PRINT COLOURED BORDER UNITS
40 C=RND(1)*7+129
50 PRINTCHR$(C)+CHR$(126)SPC(32)CHR$(C)+CHR$(126)
59 REM  PRINT STRINGS IN 2,FOR DEMO,'TAB'STAGES
60 A=RND(1)*15+4
70 PRINTSPC(A)CHR$(11)+CHR$(129)+A$
80 PRINTSPC(A+LEN(A$)+1)CHR$(11)+CHR$(132)+B$
90 NEXT
```

**PROGRAM 5**

```
1 REM  SAVED AS 'TABREP3DEMO'
2 REM  B JAQUES 1983
3 REM  ERSATZ'TAB'SYSTEM FOR COLUMNATION
4 REM  USES CHR$(30)'HOME',COMPUTED SPACING AND INT(LOG(N)) SPACING
5 REM  NOTE SPACING FUNCTIONS SEPARATEDFROM'PRINT'LINES,USE';'
10 CLS:PRINT
19 REM  LOOP FOR COLUMNS,BACKWARDS
20 FORR=4TO0STEP-1
22 T=7*R+2
23 PRINTSPC(T)"RUN"5-R
24 REM  COLUMN DEPTH
25 FORN=1TO20
29 REM  4 PLACE RANDOM NUMBER FOR COLUMNATION
30 X=INT(RND(1)*10000)/10000
34 REM  FOR LEFTMOST COLUMN FIRST  PRINT SEQUENCE NUMBER THEN RELEV
ANT SPACE
35 IFR=0THENPRINTNSPC(1-INT(LOG(N)));:GOTO45
39 REM  OTHERWISE COMPUTE INTERCOLUMN SPACING
40 PRINTSPC(T);
44 REM  PRINT NUMBER,SEE200-210FOR TRAILING ZEROS
45 PRINTX
50 NEXT N
54 REM  WHEN FINISHED AVOID'HOME'
55 IFR=0THEN70
59 REM 'HOME'CURSOR,LOOP TO NEXT COLUMN
60 PRINTCHR$(30)
65 NEXT R
70 PRINT:PRINT:PRINT"NOW WHAT?"
100 REM  FOR TRAILING ZEROS INSERT AT  32 THE LINE AS IN 110-REM
110 REM  X$=STR$(X):IFLEN(X$)<6THENREPEAT:X$=X$+"0":UNTILLEN(X$)=6
120 REM  AND REPLACE 45 BY ?X$
```

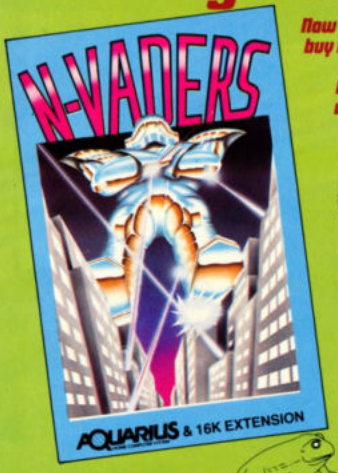
## CHR$(9), 'cursor right'

Methods 1 and 2 have been very useful, but since they rely on SPC fundamentally they do not possess the 'leaping over' quality of a true TAB function. When the screen is blank except for the material that is currently being printed this difference may not be noticeable or of importance. However, method 3 is a technique that 'drops' your material into the chosen slot without disturbing anything else — and it keeps control of the cursor. It is not a PLOT!

Create a string of non-printing cursor-right characters, CHR$(9), in the initialisation section of a proper program. When TAB is required, call up the string and take and print as much of it as you need to TAB by using the LEFT$ function, and add on the material you want to PRINT. If you expect to require 2 or more TABs in a line, extend the system by incorporating a subroutine which calculates the string slice required using POS(∅), since Oric knows where the cursor is on the line in question.

35 ►

# We've got the Aquarius taped!



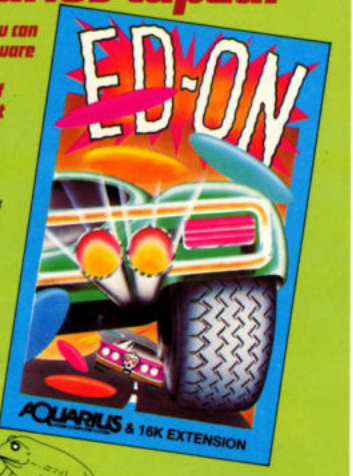

**Now for the first time you can buy cassette based software for your Aquarius. All the excitement of arcade type action at the low, low price of £5.95.**

### 'N' Vaders

The classic arcade golden oldie but written in machine code for fast, exciting action. Pit your wits and skills against squadrons of coloured weirdos. Blast them all from the sky – but beware, they get faster and meaner.

### Ed'on

Eat the dots and avoid the planes to win through. An updated version of the addictive arcade game. Accelerate, decelerate, dodge and change lanes. If you manage to avoid destruction you go on to higher things.




## JUST RELEASED

### Phrogger

A leap in front of all other versions – an arcade quality game with truly amazing graphics. Hop, skip and jump across all the dangers and perils. Take your life in your controls to reach safety.

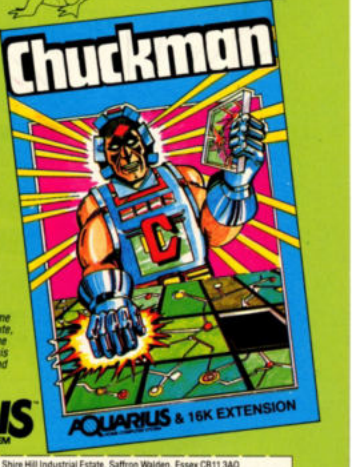



### Aliens

You are one of the chosen 'Gatherers' selected by your unique abilities and talents. Probe the mysteries of the 'past times' building. Gather the secrets of the Universe. Have you the mental strength to survive and the character to win?

### Chuckman

Based on the ever-popular arcade game with extra extras. Find the quickest route, avoid the meanies and defuse the time bombs to win the day. But beware, this game is addictive, you'll risk sleep and peace of mind.




AQUARIUS HOME COMPUTER SYSTEM

ADD ON ELECTRONICS

Add-On Electronics Ltd., Units 2, 3 and 4, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ

To: Add-On Electronics Ltd., Units 2, 3 and 4, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ

Please rush me: _____ (qty) 'N' Vader _____ (qty) Ed'on

_____ (qty) Aliens _____ (qty) Chuckman _____ (qty) Phrogger

Cassettes at £5.95 each inc. p+p and VAT for my Aquarius computer.

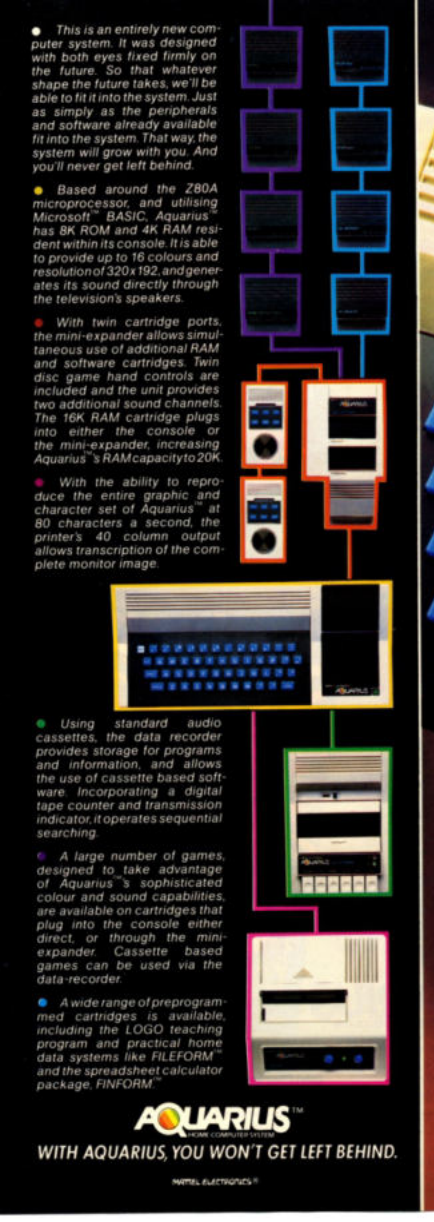
I enclose cheque to the value of £_____ or debit my Access/Visa card. No. _____

Signature _____ Name _____

Address _____ Postcode _____

Credit card holders ring (0799) 25014 (24 hrs) or Telex 81653

PCN5 - 1



- This is an entirely new computer system. It was designed with both eyes fixed firmly on the future. So that whatever shape the future takes, we'll be able to fit it into the system. Just as simply as the peripherals and software already available fit into the system. That way, the system will grow with you. And you'll never get left behind.

- Based around the Z80A microprocessor, and utilising Microsoft™ BASIC, Aquarius™ has 8K ROM and 4K RAM resident within its console. It is able to provide up to 16 colours and resolution of 320 x 192, and generates its sound directly through the television's speakers.

- With twin cartridge ports, the mini-expander allows simultaneous use of additional RAM and software cartridges. Twin disc game hand controls are included and the unit provides two additional sound channels. The 16K RAM cartridge plugs into either the console or the mini-expander, increasing Aquarius™'s RAM capacity to 20K.

- With the ability to reproduce the entire graphic and character set of Aquarius™ at 80 characters a second, the printer's 40 column output allows transcription of the complete monitor image.

- Using standard audio cassettes, the data recorder provides storage for programs and information, and allows the use of cassette based software. Incorporating a digital tape counter and transmission indicator, it operates sequential searching.

- A large number of games, designed to take advantage of Aquarius™'s sophisticated colour and sound capabilities, are available on cartridges that plug into the console either direct, or through the mini-expander. Cassette based games can be used via the data-recorder.

- A wide range of preprogrammed cartridges is available, including the LOGO teaching program and practical home data systems like FILEFORM™ and the spreadsheet calculator package, FINFORM.™

AQUARIUS™
HOME COMPUTER SYSTEM

WITH AQUARIUS, YOU WON'T GET LEFT BEHIND.

MATTEL ELECTRONICS®

Microsoft™ BASIC is a trademark owned by and used under license from Microsoft Inc.

# Ever bought a game that's not as good as its box?

Everybody has seen the home computer game packs that sparkle with imaginative colour and graphics, and lure buyers into the store.

Sadly, some who have bought have found that the game sparkled less than the box. For, as more and more companies jump on the home computer bandwagon, it becomes ever more likely that most of the imagination and excitement is concentrated in the pack. Instead of playing a fast game, you lose a fast buck. Or, more likely, several.

Yet games have become increasingly sophisticated. Scenarios are more varied, levels of play have been increased, and high resolution colour graphics capabilities are being used together with dramatically improved sound effects. The trick is to know which games are as good on screen as they are on the pack.

Relax. Help is at hand. Logic 3, publishers of the most effective self pacing programming tutorials, have selected The Best Games for Britain's top home computers.

So buy only the best. Send today for your free copy of The Best Games from Logic 3, and learn how you could save £2.00 when you buy your next computer game. If you're a dealer, we won't hold it against you — trade enquiries are welcome.

Do it. Now.

## Send the coupon.

## Have a good game without being had.

Please rush me my free copy of The Best Games. I already have/am thinking of getting a_____ home computer.

Name_____

Address_____

_____

_____

County_____ Postcode_____



# LOGIC 3

— THE KEY TO THE WORLD OF TOMORROW.

Logic 3 Ltd, Mountbatten House, Victoria Street, Windsor SL4 1HE

**PROGRAM 6**

```
◀30
 0 REM  SAVED AS'TABREP4DEMO'
 1 REM  ERSATZ'TAB'FUNCTION 4
 2 REM  B JAQUES/M LEACH 1983
 3 REM  USES CHR$(9),CURSOR RIGHT,IN     STRING SLICES
 4 REM  DOES NOT CAUSE BLANK OVERPRINTING
 5 CLS:PAPER7:INK0
 9 REM FILL SCREEN WITH X,THEN'HOME'
 10 FORR=1TO1026:PRINT"X";:NEXT
 12 PRINTCHR$(30):PRINT:PRINT:PRINT
 14 REM SET UP STRING OF CHR$(9)'S
 15 FORR=1TO39:CR$=CR$+CHR$(9):NEXT
 19 REM  DEMONSTRATION STRINGS
 20 A$="CAN YOU":B$="FIND US?"
 22 GOSUB95
 24 REM  SPECIFY'TAB'AS'T',GO TO S/R
 25 T=12:GOSUB100
 30 PRINTA$;
 35 T=20:GOSUB100
 40 PRINTB$:PRINT
 44 REM FURTHER DEMO
 45 FORL=1TO5
 50 T=RND(1)*10+2:GOSUB100
 55 PRINTA$;
 60 T=T+RND(1)*5+1+LEN(A$):GOSUB100
 65 PRINTB$;INT(T)
 74 REM PRINT COMPUTED'T'AT'TB'POSITION
 75 T=T+1+LEN(B$):GOSUB100
 80 PRINT CHR$(132)TCHR$(128)
 85 NEXT
 86 GOSUB95:PRINT
 89 REM  DEMO OF EXISTING TAB FUNCTION
 90 PRINTTAB(25)A$+" "+B$
 92 END
 94 REM  COLUMN LABELLING STRING
 95 PLOTO,PEEK(616)-1,1
 96 PRINT"12345678901234567890123456789012345678"
 97 RETURN
 99 REM  TAB BY STRING SLICING CR$
 100 TB=T-POS(0)+2
 110 PRINTLEFT$(CR$,TB);
 120 RETURN
```

**PROGRAM 7**

```
 0 REM  SAVED AS'TABREP5DEMO'
 1 REM  ERSATZ'TAB'FUNCTION 5
 2 REM  B JAQUES 1983
 3 REM  USES PEEK,POKE 617 FOR X POSITON OF CURSOR
 4 REM  DOES NOT CAUSE BLANK OVERPRINTING
 5 CLS
 9 REM FILL SCREEN WITH X,THEN'HOME'
 10 FORR=1TO1026:PRINT"X";:NEXT
 12 PRINTCHR$(30):PRINT:PRINT:PRINT
 19 REM  DEMONSTRATION STRINGS
 20 A$="CAN YOU":B$="FIND US?"
 22 GOSUB150
 24 REM  SPECIFY'TAB'AS'T',GO TO S/R
 25 T=12:GOSUB100
 30 PRINTA$;
 35 T=20:GOSUB100
 40 PRINTB$:PRINT
 44 REM FURTHER DEMO
 45 FORL=1TO5
 48 GOSUB150
 50 T=RND(1)*10+2:GOSUB100
 55 PRINTA$;
 60 T=T+RND(1)*5+1+LEN(A$):GOSUB100
 65 PRINTB$;
 74 REM PRINT COMPUTED'T'+1'T'POSITION
 75 T=T+1+LEN(B$):GOSUB100
 79 REM  'T-2'BECAUSE OF'T+2"IN 100
 80 PRINT T-2
 82 NEXT
 85 REM  DEMO OF IMPROPER(LOW) VALUE FOR'T',16 AFTER 14
 86 PRINT"TAB 14/16";:T=14:GOSUB100:PRINTA$;
 87 REM SEE L 79
 88 T=16:GOSUB100:PRINT" "+B$+"2ND TAB"T-2
 89 REM  DEMO OF EXISTING TAB FUNCTION
 90 PRINTTAB(25)A$+" "+B$+" L 90"
 96 END
 98 REM  ALTERS CURSOR POSITION TO'TAB'WITH A POKE
 99 REM  100 CHECKS FOR AN OVERPRINTING TAB VALUE,ALTERS TO MINIMUM
VALUE
 100 T=T+2
 102 IFT<PEEK(617)THENREPEAT:T=T+1:UNTILT=PEEK(617)
 104 REM  TURN OFF CURSOR,115 TURNS IT ON
 105 PRINTCHR$(17);
 110 POKE617,T
 115 PRINTCHR$(17);
 120 RETURN
 149 REM  COLUMN LABELLING STRING
 150 PLOTO,PEEK(616)-1,1:PRINT"12345678901234567890123456789012345678
"
 155 RETURN
```

Listing 6 demonstrates the full method. It is important to note that since CHR$(9) is a non-printing character it really is put at x = (-1) — the N/A column, on a line by a PRINT command, so the string slices also begin at x = (-1). Since observed printing begins at x = (-1) you will have to add 2 to the apparent TAB required (SPC(∅) puts the cursor at 1).

The central section of the demo-program computes a TAB value and prints that value. Note that here, as in several other instances where non-integers are unrealistic operators, the Oric subjects the number to an automatic INT(N) function. Particularly note where printing starts, using the printed column guide. As programmed the printing starts one column after the TAB value. This is readily altered if required. The last printed string in the demonstration shows/checks the overprinting effect of the existing TAB function (even when adjusted from -13).

## POKE(617), the 'x' position address

This also drops the material to be printed into the allotted position without over-printing blanks on its way, and keeps control of the cursor.

Memory locations 617 and 616 hold the current x,y positions of the cursor in TEXT, LORES-∅ and -1 modes and the text window (from y = 1 to 3) in HIRES mode. Thus you can PEEK and POKE here. For the purpose of TABing, it is likely that the cursor is already at or can be line fed to the required y position so only x need be considered.

POKE 617 with required TAB spacing, again noting that the number should be 2 more than the equivalent SPCing. As before one can incorporate a subroutine to have succeeding TABs on one line.

To avoid overprinting one needs to check that the proposed TAB is not less than the present cursor position. The program contains a 'wrong' set of TABs in lines 87, 88, and hopefully line 100 will give a minimum clearance. Put REM in front of line 100 to temporarily remove it and RUN again. Note that there is a space 'positively' printed between the two strings.

On my Oric the first POKE produces a cursor block that can be avoided by switching off the cursor symbol with CHR$(17). If required it can be restored with a succeeding CHR$(17). Listing 7 illustrates these features.

It is apparent that method 5 is a semi-PRINT AT function (given y, PRINT AT x). If you require a full PRINT AT (x,y) command, then details for the machine code program necessary are in the Oric manual (page 128, chapter 13). It seems that you could knock up a version by extending the POKE in method 4 to the y position at location 616.

In a sense the valuable PLOT command is a PRINT AT (ignoring all the details of different character handling) command that subsequently loses the cursor to HOME. Well, one could always put the cursor back where requited by POKE 617, 'x'; POKE 616, 'y'.

Richard Gold looks at a new graphics pad for the BBC Micro user.

# Finer artists

Graphics pads have joined the tumbling price phenomenon. The latest of the new low-priced products is the British Micro Grafpad at under £150. It brings the price into a range where home users can enjoy screen art, and is available now for the BBC. Versions are promised for the Spectrum and Commodore 64.

The model reviewed included pre-release copies of the software and manual. Designed for educational use as well as for computer aided design, and in many ways similar to the Watford Beebplotter (Issue 26), the Grafpad provides an escape for the BBC user from the long-winded MOVE, PLOT and DRAW commands.

The graphics pad, and its accompanying software cassette, allow you to draw your own designs or trace the outlines of maps and pictures. These can be saved to disk or tape, and copied through a printer.

## First impressions

Once you have waded through the excessive protective polystyrene which, as well as surviving the British postal system would presumably keep both device and user afloat in the roughest of seas, you come across a piece of hardware that looks not only well made, but also rather attractive.

The Grafpad consists of a tablet and detachable pen. The tablet has a grid for drawing which has a size of 320 by 256 pixels and a green menu area, the use of which is not specified; both are protected by perspex. The pen has a microswitch nib, looks like a dentist's drill, and is tough and reasonably durable.

## Documentation

The user manual is little more than an introductory booklet. It looks cheap (or, if you prefer, functional) and does not even give the full range of commands available in the introductory software. A definite plus is the program listings at the back of the manual, which let you write programs that use the Grafpad.

However, the manual seems little more than a single clue in a puzzle, the object of which is to discover how the Grafpad works, rather than a complete operational guide.

## In use

Perhaps the most important point to be made is that you need a disk drive in order to operate the functions with any speed. This is because when saving a screen, the whole of the screen memory, a massive 20K in MODE 1 high resolution graphics, is stored. This, of course, is very tedious using cassette, though not when using disk.

However, the Grafpad is easy to install: all you need is a BBC with 32K and a user port. The software package, which is included in the price of £148.75 (inc post, packing and VAT), effectively turns the Grafpad into nothing more than a sophisticated sketch pad — an expensive toy.

Nevertheless the range of functions is impressive. The program operates in Mode 1 only, but though only four colours can appear on the screen at a time, the full BBC palette of 16 colours is available. Furthermore, they can be swapped to try different colour schemes.

It is disappointing that the keyboard must be used in selecting commands, especially since the menu area on the tablet is not used. However, using the keyboard, and the pen on the grid, you can draw rectangles, triangles and lines quickly and easily, with rubber-banding.

Circles are drawn by fixing the centre and tracing a radius — the computer does the rest, though the circles are not as round as they could be. The freehand drawing function is good for tracing pictures, though a little jittery and therefore slightly inaccurate. You can add text to your design with the WRIGHT function which works better than it is spelt.

There is also a clever erase function which draws the background colour over the part you want to delete. This gives much more control than most other programs.

A serious fault in the Grafpad is the lack of error trapping, particularly as the key to choose a brush colour is next to that used to clear the screen. This means a slip of the hand can destroy your masterpiece.

The FILL command lets you colour in parts of the picture. Sometimes during testing the colour leaked out of what should have been an enclosed area and filled much of the screen.

British Micro sells, for an extra £20.70, a CAD program to use with the Grafpad. The ability of this program to create multicoloured and high resolution characters hides the fact that this is not really a computer aided design package at all. You can create only very small characters, and the only other creative functions are line drawing routines. Furthermore, on the review copy the SAVE and LOAD functions did not work.

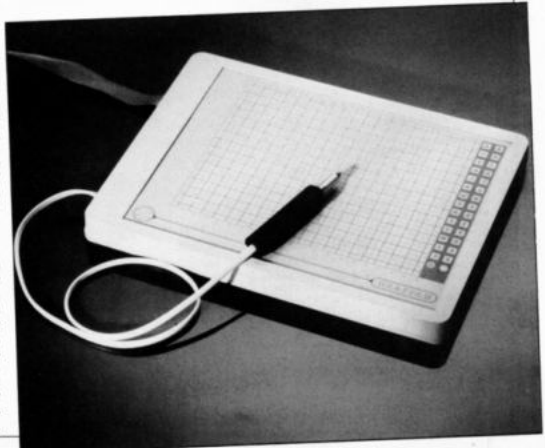
Perhaps the faults of the software should not be overstressed. Indeed, given these faults, the Grafpad itself performed extremely well. Certainly, there are inexplicable features to it. The grid itself is odd as it has no relation to the grid provided in the CAD program. Also there seems no good explanation why the pen is detachable.

Despite the perspex cover the designs can be reasonably, though not completely, accurate. And if you lack space, the Grafpad is big enough, and solid enough, to sit quite comfortably on your lap.

## Verdict

The Grafpad is well made but rather expensive. It is certainly not up to the standard required by a design studio, and probably too expensive for the home market. If a school were to consider a product like this, it would probably get better value for money with one of the keyboard-based programs.

**Product** Grafpad **Manufacturer** British Micro, Watford, 0923-48222 **Price** Grafpad: £143.75 inc VAT; CAD software: £20.70 inc VAT **System** BBC Micro (Commodore 64 and Spectrum versions promised)

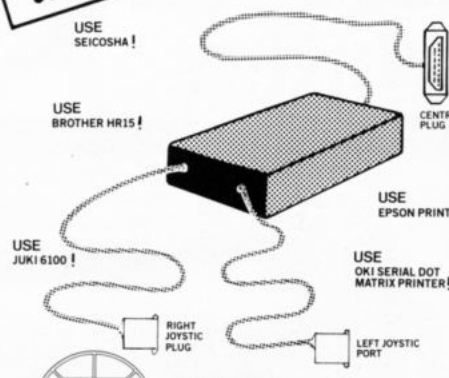


The British Micro Grafpad: affordable screen art?

# ATARI–PRINTERFACE

SPECIAL OFFER!

*For the very low price of* **£49·95**p + p&p




JUST PLUG IN!

If you are an ATARI Micro-user this new printer interface simply plugs into your Micro giving you the choice of purchasing any standard Centronics Printer available on the market.
*(The only other available printer interface is that of ATARI's own manufacture currently available at £130.00).*

**HOW TO ORDER. By Post:**
To purchase the ATARI Printerface simply fill in the coupon, enclosing your cheque/P.O. Please make cheques payable to MAINCOMP LTD and post to the address below; allow 7-14 days for delivery and add 95p for postage & packing.

POST TO: Maincomp Ltd, 1-2 Cambridge Gate, Regents Park, LONDON, NW1 4JN

*Please send me ..... ATARI Printer Interfaces*
*I enclose my cheque/P.O. for £ .....*
Name .....
Address .....
Tel (Day) ..... Tel (Eve) .....
PCN 5/84

Maincomp Limited
*Leisure Industry Specialists*

**MAINCOMP LTD**
1-2 CAMBRIDGE GATE, REGENTS PARK, LONDON, NW1 4JN
**(01) 487 5435**

# Computers by Post

## Cash'n'Carry Now Available at our Croydon Showroom

### All Prices Include VAT

**The UK's Best Printer Prices**

**DAISYWHEEL LETTER QUALITY**

| | |
|---|---|
| Smith Corona TP1 (P or S) | 330.39+VAT= £379.95 |
| Juki 6100 (P) | 339.09+VAT= £389.95 |
| Brother HR1 (P or S) | 539.09+VAT= £619.95 |
| Brother HR15 (P) | 382.57+VAT= £439.95 |

**PRINTER/TYPEWRITERS**

| | |
|---|---|
| Brother EP22 Dot Martix (S) | 139.09+VAT= £159.95 |
| Rematic 20I Daisy Wheel (P) | 347.78+VAT= £399.95 |
| Silver Reed EX44 Daisy Wheel (S) | 399.96+VAT= £459.95 |

**DOT MATRIX PRINTERS**

| | |
|---|---|
| EPSON RX80 (P) | £234.74+VAT= £269.95 |
| EPSON RX80 F T (P) | 269.50+VAT= £309.95 |
| EPSON FX80 (P) | 365.17+VAT= £419.95 |
| EPSON JX80 F T (P) | 399.96+VAT= £459.95 |
| EPSON FX80 F T (P) | 469.52+VAT= £539.95 |
| Seikosha GP80A (P) | 165.17+VAT= £189.95 |
| Seikosha GP80VS (S) | 182.57+VAT= £209.95 |
| Seikosha GP80VC (CBM) | 182.57+VAT= £209.95 |
| Seikosha GP250X (P + S) | 217.35+VAT= £249.95 |
| Seikosha Friction Feed Adaptor | 26.04+VAT= £29.95 |
| Seikosha GP700A colour (P) | 356.48+VAT= £409.95 |
| Star Gemini 10x(P) | 234.74+VAT= £269.95 |
| Star DP515 + 2K Buffer (P) | £260.83+VAT= £299.95 |
| Shinwa CT80 (P) | 243.44+VAT= £279.95 |

We supply a wide range of Cables and Interfaces Phone for Details.

(P)=Parallel-Centronics (S)=Serial RS232

| | | | |
|---|---|---|---|
| **Sinclair Spectrum 48K** inc **FREE**— 2 Arcade games worth £11 **£129.95** | **BBC Model B** inc **FREE**— Killer Gorilla (Program Power) worth £7.95 **£399.95** | **Commodore 64 £189.95** | |
| **VIC-20 Starter Pack Mkll** inc Cassette Deck plus 10 **FREE** Games **£135.95** | **VIC-20 21K Starter Pack Mkll** Plus **FREE** Database Program **£165.95** | **Commodore 1541 Disk Drive** inc **FREE** Software worth £105 **£199.95** | **Epson HX20** with case inc **FREE** Micro Cassette Drive worth £80 £399+VAT= **£458.85** |

| | | | |
|---|---|---|---|
| **Commodore** | | **BBC** | |
| **VIC 16K RAM inc Database** | | Disk Interface Kit | £81.95 |
| **Cassette Program** | £29.95 | Cumana B inc Disk I F | £459.95 |
| **16K/3K Switchable RAM Pack** | £34.95 | Cumana 1x100K Disk Drive | £229.95 |
| VIC-20 5K | £95.95 | Cumana 1x200K Disk Drive | £285.95 |
| C2N Cassette | £44.95 | Cumana 2x100K Disk Drive | £429.95 |
| 1525 Tractor Printer | £215.95 | Cumana 2x200K Disk Drive | £519.95 |
| 1526 Friction tractor Printer | £319.95 | Cumana 2x400K Disk Drive | £675.95 |
| 1520 Colour Printer Plotter | £149.95 | All above Cumana Disk Drives include | |
| 1701 Colour Monitor | £219.95 | Cable, Manual + form, disk | |
| Simons Basic ROM | £44.95 | Microvitec 14" RGB Monitor | £235.95 |
| Easyscript W P Disk | £69.95 | Wordwise W P ROM | £39.95 |
| Petspeed Compiler Disk | £44.95 | Beeb-calcW P ROM | £35.95 |
| **Atari** | | Acorn Electron | **Phone!** |
| 400 16K inc BASIC | £97.95 | **Sinclair** | |
| 800 48K inc BASIC | £269.95 | Spectrum 16K | £94.95 |
| 600XL 16K | £159.95 | Spectrum 48K see box above | |
| **Dragon** | | ZX Printer | £37.95 |
| New Dragon 64 | £219.95 | Kempston Printer I F | £44.95 |
| Dragon 32 | £159.95 | Kempston Joystick I F | £17.95 |
| Disk Drive inc Controller | £259.95 | 16K-48K Upgrade | £24.95 |

Delivery by Securicor-FREE Delivery and Packing. Send off the coupon or order by phone quoting your Access, Barclaycard No. 'Phone 01-681 8785. Immediate despatch on receipt of order or cheque clearance.

**STAR GAMES LTD** 96 North End, Croydon, Surrey. Tel: 01-681 8785

These prices correct until superceeded by next advertisement.
**All the goods in this advertisement are available for EXPORT.**

To: Star Games Ltd., 96 North End, Croydon, Surrey, CRO 1UD

*Please supply*

I enclose my cheque for £
(FREE delivery and packing)
or charge my Access Barclaycard No
Name ..... Signature .....
Address .....

PCN 5-1

This printer has features hitherto only available for well over its £240, says Roger Howorth.

# Less pricey printers



The Walters WM80 is the cheapest printer in its class, at £240. Introduced as a direct competitor for printers like the Epson RX80 and the CTI CP80, the WM80 shows how quickly the price of printers is falling.

## First impressions

The Walters WM80 comes in a plain cardboard box just too large to tuck under your arm. However, the printer itself is compact, measuring 377mm × 295mm by 125mm overall, and is pleasingly designed. It comes with lots of polystyrene packing, a paper feeding rack and even a black carbon ribbon cartridge but, alas, no plug.

There are the usual three lights, signalling Power, Ready and Paper Out, and three push buttons to control On Line, Form Feed and Line Feed. A paper feed roller, Centronics port and an on/off button complete the surface features.

Under the dark tinted perspex cover, the carbon ribbon, print head, and tractor feeds can be seen.

## Setting up

It is simple enough to load paper, and this can be single sheet, including up to triple carbons, or tractor feed. The tractor feed is adjustable to give any width between four and ten inches.

The carbon ribbon is easy to fit, and stays firmly in place. Once the plug is fitted, and the cable plugged into the Centronics port the printer is ready for use. This assumes that your computer or interface provides the necessary software. You should check whether operating software is available before buying.

For this review, a ZX Spectrum and the ZX Lprint interface were used successfully, and after only an hour, screen dumps were produced.

## Documentation

Although the printer is sold by Walters, which sounds English, the documentation seems to be the result of a bad translation, *eg*: 'Carefully lift front of printer unit and make it stands as the bottom of case be vartically face to you and hold the unit by the one of your hand on the soft surface'.

If you're familiar with hardware, you could make some sense of the 48-page booklet, but newcomers will probably be bemused and spend an inordinate amount of time altering the print format. Parts of the manual are well done, but certain chapters turn English inside out and programming examples use only a Basic interpreter and include no conversion hints.

## Features

The WM80 boasts many features that have only been available up to now on much more expensive printers. There are 228 ASCII characters in the character set, and these have true descenders. The printer runs at 80cps, and facilities include both double-width and compressed print, and a combination of the two. Superscripts and subscripts are printable, and seven international character sets can be selected using internal dip switches. Graphics dumps can also be obtained.

## In use

The print quality is good, and the characters themselves are well formed, with the possible exception of the 'g' which is printed too high on the line for my liking. The graphics dumps are particularly good for a printer in this price range.

The speed advertised is slightly ambiguous, since it can print at 80cps, but it takes another second to feed a blank line through, bringing the average speed down to 40cps. This might, however, be of only minor concern in a printer of this price.

Opening the printer to change the dip switch settings is a simple task, as long as you follow the pictorial guide in the manual. In this section, the manual's words are particularly difficult to understand, but the pictures tell the story. The dip switches are easy to change, and can be moved with fingernail or screwdriver. The optional settings for these are clearly laid out in an appendix to the manual.

The printer appears to be quite sturdy, and has the feel of one much more expensive. It is relatively quiet, and works at about the same volume as an Epson, *ie* quieter than a same-price Seikosha.

One problem is occasional paper jams. To remove the jammed paper it is necessary to remove the carbon ribbon cartridge, and unscrew the metal guard running across the top of the carriage. Fortunately, paper doesn't seem to jam often.

Walters offers the standard 90-day guarantee, and also promises to do warranty work at the factory. A spokesman said that this work is normally done within 48 hours of receipt of a faulty machine.

## Verdict

At this price, the printer seems almost unbeatable, even though closer inspection reveals some disadvantages in particular the quality of the manual. This lets down the whole product, and after five days of effort neither subscript nor italic printing had been coaxed out of it.

I'm sure it's possible, but the whole operation should take only minutes.

Although you may not want to do all your correspondence on it, the Walters is well worth considering for most general purpose uses.

**Product** Walters WM80 **Manufacturer** Walters Microsystems International Ltd, High Wycombe, (0494) 32751 **Price** £240.35 inc VAT and delivery **Interfaces** Centronics, RS232 optional **Outlets** Mail order or dealers.

MOGUL

# THE HOTWARE PEOPLE




**METAMORPHOSIS**

You stumbled into the nest of the **Cyglorx** and find yourself fighting off robot tanks guarding the **Cyglorx eggs.** You think you have everything under control and then the eggs start **hatching.** Commodore 64 version features 4 different screens.

VIC 20 – COMMODORE 64
**£7.95**

**CREATOR'S REVENGE**

The **creator** assembled a massive army of **robots** and **insects** to take revenge on the earth. Destroy insects, get treasures, and get the **neutron bomb deactivator.** Battle robots and **destroy** the neutron bomb before it annihilates your city. Miss and you must face **the mutants.** Features 4 different screens.

COMMODORE 64
**£7.95**

OTHER GAMES AVAILABLE




MOGUL COMMUNICATIONS LIMITED
90 Regent Street, London W1R 5PT Telephone 01-437 3156/7

# COLOURJET

## 7 COLOUR INK JET PRINTER

Logic seeking in dot address mode

**£499** + VAT

With Centronics parallel interface and free BBC Micro dump listing.

*Options available:*

- Buffered RS232 interface.
- Viewdata & RS232 interface.
- Apple II interface.
- IBM PC dump.




from BBC Micro screen – ½ size mode

*Specifications:*

640 dots/line.

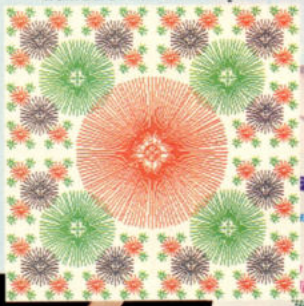
84 dots/inch both axes.

Friction feed rollpaper with single sheet feed A4.

37cps in full colour.

Ink cartridges, 4 million character life.

Virtually silent









# INTEGREX LTD.

Church Gresley, Burton-on-Trent, Staffs DE11 9PT
Tel: 0283 215432 Telex: 377106

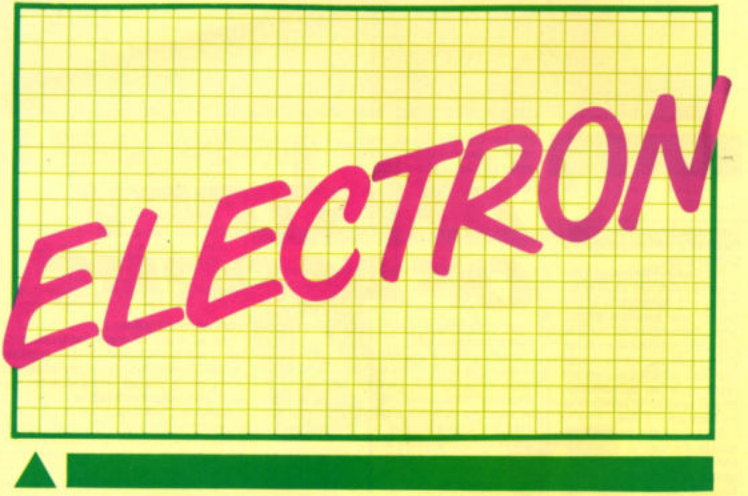
Dealers, OEM & Educational enquiries welcome

# PCN micropaedia

Vol 15 Part 1

PULL OUT AND KEEP

Looking at the




- // Acorn history
- ● Keyword corner
- Inside the machine




Although it bears a passing similarity to Acorn's BBC Micro and Atom machines (see pictures at right), the Electron breaks new ground for Acorn with its size, the inclusion of Basic keywords on shifted keys and a price of £200.

# A HISTORY OF ACORNS

Over the next three weeks, *PCN*'s Micropaedia will take you into the Electron-ic age.

This week we'll take an overview of the hardware with a look at the history and development of the Electron (see elsewhere on this page), the inside of the machine with labels explaining where all the bits of the Electron are and exactly what each of them does, and the beginning of an alphabetically-ordered selection of keywords in the Electron's BBC Basic.

The second week features software for the machine, with a look first at Electron games (and conversion of BBC games to run on the Electron), then a discussion of business software and applications for the Electron — including spreadsheets and word-processing, and finally the second part of our look at a selection of Electron keywords.

The final week of the Electron Micropaedia will focus on peripherals (or add-ons) for the Electron. Although such peripherals are currently few and far betweeen, we'll look at what is and will be available — including printer interfaces, attachments for ROM software and plug-ins for joysticks.

The history of the Acorn Electron resembles that of any youngest child.

Like any baby in a family of three, the Electron is expected to do much the same as its older siblings, the BBC Micro and the Acorn Atom. Its shortfalls (*ie* the lack of a Teletext mode and a lot of standard built-in expansion interfaces) are probably overshadowed by the enthusiasm accompanying any new birth.

The Electron's creation could, in fact, be likened to be the birth of an African elephant, as they appear to both have about the same gestation period. Acorn announced the Electron in the wake of Sinclair's 1982 launch of the ZX Spectrum colour computer, but the machine didn't emerge until Summer 1983.

It was well worth the wait. It has the benefit of much of the technology incorporated in Acorn's now-famous BBC Micro, but at less cost: no history of the Electron would be complete without a look at its BBC Micro heritage.

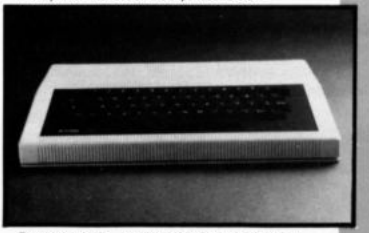
Acorn Computers was founded by Chris Curry and Herman Hauser in 1978 and didn't produce its first microcomputer until 1979 when they introduced the Acorn Atom. The Atom was a modest micro by modern standards with between 2 and 12K of RAM, a 6502-based processor and an idiosyncratic (but quick) implementation of Basic.

The Atom did, however, sell for under £200, use a full-travel keyboard and promise the capability to run a low-cost local area networking facility called 'Econet'. Chris Curry's career in computers began in 1966 as a development engineer for Clive Sinclair's Radionics concern, for whom he designed the Executive Calculator in 1971. The calculator was small enough to run off a normal hearing aid and marked a breakthrough in size.

This tiny number-cruncher fitted in with the Sinclair style of product miniaturization. Curry stayed with Radionics till 1976 when he and Sinclair set up Science of Cambridge to sell component kits for computers and wristwatch calculators. The computer kit, dubbed the MK 14-Microprocessor Kit, had 14 chips and used a ZX81-type membrane keyboard, but it required the user to program entirely in machine code.

The kit uncovered a large number of would-be programmers wanting to know more about the machine than Curry had time to explain. He hired Cambridge University Ph.D student Herman Hauser to help cope. The result of Hauser's research into the needs of home computer users and Curry's own desire to develop a home computer around Basic was the Cambridge

The Atom (below) was introduced in 1980 and for £174 offered between 2 and 12K of RAM, ROM-based software and a printer interface on the expanded version.



Processor Unit — which later became Acorn, and shortly afterwards the Atom was born.

Acorn is an enterprising company, and was soon hard at work on a new prototype computer — the Proton. This was around the time the British Broadcasting Corporation was searching fairly desperately for a benchtest micro for its then-upcoming 'Making the Most of the Micro' TV show.

Curry and Hauser were quite sure their new machine could fit the bill and began making moves to turn it into the BBC Micro. The Proton was to have been a twin-processor replacement for the Atom, but the opportunity of the BBC contract and a feeling that the Proton had perhaps more commercial posibilities than Acorn had originally thought, led to the design of The Tube — an interface that would allow the second processor to be built as a stand-alone add-on. By February 1981, the BBC was sold on the Proton and they signed an agreement with Acorn.

In March, the BBC began circulating pictures of a prototype BBC machine along with its other literature about the Computer Literacy Project.

In December, the long-awaited BBC Micro was finally launched and received high praise from even the sterner critics.

Some six months later, Clive Sinclair cracked the £200 barrier with his ZX Spectrum colour computer and Acorn, feeling truly challenged to bring in a new low-cost colour computer of their own, promptly announced the Electron was 'coming soon.'

'Soon' turned out to be about 18 months — which, by the standards of any other industry is a very quick product development time — but in the computer industry it is an aeon.

Once again, it was worth the wait. A small machine with 32K of RAM, good colour and sound and an ability to run most BBC Micro programs.

Others were soon echoing this sentiment as the Electron continued to receive rave after rave review — establishing it as one of the most popular under-£200 colour computers in the UK.

Max Phillips, reviewing the machine in *PCN* (Issue 25) said 'Acorn has an undoubted winner. The Electron isn't quite as simple as a half-priced BBC, but it does bring you amazing graphics and one of the fastest and most capable Basics in the business. It's easy to use and easy to learn.'



The BBC Micro (above) was introduced in early 1982 to a torrent of rave reviews. It has been widely taken up by schools and was the star of the BBC's Computer Programme.

Geof Wheelwright, writing in the same issue, said 'In short, the Electron has as much (if not more) in common with the phased out Atom as it does with the BBC . . . Some of the facilities now on offer for the Electron and BBC were first tried on the Electron . . . The prices of the two machines are similar, they use the same processors, have the same (type of) keyboards and offer much the same standard facilities.'

But like the Atom and BBC, the Electron will not realize its full potential until a good supply of software and peripherals is available. On the software side, the Electron is in pretty good shape as it can use much of the vast supply of BBC Micro software already on the market. (Its only great limitation is that it doesn't support the Mode 7 Teletext mode, but it shouldn't take much for software companies to modify Mode 7 — based programs for the Electron).

Peripherals are a slightly different story as Acorn has traditionally been slow to bring out add-ons for their own machines. The company has promised expansions for plug-in cartridge software, a printer interface, joystick interface, Teletext display adaptor and disk drives — but at the time of writing none of those add-ons were looming on the horizon.

The good news is that third-party peripheral development companies are racing to fill the 'Acorn gap' with their own Electron add-ons. The most popular extras seem to be printer and joystick interfaces and ROM boards that allow you to use BBC Micro ROM software.

The next two issues take an in-depth look at this machine with a discussion of applications for the Electron (and some of the software available) and a look at peripherals the next week.

In the rest of this week's issue, you'll find a detailed look inside the Electron in the centre pages and an examination of the Electron's BBC Basic in the last three pages.

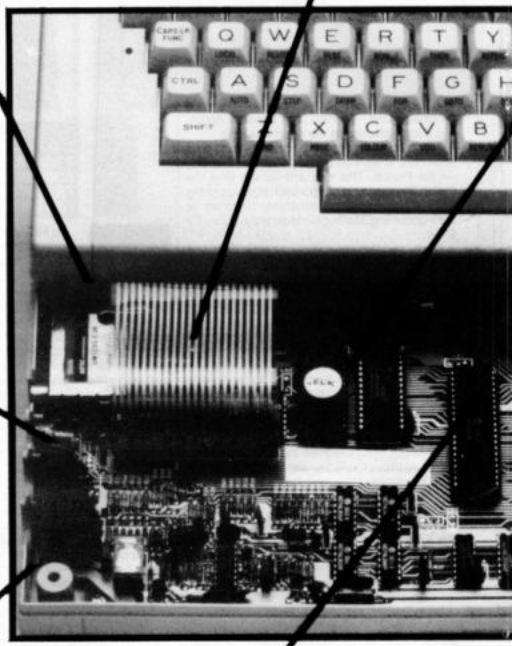


The photo above features Acorn's first release: co-managing director Chris Curry — who founded the company with Herman Hauser in the dark days when less than a million people had computers in their homes. The Electron isn't just a case of third-time lucky for Acorn — but third time lucky . . . Again.

Mr Curry is now making plans for Acorn's next machine — a business micro planned for later this year.

The UHF modulator — converts the Electron's video signal into something that can be understood by a television set. Just plug the machine into the UHF socket on the Electron at one end and into the aerial socket of your TV on the other end.

The speaker — The Electron speaker is positioned at the back of the machine, facing away from you. Unlike some computers — which have the speaker facing down and therefore muffling the sound — the Electron produces sound clearly and distinctly.



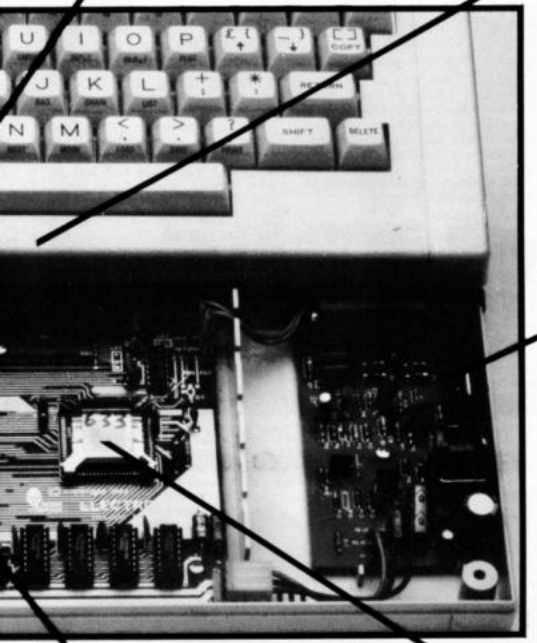

The Composite Video socket — allows you to plug the Electron directly into a professional video monitor. The signal output from this socket is in only black and white, but it can produce quite high resolution even in the 80-column mode when used with a good 'green screen' monitor.

The RGB video monitor socket gives you the opportunity of running the Electron with a professional high-resolution Red-Green-Blue monitor. Direct connection to an RGB monitor also eliminates the need to fiddle with tuning of colour and TV signals.

The 6502 processor — The heart of the Electron, this processor is the same as the one used on the BBC Micro, the Apple II computer and the Atari range of computers. The 6502, along with the Z-80, is the most popular of processors for home computers — so there should be no problem with people writing software for the machine.

The Machine Operating System and Basic chip — in early models of the Electron, the operating system and Basic language are on two different chips. In later models, however, Acorn has promised to put both functions on the same chip.

The edge connector — The Electron has bowed to current micro design conventions and included an 'edged connector' for expansion purposes at the back of the Electron. This edge connector will be the joining up-point for interfaces to run printers, disk drives, joysticks and other peripherals.




The power circuitry — To make it lighter than machines like the BBC — which use internal power supplies — the Electron uses an external power supply which transforms the mains 220 volts to 19 volts. The power is 'stepped down' again to 18 volts at the expansion port and +5, −5 and 0 volt lines to the Printed Circuit Board.

32K RAM — The Electron has the same memory size as its larger and more expensive sibling, the BBC Micro — but it uses far fewer chips to accomplish that task. Only four 64K bit RAM chips comprise the 32K.

The Uncommitted Logis Array — Probably the biggest custom chip you're likely to see in a home micro this year. This 64-pin chip does a lot of the legwork done by a combination of several chips on the BBC Micro. In addition to all the regular duties of the ULA, the Electron's custom chip has to handle all the different Modes in the Electron's display.

# A DICTIONARY OF BBC BASIC

**The Electron's BBC Basic programming language is largely made up of 'keywords' or instructions that ask the computer to carry out various tasks. Just looking at the first few keywords in the Electron's BBC Basic will give you an idea of what the machine is capable of. Below are some of those keywords and some explanantions which show you how to get the most from them, and build on what you might already know.**



ABS — Absolute value — This function ensures that a positive numeric value is always returned for a numeric variable. In simple English, that means that if you're using an equation which might at some point return an unwanted negative value, you can always ensure the value is positive.

In the example below, the ABS function is used to turn the Electron into a small musical instrument.

```
5 Q=INKEY (32767)
20 X=Q-100
30 SOUND 1,-15,ABS (X),5
40 GOTO 5
```

In Line 5, the program sets a value that tells you how long the computer should wait for you to press a key before making sure it moves on to the next line.

In Line 20, the program defines a variable X in relation to the key you hit on the Electron (as defined by Q).

Line 30 is in charge of making the sound — with the ABS statement ensuring that the number representing the pitch is positive.

LINE 40 moves back to the beginning of the program to get a new note.



ADVAL — Analogue to Digital value — Although this command can do a good deal more on the BBC Micro than the Electron because the Electron doesn't come standard with an Analogue to Digital converter, it's still worth knowing about.

The ADVAL command on the Electron is largely concerned with the amount of memory space in the buffers set aside for SOUND functions. There are four SOUND channels on the Electron and they correspond to the four buffers on the Electron.

The sound buffers in ADVAL are numbered in the negative, starting at -5 for channel 0 and moving up to -8 for channel 3. The syntax is X=ADVAL (a number between -5 and -8 goes here).

Using this command in a program would look something like this:

```
5 Q=INKEY (32767)
20 X=Q-100
30 SOUND 1,-15,ABS(X),5
35 X=ADVAL (-6):PRINT X
40 GOTO 5
```

Note this looks almost identical to our first music demonstration program. By adding Line 35 to the program, you get something telling you how quickly the data (notes) are entered on the keyboard.

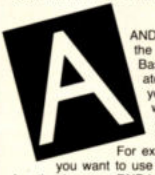
The faster you press the keys, the lower the number on the screen — data that's put in too quickly for the computer to handle goes into the buffer and the number



**The keyword sequence IF . . AND . . THEN allows you to test for the simultaneous occurrence of two conditions. Using the keywords in a statement such as: IF X=1 AND Y=10 THEN PRINT 'correct' the program would print the word 'correct' if, and only if, the variable X holds a value of 1 *and* the variable Y holds a value of 10. If X=1 and y=7 the programe would proceed to the next instruction and ignore the words after THEN. Similarly, if X=3 and y=10 the program would also 'drop through' and print the ignore the PRINT 'correct' instruction. Only if both conditions are held to be true will the program proceed.**

# IF..... AND..... THEN.....

represented by ADVAL is the amount of room still left in that buffer.



AND — This is one of the most powerful Basic 'logical operators' that allows you to test whether or not certain conditions are true. For example, perhaps you want to use a Randomizing function (more on RND later) to generate values for Colour in Mode 4, but realise there are only 16 'colours' available in that mode, and you have to make sure the value of the appropriate number is not less than 0 or greater than 16.

To make sure that condition is tested, you might use the AND statement like this:

```
40 IF C>0 AND C<16 THEN COLOUR C
ELSE GOTO 40
```

To put that to an even greater test, look at the following listing:

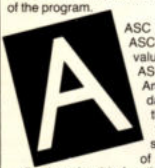
```
10 MODE 2:C=INT (RND(18))
20 S=INT(RND(255))
30 IF C>16 AND S< THEN GOTO 10
40 SOUND 1,-1,S,12
50 COLOUR C
60 IF C>10 THEN PRINT
   TAB(C-10,C);"COLOUR    ";C:GOTO
80
70 PRINT TAB(C,C);"COLOUR ";C
80 FOR N=1 TO 1000;NEXT N:CLS:GO-
TO 10
```

In Lines 10 and 20 the program defines two variables that generate integer values; those variables are called C and S. The third line uses the AND statement to test that C (the variable for Colour) is less than 16, and that S (the variable for pitch in the SOUND statement) is less than 0.

Lines 40 and 50 actually carry out the job of making a sound and defining a colour.

In Lines 60 and 70, the program tests to make sure that the word "Colour" is going to be printed in the right place on screen and go about the business of printing it.

And finally, in Line 80, there's a delay FOR . . . NEXT loop to make sure that our image stays on-screen long enough to be seen before it loops back to the beginning of the program.



ASC — Gives the ASCII character value of a string. ASC stands for American Standard Code and the II denotes that it's the second version of the standard.

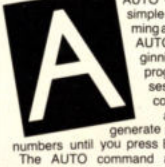
One use for this function is to get the Electron's keyboard to generate unique numeric values for each key. In the music example given in the discussion of ABS, you could easily have used the ASC function to generate music. Look at the program below:

```
 5 INPUT A$:Q=ASC(A$)
20 X=Q-100
30 SOUND 1,-15,ABS(X),5
35 X=ADVAL(-6):PRINT X
40 GOTO 5
```

The program combines some of what you've learnt already about ADVAL with the music program example used to explain ABS. In this case, however, focus your attention on Line 5.

Here the INPUT function is used to set a value for the string variable A$, and then use good old ASC to figure out what the ASCII value of the A$ variable is.

To set the value using INPUT, you have to hit the RETURN key once you've put in your character string or 'note'. Once you've done that, ASC will do the work of figuring out the ASCII value. When that value has been set, the numeric variable Q runs through and puts itself into the SOUND statement again.



AUTO — This is a simple programming aid. If you type AUTO at the beginning of every programming session, the command will automatically generate program line numbers until you press ESCAPE key.

The AUTO command automatically increases the line numbers by 10 after each RETURN starting at Line 10, unless you specify otherwise. For example, the statement:

```
AUTO 100, 8
```

will increase the line number by 8 each time you hit RETURN, and will start the program at Line 100.

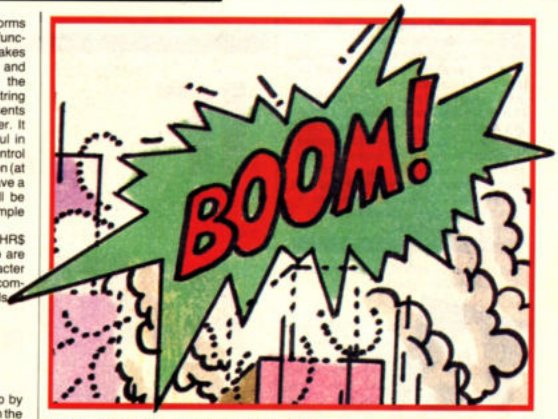
CHR$ — Performs the opposite function to ASC. It takes a number and generates the character string that represents that number. It can be very helpful in complex tasks like sending control codes to printers, but since the Electron (at least at the time of writing) doesn't have a printer interface, this discussion will be confined to the command's more simple applications.

In the example program the CHR$ command and a FOR. . .NEXT loop are used to print the Electron's full character set on-screen. (A character set is composed of the letters and symbols computer is capable of spitting out).

```
10 FOR X=32 TO 126
20 PRINT CHR$(X);
30 NEXT X
40 PRINT CHR$(27)
```

Line 10 starts the FOR. . .NEXT loop by identifying that you are concerned with the value of X between 32 and 126. Line 20 uses CHR$ to PRINT out the ASCII value of X.

Line 30 gets the next value for X, and Line 40 uses the known CHR$ value of 27 as the carriage return character in order to bring the cursor back to the left-hand side of the screen once the program has run.




CLG and CLS — both these functions clear screens. CLG clears the graphics screen with current graphics background while CLS fills the text screen with the current background colour. The example program below allows you to try both commands and see the difference between them for yourself. It draws a rectangle and then moves the rectangle across the screen, either by slowing drawing and undrawing the rectangle in new places on the screen (in the case of CLG) or by simply flashing the rectangle on and off and advancing the position of the rectangle each time it moves.

To try the CLS function, simply exchange the CLG at Line 70 in the following listing for a CLS.

```
 5 MODE 4
10 FOR X=1 TO 10
20 MOVE X*100,100
30 PLOT1,100,0
40 PLOT1,0,700
50 PLOT1,-100,0
60 PLOT1,0,-700
70 CLG
80 NEXT X
90 GOTO 5
```

COLOUR — One of the primary methods of getting colours up on the screen. The listing seen below is a modified version of the one used to show how the CLEAR function works. But to give you a better idea of what the Electron's range of colours are, the CLS statements are omitted at Lines 80 and 180.

```
  5 MODE 2:FOR X= 1 TO 10
 10 C=INT (RND(18))
 20 S=INT (RND(255))
 30 IF C>16 AND S<0 THEN GOTO 10
 40 SOUND 1,-1,S,12
 50 COLOUR C
 60 IF C>10 THEN PRINT
TAB(C-10,C);"COLOUR ";C:GOTO 80
 70 PRINT TAB(C,C);"COLOUR ";C
 80 FOR N=1 TO 1000:NEXT N
 90 NEXT X
100 CLEAR
105 FOR X= 1 TO 10
110 C=INT (RND(12))
120 S=INT (RND(235))
130 IF C>16 AND S<0 THEN GOTO 10
140 SOUND 1,-1,S,12
150 COLOUR C
160 IF C>10 THEN PRINT TAB
(C-10,C);"COLOUR ";C:GOTO 80
170 PRINT TAB(C,C);"COLOUR ";C
180 FOR N=1 TO 1000:NEXT N
190 NEXT X
```

A complete summary of what the available colours are in any screen mode is given on Page 141 of the User Guide — for both foreground and background colour (a background colour is always represented by a logical number exactly 128 more than its corresponding foreground colour).

**Micropaedia Editor:** Geof Wheelwright.
**Design:** Nigel Wingrove.
**Credits:** Some portions of this Micropaedia are extracted from a forthcoming PAN/PCN book on the Electron.

## NEXT WEEK

**A look at software for the Electron with a focus on word-processing, spreadsheets and graphics — as well as our continuing sample of Electron Basic keywords.**

**And in two week's time, we'll turn out attention to electron peripheals and finish up our look at keywords.**




• **WHEELIE** (48K Spectrum)
As proud owner of the ultimate racing motorbike, you find yourself in a strange world — a world full of double-decker buses to leap and where even the hedgehogs are out to get you! Your only hope of escape is to find the elusive ghostrider and then beat him in a life-or-death race.
100% machine-code action, keyboard and joystick options, demonstration-mode, and amazing graphics combine to make WHEELIE one of THE games for 1984. . . .only **£5.95**

• **THE TRAIN GAME** (16/48K Spectrum)
The game that starts where model railways left off. Full graphics featuring passenger, goods & express trains; tunnels; stations; turntable bonus games; irate passengers; collisions derailments; and everything else you'd expect from a major railway! Just **£5.95**

*" . . . . an excellent game which is original, well thought-out and full of action"* (S. User Nov 83)

*"Fun, fun, fun to play . . .* (Home Computing Weekly 27/9/83)

**OMNICALC** (48K Spectrum)
The best Spectrum spreadsheet you can buy. Written in machine code, to be faster, to give you more space for data, and to include more features, it is guaranteed uncrashable. Complete with comprehensive manual **£9.95**

*"If more programs shared the quality of OMNICALC then we might see more Spectrums in offices"*
(Home Computing Weekly 3/6/83)

**EVOLUTION** (48K Spectrum)
Meet Tyrannosaurus Rex, Podopteryx, Brontosaurus and many more fascinating creatures on the journey from the start of life to man. See 3500 million years of evolution compressed into half an hour **£6.95**

**CBM 64 and BBC owners — WHEELIE and THE TRAIN GAME will soon be ready for your micros.**

Items marked * are available from selected branches of Boots

Available at good computer shops everywhere, or by mail order from MICROSPHERE, 72, Rosebery Road, London N10 2LA (Tel: 01-883 9411)

Colin Cohen taps out his copy for *PCN* faster than ever before, thanks to VuType.

# Learn to type right



Jan Marshall

There are good programs and bad programs. The good programs can be further divided into good programs and good programs. I shall explain. Many of the good commercial (non-games) programs reviewed in these pages are perfectly competent and no doubt are well structured and use the computer's facilities to their full. However, if they had never been produced, computer owners would not be noticeably worse off. I know this all too well as I've had a BBC micro from the days when even the Welcome cassette seemed magic, and anything that came on the market was welcome.

In the rush to fill the gap there has been a deluge of software and much of it has been clever stuff. Even if the program was not especially useful there was no complaint as long as it did whatever it did adequately.

The computer manufacturers and conventional publishers have felt a desire to get in on the software act because others were — but they often lacked the inspiration needed when it came to the basic ideas.

If ever there was an exception to this rule it is Vu-Type from the BBC. It is a typing tutor produced in conjunction with Pitman Books — which should know all about it. Vu-Type seems an absolutely first class program — both in terms of content and implementation.

## Documentation

Of course, in common with all the 'big name' software it is over-packaged, but it includes one of the best pieces of documentation I have yet seen. Its 50 A5 pages have to fulfil several different functions: instructions for LOADing and RUNning the program, very full instructions for its use which are intended to be understood by users who know nothing of computers whose only interest is learning to type. Finally, there are eight pages devoted to typing principles.

If there are any criticisms of the documentation it is that the section on hand and body positioning should come earlier — an explanation of what touch typing is all about should probably come before the LOADing instructions.

There are remarkably few ambiguities and only one minor error that I found — the program is also largely self documenting. There is space in the manual for cataloguing the program and your results.

## Setting up

The program loaded first time (side B is blank) and took its time as the intro is &1C blocks and the main program which it loads is another &3C blocks. This is followed by 23 Pitman exercises. Even the screen displays are reassuringly given in the documentation.

During the loading you are asked whether you have motor control, a colour monitor and your operating system version. Part of the complexity of the program is that so much of it can be changed by the user. Almost anything can be redefined: you can alter all the colours in the display and even the graphics mode used, though the colours chosen are probably as good as any, but it's fun to experiment and worth choosing all the variables *before* you get stuck into the training.

You may find, if you choose four-colour graphics, that you will type ahead of the display. You can also decide which sound each key will make or whether to have them silent.

On the display the 'target' key is highlighted, but you can also choose to make the key you hit flash. This is particularly useful at the start as you are meant to look at the screen rather than the keyboard and this feature tells you straight away if you miss the target. Having the keys with sound was a help as my machine has had a bug on the space bar for as long as I can remember. The function keys are fully used — with different functions depending on the menu in use.

It was a little irritating that having chosen from a sub-menu you have to go back to the main menu before starting to type.

After loading, you are instructed to turn off the recorder (this is not an error, it's just that you are unlikely to need it for a long time). The subsequent display is divided into a map of the keyboard (you can delete the keytop lettering) over which there is a text window for the display of exercises. These can be generated by the main program, or you can use the menu to load one of the Pitman exercises which vary from simple words to freestyle text. The 'copy' scrolls across the screen from left to right.

The exercises start with simple letter combinations — such as F and J which come directly under the first-finger home keys.

As you go on you can get reports on your progress, initially a percentage accuracy with a word of criticism or encouragement and, later on, full reports. This goes as far as recording the number of strikes on each key, and your performance on every key used.

The program distinguishes between caps and lower case — so you'll need to keep a careful watch on the caps/shift lock settings.

## Verdict

In its initial stages I've found Vu-Type very easy to use. I once went on a course for several weeks and it simply didn't 'take'. As a journalist using the advanced search-and-peck technique with two fingers at 25 wpm, I can't wait to see if it will change my bad habits as much as I believe it will. The program costs £16.10 which must compare very favourably to any commercial course available.

**Name** Vu-Type **Application** Extended Typing Tutor **Price** £16.10 **Publisher** BBC Publications Ltd. (01-580 5577) **Language** Basic **Other versions** None **Format** Cassette **Outlets** Retail.

# WHY YOU SHOULD HAVE 2 NEW BOOKS FOR YOUR BBC MICRO ...




## 60 PROGRAMS - £5.95

**(LESS THAN THE PRICE OF A SINGLE CASSETTE!)**

**A massive software library** for the price of a single cassette. Explosive games, dynamic graphics and invaluable utilities, this specially commissioned collection takes BASIC to the limits and beyond.

**The most successful software writers** have pooled their talents to bury programming cliches and exploit your micro's potential to the full.

## INSTANT ARCADE GAMES - £3.95

**(INSTANT INVADERS – INSTANT LASERS – INSTANT SPACESHIPS – INSTANT GAMES – INSTANT BASIC!)**

**With little or no knowledge** of BASIC, you can still take a suite of 'skeleton' programs and create your own arsenal of dynamic and totally unique arcade games.

**... AND WHERE YOU CAN GET THEM**

From all good bookshops. Or fill in the coupon below and return it to Pan Books Ltd., Freepost, P.O. Box 109, 14-26 Baker St., High Wycombe, Bucks HP11 2TD

**For immediate 24 hour service** 'phone 01-200 0200 and use your credit card.

*POST NOW. NO STAMP NEEDED* To: Pan Books Ltd., Freepost, P.O. Box 109, 14-26 Baker Street, High Wycombe, Bucks HP11 2TD

YES. Please send me the following 60 PROGRAMS and/or INSTANT ARCADE GAMES at the price shown plus 35p for the first book ordered plus 15p for each additional book to a maximum charge of £1.25 to cover postage and packing.

☐ 60 PROGRAMS (£5.95) ☐ INSTANT ARCADE GAMES (£3.95)

Name (Mr/Mrs/Miss/Ms) _____

Address _____ Post Code _____

I enclose my cheque/postal order for £_____ payable to Pan Books Ltd or debit my Access/Visa card no.

Signature _____

Pan

PERSONAL COMPUTER NEWS

Allow up to 15 days for delivery. This offer available within UK only. Pan Books Ltd. Reg. in England. No. 389959. PCN:2



# NewBrain

## Buy from the NewBrain Specialists

**NewBrain AD. A professional micro for the price of a hobby machine.**
**EXPANDED NEWBRAIN SYSTEMS (C/PM etc) PLEASE CALL FOR PRICES**
**Printers** Epson FX80, RX80, RX80 F/T, Shinwa CP80, Juki Star Delta 10 etc. Also the new PT-5001 from KDC. From £239 + VAT.
**Recorder** Sanyo DR 101
**Monitors** Sanyo and Teco.

"The NewBrain Dissected" by John Bragg £8.50 + 50p p&p (UK)
Programme tape £9.95. Book & Tape £16.45 (post free in UK)
"Getting More from your NewBrain" by Andrew Pepper and Michelle Clark. £7.50 (post free in UK)
**NEWBRAIN OWNERS CAN'T AFFORD TO MISS THESE USEFUL BOOKS!**
**SOFTWARE TECHNICAL MANUAL** £30 + £2 p&p (UK)
Most callers now in stock

## NewBrain Software Selection

| | |
|---|---|
| **RUFAL** (W) Super new adventure | £9.95 |
| **BRAINZAP ASSEMBLER** (W) An interactive assembler/editor. | £9.95 |
| **CHESS** (G) Available once again. A really super version. | £14.95 |
| **DARK KNIGHT** (W) Graphics adventure game with many levels. | £8.00 |
| **MONITOR** (W) The memory manager. Examine, fill, alter, move, dump, save, etc. | £8.00 |
| **MAZE RUNNER** (W) 3 maze chases in one game. | £8.00 |
| **DISASSEMBLER** (W) Unravel the secrets of the NewBrain's ROM. | £9.95 |
| **DATABASE** (G) Includes sort and search on any field. | £19.95 |
| **NEWBAS** (B) Powerful machine code assembler. | £46.00 + £2 |
| **LIFE SEARCH** (W) (Adventure) Can take two lifetimes to solve! | £9.95 |
| **BRAINTEXT** (W) An easy-to-use and very practical W.P. | £12.00 |
| **STAR TREK** (W) Rid the Galaxy of the Klingon menace | £9.00 |
| **BRAIN CHASE** (W) Two new fast-action | £9.00 |
| **NEWSBRAIN INVADERS** (W) arcade games. | each |
| **SeTEXT** Powerful new command-driven w.p. | £33.00 |
| **SeTEXT** Disk version | £43.00 |
| **BRAIN BOX** Data base with powerful search facilities. | £20.00 |
| **WHOLE GOLF** (W) Random holes. Fairways plus 3-D putting. | £7.00 |
| **ACCOUNTING SOFTWARE** — Please ask for details. | |

Software suppliers: B – Brainwave, G – Gemini, W – Wolsoc Computers, C – Comix-Micro, Gr – Grundy

***Please write/phone for full lists of NewBrain hardware and software etc.***

**AUTHORS — DO YOU HAVE A PROGRAM WE MIGHT SELL?**

**MAIL ORDER** — Free delivery UK for orders over £5. Callers by prior appointment only, please. **To obtain your NewBrain etc., ring us on Stevenage (0438) 812439 (Access welcome) or send cheque/PO Access number to:**

## ANGELA ENTERPRISES

**4 Ninnings Lane, Rabley Heath, Welwyn, Herts AL6 9TD. Tel: Stevenage (0438) 812439**

Member



# cable software

## URGENTLY REQUIRE

Original Machine Code Games for the following micro's

**COMMODORE 64**
**ZX SPECTRUM**
**ORIC**
**VIC 20**
**DRAGON**
**BBC & ACORN ELECTRON**

*Write in confidence to the*
**Software Development Director, Cable Software Ltd., Cape House, 52 Limbury Rd., Luton, Beds. or Telephone 0582 591493**

# SUPA CATCHA TROOPA

NEW FOR THE COMMODORE 64 ONLY £7.50 EACH

# GOLF





**SUPA CATCHA TROOPA**
Be astounded by the superb hi-res graphics, the six levels of play and amazing sounds. Destined to be one of the most sought after games this Christmas.

**GOLF**
We created it for the Spectrum, now also available for the 64. An extremely realistic challenging and fun experience. The authentic computer golf, addictive whether or not you play the outdoor game.

Call in at your local stockist or contact us now for these and the rest of our range on the Vic-20, Commodore 64, Spectrum and Dragon.

Abrasco Ltd., The Grange Barn, Pikes End, Eastcote, Middx. HA5 2EX.
Tel. 01-866 2518.

**ABRASCO**
*a touch of magic*

# MICROTANIC COMPUTER SYSTEMS LTD.

## MICROTAN 65 *NO OTHER COMPUTER IS AS PERSONAL!*

For less than £60 you can start building your own Computer that truly suits your needs and, of course, eventually far more superior to any Computer available off-the-shelf.

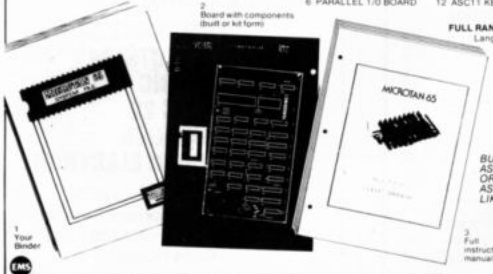
MICROTAN 65 comes in kit form, complete with manual, full instructions, board with components, (kit form or fully built) our full back-up service, and your own Microtan World Magazine available on subscription.

**FLEXIBLE & EXPANDABLE SYSTEM — 1K to 256K!**
*Just look at the options:*

1 DISK CONTROLLER
2 REAL TIME CLOCK
3 EPROM PROG. CARD
4 SOUND BOARD
5 SERIAL 1/0 BOARD
6 PARALLEL 1/0 BOARD
7 MASS EPROM STORAGE BOARD
8 INDUSTRIAL CONTROLLER BOARD
9 40K RAM BOARD
10 HIGH RES. GRAPHICS 256x256
11 PRINTER FACE BOARD
12 ASC11 KEYBOARD




Microtan World Magazine




1 Your Binder
2 Board with components (built or kit form)
3 Full instructions manual

**FULL RANGE OF SOFTWARE**
Languages available: Machine Code, Assembly, Basic, Forth, and Pilot

**HOW TO ORDER:**
Enter details in the coupon below, enclosing your cheque made payable to: Microtanic Computer Systems Ltd. Prices include VAT add £1.50 p&p. Please allow 14 days for delivery.

*BUILD AS FAST OR SLOW AS YOU LIKE!*

Post to:
MICROTANIC COMPUTER SYSTEMS LTD
16 UPLAND RD. LONDON SE22
Tel No. 01-693 1137

*Please rush me my starter kit:*
*(Please tick)*

☐ kit form — I will build myself £59.95
☐ Fully Built £69.95
☐ Complete system wall chart

*I enclose my cheque/P.O. for £*

Name .....
Company .....
Address .....

Tel (Day) .....
Tel (Eve) .....

PCN 5.1.84

**MICROTANIC COMPUTER SYSTEMS LTD**
SHOWROOM: 16 UPLAND RD
DULWICH, LONDON SE22
TEL: 01-693-1137

MAIL ORDER
235 FRIERN RD. DULWICH
LONDON SE22

*Also available from:*
Waltham Forest Computer Centre
889 Lee Bridge Rd.
Nr Whipps Cross, Walthamstow E7
Tel: 01-520 7747

Ted Ball reviews an impressive assembler and machine code monitor for the 48K Spectrum.

# Assembly pac

Devpac is an assembler and machine code monitor for the 48K Spectrum, providing extensive and powerful facilities to help you develop and debug machine code programs. Devpac includes many features intended to appeal to experienced programmers working on large programs but can also be used by beginners.

## Features

Devpac consists of two separate programs, the assembler/editor GENS3 and the machine code monitor MONS3. These can be loaded into any part of the memory and automatically relocate themselves to run at the loading address, making it easy to work with object code anywhere in the Spectrum's memory.

The assembler is very close to the Zilog standard, with standard opcode mnemonics, operand syntax, labels, and the directives ORG, EQU, DEFB, DEFW, DEFS, DEFM. Operands may include decimal, hex, binary and character constants; labels, "$" to represent the location counter; expressions involving addition, subtraction, multiplication, division and modulus (remainder) and the logical operations AND, OR, XOR.

The main difference from standard syntax is the notation for binary and hex numbers: GENS3 requires you to precede binary and hex numbers with % and # instead of the Zilog form where the numbers must end with B or H.

There is also a large number of assembly options and commands, most of them concerned with specifying the format and amount of detail in assembly listings.

GENS3 includes two very powerful features — conditional assembly and the ability to assemble source code from tape as well as from memory — these make it particularly suitable for developing large programs. Being able to assemble from tape allows you to assemble very large programs without having to split them into sections that can be assembled separately and the two features together allow you to keep a file of commonly used subroutines on tape and incorporate the routines you need at assembly time instead of having to retype them whenever you write a new program.

The machine code monitor, MONS3, includes all the usual monitor features, allowing you to inspect and alter the computer's memory and the processor's registers, run machine code programs, set breakpoints, etc. There are two other noteworthy features: first is the disassembler, which includes the option of disassembling into a labelled text file that can be edited and reassembled by GENS3. The other is the single step function which allows you to run a machine code program one instruction at a time, with full 'front panel' display, and works on programs in RAM and in ROM.

## Presentation

The cassette contains two copies of GENS3 on one side and two copies of MONS3 on the other, but the labelling does not distinguish between the two sides.

The documentation consists of a 45 page booklet, with separate sections on GENS3 and MONS3. The features and the syntax for the assembler, editor and monitor commands are all explained clearly, although a beginner may have difficulty with the descriptions of some of the more advanced features. However, there are fully worked examples that you can follow through step by step and which help you understand how to use the package.

## In use

Devpac includes a great many features, so there are a lot of different types of commands. Most require a single key, or a shift key and another key to specify what is to be done, and some have to be followed by parameters. This kind of system is never easy to use when there are many non-mnemonic commands, and it is particularly difficult in Devpac where there are three sections, the editor, the assembler, and the monitor, with similar commands used to do different things.

If you use Devpac regularly you will eventually learn the commands you use most often, but you will inevitably have to do a lot of searching through the manual for the less common commands.

The assembler is reasonably fast when using a source code file in memory — with no listing it took about 4 seconds to assemble 150 lines. It is, of course, much slower when assembling from tape, but the loss of speed is a small price to pay for being able to assemble a source file that is much too big to fit in memory.

The MONS3 'front panel' displays a great deal of information; a disassembly of the instruction starting at the current memory pointer; the contents of all the registers and, for each 16-bit register or register pair, the contents of the 7 bytes starting from the address pointed to by the register as well as the contents of 24 bytes centred on the memory pointer. Nevertheless, the display is clearly laid out and easy to interpret.

Debugging a program with the aid of breakpoints and the single step can be tedious, but the manual gives a great deal of help on how to go about it.

## Reliability

The assembler performs extensive error checking and will find almost all errors in the source code. The only bug that I found in the error checking was that it will assemble the incorrect instruction "LD (HL),(HL) and the corresponding forms with the index registers IX and IY. There also seems to be a bug involving the conditional assembly, where the object code is not displayed in the assembler listing. Conditional assembly does, however, generate the object code even though it is not displayed.

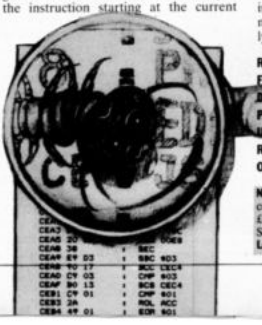
The monitor checks that commands are valid, and the manual gives many warnings about commands that could cause trouble or crash the machine. There is one case where I think that the warning in the manual should be replaced by additional error trapping in the program — when you single step, the program counter and the memory pointer must have the same value otherwise the consequences are unpredictable.

MONS3 and GENS3 are, however, quite reliable in normal use and should not give any trouble with reasonable care.

## Verdict

The assembler is closer to the Zilog standard and includes more features than any of the numerous other assemblers available for the Spectrum. The monitor is also very good and includes many advanced features. Although Devpac is not very easy to use — partly because there is so much in it — it is very powerful and this far outweighs the difficulties in using it, and the few minor bugs.

Devpac is also very reasonably priced. Although it gives you much more the price is still about the same as other assembler/monitor packages for the Spectrum. Highly recommended.




**Name** Devpac **Application** Assembler & machine code monitor **System** 48K ZX Spectrum **Price** £14.00 **Publisher** Hisoft, 60 Hallam Moor, Liden, Swindon, Wilts, SN3 6LS **Format** Cassette **Language** Machine code **Outlets** Mail order.

## DRAGON 32

# Gateway getaways

**Name** Trace Race **System** Dragon 32, joysticks **Price** £8.75 **Publisher** Cable Software, 52 Limbury Road, Luton LU3 2PL **Format** Cassette **Language** Basic & M/code **Other versions** None **Outlets** Mail order.

Trace Race is a follow-up to Cable's other successes with games based on Walt Disney's Tron. It's another fast action game, mostly in machine code, with speech built into the program. Admittedly, I only came across one word, but it's still impressive.

### Objectives

Two versions are open to you, either a solo game or a two-player option. Solo is you against the computer. You fly along a drawn grid, avoiding the trace gates the computer will put in your path.

Crashing into the grid walls, your own trace line (swift U-turns are out) or a gate ends your life. After your run is over, the time is displayed, allowing you to brush up on your skills before challenging friends and enemies to a duel.

The two player option has no trace gates, but the rules are the same.

The throttles on both bikes are jammed wide open (naturally) so your joystick only allows left/right and up/down movement.

Of the two bikes, red always appeared to go faster, so it's not the one to pick to stay alive.

### In play

The program is in Cable's standard video box packaging, *ie* sturdy and smart. A short Basic program is loaded first, which on running loads the machine code.

The instruction sheet is clear, brief and simple. A nice touch at the start of the game is the choice of a fast or normal game. As a Dragon owner who suffered with a machine that crashed at the higher speed of 1.8 Hz, there was nothing more infuriating than having to find the POKE that doubles the speed, delete it then start a game. At least with this alternative you don't get an instant crash. Running at the normal speed still gives a fast game in either solo or duo versions.

The graphics are very good in both games, as is the sound. The noise made when the trace gates are drawn on didn't really fit in though. They made a kind of squelchy noise, which I didn't think was very suitable, it needed a more metallic sound.

This is only nitpicking though. If you want an enjoyable, straightforward, and instantly playable game for Christmas, then this is the one.

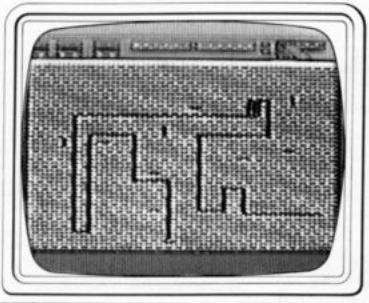
### Verdict

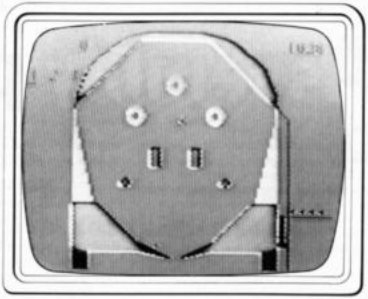
By far the best of Cable's releases so far. But be warned, the only thing you can't do on bikes is stand still.

**Jim Ballard**

**RATING**

| | |
|---|---|
| **Lasting appeal** | |
| **Playability** | |
| **Use of machine** | |
| **Value for money** | |





# Pins and needles

**Name** Pinball **System** Dragon 32 **Price** £8 **Publisher** Microdeal, 41 Truro Road, St Austell, Cornwall **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Mail order, most retail.

It must be at least thirty years that pinball machines have been around and they're still going strong despite the Invaders invasion.

### Objectives

The aim is to flip the ball around the table and score unbelievably high scores, which are recorded for you at top left of the screen, with current score at top right.

### In play

There are three different table layouts to choose from, the first having seven bumpers and the second and third nine bumpers each. On each screen there is a whirling cross which appears from time to time and which will gain you 1000 points if you hit it. There's a choice of three background colours, and you can use either joystick or keyboard; this is not very strenuous as the '7' key is the only one you'll need. This chooses the table layout, fires the ball onto the table, and operates the flippers.

To fire the ball, of which you get five with a bonus every 10,000 points, you press the fire-button or '7' key down to pull the plunger back, then release it to fire. The ball bounces around with realistic sounds, and the speed of movement seems fairly authentic with it shooting off as it hits a bumper or crawling slowly up the screen when gently flipped.

The problem with Pinball, though, is the graphics. These are decidedly fuzzy on even the clearest screen, and the green background I found almost unusable. As the ball bounces around, it also disappears briefly where the whirling cross appears and around the flippers. When this happens you can dig it out with a bout of frantic flipping.

Despite the dastardly disappearing ball, though, I did enjoy Pinball but felt guilty for doing so. It seemed that with complex adventures to be waded through, and multi-screened fast-moving arcade games to master, I ought not to be sitting there having fun with a game which only required you to lift one finger. But, as in the arcades, you become almost mesmerised by the bouncing ball, your flipper-finger itching, and all that matters is beating that high-score put up there by you or somebody else.

### Verdict

At the standard Microdeal price of £8, this doesn't compare well with some of its other offerings, and its appeal may be limited to those occasional sessions when you realise you haven't played the game for a while, just as you can pass dozens of Pinball machines and ignore them then one day you simply have to play. So, although I enjoyed it, it might not be everyone's cup of tea.

**Mike Gerrard**

**RATING**

| | |
|---|---|
| **Lasting appeal** | |
| **Playability** | |
| **Use of machine** | |
| **Overall value** | |

LANDAU ELECTRONICS

SPECIALISTS IN

**software**

Programmes for all leading home computer & video games including:

APPLE, ATARI, BBC, COLECOVISION, COMMODORE
DRAGON, ELECTRON, INTELLIVISION, ORIC
SINCLAIR, SORD, TEXAS, VECTREX
& MANY OTHERS!

LANDAU ELECTRONICS

IN:
LIONHOUSE, 227 TOTTENHAM CT. RD.
LONDON, W1
TEL: 01-637 3024
AND AT: 215 HIGH ST., SUTTON., SURREY
TEL: 01-643 5494

**BICODALS**
**DO YOU SPEAK 6502 OR Z80?**

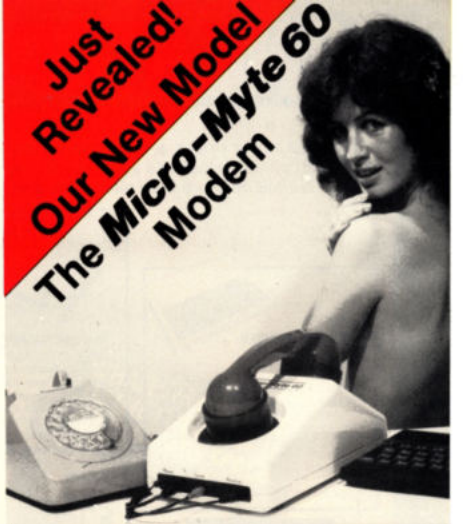
**JOYSTICK JOUSTERS CHALLENGE YOU TO SINGE THEIR SILICON WITH TURBO CHARGED CREATIONS**

**SEND YOUR COMPOSITIONS FOR IMMEDIATE EVALUATION TO**

KACE INTERNATIONAL
(SOFTWARE DIVISION)
32 AVON TRADING ESTATE
AVONMORE ROAD
LONDON W14
TELEPHONE 01-602 7355

**Just Revealed! Our New Model**

**The Micro-Myte 60 Modem**



**A professional modem, now with universal couplings, at only an eighth of the price - designed specifically for use with home computers.**

Now you can communicate information between compatible micro-computers with your phone, at three times the speed of most other acoustic modems.

The Micro-Myte 60 connects directly to your computer or your cassette recorder via the input/output sockets and transmits or receives up to 60,000 bits per minute of data — twelve times faster than telex and cheaper than first class letter post!

Use the Micro-Myte 60 to send or receive pre-recorded programmes selected data or high resolution screen contents — in black and white or colour — throughout the international telephone network. The universal rubber couplings enable the modem to be used with most types of British and Continental telephones.

Initially designed for use with identical computers, i.e. ZX81 to ZX81 or Spectrum to Spectrum the new Micro-Myte 60 CAN NOW be used to interface the ZX81 to the Spectrum and vice versa, by using the appropriate interface software which is available as an optional extra. (Limited to resolution of 64 x 32 for screen contents in black and white only and selected data.)

The Micro-Myte 60 is simple to operate and utilises the computing power of the host machine to the full, eliminating costly hardware and the need for a separate power supply.

**As a result it is available at the extremely competitive price of £48.00, including VAT, post and packaging (UK only).**

The price includes the modem, ZX81 and Spectrum software on cassette, connection cable and operating instructions, with a 12 month guarantee.

**There are no hidden extras, making the Micro-Myte 60 an ideal gift for the enthusiast.**

**Optional Extra**
Interface software (ZX81 to Spectrum and vice versa) — £9.50 (inc. VAT).

Micro-Myte Communications Ltd
Polo House, 27 Prince St
Bristol 1
telephone (0272) 299373

Callers welcome

**To obtain yours now . . . clip the coupon.**

I am a ZX81/Spectrum user (specify .....)
☐ Please send me ..... Micro-Myte 60 modem(s) at £48.00 each.
☐ Please send me ..... Interface software(s) at £9.50 each.
I enclose cheque/postal order, payable to Micro-Myte Communications Limited.
Name Telephone
Address

# ONE-STOP SHOPPING

**Just look at our prices and selections: but if you don't see what you want please telephone us, as we are unable to list all the items we stock. We will be more than pleased to give you our Best price.**

NEWS FLASH! ACORN APPOINTED AND APPROVED ECONET SERVICE CENTRE

## BBC MICROCOMPUTER



| | |
|---|---|
| Model B | £399 |
| Model B & Disc Interface | £469 |
| Model B & Econet | £446 |
| Model B & Econet & Disc Int | £516 |
| Disc Interface Kit | £97 |
| * Speech Synthesizer (offical BBC) | £54 |
| Teletext Recever | £225 |
| 1.2 Operating System (incl fitting) | £11.50 |
| Basic 11 | £15 |

** New in stock. Price incl. fitting*



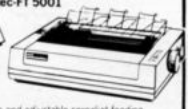
***NOW AVAILABLE***
**THE ACORN ELECTRON**
**ONLY £199.00**

## WORD PROCESSORS

| | |
|---|---|
| View Word Processor | £59 |
| Word Wise Word Processor | £45 |

## Logitec-FT 5001

STAR BUY



Friction and adjustable sprocket feeding, variety of printing models, (PICA & ELITE pitch) user font registry command, automatic paper insertion. 96 ASCC11 with descenter. 8 international character sets. 48 semi graphics!

**At the very low price of £330**

## DOT MATRIX PRINTERS



### MANNESMANN MT80

High quality 80 column serial dot matrix printer. Dual density dot addressable graphics, quick tear facility as standard, optional sound reduction kit to give an impressive L55dBa acoustic noise rating. Ability to handle both tractor-fed fanfold and single paper.

**Special price of £295**

FREE CABLE AND PAPER WITH ALL PRINTERS

### EPSON



| | |
|---|---|
| Epson FX80 F/T | £415 |
| Epson RX80 F/T | £315 |
| Epson FX100 T/T | £499 |

### SHINWA CP80



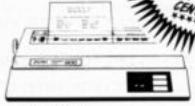
80 column, friction and adjustable tractor feed, bidirectional logic seeking, HI-RES graphics and block graphics, sub and superscripts, condensed and emphasised print, and underlining, vertical and horizontal tabs, self test, italic print, etc.

| | |
|---|---|
| Shinwa CP80 F/T | £289 |
| Parallel Printer Lead | £13 |
| 2000 Sheets Fanfold Paper | £15 |

## ODDS

| | |
|---|---|
| Official Joysticks | £13 |
| Compatible Joysticks Damping Control | £15 |
| Dust Covers – for various machines – from | £3.95 |

## DAISYWHEELS



### JUKI 6100

20 CPS print speed, supports all wordstar features, emulates diablo protocols.

Juki 6100 Daisywheel with 2K Buffer ..... £395



### BROTHER HR15

Buffer – 3K byte, shadow printing, super/sub script, carriage skip movement, text reprinting, colour printing (red and black), auto underscoring, proportional spacing, clear buffer—

**Also available with keyboard.**

| | |
|---|---|
| Brother HR15 | £431 |
| Keyboard | £176 |

## *STAR BARGAIN!



**BBC Model B plus Disc/Interface fitted view, V.D.U. Green Monitor, Juki Daisywheel Printer, 200K Dual Disc Drives and manual and formating disc. ONLY £1,360 (incl. all cables)**

**ALL PRICES INCLUSIVE OF VAT.**

**TCL**

# Twillstar Computers Limited

Microcomputers, Peripherals, Software, Service Contracts.

EMS

# KEENEST PRICES ★ PROMPT RELIABLE SERVICE ★ that's Twillstar!

## MONITORS

**PHILIPS TP200 Green Monitor**

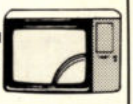


You can use this latest Philips Green Monitor for personal computers, business computers, control systems, automatic test equipment. The picture quality of the TP200 means not only 80 x 24 lines of information but also usage for high resolution graphics.

At the bargain price of **£79**

BBC Official 12" ..... **£95**

**NORDMENDE 14" TV/ MONITOR**



This TV Monitor is not a modified television as many TV Monitors are, but a 14" TV Monitor which has been designed to perform both functions. It has RGB and Composite video and sound. An RGB cable for a BBC is supplied as standard.

With Remote Control ..... **£269**

**Colour monitor**

Microvitec 14" 1431 ..... **£247**

## TORCH DISK PACK

**Torch Z80 Disk Pack**

**48K(i) Z80 Application Processor Perfect Software**

**At New Low Price**

**£835.00 Inc. Installation**

## SLIM DISK DRIVES



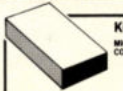
STAR BUYS

| | |
|---|---|
| **TEAC 55A** | |
| **S/S 40 TRACK** | |
| 100K SD Single | £169 |
| 200K DD Dual | £339 |
| **TEAC 55E** | |
| **S/S 80 TRACK** | |
| 200K Single | £220 |
| 400K Dual | £440 |
| **TEAC 55F** | |
| **D/S 80 TRACK** | |
| 400K S/D Single | £269 |
| 800K D/D Dual | £539 |
| **MITSUBISHI** | |
| 400K D/S DD Single | £269 |
| Dual | £539 |
| **FORMATTING DISK & MANUAL** | £10 |

*ALL DRIVES CASED WITH FREE CABLES

- ✱ SERVICE CONTRACTS TO EDUCATION AUTHORITIES AT DISCOUNT
- ✱ OFFICIAL ORDERS FROM DEALERS, GOVERNMENT DEPARTMENTS, COLLEGES AND SCHOOLS WELCOME
- ✱ ALL PRICES INCLUSIVE OF VAT

## KOMORI – MICROPROCESSOR CONTROLLED



Ideal for BBC Micro and any other computers with standard interface 5¼" Slimline on-board single chip microcomputer reduces TTL count by 70%, extra low power requirement, direct drive (no belts!), guide rail means completely quiet operation, unique eject mechanism, fast 6ms track to track access time, fully guaranteed. Cased with leads.

Priced at the **STAR BARGAIN PRICE** of **£169**

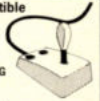
| | |
|---|---|
| Power supply | £40 |
| Cables Single | £9.50 |
| Cables | £13.50 |

## FLOPPY DISKS



| | |
|---|---|
| **Floppy Disks in packs of 10** | |
| **Single sided 40 Track** | £20 |
| **Double sided 80 Track** | £35 |

## BBC Compatible



**KLIK STIK JOYSTICK – SELF CENTRING**

**Two Fire Buttons**

**Single – £17.95**

**Dual – £34**

STAR BUY

## SANYO SLIM 3A



The slim 3G Sanyo Cassette Recorder (no) recently available in the market. ONLY **£28.95**

Official BBC Cassette Recorder ..... **£29.95**

Cassette Recorder lead ..... **£2.50**

## UTILITY SOFTWARE



Screen Dump Rom **£17.25**

Analyse Disk **£15**

Compatible for MX80, FX80 etc.

**NEW BOOKS AND SOFTWARE IN STOCK**

✱✱✱✱✱✱✱✱

**FITTING SERVICES AVAILABLE**

## SOFTWARE

### ACORN SOFT GAMES

| | |
|---|---|
| Creative Graphics | £9.95 |
| Graphs & Charts | £9.95 |
| Desk Diary | £9.95 |
| Monsters | £9.95 |
| Snappers | £9.95 |
| Planetoid | £9.95 |
| Arcade Action | £11.50 |
| Rocket Raid | £9.95 |
| Meteors | £9.95 |
| Arcadians | £9.95 |
| Sliding Block | £9.95 |
| Cube Master | £9.95 |
| Chess pack | £9.95 |
| Super Invaders | £9.95 |
| Mouse Base | £9.95 |
| Snooker | £9.95 |
| Starship Command | £9.95 |
| Draughts/Reversi | £9.95 |

### ADVENTURES

| | |
|---|---|
| Sphinx Adventure | £9.95 |
| Philosophers Quest | £9.95 |
| Castle of Riddles | £9.95 |
| Countdown to Doom | £9.95 |

### LANGUAGES

| | |
|---|---|
| Lisp | £16.85 |
| Forth | £16.85 |
| Microlisp | £49.85 |
| BCPL | £99.00 |

### EDUCATION

| | |
|---|---|
| Algebraic Manipulation | £9.95 |
| Pirelo Park | £9.95 |
| Business Games | £9.95 |
| Tree of Knowledge | £9.95 |
| Sentence Sequencing | £11.90 |
| Word Sequencing | £11.90 |
| Missing Signs | £11.90 |
| Number Balance | £11.90 |
| Word Hunt | £11.90 |
| Speed & Light | £11.90 |
| Density & Circuit | £11.90 |
| Chemical Analysis | £13.80 |
| Chemical Simulations | £13.80 |
| Chemical Structures | £13.80 |
| Jam | £11.90 |

### BOOKS

| | |
|---|---|
| Creative Graphics | £7.50 |
| Graphs & Charts | £7.50 |
| Lisp | £7.50 |
| Forth | £7.50 |
| View Guide | £2.50 |
| Into View | £2.50 |
| BCI Manual | £15.00 |

### BBC GAMES SOFTWARE (BUG BYTE)

| | |
|---|---|
| Galaxy Wars | £7.50 |
| Oblivion | £7.50 |
| Red Lord | £7.50 |
| Music Synthesizer | £9.50 |
| Graphics Package | £9.50 |
| Old Farmer Tyme | £9.50 |
| City Defence | £9.50 |

STAR BUYS

### (COMPUTER CONCEPT)

| | |
|---|---|
| Asteroid Belt | £8.99 |
| Characters | £6.65 |
| Hitch-Hiker | £6.85 |
| Snake | £8.95 |
| Space Hawks | £8.95 |

### PROGRAM POWER

| | |
|---|---|
| Fela in the Factory | £7.95 |
| Fela and the Fruit Monsters | £7.95 |
| Escape from Moonbase Alpha | £7.95 |
| Danger UXB | £7.95 |
| Moon Raider | £7.95 |
| Bandits at 3 O'clock | £6.95 |
| Swoop | £7.95 |
| Croaker | £7.95 |
| Alien Swirl | £6.95 |
| Chess | £7.95 |
| Asteroid Storm | £7.95 |
| Command | £7.95 |
| Pool | £5.95 |
| Beebtote | £5.95 |
| Caverman Adventure | £6.95 |
| Rewers | £5.95 |
| Physics | £6.95 |
| Chemistry | £6.95 |
| World Geography | £6.95 |

### BUSINESS SOFTWARE

**Word Processors Room Based**

| | |
|---|---|
| Word Wise | £44.85 |
| View | £59.30 |

### GEMINI

| | |
|---|---|
| Cash Book Accounts | £59.95 |
| Final Accounts Program | £59.95 |
| Invoices and Statements | £19.95 |
| Commercial Accounts | £19.95 |
| Mailing List | £19.95 |
| Data Base | £19.95 |
| Stock Control | £19.95 |
| Home Accounts | £19.95 |

**Spread Sheet Analysis**

| | |
|---|---|
| Beebcalc Rom | £39.00 |
| (Also availbe on 40/80 Disc) | |

### BOOKS

| | |
|---|---|
| 30+ Programs – BBC Micro | £4.95 |
| 30 Hour BASIC (BBC Micro) | £6.00 |
| 6502 Appicator Book | £10.25 |
| Advanced 6502 Interfacing | £10.95 |
| BBC Micro Revealed | £7.95 |
| Basic programming of BBC micro | NEW! £5.95 |
| BBC basic For Beginners | NEW! £6.95 |
| Putting your BBC to work | NEW! £4.95 |
| Creative Graphics on BBC Micro | £7.50 |
| Easy Prog. for BBC Micro | £6.50 |
| Further Prog. for BBC Micro | £5.95 |
| FORTH Programming (Sams) | £12.50 |
| Advance BBC Micro user Guide | £12.95 |
| Basic Programming for BBC Micro | £9.95 |
| 21 Games for BBC Micro | £5.95 |
| Intro to Micro Beginners Book (3 Ed) | £9.90 |
| Let Your BBC Teach You to Program | £6.75 |
| Micros in the Classroom | £4.90 |
| Practical Prog. for BBC & ATOM | £5.95 |
| Programming the 6502 | £10.75 |
| Structured Prog. with BBC BASIC | £9.50 |
| The BBC Micro an Experts Guide | £7.90 |
| 6502 Games | £9.75 |
| Basic Handbook (2nd Ed) | £15.75 |
| Advanced BASIC | £9.95 |
| BASIC Computer Prog. for the Home | £9.70 |
| ALP for BBC Computers | £8.95 |
| BCPL for the BBC Micro User Guide | £15.00 |
| Games BBC Computer Play | £6.95 |
| Basic Programming on the BBC Micro | £5.95 |
| 30 Hours Basic | £5.95 |
| 35 Educational Programmes for BBC Micro | £6.95 |



## HOW TO ORDER

✱✱✱✱✱✱✱✱

**You may purchase any of the items listed by cheque, Barclaycard or Access. All you have to do is fill in the details in the coupon below and list your requirements on a separate sheet of paper. Post to us and we will despatch within 7 to 14 days. All prices inclusive of 15% VAT.**

Add £2.50 P&P for orders below £150, over, add £8 P&P.

## TELEPHONE ORDERS (01) 574 5271

**Credit card holders may order by telephone. Give Card No., Name, Address and item required.**

**Post to:**
**TWILLSTAR COMPUTERS LTD, 17 REGINA ROAD, SOUTHALL, MIDDLESEX.**

I have enclosed my list of requirements along with my cheque/P.O. for £_____

I prefer to pay with my ACCESS/BARCLAYCARD (Delete whichever not applicable)

CARD NO._____

SIGNATURE_____

NAME_____

ADDRESS_____

_____

_____

TEL: (Day)_____

TEL: (Eve)_____

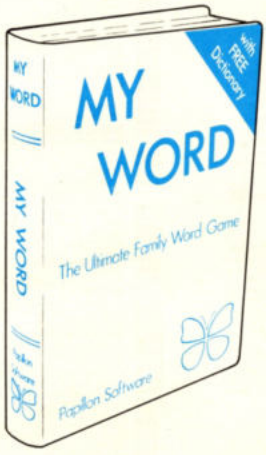
**CREDIT CARDS VALID IF SIGNED BY CARD HOLDER. ADDRESS ABOVE MUST BE THE SAME AS CARD HOLDER.**

PON 5.1.84

## 17 REGINA ROAD · SOUTHALL MIDDLESEX · TEL: (01) 574 5271

(OPEN SIX DAYS A WEEK – 10 a.m. to 8 p.m.)

# "PROBABLY THE FINEST WORD GAME YET DEVISED"




"My Word... the family word game that makes board games look boring."

"My Word . . . compete with the computer or family and friends. Terrific challenge. Totally absorbing.

"To say it's educational is just half the story. It's also highly entertaining for all ages."

"My Word . . . a vocabulary stretching competitive game for all the family.... All the ingredients for a real winner.

My Word claims to be the finest word game yet devised. It's a totally original game designed to use your computer's high speed vocabulary checking ability and comes complete with an extensive software word-checker plus a FREE hard copy dictionary with over 39000 references. My Word – proof positive that a program can be educational, absorbing and great fun.

My Word is available **now** direct from Papillon Software for Commodore 64, BBC B (or A + 32K) and Spectrum computers. Dealer enquiries welcome.

PAPILLON SOFTWARE
426 CRANBROOK ROAD
GANTS HILL
ILFORD
ESSEX
Tel: 01-518 1414

Please rush me ..... copy/copies of My Word for use on the [ ] Commodore 64 [ ] BBC Micro [ ] Spectrum at £14.95 each.
I enclose a remittance of £..... (cheques/PO's payable to Papillon Software).
Please debit my [ ] Access [ ] Barclaycard in the sum of £.....

Account Number .....

Signed ..... Date .....

Name (block capitals) .....

Address .....

Post today to Papillon Software, 426 Cranbrook Road, Gants Hill, Ilford, Essex. Tel: 01-518 1414. Please allow 14 days delivery.

John Fairbairn revels in the delights of games to cheer the half-starved Colour Genie owners.

# Games of the Genie genus generally

Most people's reaction to the Colour Genie has been, 'Nice computer, shame about the software.' Only recently has the number of titles on offer topped 100, and some of those have been dreadful.

But despair not CG owners. At least one company has brought a touch of class to Genie software: JD Tronics of London.

The J is for Justin Barrington, the D for Daniel Brown, a duo who had many years' experience with the TRS-80. They are justifiably proud of their first offerings for the Genie — Micronopoly and Puckman.

## Micronopoly

I was tickled pink when this easy-to-load program first ran. Unlike most computer Monopolies (for that is what it is of course) it is superbly designed — simple but elegant. Instead of the pure-text versions you mostly see this keeps the text on the right-hand side of the screen and shows the board moving down the left, like a slow-moving cine film — an effect reinforced by the sprocket-hole kind of sound as it moves. I loved it.

But I had one nasty shock. The cassette inlay gives no instructions on how to play but just says, 'All standard rules.' Rubbish!

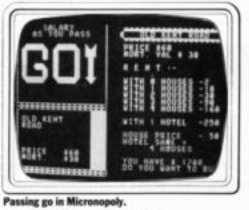
It doesn't charge double rent when a person owns all the properties of a set, and I was even more disconcerted when the Genie (it plays against 1-4 humans) bought three houses for Piccadilly when it had only one on Coventry Street and none on Leicester Square.

This is definitely not sanctioned by my 1972 copy of the rules of Monopoly or by Maxine Brady's *The Monopoly Book*, but friends have assured me lots of people play this way to speed the game up. It's reasonable enough, but I would have preferred it as an option. However, as the program occupies a full 32K, YJD tell me nothing else could be squeezed in.

The Genie itself plays a good game, very aggressive and verging on the reckless, but fortune often favours the brave.

Although it is in Basic, the game is fast. It can seem slow but actually is faster than the real game — at least as played by my family where half the time is spent looking for the dice on the floor. The Genie handles the dice for you, and all the money, and you handle the Genie by a very simple menu system that offers a wide range of options (roll the dice, buy property or houses, mortgage, check list of properties, etc.)

There are a couple of bugs to do with user input that don't seem to affect the actual game but cause a little irritation, and I would have liked longer delay loops in some cases. I would also like a 'who's got how much' option on the menu, and why




**Passing go in Micronopoly.**

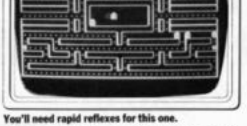
does Genie always go first?

Good family game, very good value for money if you accept the quirks.

## Puckman

Yes, JD, it is another Pacman (tney asked me not to say that), but this is the proper arcade version and another superb offering. It hardly needs describing except to confirm that it has the full maze, power pills and ghosts, and is smooth and fast (all machine code). Good sound, good graphics, easy loading, but no joystick control (use the arrow keys).

The title set me to musing about what ever happened to Puck matches, which shows my age and may explain why I'll never get the £100 prize for top score JD is



**You'll need rapid reflexes for this one.**

offering all purchasers. My kids, 6 and 12, won't win the prize either — I suspect you have to be around 14-15 to really get the best out of this game, the programmers' top score is 24,300 and the best by a purchaser so far is 13,200.

Incidentally, JD Tronics is set to issue a cassette-based word processor in the New Year. I can't wait.

## A. G. Kneeus Games

A rather different approach is taken by Ipswich's A.G. Kneeus, a very pseudonym but a very honest chap who is trying to offer reliable programs at a decent price, while at the same time making them all listable so that owners can re-work them or use them for study.

The programs are all in Basic and easy to load. Sound is usually very good, graphics are cute rather than brilliant (but easy for




**Watch the birdie in Buzz-Bee-Ball.**

the beginner to follow and change).

Best of the range seems to be *Video Paint Pot*. It grabbed my kids' attention, but the instructions are so awful they drifted away, frustrated, very quickly. I had to persevere, and eventually discovered the program will do a lot (draw solid or dotted lines in eight directions or circles in a variety of sizes and colours, and paint inside them) but I was still hazy about several things.

Ask for full instructions — get them and you'll get good value for money.

*Draughts* is another game I think many people could be satisfied with. Not the connoisseurs, that is, but it'll give most people a decent game.

*Buzz-Bee-Ball* was my favourite. It's football between a little bird (good on the wing) and a man. Using the arrow keys you can play against Genie or a partner. Utterly simple, but it fascinated simple me.

*E. T. Aulie* is a passable variety of Pacman, but if that's really what you want I'd go for JD Tronics' version any day.

*Bust-a-Dam* is an uninspired version of Breakourt and *Retaliation*, which is a type of Space Invaders.

**JD Tronics** 42 Crediton Hill, London NW6 1HR. Micronopoly £8.00 (needs 32K), Puckman £8.00.
**A. G. Kneeus** 97 Burrell Road, Ipswich IP2 8AD. All titles £6.50.

# BIG JOHN'S CROSSWORD

14 15

**TODAY'S CLUES**

We don't stock HIFIs, cameras or second hand cars, but deal exclusively in home computers and everything for them.

Today's solution has ten micros, over one thousand software titles, books, magazines, plus lots of add ons and advice. I think it would be fair to say that we do have plenty of MICRO ANSWERS.

Service is high on our list of priorities — we have four fully trained Staff who will be happy to demonstrate any piece of software, though I hear that Flight Simulators are their favourites.

Our shop is only three minutes walk from Victoria Station which is covered by both mainline and underground trains, as well as over twenty inner London bus routes. In fact MICRO ANSWERS is so obvious that you don't have to look below for today's solution.

34 35

## MICRO ANSWERS

**70-71 WILTON ROAD**
**LONDON SW1V 1DE**
**01-630 5995**

38

**MONDAY-FRIDAY 10AM-8.30PM**
**SATURDAY 10AM-7PM**

## SPECTRUM 48K

# Undersea search

**Name** Hunter Killer **System** 48K Spectrum **Price** £7.95 **Publisher** Protek, 1a Young Square, Brucefield Industrial Estate, Livingston, West Lothian (0506-415353) **Format** Cassette **Language** Basic **Other versions** None **Outlets** Mail order, Menzies, other dealers

As the software skies are now so full of flight simulators that Protek has decided to come down from out of the clouds with a splash and offer something different, a submarine simulator.

### Objectives

They have made you Commander of an "S" type submarine lurking off the coast of Holland and Germany during World War Two, your mission to locate and sink an enemy submarine in the same patch of water. Another nice, friendly game designed to increase international understanding.

### First impressions

The cassette is certainly well presented, coming in a large box complete with 12-page manual and two additional instruction manuals because one of the interesting features of Hunter Killer is that it can be played in a dual game linking two machines with the networking lead provided with Interface 1, both machines needing an Interface with their own TV screens.

### In play

The solo game offers five difficulty levels, and after choosing your level you're given the option of seeing a practice torpedo fired. You're only likely to choose this option once as the torpedo makes painfully slow progress through the water towards the enemy sub seen through your periscope. To be fair, this is the only part of the game which was slow, the rest responding pretty briskly to the keyboard or a Protek joystick.

There are three screens giving you the information you need; the Control Room and Chart Room down below, both with excellent graphics.

The first tasks to master are how to dive and surface successfully, which involves adjusting your ballast tanks and hydroplanes. You cannot stay underwater too long as the electric motors can only be recharged from the diesel engines on the surface. But stay on the surface too long and you risk the enemy submarine getting you first, or being spotted by a passing aircraft (this doesn't apply in the dual game.)

You scroll from the Control Room to the Chart Room using the 'C' and 'X' keys, and these keyboard controls are sensibly laid out, using adjacent keys where possible, with a summary of the controls printed on the back of the instruction booklet.

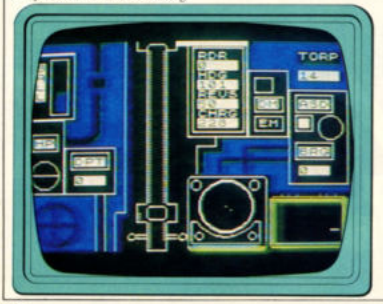
### Verdict

An excellent simulation, and definitely not sub-standard.

**Mike Gerrard**

**RATING**

| | |
|---|---|
| **Lasting appeal** | |
| **Playability** | |
| **Use of machine** | |
| **Overall value** | |






# A real bun fight

**Name** Mr Wimpy **System** Spectrum 48K **Price** £5.90 **Publisher** Ocean Software, Ralli Building, Stanley Street, Manchester M3 5FD **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Sinclair dealers

In a novel marketing approach, Ocean Software has joined forces with the Wimpy fast food chain to bring us Mr Wimpy, a game of burger building and sausage survival.

### Objectives

The game divides into two sections. Part 1 has Mr Wimpy collecting three ingredients while avoiding manhole covers, and Waldo the burger thief. Part two has him galloping up and down ladders and across platforms in an attempt to assemble four hamburgers. Trying to thwart him at different levels of the game are Sid Sos, Sam Spoon, Ogy Egg and Pam Pickle.

### In play

Mr Wimpy resembles the Wimpy logo, a small chubby chap dressed in Beefeater costume. Starting with five lives, Mr Wimpy appears in a recess, stage left. As he moves out of his cubby hole, his little legs pumping away, out pops a tray which then obligingly follows in his footsteps. Over at stage right are three burger ingredients which have to be brought back to the left-hand hideyhole, one by one.

Floating up and down in the central portion of the screen are three golden doughnut-like manholes which Mr Wimpy must dodge. A further hazard is the roly-poly blue meanie Waldo who charts a fast and erratic course around the screen. If he hits Mr Wimpy's tray, the tray (and the ingredient, if one is in tow) return to the starting grid.

Having successfully captured the ingredients, Mr Wimpy now faces a daunting screen where four hamburgers await his attention. The four constituents of each burger have been stacked vertically, one part per platform. Mr Wimpy has access to each of the platforms by means of ladders. When he runs over the top of one of the constituents, it becomes dislodged and falls down a level, with subsequent knock-on effects.

Quite simple, really, or it would be were it not for two beautifully animated mischief-makers: Sid Sos, a twitching frankfurter on legs, and Sam Spoon, a perambulating piece of cutlery. These relentlessly pursue Mr Wimpey who loses a life if caught. He can stop them temporarily by dropping a piece of burger on them or by shaking his pepperpot.

Later, a ferocious fried egg and a precocious pickle add to his problems.

### Verdict

Excellent joystick/keyboard response, humourous graphics, smooth animation, and a zany plot — this one is a real giggle and for my money the best all-round family game to date.

**Bob Chappell**

**RATING**

| | |
|---|---|
| **Lasting Appeal** | |
| **Playability** | |
| **Use of Machine** | |
| **Overall Value** | |

fantasy SOFTWARE

# DOOMSDAY CASTLE

**is an arcade style game with the feel of a real adventure**

Doomsday Castle consists of a labyrinth of 76 complexly inter-connected Halls and Passages where you will meet a whole host of adversaries serving the infinitely evil Scarthax, the Garthrogs, the Orphacs, the phenomenally nasty Googly Bird and the Urks which manifest themselves in over fifty unbelievably weird and wonderful guises.

Scarthax has scoured the Universe to bring together the six ancient stones of lifeforce. United in Doomsday Castle they are being used to wield an irresistable power over the cosmos, emanating waves of corruption through every galaxy.

To save the Universe, you must battle your way through the Castle to find and collect the six stones and use their force against Scarthax to destroy Doomsday Castle, hopefully escaping yourself before the final cataclysmic explosion. The task is not easy (saving the Universe never is!) and it will take youmany games to unfold the structure of Doomsday Castle and discover the locations of the ancient stones. The addictive arcade style action will keep you coming back to play but the overall challenge should still keep you occupied for months.





You take on the role of our super hero ZIGGY shown here above in his exploratory capsule in combat with an Urk disguised as a pangalactic gargleblaster (!!) This is a true representation of the on-screen graphics.

**FANTASY SOFTWARE is available from W.H.SMITHS, JOHN MENZIES, LASKYS, GREENS, RUMBELOWS, SPECTRUM GROUP, COMPUTERS FOR ALL and all other good software retailers.**

**For 48K Spectrum**

# DOOMSDAY CASTLE

is available at £6.50 from

FANTASY SOFTWARE, FALCONBERG LODGE, 27A ST GEORGES ROAD, CHELTENHAM, GLOS GL50 3DT

despatched by return first class post together with free membership and current newsletter of the Fantasy Micro Club.

Trade Enquiries welcome – telephone 0242-583661.

# COMMODORE 64

## Rocks and lizards

**Name** Crazy Caveman **System** Commodore 64 **Price** £6.50 **Publisher** Merlin Software, Business and Technology Centre, Bessemer Drive, Stevenage, Herts. SG1 2DX **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Retail.

It's a refreshing change not having to blast away at mutants or invaders from some far-distant galaxy. The setting for this game is prehistoric times. You are a Neanderthal battling it out with an axe against dinosaurs, dodos and other early beasts.

### Objectives

You are the Crazy Caveman of the title, armed only with an axe. You have become separated from your hunting party and you're trying to make it back home alone. In the process you come up against some prehistoric problems.

### In play

Initially you encounter rolling rocks. These move across the screen from left to right and the only way to avoid them is to jump over the top of them. They usually come in groups of four with very little random variation in timing or separation and it soon becomes very easy to judge the jumping.

Not only do you have to hop, skip and jump over the rocks, but in order to progres to the next level you have to move the left to break new ground. Trying to dodge the issue by moving to the right is of no use; you're limited to just a few steps.

Following the rocks comes a gang of dinosaurs. You have to be quick and accurate with your axe to kill them. Of course, if you don't you'll end up as their luncheon. They looked deceptively like herbivores to me.

If you manage to negotiate the dinosaurs, your next hazard is the dodos. Dodos, according to the instructions, never accomplished the art of flying. They only manage short hops and bounce around the screen in fairly large numbers.

It can get extremely difficult to avoid them. I never managed to kill one and I'm not even sure you're supposed to.

The fourth hazard is some different types of prehistoric birds (pterodactyls?) which fly above you dropping rocks on your head.

I'm afraid that my history books must be out of date as I could find no reference to rock-dropping birds.

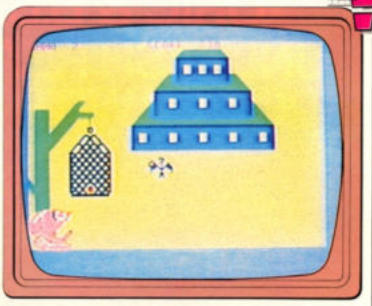
### Verdict

This was an enjoyable game which will test even the most ardent games player. The graphics are fairly well-done and the screen scrolling is exceptionally smooth. The sound, however, leaves a lot to be desired. If you are fed up with the usual space destructive games then you should give this one a second glance.

**Nigel Farrier**

| RATING | |
|---|---|
| Playability | |
| Use of machine | |
| Value for money | |
| Overall Value | |



## Fire eater

**Name** Goodness Gracious **System** Commodore 64 **Price** £6.95 **Publisher** Beyond, Competition House, Farndon Road, Market Harborough, Leics **Format** Cassette **Language** Basic **Other Versions** None **Outlet** Mail order and most dealers.

Ever fancied controlling a dinosaur? Well now's your chance, as you travel back in time to a world ruled by dinosaurs. Being somewhat smarter than the average Tyrannosaurus Rex, these dinosaurs hurl fireballs from their mouths, and keep all the other nasties at bay.

### Objectives

These prehistoric beasts get their power from a magical red gem, which everything else in this strange world is trying to get hold of.

You control the dinosaur, and make it spit fireballs at appropriate moments to eliminate every other life-form that appears on the screen. Should the magical gem come under attack three times in the same location, it is moved off to a new hiding place and must defend it all over again.

Initially you have to spit fireballs at a devil-like figure that approaches from the right — subsequent devils come at you at slightly faster speeds. The next level has you at the top left of a flight of stairs, another leads up from the middle of the screen to the right. Down this hop aliens at which you have to spit.

There's a little competition being run in conjunction with this game. If you manage to survive five attacks from little monsters bent on taking the gem and running, you can write in to the Beyond team and tell them how the attacks begin on level 6.

### In play

You might be forgiven for concluding this is a good, unusual game.

Unusual it may be, but good it certainly isn't.

I doubt whether many will enter the competition, because this game becomes so tedious.

Your dinosaur cannot move about the screen nimbly dodging other creatures and spitting at them as it's rooted to the spot. Instead, your solitary control key in the whole game is the space bar. This must be pressed down for an interval of time, and on release the fireball wobbles its way across the screen; the distance travelled is related to length of time the key was held down.

The supply of fireballs is limited to 10 per game, with a bonus level of 1 fireball for every alien successfully demolished.

Of course, you could always go for expert level, and start off with 5 and get 2 extra for every hit.

### Verdict

Not destined to become one of the all time greats in the 64 Hall of Fame, and for a new company trying to make its way in the computer software scene this is a very disappointing start.

**Pete Gerrard**

| RATING | |
|---|---|
| Lasting appeal | |
| Playability | |
| Use of machine | |
| Value for money | |

# ORIC & B.B.C. OWNERS - UNLEASH REAL COMPUTING POWER WITH I.T.L. KATHMILL






# BYTE DRIVE 500

## first Disc Drive with Hybrid Interface Cable and Master D.O.S.

For too long, the performance potential of your computer, has been limited by the lack of a suitable Disc Drive. Now I.T.L's Byte Drive 500 meets this need.

With its 500K Bytes (440K Bytes formatted) capacity, and access time of only 3ms, Byte Drive 500 opens up a new era of computing capability for the more ambitious user.

Byte Drive 500 is compact, economically priced and easy to operate. Systems will shortly be available to interface with Dragon, Spectrum and Vic computers.

The full D.O.S. included in the price consists of:

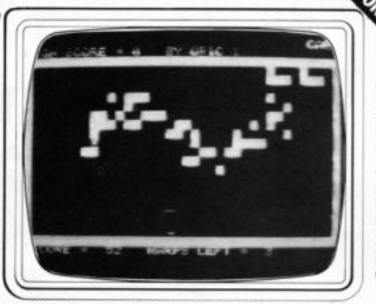
- 3" F.D.D. Unit
- ✳ Power supply unit & mains cable
- ✳ A single P.S.U. can power 2 drives.
- Hybrid interface cable
- Power unit cable
- Master D.O.S. disc
- 100 page manual

RECOMMENDED RETAIL PRICE £260.00 + V.A.T.

SYSTEM DESIGNED & ASSEMBLED IN U.K

Byte Drive 500 is available from most quality computer retailers. In case of difficulty contact:
I.T.L. KATHMILL LTD.
The Old Courthouse, New Road, Chatham, Kent ME4 4QJ.

# Jungle chase



**We pay for published programs on a sliding scale which take into account length, complexity, originality and the programming skill demonstrated in the program. So why not give us a RUN for our money?**

**Send your contribution, on disk or cassette, together with a plain paper listing and brief summary notes to:**

**Kenn Garroch, Personal Computer News, 62 Oxford St, London W1A 2HG.**

**Title** *Jungle Chase*
**Machine** *Oric 1 48K*
**Application** *Game*
**Language** *Tansoft Basic*
**Author** *R de Mercado*

Have you ever fancied youself as a jungle explorer? If you have then here's a game for you.

Having stumbled across a man-eating plant whilst exploring the deepest jungles of darkest Africa, you have to try to escape. You must avoid the flesh-eating plant as much as you can and not become surrounded by it. You do not, unfortunately, have any weapons, so you cannot attack the plant. However, you do have the ability to warp away from your current position three times to a new, random one.

| | |
|---|---|
| 2 | Set screen colours, red ink on black paper. |
| 3 | Initialise the high score of zero to "ORIC 1". |
| 4 | Gosub and define the plant character and the explorer zero. |
| 7-8 | Set up a random x/y position for the explorer. |
| 9 | Set up the score and warps. |
| 21 | Gosub and give the instructions. |
| 25 | Clear the screen and set the ink and paper colours. |
| 30-35 | Print the surrounding jungle. |
| 50 | Plot the explorer onto the screen. |
| 110 | Remember the position of the explorer. |
| 115-116 | Print up the number of warps and the current score. |
| 117-118 | Print up the high score and who. |
| 120 | Select a random number to specify the next position of the plant. |
| 121-124 | Jump to the appropriate routine to check the place where the plant is going to be. |
| 125 | Make sure G is in the range 1-4. |
| 127-145 | Check the positions top, bottom, right, left to see what character is there. |
| 150 | Put the plant onto the screen. |
| 155 | If bell is on then ping. |
| 160 | Save position of explorer. |
| 165 | If there are some warps left then skip the next bit. |
| 170 | Check for surround. |
| 200 | Get a key from the keyboard. |
| 210 | If space bar and there are warps left, then warp. |
| 220 | Bell on if "B". |

```
0 REM COPYRIGHT R.de Mercado
1 REM JUNGLE CHASE
2 PRINTCHR$(6):PRINTCHR$(17)
3 HS=0:HS$="ORIC 1"
4 GOSUB 1000
7 X=INT(RND(1)*36)+1:IF X<2 THEN GOTO 7
8 Y=INT(RND(1)*19)+1:IF Y<2 THEN GOTO 8
9 G=1:W=3
21 GOSUB 2000
25 CLS:PAPER0:INK2
30 FOR I=1 TO 37:PLOT I,1,"'":PLOT I,21,"'":NEXT I
35 FOR I=1 TO 21:PLOT 1,I,"'":PLOT 38,I,"'":NEXT I
50 PLOT X,Y,CHR$(35)
100 REM PLAY
110 A=X:B=Y
115 PLOT 2,22,"SCORE = ":PLOT 10,22,STR$(S) :PLOT 16,22,"WARPS LEFT
="
116 PLOT 29,22,STR$(W)
117 PLOT 1,0,"HIGH SCORE = ":PLOT 13,0,STR$(HS):PLOT 18,0,"BY "
118 PLOT 21,0,HS$
120 LET G= INT(RND(1)*4)+1
121 IF G=1 THEN GOTO 127
122 IF G=2 THEN GOTO 133
123 IF G=3 THEN GOTO 137
124 IF G=4 THEN GOTO 143
125 GOTO 120
127 IF SCRN(A+1,B)=35 OR SCRN(A+1,B)=33 THEN 120
130 IF A=37 AND A)=2 THEN A=A+1
132 GOTO 150
133 IF SCRN(A-1,B)=35 OR SCRN(A-1,B)=33 THEN 120
135 IF A=37 AND A)=2 THEN A=A-1
136 GOTO 150
137 IF SCRN(A,B+1)=35 OR SCRN(A,B+1)=33 THEN 120
140 IF B<=20 AND B)=2 THEN B=B+1
142 GOTO 150
143 IF SCRN(A,B-1)=35 OR SCRN(A,B-1)=33 THEN 120
145 IF B<=20 AND B)=2 THEN B=B-1
150 PLOT A,B,CHR$(33)
155 IF C=1 THEN PING
160 M=X:N=Y
165 IF W>0 THEN GOTO 200
170 IFSCRN(M,N-1)=33ANDSCRN(M,N+1)=33ANDSCRN(M+1,N)=33ANDSCRN(M-1,N
)=33THEN400
200 K$=KEY$
210 IF K$=CHR$(32) AND W>0 THEN GOTO 3000
220 IF K$=CHR$(66) THEN C=1
225 IF K$=CHR$(79) THEN C=0
230 IF K$=CHR$(11)ANDSCRN(X,Y-1)=33THEN 200
235 IF K$=CHR$(11)AND SCRN(X,Y-1)=32 THEN Y=Y-1
236 IF K$=CHR$(11)THEN 270
240 IF K$=CHR$(10) AND SCRN(X,Y+1)=33 THEN 200
245 IF K$=CHR$(10) AND SCRN(X,Y+1)=32 THEN Y=Y+1
246 IF K$=CHR$(10) THEN 270
250 IF K$=CHR$(8) AND SCRN(X-1,Y)=33 THEN 200
255 IF K$=CHR$(8) AND SCRN(X-1,Y)=32 THEN X=X-1
256 IF K$=CHR$(8) THEN 270
260 IF K$=CHR$(9) AND SCRN(X+1,Y)=33 THEN 200
265 IF K$=CHR$(9) AND SCRN(X+1,Y)=32 THEN X=X+1
266 IF K$=CHR$(9) THEN 270
267 FOR K=B TO 11:IF K$<>CHR$(K) THEN 200:NEXT K
270 A=X:B=Y
290 PLOT M,N,CHR$(32)
300 PLOT X,Y,CHR$(35)
310 S=S+1
320 GOTO 110
400 PLOT 2,24,"I'M AFRAID YOU'RE SURROUNDED PAL"
405 T$=STR$(S)
410 WAIT 200
```

67 ►

# For the operator who has everything except perfection

## The EMAX ARCADE PROFESSIONAL™



AIM FOR NOTHING LESS THAN
**TOTAL GAME CONTROL**
2/4/8 WAY GATE INTERCHANGE
COMPLETE QUADRANT ACCURACY

**WARNING!**
THIS PANEL IS A PROFESSIONAL MODULE. IT IS NOT A TOY.



**NOW YOU HAVE THE POWER TO DESTROY THE JOY STICK CHEAP AND NASTIES WITH...**

**...THE NEW SUPER JOY STICK**

NOW AVAILABLE FROM LEADING COMPUTER STORES

**PRICE £38.50**
(VAT INCLUDED)

For VIC 20 — COMMODORE 64 — ATARI — SPECTRUM (with Interface)

from EMAX
COMPUTING
PINFOLD LANE INDUSTRIAL ESTATE
BRIDLINGTON, NORTH HUMBERSIDE
TEL: (0262) 602541/2. TELEX: 527381 EMAX G
24-HOUR ANSWERING SERVICE
EMAX Computing is a division of EUROMAX Electronics Ltd.

NAME .....
ADDRESS .....
.....
.....
ACCESS No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

| QTY: | | PRICE | Total |
|---|---|---|---|
| | ARCADE PROFESSIONAL | £38.50 | |
| | Spectrum Interface | £11.50 | |
| | | P&P | £1.85 |
| | Enclosed Cheque/P.O. | £ | |

ALL TRADE ENQUIRIES WELCOME

# JUNGLE CHASE

| | | |
|---|---|---|
| ▶ 65 | 225 | Bell off if "O". |
| | 230-236 | Check for upward movement, depending on plant position. |
| | 240-246 | Downward movement (cursor down key pressed). |
| | 250-256 | Left. |
| | 260-266 | Right. |
| | 270 | Save position of the explorer. |
| | 290-300 | Update the explorer. |
| | 310 | Update the score. |
| | 320 | Continue the game. |
| | 400 | You are surrounded. |
| | 405 | Put the score into a string. |
| | 410 | Pause. |
| | 414-418 | Print a message depending on the score. |
| | 420-440 | Print the score. |
| | 444 | Check whether the high score has been beaten. |
| | 450-490 | Prompt for another game and act on the answer. |
| | 505 | Wait a bit. |
| | 535 | Set up the new high score. |
| | 537-550 | Printup the new high score. |
| | 555-560 | Print JUNGLE CHASE in double height characters. |
| | 565-580 | Get the new hi-scorer's name. |
| | 1000-1999 | Define the user defined characters for the plant and the explorer. |
| | 2000-2200 | Instructions. |
| | 3000 | Begin the warp routine. |
| | 3005 | Remove explorer from the current position. |
| | 3010-3020 | Select a new random position for the explorer to warp to. |
| | 3025 | Make the warp sound. |
| | 3030 | Replace the explorer. |
| | 3040 | Decrement the number of warps. |
| | 3050 | Continue the game. |
| | 5000-5050 | Save the game three times. |
| | 9010 | Data for the explorer character. |

```
414 IF S<=10 THEN PLOT 2,24,"HUH,SOME EXPLORER YOU WERE ........"
415 IF S>10 AND S<=30 THEN PLOT 2,24,"YOU WEREN'T MADE FOR JUNGLE L
IFE..."
416 IF S>30 AND S<=50 THEN PLOT 2,24,"I THINK YOU NEED MORE EXPERIE
NCE..."
417 IF S>50 AND S<=100 THEN PLOT 2,24,"HARD LINES,BETTER LUCK NEXT
TIME..."
418 IF S>100 THEN PLOT 2,24,"EAT YOU'RE HEART OUT DAVID BELLAMY..."
420 PLOT 2,25,"NEVER MIND,YOU SCORED "
430 PLOT 24,26,T$
440 PLOT 29,26,"POINTS"
444 IF S>HS THEN GOSUB 500
450 PLOT 1,14,"ANOTHER GAME Y/N?"
460 GET D$
475 IF D$="Y" THEN GOTO 7
480 IF D$="N" THEN:CLS:INK 0:PAPER7
485 IF D$<>"N" THEN 460
490 END
500 REM HI-SCORE
505 WAIT 510
535 HS=S
537 PLOT 14,0,CTR$(HS)
538 PRINTCHR$(6):PRINTCHR$(17)
540 CLS:PRINT:PRINT
550 V$="   JUNGLE CHASE HI-SCORE":PRINT
555 PRINT CHR$(132)CHR$(142)+V$
560 PRINT CHR$(132)CHR$(142)+V$
565 PRINT:PRINT:PRINT:PRINT"PLEASE TYPE IN YOUR NAME UP TO 12 CHARA
CTERS"
570 PRINT"LETTERS LONG THEN RETURN":PRINT:PRINT:INPUT H$
575 IF LEN(H$)>15 THEN GOTO 540
576 PRINTCHR$(6):PRINTCHR$(17)
580 RETURN
997 GOTO 15
998 GOT 98
999 END
1000 REM
1005 MESTORE
1010 FOR I=46544 TO 46561:READ J:POKE I,J:NEXT I
1020 FOR I=46240 TO 46255
1030 READ SYMBOL I,0:NEXT I
1999 RETURN
2000 REM INSTRUCTIONS
2010 CLS:INK INT(RND(1)*7)+1:PAPER0
2020 F$="      JUNGLE CHASE":PRINT
2030 PRINTCHR$(132)CHR$(138)+F$
2032 PRINTCHR$(132)CHR$(138)+F$
2040 PRINT
2050 PRINT"  YOU ARE AN EXPLORER AND YOU ARE":PRINT
2052 PRINT"- IN THE DEEPEST AFRICAN JUNGLE WHEN":PRINT
2054 PRINT"  YOU STUMBLE ACROSS A FAST GROWING,":PRINT
2056 PRINT"  MAN EATING PLANT.":PRINT
2058 PRINT"  THE PLANT GIVES CHASE AND YOU MUST":PRINT
2060 PRINT"  KEEP MOVING AWAY FROM IT.":PRINT
2062 PRINT"THE GAME ENDS WHEN YOU ARE SURROUNDED":PRINT
2064 PRINT"YOU TAKE IT IN TURNS TO MOVE AND":PRINT
2066 PRINT"TO MOVE YOU USE THE RELEVANT":PRINT
2067 PRINT"CURSOR KEYS":PRINT
2068 PRINT"      YOU SCORE 1 POINT FOR EACH MOVE"
2070 PRINT"PRESS ANY KEY TO CONTINUE":GET R$
2080 CLS: F$="      JUNGLE CHASE":PRINT
2090 PRINTCHR$(132)CHR$(138)+F$
2100 PRINTCHR$(132)CHR$(138)+F$
2110 INK INT(RND(1)*7)+1:PRINT
2120 PRINT"YOU DO,HOWEVER HAVE ONE 'WEAPON'":PRINT
2130 PRINT"YOU HAVE THREE WARPS.":PRINT
2140 PRINT"IF YOU DO GET SURROUNDED THEN PRESS":PRINT
2150 PRINT"THE SPACE BAR AND YOU WILL DISAPPEAR":PRINT
2160 PRINT"AND REAPPEAR AT A RANDOM POSITION ON":PRINT
2170 PRINT"THE SCREEN.ONCE YOUR STOCK OF WARPS":PRINT
2180 PRINT"HAS RUN OUT THEN YOU START WORRYING.":PRINT
2185 PRINT"IF YOU WANT A BELL WHEN IT IS YOUR":PRINT
2186 PRINT"TURN PRESS 'B' AND IF YOU WANT TO ":PRINT
2187 PRINT"TURN IT OFF PRESS 'O'":PRINT
2190 PRINT"          ***** BEST OF LUCK *****"
2200 PRINT"   PRESS ANY KEY TO START":GET R$:RETURN
3000 REM WARP
3005 PLOT X,Y,CHR$(32)
3010 X=INT(RND(1)*36)+1:IF X<2 THEN GOTO 3010
3020 Y=INT(RND(1)*19)+1:IF Y<2 THEN GOTO 3020
3025 ZAP:ZAP:ZAP
3030 PLOT X,Y,CHR$(35)
3040 W=W-1
3050 GOTO 110
5000 REM SAVE ROUTINE
5005 FOR I=1 TO 3
5010 WAIT 300
5020 CSAVE"JUNGLE CHASE",AUTO
5030 NEXT I
5040 WAIT 300
5050 END
9000 REM DATA
9010 DATA 31,21,31,4,31,4,10,17
```



# Screen dump

**Title** *Screen Dump*
**Machine** *BBC B*
**Application** *Printing*
**Language** *6502 Machine Code Asembler*
**Author** *J M Buckley*

If you have a Centronics 739 printer and a BBC micro computer, then this could be the program for you. This screen dump routine, from J M Buckley of St Albans, takes about four minutes to dump the whole screen because it is written in Assembler. This compares well with an equivalent Basic program, which, the author reckons, will take around 15 to 20 minutes.

The program produces a two tone Graphics Dump. Odd logical colours are printed as solid black, colours with bit one set but not bit zero are printed with alternate dots to give a grey colour. This may be changed in lines 520 to 550 and 650 to 730 of the program. The utility uses PAGE & 11 of the BBC's memory. This is unused except when Data or *SPOOL files are open and allows PAGE to be set as low as &1200 for large programs.

The Screen dump routine itself was designed to work in MODE 0 but will work equally well in all graphics modes. For the lower resolution modes it could be modified to give a more complex range of tones if necessary.

Make sure that the graphics origin has been set to the bottom left hand corner before calling the program (*PRTSCRN with a disk system) by using VDU 29,0;0;.

100 Assemble the code for the screen dump.
110 Switch on the extended messages for the filing system.
120 Save the assembled code under the file name $.PRTSCRN. Note that if data files are being used then the base location &1100 will need to be changed i.e. the code will need to be placed elsewhere in the memory.
130 Reset the filing system messages.
140 End the program.
170 Start the assembling procedure.
180-200 Set up the various variables. Block is used for work space.
210 The code needs to be assembled twice. The first time assembles and takes note of the forward jump addresses. The second pass assigns the addresses to their correct values giving the final code.
220 P% is the origin that the code is assembled to.
240 On the first pass OPO is set to 0 so no assembly errors are generated. The second pass generates an assembly listing.
260-350 Switch on the printer, set printer to graphics mode with the appropriate escape sequence.
370-430 Set up the parameter block for the OSWORD call.
450-490 Re-initialise the zero page locations for each pair of bytes.

```
10REM Centronics Printer machine code
20REM Graphics Dump
30REM J.M.Buckley    3/12/83
40REM Copyright reserved, Unrestricted non-Comsercial use encouraged.!
50REM 2-tone version 2.0
60REM uses zero Page &70 -> &77 for parameter block
70REM uses Page &11 for Prograa, D.K. if no data files. Change lines
80REM 120 and 220 if required.
90
100PROCasseable
110*OPT1,2
120*SAVE $.PRTSCRN 1100 11Cb 1100
130*OPT1,0
140END
150
160
170DEFPROCasseable
180block =&70
190oswrch=&FFEE
200osword=&FFF1
210FOR pass=0 TO 3 STEP 3
220P%=&1100
230[
240OPT pass
250.dump_screen
260             LDA £2                  \ Enable printer
270             JSR oswrch
280             LDA £13                 \ start printer at new line
290             JSR wrch_to_printer
300             LDA £27                 \ Switch printer to graphics
310             JSR wrch_to_printer     \ mode with sequence
320             LDA £37                 \ ESC,1,0
330             JSR wrch_to_printer
340             LDA £48
350             JSR wrch_to_printer
360
370             LDA £10                 \ set up parameter block for OSWORD
380             STA block               \ LSB of X
390             LDA £0
400             STA block +1            \ MSB of X
410             STA block +2            \ LSB of Y
420             STA block +3            \ MSB of Y
430
440.loop1
450             LDA £0
460             STA block +5            \ space to build printer bytes
470             STA block +6
480             LDA £5
490             STA block +7            \ bit counter while building bytes
500.loop2
510             LDX £ block MOD 256     \ Set up registers for OSWORD Call
520             LDY £ block DIV 256
530             LDA £9
540             JSR osword
550             LSR block +4            \ result bit 0 into Carry
560             ROL block +5            \ rotate back into printer byte 1 LSB
570             LSR block +4            \ result bit 1 into Carry
580             ROL block +6            \ rotate back into printer byte 2 LSB
590             SEC
600             LDA block               \ reduce X by 2 for each bit
610             SBC £2
```



# Look to the stars for the best in printing




*GEMINI and DELTA, a new range of Star Performers —the ideal complement to any computer system. At prices starting from £219 + VAT, the GEMINI and DELTA open up a new world of printing power — quiet, fast printing in a range of different character types, print pitches and print densities and ultra high resolution graphics and programmable down-loadable characters for good measure.*

*GEMINI and DELTA — professional solutions to the printer problem.*

**KEY FEATURES:**

- **120 CPS (Gemini), 160 CPS + 8K buffer (Delta)**
- **Friction, tractor and roll feed**
- **Ultra high resolution graphics**
- **Normal, expanded and condensed print**
- **Emphasized and double strike print**
- **Superscripts and subscripts**
- **True underlining**
- **Italics and international characters**
- **Downloadable character set**
- **Interface — Gemini (parallel), Delta (parallel & RS232)**
- **Full one year parts and labour warranty**

**Micro Peripherals Ltd**

*'THE POWER BEHIND THE PRINTED WORD'*

69 The Street, Basing, Basingstoke, Hants. RG24 0BY

Tel: 0256 3232 (12 lines) Telex: 859669 MICROP G

*Call your local dealer now for full information on the GEMINI and DELTA printers or clip this coupon and we'll send you brochures and print samples.*

*Name*.....

*Address*.....

.....

.....*Tel. No.* .....

# Not all home computers stay at home.

The BBC Micro is the ideal family computer–simple to operate, yet fast, powerful, with enormous potential.

But it's nice to know, when you buy one for your home, that the business, educational and scientific worlds agree with your choice.

Here are a few stories to illustrate how the BBC Micro gets out and about. And one to remind you how helpful it can be when it stays at home.



## A practical lesson in business admin.

The contribution of the BBC Micro in the classroom has long been recognised at Perins Community School in Hampshire.

The School has 12 BBC Micros used extensively across the syllabus: in fact some pupils are using them to study for their GCE O Levels in computing.

One of the programs available to Perins teachers such as David Beck, pictured below with his class, is "Newsagent."

This program contains all the necessary information for the class to run a newsagent's shop; allowing them to organise daily deliveries, make up bills and keep an eye on stock control and ordering.

It's a nice example of how the BBC Micro can be used not only to acquaint a class with the language of computers, but also with some of the realities of the community in which they live.



## Correcting Jodrell Bank.

The BBC Micro is a familiar worker around Jodrell Bank.

You'll find it in the reception area explaining the workings of a radio telescope to visitors, for example.

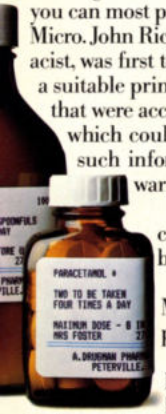
But it's also been helping in a more testing task: to improve the performance of the Defford telescope.

In this application it has been used to make calculations necessary to determine the precise parabolic shape of the dish.

Theodolites are used to do the measuring–then the BBC Micro works out the necessary corrections.

## The end of the scrawl.

If any of you have noticed how much easier it is to read and understand labels on drugs and medicines these days, then you can most probably thank the BBC Micro. John Richardson, a Preston pharmacist, was first to realise how a micro with a suitable printer could produce labels that were accurate and legible and which could include, automatically, such information as drug reaction warnings.




At the same time it could record drug usage for better stock control.

He chose the BBC Micro for its versatility and potential for expansion.

John Richardson believes that this system will be recognised as standard in the profession and be used in hospitals, health centres and pharmacies throughout the UK.

## Meanwhile back at home.

Dr. & Mrs. Yarwood bought a BBC Micro as a birthday present for their 12 year old daughter.



However, it quite quickly became common property.

All three can now write their own programs. Mrs. Yarwood is particularly proud of one program she has compiled to help teach her daughter French vocabulary.

They all agree that although the Micro is fast and powerful enough to be at home in Jodrell Bank, it is also the ideal computer at the Yarwood home: simple to set up (virtually any TV set and cassette player is all you need) and simple to use.




## All this for only £399.

The BBC Micro comes with a comprehensive, step-by-step User Guide which introduces you to your micro and shows you how to construct useful programs of your own.

You will also receive a free "Welcome" cassette which contains 15 different programs for you to experiment with, ranging from music and graphics to games like Kingdom and Bat 'n' Ball.

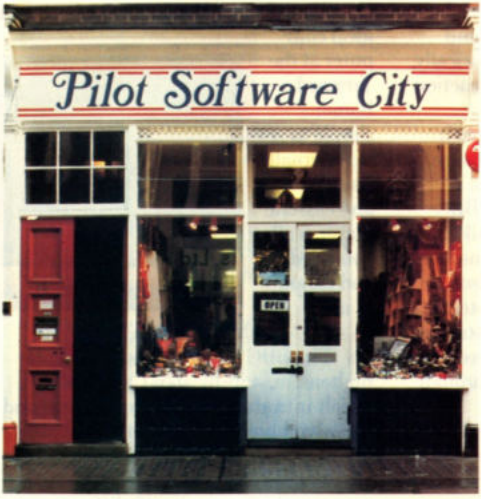
The BBC Micro is available from W H Smith Computer Shops, Boots, John Lewis and local Acorn stockists.

Alternatively if you would like to order one with your credit card or if you want the address of your nearest supplier just phone 01-200 0200 or 0933-79300.

**The BBC Microcomputer System.**

Designed, produced and distributed by Acorn Computers Limited.

# Pilot Software City




**WE HAVE THE LARGEST SELECTION OF GAMES AND EDUCATIONAL SOFTWARE IN LONDON**

***COME AND VISIT THE SPECIALIST SOFTWARE SHOP AND FIND OUT FOR YOURSELF***



*OPEN 10-7 MON-FRI*
*10-5 SATURDAY*

- ★ Games and Education
- ★ Books, Magazines & Supplies
- ★ Software Demonstration
- ★ Computer-time Rental
- ★ Business Software
- ★ Data Base Design
- ★ Accessories and Furniture




*32 Rathbone Place, London, W1P 1AD. 01 636 2666 4 minutes Tottenham Court Road Tube*

# SCREEN DUMP



510-670 Perform OSWORD call, transfer bit 0 of the result to byte 1, bit 2 to byte 2, shifting bytes left (equivalent to multiplying by two), decrement the X pointer in zero page, by two. Do this for six bytes.

680-760 You now have two numbers between 0 and 63. The printer requires them between 32 and 95 so add 32. OR the second byte with the first to give solid black for odd colours.

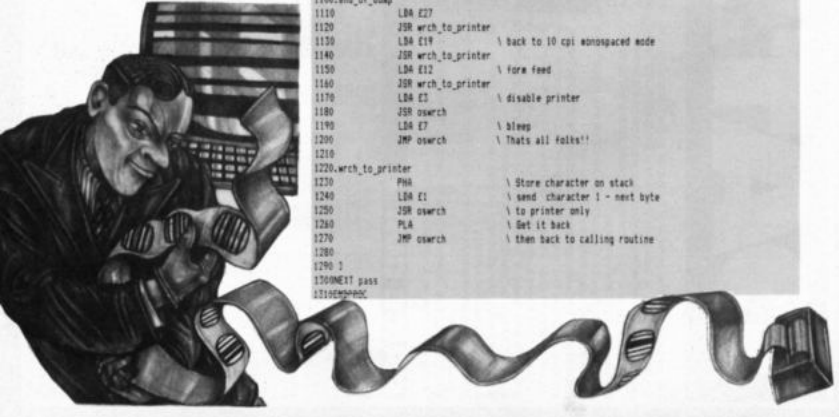
790-930 Increase the Y pointer by four. If Y is now 1024 you have reached the end of the line, otherwise restore X to what it was at the begining of this pair of bytes by adding 12.

950-1090 Send a return to the printer and zero Y. Add 24 to X (12+12 for a new line) If X is greater than 1279 then the dump is finished.

110-1200 You have finished, so restore the printer to normal operation; send a form feed, switch it off, BLEEP.

1230-1270 Subroutine to precede character by 1, ensuring it is sent only to the printer. Works on all OS types.

```
620             STA block
630             LDA block +1
640             SBC £0
650             STA block +1
660             DEC block +7        \ 6 pixels for each byte
670             BPL loop2
680             LDA block+5
690             CLC
700             ADC £32             \ bring to correct range for 739
710             JSR wrch_to_printer
720             LDA block +6        \ second byte
730             ORA block +5        \ Or with byte 1 ( odd colours solid )
740             CLC
750             ADC £32             \ bring to 739 range
760             JSR wrch_to_printer
770             LDA block +2
780             CLC
790             ADC £4              \ increase Y by 4
774 2         STA block +2
810             LDA block +3
820             ADC £0
830             STA block +3
840             CMP £4
850             BEQ newline         \ Y has reached max value so end of line
860             LDA block
870             CLC
880             ADC £12             \ Restore Value of X for new byte
890             STA block
900             LDA block +1
910             ADC £0
920             STA block +1
930             JMP loop1           \ go back for next byte
940.newline
950             LDA £13             \ newline to printer
960             JSR wrch_to_printer
970             LDA £0              \ Set Y back to zero
980             STA block +2
990             STA block +3
1000            LDA block
1010            CLC
1020            ADC £24             \ increase X by 24 ( from end of one
1030            STA block           \ byte to start of next)
1040            LDA block+1
1050            ADC £0
1060            STA block +1
1070            CMP £5
1080            BEQ end_of_dump     \ X has reached max value also
1090            JMP loop1
1100.end_of_dump
1110            LDA £27
1120            JSR wrch_to_printer
1130            LDA £19             \ back to 10 cpi monospaced mode
1140            JSR wrch_to_printer
1150            LDA £12             \ form feed
1160            JSR wrch_to_printer
1170            LDA £3              \ disable printer
1180            JSR oswrch
1190            LDA £7              \ bleep
1200            JMP oswrch          \ Thats all folks!!
1210
1220.wrch_to_printer
1230            PHA                  \ Store character on stack
1240            LDA £1               \ send  character 1 - next byte
1250            JSR oswrch           \ to printer only
1260            PLA                  \ Get it back
1270            JMP oswrch           \ then back to calling routine
1280
1290 ]
1300NEXT pass
1310[wwwww
```



# DATABASICS

This six-page guide lists as many of the micros on the market for under £12,000 as possible. In Databasics you'll find all the specifications for the machines, add-ons and software necessary to make your buying decisions.

PCN keeps you up to date in three-week cycles, starting with hardware, then peripherals and finally software.

**PRICE** Specifications listed for each machine indicate what you get for the basic price quoted, which includes VAT.

**PROCESSOR TYPE** a microprocessor is the heart of the computer. The Z80 and 6502 are popular 8-bit chips. The 8088 and 68000 are common 16-bit chips. If a machine has an 8-bit and a 16-bit processor we have listed the 16-bit only. Cust. means custom-built.

**SPEED IN MHz** Speed of the clock used to drive the microprocessor, measured in MegaHertz (million cycles per second).

**STANDARD RAM** Amount of main memory used on the system. The capacity is expressed in kilobytes.

**MAX RAM normally at extra cost** Amount of memory to which the system can be expanded.

**MAX CHARACTERS columns × lines** The number of characters that can be displayed across the screen and the number of lines down.

**METHOD (at extra cost)** This indicates the way the computer displays information. **M** on its own means that a monitor is included in the basic price. **Tv** indicates that you can plug the computer into a television set (**M+**) indicates that the monitor costs extra. **LCD** = Liquid crystal display.

**COLOUR CAPABILITY** tells you whether the machine can give colour at the basic price quoted.

**MAX DOT RESOLUTION** gives the maximum number of points across the screen by the number of points down the screen that are available for graphics.

**KEYBOARD** This tells you the type of keyboard that comes with the machine. **W** = word processing, **C** = calculator and **T** = touch-sensitive.

**No OF FUNCTION KEYS** refers to the number of keys that can be used for different jobs by different programs.

**NUMERIC PAD** indicates whether the machine has a separate calculator-style group of number keys to enter data quickly.

**INTERFACES BUILT-IN** shows the number of standard connections built into the machine.

**CASSETTE FACILITY** gives a yes or no as to whether or not the machine can use a cassette to store data.

**CAPACITY PER DISK AND DISK SIZE** tells you how many disk drives come with the machine, and the amount of data in kilobytes (K) or megabytes (Mb) that can be stored on each drive. There are two sizes for disks, 5¼" or 8", and they can be floppy (**F**) or hard (**H**).

**OPERATING SYSTEM** gives the program that looks after the general running of a computer.

**LANGUAGES INC** is a column which lists the programming languages that come with the machine at the basic price.

**OTHER LANGUAGES AVAILABLE** indicates whether or not other programming languages are available for the machine.

**DISTRIBUTOR** To find which company distributes the machine refer to the distributor table from the code listed in this column. The table is at the end of the listings, and gives the distributor's name and telephone number.

All details given are the latest available. We ask distributors to let us know as soon as machine specifications change so Databasics can be kept right up to date. This guide has been meticulously researched and the information collected from individual distributors listed.

## PRICE GUIDE

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sinclair ZX81 | £40 | Datac Micro Controller | £431 | Televideo TS-800 Series | £1,495 | Adler Alphatronic P2 | £2,197 | Britannia Baby | £2,657 | Samurai | £3,214 | Altos 800-15 | £5,663 |
| Casio PB100 | £50 | Powertran Cortrex | £454 | HP86A | £1,570 | Country Com'ters C3000 | £2,242 | Adler Alphatronic P3 | £2,696 | Tiger | £3,214 | Durango F85 | £5,744 |
| TRS-80 PC4 | £50 | Epson HX20 | £472 | Osborne I | £1,581 | Kemitron K2000E | £2,242 | Corona PC1 | £2,697 | Torch | £3,214 | Triton 4 | £5,744 |
| Aquarius | £50 | Tandy TRS-80 Model 100 | £499 | Signet 10025 | £1,599 | Flair Black Box 320S | £2,242 | Eagle II | £2,702 | Future FX30 | £3,220 | SWTech. Products 50'9 | £5,750 |
| Laser 200 | £70 | Nascom 3 | £549 | APL Signet | £1,610 | Sanyo MBC 2000 | £2,242 | Almarc 801 | £2,708 | Sord M223 | £3,277 | BASF 7100 | £5,805 |
| Oric-1 | £80 | Commodore 4016 | £632 | Basis 108 | £1,683 | Toshiba T-200 | £2,242 | DEC Rainbow 100 | £2,714 | Kontron RS180 | £3,306 | Compustar | £5,837 |
| Sharp PC1251 | £80 | Research Machine 480Z | £650 | Commodore Spr. Pet 9000 | £1,719 | TMK 332 | £2,242 | ICL PC Model 10 | £2,754 | Kaypro 10 | £3,340 | Sord M243 | £5,842 |
| Jupiter Ace | £90 | DAI PC | £684 | Gemini Galaxy 2 | £1,719 | Merlin M2215 | £2,742 | Milbank SX10 | £2,754 | Columbia PC 1600-1 | £3,392 | Sage IV | £5,962 |
| Casio FX702P | £90 | Apple II | £776 | ACT Apricot | £1,719 | Bonsai SM 3000 | £2,294 | Sirius I | £2,754 | Digico Prince | £3,392 | Rair Business Computer | £6,037 |
| Sinclair Spectrum | £99 | Commodore 500 | £799 | Microsolution Brit. Genius | £1,840 | CAL PC | £2,294 | Victor 9000 | £2,754 | OEM Orion | £3,392 | Superstar | £6,296 |
| Tandy TRS-80 Pocket 2 | £130 | Tandy Model 4 | £861 | Globe 101 | £1,850 | Sanyo MBC 1250 | £2,294 | North Star Advantage | £2,766 | Barcelitos AMT 100 | £3,450 | Racal 6000 | £6,327 |
| Commodore VIC 20 | £140 | HP 75C | £883 | Grundy 8200 | £1,850 | Casu Mini C2 | £2,300 | Apple III | £2,780 | Kalamazoo 1050 | £3,450 | TI System 200-250 | £6,695 |
| Atari 400 | £149 | Sharp MZ80B | £900 | Genie III | £1,897 | Seed System I | £2,300 | Sanyo MBC 4050 | £2,817 | Digital Microsystems 3 | £3,576 | Wicat 150 | £6,846 |
| Sord M5 | £150 | Franklin Ace | £914 | Toshiba T-100 | £1,900 | Sharp PC3201 | £2,300 | Bonsai SM 4000 | £2,842 | Corvus Concept | £3,594 | Sundance I | £6,969 |
| Atari 600XL | £160 | Apple IIe | £972 | Sord M23 | £1,932 | HP 85 | £2,360 | Logica VTS Vitesse | £2,863 | Televideo TS 1602-C | £3,714 | Pascal Mod. Microengine | £7,003 |
| Colour Genie | £168 | Mupid 320 GB | £978 | Kaypro II | £1,949 | HP Series 100, 120 | £2,362 | Decision-1 Computer O11 | £2,869 | Adds Multivision | £3,795 | Apple Lisa | £7,653 |
| Sharp PC1500 | £169 | Husky Hunter | £997 | Krypton 800 range | £1,949 | Sord M23P | £2,369 | Olivetti M20 | £2,869 | Clenio Pronto | £3,795 | Sundance II | £8,205 |
| Dragon 32 | £174 | Commodore 8032 | £1,129 | Kenilworth 83G | £1,953 | TI Prof. Computer | £2,386 | DMS Fox | £2,875 | Panasonic JD800M | £3,795 | Hayewood Hinet | £9,550 |
| Texas CC40 | £180 | Commodore 710 | £1,144 | Transam Truscan | £1,983 | IBM PC | £2,392 | Eagle III | £2,950 | Kemitron K3000 | £3,795 | Altos 856-10 | £9,631 |
| Tandy TRS-80 colour | £180 | Microdecision | £1,144 | NCR Decision Mate V | £1,983 | Xerox 820 Model II | £2,415 | Zenith ZF-120-22 | £2,978 | DEC PC 350 | £3,850 | Sundance 16 | £10,480 |
| Mattel Intellivision | £190 | Duet 16 | £1,144 | Epson QX10 | £1,995 | Haywood 3000 | £2,439 | Monroe EC 8800 | £2,990 | Vector 4 | £3,852 | Spectrum | £11,442 |
| Electron | £199 | Tulip 1 | £1,150 | IDS Datamachine | £1,995 | LSM4 | £2,472 | Philips P3500 | £3,000 | Cifer Club | £3,904 | | |
| Camputers Lynx | £225 | Fujitsu FM8 | £1,150 | Tandy TRS-80 Model II | £1,999 | Canon CX-1 | £2,500 | Tanberg EC10 | £3,000 | Sage II | £4,019 | | |
| Dragon 64 | £225 | Sanyo MBC 1000 | £1,195 | Kenilworth 83N | £2,012 | Sirius 1 | £2,525 | Archives 1 | £3,003 | Tandy TRS-80 Model 16 | £4,199 | | |
| Commodore 64 | £229 | Pied Piper | £1,226 | Caltext Micro | £2,019 | IOTech Iona | £2,539 | Cromemco System 1 | £3,025 | IBM PCXT | £4,258 | | |
| Sharp MZ700 | £250 | Positron 900 | £1,259 | Minstrel | £2,059 | HP 87XM | £2,571 | Wang Professional | £3,076 | Hytech H4500 | £4,310 | | |
| Atari 800XL | £250 | Tandy TRS-80 Model III | £1,299 | Portico Miracle Portable | £2,064 | Quantum 2000 | £2,587 | DECPC 325 | £3,080 | BMC OK 11 F800, Model 20 | £4,360 | | |
| New Brain A | £269 | Cromemco C10 | £1,350 | LSIM3 | £2,064 | Ajile | £2,599 | Direct 1000 | £3,093 | ADS 42 | £4,500 | | |
| Genie II | £299 | Commodore 8096 | £1,374 | Haywood 9000 Composite | £2,064 | Canon AS100 | £2,633 | Equator | £3,099 | Televideo TS-80ZH | £4,500 | | |
| Atari 800 | £300 | NEC PC 8001 | £1,375 | Research Machines 380Z | £2,147 | CP1100 | £2,639 | Hyperion | £3,100 | Country Com'ters C1000 | £4,542 | | |
| Nascom 2 | £327 | Pasca 640 | £1,437 | Superbrain JR | £2,150 | Seed System 19 | £2,600 | Clenio Table-Tops 925 | £3,105 | Micro Five 1000 | £5,175 | | |
| Microtan 65 | £389 | NEC PC8000 | £1,454 | Future Computers FX-20 | £2,156 | Enterprise 1000 | £2,645 | ITT 3030 | £3,105 | Fortune 32:16 System 2 | £5,204 | | |
| 86C Model B | £399 | Signet 2 | £1,483 | C WP Cortex | £2,179 | Facit 6520 | £2,645 | HP Series 200 Model 16A | £3,211 | Zeus 4 | £5,400 | | |
| Sharp MZ80A | £399 | Magnum | £1,489 | Comart Communicator | £2,180 | Olympia Boss Model A | £2,645 | Cifer Series 1 | £3,214 | Molecular M200 | £5,462 | | |

**ABBREVIATIONS**

Ap: APL
As: Assembly
Ba: Basic
Co: Cobol
Cm: Comal
Fr: Forth
Fn: Fortran
Pa: Pascal

# HARDWARE

| Make and model | Price inc VAT | Processor type | Speed (in MHz) | Standard RAM | Max RAM — normally at extra cost | Display: Max characters columns × lines | Display: Method (at extra cost) | Display: Colour capability | Graphics: Max dot resolution | Keyboard: Type of keyboard | Keyboard: No. of function keys | Keyboard: Numeric pad | Interfaces built-in: No. of RS232 | Interfaces built-in: No. of Centronics | Interfaces built-in: No. of IEEE 488 | Interfaces built-in: No. of others | Interfaces built-in: No. of expansion slots | Storage: Cassette facility | Storage: Capacity per disk and disk size | Operating system | Languages inc | Other languages available | Distributor | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ACT Apricot | £1,719 | 8086A | 5 | 256K | 768K | 80×25 | LCD | | 800×400 | W | 8 | ● | 1 | 1 | | | 2 | | 2×315K3½F | MSDOS | Ba | ● | A7 | *PCN* issue 37 |
| Adds Multivision | £3,795 | 8085A | 5 | 64K | 256K | 80×25 | M | | 640×240 | W | 28 | | 1 | | | 1 | | | 1×350K5¼F | CP/M2.2, Muon | Ba | ● | A2 | Multi user system |
| Adler Alphatronic P2 | £2,197 | 8085A | 3 | 48K | 64K | 80×24 | M | | | W | 6 | ● | 2 | | | 1 | 3 | | 2×320K5¼F | CP/M | Ba | ● | T1 | £327 buys extra storage |
| Adler Alphatronic P3 | £2,696 | 8085A | 3 | 64K | | 80×24 | M | | | W | 6 | ● | 2 | | | 1 | 3 | | 2×790K5¼F | CP/M | | ● | T1 | 16 bit option-promised |
| Ajile | £2,599 | 8088 | 4 | 256K | | 80×25 | M | | 640×250 | W | 10 | ● | 1 | 1 | | 2 | | | 2×320K5¼F | MS-DOS | BaAs | ● | A9 | *PCN* issue 13 |
| Almarc 801 | £2,708 | Z80 | 4 | 64K | 512K | 80×25 | (M+) | ● | | W | | | 2 | | | | 11 | | 2×800K5¼F | CP/M | | ● | A4 | 8-bit range goes to 20Mb |
| Aquarius | £68 | Z80A | 4 | 4K | 52K | 40×24 | TV | ● | 320×192 | C | | | | | | | 1 | ● | | Cassette | Ba | | M7 | *PCN* issue 7 |
| Altos 800/15 | £5,663 | Z80 | 4 | 192K | 208K | 80×24 | M | | | W | 8 | ● | | | 1 | | | | 1×450K5¼F | MP/M | | ● | L1 | Multi user business machine |
| APL Signet | £1,610 | Z80A | 4 | 64K | | 80×25 | Tv(M+)* | ● | | * | | | 2 | | | | | | 2×188K5¼F | APL, CP/M | Ap | ● | M1 | *APL terminal recommended |
| Apple II | £776 | 6502 | 1 | 48K | 128K | 40×24 | Tv(M+) | ● | 256×192 | W | | | | | | | 8 | ● | | CP/M, DOS 3.3, UCSD-P | Ba | ● | A8 | Plenty of software and extras |
| Apple IIe | £972 | 6502 | | 64K | 128K | 80×24 | (M+) | ● | 256×192 | W | | | | | 1 | | 8 | | | DOS | Ba | ● | A8 | Updated Apple II |
| Apple III | £2,780 | 6502 | 2 | 128K | 256K | 80×24 | (M+) | ● | 560×192 | W | | ● | 1 | | | | 4 | | 1×140K5¼F | SOS, DOS | | ● | A8 | Will emulate Apple II |
| Apple Lisa | £9,775 | 68000 | 8 | 1Mb | | 120×30 | M | | 792×360 | W | | ● | 2 | 1 | | | 3 | | 2×860K5¼F | Lisa | | ● | A8 | *PCN* issue 1 |
| Archives I | £3,003 | Z80 | 4 | 64K | | 80×25 | M | ● | 240×100 | W | 23 | ● | 2 | 1 | | 1 | 5 | | 2×386K5¼F | CP/M | | ● | S1 | Standard CP/M + graphics |
| Atari 400 | £150 | 6502B | 1.79 | 16K | | 40×24 | Tv | ● | 320×192 | T | 3 | | | | | | 7 | | | Cassette | Ba | ● | A5 | Games computer |
| Atari 800 | £300 | 6502 | 1.8 | 48K | | 40×24 | Tv(M+) | ● | 320×192 | W | 3 | | | | | | 7 | 4 | ● | Cassette | Ba | ● | A5 | Versatile, good graphics |
| Atari 600XL | £160 | 6502C | 1.79 | 16K | 64K | 40×24 | (M+)Tv | ● | 320×192 | W | 5 | | | | | | 4 | 1 | ● | 1×127K5¼F | DOS 2 | Ba | ● | A5 | Dos 3 available 1984 |
| Atari 800XL | £250 | 6502C | 1.79 | 64K | | 40×24 | (M+)TvM | ● | 320×192 | W | 5 | | | | | | 4 | 1 | ● | 1×127K5¼F | DOS 2 | Ba | ● | A5 | 256 colours, 128 at any one time |
| Barcellos AMT 100 | £3,450 | Z80A | 4 | 64K | 256K | 80×24 | TvM | | | W | 8 | ● | 1 | 1 | | | 2 | 3 | | 2×500K8F | CP/M | BaCo | ● | B1 | Up to four users |
| BASF 7100 | £5,805 | Z80A | 4 | 64K | | 80×24 | M | | | W | 26 | ● | 1 | 1 | | | | | | 3×163K5¼F | BOS | Ba | ● | C1 | Hard disk promised |
| Basis 108 | £1,683 | 6502 | 1 | 64K | 126K | 80×24 | TvM | ● | 820×168 | W | 15 | ● | 1 | 1 | | | 6 | ● | | | | | C12 | Apple bus, Z80, 80 columns |
| BBC Micro Model B | £399 | 6502 | 2 | 32K | | 80×30 | Tv(M+) | ● | 640×256 | W | 10 | | | 1 | | 5 | 3 | ● | | MOS | BaAs | ● | A1 | *PCN* issue 3 |
| BMC OKI if 800, Model 20 | £4,360 | Z80B | 5 | 64K | 256K | 80×25 | M | ● | 640×200 | W | 15 | ● | 1 | | | | | ● | 2×340K5¼F | CP/M | Ba | ● | E1 | Built-in printer |
| Bonsai SM 3000 | £2,294 | Z80 | 2 | 64K | | 80×24 | M | | 80×24 | W | 14 | ● | 1 | 1 | | | | | 2×350K5¼F | CP/M | | ● | B2 | CP/M business machine |
| Bonsai SM 4000 | £2,842 | 8088 | 5 | 128K | 256K | 80×24 | M | | | W | 14 | ● | 1 | 1 | | | | | | CP/M, MP/M, MS-DOS | | ● | B2 | Z80 for 8 bit software |
| Britannia Baby | £2,657 | 8085 | 6.14 | 64K | | 80×25 | Tv(M+) | | 80×25 | W | 11 | ● | 2 | 1 | | | | | 2×500K5¼F | CP/M | AsBaCo | ● | B3 | Cobol language included |
| British Micro Mini 803 | £1,490 | Z80A | 4 | 64K | | 80×25 | (M+) | | 512×256 | W | 17 | ● | 1 | 1 | | 1 | | | 2×400K5¼F | OS/M | | ● | B4 | This is CP/M compatible |
| CAL PC | £2,294 | 8088 | 5 | 128K | 256K | 80×25 | TvM | ● | 256×512 | W | | ● | 2 | 1 | | 1 | 5 | | 2×400K5¼F | CP/M | Ba | ● | C3 | Also Z80B Processor |
| C-Base 64A | £401 | 6502 | 1 | 64K | 192K | 40×24 | Tv(M+) | ● | 256×192 | W | 51 | ● | | | | | 8 | ● | | CP/M, DOS 3.3, UCSD-P | Ba | ● | W3 | Apple II compatible |
| Caltext Micro | £2,019 | Z80A | 4 | 64K | 256K | 80×24 | TvM | | | W | 36 | ● | 1 | 1 | | | 3 | | 2×400K5¼F | CP/M | | ● | C3 | Range of software included |
| Camputers Lynx | £225 | Z80A | 4 | 48K | 192K | 40×24 | Tv(M+) | ● | 248×256 | W | | | | 1 | | 1 | | ● | | CP/M | Ba | ● | C5 | Also 128K with CP/M |
| Canon AS100 | £2,633 | 8088 | 4 | 128K | 512K | 80×25 | M | ● | 640×400 | W | 12 | ● | | 1 | | | 4 | | 2×640K5¼F | | | ● | C4 | Choice of CP/M86 or MS-DOS |
| Canon CX-1 | £2,500 | 6809 | 4 | 128K | 256K | 80×24 | M | | 80×25 | W | 15 | ● | 3 | 1 | 1 | | 2 | | 2×320K5¼F | MCX | BaAs | ● | C4 | Pascal, Fortran as extras |
| Casio FX 702P | £90 | Cust. | | 2K | | 20×1 | LCD | | | C | | | | | | | | ● | | Cassette | Ba | | C6 | Pocket computer |
| Casio PB100 | £50 | Cust. | | 0.7K | 1.7K | 60×1 | LCD | | | C | | ● | | | | | 1 | ● | | Cassette | Ba | | C6 | Business pocket computer |
| Casu Mini C Mark 2 | £2,300 | Z80A | 4 | 64K | | * | (M+) | | * | | | | 4 | 1 | | | 6 | | 2×1Mb8F | | | ● | C7 | *Choose your own terminal |
| Cifer Series 1 | £3,214 | Z80 | 4 | 128K | 320K | 132×32 | TvM | | | W | 40 | ● | 3 | 1 | | | | | 2×800K5¼F | CP/M | | ● | C17 | Other models available |
| Cifer Club | £3,904 | Z80A | 4 | 64K | 256K | 80×24 | M | | 1024×300 opt | W | 20 | ● | 3 | 1 | 1 | | | | 1×800K 5¼F | CP/M, MP/M opt, UNIX opt | | ● | C17 | Optional 68000 processor |
| Clenlo Pronto | £3,795 | Z80A | 4 | 64K | 1Mb | * | Tv(M+) | | * | * | | | 2 | 2 | | | 18 | | 2×600K8F | CP/M | Ba | ● | C8 | *Choice of terminal |
| Clenlo Table-Top 925 | £3,105 | Z80A | 4 | 64K | 128K | 80×25 | M | | | W | 11 | ● | 2 | 2 | | | | | 2×600K8F | CP/M | | ● | C8 | Watch out for the weight |
| Columbia PC1600-1 | £3,392 | 8088 | 4.77 | 128K | 1Mb | 80×24 | M | ● | 640×200 | W | 10 | ● | 2 | 1 | | | 8 | | 2×320K5¼F | CP/M, MS-DOS | Ba | ● | I1 | An IBM lookalike |
| Commodore VIC 20 | £140 | 6502 | 1 | 5K | 32K | 22×23 | Tv(M+) | ● | 176×158 | W | 8 | | | | | 3 | 1 | ● | | Kernal | Ba | ● | C9 | Very popular home micro |
| Commodore 64 | £229 | 6510 | 1 | 64K | | 40×25 | Tv(M+) | ● | 320×200 | W | 8 | | | | | 3 | | ● | | Kernal | Ba | ● | C9 | *PCN* issue 24 |
| Commodore 4016 | £632 | 6502 | 1 | 16K | 32K | 40×25 | TvM | | | W | | ● | | | 1 | 1 | 3 | ● | | Cassette, PETDOS | Ba | ● | C9 | The original PET |
| Commodore 700 | £1,144 | 6509 | 2 | 128K | 896K | 80×25 | TvM | | | W | 10 | ● | 1 | | 1 | 2 | 1 | ● | | Kernal | Ba | ● | C9 | *PCN* issue 5 |
| Commodore 8032 | £1,129 | 6502 | 1 | 32K | 96K | 80×25 | TvM | | | W | | ● | | | 1 | 1 | | ● | | Cassette, PETDOS | Ba | ● | C9 | The 80-column PET |

# HARDWARE

| Make and model | Price inc VAT | Processor type | Speed in MHz | Standard RAM | Max RAM — normally at extra cost | Display: Max characters columns × lines | Display: Method (at extra cost) | Display: Colour capability | Graphics: Max dot resolution | Keyboard: Type of keyboard | Keyboard: No. of function keys | Keyboard: Numeric pad | Interfaces built-in: No. of RS232 | Interfaces built-in: No. of Centronics | Interfaces built-in: No. of IEEE 488 | Interfaces built-in: No. of others | Interfaces built-in: No. of expansion slots | Storage: Cassette facility | Storage: Capacity per disk and disk size | Operating system | Languages inc | Other languages available | Distributor | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Commodore Super Pet 9000 | £1,719 | 6502 | 2 | 96K | | 80×25 | TVM | | | W | | ● | 1 | | 1 | 1 | 2 | ● | | Cassette, PETDOS | Ba | ● | C9 | Top of the range |
| Compustar | £5,837 | Z80A | 4 | 64K | | 80×25 | M | | | W | | ● | 2 | | | | | | 1×10Mb8H+1×350K5¼F | CP/M | Ba | ● | I10 | Networking system |
| Comart Communicator CP100 | £2,180 | Z80 | 4 | 64K | 512K | 80×24 | M | | | W | | ● | 2 | 1 | | | 10 | | 2×390K5¼F | CP/M | | ● | C13 | Business CP/M micro |
| Corona PC1 | £2,697 | 8088 | 5 | 256K | 512K | 80×24 | M | ● | 640×320 | W | 1 | ● | 1 | 1 | | | | | 2×144K5¼F | CP/M | Ba | | N1 | Price includes twin disk drive |
| Corvus Concept | £3,594 | 68000 | 8 | 256K | 1Mb | 120×60 | M | | 720×560 | W | 10 | ● | 2 | | | 1 | 4 | | | Merlin | Pa | ● | K1 | A4 shaped screen |
| Country Computers C1000 | £4,542 | 6502 | 1 | 64K | 128K | 80×24 | M | | 280×192 | W | 12 | ● | 1 | | | | 3 | | 1×10Mb5¼H+1×140K5¼F | DOS, CP/M | Ba | ● | C16 | Runs all Apple software |
| Country Computers C3000 | £2,242 | Z80A | 4 | 64K | 256K | " | " | | | " | | | 1 | 1 | | | | | 1×5Mb5¼H+1×500K5¼F | CP/M | | ● | C16 | *Terminal own choice |
| CP1100 | £2,639 | 8086 | 6 | 128K | 1Mb | " | (M+)* | | | " | | | 2 | 1 | | | 7 | | 2×390K5¼F | CP/M 86 | | ● | C13 | Choose your own terminal |
| Cromemco System 1 | £3,025 | Z80 | 4 | 64K | | 80×24 | (M+) | ● | 450×735 | W | 20 | ● | 1 | | | | 8 | | 2×390K5¼F | CDOS, Crom | | ● | C13 | Upgrades available |
| Cromemco C10 | £1,350 | Z80 | 4 | 64K | | 80×25 | M | | 80×25 | W | | | 2 | 1 | | | | | 1×390K5¼F | CP/M | Ba | ● | C18 | Low cost CP/M machine |
| C/WP Cortex | £2,179 | Z80 | | 64K | | 80×25 | M | | 600×240 | W | 10 | ● | 1 | 1 | | | | | 2×360K5¼F | CP/M | Ba | ● | C20 | Z80 plus 6502 |
| DAI PC | £684 | 8080 | 2 | 48K | | 60×24 | Tv(M+) | ● | 255×335 | W | | | 1 | | | | | ● | | Cassette | Ba | | D9 | Optional maths chip |
| Datac Micro Controller | £431 | Z80 | 2 | 16K | | 40×24 | Tv(M+) | | 80×60 | W | | | 1 | | | 1 | 1 | ● | | | Ba | ● | D1 | Mainly used in labs |
| DEC Rainbow 100 | £2,714 | 8088 | N/A | 64K | 192K | 132×24 | M | ● | 960×240 | W | 20 | ● | 2 | | | | 3 | | 2×400K5¼F | CP/M | | ● | D2 | Versatile business machine |
| DEC PC 325 | £3,080 | PDP11/23 | N/A | 256K | | 132×24 | M | ● | 960×240 | W | 20 | ● | 2 | | | | 1 | | 2×400K5¼F | P/OS | | ● | D2 | Mini in micro clothing |
| Decision-1 Computer MDC-011 | £2,869 | Z80A | 4 | 64K | 192K | | (M+)* | | | * | | | 3 | 1 | | 1 | | | 2×400K5¼F | CP/M | Ba | ● | I2 | *Buy your own terminal |
| Digico Prince | £3,392 | Z80A | 4 | 64K | | 80×25 | M | | | W | 50 | ● | 2 | | | | 7 | | 2×400K5¼F | CP/M | | ● | D3 | Unusual keyboard |
| Digital Microsystems DMS-3 | £3,576 | Z80A | 4 | 64K | | | (M+)* | | | * | | | 3 | | | 1 | | | 2×512K8F | CP/M | | ● | D4 | *Choice of terminal |
| Direct 1000 | £3,093 | Z80 | 4 | 64K | | 80×25 | M | | 132×28 | W | | | 2 | | | | | | 2×300K5¼F | CP/M | | ● | D5 | Standard CP/M machine |
| DMS Fox | £2,875 | Z80A | 4 | 64K | | 80×24 | M | | | W | 16 | ● | 3 | 1 | | 1 | | | 1.2Mb5¼F | CP/M | | ● | D4 | Portable machine |
| Dragon 32 | £174 | 6809E | 1 | 32K | 64K | 32×16 | Tv(M+) | ● | 256×192 | W | | | | 1 | | 4 | 1 | ● | | Cassette | Ba | | D6 | Tandy colour lookalike |
| Dragon 64 | £225 | M6809 | 0.89 | 64K | | 32×16 | Tv(M+) | ● | 256×192 | W | | | | 2 | | 4 | | | 1×175K5¼F | OS9 | Ba | ● | D | *PCN issue 39 |
| Duet 16 | £1,144 | 8086 | 8 | 128K | 512K | 640×400 | (M+) | ● | 640×400 | W | 12 | ● | 2 | 1 | | | 4 | | 1×720K5¼F | MS, DOS, CP/M | Ba 86 | ● | L7 | Portable business |
| Durango F85 | £5,744 | 8085A | 5 | 64K | 196K | 80×64 | Tv(M+) | | | W | | ● | 4 | | | 1 | 12 | | 2×1Mb5¼F | Star Basic | BaCo | ● | C3 | Built in printer |
| Eagle II | £2,702 | Z80A | 4 | 64K | | 80×24 | M | | 80×24 | W | | ● | 2 | 1 | | 1 | | | 2×500K5¼F | CP/M | Ba | ● | M3 | Upgrades available |
| Electron | £199 | 6502 | 2 | 32K | | 80×32 | Tv(M+) | ● | 640×256 | W | 10 | | | | | | | ● | | MOS | BaAs | ● | A1 | Excellent beginners' machine |
| Enterprise 1000 | £2,645 | * | 8 | 64K | | | M | | | W | 10 | ● | 2 | | | 2 | | | 2×358K5¼F | Enterprise | * | ● | D7 | Micro Nova 16-bit |
| Epson HX20 | £472 | 6301 | 1 | 16K | 32K | 20×4 | LCD | | 120×32 | W | 13 | ● | 2 | | | | 2 | ● | | Cassette | Ba | | E2 | Powerful portable |
| Epson QX10 | £1,995 | Z80 | 4 | 192K | 256K | 80×25 | M | | 640×400 | W | 18 | ● | 1 | 1 | | | 5 | | 2×320K5¼F | CP/M | Ba | ● | E2 | Expansion required for Valdocs |
| Equator | £6,842 | Z80A | 4 | 64K | 448K | 80×24 | M | | 255×560 | W | 14 | ● | 7 | 1 | | 1 | 8 | | 1×5Mb5¼F+1×750K5¼F | CP/M, MP/M, Turbo DOS | | ● | E3 | Two bigger models available |
| Facit 6520 | £2,645 | Z80 | 4 | 64K | 128K | 80×24 | M | | 80×24 | W | 8 | ● | 2 | | | | | | 2×320K5¼F | CP/M, Facit DOS | Ba | ● | F1 | Concurrent printing |
| Fortune 32:16 System 2 | £5,204 | 68000 | 6 | 256K | 1Mb | 80×24 | M | ● | 1024×1024 | W | 16 | ● | 1 | | | | 20 | | 2×800K5¼F | Unix | | ● | I3 | Genuine 16-bit |
| Franklin Ace 1000 | £914 | 6502 | 1 | 64K | 128K | 40×24 | M, Tv | ● | 256×192 | W | | ● | | 1 | | 4 | 1 | ● | 2×140K5¼F | opt CP/M | Ba | ● | C15 | Apple IIe compatible |
| Fujitsu FM8 | £1,150 | 6809 | 1 | 64K | | 80×25 | (M+) | ● | 640×200 | W | 10 | ● | 1 | 1 | | 4 | 1 | ● | | Flex | Ba | | S2 | Good for business graphics |
| Future Computers FX-20 | £2,156 | 8088 | 8 | 128K | 1Mb | 80×25 | M | | 800×400 | W | 20 | ● | 2 | | | 2 | | | 2×800K5¼F | CP/M 86, MS-DOS | | ● | E1 | Business micro, runs CP/M |
| Future FX-30 | £3,220 | 8088 | 8 | 128K | 1Mb | 80×25 | M | ● | 1,280×500 | W | 30 | ● | | | 1 | 3 | 2 | | 1×800Si¼F+1×5Mb5¼F | CP/M86,CP/M80 emulation | | ● | E1 | Hard disk version |
| Genie II | £299 | Z80 | 1.7 | 16K | 48K | 64×16 | Tv(M+) | | 128×48 | W | 4 | ● | 1 | | | | 1 | ● | | Cassette | Ba | ● | L2 | Speeded-up Genie I |
| Genie III | £1,897 | Z80A | 3.2 | 64K | | 80×24 | M | | 160×72 | W | 8 | ● | 1 | 1 | | 1 | 3 | | 2×700K5¼F | New DOS | Ba | ● | L2 | CP/M costs extra |
| Colour Genie | £168 | Z80 | 2.2 | 32K | | 40×24 | Tv(M+) | ● | 160×96 | W | 8 | | 1 | 1 | | 2 | 1 | ● | | Cassette | Ba | | L2 | Home games machine |
| Gemini Galaxy 2 | £1,719 | Z80 | 4 | 64K | 512K | 80×25 | M | | 160×75 | W | 10 | ● | 1 | 1 | | 1 | 5 | ● | 2×400K5¼F | CP/M | | ● | G1 | Low cost British system |
| Globe 101 | £1,850 | 8085 | 3 | 64K | | 80×24 | M | | | W | 20 | ● | 3 | | | | | | 2×325K5¼F | CP/M | | ● | G4 | Wordstar plus Mail Merge inc. |
| Grundy 8200 | £1,850 | Z80 | 4 | 64K | 256K | 80×24 | M | | 160×70 | W | 10 | ● | 1 | 1 | | | | | 2×390K5¼F | CP/M | | ● | C19 | Software included |
| Haywood 9000 Composite | £2,064 | Z80A | 4 | 64K | 192K | 80×25 | M | | 64×255 | W | 34 | ● | 2 | | | | 8 | | 2×320K5¼F | CP/M | As | ● | H1 * | Designed for network |
| Hitachi PC1 | £2,985 | 8088 | 5 | 320K | 576K | 80×25 | M | ● | 640×200 | W | 10 | ● | 1 | 1 | | 2 | 5 | | 2×320K5¼F | MS DOS | Ba, As | ● | H6 | Will be Pro-Tested, Issue 44 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HP 75C | £883 | Cust. | N/A | 16K | 24K | 32×1 | (M+) | | | C | | | | | 1 | 4 | ● | 1.3K card reader | HP | Ba | | H2 | Calculator/computer |
| HP 85 | £2,360 | Cust. | N/A | 16K | 32K | 32×20 | M | | 255×191 | W | 8 | ● | 1 | | | 4 | 4 | ● | Cassette | Ba | ● | H2 | Engineers' machine |
| HP 86A | £1,570 | Cust. | N/A | 64K | 512K | 80×24 | M | | 544×240 | W | | | | 1 | 1 | 2 | 4 | | | HP | Ba | ● | H2 | CP/M optional |
| HP 87XM | £2,571 | Cust. | N/A | 128K | 640K | 80×24 | M | | 544×240 | W | 14 | ● | 1 | 1 | 1 | 3 | 4 | | | HP DOS | Ba | ● | H2 | Special technical uses |
| HP Series 100, 120 | £2,362 | Z80A | 3.68 | 64K | | 80×24 | M | | 80×24 | W | 8 | ● | 2 | | | 1 | | | | HP | Ba | ● | H2 | Top end HP business system |
| HP Series 200 Model 16A | £3,212 | 68000 | 8 | 128K | 750K | 80×25 | M | | | W | 5 | | 1 | | 1 | 2 | | | | HP | | ● | H2 | Genuine 16-bit |
| Husky Hunter | £997 | NSC800 | 4 | 80K | 208K | 40×8 | LCD | | 240×64 | C | 8 | | 1 | | | | | | | CP/M | Ba | ● | D10 | Waterproof, with metal case |
| Hyperion | £3,100 | 8088 | 4.7 | 256K | | 80×25 | M | | 320×200 | W | 10 | ● | 1 | 1 | | 1 | | | 1×320K5¼F | MS, DOS, CP/M 86 | BaAs | ● | G5 | Same as Ajile |
| Hytech H4500 | £4,310 | Z80 | 4 | 64K | 208K | 80×25 | M | | 80×25 | W | 26 | ● | 1 | | | 3 | | | 2×403K5¼F | CP/M | Ba | ● | H3 | Standard CP/M micro |
| IBM PC | £2,392 | 8088 | 4.7 | 64K | 576K | 80×25 | (M+) | ● | 640×200 | W | 10 | ● | | 1 | | 5 | | | 1×360K5¼F | MS-DOS | Ba | ● | I9 | Slow but reliable |
| IBM PCXT | £4,258 | 8088 | 4.77 | 128K | 640K | 80×25 | (M+) | ● | 350×720 | W | 12 | ● | | | | 8 | | | 1×10Mb5¼H | DOS 2 | Ba | ● | I9 | 8087 co-processor possible |
| ICL PC Model 10 | £2,754 | 8085 | 3 | 64K | 256K | 80×24 | Tv(M+) | | | W | 11 | ● | 2 | | | 8 | | | 2×700K5¼F | CP/M | Ba | ● | I4 | Bottom of range |
| ICL PC Model 15 | £2,702 | 8085A | 5 | 64K | 512K | 80×25 | M | ● | | W | | ● | 8 | | | 8 | | | 1×13.3Mb5¼H | CP/M, MP/M | Ba | ● | I4 | Suitable for small business |
| IDS Datamachine | £1,995 | Z80 | 4 | 64K | 1Mb | " | Tv(M+) | | " | | | | 2 | | | 15 | | | 2×400K5¼F | CP/M | Ba | ● | I8 | *Depends on terminal |
| IO Tech Iona | £2,539 | Z80 | 4 | 69K | 960K | 80×24 | M | ● | 160×75 | W | 12 | ● | 1 | 1 | | 8 | ● | | 2×400K5¼F | CP/M | | ● | I5 | Good colour versatility |
| Intellivision + micro adaptor | £189.90 | CP1610 | 2,4 | 5K | | 20×12 | Tv | ● | 160×96 | C | | | | | | 1 | ● | | | Cassette | Ba | | M7 | Computer adaptor is £89.95 |
| ITT 3030 | £3,105 | Z80A | 4 | 64K | 256K | 80×24 | Tv(M+) | | 80×24 | W | 8 | ● | 1 | | | 1 | 1 | | 2×280K5¼F | CP/M, BOS | | ● | I7 | Top end business system |
| Jupiter Ace | £90 | Z80 | 3.25 | 3K | 51K | 32×24 | Tv(M+) | | 64×46 | C | | | ● | | | 1 | ● | | | | Fr | | J1 | Native Forth machine |
| Kalamazoo 1050 | £3,450 | 8085 | 6 | 64K | | 80×24 | Tv(M+) | | 80×24 | W | 10 | | 1 | | | | | | 2×250K5¼F | Kalamazoo | | ● | K3 | Only Kabol language |
| Kaypro II | £1,949 | Z80 | 4 | 64K | | 80×24 | M | | | W | | ● | 1 | 1 | | | | | 2×200K5¼F | CP/M | Ba | ● | C15 | *PCN* issue 35 |
| Kaypro 10 | £3,340 | Z80A | 4 | 64K | | 80×24 | M | | 100×160 | W | | ● | | 1 | | 2 | | | 1×10Mb5¼H | CP/M | Ba | ● | C15 | *PCN* issue 35 |
| Kemitron K2000E | £2,242 | Z80 | 4 | 64K | | 80×24 | (M+) | | 80×24 | W | | | 2 | 1 | | 11 | | | 1×300K5¼F | CP/M | | ● | K4 | Scientific Keyboard |
| Kemitron K3000 | £3,795 | Z80 | 4 | 64K | 256K | 80×24 | (M+) | | 80×24 | W | | ● | 2 | | | 14 | | | 2×1Mb8F | CP/M, MP/M | | ● | K4 | For scientific use |
| Kenilworth 83G | £1,953 | Z80A | 4 | 64K | | 80×25 | TvM | | 160×75 | W | 10 | ● | 1 | 1 | | 5 | | | 2×350K5¼F | CP/M | | ● | K5 | British portable |
| Kontron RSI 80 | £3,306 | Z80 | 4 | 64K | 128K | 80×25 | M | | 256×512 | W | 16 | ● | 2 | 1 | | 8 | | | 2×303K5¼F | Kontron | Ba | ● | K6 | O/S CP/M based |
| Krypton 800 range | £1,949 | Z80A | 4 | 64K | 256K | 80×24 | M | | 80×24 | W | 13 | ● | 2 | 1 | | 8 | | | 2×386K5¼F | CP/M | | ● | T8 | Fully definable characters |
| Laser 200 | £70 | Z80A | 3.6 | 4K | 64K | 32×16 | TV | ● | 32×16 | C | | | 1 | | | 1 | ● | | | | Ba | | C14 | Cheap colour computer |
| LSI M3 | £2,064 | Z80 | 2.5 | 64K | | 80×24 | M | | 80×24 | W | 31 | ● | 1 | 1 | | | | | 2×200K5¼F | CP/M | | ● | L3 | Big, British and CP/M |
| LSI M4 | £2,472 | 8088 | 5 | 128K | 256K | 80×24 | M | | 160×72 | W | 31 | ● | 2 | 1 | | 1 | | | 2×400K5¼F | CP/M 86, CP/M80 | | ● | L3 | *Z80* for 8-bit software |
| Logica VTS Vitesse | £2,863 | 8086 | 5 | 64K | 256K | 80×24 | M | ● | 640×288 | W | 12 | ● | 1 | 1 | | 4 | | | 2×1Mb5¼F | CP/M, MS-DOS | Ba | ● | L4 | High-res colour graphics |
| Magnum | £1,489 | Z80 | 4 | 64K | | 80×25 | M | | | W | | ● | 2 | | | | | | 2×400K5¼F | CP/M | | ● | I6 | Inexpensive CP/M machine |
| Merlin M2215 | £2,742 | 8085 | 5 | 64K | | 24×80 | M | | | W | 22 | ● | 2 | | | 2 | | | 2×780K5¼F | CP/M | Ba | ● | B7 | Business computer |
| Micro Five 1000 | £5,175 | 8088 | 8 | 128K | 512K | 25×80 | TvM | | 512×512 | W | 20 | ● | 10 | | | 2 | | | 2×1Mb5¼F÷2×6.3Mb5¼H | " | | ● | F2 | *Choose your own O/S |
| Microdecision | £1,144 | Z80 | 4 | 64K | | 80×24 | (M+) | | " | | | | 2 | | | | | | 1×200K5¼F | CP/M | Ba,Pilot | ● | M9 | *Terminal extra |
| Microsolution British Genius | £1,840 | Z80 | 4 | 64K | | 80×24 | TvM | | 80×24 | W | 21 | ● | 1 | 1 | | | | | 2×160K5¼F | CP/M | | ● | M4 | 'Genius' by nature? |
| Microtan 65 | £389 | 6502 | 1 | 8K | 48K | 25×64 | (TvM+) | | | W | | ● | 1 | 2 | | | ● | | | Tanbug | Ba | ● | M8 | *PCN* issue 26 |
| Millbank SX10 | £2,754 | Z80A | 4 | 65K | 256K | 80×25 | M | | 80×25 | W | 10 | ● | 2 | | | 1 | | | 2×350K5¼F | CP/M | As | ● | M5 | Scientific applications |
| Minstrel | £2,059 | Z80 | 4 | 64K | 352K | | | | | | | | 2 | 1 | | | | | 2×400K5¼F | CP/M opt | | ● | H4 | Choose your terminal |
| Molecular M200 | £5,462 | Z80 | 4 | 64K | 320K | | (M+)* | | | " | | | 2 | | | 1 | 16 | | 1×10Mb8H + 1×500KBF | CP/M | BaAs | ● | G2 | *Terminal required |
| Monroe EC8800 | £2,990 | Z80A | 3 | 128K | | 40×24 | M | | 240×240 | W | 32 | ● | 3 | | | 3 | | | 1×320K5¼F | Monroe | BaPaPilot | ● | F3 | Only 40-character screen |
| Mupid 320-GB | £978 | Z80A | 4 | 64K | 128K | 40×24 | Tv(M+) | ● | 320×240 | W | 55 | ● | | | 1 | 2 | 1 | ● | | CP/M+ | BaAs | | P6 | *PCN* issue 22 |
| Nascom 2/3 | £327 | Z80A | 4 | 2K | 64K | 16×48 | Tv(M+) | | 48×96 | W | | | 1 | | | 4 | ● | | | NAS, SYS | BaAs | ● | L5 | Old reliable |
| NCR Decision Mate V | £1,983 | Z80A | 4 | 64K | 512K | 24×80 | M | ● | 640×400 | W | 20 | ● | | | | 7 | | | 2×320K5¼F | CP/M 80 | As | ● | N3 | *PCN* issue 8 |
| NEC PC8000 | £1,454 | Z80 | 4 | 32K | 64K | 80×25 | M | ● | 160×100 | W | 10 | ● | 2 | 1 | | | | | 2×300K5¼F | CP/M, NEC, DOS | Ba | ● | N1 | Superb colour graphics |
| NEC PC8001 | £1,375 | Z80A | 4 | 64K | | 80×24 | M | ● | 100×200 | W | 10 | ● | | 1 | | | ● | | 2×144K5¼F | CP/M | Ba | | N1 | Price includes twin disk drive |
| Newbrain A | £269 | Z80A | 4 | 32K | 512K | 80×30 | Tv(M+) | | 640×220 | C | | | 2 | | | 1 | ● | | | Cassette | Ba | | G3 | A lot of prgmise |
| North Star Advantage | £2,766 | Z80 | 4 | 64K | | 80×24 | M | | 640×240 | W | 15 | | 1 | | | 6 | | | 2×360K5¼F | CP/M | | ● | T9 | 16-bit option |
| OEM Orion | £3,392 | 8086 | 8 | 128K | 896K | 80×25 | TvM | | 800×400 | W | 13 | ● | 11 | | | 6 | | | 2×500K5¼F | CP/M 86 | BaCo | ● | O5 | *Full communications machine |
| Olivetti M20 | £2,869 | Z8000 | 3 | 160K | 512K | 80×25 | M | ● | 512×256 | W | | ● | 1 | 1 | | 5 | | | 2×320K5¼F | PCOS | Ba | ● | B6 | Real 16-bitter |
| Olympia Boss Model A | £2,645 | Z80A | 4 | 64K | | 80×28 | M | ● | 80×28 | W | 10 | ● | 1 | | | 4 | | | 2×140K5¼F | CP/M | | ● | O1 | Useful 28 lines on screen |
| Oric 1 | £80 | 6502A | 1 | 16K | 48K | 40×28 | Tv(M+) | ● | 240×200 | C | | | | 1 | | 1 | ● | | | Cassette | Ba | | O2 | 4-colour printer opt |
| Osborne 1 | £1,581 | Z80 | 4 | 64K | | 104×24 | M | | 104×24 | W | 10 | ● | 1 | | 1 | | | | 2×185K5¼F | CP/M | Ba | ● | O3 | Portable, includes software |
| Panasonic JD 800M | £3,795 | 8085A | 4 | 60K | | 80×24 | M | | 80×24 | W | 21 | ● | 3 | | | | | | 2×250K8F | CP/M | Ba | ● | P1 | Larger model costs £5,002 |
| Pasca 640 | £1,437 | Z80A | 4 | 64K | | 80×24 | M | | | W | | ● | 1 | 1 | | | | | 2×250K8F | CP/M | | ● | W1 | Regular CP/M micro |
| Pascal Modular Microengine | £7,003 | WD9000 | 2 | 128K | | " | " | | " | " | | | 4 | | | 8 | | | 2×1.2Mb8F | UCSD-P | Pa | ● | P2 | *Terminal extra |

| Make and model | Price inc VAT | Processor type | Speed (MHz) | Standard RAM | Max RAM — normally at extra cost | Display: Max characters (columns × lines) | Display: Method (at extra cost) | Display: Colour capability | Graphics: Max dot resolution | Keyboard: Type of keyboard | Keyboard: No. of function keys | Keyboard: Numeric pad | Interfaces built-in: No. of RS232 | Interfaces built-in: No. of Centronics | Interfaces built-in: No. of IEEE 488 | Interfaces built-in: No. of others | Interfaces built-in: No. of expansion slots | Storage: Cassette facility | Storage: Capacity per drive and size | Operating system | Languages inc | Other languages available | Distributor | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pied Piper** | £1,226 | Z80A | 4 | 64K | | 80×24 | Tv(M+) | | | W | 36 | | | 1 | | | 1 | | 1×780K5¼F | CP/M | | | S11 | *PCN* issue 4 |
| **Philips P3500** | £3,000 | Z80A | 4 | 64K | 320K | 80×25 | M | | | W | 11 | ● | 2 | | | | | | 2×0.6Mb5¼F | Turbo-DOS | Co | ● | P3 | Fast O/S as standard |
| **Portico Miracle Portable** | £2,064 | Z80A | 4 | 128K | 256K | 80×25 | M | | 640×250 | W | 10 | ● | 2 | 1 | | | 5 | | 2×400K5¼F | CP/M | | ● | P7 | *PCN* issue 28 |
| **Positron 900** | £1,259 | 6809 | 1 | 64K | 256K | " | (M+) | | " | " | | | 4 | | 1 | | 3 | | | O/S 9 | Ba | ● | P4 | *You choose your terminal |
| **Powertran Cortex** | £454 | 9995 | 12 | 64K | 1Mb | 40×24 | Tv(M+) | ● | 256×192 | W | 12 | ● | 1 | | | | | ● | | | BaAs | | | Mainly sold as £340 kit |
| **Quantum 2000** | £2,587 | Z80A | 4 | 64K | 192K | 80×25 | M | | 160×75 | W | 18 | ● | 1 | 1 | | | 5 | ● | 3×860K5¼F | CP/M | Ba | ● | Q1 | Mono, low-res graphics |
| **Rair Black Box Model 3/20S** | £2,242 | 8085 | 5 | 64K | 256K | 80×24 | (M+) | | " | | | | 2 | | | | 8 | | 2×1Mb5¼F | CP/M | Ba | ● | R1 | *VDU extra; many versions |
| **Rair Business Computer** | £6,037 | 8088 | 5 | 256K | 1Mb | 80×25 | M | ● | | W | 10 | ● | 2 | | | 4 | 8 | | 1×19Mb5¼H+1×1Mb5¼F | CP/M, PCDOS | Ba | ● | R1 | Hybrid 8/16 bit |
| **Racal 6000** | £6,327 | Z80 | 5 | 64K | 256K | 80×26 | M | | 80×26 | W | 21 | ● | 1 | 1 | | | | | 1×600K8F | CP/M | | ● | R2 | CP/M languages available |
| **Research Machines 380Z** | £2,147 | Z80A | 4 | 32K | 56K | 40×24 | Tv(M+) | | | W | | | 1 | 1 | | | 4 | ● | 2×144K5¼F | CP/M | Ba | ● | R3 | Widely used in schools |
| **Research Machines Link 480Z** | £650 | Z80A | 4 | 32K | 256K | 40×24 | Tv(M+) | | | W | 4 | | 2 | 1 | | 1 | 2 | ● | | Cassette | Ba | | R3 | CP/Net version available |
| **Sage II** | £4,019 | 68000 | 8 | 128K | 512K | " | (M+) | | " | " | | | 2 | 1 | 1 | | | | 2×640K5¼F | UCSD-P System | BaAsPaFn | ● | T10 | *Terminal extra |
| **Sage IV** | £5,962 | 68000 | 8 | 128K | 1Mb | " | (M+) | ● | | " | | | 6 | 1 | 1 | | | | 2×640K5F+1×6Mb5¼ | UCSD-P System | PaBaFn | ● | T10 | *Terminal own choice |
| **Samurai** | £2,754 | 8086 | 4.6 | 128K | 768K | 80×25 | M | ● | 720×400 | W | 12 | ● | 3 | 1 | | | 3 | | 2×1.2Mb8F | MS DOS, CP/M 86 | | ● | M6 | High-res colour graphics |
| **Sanyo MBC 1000** | £1,195 | Z80A | 4 | 64K | | 80×25 | M | | 80×25 | W | 17 | ● | 1 | 1 | | | | | 1×320K5¼F | CP/M | Ba | ● | L1 | Standard CP/M model |
| **Sanyo MBC 1250** | £2,294 | Z80 | 4 | 64K | | 80×40 | M | | 640×400 | W | | ● | 1 | 1 | | | | | 2×640K5¼F | CP/M | Ba | ● | L1 | High-res graphics |
| **Sanyo MBC 2000** | £2,242 | 8085A | 5 | 64K | | 80×24 | M | | 80×24 | W | 24 | ● | 2 | 1 | | | 2 | | 2×328K5¼F | CP/M | Ba | | L1 | Big disk model costs £3,622 |
| **Sanyo MBC 4050** | £2,817 | 8086 | 5 | 128K | 512K | 80×24 | M | | 80×24 | W | | | 1 | 1 | | | | | 2×640K5¼F | CP/M 86 | Ba | ● | L1 | Pseudo 16-bit |
| **Seed System 1** | £2,300 | 6800 | 2 | 32K | 64K | 80×24 | M | | 80×24 | W | 3 | ● | 2 | | | | 8 | | 2×160K5¼F | DOS 68 Flex | Ba | ● | S3 | Ageing business machine |
| **Seed System 19** | £2,600 | 6809 | 2 | 48K | 1Mb | 80×24 | M | | | W | 3 | ● | 2 | | | | 8 | | 2×160K5¼F | OS-9 | | ● | S3 | Latest from Seed |
| **Sharp MZ80A** | £347 | Z80 | 2 | 48K | | 40×25 | M | | 80×50 | W | | ● | | | | | | ● | | Sharp Basic | Ba | ● | S4 | CP/M facility extra |
| **Sharp MZ80B** | £900 | Z80A | 4 | 64K | | 80×25 | M | | 320×200 | C | 10 | ● | | | | | | ● | | Sharp Basic | Ba | ● | S4 | Unusual keyboard |
| **Sharp MZ700** | £250 | Z80A | 4 | 64K | 68K | 40×25 | Tv(M+) | ● | 80×50 | W | 5 | | | 1 | | 2 | 1 | ● | | Sharp | Ba | ● | S4 | *PCN* issue 27 |
| **Sharp PC1251** | £79.95 | Cust. | .58 | 4.2K | | | LCD | | 24×1 | C | 18 | ● | | | | | 1 | ● | | Sharp Basic | Ba | | S4 | Pocket computer |
| **Sharp PC1500** | £169 | Cust. | 1.3 | 3.5K | 11.5K | 26×1 | LCD | | 156×7 | C | 6 | ● | 1 | 1 | | | 2 | ● | | Cassette | Ba | | S4 | Optional 4-pen plotter |
| **Sharp PC3201** | £2,300 | Z80A | 2.6 | 64K | 112K | 80×25 | M | | 160×50 | W | 10 | ● | | | | | 5 | | 2×500K5¼F | Sharp Basic | Ba | ● | S4 | Powerful Sharp Basic |
| **Signet 10025** | £1,599 | Z80B | 6 | 64K | | 80×24 | M | ● | 512×512 | W | | ● | 2 | 1 | | | 1 | | 2×200K5¼F | CP/M, Macnos | | ● | S9 | Choice of keyboards |
| **Signet 2** | £1,483 | Z80 | 4 | 64K | | 80×24 | (M+) | ● | 512×256 | W | 18 | ● | 2 | | | | | | 2×200K5¼F | CP/M | | | S9 | Multi-user system |
| **Sinclair ZX81** | £40 | Z80A | | 1K | 16K | 32×24 | Tv | | 64×44 | C | | | | | | | 1 | ● | | Cassette | Ba | | S5 | Sold a million |
| **Sinclair Spectrum** | £99 | Z80A | 3.5 | 16K | 48K | 32×24 | Tv | ● | 256×192 | C | | | | | | | 1 | ● | | Cassette | Ba | ● | S5 | *PCN* issue 14 |
| **Sirius I** | £2,525 | 8088 | 5 | 128K | 896K | 80×25 | M | | 800×400 | W | 7 | ● | 2 | | 1 | | 4 | | 2×600K5¼F | CP/M 86, MS/DOS | Ba | ● | A7 | IBM style |
| **Sord M5** | £150 | Z80A | 4 | 4K | 16K | 40×24 | Tv(M+) | ● | 256×196 | C | | | | 1 | | 2 | | ● | | Cassette | Ba | | S6 | *PCN* issue 12 |
| **Sord M23** | £1,932 | Z80A | 4 | 128K | | 80×25 | M | ● | | W | 14 | ● | 2 | 1 | | 2 | 3 | | 2×330K5¼F | Sord O/S, SB80 | BaPips | ● | S6 | CP/M compatible |
| **Sord M23P** | £2,369 | Z80A | 4 | 128K | | 80×25 | Tv(M+) | ● | 640×200 | W | 14 | ● | 2 | 1 | | 2 | 2 | | 2×290K3½F | Sord O/S, SB80 | BaPips | ● | S6 | Complete with suitcase |
| **Sord M223** | £3,277 | Z80 | 4 | 64K | | 80×25 | M | | | W | | ● | 2 | | | 4 | | | 2×350K5¼F | Sord O/S, SB80 | BaPips | ● | S6 | Standard business machine |
| **Sord M243** | £5,842 | Z80 | 4 | 192K | | 80×25 | M | ● | 640×400 | W | 15 | ● | 4 | 1 | | 4 | | | 2×1Mb8F | Sord O/S, SB80 | BaPips | ● | S6 | Large and powerful |
| **SWTP SO9** | £5,750 | 6809 | 2 | 256K | 1.2Mb | 80×24 | M | | | W | 15 | ● | 1 | 1 | | | | | 2×1.5Mb5¼F | Flex, Uniflex | | ● | S7 | Top end SWTP |
| **Spectrum** | £11,442 | 68000 | 8 | 256K | 4Mb | " | (M+) | | " | " | | | 4 | | | | 16 | | 2×720K5¼F | Mirage | Ap | ● | M1 | *As terminal |
| **Sundance I** | £6,969 | Z80A | 4 | 64K | 256K | 132×24 | M | | | W | 4 | ● | 1 | 1 | | | | ● | 1×7Mb5¼H | CP/M | Ba | ● | T2 | Ordinary CP/M machine |
| **Sundance II** | £8,205 | Z80A | 4 | 128K | 256K | 132×24 | M | | | W | 4 | ● | 1 | 1 | | | | ● | 1×7Mb5¼H | CP/M | Ba | ● | T2 | Middle-range Sundance |
| **Sundance 16** | £10,480 | Z8001 | 6 | 256K | 1Mb | 80×24 | M | | | W | | ● | 5 | 1 | | | | ● | 1×14Mb5¼H | BOS | | ● | T2 | Tape backup for hard disk |
| **Superbrain JR** | £2,127 | Z80A | 4 | 64K | | 80×24 | M | | 560×240 | W | | ● | 2 | | | | 1 | | 2×160K5¼F | CP/M | Ba | ● | I10 | Bigger models available |
| **Superstar** | £6,296 | Z80 | 4 | 64K | | 80×24 | Tv(M+) | | 80×24 | | | | 1 | 1 | | | 8 | | 1×10Mb5¼H+1×400K5¼F | CP/M 80 | Ba | ● | B7 | Includes hard disk |
| **Tandberg EC10** | £3,000 | 8080A | 2 | 64K | | 80×25 | M | | | W | | ● | 7 | | | | | | 1×250K8F | CP/M, TOS | Ba | ● | T3 | Very early machine |
| **Tandy TRS-80 Model II** | £1,999 | Z80A | 4 | 64K | 256K | 80×24 | M | | 80×24 | W | 2 | ● | 2 | 1 | | | | | 1×500K8F | TRS-DOS | Ba | ● | T4 | Big business machine |
| **Tandy TRS-80 Model III** | £1,299 | Z80A | 2 | 48K | | 64×16 | M | | 128×48 | W | | ● | 1 | 1 | | 1 | | ● | 2×184K5¼F | TRS-DOS | Ba | ● | T4 | Standard TRS 80 |
| **Tandy TRS-80 Model 16** | £4,199 | 68000 | 8 | 128K | 512K | 80×24 | M | | | W | 2 | ● | 2 | 1 | | | | | 2×1.2Mb8F | TRS-DOS | BaAs | | T4 | True 16-bit |

## MICRO-USER T-SHIRTS & SWEATSHIRTS

1 ZX81
2 SPECTRUM
3 ORIC-1
4 EPSON
5 I'M USER FRIENDLY
6 HAVE YOU SEEN MY PERIPHERALS?
7 INVADER
8 SUPER INVADERS (multi-colour on white only)
9 Z80
10 6502

T-SHIRTS 100% cotton in white, sky or red £3.25 each inc.
SWEATSHIRTS Poly-cotton in white or grey £5.75 each inc.

All available in small-medium-large and ex-large sizes.

Mail Order Only from
**ONE PER CENT SCREENS**
Dept 1, Unit 12, Star Lane Estate,
Great Wakering, Essex

## PRINTER BONANZA!

**EPSON**

PRINTERS AT UNBEATABLE PRICES

EPSON RX80T £225 + VAT
EPSON RX80FT £250 + VAT
EPSON FX80 £334 + VAT
EPSON FX100 £485 + VAT
EPSON MX100 £390 + VAT
JUKI 6100 £337 + VAT
STAR 515 £380 + VAT
CT1CP80 £240 + VAT
MT80 £265 + VAT
SEIKOSHA GP 700A £337 + VAT

THE NEW 'STAR' AND 'CP' PRINTERS – AS GOOD AS EPSON
STAR & EPSON – THE BEST ON THE MARKET



All printers carry a 1 Year Guarantee and come with paper. Shipment is by TNT direct to your door — Please add £7 + VAT carriage.
**Payment by Cheque, Access, Visa etc.**
As our prices vary from week to week send for our full weekly stock/price sheet which will cost you only a sae.
Shipments throughout UK. We can export to most countries in the world. Please phone for Access or Visa buying details.

IMMEDIATE DELIVERY.

**Micro-Spares**
**We cannot and will not be beaten on Price!**
**Note our change of address**
**104-106 Hanover Street, Edinburgh EH2 1DR**
**031-226 3345**

# WILD WEST HERO

*By THE SILICON KID*




**Dealers ring Paul Holmes**
**041-956 5058**

### The Game

Being alone in the West was never particularly safe, even at the best of times, so when the Wild West Hero took up the challenge of ridding the rockies of bandits he found a few slight problems. Being outnumbered sixty to one can be irritating especially when some annoying person has planted 'Killer Cacti', 'Treacherous Trees' or some other lethal objects around the battle area. Combined with the fact that the killing of one gang simply brings yet another bigger, nastier and faster gang of bandits made life, well, somewhat awkward, but then again he was 'The Wild West Hero'.

**Only £5.90 inc VAT p&p**

Wild West Hero uses full colour graphics, hi-res, smooth movement, dramatic sound effects, 100% machine code, high score, two play option, compatible with Kempston or Downsway joystick interface.
All Timescape products are guaranteed for life, if our software ever fails to load return the cassette for an instant replacement.
All orders despatched within 24 hours of receipt of order.

TIMESCAPE
SOFTWARE
**1 VIRGINIA GARDENS, FAIRWAYS, MILNGAVIE, GLASGOW G62 6LG**
**Telephone: 041-956 5058**

Please send me Wild West Hero **NOW!**
Name.....
Address.....
.....
I enclose cheque/P.O. for.....

Copying, lending or hiring "Wild West Hero" is prohibited.

| Make and model | Price inc VAT | Processor type | Speed in MHz | Standard RAM | Max RAM — normally at extra cost | Display: Max characters (columns × lines) | Display: Method (if extra cost) | Display: Colour capability | Graphics: Max dot resolution | Keyboard: Type of keyboard | Keyboard: No. of function keys | Keyboard: Numeric pad | Interfaces built-in: No. of RS232 | Interfaces built-in: No. of Centronics | Interfaces built-in: No. of IEEE 488 | Interfaces built-in: No. of others | Interfaces built-in: No. of expansion slots | Interfaces built-in: Cassette facility | Storage: Capacity per disk and disk size | Storage: Operating system | Languages inc | Other languages available | Distributor | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HARDWARE** | | | | | | | | | | | | | | | | | | | | | | | | |
| Tandy TRS-80 Colour Computer | £180 | 6809E | 1 | 16K | 32K | 32×16 | Tv | ● | 256×192 | W | | | 1 | | | | | ● | Cassette | Ba | ● | T4 | Related to Dragon 32 |
| Tandy TRS-80 PC4 | £50 | Cust. | N/A | ½K | 1½K | 12×1 | LCD | | 12×1 | C | 9 | ● | | | 1 | 1 | | | Cassette | Ba | | T4 | Low-cost pocket computer |
| Tandy Model 4 | £861 | Z80A | 2 | 16K | 128K | 80×24 | M | | 80×24 | W | 10 | | 1 | 1 | | | | ● | 1×187K5¼F | TRS DOS | Ba | ● | T4 | Floppies versions available |
| Tandy Model 100 | £499 | 8085 | 2.4 | 8K | 32K | 40×8 | LCD | | 240×62 | W | | | 1 | | | | | ● | | | Ba | | T4 | Software built in |
| Tandy TRS-80 PC2 | £130 | Cust. | 1.3 | 2.6K | 16K | 26×1 | LCD | | 156×7 | C | 6 | ● | | | | | | ● | Cassette | Ba | | T4 | Plotter available |
| Televideo TS-802H | £4,533 | Z80 | 4 | 64K | | 80×24 | M | | 80×24 | W | 15 | ● | 2 | | | 1 | | | 1×256K5¼F+1×7Mb5¼H | CP/M | | ● | C11 | Recently upgraded |
| Televideo TS-800 Series | £1,495 | Z80A | 4 | 64K | | 80×24 | M | | 80×24 | W | 15 | ● | 2 | | | 1 | | | | CP/M | | ● | C11 | Standard CP/M machine |
| Televideo TS 1602-C | £1,323 | 8088 | 5 | 128K | 256K | 80×24 | M | | 576×424 | W | 15 | ● | 2 | | | 1 | | | 2×256K5¼F | CP/M-86 | | ● | C11 | Graphics, but no colour[1] |
| Tiger | £3,214 | Z80 | 4 | 62K | 256K | 80×24 | M | ● | 512×512 | W | 10 | ● | 1 | 1 | 1 | 3 | 2 | ● | 2×1Mb5¼F | CP/M-86 | | ● | H5 | *PCN* issue 36 |
| TI Professional Computer | £2,386 | 8088 | 5 | 64K | 256K | 80×25 | M | | | W | 12 | ● | 1 | | | 1 | | | 1×320K5¼F | | | ● | T5 | *PCN* issue 3 |
| Texas CC40 | £180 | Cust. | | 6K | 18K | 31×1 | LCD | | 31×1 | C | 4 | | | | | | | ● | | | Ba | ● | T5 | Cartridge software available |
| TI System 200-250 | £6,695 | 9900 | 4 | 64K | | 80×24 | M | | 80×24 | W | 12 | ● | 1 | | | | | | 1×5Mb5¼H | UCSD-P, PX10 | | ● | T5 | Bigger version available |
| TMK 332 | £2,242 | 8085A | 5 | 64K | | 80×24 | M | | 190×96 | W | 22 | ● | 2 | 1 | | | | | 2×320K5¼F | CP/M | Ba | | P5 | *6502 I/O processor |
| Torch | £3,214 | Z80* | 4/2 | 96K | | 80×30 | TvM | ● | 640×256 | W | 15 | ● | 1 | 1 | | 4 | | ● | 2×400K5¼F | CPN | Ba | ● | T6 | CP/M compatible |
| Toshiba T-100 | £1,900 | Z80A | 4 | 64K | 96K | 80×25 | TvM | ● | 640×200 | W | 8 | ● | 1 | 1 | 1 | | 2 | | 2×256K5¼F | CP/M | Ba | ● | O4 | Pro test March 18 |
| Toshiba T-200 | £2,242 | 8085 | 2.6 | 64K | | 80×24 | M | | 80×24 | W | 13 | ● | 1 | | 1 | | | | 2×256K5¼F | CP/M | Ba | ● | O4 | Standard CP/M machine |
| Transam Truscan | £1,983 | Z80A | 4 | 64K | | 80×24 | TvM | | 640×288 | W | | ● | 2 | 1 | | 1 | 5 | | 2×190K5¼F | CP/M | | | T7 | S-100 machine |
| Triton 4 | £5,744 | Z80A | 4 | 64K | 160K | 80×24 | M | | | W | 8 | ● | 1 | 1 | | | 3 | | 2×1.2Mb8F | MPSL-BOS | | ● | T11 | Upgradable to Winchester disk |
| Tulip 1 | £1,150 | 8086 | 8 | 128K | 896K | 80×24 | M | ● | 760×288 | W | 16 | ● | 1 | 1 | | 6 | 1 | | 1×5.25K5¼F | CP/M | Ba | | N2 | IBM PC software compatible |
| Vector 4 | £3,852 | 8088 | 5 | 128K | 256K | 80×24 | M | ● | 640×312 | W | 15 | ● | 1 | 1 | | 1 | 2 | | 2×630K5¼F | CP/M, CP/M 86 | Ba | ● | A4 | 8-bit and pseudo 16-bit |
| Victor 9000 | £2,754 | 8088 | 5 | 128K | 896K | 80×25 | M | | 800×400 | W | 7 | ● | 2 | 1 | | 4 | | | 2×600K5¼F | CP/M 86, MS-DOS | Ba | ● | D8 | Same as Sirius 1 |
| Wang Professional | £3,076 | 8086 | 8 | 128K | 256K | 80×25 | M | | 800×300 | W | 16 | ● | 1 | 1 | | | | | 2×360K5¼F | MSDOS,CP/M80,USCDP | Ba | ● | W4 | 8087 co-processor optional |
| Wicat 150 | £6,846 | 68000 | 8 | 256K | 1.5Mb | 80×25 | M | | 400×300 | W | 20 | | 2 | 1 | | 1 | | | 2×616K5F | MCS | Ba | ● | S10 | Upgradable to 32 user system |
| Wilkes YDB110 | £4,025 | 8086 | 5 | 128K | 896K | 80×24 | M | ● | 960×624 | W | 21 | ● | | 1 | | 6 | | | 2×1.2MbBF | CP/M 86 | Ba | ● | W2 | Standard CP/M machine |
| Xerox 820 Model II | £2,415 | Z80A | 4 | 64K | | 80×24 | M | | 1024×512 | W | | ● | 2 | 2 | | 2 | | | 2×160K5¼F | CP/M | | | R4 | Powerful graphics |
| Zenith ZF-120-22 | £2,978 | 8088 | 5 | 128K | 192K | 80×25 | M | | 640×225 | W | 18 | ● | 2 | 1 | 1 | 1 | 5 | | 2×320K5¼F | CP/M, MS-DOS, Z Basic | | ● | Z1 | *PCN* issue 28 |
| Zeus 4 | £5,400 | Z80 | 4 | 64K | 320K | 80×25 | (M+) | | 80×25 | W | 11 | ● | 10 | | | | | | 1×6Mb5¼H+1×250K5¼F | CP/M, Muse | As | ● | M5 | Designed as multi-user |

## DISTRIBUTORS

**A1** Acorn Computers, Cambridge 245200 **A2** Adds (UK) Ltd, 01-949 1272 **A3** Ads Ltd, 01-947 4881 **A4** Almarc Data, Nottingham 52657 **A5** Atari International (UK), Slough 33344 **A7** ACT, 021-454 8585 **A8** Apple Computers, Hemel Hempstead 60244 **A9** Anderson Jacobson Ltd, Slough 25172

**B1** Barcellos Ltd, Leicester 541574 **B2** Bonsai, 01-580 0902 **B3** Britannia Computer Ltd, Dudley 233433 **B4** British Micro, Watford 48222 **B6** British Olivetti, 01-785 6666 **B7** Bromley Computer Consultancy, 01-697 8933 **B8** British Telecom Merlin, 01-840 4567

**C1** Computer Pheripherals Ltd, 01-278 7837 **C2** Country Computers Ltd, Heddich 29826 **C3** Computer Ancillaries, Egham 36455 **C4** Canon (UK) Ltd, 01-680 7700 **C5** Camputers Lyne, Carmbridge 315063 **C6** Casio, 01-450 9131 **C7** Casu Electronics Ltd. Uxbridge 72511 **C8** Clenlo Computer Systems, 01-670 4202 **C9** Commodore Business Machines, Slough 79292

**C11** Colt Computer Systems, 01-577 2686 **C12** Community Computers, Peterfield 87567 **C13** Comart, Huntingdon 215005 **C14** Computers For All, Basildon 418414 **C15** CK Computer, Plymouth 780311 **C16** Country Computers, Redditch 29826 **C17** Cifer, Melksham 706361 **C18** Comart, St. Neots 215005 **C19** Ceedata, 01-941 4899 **C20** C/WP Computers, 01-828 9000

**D1** Datac, 061-941 2361 **D2** Dec Ltd, Basingstoke 59200 **D3** Digico, Letchworth 78172 **D4** Digital Microsystems, Reading 343885 **D5** Direct (UK), Warrington 814072 **D6** Dragon Data Ltd, Kenfig Hill 744700 **D7** Data General, 01-572 7455 **D8** DRG, Weston-super-Mare 415396 **D9** Data Applications, Cirencester 61826 **D10** DVW Electronics, 0203-668181

**E1** Encotel Systems, 01-686 9687 **E2** Epson (UK), 01-902 8892 **E3** Equinox, 01-739 2367

**F1** Facit Addo Ltd, Medway 401721 **F2** Five Technology, Lichfield 57701 **F3** FI Cord, 061-445 7716 **F4** Flight Electronics, Southampton 27721

**G1** Gemini Micros, Amersham 28321 **G2** Gecas, 01-629 3758 **G3** Grundy Business Systems, 01-943 1901 **G4** Globe Business Machines, Weston-super-Mare 83522 **G5** Gulfstream, 040 26 4926

**H1** Haywood Electronic Asoc Ltd, 01-428 0111 **H2** Hewlett Packard, Bracknell 63100 **H3** Hytech Microsystems, Oxford 726644 **H4** Holtel Microsystems, 01-328 8737 **H5** HH Electronics, 0954-81140 **H6** Hitachi, 01-848 8787

**I1** Icarus Computer Systems, 01-485 5574 **I2** Interam Computer Systems, 01-675 5325 **I3** IBR Microcomputers, Reading 664111 **I4** ICL, Slough 31111 **I5** IO Technology, 01-248 4876 **I6** Irvine Business Systems Ltd, Irvine 75000 **I7** ITT Consumer Products, Basildon 3040 **I8** Interactive Data Systems, Milton Keynes 313997 **I9** IBM UK Product Sales Ltd, 01-578 4399 **I10** Intertec Data Systems, 01-840 1599

**J1** Jupiter Caritab, Cambridge 313479

**K1** Keen Computers, Nottingham 412777 **K2** KGB Micros, Slough 38581 **K3** Kalamazoo Business Systems, 021-475 2191 **K4** Kemitron, Chester 21817 **K5** Kenilworth Computers, Kenilworth 512127 **K6** Kontron Computers, St Albans 66222

**L1** Logitek, Standish 426644 **L2** Lowe Electronics, Matlock 4995 **L3** LSI Computers Ltd, Woking 23411 **L4** Logica VTS, 01-637 5171 **L5** Lucas Logic, Kenilworth 59412 **L6** Leicester Micro Systems, Leicester 55 1869 **L7** Lambart Micro Computers, 0628-75001

**M1** Micro APL Ltd, 01-834 2687 **M2** Microprocessor Engineering, Southampton 775482 **M3** Mediatech, 01-903 4372 **M4** Microsolution, Chipping Norton 3256 **M5** Millbank Computer, 01-891 4691 **M6** Micro Networks Ltd, 01-602 7405 **M7** Mattel, 01-900 0311 **M8** Microtanic Computer Systems, 01-693 1137 **M9** Midlectron, Derby 6811

**N1** NEC 01-388 6100 **N2** Newport Technical Services, 0272-290651 **N3** NCR, 01-723 7070

**O1** Olympia Boss Systems, 01-262 6788 **O2** Oric Products International, Ascot 27686 **O3** Osborne Computer, Milton Keynes 615274 **O4** Office International, Sunbury-on-Thames 85666 **O5** OEM, 01-407 3191

**P1** Panasonic Business Equipment (UK), Slough 75841 **P2** Pronto Electronic Systems, 01-554 6222 **P3** Phillips Business Systems Colchester 575115 **P4** Positron Computer Ltd, Newton-le-Willows 29741 **P5** PHL, 021-745 3033 **P6** Poulter Compuvision Ltd, 0532-469611 **P7** Portico Technology, 01-735 8171

**Q1** Quantum Computer Systems, Leeds 458877

**R1** Rair Ltd, 01-836 6921 **R2** Racal, Reading 782158 **R3** Research Machines Ltd, Oxford 249866 **R4** Rank Xerox, Uxbridge 51137 **S1** Salmon Electronics, Darlington 721368 **S2** Sterling Microsystems, 01-486 7671 **S3** Seed, Brownhills 378151 **S4** Sharp Electronics, 061-205 2333 **S5** Sinclair Research, 0276 685311 **S6** Sord, 01-930 4214 **S7** SWTP, Peterborough 234433 **S8** Sirtel UK Ltd, Peterborough 236010 **S9** Shelton Intruments, 01-278 6272 **S10** Software Sciences Ltd, Farnborough 544321 **S11** Semi-tech Microelectronics 01-390 6179

**T1** Trusthall Adler, 01-250 1717 **T2** Thames Systems, Thame 5471 **T3** Tandberg, Leeds 774844 **T4** Tandy Company, Walsall 648181 **T5** Texas Instruments, Bedford 67466 **T6** Torch Computers, Cambridge 841000 **T7** Transam Microsystems, 01-404 4554 **T8** Transtec, Bristol 277462 **T9** TRW Datacom International Ltd, Windsor 59183 **T10** TDI, Bristol 742796 **T11** Trivector Commerce, Biggleswade 82222

**W1** Westrex Ltd, 01-578 0957 **W2** Wilkes Computers, Bristol 277399 **W3** Wollcrown, 01-930 1991 **W4** Wang UK, 01-560 4151

**Z1** Zenith Data Systems, Gloucester 29451

# SKULL

## IS HERE
## AND WAITING FOR YOU
## AND YOUR SPECTRUM!

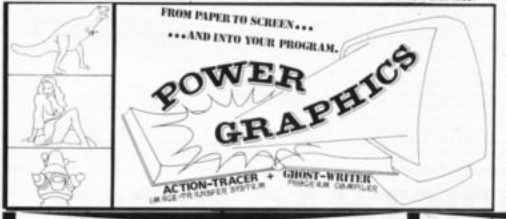
GAMES MACHINE

**40 FRETHERNE ROAD, WELWYN GARDEN CITY, HERTS**
**TELEPHONE (0703) 28444/28435**

---

**NOW YOU CAN LIFT STATIC DRAWINGS, PHOTOGRAPHS, ETC, RIGHT OFF THE PAPER AND BRING THEM TO LIFE INTO *YOUR* PROGRAM!**

TWO POTENT FEATURES COMBINE TO BRING YOU UNIQUE NEW POWER OVER YOUR SPECTRUM GRAPHICS!

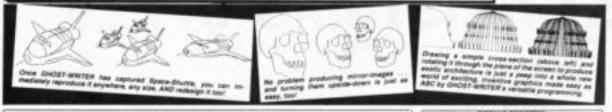



● **ACTION-TRACER** Gives you the power to transfer drawings, photographs, paintings, lettering — in fact ANY paper-based images into full colour line-drawings on your Spectrum screen, with astonishing ease and an accuracy that rivals expensive digital tracers. But this time you get more than just a static on-screen design that has to be laboriously droned on and off tape, because . . .

● **GHOST-WRITER** Interprets your on-screen design into the precise sequence of basic instructions needed to EXACTLY reproduce it, and then writes the program for you, directly into memory! New program lines appear in your listing which are indistinguishable from ones you might have written yourself. When you've finished, POWER-GRAPHICS will 'self-destruct', leaving behind only your new program lines ready to use.

TOGETHER THEY'RE DYNAMIC!

The new program captures your design DYNAMICALLY, giving you instantly the power to MOVE it anywhere, to SHRINK it down to a single pixel, or EXPAND it to fill the screen. You can SQUEEZE or STRETCH it into weird distortions, flip it UPSIDE DOWN or MIRROR-IMAGE it, ROTATE it in the plane of the screen . . . in other words MANIPULATE IT UNDER YOUR FULL CONTROL!




MANIPULATION OR ANIMATION - GHOST-WRITER ALWAYS WRITES EXACTLY THE PROGRAM YOU NEED!

You can tell GHOST-WRITER to program selected parts of your design with their own special line numbers, allowing you to call them as separate sub-routines. Thus you can add or remove parts at will – like the Bunsen burner in this chemistry diagram.



INSTANT FORGERY!

How would you like to write a program that signs your name exactly as you do yourself?

It's just a few minutes' fun with POWER-GRAPHICS!

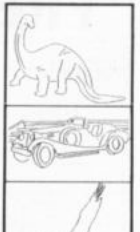


Animating the lips of this well-known newsreader (recognise her?) is just as simple – and thanks to POWER-GRAPHICS' ability to produce high-speed curves when needed (which draw as fast as straights) her curved lips can be animated in real time!

POWER-GRAPHICS is fun to use, simple in operation, and for beginners and advanced users alike is an important new programming tool that extends the Spectrum's potential for imaginative graphics into exciting new regions.

IF YOU WANT PICTURES YOU CAN USE, IT HAS TO BE POWER-GRAPHICS

**ZX SPECTRUM**
**FOR 16K OR 48K**
**ONLY £8.95**



**BUTTERCRAFT SOFTWARE**
**14 Western Avenue, Riddlesden, Keighley, Yorks, ENGLAND**

PLEASE ASK FOR OUR ILLUSTRATED LIST OF GUARANTEED-QUALITY TRS80/VIDEO GENIE SOFTWARE

OVERSEAS CUSTOMERS ADD £1.00 EXCESS POSTAGE

# PCN Billboard

**Spectrum** games, £2 each, Jumping Jack, Blind Alley, Quicksilva, Invaders, 3D Desert Patrol. Send PO only to: 25 Oxwich Rd, Mochdre, Colwyn Bay, Clwyd.

**Oric** software, Oric Forth £10, Dinky Kong, Digger, Harrier Attack, £5 each. The lot for £20. Tel: 0942 728161 after 4pm.

**Atari 400** 16K program recorder, Basic and Pilot Programming languages plus one joystick and lots of software all for £200. Tel: 582 3975.

**Acorn Atom**, 12K + 12K, regulated PSU, utility ROM, soft VDU, Pecker computer, Invaders cassettes, 3 Atom books, Price £90 ono. Tel: (0742) 655227 after 7pm.

**Oric-1 48K** boxed, under guarantee, as new. Several games, Ian Sinclair book. £120. 4 Park Mansions, Main Avenue, Moor Park, Northwood, Middx, HA6 2JH.

**Acorn Atom** 4K only £60, also cheap printer Olivetti TE300 Teleprinter ASCII punched tape I/O and RS232 (needs attention) £50. Tel: Crowthorne 771915 evgs.

**Dragon 32**, tape recorder, joysticks manual leads, plus 30 assorted cassettes incl. books, magazines, £200 ono Tel: 021-788 8693 after 6pm.

**Oric-1** Forth by Tansoft for 48K Model for sale, original tape plus manual, £10 ono. Tel: Skelmersdale 26072 ask for Andrew.

**Sharp MZ-80K** 48K RAM, beautiful condition, as new, complete with cover and selection of software, over £400 new, only £225. Tel: Padgate (Warrington) 816624.

**TRS-80** +32K Interface + Monitor + 3 double density disk drives, +software including Visicalc, Profile and Editor Assembler. Excellent condition £950 ono. Tel: Dave Milburn 01-928 1777 X4110 daytime.

**Osborne** 01 with software worth £800, Epson FX80 matrix printer, manuals, paper, disks, wordstar, supercalc, suit small business or writer. Allen 01-724 3681. £1200 ono.

**Apple** software, Arcade/adventure games, utilites, business-Visicalc, Applewriter, dBase II, Cobol, Wordstar/Spellstar/Mailmerge. Full list. SAE please. J Davey, 44, Hazelmere Road, Stevenage, Herts.

**Vic 20** 16K RAM, 9 months old, 25 games on cassette and cartridge, excellent condition for quick sale, £125. Tel: 01-881 1758 eve, after 7.30.

**Spectrum** software wanted. Original with cassette slip, all types, will collect and pay cash for large quality collections only. Tel: (London) 01-520 0904 with details.

**Commodore 64** software. A simple word processor on tape or disk, output to 1520 etc., £10 tape, £12 disk. 66 Gainsborough, Bracknell, RG12 4WL.

**Sharp MZ80K** disk drives, I/O box, disk interface, printer interface, Ardensoft tool kit, word processor, £450. Tel: 01-723/1547 (London).

**Wanted:** Spectrum and Commodore 64 software. Originals only. Top prices paid. Please submit SAE and list to Upper Shortlands, Wedmore, Somerset.

**Atax 822** printer, no interface needed, plus three rolls of thermal paper, £100. Also various cartridges, £12.50 each. Tel: 01-674 5809 evenings.

**Microplus S100** disc controller board, £15. UK101 expanded cased, £80. S100 backplane, offers. 8086 development chip set/monitor. ROM's, offers. Tel: Hugh Bridge, 01-735 1862.

**Texas TI99/4A** computer, speech synthesizer, extended Basic, cassette lead, eight cartridges including Parsec, Munchman, Invaders, Adventure, various games cassettes, £250 ono. Tel: Crayford 56645.

**Spectrum** software to sell. Christmas bargains! Abersoft Forth (cassetted) £10. Heathrow ATC, £5. Hobbit, £8. VU3D, £6 or £25 the lot. Tel: Chris on Rugby 832468.

**VIC-20** software, Vi-Calc, Adventure cartridge: The Count. Cassette: Magic Mirror, Werewolf Curse, £5 each or all four for £15. Contact Paul on (0455) 637427.

**Swap** or sell, BBC Micro Software, Snapper, Vortex, Crooker, Chess, etc. 15 original tapes. Tel: John, Romford 63638 between 6 and 7 pm.

**SHARP** Spectrum software, loads to choose from. Hobbit, Manic Miner, Jetman, Atic Atack. Loads more to choose from. Tel: 051-226 7963 after 6pm and ask for Ray.

**BBC** disk drive, 100K, SS/DD plus tons of software. Want only £195. Tel: 01-574 4122 between 7-9pm.

**ZX81**, 16K, complete in box, magazines, books, £60 of software, guaranteed until 14/5/84. Ring Havant 482700 after 5pm. Worth over £130, open to offers.

**Wanted.** Valforth language for the Atari I 400/800, plus set of utilities and manuals, good price paid. Tel: Grant on (0309) 73694.

**For sale**, 16K ZX81, typewriter keyboard and over £90-worth of software. Tel. 01-267 5295 between 2pm and 10pm.

**BBC** DFS 0.90, £10. Security Eprom, £10. Both with fitting instructions. Mrs Lynda Openshaw, 44 Brierley Street, Bury, Lancs.

**Epson** HX-20, Microcassette, case, cost £559 (inc. VAT), only one year old, hardly used. Yours for only £400 (inc. VAT). Tel: Phil Bowles, 01-470 4183.

**Atari VCS** for sale. Plus 11 cartridges, joysticks and paddles, only £170. Tel: 01-889 9887 evenings.

**Oric-1** 48K. With leads, demonstration tape, manual and Oric-1 book. Excellent condition. Still under guarantee. Only £105. Tel: (0705) 585609.

**1984 LINK.** One month old, guaranteed. Plus Pac-Man; Monstermine. Tapes including all leads, two manuals, excellent condition, bargain at £260. Tel: 061-881 4018 after 5pm.

**Spectrum** software. Wanted, originals only, top prices paid, any quantity. Send list plus SAE. S. Duckett, Upper Shortlands, Wedmore, Somerset.

**TRS-80** + 32K interface, monitor, 3 double density disk drives and software, including VisiCalc, Profile and Editor Assembler. Excellent condition, £850 ono. Tel: Dave Milburn on 01-928 1777, ext. 4110 daytime.

**VIC-20**, 16K expansion, QN cassette unit, joystick, programmers reference guide, £120 worth software, 30 magazines, vgc. All worth £315, accept £175 ono. Tel: Alan (0294) 64235 evenings.

**Oric 1**, 48K, complete manual, leads and software. Xenon I, Galaxians, Oricmon, Oric Owner magazines. All worth £180, sell for £125. Tel: Mehran on 01-4290317 evenings.

**2C8** cassette recorder. Suitable for C64 or VIC-20, £30. Calc result 3D spread sheet, £89. Both hardly used. Tel: 01-952 2644 evenings.

**Swap.** Spectrum software, including Manic Miner, Atic, Atac, Scrabble, Lunar Jetman and over ten of top thirty. Tel: Bloxwich 409552.

**48K Spectrum** + tape deck and mags and 46 games, including Jet Pac, Manicminder, Penetrator, Time Gate, Football Manager, etc. All for £200. Tel: 01-203 0902, Damian.

**Sharp MZ80A**, 48K micro computer, complete with monitor and integral cassette deck. Excellent condition. Boxed as new, hardly used. £250. Tel: Guildford (0483) 232253.

**Oric** version of The Hobbit, complete with book. Only £10. Tel: Barnsley (0226) 43071 and ask for Antony.

**Spectrum** software. Scramble, Gulpman, tape copier, Invaders, Golf, all £3.50. Black Crystal, Automonopoli, Spectres, £5. Forth, £10. Excellent condition. Write to M. Groll, 31 Armitage Lane, Brereton, Rugeley, Staffs.

**For Sale.** Lynx 48K Micro, £155 ono. Immaculate condition, still in box. All manuals, leads. User mags and games. Ian Paton, 39 Yates Street, Liverpool L86RD.

**Spectrum** DK tronics light pen for sale, five months old, hardly touched, still in box. Cost me £20, sell for £12. Tel: 01-790 7777, Stepney, London E11.

**Wanted:** Dragon 32, users in the Southampton to Salisbury area for pen-pals. Write to Ashley R. Adamson, St. Elmo, Slab Lane, West Wellow, Romsey, Hants SO51 0BY.

**Wanted:** Memotech keyboard and buffer pack for ZX81. Must be in perfect condition. J. Moffett, 121 Knockbreda Park, Belfast BT6 0HE. Tel: (0232) 640075.

**Wanted:** Spectrum software. All types collected, makers originals with cassette, slips only, cash offer and collected (London area). Tel: details plese 01-520 0904.

**Dragon 32** boxed. Plus leads, £300-worth software, books. For £195 ono. Also T1994A, boxed, guaranteed, £60 software, joysticks, leads, £130 ono. Tel: (0254) 672068 after 5pm.

**Dragon 32**, four months old, replacement, plus joysticks, games on cassettes, cartridges, magazines, one years' insurance, immaculate condition, boxed, as new, only £150 ono. Tel: 01-570 8783.

**Atari** software, 400 800, 600XL, brand new, unwanted Christmas surprise, large list. SAE for details, 27 Crawford Gardens, St Andrews, Fife KY16 8XQ. Tel: (0334) 75817.

**Commodore 64.** Still guaranteed, £185, complete with box, manual. Would like to exchange Atari 600XL with cassette, must still be under guarantee. Tel: Southampton 437369.

**Conf** cartridge for sale or swop. Also willing to swop other Atari software. Tel: Mark on (0495) 247328 anytime.

**Sharp MZ80K** software. 22 cassettes and book for sale, only £40 the lot. Includes user notes. Tel: John, 01-472 1331 after 6pm.

**48K Oric**, as new, boxed, plus printer cable, £100. Tel: 01-841 1815.

**Commodore 3032** (32K), dual disk drives and printer. All vgc. Also assembler software and all cables, £925 ono. Tel: Brighton (0273) 771577.

**BBC B + DFS** new, boxed, complete with all leads and two Acornsoft games, bargain at £200, must sell moving country. Tel: Oxford 64039 after 8pm. (James).

# FREE CHRISTMAS OFFER

| | | | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

## Billboard Buy & Sell Form

Due to popular demand, we are continuing our special Christmas offer into the New Year, this lets you put your Billboard entry in free. Just complete the form from last week's, this week's or next week's issues and send it in. You don't need to send us any money. Put one word in each box, to a maximum 24 words, and send it to Billboard, Personal Computer News, 62 Oxford Street, London W1A 2HG. To take advantage of the free offer, you must send a 'Free Christmas Offer' cut out from PCN; we won't accept photocopies. And, as always, we can't guarantee when your ad will appear and we will not accept ads from commercial organisations.

Your Name: .....

Address: .....

Telephone: .....

# MICROSHOP

**Rates:** £10 per single column cm. Minimum size 3 cm. Series discount available. **Mechanical Data:** Column width, 1 column 57mm. 2 colours 118mm. 3 columns 179mm. **Copy Dates:** 10 days prior to publication.
**Contact:** Christian McCarthy on 01-323 3211.

## Software

WANTED SOFTWARE FOR LYNX AND MTX

### LYNX SOFTWARE

***FROM BUSTECH. NEW RELEASES!!***

**YNXVADERS**

100% M/C arcade game for the Lynx. Good implementation of space invaders with smooth fast graphics. £7☐

**ROBORUN**

This game has seven levels to progress through with the hazards of radio-active barrels, guards, etc. Each level is harder till eventually you have to face XP2 and defeat him. Great entertainment with a hall of fame. £6☐

*Dealer enquiries welcome. Send SAE for full software list of 15 titles.*

NAME .....

ADDRESS .....

.....

.....

**Please tick boxes and send cheques/PO to:**
**Bustech,**
**19 Landport Terrace,**
**Portsmouth, Hants.**

ALL ORDERS DESPATCHED WITHIN 14 DAYS
***Dealer enquiries welcome***

### ORIC • SPECTRUM • DRAGON

**AZIMUTH-90** This Cassette eliminates all loading problems by correcting and maintaining the azimuth to the standard 90 degrees. A must for all cassette based computer systems. **£6.95**

**C15 DATA SAFE CASSETTES** Guaranteed error free SAVEing and LOADing of programs and data. Pack of 4 cassettes **£3.95**

### 48K LYNX 96K

| | |
|---|---|
| SPACE INVADERS 100% Machine Code | £6.95 |
| VOODOO TREASURE ISLAND Fast addictive action | £6.95 |
| *HOME ACCOUNTS SYSTEM Easy to use | £6.95 |
| *TELEPHONE & ADDRESS DATABASE Business/home use | £6.95 |
| *CASSETTE DATA FILE HANDLER A must for every Lynx | £6.95 |

* As Exhibited by Computers at the MicroTrade83 Exhibition, Barbican Centre
Send large SAE for free membership to Lynx Newsletters and Product News

Cheque/PO to: **RAD SYSTEMS, 17 Devonshire Hill Lane, London N17 8LJ**
ALL ORDERS DESPATCHED WITHIN 48 HOURS BY FIRST CLASS POST
Overseas — Add 10%

### COMPUTER RETAILERS
### MICRODEALER UK IS THE UK's No. 1
**SOFTWARE SPECIALIST DISTRIBUTOR**

The Microdealer UK Software Portfolio contains a staggering **27** of the UK Top **30** best selling programs.
Microdealer UK is open **7 days a week** and sells **advice, experience, knowledge** and **software**.
Remember, make Microdealer UK your first call for software.

**RING:**
**305 0521**
**NOW!**

### MASSIVE DISCOUNTS
*(UP TO 60% !!)*
**ON SOFTWARE FOR ATARI, BBC, COMMODORE 64, DRAGON, SPECTRUM & VIC20**

**Send s.a.e. for free leaflet or call in at one of our shops now!**

*STOP PRESS*
Look for our incredible bargains on Stand 23/24 at the London Home Computer Show, Jan. 6th-8th, Royal Horticultural Society's New Hall, London.

**Maplin Electronic Supplies Ltd.**
All mail to P.O. Box 3, Rayleigh, Essex SS6 8LR. Tel: (0702) 552911
Shops at: 159-161 King Street, Hammersmith, London W6. Tel: 01-748-0926.
8 Oxford Road, Manchester. Tel: 061-236-0281.
Lynton Square, Perry Barr, Birmingham. Tel: 021-356-7292.
282-284 London Road, Westcliff-on-Sea, Essex. Tel: 0702 554000.
46-48 Bevois Valley Road, Southampton. Tel: 0703 25831
All shops closed all day Monday.

### 64 BUSINESS SPECIALISTS

We have interfaces that work! 80 column boards. Flight simulators and lots of goodies. Point of sale software now available. Commodore service agents.

**Milton Keynes Music + Computer Centre**
**17 Bridge St. Leignton Buzzard Beds**
**Tele. 0525 376622.**

### JANUARY SALE

The Hobbit (Melbourne) C64 + Spectrum £11.
Valhaua (legend) Spectrum £11.50.
All ultimate, Imagine software at £4.40; special offer £1.00 off normal price of game (except Sinclair Psyon, not available) featured in PCN charts or reviewed in all January issues of PCN. Send s.a.e. for full list including Atari, BBC, Lynx and Dragon software + peripherals. We will match games prices (phone for quote) **PERIPHERALS** curran speach syntheiser for Spectrum Joystick Interface £13.00. Vic 20 16K RAM PAK £22. Cheque and postal orders to **LaMer Software, 22 West St. Western-Super-Mare, Avon BS23 1JU or phone 0934 26339 for quotations between 10am and 6pm.**

### Calling all *NewBrain* owners

Universally compatible

**CENTRONICS** printer interface **£40.95**
Hi-res **GRAPHICS** screen dumps ... for Epson, Seikosha, Microline etc (please specify) **£6**
**SPACE FIRE** arcade game for all the family **£4**

**TYEPRO LIMITED**
30 Campion Road, Cambridge CB4 2NG
TEL: Day 0467 840083 Eve. 0223 322394

Anthony Ashpitel's **TYPING MASTER** **£15**
**MORTGAGE/MATHS/PLOTTER** **£5 each**
**MEMOPAD** with wordwrap, find, justify, etc. **£10**
**CHESS 2** best Chess program for NewBrain **£15**
Many select 4 programs from EPROMS, expand up to 112K with **MICROPAGE/PERIPHERALS** **£29.95**
Micropage versions: TYPING MASTER & CHESS 2 **£30 each**
MORTGAGE **£15**
MEMOPAD **£20**
your 8K program in EPROM **£15**
Dealer enquiries welcome.

**JOYSTICK** including interface and software **£19.95**
NewBrain **USERS GROUP** Annual Subscription (6 newsletters & special offers) **£5**

**GFG Microsystems,**
**36 Armitage Way, Cambridge CB4 2UE.**
**Tel: (0223) 315126**
All prices include VAT. P&P

### SHARP
**MZ-700 MZ-80A MZ-80K**

CASSETTE SOFTWARE
SAE FOR CATALOGUE

**DAVID COMPUTER SOFTWARE**
**38 SOUTH PARADE, BRAMHALL, STOCKPORT**

### WANTED
**PERSONAL COMPUTERS**
all models bought for cash
Morgan Camera Company
**160 Tottenham Court Road,**
**London W1. Tel: 01-388 2562**

### Programs Wanted

**We require quality programs for most micros.**
**We pay cash fees, royalties and distribute in the UK, USA and Europe.**
Phone: **Basingstoke (0256) 25107**
or write to:
DREAM SOFTWARE **Dept. PCN**
**P.O. Box 64, Basingstoke, Hants. RG21 2LB**
(Please enclose return postage if you wish your cassette returned)

# MICROSHOP

## Software

**New Releases for '84**

THE TRAP, a graphic adventure for the 48K Spectrum, with colour, sound and high res graphics. £ 6.95

WAYDOR, a brilliant adventure game with graphics for the ORIC-1 ..... £ 7.50

SLITHER, the unstoppable serpent, an impossibly addictive game for the 16 -48K Spectrum ..... £ 5.50

WORDMAKER/LISTMAKER, develop spelling and vocabulary skills in the context of a simple letters and word game for the 16 -48K Spectrum ..... £ 7.50

The Spectrum TOOLKIT, an utility program to extend the existing basic command set and include routines useful to programmers for the 16 -48K Spectrum £ 8.95

The ORIC 1 TOOLKIT, provides an extra 14 BASIC statements which can be used in programs written in BASIC or as direct (immediate mode) commands for the 48K ORIC 1 ..... £ 8.95

SPACE ODYSSEY, flight, dodge and avoid limpet mines, tractor beams and aliens. A seek and destroy mission for the BBC model B ..... £ 6.95

PLUS MANY OTHER ★NEW RELEASES★

Send Name and Address for details.

TRADE ENQUIRES WELCOME 01-567 6286

**IMS Software**

143-145 Uxbridge Road, London W13 9AV

## Accessories

**SPECTRUM RAM UPGRADE 16K-48K**

A GREAT NEW DEAL!

£20.99

EASY TO FIT. CHIPS JUST PLUG IN.

NO SOLDERING. SENT WITHIN 10 DAYS

INCL. VAT, P. & P.

ISSUE TWO MACHINES ONLY (BLUE KEYS)

S.A.E. for details, please.

**DISPLAY INSTRUCTION SHEET**

Get the best possible results from your Spectrum. Deals with yellowish white, wobbling colours etc. Send £1 plus Stamped Addressed Envelope

MAIL ORDERS ONLY. Cheques/P.Os to:
FOUNTAIN COMPUTERS LIMITED
Bishops Court,
Bishopstoke,
EASTLEIGH
Hants, SO5 6PE
(0703) 618505

SORRY, NO OVERSEAS ORDERS ACCEPTED (excluding BFPO, Channel Islands and Eire).

## Hardware

**SALE**

| | |
|---|---|
| Sharp PC-1500 | £129.95 |
| CE150/Printer/Cass. Int. | £119.95 |
| Sharp PC-1251 | £59.95 |
| CE125 Printer/Cassette | £79.95 |
| Sharp MZ80A | £375.00 |
| Sharp MZ80B | £650.00 |
| Sharp P6 Printer | £400.00 |
| Business Software for MZ80A | £18.00/proc. |

**All prices inclusive of VAT, postage, packing and ins.**

**West Coast Personal Computers**
**47 Kyle Street,**
**Ayr,**
**Tel: 0292-285082**

## Cassettes

**BLANK CASSETTES!**

**TOP QUALITY PROFESSIONAL BRAND COMPUTER/AUDIO CASSETTES AT BUDGET PRICES**

Packed in boxes of 10 cassettes
Complete with labels, inlay cards and library cases.
*Prices include VAT post & packing*

| LENGTH | BOX PRICE (10) | QTY | Amount |
|---|---|---|---|
| 5 mins | £4.35 | | |
| 10 mins | £4.40 | | |
| 12 mins | £4.45 | | |
| 15 mins | £4.50 | | |
| 30 mins | £4.70 | | |
| 60 mins | £5.30 | | |
| 90 mins | £7.00 | | |

*Cheque/Postal Order enclosed for* £

*NAME* .....

*ADDRESS* .....

.....

**PROFESSIONAL MAGNETICS LTD**
Cassette House, 329 Hunslet Rd, Leeds
LS10 1NJ
Tel: (0532) 706066
*TRADE ENQUIRIES WELCOME*
*Get the best terms, service and products*

**BASIC PROGRAMMING COURSES**

If you are thinking of buying a micro, or have just bought one, why not attend one of our day or evening programming courses?

- ★ **10 weeks intensive Basic programming courses.**
- ★ **Small classes started every term.**
- ★ **2 evening or 2 days per week (2½ hours per session).**
- ★ **Tuition by experienced, sympathetic teachers.**
- ★ **Gains essential experience on our disk based B.B.C. Micro's.**
- ★ **£170 inclusive of VAT.**

O/A Level Computer Studies, City and Guilds 746, A.B.E. and A.A.T. Data Processing and other courses run by

**BORLANDS COLLEGE OF COMPUTING**
David Game Tutorial College
86, Old Brompton Road
London SW7 3LQ
Tel: 01-584 7580/9097

If an advertisement is wrong we're here to put it right.

If you see an advertisement in the press, in print, on posters or in the cinema which you find unacceptable, write to us at the address below.

The Advertising Standards Authority.

ASA Ltd, Dept 3
Brook House, Torrington Place,
London WC1E 7HN

**NO GIMMICKS! NO WAFFLE! SIMPLY THE BEST PRICE!**

**WORDSTAR/MAILMERGE/SPELLSTAR**

For IBM® Personal Computer

**FOR ONLY £299** [YES ALL THREE]

**VER. 3.24**

**Mailmerge only £55**
**Spellstar only £99**

ACT Sirius 1 **Wordstar only £199**

II apple III

OVERSEAS AND TRADE ENQUIRIES WELCOME

| | |
|---|---|
| WORDSTAR PROFESSIONAL PACK | £369 |
| SUPERCALC PROFESSIONAL PACK | £169 |
| DEBASE PROFESSIONAL PACK | £337 |
| MULTIPLAN | £139 |
| HOMEWORD WORD PROCESSOR/ALSO SUITABLE FOR COMMODORE 64/ATARI | £32.95 |
| VISICALC 3.3 | £149 |

By popular demand we are able to supply business, educational and recreational software at DISCOUNT PRICES for the following machines: Apple, Atari, BBC, Commodore, Vic 20, DEC Rainbow, IBM, ICL, Epson, Sinclair, Sirius, Spectrum, Texas, TRS 80, CPM 5¼ or 8 inch.

*Please send SAE for full list*

**NEW HARDWARE**

| | |
|---|---|
| STAR DP 515 PARALLEL INTERFACE | £269 |
| OLIVETTI JP 101 PARALLEL INTERFACE | £239 |
| JUKI 6100 DAISYWHEEL | £359 |
| MOST PRINTER CABLES IN STOCK FROM AROUND | £7 |

**USED HARDWARE**

Watanabe WX4633 10 pen plotter RS232, mint condition ..... £1,600
DRE 132 column printer, tractor, RS232 ..... £200
QUME Sprint 3-55, daisywheel, speed-feed, single sheet feeder, QUME parallel int ..... £595
Decwriter LA36 RS232 keyboard/printer ..... £225
Burroughs B90 series, mini computer and Winchester 16 Mb, 2 VDU's ..... £3,000
Micos 100 minicomputer (based on Data General Nova 3/12), 2 Midas terminals, Centronics printer 64Mb fixed/exch CDC drive, includes Travel Agent software, desk etc. ..... £8,500

All prices plus VAT in UK. Phone your Access or Barclaycard number for immediate despatch (software sent post free).

**Photographic & Optical Services Ltd**
**129-137 STANLEY ROAD**
**TEDDINGTON, MIDDX.**
**Tel: 01-977 3498**
Answering machine after business hours.
*Offers subject to availability.*
*Telephone first to reserve.*

NEW!

## MODEM

WS2000 "WORLD STANDARD"

This is the only Modem you should ever need to buy. All standards in one package!

- 300, 600, 1200, 1200/75 BAUD
- FULL and HALF DUPLEX
- ORIGINATE and ANSWER
- RS423 232 COMPATIBLE INTERFACE
- CCITT AND BELL / USA STANDARDS
- HOST 75, 1200 BAUD CAPABILITY WS2000 CAN COMMUNICATE WITH VIRTUALLY ANY OTHER MODEM IN ANY COUNTRY!
- IN BUILT SELF TEST FEATURES
- BUSINESS OR HOME USE. VERSATILITY
- BT APPROVED ISOLATION COMPONENTS AND MODULAR PHONE PLUG

LINK THE WORLD TO YOUR COMPUTER FOR JUST **£99.95** exc.
Includes FREE computer contact numbers directory

## GRAPHICS DIGITIZER

"Computerised Drawing Board" for BBC 'B'

**Our latest issue featuring:**

- 40 + GRAPHICS COMMANDS
- AUTO SHAPES, COLOUR FILL
- SAVE SCREEN, PRINT SCREEN
- UNIQUE 'WORK SHEET' DESIGN AID SYSTEM
- TOP SOFTWARE IN CASSETTE

★★ OUTSTANDING VALUE. OUR DIGITIZER, WORK SHEET, CASSETTE AND 8-PAGE MANUAL

READY TO USE FOR ONLY **£29.95** EXC. Also for RML 380Z!

## LIGHT PENS

State-of-the-Art electronics and latest software in cassette at AN UNBEATABLE PRICE

- FULL FREEHAND DRAWING DIRECT ONTO TV MONITOR SCREEN (Mono or B + W)
- CHOOSE DRAWING MODE — FINE TO MEDIUM LINES OR PAINTBRUSH
- PAINT ROUTINE TURNS THE PEN INTO A PAINTBRUSH
- FULL 8-COLOUR PALLETTE
- SAVE PICTURES TO CASSETTE
- PRINT-OUT PICTURES (Epson etc)

READY TO USE. ALL FOR **£12.95** EXC FROM STOCK FOR BBC 'B' and for RML 380Z

LIGHT PENS

## CONTROL INTERFACES

Our ever-expanding range of Control Interfaces covers digital and analogue control via RMC and computers, from a few volts to mains power.

- OPTO-ISOLATED for total safety and computer protection.

Use our interfaces to control lab experiments, robotics, industrial processes — even the electric heating.

- PRICES from £34.00 exc.

SEND SAE for latest spec. sheets

OUR PRODUCTS HAVE BEEN SUPPLIED TO HOMES, SCHOOLS AND COLLEGES THROUGHOUT THE WORLD, AND TO H.M. MINISTRY OF DEFENCE.

Seasons Greetings

## Please Rush Me. . . .

( ) **WS 2000 MODEMS @ £116.00**
( ) **DIGITIZERS (BBC B) @ £36.00**
( ) **LIGHT PENS (BBC B) @ £12.60**

} DELIVERY, VAT INC.

Cheque/PO enc. / Debit my Access/Barclaycard No

/POR TOTAL OF £

Name ..... Address .....

..... Postcode .....

MINOR MIRACLES
MINOR MIRACLES DEPT PCW 1
PO BOX 48
IPSWICH IP4 2AB
TEL: 0473 50304 (SALES) 0449 721888 (TECH)

# MAIL ORDER!

# ALGOTEK

## THE FIRST NAME IN BBC COMPUTERS IN THE NORTH



SCHOOLS/COLLEGES & UNIVERSITIES
SPRING OFFER

| Description | Net | Inc VAT | Carr |
|---|---|---|---|
| Disc Drives: BBC Compatible | | | |
| Cumana | | | |
| 5¼sle 40 Track 100K | £169.00 | £194.34 | £5 |
| 5¼sle 80 Track 200K | £208.70 | £257.71 | £5 |
| 5¼sle 80 Track 400K | £259.20 | £298.08 | £5 |
| 5¼sle 80 Track with PSU 200K | £185.52 | £210.82 | £5 |
| 5¼sle 40 Track with PSU 200K | £226.82 | £260.84 | £5 |
| 5¼sle 80 Track with PSU 400K | £286.82 | £329.84 | £5 |
| 5¼sle 40 Track Dual with PSU 400K | £534.85 | £585.08 | £6 |
| 5¼sle 40 Track Dual with PSU 800K | £421.85 | £485.15 | £6 |
| 5¼sle 80 Track Dual with PSU 800K | £526.85 | £605.88 | £6 |
| Prices for Canon Drives include all cables and formatting disk. | | | |
| Torch ZED disk pack | £750.00 | £859.50 | £6 |
| Daisy Wheel Printer | | | |
| DAT 500 | £299.00 | £343.85 | £9 |
| DAT 550 | £485.00 | £554.75 | £9 |
| DAT 770 | £795.00 | £914.25 | £9 |
| Colour monitor & TV in one with remote | | | |
| 14" Ferguson model 5704U | £275.00 | £316.25 | £9 |
| 20" Ferguson model 5781 | £515.00 | £526.25 | £10 |
| 20" Ferguson model 5730U | PRICE ON APPLICATION | | |
| Computers | | | |
| BBC micro model A | £260.00 | £299.00 | £7 |
| BBC micro model B | £346.96 | £399.00 | £7 |
| BBC micro model B with ECONET | £367.85 | £446.00 | £7 |
| BBC micro model B with ECONET + DFS | £448.70 | £516.00 | £7 |
| ELECTRON | £175.04 | £199.00 | £7 |
| Teleo adaptor | £225.00 | £256.75 | £2 |
| Prestel adaptor | £69.95 | £80.44 | £2 |
| Wordwise word processor | £59.00 | £44.85 | £1 |

| Description | Net | Inc VAT | Carr |
|---|---|---|---|
| Algotek toolkit in Epsom. 4 to 8 upgrade kit (fitting £15.00) | £87.39 | £100.50 | £1 |
| Disc Interface kit (fitting included) | £85.00 | £109.25 | £1 |
| New Basic II rom | £59.00 | £44.85 | £1 |
| 6502 second processor | £185.00 | £224.25 | £1 |
| Z80 second processor | £347.17 | £399.25 | £1 |
| Database | £17.55 | £19.95 | 50p |
| Stockcontrol | £17.55 | £19.95 | 50p |
| Commercial Accounts | £17.55 | £19.95 | 50p |
| Wordpro | £17.55 | £19.95 | 50p |
| Database | £20.65 | £25.95 | 50p |
| Wordpro | £20.65 | £25.95 | 50p |
| Educational | | | |
| Swag | £6.04 | £6.95 | 50p |
| Where | £6.04 | £6.95 | 50p |
| Constellation | £6.04 | £6.95 | 50p |
| Junior maths pack | £6.04 | £6.95 | 50p |
| Physics | £6.04 | £6.95 | 50p |
| Chemistry | £6.04 | £6.95 | 50p |
| Barrage | £6.91 | £7.95 | 50p |
| Educational Cassette: | | | |
| Maths Computer | £8.65 | £9.95 | 50p |
| Algebraic Manipulation | £8.65 | £9.95 | 50p |
| Creative Graphics | £8.65 | £9.95 | 50p |
| Tree of Knowledge | £8.65 | £9.95 | 50p |
| Graphics Charts | £8.65 | £9.95 | 50p |
| BBC Early Learning | £8.70 | £10.00 | 50p |
| BBC Puzzle | £8.70 | £10.00 | 50p |
| BBC Drawing | £8.70 | £10.00 | 50p |
| BBC Planning | £8.70 | £10.00 | 50p |
| BBC The Compt Prog Utz 1 | £8.70 | £10.00 | 50p |
| BBC The Compt Prog Utz 2 | £8.70 | £10.00 | 50p |
| Educational Disk | | | |
| Missing Signs | £13.55 | £15.55 | 50p |
| Word Sequencing | £13.55 | £15.55 | 50p |
| Sentence Sequencing | £13.55 | £15.55 | 50p |
| Word Hunt | £13.55 | £15.55 | 50p |
| Number Balance | £13.55 | £15.55 | 50p |

Many more educational programmes on request.

Be light years ahead of the competition and contact Algotek, Wakefield now.

Please supply me with

NAME ..... School/College/University

ADDRESS .....

..... TEL NO

Please include me on your mailing list ☐

**Send to:**
**Algotek Computer Co Ltd., 11 Wood Street, Wakefield WF1 2EL Tel: 0924 369555**

Algotek COMPUTERS Wakefield

# · VALUE · VALUE · VALUE ·

## BASE UNITS



£349.00 + £52.35 VAT

BASE 64A compatible with Apple cards and software. Equivalent to Apple II plus with extra 16K and new Autostart Monitor. Additional features include ROM based system control program, 64K on board memory, expandable to 192K. MINI-WRITER on board in ROM. 24K system memory. Tiny assembler with assembly and disassembly function. Upper and lower case characters. Function commands on keyboard. Numerical and cursor keypad. Can load 140K diskette program to 192K user RAM. Staggering value!

****Dealer enquiries welcomed****

## MONITORS



£75.00 + £11.25 VAT

12" Green 18 Mhz monitor in elegant plastic case.

## IBM PC LOOK-ALIKE

We shall shortly be offering a fully PC compatible at £1,893

## APPLE CARD ADD-ONS

### 80 COLUMN CARD CPA 4

**£57.50** + £8.62 VAT

80 characters by 24 lines with true descenders. 7 x 9 character resolution compatible with BASIC, PASCAL and CP/M. Modem compatible. Similar to Videx.

### Z80 CARD CPA 3

**£47.99** + £7.19 VAT

### 128K RAM CARD CPA 20

**£199.00** + £29.85 VAT

Enables user to load 142K program or use as a fast access disk.

### 16K RAM LANGUAGE CARD CPA1

**£57.50** + £8.62 VAT

### FORTH CARD CPA 2

**£57.50** + £8.62 VAT

### INTEGER CARD CPA 2A

**£57.50** + £8.62 VAT

### EPROM WRITER CARD CPA 5

**£79.00** + £11.85 VAT

Programs 2716, 2732, 2764, 2516, 2532, 2564. Read, write, copy, compare.

### PAL CARD CPA 7

**£69.00** + £10.35 VAT

Display your II plus colour text and graphics on your home television

### PRINTER INTERFACE CARD CPA 9

**£38.32** + £5.75 VAT

Parallel printer interface.

### RS 232 CARD CPA 12

**£57.50** + £8.62 VAT

## APPLE DRIVE ADD-ONS

### DISK INTERFACE CPA 6

**£47.90** + £7.19 VAT

To connect Apple or compatible drive

### DISK DRIVE CPA 14

**£139.00** + £20.85 VAT

Top quality Japanese slimline drive with cable.

## PRINTERS



£229.00 + £34.35 VAT

CP80 Matrix Printer. 80 cps, bidirectional logic seeking 80 column. Friction and adjustable tractor feed. Hi res and block graphics. True descenders. Switchable italic print. Auto underline.

## TURNKEY OFFERS

Base 64 unit with monitor, two slim line disk drives and disk controller for **£749.00** + £112.35 VAT

Base 64 unit with monitor, two slim line disk drives and controller, Z80 card and 80 column card. CP 80 printer and controller **£1108.00** + £166.20 VAT

## TO ORDER:

*Access and Barclaycard accepted.*
*Send exact amount including 15% VAT plus £1.50 per board carriage and insurance, or £7.00 carriage and insurance for monitors, printers and base units OR call at our warehouse at the South Bank Business Centre, 400 yards from Vauxhall Tube Station.*

# · WOLFCROWN

*Alphasoft Limited · Unit 8, South Bank Business Centre, 1 Ponton Road, London SW8 5BL · Telephone: 01-627 4400*

## DUCKWORTH HOME COMPUTING

a new series

All books written by Peter Gerrard, former editor of *Commodore Computing International*, author of two top-selling adventure games for the Commodore 64, or by Kevin Bergin. Both are regular contributors to *Personal Computer News, Which Micro?* and *Software Review*.

### EXPLORING ADVENTURES

A complete look at the fabulous world of Adventure Games for your computer. Starting with an introduction to adventures, and their early history, it takes you gently through the basic programming necessary before you can start writing your own games. Inputting information, room mapping, movement, vocabulary and everything required to write an adventure game are explored in detail. There follow a number of adventure scenarios, just to get started, and finally three complete listings written especially for your machine, which will send you off into wonderful worlds where almost anything can happen. The three games listed in each book are available on one cassette at £7.95. The complete guide to adventure games: playing, writing and solving them. Peter Gerrard is the author of Romik's two top-selling adventure games – Fools Gold and Tomb of Xenops:

| | | |
|---|---|---|
| EXPLORING ADVENTURES ON THE COMMODORE 64 | £6.95 | (just published) |
| EXPLORING ADVENTURES ON THE VIC* | £6.95 | (just published) |
| *Two of the games require 16K expansion and the third 32K | | |
| EXPLORING ADVENTURES ON THE SPECTRUM 48K | £6.95 | (just published) |
| EXPLORING ADVENTURES ON THE ORIC 48K | £6.95 | (This month) |
| EXPLORING ADVENTURES ON THE DRAGON | £6.95 | (February) |
| EXPLORING ADVENTURES ON THE BBC Model B | £6.95 | (February) |
| EXPLORING ADVENTURES ON THE ELECTRON | £6.95 | (February) |

Other titles in the series include *Using the Commodore 64, The Beginner's Guide to Computers and Computing, Sprites & Sound on the 64, 12 Simple Electronic Projects for the VIC, Will You Still Love Me When I'm 64, Advanced Basic & Machine Code Programming on the VIC, Advanced Basic & Machine Code Programming on the 64*, as well as *Pocket Handbooks for the VIC, 64, Dragon* and *BBC Model B*.

*Write in for a descriptive leaflet (with details of cassettes).*



**DUCKWORTH**

The Old Piano Factory, 43 Gloucester Crescent, London NW1 7DY
Tel: 01-485 3484

## HISOFT PASCAL DEVPAC

### Quality ZX SPECTRUM* Software

### HISOFT PASCAL 4T

"... I haven't seen any other compiler that could match Hisoft's Pascal" ... *Using the Spectrum Micro – Autumn 1983*

"This is a very impressive product ... of benefit to any Spectrum programmer ..." *David Barton ZX COMPUTING Aug/Sept 1983*

Just two comments from full length reviews of our powerful and virtually full implementation of Standard Pascal. The advantages of using Pascal are well-known — fast, self-documenting, and above all, structured programs and now, with Hisoft Pascal, you can reap all these benefits on a wide range of home computers, including the 48K Sinclair Spectrum! Hisoft Pascal produces programs that run typically 40 times faster than equivalent ZX BASIC programs and, sometimes, up to 1,000 times faster!

Hisoft Pascal supports FOR ... DO, WHILE ... DO, REPEAT ... UNTIL, CASE ... OF, INTEGERs, REALs, CHARacters, RECORDs, POINTERs, SETs, ARRAYs etc. etc. — it is not a Tiny Pascal but a virtually full implementation of the language allowing the user to develop true high-level language skills while attaining execution speed close to that of machine code. Complete with a 70-page manual.

Hisoft Pascal is also available in a variety of disk formats, including sequential FILE handling.

### HISOFT DEVPAC 3

"... DEVPAC is most highly recommended. The documentation is first class." *Your Computer May 1983*

"... *If you write programs in machine code, buy DEVPAC – it is the best currently on the market.*" *Adam Denning, ZX SOFT in Which Micro September 1983*

Two comments from reviews of earlier versions of DEVPAC — now we have DEVPAC 3 available: a powerful Z80 assembler with conditional assembly, assembly from tape (to enable generation of very large code files), ORG, EQU, DEFB, DEFS, DEFW, DEFM, labels of any length — in fact all you need for fast (3,000 lines per minute) and powerful assembly programming. But it doesn't stop there: DEVPAC 3 also includes an incredible debugger/dis-assembler giving you a "front panel" display of the Z80 system and allowing extensive debugging of your machine-code programs, including single-stepping programs **EVEN IN ROM!!!** Open up the secrets of low-level programming with DEVPAC 3.

**Prices:**

**Hisoft Pascal 4T** **(ZX SPECTRUM) £25 inclusive**
**(NewBrain, SHARP MZ700 etc) £35 plus VAT**
**Hisoft Pascal 4D, many disk formats £46 inc.**
**Hisoft DEVPAC 3** **(ZX SPECTRUM) £14 inclusive**
**(NewBrain £25 inclusive**

*****STOP PRESS***** Hisoft Pascal for the SPECTRUM now comes complete with a Turtle Graphics package allowing fast and easy production of compiling graphic displays. Hisoft Pascal and Hisoft Devpac also available on ZX Microdrive, please write for details.



and others

**HISOFT**
13 Goossacre, Cheddington
Leighton Buzzard, Beds. LU7 0SR
Tel: (0296) 668995



# Just the thing for these long winter nights. . . . . .




**PETTIGREWS DIARY** £7.95
(Dragon/BBC "B" in February)

"I have nothing but praise for this unorthodox adventure. It utilises the graphics of the Dragon well, has plenty of tunes and is well error trapped"
Micro Adventurer

**EMPIRE** £6.95
(Dragon/BBC "B")

"This is a terrific game . . . highly addictive"
Home Computing Weekly

"An extremely good game . . . highly recommended"
Personal Computer News

"The ideal game as the winter nights draw in"
Popular Computing Weekly

AVAILABLE FROM BOOTS AND ALL GOOD SOFTWARE STOCKISTS OR DIRECT, ENCLOSING A CHEQUE/P.O. TO
**SHARDS SOFTWARE**
189 ETON ROAD,
ILFORD,
ESSEX IG1 2UR.



## WIMBLEDON COMPUTER & HI FI C·E·N·T·R·E



**BBC SERVICE & INFORMATION CENTRE**

WE HAVE A WIDE RANGE OF PRINTERS, DISK DRIVES, MONITORS AND OTHER PERIPHERALS.
FULL RANGE OF SOFTWARE
*WE OFFER*
FULL DEMONSTRATION FACILITIES.
FINANCE AND LEASING.
EXCELLENT AFTER SALES SERVICE.
& WELCOME



CALL IN FOR A CHAT OR JUST COME IN AND BROWSE

ACORN COMPUTER · Gemini · BBC SOFT

61 THE HIGH STREET,
WIMBLEDON VILLAGE, SURREY SW19
**TEL. 01-879 0857**


## Services


Dear reader, my name is Simon Stabs. I specialise in direct data duplicating for the following cassette-based micros: BBC A/B, ZX Spectrum, Electron, Lynx, Oric 1 and Dragon 32. I too copying for BBC 40/80 track. Dot matrix printed labels to order/blanks. Blank cassettes.

FAST TURNAROUND **0869 252831** COMPETITIVE PRICES

I'm proud to be sole duplicator for Chalksoft Educational Programs whose new mail order address is: Freepost O.F., Chalksoft Ltd, 27 Usborne Road, Northwick, Worcester. Yours Sincerely, Simon Stabs.

For further information about our sole cassette copying service or prices:
**FREEPOST, 46 WEST END, LAUNTON, OXON OX60 B12**

**MICROSHOP**
**CALL**
**CHRISTIAN McCARTHY**
**ON**
**01-636 6890**

# Acorn checks out in chess



Well, Acorn got it half wrong. Using the 'precocious' (Acorn's word) BBC micro it almost predicted the outcome of the World Chess Championship semi-finals.

In the first semi-final its probability ratings were Kasparov (youthful genius and hero of the Russian people) 89 per cent, Korchnoi (ageing defector, enemy of the Russian people) 11 per cent. In the event Acorn nearly came a major cropper.

Korchnoi took an early lead but Kasparov clawed his waay back to finally overhaul his experienced opponent.

In the other semi-final Acorn had the competitors more evenly matched and ended up predicting the wrong winner. Its ratings were Zoltan Ribli (rising star from Hungary) 60 per cent, Vassily Smyslov (Russian veteran) 40 per cent.

As it turned out experience triumphed over youth and Smyslov had a relatively easy win.

# Pull the cord

Furniture makers are among the unsung heroes of the micro revolution. While we find ever more ways to damage our health with advanced technology, the tireless upholsterers are beavering away to keep us fit.

Prayer has nothing to do with it, whatever you might think of the photo. It's all a question of posture. On these remarkable chairs slouching is physically impossible — as the diagram so graphically demonstrates.

# NEXT WEEK

**Hitachi hit?** *A full Pro-Test of Hitachi's new and colourful PC.*

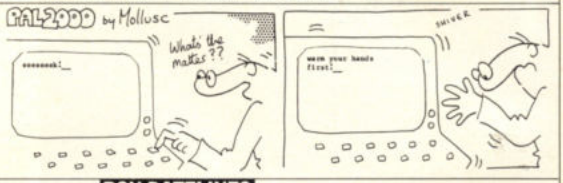
**Jet propelled** *PCN puts the Integrex Colourjet printer through its paces.*

**Electron II** *The second part of our pull-out-and-keep guide to the Electron.*

**64 Basic** *Taking stock of a Basic compiler for Commodore's 64.*

**In focus** *Peripherals move centre stage in the Databasics section.*

**Gameplay** *Reviews of games for the Dragon 32, Commodore 64 and Vic 20.*




## PCN DATELINES

PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

## UK EVENTS

| Event | Dates | Venue | Organisers |
|---|---|---|---|
| Which Computer? Show | January 17-20 | NEC, Birmingham | Clapp & Poliak Europe Ltd., 01-747 3131 |
| Northern Home Entertainment Show | January 19-22 | Excelsior Hotel, Manchester Airport | Stamley Wire Advertising Ltd., 01-253 6637 |
| Acorn Education Exhibition | January 25-27 | Central Hall, Westminster | Computer Marketplace (Exhibitions) Ltd, 01-930 1612 |
| Peripherals Suppliers | January 31-February 2 | Cunard International | Reed Exhibitions, 01-643 8040 |
| Communications & Computer Systems Fair — CABLES | February 2-4 | Pontin's, Prestatyn, Wales | Pontin's Ltd., 07456 2267 |
| London Home Computer Show | February 3-5 | Royal Horticultural Society's Old Hall, Westminster, SW1 | Andy Jones, 0562 751126 |
| 10th ZX Microfair | February 4 | Alexandra Palace, N22 | Mike Johnstone, 801 9172 |
| The Apricot & Sirius Show | February 7-9 | Kensington & Chelsea Town Hall | Dennis Jarrett, 241 2448 |
| Taunton YMCA Computer Exhibition | February 11 | Taunton YMCA, Somerset | P. Wojeik, 0823 74667 |
| LET '84 | February 13-15 | Heathrow Penta Hotel | Anthony Farrar, 0923 774262 |
| International Home Computers, Video Games & Software Exhibition | February 13-15 | Heathrow Penta | Wheatland Journals Ltd., 0923 774262 |
| Information Technology & Office Automation Exhibition and Conference | February 21-24 | Barbican Centre, London EC1 | B.E.D. Exhibitions Ltd., 01-647 1001 |
| OEM Only Conference | March 7 | Hilton Hotel, London W1 | Tom Lewis, 01-994 6477 |
| Computer Trade Show | March 13-15 | Wembley Conference Centre, Middlesex | Reed Exhibitions, 01-643 8040 |

## OVERSEAS EVENTS

| Event | Dates | Venue | Organisers |
|---|---|---|---|
| International Winter Consumer Electronics Show 22-25 | January 6-10 | Las Vegas, USA | Consumer Electronics Shows, Chicago, 0101 312 861 1040 |
| National Software Show (East) | February 3-5 | Miami Beach, Florida, USA | Raging Bull, USA, 0101 415 459063 |
| Personal Business Computer Show | February 29-March 3 | Hong Kong | Overseas Exhibition Services Ltd., 01-486 1951 |


MANIC MINER
by Chris Lancaster
COMMODORE 64
Penguins, Man Eating Toilets, Seals, Mutant Telephones, Bugs, Falling Skylabs and Kangaroo's-plus many more, join forces to stop Willy in his quest to get the treasure.
AVAILABLE NOW!
Distributors contact:
SOFTWARE PROJECTS
Bear Brand Complex, Allerton Road, Woolton, Liverpool, Merseyside L25 7SF
051-428 7990
CBM 64

# BUG-BYTE SOFTWARE

BUG-BYTE SOFTWARE PRESENT CAVERN FIGHTER





# CAVERN FIGHTER

**ALERT..ALERT..ALIEN..FORCES ..FROM..THE..PLANET..ZRAGG.. ARE..PLANNING..TO..ATTACK.. AND..DESTROY..WATFORD ..THEY..MUST..BE..STOPPED.....**

The sub-space communicator crackles briefly, then goes quiet. You type in the co-ordinates of the planet into your hyperdrive and hit the activate button. As the stars turn into white streaks, you think back to the last encounter with the forces of Zragg, the deadly caverns, the automatic missiles, the precious fuel dumps, the cavern guardians, the asteroids, but most of all, the treacherous maze.

Can you guide the fighter "Gamma 14" through the caverns of Zragg? Can you hit the fuel dumps? Can you destroy the Dictator's base to save Watford? Now is your chance to discover your abilities.

**FOR THE 48K SPECTRUM**

**£5.95**

## OTHER BEST SELLERS FOR YOUR SPECTRUM












**Bug-Byte Limited**
**Mulberry House,**
**Canning Place, Liverpool L1 8JB**

Dealers contact Matthew Thomas on 051-709 7071
Registered Dealers can order direct from CBS Distribution on 01-960 2155