

# PERSONAL

# COMPUTER

EVERY THURSDAY

NEWS

THE COMPLETE COMPUTING WEEKLY

50p DEC 1-7, 1983 Vol 1 No 39

**BRITAIN'S  
BIGGEST  
WEEKLY**

**DRAGON 64**  
New life for  
an old  
flame?



**THIS WEEK**

**BBC CHESS**

Master your micro's fast-moving play

**3D on SPECTRUM**

Games that give that extra touch of horror

**TANDY JET SET**

Pro-Test of this new colour printer

**IBM BASIC AID**

Will this package help you program?

**PRIZE  
COMPETITION**

Win a light rifle and games

**THE 1984  
MICROCOMPUTING AWARDS**

Cast your vote and enter our draw

**FREE  
THIS  
WEEK**

**PCN** **CHRISTMAS MICRO BUYER'S GUIDE**  
*micropaedia* Vol 13 Part 1

**ORIK-1**

**DIG DOG**

Guide Max the Mutt to his long buried bones. Win the race or be eaten by the deadly rats. Full sound Hi score and options. Cassette only.

**DIG DOG**



**COSMIC CONVOY**

commodore 64

**COSMIC CONVOY**

Guard the precious cargo through the cosmos. Your Hyper Viper fighters must stop the slaughter in the convoy Hi-score and full sound player options. Cassette or disk.

**PIPELINE**



Cassette or disk

commodore 64

**JAMMIN'**

Guide Rankin Rodney through the top 20 mazes to an interactive rock sound track. Full player options.

ALL  
**£6.90**  
on  
cassette

commodore disk  
**£9.99**  
INC.  
EVERYTHING

**JAMMIN'**



**SPECIAL**

commodore 64

**SUPER PIPELINE**

Keep the oil flowing, fix the plugs, dodge the spiders. Full music and player options.



**Taskset Ltd**

13 HIGH STREET BRIDLINGTON YO16 4PR

ACCESS ORDERS (0262) 73798 24 HOURS

Dealer enquiries welcome (0262) 602668

Selected titles  
Available from: W. H. Smith, Boots and all leading software stores

<input type="checkbox"/> DIG DOG	48K ORIK-1	NAME:.....
<input type="checkbox"/> COSMIC CONVOY	Commodore 64	ADDRESS:.....
<input type="checkbox"/> JAMMIN'	Commodore 64	.....
<input type="checkbox"/> SUPER PIPELINE	Commodore 64	.....

Disk Cass.

**Wild West Shootout**  
 Ten Stack light rifles — plus games — are the prizes in this fun competition. Take your best shot on page 89.



# British Micro Awards 1984

Your chance to vote for the best in microcomputing. Plus a chance to win an Oric and software. Full details on page 32.



**Pull-out and keep**  
**Micropaedia**  
**Christmas Buyer's Guide**  
 PCN's handy reference to the best of the micros in the shops.

## PCN PRO-TEST: HARDWARE



**Dragon doubles up** 22

The Dragon 64 — big brother of the 32 — is with us now. Mike Gerrard puts it through the hoop.

## REGULARS

**Monitor** 2  
 Osborne prepares to go it alone — page 2; Rogue BBC Basic on Christmas market — page 3; Better year ahead for business users — page 4; Double glazing: two windows arrive — page 5; ITT takes on IBM PC — page 6.

**PCN Charts** 8  
 The best-sellers slug it out in the run-up to Christmas.

**Random Access** 10  
 A tanner could be yours if you drop us a line.

**Routine Inquiries** 11  
 Your problems solved by our panel of experts.

**Microwaves** 18

**ProgramCards** 78  
 A machine code utility for the Spectrum, a handy routine for the BBC, and the final cards of our game for the Spectrum and the machine code monitor on the Commodore 64.

**Readout** 76  
 PCN's look at the new books.

**Billboard** 90

**Quit/Datelines** 96  
 Make a date for the pre-Christmas computer fairs.

Cover photo by John Price Stuios

## PCN SPECIALS

**Newbrain programming** 26

Part 2 of Chris Rust's word processing program.

**Dragon in flight** 31

Machine code arcade action on the Welsh micro as Darren Eteo continues his version of Scramble.

## PCN PRO-TEST: SOFTWARE

**BBC in check** 59

David Janda tries a few openings against the BBC and a program named White Knight.

**An aid to IBM** 63

Bryan Skinner looks at CRF — a helpful package for PC programmers.



## PCN PRO-TEST: PERIPHERALS

**Tandy colour prints** 35

Bill Davies looks at a seven-colour printer at a competitive price.

## GAMEPLAY

A handful of the new games for Oric owners 65

Spectrum in the third dimension 67

Bacteriological warfare with a BBC 71

A quick-fire quintet on the Atari 72

**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 Eisen 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 Veeman, Alison Hare, Deborah Quinn Production manager Eva Haggis Microshop Production Nikki Payne Advertisement assistant Jenny Dume 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

# Osborne plans

Osborne UK expects to be going it alone next year and plans a flying start.

If it separates from its troubled US parent company, the UK arm aims to rehabilitate the Osborne portable micro with a package of selling points and services. These will include a price cut, refinements to its existing services, and changes in its direct marketing. It also expects to sub-contract out the manufacturing and carry out more local hardware and software development.

'With the recent downturn in demand, we have had ample opportunity to review our operations,' said Mike Healey, Osborne UK

managing director. One result of this review is the feeling that the Osborne 1 is overpriced, despite the amount of free software that comes with the system. Its pricing will be 'revised' in the new year.

Mr Healey also spoke of a number of new services and refinements to its existing customer services. Osborne users should be able to buy a wider range of products directly from the company next year, particularly software and add-ons.

Bruce Durie of the Osborne User Group said he was 'absolutely satisfied' that Osborne UK would be able to meet the needs of users. 'The company is now able to make

use of us as a support group,' he said, emphasising the close links between the supplier and its users.

There are thought to be about 7,000 Osborne users in the country, and Mr Durie will try to assemble as many of them as possible at a meeting at the Open University, Milton Keynes, on January 14. He asks any Osborne user interested in attending to contact him at, 18 Crendon St., High Wycombe, Bucks.

The purpose of the meeting will be to re-assure users that Osborne isn't going to disappear from the UK, and to look for ways to use the experience of both the supplier and the users.

## Apple takes software out of Lisa price

Apple UK has followed its US parent company in taking software out of the Lisa's price. The Lisa now costs £5,500.

The software, of course, is an essential part of Lisa's operation, but Apple says that with more third party software becoming available for Lisa it makes sense to offer customers the option.

You can't actually do much with Lisa on its own but you still have a base for either third party software, or for your own customised system. And the machine's specification is still impressive.

Business Systems International sells the Busifile database system, while the financial modelling package Modeller comes from Intelligence UK and Sunaccount, a Cobol business accounting package, is sold by Systems Union.

Logica will soon launch a Xenix package, while the mathematically based language APL6800 is also in the pipeline.

You'll still get the O/S Lisadesk with your unbundled Lisa, and Lisadraw, Lisaproject, Lisacalc, Lisagraph, Lisawrite and Lisalist will be available together at f

Dear Sir,

Enclosed find the press release for our new ROM based software for the BBC Micro aptly named Beefont.

The ROM has 6 standard scripts, 5 in upper & lower case and 1 in upper case only. The facility for 2 user-defined character sets has also been provided.

**TWO-FACED** — It's amazing what you can do with a humble dot-matrix printer these days. Watford Electronics (0923 40588) is now selling a ROM-based program to make your letters and other documents more attractive. Beefont gives you six new typefaces and allows you to define two of your own character sets. To sell for £45, Beefont will be in competition with the disk-based Fancy Font (Issue 36). Fancy Font offers different sizes of font, more sets and costs £161.

## Micro printer family grows with another Brother

Spring should see the launch of the Brother EP-44, a much improved version of the Brother EP-22 portable typewriter/printer (Issue 35).

The EP-44 still has a built-in RS232 interface, but has a much larger memory than the EP-22's 2,000 characters, has much better quality print with true descenders, and is send and receive, so you can use it as a terminal or even as an extension keyboard for your micro.

On top of this the editing facilities have been enhanced, and it will be possible to mix calculations and text. The Brother's brother costs around £230, and, large companies being what they are, is about to be joined by another brother.

This is the HR5, which is a printer only. It will cost £170, and will print

at around 30cps. Its main feature is that it is very small, around half the size of an Epson, and emulates the MX80. So if you can get your micro running with an Epson, you should have no trouble with this one. It uses the thermal paper or thermally printed carbon ribbon system used by the EP-44. This system was adequate on the EP-22, but was much clearer on the pre-production models PCN saw.

Brother itself is now on the brink of a major commitment to the UK micro printer market, and will be giving interfacing support to customers. The company regards itself as having about a year's start on its nearest rivals, and should be producing a number of new products over the next year.

## Torch first with Z80 card

Torch Computers has pushed Acorn into second place by bringing out a Z80 card for the BBC micro.

Torch already builds a Z80 into its disk pack but it announced last week that it had made a card for the BBC including the Z80 processor, 64K of RAM, its MCP operating system offering CP/M compatibility, and the Perfect suite of software.

The unit will cost £375.

The prices of Acorn's controver-

sial second processors for the BBC are not expected to be as high as PCN reported last week. An official Acorn spokesman said that pricing on the 6502 and Z80 add-ons has yet to be decided, but he added that they were likely to cost a little under half what PCN had been told by an Acorn representative at Compec — this would put them below £175 and £400 respectively.

In quantities of 100 Z80 chips cost about £6 each.

## Acorn net cast

In a move that could herald the end of Econet, Acorn has revealed that it is working on a new networking system based on the Cambridge Ring.

As the result of collaboration between Acorn and Cambridge University's Computer Laboratory, the company hopes to offer a £50 CMOS chip that will allow BBC Bs and other micros to interface with a second generation of the highly rated ring network.

Apart from its low cost compared to other networking systems like Ethernet, the improved ring offers a high data transfer rate. A Cambridge Ring using fibre optic cable could operate at 100Mbits per second and carry video signals in addition to data and voice signals.

Hermann Hauser, an Acorn director, has said that the Cambridge Ring will replace Econet as the standard networking system for the BBC. Existing users will be able to upgrade to the new system when it becomes available at the end of next year. In practice it wouldn't be so much an upgrade as a replacement.

Econet uses twin twisted pairs of wires in a bus configuration with a collision detection protocol. It is, therefore, completely incompatible with the Cambridge Ring which uses a single twisted pair of wires (or in the fastest version, optical fibre cable) in a ring configuration with

an 'empty slot' protocol.

Its main drawback is that it may have missed the boat if it is to become an industry standard. IEEE, the American standards institute, has opted for Ethernet, which is similar in concept to Econet but operates at speeds approaching that of the Cambridge Ring. Meanwhile IBM has announced a network of its own using a token passing protocol (a station can only transmit if it is in possession of a token that is passed to each station in turn).

The other drawback could be cost. If Acorn keeps costs down to the £50 per station it has quoted it will certainly make it attractive. But other manufacturers are likely to wait and see if Acorn can deliver the goods before committing themselves to buying Cambridge Ring chips.

Torch Computers, for example, which sells its own upgraded version of Econet, called Torchnet, will not say if it will switch to the ring.

'The first Cambridge Ring is certainly excellent,' said Ray Anderson, Torch's software director, 'and, in principle, we are interested in the technology. But we would want to know more about what Acorn's product can do together with firm prices and delivery dates before we started to give it active consideration.'

# Old ROM back in some BBCs

By John Lettice

If you're buying a BBC Model B this Christmas, you may be in for a surprise. The Model B is selling so well that Acorn is facing a chip shortage, and as a result is using stocks of its 1981 Basic ROM chip in some machines.

It's difficult to tell what your chances of buying a BBC with the old chip are, because the percentage will vary depending on the availability of the new ones. An Acorn spokesman told *PCN* that the numbers involved were very small.

But from the customer's point of view you have no comeback on Acorn if you do find you've bought a machine with the 1981 chip. Although most Model Bs are now

produced with the 1982 Basic ROM, the specifications Acorn quotes are for the 1981, so this is the only chip Acorn is legally obliged to use.

Most customers will still get the enhanced chip, but a few will not. So if you're about to buy a BBC B, either get a guarantee that your dealer will exchange it if necessary, or check it before buying it. Hit the Break key and type REPORT, and it will either tell you Copyright 1981 or 1982.

But what if you've already bought a 1981 one? Will you be able to switch the chip later? Acorn says that it is working out a suitable policy for replacement of the old chips. Watch for developments in future issues.

# Promises are no substitute for presents

For sale, or not for sale?

In the pre-Christmas bonanza of advertised new releases you would be well advised to phone suppliers to find out if what you want is, in fact, ready for sending on.

We've found several suppliers advertising programs which are not ready for release. Reasons given include: 'We had tape-duplicating problems, the new batch is coming

in tomorrow'; 'The software's ready, we're just waiting for the cassette covers to come back from the printer'; 'We're out of stock at the moment', (the advertisement had been out only 3 days).

While these reasons may be true, it seems suppliers are advertising products which are not ready for delivery. Not that you would guess this from advertisements. Most of the products were displayed alongside well-known and available programs.

So, before you part with your Postal Order or cheque, take time to find out whether you can expect the package in a few weeks, or several months. . .

# A-T calls in spreadsheet

Ashton-Tate, maker of software such as dBase II has withdrawn its Financial Planner spreadsheet.

A spokesman for A-T said that promised enhancements had not

come through early enough and the company had therefore decided to pull the package in and to spend time on improving it. Financial Planner will be relaunched in 1984. The spokesman would not give a firm date, nor detail the 'substantial' improvements to be made, which are thought to concern recalculations, a weak feature.

# Artless Hobbit

BBC Micro users can now get their hands on Melbourne House's best-seller *The Hobbit*, but they have to do without the program's graphics.

The BBC's 32K is enough room for text handling and other necessary routines, but the extra 16K in which the graphics routines reside on the Spectrum and Oric systems isn't there.

*The Hobbit* has been consistently popular since its launch in November last year and many people still number it among the best adventure games on the scene. Whether it will catch on without graphics remains to be seen. The BBC version costs £14.95 and comes with a copy of Tolkien's book and a 16-page instruction booklet.

# Dragon deal

Dragon 32 users will not be offered an upgrade to the Dragon 64. Instead the company is looking at a trade-in deal.

'We are putting the wheels in motion at the moment to set that up,' said Dragon Data's Richard Wadman. 'The net cost to the user of moving to a 64 in this way could be about £85', he added.

Dragon will be putting plenty of resources behind the 64 in the new year and it is also looking at MSDOS to complement OS-9 on its business system. Mr Wadman said that the Dragon 32 would probably fade into the background, as far as sales are concerned, in the middle of next year but he added, 'That doesn't mean that we will be strangling it on January 1.'

He scoffed at suggestions that Dragon Data had considered pulling out of the home computer business in the wake of the financial problems that came to a head in September (Issue 27). 'We intend to expand our range,' he said.

# Two early new year disk drives for Oric

The long awaited Oric drives will be available in January — twice.

First off the starting blocks will be Byte Drive 500, which will be available in early January for the Oric, BBC B and Apple. Stocks of these are being built up by manufacturer ITL Kathmill, (0634) 815464.

Next in line will be Oric's own drives, which an Oric spokeswoman claims will be launched at the Northern Computer Fair on January 17.

The official Oric drives are said to be in production, but the spokeswoman could not give *PCN* information about numbers being produced. ITL, on the other hand, says it has been holding back on the launch of Byte Drive 500 until stocks were large enough to satisfy shops.

The ITL product's specifications are impressive. The basic unit consists of a small black single-disk box, using 3in. Hitachi disks with a formatted capacity of 220K per side, and a claimed typical access time of 3 milliseconds. The idea is that all micros use the same unit, plus a separate power supply that fits into a matching case. A connecting 'hybrid cable' has the machine-specific interface built in. For a complete single disk system for the Oric you'd pay £299, including VAT.

ITL says the disk system doesn't interfere with the micro's internal memory, so you should have no problems running existing programs. The Oric version is compatible with the redesigned Oric ROM,



Byte Drive — beating Oric to the punch.

and if you have the old ROM it includes a number of enhancements that tackle some difficulties you may have encountered.

It's planned to get the system available for other micros soon, and a Spectrum version is scheduled for April or May. An upgrade to 5.25 in. disks is also scheduled, and ITL wants to beef up the capacity of the system while holding the price, at least for a year.

But why start with Oric? ITL tells us that 'disk drives were promised for several other micros. Oric didn't have them, and we aimed at where we saw the need.' Design of the system started in July, just before Oric started referring to its 'coming soon' drives.

Meanwhile, the Spectrum — no

relation — chain of computer shops is selling a disk system for the ZX Spectrum for £245. It's made by Interactive Instruments, and is currently exclusive to the Spectrum chain. It works for the 16K or 48K, and uses 100K single-sided double-density 5.25 in. disks.

The sudden explosion of drives for low-cost micros looks like starting a new war in the market. If more manufacturers using the new 3 in. and 3.5 in. disks come into the market, cheap storage should take several giant steps, and you could be throwing away your tape recorder by next Christmas.

But another pioneer of home micro disk systems, the French company Cyborg, does not expect to ship before January.

## VIEW FROM JAPAN



## Santa-san and a micro Christmas

By Serge Powell

'Tis but a short time to Christmas and all across Japan young kiddies are dreaming of ROM and RAM, and their joysticks are tucked carefully beneath the futons in the hope that old Santa-san will soon be there.

Or are they?

For a Shinto-Buddhist country it seems that Japan has certainly managed to get into the swing if not the spirit of Christmas. Here we are, as I write this, not yet out of November, and last night the television news covered a parade of Santa Clauses in some remote part of Japan. Even without that I've already become so used to seeing Santa Clauses in the store windows that if the hordes of Japanese salary men that board my commuter train each morning suddenly did so bedecked in red suits and sporting white beards in place of their three-piece suits I might not notice the difference.

The retailers certainly seem to be gearing up for business in what would appear to be the normal Christmas fashion. The stores are bulging with electronic gew-gaws including many new computer models and a lot of new games, especially since the advent (if that is the right word in this context) of MSX Basic.

But gearing up for business in the normal Christmas fashion begs a number of questions in a non-Christian society. Actually, the average Japanese family's idea of Christmas is for poppa-san to travel home on Christmas Eve with what is known as a Christmas cake, but instead of being filled with nuts, fruit and loose change it is little more than a birthday cake decorated with Merry Christmas icing rather than Happy Birthday.

The standard Christmas gift-giving is pretty much confined to inconsequential like woollen jumpers (apologies to sheep shearers everywhere). So why are the retailers getting ready for Christmas so assiduously?

The Japanese have a quaint custom called the Bonus Season. Unlike most seasons, it comes twice a year—in December and June—and it is more a form of deferred salary than a real bonus in most cases. Depending on how well the union has negotiated the deal, it can amount to between 1½ and four times your monthly salary in a lump sum.

No wonder the shopkeepers and store managers are rubbing their hands in anticipation of heavy sales, especially of high ticket items like personal computers with all the trimmings, video recorders and cameras, cars, and foreign holidays, and no wonder they are so quick to take advantage of that old western custom personified by Santa Claus.

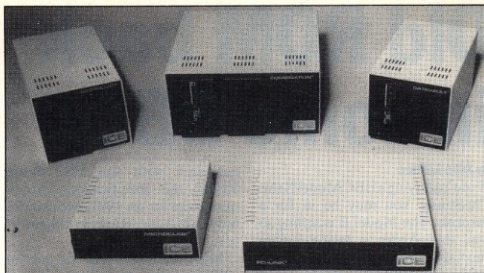
He is ready-made for them. Having spent June and July racking their brains for eye-catching promotions and come-ons to separate the recipients from their summer bonuses, what could be better come December than an idea that their brethren abroad have had almost 2,000 years to fine tune.

And so Santa Claus becomes the excuse the retailers give to individuals (and surprisingly not so much to families, which presumably have to consider things like mortgages) so that they can purchase the thing they would probably be buying anyway.

But this is hardly the season to be cynical. When all is said and done, we all know that it's better to give than to receive, and if retailers can give Shinto-Buddhists an excuse for getting into computers there may be something to be said for the Christmas ideal of peace on earth and goodwill to men the way it works in Japan.

But it's still a fascinating mixture of the sacred and the profane; the spirit of Christmas and the world of wage bargaining. In Japan, of course, it might be argued that the spirit of Christmas is not so much sacred as irrelevant, but in the world of commerce nothing is irrelevant that can be turned to profit.

With the unions and the bosses sitting around a table and agreeing that a rather substantial amount of income should be handed over at this time of year, and with the consumer actually getting to it before the tax-man, there should be plenty of goodwill flying around; why shouldn't the computer industry and the retailers catch a piece of it?



Microcubes from the Ice box range—megabytes to cut your teeth on.

Ice has launched a range of Winchester disk drives and associated back-up devices. Amongst them is the Microcube which Ice claims utilises the latest developments in hard disk technology.

The Microcubes are 3.5in drives and are available in capacities of 5 and 10Mb. They will interface with the Apple II, IBMPC, Sirius/Victor and Epson QX10.

## Mass storage in the Ice age

Ice provides the interface card, installation and operating manual, full support software, not to mention one year's on-site maintenance as standard.

Contact Ice (07842-47271)

## A New Year's revolution?

Business micro users can look forward to better products and better service next year.

David Broad, managing director of UK micro maker Comart, told a recent meeting organised by the Computer Retailers Association (CRA) that 1984 would sort out some micro suppliers and see others improving their standards.

"Nineteen eighty-four will certainly see the exit of many of the camp followers," he said. But other micro makers and 'professional' dealers will add to the functions and services they can offer users, he predicted.

"I think that all micro manufacturers will become more applications-oriented," Mr Broad said. He suggested that software endorsement schemes would become much more common than they have been. On the system software front he forecast that utilities would in-

creasingly be built into the machine and included in the sale price, with much improved documentation.

"A 12-month warranty will be the order of the day," he said, adding that fast repair and return times backed up in the first place by improved reliability from the manufacturers would give users an easier ride in the coming year.

His speech to the CRA meeting also gave a hint of a reduction in the price of UK-produced micros. The duty barriers that discriminate against imported components in contrast to imported systems are coming down, he said.

Without sticking his neck out on the subject of technology, Mr Broad predicted closer co-operation between suppliers of both hardware and software particularly in the area of networking. "Clients are going to insist on compatibility," he said.

## Transform your Spectrum with a real keyboard

A Beckenham company looks set to beat Fuller to the punch with a full-size keyboard for the ZX Spectrum.

Transform (658-6350) says that it is currently manufacturing the keyboard and it expects to be able to demonstrate it at the ZX Micro Fair in London at the weekend. By mid-December it should be in full production.

The keyboard unit will take the Spectrum with or without an Interface 1 attached. Its features include

a space bar, numeric pad, separate exponentiation mode and decimal point key.

Transform will be offering The Telesound beeper with the unit to transfer sound to your TV speaker.

With a gentle dig a Fuller, whose FDS has been pictured in advertisements and spoken of in awed tones for several months, Transform has declared that it will not be advertising the keyboard until it is confident that it will be able to meet. The unit will cost £99.99.

# VisiOn arrives . . .

VisiCorp's Lisa-like operating environment, VisiOn, is finally available for delivery, following its announcement earlier this year. But users may be disappointed when they investigate the prices and discover the drawbacks.

Like Microsoft's MSDOS enhancement, VisiOn aims to give a more friendly interface by using multiple windows on the screen and a desktop mouse to select options and move text and data.

VisiOn also allows you to run several tasks concurrently and switch easily from one application to another.

The VisiOn screen looks similar to Apple's expensive Lisa system with the notable omission of the icons (small pictures of everyday objects that represent computer functions).

VisiCorp describes the screen display as a desktop metaphor; it has tried to create an electronic analogy of what happens on the average desk.

Using VisiOn, a collection of files can be taken from the filing drawer and spread on the desk. A file can be opened and worked on, and information moved between files, using the mouse to select commands.

For the inexperienced user, there

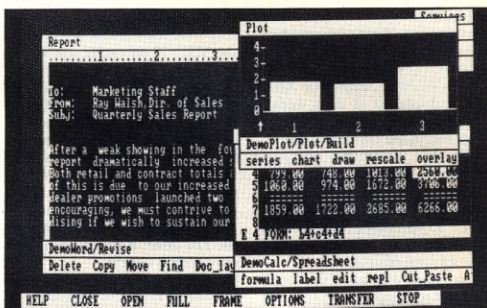
are two levels of 'help' information. Placing the screen pointer on a command generates a one-line comment describing what the command does. For more detailed information the 'HELP' command brings a 'help' window on screen. According to VisiCorp, VisiOn keeps track of what you are doing and anticipates what help you may want.

Unlike Microsoft's enhanced MSDOS, VisiOn is not an operating system, but sits on top of the OS providing a consistent interface between the user and the applications program. And, unlike the Microsoft offering, it will cost extra.

These differences could be crucial. If you use, say, an MSDOS system, your favourite programs will run under the enhanced MSDOS even if they don't take advantage of the mouse and multiple windows. With VisiOn, the same programs would have to be re-written.

Since there will be far fewer people using VisiOn rather than MSDOS, it seems likely that fewer software companies will customise their programs to work with VisiOn.

At the moment only a spreadsheet, a graphics package and a word processor will work under



VisiOn windows — 3D depth but no icons.

VisiOn, all written by VisiCorp. A database manager is promised for next spring.

The only other programs in the pipeline are communications packages being developed jointly with other software companies, which will add micro-mainframe links and networking.

The costs of VisiOn could be another disincentive. The Applications Manager costs £375 (plus VAT), to which must be added the cost of the applications packages and the mouse.

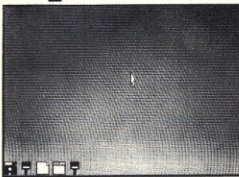
For a user wanting VisiOn Calc

and VisiOn Graph the cost will be £935 (plus VAT). With VisiOn Word the price rises to £1,170 (plus VAT).

Dealers at the UK launch were less than impressed with VisiOn. As one put it: 'VisiCorp is built around the success of one product, Visicalc, and that has had its day. I sell 40 Lotus 1-2-3 packages for every copy of VisiCalc.'

'All that VisiOn seems to offer is a more user-friendly competitor for 1-2-3 but without the database. At £1,200 a throw it is hardly good value for money.'

## And Microsoft opens windows



MS-Windows' opening screen—a mouse-controlled cursor and icons.

Windows on micros are about to become one of the biggest promotional drives since the double-glazing boom. The reason? Microsoft Windows is going to be standard equipment on the micros of 23 manufacturers.

MS-Windows was launched in the US two weeks ago (Monitor, Issue 38) and made its first appearance in the UK last week. In the interval it has found further support from hardware and software suppliers, and a roll of companies that will support the product reads like a Who's Who of microcomputing.

IBM's name isn't on the roll but that doesn't deter Microsoft from hailing MS-Windows as an oppor-

tunity to create 'a standard user interface and development environment'. In other words, what you do with a micro and the way you do it is about to become more consistent across a range of different machines.

MS-Windows is an extension to MSDOS 2.0 and on the machines of 23 suppliers it will be part of the package. Microsoft UK's general manager David Fraser expects it to make little or no difference to the cost of the system.

To use it you need 192K of RAM, twin floppies, a bit-mapped display and a mouse. The system lets you select a job from a row of icons, split the screen to accommodate windows featuring several applications, and initiate procedures without touching the keyboard.

For the sake of speed, MS-Windows loads all the selected applications into RAM when it is booted. Data can be transferred between applications, but the system may have restrictions when running jobs requiring a great deal of memory. Microsoft is looking into forms of swapping.

MS-Windows features passive and intelligent windows; a block of text, for example, may be realigned when the window in which it appears is moved to another area of the screen, while a simple display may be clipped as its window shrinks. It also allows over-printing part of a window with a relevant 'help' box.

In alphabetical order, MS-Windows' 23 supporters are: Altos, Apple/Rana, Burroughs, Bytec, Columbia, Compaq, Computer Devices, Convergent Technologies, Data General, DEC, Eagle, Hewlett-Packard, Honeywell, ITT, Mindset, NCR, Polo Microsystems, Seequa, Tandy, Televideo, Texas Instruments, Wang and Zenith.

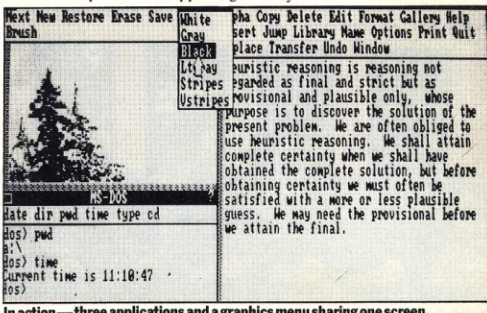
Software producers supporting

the system are Ashton-Tate, Context MBA, Lotus, Peachtree, Software Arts and Software Publishing, and ACT and Micro Focus seem likely to join them.

The first systems with MS-Windows are due out in the US on April 30.

Each manufacturer implements the package, usually by adding two device drivers — an interface to handle the keyboard and mouse input, and another for the screen output.

It may be that Microsoft needs the support of IBM to stand a real chance of establishing a standard with MS-Windows. Mr Fraser pointed out that IBM doesn't usually follow suit. It will not pronounce on windows until it is ready to.



In action—three applications and a graphics menu sharing one screen.

# ITT extras

The multinational ITT Corporation is set to take on IBM with a product that undercuts the PC by about five per cent.

ITT's machine, called the Xtra, will be launched at next week's Comdex show in Las Vegas and will be on sale in the US from April.

ITT has based the machine around the 8088 processor and is promising IBM compatibility. It will be offered in two versions.

The \$3,000 model has 128K of RAM, twin floppies and monochrome monitor.

The more expensive version is intended to compete with the IBM hard disk XT machine (hence the Xtra label on ITT's offering). It will have a 10Mb hard disk.

Apart from the lower cost, ITT is pinning its hopes on the extras it has built into its machine, including communications facilities to link into ITT services such as electronic mail. There is also a tilt and swivel mechanism on its monitors and a redesigned keyboard.

ITT says the machine will incorporate the window extension to the MSDOS operating system (report, page 5).

Unlike IBM, ITT is not an established computer manufacturer. Its main involvement in computing has been as a maker of terminals and printers and its previous foray into the personal computer field was through a deal with Apple which allowed the company to assemble Apple IIs and sell them as the ITT 2020. But this was not an outstanding success.

■ Co-incidentally, IBM has announced the PC XT/370 desktop system in the UK some five weeks after its appearance in the US. The XT/370 looks identical to the PC's hard disk cousin, the XT, but it interfaces to IBM's VM mainframe operating environment and gives a wider range of functions to users. With 10Mb of hard disk it will cost £8,228 plus VAT, and you will also have to fork out £919 for the software.



**IBM ON THE LINE** — ACT has adapted its electronic mail package Micromail to support the IBM PC, opening the service up to many new users. The package lets subscribers send and receive messages, link to Telecom Gold, and send telexes. It costs £109 for which you get access to an electronic mailbox for a year, communications software, and documentation. ACT, distributor of the Sirius and manufacturer of the Apricot, is on 0272 211733.

## Keeping time with a PC

Unspectacular though it may look this modest little device is unusual. It is called Pixtik and is a real-time clock that fits externally to the IBM PC. You plug it into the parallel printer port and slot the printer into it. It has a power supply good for two years and costs £57.70 from Pixel-Plus, 0530 62565.



## SOFTWARE

### Games

**Atari:** English Software (061-835 1358) has expanded its Atari range with games for the 400, 800, 600XL and 800XL, costing £9.95 each. The titles include Batty Builders, Airstrike 2, and Caverunner. And Allrian (0753 45201), a newcomer to the Atari field, is publishing a series in 16K for the full range of micros. Supplied on cassette, at £7.50 each, they are Intruder Alert, Rings of the Empire, Space Trap, Giant Slalom, and Crazy-tack.

**Colour Genie:** The Ipswich Software Factory has released three games for Lowe's Colour Genie, each costing £8. A-10 Bomber is a Scramble-type game, Geniepede pits you against spiders and scorpions, and Martian Rescue involves picking up a ship-wrecked crew while avoiding Martian attackers and asteroid storms.

**Commodore:** An interesting idea

from Audiogenic caters for both Vic 20 and Commodore 64 users. Its new cassettes store different versions of the same game on either side. Two in this series are currently available: Cataclysm and Bonzo. Cataclysm is shoot-em-up style and costs £5.95; Bonzo, for £7.95 has ladders, levels, and boxes. Broderbund, the US software producer distributed in the UK by Softsel (01-844 2040) has adapted its Spare Change cartoon game for the Commodore 64. There are already for the Apple and Atari. In this game you own a Spare Change Arcade and have to stop pilfering by two Zerkos. Marketing Micro Software, closer to home in Ipswich (0473 462721), has a US import for the 64 called Zeppelin Rescue, costing £19.95 on disk or £17.95 on tape. Another from the same company, Conqueror, is for the Vic 20. This has a medieval setting and costs £15.95.



Zeppelin Rescue and Conqueror among others from Marketing Micro Software.

### Business

**Sanyo:** A book-keeping system with the promising name of Prophet has been launched for Sanyo micros by Logitek (0257 426644). It includes sales, nominal and purchase ledgers, invoicing, stock control, payroll, and a report generator. The full package costs £750 plus VAT.

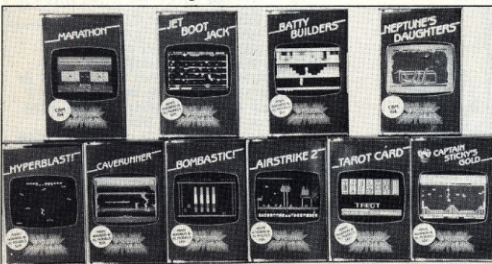
**Sirius:** Croydon systems company Encotel (01-686 9687) has added a built-in calculator to the newly-released version of Spell-binder for the Sirius. At £320, it includes assembler files of video and printer drivers, editing characters, microprograms and documentation. Paperless offices are also the aim of Micro Nationwide (0293 511482) with its Memo 2000 package. Running at 1200 bps, this lets a Sirius user hook into Telecom Gold, other Sirius systems, or com-

patible computers. Versions for the IBM PC, Apricot, and NCR Decision Mate V are planned.

**Commodore:** Also from Broderbund (see under Games) comes Bank Street Writer, a word processor for the Commodore 64. In the US it costs \$69.95.

**IBM PC:** ACS of London (01-883 7302) has been appointed by Micro Marketing International and IMSI of the US to distribute their products in the UK, bringing over programs for the IBM PC. Four-Point Graphics costs £132; Bisybase, to schedule your day, costs £183; Job Costing is £183; and Investment Manager, compatible with Lotus 1-2-3, costs £199.

**CP/M, MSDOS:** Corporate Modelling Consultants has unveiled Uni-for, a £950 statistical forecasting package for business systems. It provides the tools to develop models from which forecasts can be made.



English Software's range for the Atari systems old and new.

# MISSION 1



## BECOME A SECRET AGENT

Mission Software's complete package on Project Volcano, is probably the most advanced Adventure Computer Game Package you have considered this year. It is not just for the dedicated game player but for those that want to get involved in Secret Codes - Messages, and the seamy-side of Di6 (British Intelligence) and the K.G.B.

IT IS A MUST FOR THE SINCLAIR SPECTRUM 48K AND DRAGON 32 HOME COMPUTER OWNERS.

When you receive your Adventure Game from Mission Software Limited, included in the package is your Passport to the international workings of the Secret Agents.

Your personalised Passport will assist you in negotiating the K.G.B. network in the Soviet Block Countries and vital to the success of your mission.

Command Headquarters will give you information that other Agents have recorded, together with their Communication Log, Mission Instructions, Secret Memos, Classified Diagram, Full Briefing Instructions and other Secret Data.

IT'S UP TO YOU TO BREAK THE CODE AND BECOME A SUCCESSFUL SECRET AGENT.

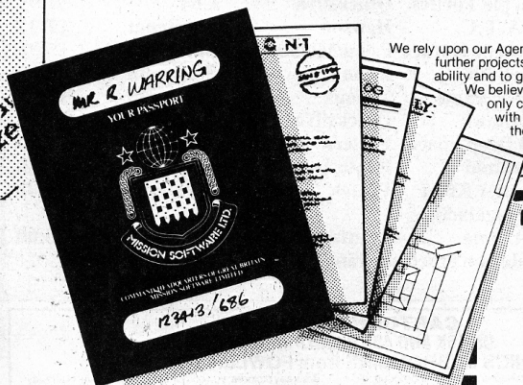


• We know your friends will want to become Secret Agents and use your game, we will be quite happy to supply them with their Passport and Documents for £2.95 per kit. This way you always retain your personal Passport and Secret Information.

• The moment you tell us you have completed your current assignment we will advise by Secret Data, details of how to penetrate one of the World's most secret establishments.

• To obtain your Game and personal Passport with all its Secret Documents send a Cheque or Postal Order for 16.95 (inc. P.P. & V.A.T.) with the Coupon at the foot of this advertisement.

ORDER MISSION 1 TODAY AND JOIN THE GROWING NUMBER OF SECRET AGENTS OPERATING FROM COMMAND HEADQUARTERS.



We rely upon our Agents to feed back information to make further projects interesting and complex, to tax your ability and to guarantee many hours of enjoyment.

We believe Mission Software Limited is the only company that supports its Field Agents with a mass of Secret Information to make the Mission exciting and enjoyable which makes it a must in Computer Games.

**£6.95**

Inc. P.P. & V.A.T.

PLEASE SEND ME MISSION 1 FOR MY (TICK AS APPLICABLE)  
 DRAGON 32  SINCLAIR SPECTRUM 48K   
 EXTRA PASSPORT CODE-BREAKER £2.95

I ENCLOSE MY TOTAL REMITTANCE OF £.....

CHEQUES AND POSTAL ORDERS MADE PAYABLE TO MISSION SOFTWARE LIMITED

NAME .....

ADDRESS .....

## MISSION SOFTWARE LIMITED

COMMAND HEADQUARTERS · 1st FLOOR  
 49 GRANGE ROAD · DARLINGTON · Co. DURHAM  
 DL1 5NB · TELEPHONE (0325) 483344

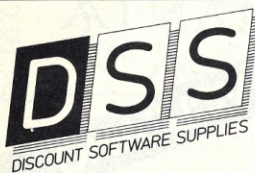
MISSION SOFTWARE LIMITED  
 COMMAND HEADQUARTERS · 1st FLOOR · 49 GRANGE ROAD  
 DARLINGTON · Co. DURHAM · DL1 5NB · TEL. (0325) 483344

## LLAMASOFT!! awesome games software



VIC 20  
CBM 64  
ATARI  
SPECTRUM

NOW IN BOOTHS, LASKEYS &  
MANY RETAILERS, OR FROM  
49 MT. PLEASANT, TADLEY, HANTS  
TEL. 07356 4478



01-221 1473

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 W14L  
ACCESS WELCOME

# PCN Charts

This top 30 games list is compiled from both independent and multiple sources across the nation. It reflects what's happening in high streets in the two weeks up to November 10 and, like the micro charts, does not take account of mail order sales. The micro charts this week show the number of machines sold in the same two-week period so they tell the story in the high street between November 11 and November 25.

## GAMES

### Top Thirty

	GAME TITLE	PUBLISHER	MACHINE	PRICE
▲ 1 (5)	Valhalla	Legend	Spectrum	£14.90
▼ 2 (1)	Nolan Jet Man	Ultimate	Spectrum	£5.50
▶ 3 (3)	Flight	Psion	Spectrum*	£5.95
▲ 4 (12)	Ant Attack	Quicksilva	Spectrum	£6.95
▲ 5 (—)	Atic Attack	Ultimate	Spectrum	£5.50
▼ 6 (4)	Hobbit	Melbourne	Spectrum*	£14.95
▼ 7 (2)	Manic Miner	BugByte	Spectrum	£5.95
▲ 8 (9)	JetPac	Ultimate	Spectrum*	£5.50
▲ 9 (22)	Splat!	Incentive	Spectrum	£5.50
▶ 10 (10)	Gridrunner	Llamasoft	Vic 20*	£6.00
▼ 11 (6)	Hovver Bovver	Llamasoft	C64	£7.50
▲ 12 (—)	Arcadia	Imagine	V20*	£5.50
▲ 13 (15)	Horace and the Spiders	Psion/Melbourne	Spectrum*	£5.95
▶ 14 (14)	Chukkie egg	A&F	Spectrum	£6.90
▼ 15 (8)	Kong	Ocean	Spectrum	£5.90
▲ 16 (—)	Computer War	Thorn	V20*	£29.99
▲ 17 (23)	Harrier Attack	Martech/Durell	Oric	£6.95
▼ 18 (7)	Zoom	Imagine	Spectrum	£5.50
▲ 19 (29)	Bugaboo	Quicksilva	Spectrum	£6.95
▲ 20 (28)	Corridors of Genon	New Generation	Spectrum	£5.95
▶ 21 (21)	Purple Turtles	Quicksilva	C64	£7.95
▼ 22 (13)	H.A.T.C.	Hewson	Spectrum	£7.95
▲ 23 (—)	Hungry Horace	Psion/Melbourne	Spectrum*	£5.95
▼ 24 (18)	Scrabble	Psion	Spectrum	£15.95
▲ 25 (—)	Sheer Panic	Visions	Spectrum	£5.95
▲ 26 (—)	Skyhawk	Quicksilva	Vic 20	£7.95
▼ 27 (19)	3D Deep Space	Postern	Atari*	£8.00
▲ 28 (—)	Pyramid	Fantasy	Spectrum	£5.50
▲ 29 (—)	Hunter Killer	Protek	Spectrum	£7.05
▲ 30 (—)	Metagalactic Llama	Llamasoft	Vic 20	£6.00

\*Denotes available on other machines

## CARTOON ANIMATION ON 16K AND 48K SPECTRUM WITH THE GRAPHICS SUBROUTINE from FOWLER SOFTWARE

The program enables someone with no knowledge of machine code to animate his drawings. Small and large objects can be moved smoothly, ie one pixel at a time.

In order to show what is possible using this program, demonstration program includes a 9 x 3 characters figure walking across the screen.

The Graphics Subroutine is in machine code. The user writes his own Basic program, loads on the Graphics Subroutine and accesses this from the Basic program.

A booklet explains in detail that to move a drawing you need to tell the Graphics Subroutine where the drawing is in the memory, where an instruction sequence is, where you want the drawing to start on the screen, the length and height of the drawing, and the speed of movement. All this is done using Basic commands. The Graphics Subroutine occupies less than 760 bytes.

It moves a drawing by altering the area of memory containing the screen display. You do not even need to

draw any pictures; you could just move whatever is already on the screen eg. text. The drawings that are moved are one colour (ink and paper). You can also use the Graphics Subroutine to draw and colour a stationary drawing. The time taken to draw and colour a picture which fills the entire screen is a 1/10 second.

A 3 x 3 characters drawing involves typing in 81 numbers and uses up 81 bytes.

Please send me ..... copies of the  
Graphics Subroutine and instructions at £10 each  
cheque/0. to Fowler Software, Hindon Mill, Nelson, Lancs.  
Mr/Ms/Miss: .....  
Address: .....

# PCN Charts

Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT. Information for the top-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.

## HARDWARE

### Top Twenty up to £1,000

MODEL	PRICE	DISTRIBUTOR
▲ 1 (3) CBM 64	£220	(CO)
▼ 2 (1) Spectrum	£99	(SI)
▼ 3 (2) BBC B	£399	(AC)
▶ 4 (4) Vic 20	£140	(CO)
▲ 5 (6) Oric 1	£99	(OR)
▲ 6 (7) Dragon 32	£170	(DD)
▲ 7 (8) TI/994a	£90	(TI)
▼ 8 (5) ZX/81	£45	(SI)
▶ 9 (9) Atari 800	£300	(AT)
▲ 10 (11) Apple 11e	£750	(AP)
▲ 11 (15) Sharp MZ700	£240	(SH)
▲ 12 (13) Lynx 48/96	£225	(CA)
▲ 13 (16) Tandy Colour	£180	(TA)
▲ 14 (19) Colour Genie	£168	(LO)
▼ 15 (12) Sharp MZ80A	£349	(SH)
▲ 16 (18) CGLM 5	£150	(SO)
▼ 17 (10) Atari 400	£150	(AT)
▲ 18 (—) Newbrain A	£268	(GR)
▼ 19 (14) Aquarius	£70	(MA)
▼ 20 (17) Electron	£199	(AC)

### Top Ten over £1,000

▶ 1 (1) ACT Sirius	£2,525	(ACT)
▶ 2 (2) IBM PC	£2,392	(IBM)
▲ 3 (4) Apple III	£2,780	(AP)
▲ 4 (5) Commodore 8000 series	£1,200	(CO)
▼ 5 (3) HP86A	£1,570	(HP)
▲ 6 (9) Apricot	£1,719	(ACT)
▲ 7 (—) Kaypro	£1,949	(CKK)
▼ 8 (6) Epson QX10	£1,995	(EP)
▼ 9 (8) DEC Rainbow	£2,714	(DEC)
▲ 10 (—) Teletideo TS-800 series	£1,495	(MD)

AC Acorn Computers. ACT — ACT. AP — Apple Computer. AT — Atari International. BM — British Micro. CA — Computers. CO — Commodore. DEC — Digital. DR — Dragon Data. EP — Epson. HP — Hewlett Packard. IBM — IBM. LO — Lowe Electronics. LL — Lucas Logic. MA — Mattel. OL — Olivetti. OR — Oric. SH — Sharp. SI — Sinclair. SO — Sord. TA — Tandy. TI — Texas Instruments.

**NO.1 SOFTWARE RETAILER**  
 THE WORLD OF SOFTWARE LTD  
 100, STATION ROAD, BIRMINGHAM  
 B15 2JG  
 TELEPHONE: 0121 363 1951

Looking for the P.C.N. top thirty programs or something a little different? Choose from thousands of cassettes. BBC, C64, VIC20, Spectrum, ZX81, Oric, Dragon, and others. North London's No 1 software retailer...



TELEPHONE ORDERS  
**01-952 0451**



## PROGRAMMERS

Softek is continuing its search to the furthest outposts of the galaxy for Superstars of Machine Code Programming to expand its force of Game Masters. (Particularly for Spectrum, CBM 64 and the Acorn Electron)

In return we will offer formidable outright payments or the potential of achieving No 1 Slot in the Charts & possible royalty payments of the galactic proportions of £50,000 a year or more!

If this is you then phone immediately or write to...

**SOFTEK INTERNATIONAL LTD.**

12/13 Henrietta Street Covent Garden London WC2E 8LH  
 Tel: 01 240 7877

## SPECTRUM EXTENDED BASIC

**IMPROVE YOUR PROGRAMMING  
 EASE DE-BUGGING  
 HELPS YOU ADD STRUCTURE  
 TO YOUR PROGRAMS**

The ten additional BASIC commands provided by Spectrum Extended Basic are considered an essential aid for most programming applications, so much so that many of these commands are standard features on other Basics.

The program is compact, occupying less than 5K memory, is user friendly — requiring only a two key entry — and incorporates syntax checking.

The program commands are used and entered just like normal Basic keywords, the program operates by trapping your usual keyboard input and testing for any of the ten additional commands.

**The extra commands available are:**

- AUTO auto line number, start and interval definable.
- CLOCK ON/OFF 12 hour clock, displayed on screen.
- DELETE Basic line/block delete.
- EXAMINE reads tape headers and displays information.
- FIND find specified string in Basic program.
- MEMORY displays memory status.
- RENUMBER full line renumber with GOSUBs and GOTOS.
- SCROLL ON/OFF continuous scrolling.
- TRACE ON/OFF slows program execution, displays line and statement currently executed.
- VARIABLES displays variable names and contents.

**48K Spectrum Extended Spectrum — £9.95**

Also available at Boots, W.H. Smith and all good computer shops.

Send SAE for Catalogue.

**DELIVERY:**

UK — prices include VAT and postage & packing.

EUROPE — add 80p per program.  
 ALL OTHER PLACES — for air mail add £2 for the first program and 50p for each subsequent program. Surface delivery add 80p per program.

CP software

Send Cheque, Postal Order or Access No. to:

**CP Software, Dept PCN1A**

17 Orchard Lane, Prestwood,  
 Bucks HP16 0NN



## Manic Miner Reincarnate

Any Spectrum owner struggling to get through Manic Miner may be interested to learn how to get more lives. The number of lives you start with is held in 34269, so first MERGE the Basic program and stop the tape. Then enter "25 POKE 34269, n" where n is the number of lives you would like. Then RUN this program and start the tape again.

It is recommended that n be no greater than 32 as it can corrupt the screen display and greatly reduce speed.

*Brian Sheldon,  
Morecambe, Lancs  
Some would say, this isn't quite  
cricket. . . Ed*

## Gazing in hope toward Jupiter

I hope that the demise of Jupiter Cantab does not mean the end of the Ace. I think that lack of proper marketing was one reason why Jupiter Cantab did not survive. The Ace is a good machine (but could have been better) and has a well written user manual.

The supposed lack of software for the Ace is no problem to me. I have written a home accounts program, which I hope will be published shortly, and am working on a database with word processing facilities, which I will also put forward for commercial publication. The lack of hardware add-ons, however, is a problem.

*A. Kashko  
Hayes, Middlesex.*

## Keeping dealers in order

I think that something has got to be done about readers who advertise goods without having them in stock.

I ordered a disk drive on a return of service basis which was well advertised. Five weeks later this was still not received. And not a word from the supplier. So I sent a cancellation notice with proof of delivery, and I advised Access of my actions, as my account had not been debited up to this point.

However, two weeks later the disk drive arrived (the supplier had not accepted my cancellation).

In the meantime I had purch-



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

ased elsewhere, and received my order within three days.

The only problem is that I ended up with two disk drives.

I believe I was justified in cancelling the first order and the supplier should have done the honourable thing and accepted this. Another point is Access should advertise that a credit card cannot be cancelled despite a two-week notice.

*G S Dutton,  
Harwich, Essex.*

## Commodore confusion

I have just been browsing over issues of PCN and . . . I'm staggered . . . I'm shocked I'm . . . words fail me.

I have just reread your advertisement for the Personal Computer News Sixty Programs publication for the BBC, Spectrum, Dragon and Oric. Good stuff! But . . . I quote, 'completely new collection of programs for each of the most popular and fast selling computers' Come, come, now PCN. Have you heard of the Vic 20 and the Commodore 64? According to your own publication the current second and third positions in the charts are respectively held by the Vic 20 and the 64, and at the time of publication the positions were second and fourth. What has Commodore done to you that you should so pointedly ignore its computers when publishing the Sixty Programs books?

The Vic 20 has been one of the most popular and high selling computers for donkeys years. But the above quote

hardly seems fair on the Vic 20 and the 64 and you have misquoted the current 64 recommended price in PCN Charts, which is unforgivable.

While I am having a good moan, would you assure me your Bee game shown at the PCW Show will be listed in ProgramCards for other computers apart from the Beeb, and don't forget the 64 and the Vic 20 this time! Let's face it, we Commodore owners have enough to put up with our user's manuals and can do without PCN ignoring us.

*E Covell,  
Billericay, Essex.*

Ignore you . . . Heaven forbid! PCN's books of 60 programs for the Vic and 64 are due out next month (and we put the price problem straight too) — Ed.

## High-rise idea for exhibitions

Reading the PCN Datelines (which are an ace idea) made me think of an exhibition to which I went.

The show was cramped into one hall of the Bingley Hall, Birmingham, with half the space taken up by a rest area and café. The stands were virtually inaccessible unless you were a sixteen stone giant, with experience of judo, karate and heavyweight boxing. The answer to this problem? Two monitors. If the exhibiting company put a second monitor high-level then people at the back of the crowd could see.

Of course this would not be very suitable for a company

displaying hardware, but my observations showed that 50 people did not (or were not so likely, at any rate) to group around a ZX81 RAM, or some other wonderful piece of hardware.

*Marc Clewer,  
Bourneville,  
Birmingham.*

## Complaining rhyme of wasted time

On Guy Fawkes' Day I went to see the Brainwave show at NEC. I'd seen it in UK Events, and so the trip (it seemed) made sense.

But all the halls were bleak and bare,  
no home computers found I there.

(It really wasn't very funny, I'd wasted lots of time, and money)

Next time you hear of shows in Birmingham;  
before you publish, try confirming!

*Mike Campbell Jones  
Dinas Powys,  
S. Glamorgan.*

## PCN £10 Star Letter



'Tis with regret I must admit  
How Datelines sent you on a trip  
That wasted time, and money too  
And caused concern to more than a few.

But we did all within our power  
To check the facts — the day, the hour  
And spread the word in all good faith  
That Brainwave was the trip to make.

(And since you complain in novel way  
You win star prize and £10 we'll pay!) — Ed

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.

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.

## All about Videotex plus a little hack

**Q** I hear and read of Prestel and Teletext. What are they? What is the difference between them? How do I go about getting my micro rigged up to use them? How much does it cost to join and for the use of each page?

**A** Also, I've seen War Games — is it possible for a person to link a private computer to an international network and pass all security measures?

*Name and address supplied*

**A** Prestel and Teletext are different versions of what is known as Videotex — the technology that hooks the humble domestic television up to remote computers. Videotex comes in two forms: Teletext, which broadcasts the information as part of the television signal; and Viewdata, which uses the telephone network.

Teletext is non-interactive. You can receive the information but you can't send messages back to the remote computer. To receive it, you will need a special adaptor which is usually built in to the television. To use Teletext services, such as Ceefax or Oracle, costs nothing and there are no subscription fees.

At the moment the only micro that can receive and process Teletext information is the BBC B equipped with a Teletext adaptor (£225).

Viewdata is better known by the name of the largest commercial Viewdata service — Prestel. There are others that can be accessed by members of the public as well as private viewdata services run by companies for their own internal purposes. Prestel is run by British Telecom, which sub-lets space on its computers to organisations known as information providers. These maintain their own databases which may be open to any Prestel user or restricted to what is called a closed user group.

From the micro user point of view the two most useful information providers are Micronet 800 and Viewfax 258,

whose pages are packed full of information about micros, latest micro news and software you can download and run on your own machine.

To use Prestel and other viewdata services you will need to buy a modem which converts digital signals into analogue signals for transmission over the telephone system. You will also need the software that allows your micro to talk to the computer on the other end of the telephone line. It is now possible to buy for most makes of micro a hardware/software package of this kind of under £100.

On top of this you will have to pay a quarterly subscription of £5 to gain access to Prestel and a five pence per minute connection charge if you use Prestel during normal office hours (the rest of the time it is free). Most closed user groups on Prestel (like Micronet) charge an annual subscription (in Micronet's case it is £8 a quarter) to gain access to some or all of their pages. In fact, most of Micronet's pages are open to public access and it is only its electronic mail and telex software pages that are restricted to members. All of Viewfax's pages are open to public access.

In addition, some pages on Prestel carry a frame charge. This can be as little as 1p per frame or as much as 50p. Most pages on Prestel are free and you will only have to pay to look at or use those pages that carry a service or software. (Even this is not a hard and fast rule).

As for your final point: yes, in theory it is possible to use your micro with a suitable modem to gain access to mainframe computers. Believe it or not an American micro 'hacker' recently appeared in court because he managed to break into a Department of Defense computer.

To be able to do this yourself (which, of course, we do not recommend you trying) you would need to know the telephone number of the computer and the passwords that will allow you to log on.

## Snow joking matter, on a 64

**Q** A couple of months ago I bought a Commodore 64 together with the relevant data cassette recorder.

I am using the 64 with the Texas Instruments colour monitor BGC370. This has a total of eight different channels. Channels 7 and 8 are the ones I'm using.

It has all been a little bit frustrating since on both channels the message Ready For Use lasts only a short period before the screen becomes snowy.

After a couple of minutes the screen is all right again, but when I've typed in a program listing the screen has become snowy again.

**Could you please advise me on what is going wrong with this colour monitor. The trouble does not occur when I use my other monitor, a 12in Zenith green screen model.**

*KH Tjoa, Amsterdam, The Netherlands*

**A** With Christmas on the way this is a topical and picturesque problem, but that won't be much consolation to you as you peer through a blizzard at your coding. How can the snow be thawed?

The answer probably lies in the Commodore 64 rather than in the monitor. The fact that you have no trouble with the monochrome monitor doesn't necessarily indicate that it is a fault in the Texas Instruments unit — but there is also the fact that some users of Commodore 64s in the USA have experienced just the kind of trouble you describe.

You could first check that the TI monitor is blameless by running the 64 with a colour television or two. If the snow continues to fall across the screen you can be reasonably sure that the problems lies in the 64; if, on the other hand, the screen displays are clear you should take the monitor and the problem to your nearest dealer.

You don't say where you bought the 64 or where it was manufactured, but the snow phenomenon has been a problem on some US machines.

The answer, if you can narrow down the source of the problems to the 64, is relatively simple but it isn't one that you'll be able to deal with yourself. The American experience has demonstrated that what is required is a capacitor in the video circuitry of the 64. You should take the system to a Commodore dealer and ask them to make this modification.

## Legal thoughts from abroad

**Q** I bought a BBC Model B this summer, and have found that it is equipped with the 1981 Basic, not the 1982. On top of this, it is faulty. I have found out what the fault is, and have written to the dealer I bought it from, but they don't even answer my letters. What should I do?

*Tonio Galea, Paola, Malta*

**A** First the bad news. Acorn says that the vast majority of machines currently being produced include the new chip, but this depends on availability of chips, and therefore it's still possible to buy a Model B with the old chip. The company sees this as a gradual changeover, and as the spex advertised are for the old chip, Acorn is perfectly within its rights to carry on selling it.

There should only be a very few cases of this, but this doesn't really help you. It should be possible to upgrade, as you just need to switch the chips, but your being in Malta might make this expensive. Check with Acorn first. doesn't really help you. It should be possible to upgrade, as you just need to switch the chips, but your being in Malta might make this expensive. Check with Acorn first.

As regards your defective micro, your living in Malta should not affect your rights under UK consumer legislation, if you bought from a British company. You should write to the company, recorded delivery if you can, saying that you have been sold defective goods, and that you want your money back.

In the UK you would also say that you intended to take legal action against them for the recovery of your money unless the company replied with a reasonable period — say seven to 14 days — but as you do live in Malta, this may not impress anyone much.

But do write again and try to get some means of proving that the letter was actually delivered. Then you've got to find some way of enforcing your rights in this country. If you have a relative who could do this for you, that would help.

# SPECTRUM

## NEWS

from SPECTRUM

### DISK DRIVE for ZX SPECTRUM

Now from SPECTRUM a Disk Drive for the ZX SPECTRUM exclusive to SPECTRUM stores see our ad for full details

### Super new add-on for ZX SPECTRUM

● New! SINCLAIR INTERFACE 2 and ROM CARTRIDGES plus new software - see our ad for details.

### ● Quality printer at under £200

SEIKOSHA GP-100A now only £199.95 from Spectrum.

### LATEST NEWS

● For up-to-date news, information & offers from SPECTRUM - see PRESTEL page 600181 for full details.

### Spectrum GIFT VOUCHERS

● Not sure what to buy? Why not give a SPECTRUM GIFT VOUCHER - available in any value over £5. See your local SPECTRUM dealer NOW!

### NEW SPECTRUM MEMBERS

Check our address page! - there are many new SPECTRUM dealers throughout the UK so there's a good chance there'll be a SPECTRUM centre near you.

### AFTER SALES CARE

SPECTRUM service centres will ensure that should your machine 'go down' we will get it running again as quickly as possible. We also offer extended warranties at reasonable prices too - ask your SPECTRUM HOME COMPUTER CENTRE for full details

### COMPUTER DEALERS

(or prospective Computer dealers!) If, you would like to know more about becoming a SPECTRUM APPOINTED DEALER on an exclusive area basis, please write to MIKE STERN, Spectrum (UK) Ltd., Burrowfield, Welwyn Garden City, Herts. or telephone (07073) 34761

Fantastic Value from Spectrum!

## COMMODORE 64

## BUSINESS PACKAGE

SAVE **£200**  
OVER



### Includes:

- COMMODORE 64
- DISK DRIVE
- COLOUR MONITOR
- COMMODORE PRINTER
- FUTURE FINANCE PROGRAM
- Plus!
- FREE! GAMES DISK WITH SIX GAMES

FOR THE SMALL BUSINESSMAN... this has to be the business computer opportunity of a lifetime! This superb, top-value package includes everything you need to set up your own powerful small business/home Micro system.

There's the high-power Commodore 64 computer with its huge 64K RAM memory built-in and brilliant graphics capability, with full colour. The system's completed with a Commodore disk drive - store your entire filing system, accounts, sales records, etc. - plus tractor-feed printer, and a 1701 colour monitor.

It really is tremendous package - at SPECTRUM'S incredible low price, it's unbeatable!

ALL THIS FOR ONLY

**£899<sup>99</sup>**

OR LESS!

All items can be purchased separately - ask your local SPECTRUM dealer for price.

## COM-64 Home Entertainment Package

ONLY

**£239<sup>99</sup>**

(Normal retail price £282.85)

SAVE OVER **£40**

- Includes: ■ COMMODORE 64  
 ■ CASSETTE INTERFACE ■ CASSETTE RECORDER ■ QUICK-SHOT JOYSTICKS ■ CASSETTE WITH 4 GAMES

# Sensational COMMODORE VIC-20

Offers from Spectrum!



**VIC-20**

ONLY

**£99<sup>95</sup>**

**VIC-20  
EXPANDER PACK**

**All this for  
under £200!**

Includes:

- Vic-20 computer
- Tape Interface
- Tape Recorder
- 64K RAM Expansion pack
- Quickshot Joysticks
- 4 Cassette Games

**SAVE £67.80**

**£195<sup>95</sup>**

Normally £263.75

**HURRY! Only while offer lasts!**

## STACK LIGHT RIFLE



**For Commodore  
64 & VIC-20**

Available for the SPECTRUM VIC-20, and the COMMODORE 64 (Arriving Now!), comes complete with 12 feet of cable and three exciting action software games including "HIGH NOON SHOOTOUT" with full sound effects.

Spectrum  
Price

**£29.95**

Including 3  
FREE Games

## SINCLAIR ZX-81

Super-Deal Offer!



**ZX-81 COMPUTER  
Plus 16K RAM PACK**

**Plus 4 Games**

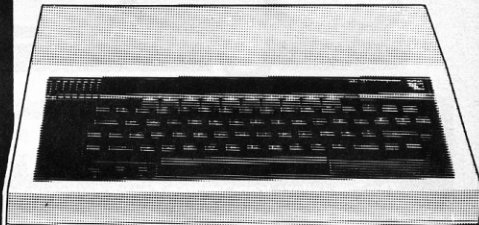
**ALL FOR ONLY**

**£56<sup>95</sup>**

### ZX-81 ACCESSORIES

64K RAM PACK .....	£54.95
16K RAM PACK .....	£24.95
ZX Printer .....	£39.95

# BBC



**Model B Micro**

SPECTRUM  
PRICE

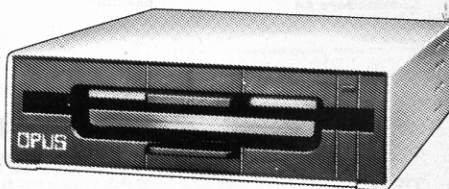
**£399**

**BBC Model 'B' with Disk Interface Fitted £469.75**

Sensational Offer for BBC Owners!  
**OPUS**

## DISK DRIVE

for BBC Model 'B'



Now from SPECTRUM - a DISK DRIVE for the BBC at under £180. Compare this price with any other Disk Drive for the BBC and we're sure you'll agree that this really is terrific value for money - But **HURRY!** stocks are limited and are sure to sell fast - so get to your local SPECTRUM dealer NOW!

**£179<sup>95</sup>**

## Other equipment for the BBC

BBC Single Disk Drive 100k .....	£265.00
BBC Dual Disk Drive 800k .....	£803.85
BBC Tape Recorder .....	£299.90

Acorn Software Cassette-Based from .....	£9.95
Acorn Disk-Based software .....	£11.50
BBC Cassette-Based software from .....	£9.95
BBC BUGGY Spectrum Price .....	£189.00
IKON FLOPPY TAPE DRIVE for the BBC - the ideal alternative!	
Spectrum Price .....	£155.25
QUICK-SHOT JOYSTICK Especially for the BBC - Spectrum Price .....	£19.95

**BBC  
BUGGY  
£189.00**

Now available:  
**RC DIGITAL  
TRACER  
for the BBC  
£55.50**

**Turn the page for more super  
offers from Spectrum . . .**

# SPECTRUM

## SOFTWARE

The Top sellers from leading British Software houses.

### Micro Dealer UK

#### ZX SPECTRUM

Legend "Valhalla"	£14.95
Ultimate "Luna Jet Man"	£5.50
Ultimate "Alic Atac"	£5.50
Bug-byte "Manic Miner"	£5.95
QuickSilva "3-D Ant Attack"	£6.95
A & F "Chuckie Egg"	£6.90
CDS "Pool"	£5.95
Crystal "Halls of the Things"	£7.50
Quann "Kong"	£5.90
QuickSilva "Games Designer"	£14.95
Imagine "Zoom"	£5.50
Incentive "Sploit"	£5.50
New Generation "Corridors of Genon"	£5.95
QuickSilva "Bugaboo"	£6.95
Ultimate "Jet Pac"	£5.50
Artic "Dimension Destructors"	£5.95
Protek "Hunter Killer"	£7.95
Reschitt "Apocalypse"	£8.95
Ocean "Transversion"	£5.50
Ultimate "Tranz Am"	£5.50
Addictive Games "Football Manager"	£5.50
QuickSilva "Aqualplane"	£6.95
Doric "Oracles Cave"	£7.95
Artic "3-D Combat Zone"	£5.95
Hewson "3-D Space Wars"	£5.95

#### Commodore 64

Llamosoft "Hover Bover"	£7.50
Llamosoft "Attack of the Mutant Camels"	£7.50
Melbourne House "Hungry Horace 64"	£5.95
Interceptor "Siren City"	£7.00
Games Machine "The fabulous Wanda and the secret of life, the universe and everything"	£7.95
Bobbebus "Exterminator"	£5.90
QuickSilva "Purple Turtles"	£7.95
Ocean "Armageddon 64"	£6.90
Melbourne House "The Hobbit 64"	£14.95
Interceptor "Vauxex Raider"	£7.00
Llamosoft "Matrix 64"	£7.50
Artic "Hexper"	£7.95
QuickSilva "Quintic Warrior"	£7.95

#### VIC-20

Ultimate "Jet Pac"	£5.50
Llamosoft "Meta Galactic Llamas battle at the edge of time"	£6.00
Imagine "Bewitched"	£5.50
QuickSilva "Slayhawk"	£7.95
Llamosoft "Matrix"	£6.00
Interceptor "Crazy Kong"	£6.00
Imagine "Arcadia"	£5.50

#### BBC

Software Invasion "Attack on Alpha Centauri"	£7.95
Pision "Saloon Sally"	£7.95
DoctorSoft "Flight Simulator"	£7.95
Amcom "Space Highway"	£7.95
Alligator "Bug Blaster"	£7.95

**ORIC**

Softek "Dracula's Revenge"	£6.95
UK Software "Zorgon's Revenge"	£8.50
Martech "Harrier Attack"	£6.95

**DRAGON 32**

Softek "Ugh!"	£6.95
J Maurice Micros "Maurice Minor"	£7.95

### SUNSHINE

Cruising (Dragon 32)	£6.95
Cruising (ZX Spectrum)	£4.95
Blind Alley (ZX Spectrum)	£4.95
Androids (ZX Spectrum)	£4.95
Galaxy Attack (ZX Spectrum 48K)	£5.95
Sword Fight (ZX Spectrum)	£5.95

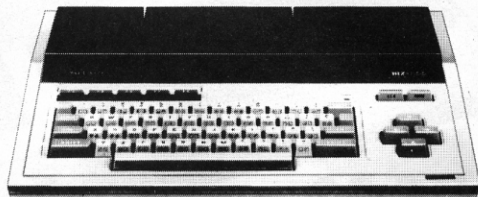
### MICRODEAL

<b>DRAGON</b>	£8.00
The King	£8.00
Space War	£8.00
Defence	£8.00
Alcatraz	£8.00
Katepillar Attack	£8.00
Space Monopoly	£8.00
Mansion Adventure	£8.00

### SALAMANDER

Franklin's Tomb (Dragon, BBC, Oric)	£9.95
Lost in Space (Dragon, BBC, Oric)	£9.95
737 Flight Simulator (BBC B)	£9.95
Grid Runner (Dragon)	£7.95
Night Flight (Dragon)	£7.95
Dragon Trek (Dragon)	£9.95
Grand Prix (Dragon)	£7.95
Salamander Graphics System (Dragon)	£9.95
Golf (Dragon)	£7.95
Wizard War (Dragon)	£7.95

## SHARP MZ 711 (MZ-700 Series Computer)



### FREE! 10 CASSETTE BASED GAMES

The super new colour computer from SHARP. Now available in limited quantities - including 10 FREE CASSETTE BASED GAMES from SPECTRUM

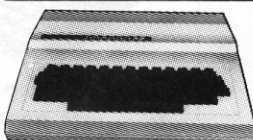
### SPECTRUM PRICE

£ **249<sup>95</sup>**

SHARP PRINTER ..... £129.95  
CASSETTE RECORDER .... £39.95

## SHARP MZ80A £399

## DRAGON



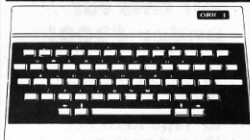
### Sensational HALF PRICE offer!

Buy the DRAGON 32 from SPECTRUM for £175 and get an ACCESSORY PACK for DRAGON including ■ COMPUTER CASSETTE RECORDER ■ JOYSTICKS ■ DRAGON CASSETTE TAPE (Total value £50)

### ALL FOR ONLY £25

DRAGON Single DISC DRIVE Now available ..... £275.00  
JOYSTICK INTERFACE allows connection of ATARI type Joysticks ..... £14.95

## ORIC-I



### SPECTRUM PRICE

£ **139<sup>95</sup>**

### HALF PRICE OFFER!

Bring a copy of this ad to your local SPECTRUM dealer when you purchase an ORIC-4 48K and it will entitle you to purchase the following 4 titles of Software at HALF-PRICE! ■ MULTIGAMES ■ ORICFLIGHT ■ CHESS ■ ZODIAC

## LEDA COMPUTER CARE KITS



For Disk **£12.95**

For Cassette **£9.95**

## BOOKS

#### GRANADA PERSONAL COMPUTING TITLES

The ZX Spectrum and how to get the most from it	£5.95
The Spectrum Programmer	£5.95
The Spectrum Book of Games	£5.95
Introducing Spectrum Machine Code	£7.95
The Apple II Programmer's Handbook	£10.95
Programming with Graphics	£5.95
The Dragon & how to make the most of it	£5.95
Computing for the Hobbyist & small Business	£6.95
Simple Interfacing Projects	£6.95
The BBC Micro: An expert guide	£6.95

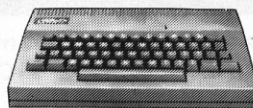
#### Commodore 64 Computing

The Oric-1 and how to get the most from it	£5.95
The Dragon 32 book of games	£5.95
Computer Languages and their uses	£5.95
Lynx Computing	£4.95
21 Games for the BBC Micro	£5.95
Choosing a Microcomputer	£4.95
Databases for fun & profit	£5.95
Introducing the BBC Micro	£5.95

#### The Working Commodore 64

Commodore 64 Machine Code Master	£6.95
The Working Dragon	£5.95
The Working Spectrum	£5.95
The Working CBM 64	£5.95
Dragon 32 Games Master	£6.95
Functional Forth for the BBC Micro	£4.95
Androids for the 16K Spectrum	£5.95
Sword Fight for 16K Spectrum	£5.95
Dragon 32 Games Master	£6.95
Galaxy Attack for 48K Spectrum	£5.95
Blind Alley for 16K Spectrum	£5.95
Cruising for 16K Spectrum	£5.95

## LYNX 96K



Now from SPECTRUM - the new LYNX 96K offering more workspace for ambitious programs. The most important feature of the 96K machine is its additional memory. In full high resolution colour, it provides 37.5K of RAM directly accessible in Basic - with up to 24K more available to programs using machine code. Ask to see the super new LYNX 96K at SPECTRUM - NOW!

### SPECTRUM PRICE

£ **299**

For the Lynx owners who're ready to take the next step, the 48K machine can be upgraded to full 96K specification for just **£89.95**

**LYNX 48K Model - SPECTRUM PRICE £199**

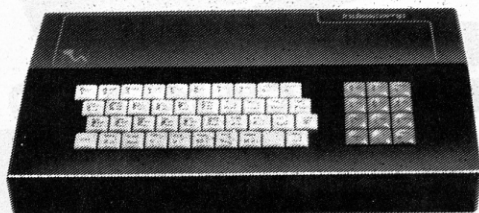
# Everything you've ever wanted for your ZX SPECTRUM

Superb ZX add-on's from your local Spectrum dealer

New & exclusive to Spectrum!

## INDESCOMP

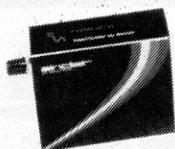
Superb quality add-on's for the ZX SPECTRUM



**INDESCOMP  
KEYBOARD**  
WITH FULLY  
ADJUSTABLE SOUND

**£59<sup>95</sup>**

**INDESCOMP  
SOUND AMPLIFIER**



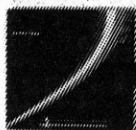
**ONLY £10.95**

**INDESCOMP  
JOY  
STICK  
INTER-  
FACE**



**£14.95**

**INDESCOMP  
32K  
RAM  
PACK**



**£39.95**

**INDESCOMP  
DOMESTIC  
CONTROL-  
LER**



**£49.95**

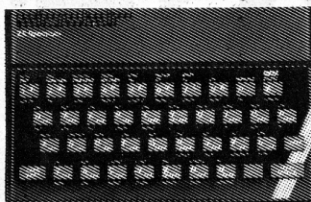
**INDESCOMP RS232 & CENTRONICS  
PRINTER INTERFACE ..... £49.95**

**ALPHACOM Thermal Printer for ZX  
SPECTRUM - NOW DOWN TO £59.95**

## DIGITAL TRACER

From RD Labs  
for the ZX  
Spectrum

**£55.50**



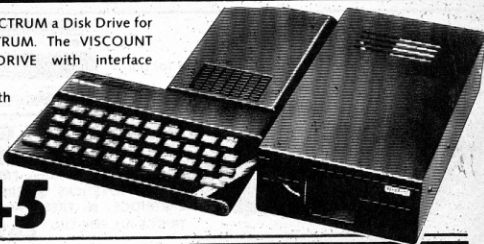
**ZX SPECTRUM  
16K  
£99.95  
ZX SPECTRUM  
48K  
£129.95**

Spectrum Computer Centres have no connection whatsoever with the ZX Spectrum Computer manufactured by Sinclair Research Ltd.

## VISCOUNT DISK DRIVE

Now from SPECTRUM a Disk Drive for the ZX SPECTRUM. The VISCOUNT 5 1/4" DISK DRIVE with interface system and complete with all leads.

**ONLY  
£245**



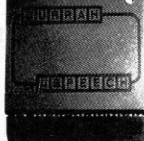
**PROTEC  
Joystick  
Interface  
£14.95**



**KEMPSTON  
Joystick  
Interface**  
(Joysticks opt. extra)



**£15**  
Joysticks with interface ..... £24.95  
Centronics Interface ..... £45.00



**CURRAH  
Speech  
Synthesiser  
£29.95**

**CHEETAH  
32K RAM  
Pack  
£39.95**



## PRISM VTX 5000 MODEM



Now, your ZX SPECTRUM is your key to the world with the incredible PRISM VTX 5000 MODEM

■ Versatile modem for ZX Spectrum (16K or 48K) versions ■ Slim design fits easily, matches your micro ■ Instant access to Prestel™ & Micronet 800 information services ■ Instant communication with other ZX Spectrum users ■ Use the Prism VTX 5000 with a Sinclair printer - and print Prestel frames. Ask your local SPECTRUM dealer for further details - NOW!

**SPECTRUM PRICE**

**£99<sup>95</sup>**

## Sinclair ZX INTERFACE 2

The new ROM Cartridge/Joystick interface. Loads programs instantly! Takes two joysticks! Just plug in and play.

**ONLY £19.95**

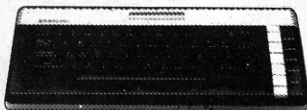
Plus! New ROM cartridge software.

**Turn the page for more super  
offers from Spectrum . . .**

# SPECTRUM

## ATARI

### New! 600XL



- 16K RAM expandable to 48K
- Full stroke keyboard
- Full sound with 3½ octave range
- 11 Graphic Display modes
- Full colour (256 colours -128 colours can be displayed at one time. Ask to see this super new micro at your local SPECTRUM dealer NOW!

SPECTRUM PRICE

**£159.99**

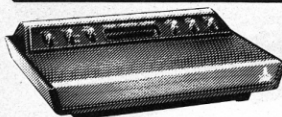
### ATARI 800

Check with your local SPECTRUM dealer for our SUPER LOW price.

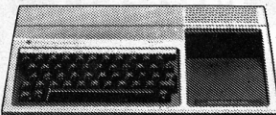


### ATARI VCS GAMES MACHINE

With all these FREE extras: FREE PADDLES  
 ■ FREE JOYSTICKS ■ FREE COMBAT CARTRIDGE ■ FREE PAC-MAN CARTRIDGE ALL FOR ONLY **£69.99**



## TEXAS



### TI-99/4A

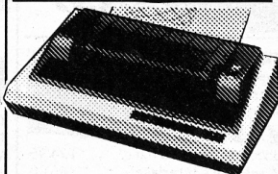
Exceptional value from SPECTRUM and representing probably the finest home micro computer value on the market today! - The TEXAS TI-99/4A is built to an extremely high standard and is highly recommended by SPECTRUM for its utter reliability.

SENSATIONAL  
NEW LOW PRICE

**£88<sup>95</sup>**

Wide range of software available for TEXAS from your local SPECTRUM dealer.

## PRINTER BARGAINS

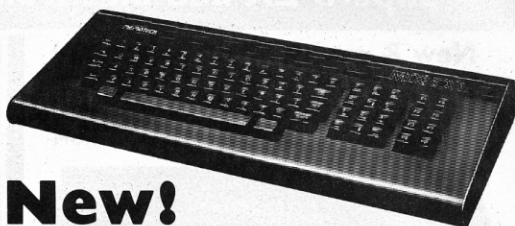
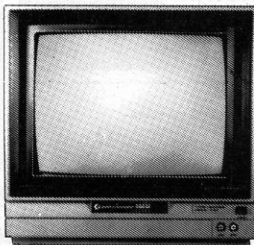


### SEIKOSHA GP100 A

SEIKOSHA GP100 VC.....	<b>£199.95</b>
SEIKOSHA GP100 AS.....	<b>£199.95</b>
SEIKOSHA GP250 X.....	<b>£249.95</b>
EPSON FX 80.....	<b>£459.95</b>
EPSON RX 80.....	<b>£314.95</b>
MICROLINE 80.....	<b>£249.95</b>
MICROLINE 82A.....	<b>£349.95</b>
MICROLINE 92.....	<b>£495.95</b>
ALPHACOM 42.....	<b>£99.90</b>

## MONITORS

- COMMODORE 1701 with sound ..... **£230.00**
- SANYO 14" Colour TV (ideal as a monitor).... **£229.95**
- SANYO CDD 3125NB Colour Monitor..... **£285.35**
- SANYO 12" Green Monitor..... **£99.95**



## New! MEMOTECH MTX500

Here's the super Memotech MTX500 Micro - specially designed for versatility in a wide variety of applications. Its 16K ROM contains several languages & routines to suit users with differing levels of computer skills. Its RAM is a powerful 32K - expandable to a massive 512K - with full 16-colour high-definition graphic capability, and a superb top-quality keyboard. It's a superb Micro and you can see it at SPECTRUM now!

**SUPERB VALUE AT ONLY**

**£275**

## MY TALKING COMPUTER

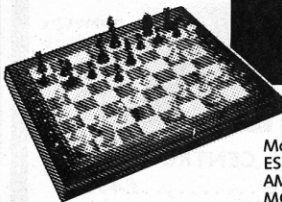
"My Talking Computer" by Electroplay is a marvellously simple and clear children's Micro that's perfect for the younger child or the slow learner. There's a range of brightly coloured, bold programs - such as "Talking Story", "Talking Numbers" or "Talking Games" - giving a wide selection of educational AND fun games, on easy-load cartridges.



**£59<sup>95</sup>**

SPECTRUM PRICE

## CONCHESSESS CHESS COMPUTER



'The intelligent CHESS COMPUTER'

Models available:  
 ESCORTER..... **£179.99**  
 AMBASSADOR.... **£229.99**  
 MONARCH..... **£279.95**

## ACCESSORIES

C12 DATA CASSETTES.....	<b>£0.50</b>	TELEVISIONS	
C15 DATA CASSETTES.....	<b>£0.58</b>	12" TR0 B&W PORTABLE.....	<b>£59.95</b>
VISCOUNT SINGLE SIDED, DOUBLE DENSITY (10) (FOR APPLE COMMODORE, ATARI, TANDY).....	<b>£21.25</b>	CTP3131 14" COLOUR PORTABLE.....	<b>£229.95</b>
VISCOUNT SINGLE SIDED, SINGLE DENSITY (10).....	<b>£21.25</b>	<b>COMPUTER CASSETTE RECORDERS</b>	
VISCOUNT DOUBLE SIDED, DOUBLE DENSITY (10) (FOR SHARP SUPERBRAIN, ETC).....	<b>£33.81</b>	from <b>£27.50</b>	
VISCOUNT SINGLE SIDED DOUBLE DENSITY 96 TRACK (10) (FOR NASCOM, COMMODORE 8050, ETC).....	<b>£51.36</b>	ZETA Joystick	
EMPTY DISK CASES (FOR 5¼" DISKETTES).....	<b>£1.95</b>	for ATARI, COMMODORE, VIC-20 & 64, SPECTRUM & ORIC	
DISK HEAD CLEANER KIT.....	<b>£16.10</b>	<b>ONLY £10.95</b>	

# There's a Spectrum Centre near you...

## AVON

**BATH** Software Plus, 12 York St.  
TEL: (0252) 61676  
**BRISTOL** Bressal Computers Ltd.  
24 Park Row. TEL: (0272) 294188  
**WESTON-SUPER-MARE** K & K  
Computers, 32 Alfred St. TEL: (0934) 419324

## BEDFORDSHIRE

**BEDFORD** Stand Ltd., 115 Midland Rd.  
TEL: (0254) 49341  
**DUNSTABLE** Buzzards, 7-11 Broad Walk.  
TEL: (0882) 65515  
**LEIGHTON BUZZARD** The Computer  
Centre at Milton Keynes Music, 17 Bridge St.  
TEL: (0525) 376622  
**LUTON** M & M, 49 George St.  
TEL: (0582) 233912

## BERKSHIRE

**READING** David Saunders, 9 Field Hall  
Place. TEL: (0734) 580719  
**WINDSOR** Wycombe Video, 44 King  
Edward Court. TEL: (07535) 67441

## BUCKINGHAMSHIRE

**BLETCHLEY** Rams Computer Centre,  
117 Canterbury Way. TEL: (0509) 547744  
**CHEESHAM** Reed Photography &  
Computers, 113 High St. TEL: (0494) 783373

## CAMBRIDGESHIRE

**CAMBRIDGE** K. P. Ltd., 12a Kings Parade.  
TEL: (0223) 68087  
**PETERBOROUGH** Petalborough  
Communications, 95 Midland Rd.  
TEL: (0753) 41007

## CHANNEL ISLANDS

**GUERNSEY** Grant's 3-5 The Pellet, St.  
Peter Port. TEL: (0481) 24682  
**JERSEY** Audio & Computer, 7  
Peter St. St. Helier. TEL: (0534) 74000

## CHESHIRE

**ALTRINCHAM** Mr. Micro, 28 High St.  
TEL: (061) 941 8213  
**CREWE** Microcom, Unit 2, 128 Nantwich Rd.  
TEL: (0270) 21604  
**CHESTER** Oaker Computers Ltd.,  
100 Bognon. TEL: (0244) 310099  
**MACCLESFIELD** Camera & Computer  
Centre, 110 Mill St. TEL: (0625) 27468  
**NORTHWICH** Camera & Computer  
Centre, 3 Town St. TEL: (0606) 456229  
**STOCKPORT** Widling Ltd., 1 Little  
Underbank. TEL: (061) 480 3043  
**WARRINGTON** Widlings, 111 Bridge St.  
TEL: (0525) 38290  
**WIDNES** Computer City, 78 Victoria Rd.  
TEL: (051) 420 3333  
**WILMSLOW** Swift of Wilmslow, 4-6 St.  
Annes Parade. TEL: (0625) 526213

## CLEVELAND

**MIDDLESBROUGH** McKenna & Brown,  
206 Linthorpe Rd. TEL: (0642) 222858

## CORNWALL

**ST. AUGUSTINE** A & B Computers, Duchy  
House, 6 Lower Aylmer St. TEL: (0728) 673337

## CUMBRIA

**BARROW-IN-FURNESS** Barrow  
Computer Centre, 96 Church St.  
TEL: (0929) 38350  
**CARLISLE** The Computer Shop, 56-58  
Louthier St. TEL: (0228) 27710  
**PENRITH** Penrith Communications,  
14 Castlepie. TEL: (0768) 67146.  
Open Mon-Fri 10-6 p.m.  
**WHITEHAVEN** P. D. Hendren, 15 King St.  
TEL: (0496) 20463

## DERBYSHIRE

**ALFRETON** Gordon Harwood, 69/71 High  
St. TEL: (0773) 82078  
**CHESTERFIELD** The Computer Centre,  
14 Stephenson Place. TEL: (02426) 208802  
**DERBY** C T Electronics, at Camera Thorpe,  
The Spot. TEL: (0332) 360456

## DEVON

**EXMOUTH** Open Channel, 30 The Strand,  
TEL: (08952) 4408  
**PLYMOUTH** Syntax Ltd., 76 Cornwall St.  
TEL: (0272) 28705  
**TIVERTON** Actron Micro Computers,  
25 St. Andrew St. TEL: 0894 252854  
**TORQUAY** Devon Computers, 8 Thornhill Rd.,  
Castle Circus. TEL: (0803) 526303

## DORSET

**BOURNEMOUTH** Lansdowne  
Computer Centre, 1 Lansdowne Crescent,  
TEL: (0202) 20165

## DURHAM

**DARLINGTON** McKenna & Brown,  
102 Bangate. TEL: (02035) 459744

## ESSEX

**BASILDON** Godfrey's 28-32 East Walk,  
Town Centre. TEL: (0268) 289379  
**CHELMSFORD** Maxton Hyman Ltd.,  
5 Broadfield Rd. TEL: (0245) 354598  
**COLCHESTER** Colchester Computer  
Centre, 10 St. Botolph St. TEL: (0206) 4742  
**GRAYS** H. Reynolds, 79 Orsett Rd.  
TEL: (0375) 53948  
**ILFORD** Videotronics, 76 Ilford Lane.  
TEL: (011) 478 307  
**LOUGHTON** Micro & Video Channel,  
309 High Rd. TEL: (01) 508 1216

## GLOUCESTERSHIRE

**GLOUCESTER** The Model Shop, 79-81  
Northgate St. TEL: (0452) 410693

## HAMPSHIRE

**ALDERSHOT** David Saunders, 51 Station  
Rd. TEL: (0252) 20130  
**ANDOVER** Andover Audio, 105 High St.  
TEL: (0264) 58251  
**BASINGSTOCK** Fisher's, 2-3 Market  
Place. TEL: (0256) 22079  
**PORTSMOUTH** Cynpus Computers,  
121-261 Commercial Rd. TEL: (0705) 833938  
**PORTSMOUTH Waterlooville** G & G  
Microland, 7 Queens Prde. TEL: (0704) 59911  
**SOUTHAMPTON** R. J. Parker & Son Ltd.,  
11 West End Rd., Bitterne. TEL: (0703) 445926  
**WINCHESTER** Winchester Camera &  
Computer Centre, 75 Parchment St.  
TEL: (0962) 53982 (Just Opening)

## HEREFORD

**HEREFORD** Melgray Hi-Tech Ltd., 49  
Broad St. TEL: (0432) 275737

## HERTFORDSHIRE

**BOREHAM WOOD** Master Micro, 36  
Shenley Rd. TEL: (01) 963 8368  
**HITCHIN** Camera Arts (Micro Computer  
Division), 88a Hermitage Rd.  
TEL: (0482) 53285  
**POTTERS BAR** The Computer Shop,  
197 High St. TEL: (0770) 44417  
**ST. ALBANS (Herts)** Clarke Computer  
Division, 86a Hermitage Rd.  
TEL: (0772) 52991  
**STEVENAGE** D. J. Computers, 1 Town St.  
TEL: (0438) 66501  
**WATFORD** SRS Microsystems Ltd., 94  
The Parade, High St. TEL: (0923) 26692

## HUMBERSIDE

**GRIMSBY** R. C. Johnson Ltd., 22 Friargate,  
Riverbank Centre. TEL: (0472) 42031  
**HULL** The Computer Centre, 26 Anlaby  
Rd. TEL: (0482) 26297

## ISLE OF MAN

**DOUGLAS** T. H. Colebourne Ltd.,  
57-61 Victoria St. TEL: (0624) 3482  
(Just Opening)

## KENT

**CANTERBURY** Kent Micro Systems,  
Conquest House, 17 Palace St.  
TEL: (0227) 50200  
**DOVER** Kent Photos & Computers, 4 King St.  
TEL: (0304) 202020  
**ORFINGTON** Ellis Marketing Ltd.,  
25 Station St., Petre Wood. TEL: (0689) 39476  
**RAINHAM** Microway Computers Ltd.,  
39 High St., Medway Towns.  
TEL: (0634) 376702

**SEVENOAKS** Ernest Fielder Computers,  
Dorset St. TEL: (0732) 466800  
**SITTINGBOURNE** Computers Plus,  
65 High St. TEL: (0795) 266775  
**TUNBRIDGE WELLS** Modata  
Computers Ltd., 28-30 St. Johns Rd.  
TEL: (0892) 41555

## LANCASHIRE

**ACCINGTON** PV Computers, 38A Water  
St. TEL: (0254) 36521/32611  
**BLACKBURN** Tempo Computers,  
9 Railway Rd. TEL: (0254) 691333  
**BURNLEY** IVO Computer Systems, 39-43  
Standish St., North 1st. TEL: (0562) 54299  
**BURY (Lancs.)** Micro-North, 7 Broad St.  
TEL: (061) 787 5764  
**OLDHAM** Home & Business Computers,  
154 Yorkshire St. TEL: (061) 633 1608  
**PRESTON** Wilding's 49 Fishergate.  
TEL: (01) 721 556250

**ROCHDALE** Home & Business Computers,  
75 Yorkshire St. TEL: (0706) 344654  
**LEICESTERSHIRE**  
**LEICESTER** Youngs, 40/42 Belvoir St.  
TEL: (0533) 544774  
**MARKET HARBOUROUGH** Harborough  
Computers, 7 Church St.  
TEL: (0658) 63056

## LINCOLNSHIRE

**GRANTHAM** Oakleaf Computers Ltd.,  
121 Doding Rd. TEL: (0476) 79994/70281  
**LINCOLN** MCO Computers, 24 Newlands.  
TEL: (0522) 25907

## LONDON

**E6** Parcivals, 85 High St. North, East Ham.  
TEL: (01) 472 8941  
**E8** McDowds, 244 Graham Rd., Hackney.  
TEL: (01) 433 9635  
**E1** Sidney Levy, 17-19 Leather Lane.  
TEL: (01) 242 3456  
**E2** Devron Computer Centre, 155,  
Moorgate. TEL: (01) 638 3339/1830  
**N14** Logic Sales, 19 The Broadway,  
Newington, Southgate. TEL: (01) 882 4942  
**N20** Castlehurst Ltd., 1291 High Rd.  
TEL: (01) 446 2280  
**NW4** Davi Video Computer Store, 112 Brent St.,  
Hendon. TEL: (01) 202 2272/3/4  
**SE1** Vic Odden's, 6 London Bag Walk.  
TEL: (01) 403 1989  
**SE9** Square-Deal, 373-375 Footscray Rd.,  
New Eltham. TEL: (01) 859 1516  
**SE14** Gatwick Computers, 288 Kennington  
Pk. TEL: (01) 587 0336  
Adjacent to Oval Tube  
**SE15** Castlehurst Ltd., 152 Rye Lane,  
Peckham. TEL: (01) 639 2205  
**SE25** Ellis Marketing, 79 High St., South  
Norwood. TEL: (01) 653 4224  
**SW6** Chemsco Micro Ltd., 14 Jordan  
Park, Putney. TEL: (01) 385 9494  
**SW19** Incom, 31 High St., Wimbledon.  
TEL: (01) 947 7678  
**W1** Devron 4 Edgware Rd.  
TEL: (01) 724 2373  
**W1** Computers of Wigmore Street,  
87 Wigmore St. TEL: (01) 488 0373  
**W1** Sonic Foto & Micro Centre, 256  
Tottenham Court Rd. TEL: (01) 580 5826  
**W7** K T Electronics, 11-13 Boston Rd.,  
Harwell. TEL: (01) 579 2842

## MANCHESTER GREATER

**MANCHESTER** Lomax Ltd., 8 Exchange  
St. St. Ann's Sq. TEL: (091) 832 6167  
**SWINTON** Mr. Micro Ltd., 69 Partington  
Lane. TEL: (061) 728282  
Late Night Friday  
**HYDE** Pace, 213-215 Market St.  
TEL: (061) 368 5926  
**BOLTON** Widling Ltd., 23 Deansgate.  
TEL: (0204) 33512  
**WIGAN** Widling Ltd., 11 Mesnes St.  
TEL: (0942) 44382

## MERSEYSIDE

**BIRKENHEAD** Fairs Camera's & Hi-Fi,  
Dacre Hill, Rock Ferry. TEL: (051) 645 5000  
**HESWALL** Thorngaard Computer Systems,  
46 Pansy Rd. TEL: (051) 342 7516  
**LIVERPOOL** Beaver Ratio, 20-22  
Whitechapel. TEL: (051) 709 8699  
**LIVERPOOL (Aintree)** Hargreaves,  
31/37 Warbeck Moor. TEL: (051) 525 1782  
**SOUTHPORT** Central Computers, 576  
Lord St. TEL: (0704) 31881

## MIDDLESEX

**EDGWARE** Breaker 1-4, 130 High St.  
TEL: (01) 952 7488/8860  
**HARROW** Camera Arts (Micro Computer  
Division), 24 St. Ann's Rd. TEL: (01) 427 5469  
**HIVE** Computers, 1000 Oxbridge Rd.  
TEL: (01) 575 2511 (Just Opening)  
**TEDDINGTON** Teddington Camera Centre,  
Broad St. TEL: (01) 977 4716  
**UXBRIDGE** JKL Computers Ltd.,  
7 Windsor St. TEL: (0695) 51815

## NORFOLK

**FAKENHAM** Fastview, 12 Norwich Rd.  
TEL: (0203) 53119  
**NORWICH** Sound Marketing, 52 St.  
Benedicts St. TEL: (0603) 66725  
**THETFORD** Theford C & Micos, 21  
Guldhall St. TEL: (0842) 61645

## NORTHANTS

**NORTHAMPTON** Best Computers &  
Systems Ltd., 72 Kingsburge Hollow.  
TEL: (0604) 710740

## NOTTINGHAMSHIRE

**NOTTINGHAM** Cameo Computers,  
8/9/10 Trinity Walk. TEL: (0602) 742921  
**NOTTINGHAM** Basic, 39-41 Trent  
Boulevard, West Bridgford.  
TEL: (0530) 191713  
**WORKSOP** Computagraf, Bridge St.  
TEL: (0909) 472248

## NORTHERN IRELAND

**BELFAST** Arthur Hobson Ltd., 37 Gt.  
Victoria St. TEL: (0232) 246336  
**CO. ARMAUGH** Pedlows, 16 Market St.,  
Portadown, Craigavon. TEL: (0762) 332265  
**LONDONDERRY** Fryde Computer  
Systems, 8 Bishop St. TEL: (0504) 288337  
**NEWRY** Newry Computer Centre, 34  
Monaghan St. TEL: (0683) 66545

## EIRE

**DUBLIN** Edtek Computer Co. Ltd., Unit 6,  
Powerscourt, Townhouse, Stone  
Wallace St. TEL: Dublin 79934

## OXFORDSHIRE

**ABINGDON** New Fields Computers,  
21 Stent St. TEL: (0263) 21207  
**BANBURY** Computer Plus, 2 Church Lane.  
TEL: (0295) 55890  
**HENLEY-ON-THAMES** Family Computers  
Ltd., 40A Bell St. TEL: (0491) 575744  
**OXFORD** Leaf Fields, 5 St. Eaves St.  
TEL: (0235) 21207

## SCOTLAND

**ABERDEEN** North East Computers,  
1-3 Ellis St., Peterhead. TEL: (0779) 79900  
**Ayr** Vennals, 6 New Bridge St.  
TEL: (0292) 264424  
**DUMFRIES** Vennals, 71 English St.  
TEL: (0878) 54547  
**EDINBURGH** The Silicon Centre, 6-7  
Antigua St. TEL: (031) 557 4546  
**GLASGOW** Victor Morris Ltd., 340 Argyle  
St. TEL: (041) 221 8958  
**HAMILTON** Tom Dickson Computers, 8-12  
Caldwell St. TEL: (0698) 283193  
**KILMARNOCK** Vennals, 49 Foregate.  
TEL: (0653) 32175  
**KIRKCALDY** Kirkcaldy Photographic  
Services, 2544 High St., Fife.  
TEL: (0592) 294734  
**STIRLING** R. Kilpatrick, 68 Port St.  
TEL: (0786) 5532

## SHROPSHIRE

**SHREWSBURY** Computaram,  
13 Castlegate. TEL: TBA

## SOMERSET

**TAUNTON** Grays, 1 St. James St.  
TEL: (0623) 72966

## STAFFORDSHIRE

**STAFFORD**, Computaram, 59 Forge St.  
TEL: (0785) 41699

## STOKE-ON-TRENT

**11 Market Sq., Andra, Hanley.**  
TEL: (0782) 268620

## SUFFOLK

**BURY ST. EDMUNDS** Bury Computer  
Centre, 11 Guildhall St. TEL: (0284) 708572  
**FLEETSTOWNE** K. M. Communications Ltd.,  
4 Manning Rd. TEL: (0394) 27113 or 274559  
**IPSWICH** Brainwave, 24 Crown St.  
TEL: (0473) 50965

**LOWESTOFT** John Wells, 44 London Rd.,  
North. TEL: (0602) 3742

## SURREY

**CAMBERLEY** Camera Arts (Micro  
Computer Division), 36 High St.  
TEL: (071) 635848  
**CHERTSEY** Chertsey Computer Centre,  
1 Windsor St. TEL: (08326) 64663  
**GUILDFORD** The Model Shop, 23 Swan  
Lane. TEL: (0772) 0483 3915  
**HASLEMERE** Haslemere Computers,  
25 Junction Place, Red Cinema.  
TEL: (0428) 54428  
**NEW MALDEN** Surrey Micro Systems,  
31 High St. TEL: (01) 842 0478  
**WALLINGTON** Surrey Micro Systems Ltd.,  
53 Woodcote Rd. TEL: (01) 647 5636  
**WOKING** Harpers, 17/13 Commercial Way.  
TEL: (0462) 25657

## SUSSEX

**BEXHILL-ON-SEA** Computaram,  
23 St. Leonards Rd. TEL: (0424) 223340  
(Opening Mid-October)  
**CRAWLEY** Gatwick Computer Services,  
82 The Boulevard. TEL: (0293) 37842  
**LITTLEHAMPTON** Alan Chase Ltd.,  
39 High St. TEL: (0964) 5674/4545

## TYNE & WEAR

**NEWCASTLE-ON-TYNE** Newcastle  
Camera & Computer Centre, 16 Northumberland  
Cl. TEL: (0632) 327461

## WALES

**ABERDARE** Inky Computer Services Ltd.,  
70 Mill St. The Square, Treycyan.  
TEL: (0665) 891828  
**ABERYSTWYTH** AberData at Gallows,  
23 Peter St. TEL: (0870) 615522  
**CARDIFF** Randall Cox, 18/22 High St.  
Arcade. TEL: (0222) 31980  
**LANDUDNO (Gwynedd)** Computer  
Plus Discount, 15 Clomel St.  
TEL: (0492) 79943  
**NEWPORT (Gwent)** Randall Cox, 118  
Commercial St. TEL: (0534) 67378  
**PEMBROKE** Randall Cox, 19 Main St.  
TEL: (064) 668 2876  
**PORT TALBOT** Micro Gen, 6 Royal  
Buildings, Talbot Rd. TEL: (0639) 887730  
**WREXHAM** T E Roberts, 26 King St.  
TEL: (0797) 364404/364527

## WARWICKSHIRE

**LEAMINGTON SPA** IC Computers, 43  
Russell St. TEL: (0926) 36244  
**RUGBY** The Rugby Micro Centre, 9-11  
Regent St. TEL: (0788) 70522

## WEST MIDLANDS

**BIRMINGHAM** Sherwoods, Gt. Western  
Arcade. TEL: (021) 236 7211  
**SUDLEY** Central Computers (Dudley), 35  
Churchill Precinct. TEL: (0884) 238169  
**ERDINGTON** The Gamekeeper Grand Fare,  
High St. TEL: (021) 3846109  
**WEST BROMWICH** Bell & Jones,  
39 Queens Sq. TEL: (021) 553 0820

## WILTSHIRE

**SALISBURY** Wytham Computer Centre,  
20 Millers St. TEL: (0722) 26688

## WORCESTER

**WORCESTER** David Waring Ltd., 17-51  
1 Marmon House, High St. TEL: (0905) 27561

## YORKSHIRE

**BRADFORD** Erricks Foto-Sonic House,  
Rawson St. TEL: (0274) 309286  
**LEEDS** J. Richards (formerly  
Lawrie's) 12 Queen St. TEL: (0484) 25334  
**LEEDS** Bass & Bligh, 4 Lower Bridge.  
TEL: (0532) 454451  
**SHEFFIELD** Superior Systems Ltd., 178  
West St. TEL: (0742) 755005  
**SKIPTON** Leek & Aise, 45 Belmont Bridge.  
TEL: (0756) 60078  
**YORK** York Computer Centre, 3 Stonegate  
Arcade. TEL: (0904) 641862



# HERE COMES HORACE!

Just when you thought microcomputer games had nothing more to offer, here comes Horace!

It has been said that Horace games are in a class of their own: in fact, Horace is almost a legend.

Horace is a cute, lovable, animated character who races through adventures, creating havoc wherever he goes, and the good news is that Horace games are now available for most microcomputers.

When Horace was first introduced to computer owners in the game "Hungry Horace", he immediately became a cult figure, winning the hearts of thousands of computer owners. Now, you too can enjoy the hair-raising adventures of Horace.

The Horace series of games brings you splendid graphics, addictive games and a lovable mischievous character, for only £5.95 per cassette.



## HUNGRY HORACE

The original Horace adventure. Horace creates havoc in the park as he picks the flowers, annoys the guards and steals their lunch. Patently ridiculous, but great fun.

## HORACE GOES SKIING

Our hero attempts winter sports: First of all he must get to the ski shop, then lumbered with a pair of skis, he has to dodge the traffic once again to reach the snow. Skiing is complete with slalom flags, trees and moguls. So watch out, Horace!

## HORACE AND THE SPIDERS

Horace's task is to rid the mountain caves of spiders. But before he can do that he must climb the mountain and reach the dreaded spider bridge. To cross it, Horace must swing from spider thread to spider thread! This game is challenging and fun with some amazing animation.



# MELBOURNE HOUSE



## Melbourne House Publishers

### Spectrum

Spectrum version of Horace games are available from selected branches of WH Smith, Boots and Menzies or directly from Sinclair Research Ltd.

### Commodore 64

Commodore 64 Hungry Horace £5.95 □  
Commodore 64 Horace Goes Skiing £5.95 □

### Dragon 32

Dragon 32 Hungry Horace £5.95 □

All prices include VAT where applicable. Please add 80p for post and pack.

Orders to:  
Melbourne House  
131 Trafalgar Road  
Greenwich, London SE10

Correspondence to:  
Melbourne House  
Church Yard  
Tring, Hertfordshire HP23 5LU

PCN 1/12

I enclose my cheque/money order for £

Please debit my Access Card No.

Expiry date

Signature

Name

Address

Postcode

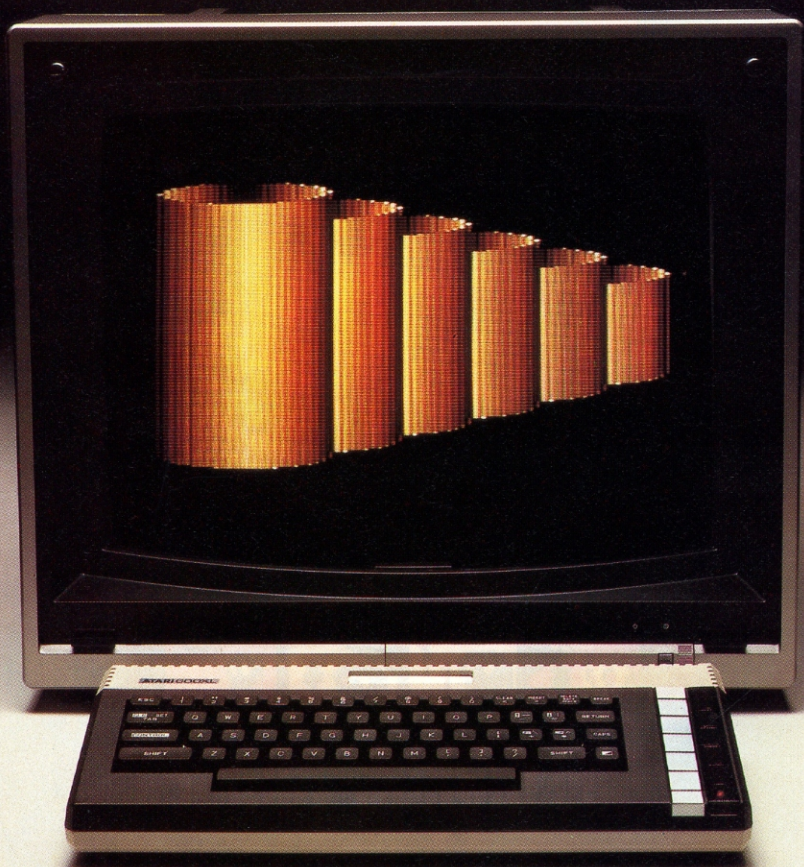
£
£ + p/p 80
Total
£

Trade enquires welcome



All Melbourne House cassette software is unconditionally guaranteed against malfunction. Access orders can be telephoned through on our 24 hr ansafone (01) 858 7397.

# As your expectations so can your



## 600XL Home Computer.

Whatever you want your home computer to do, the ATARI 600XL™ can do it.

### ATARI 600XL product specifications.

**Colour capabilities:** 16 colours and 16 intensities. 256 shades.

**Memory:** 16K RAM expandable to 64K with memory expansion module. 24K ROM operating system including ATARI BASIC programming language.

**Sound:** 4 independent sound synthesisers. Each with a 3½ octave range.

**Display:** 11 graphic modes. 5 text modes. Up to 320 x 192 resolution. Maximum text display 24 lines by 40 columns.

**Special ATARI integrated circuits:** GTIA for graphics display; POKEY for sound and controller ports; ANTIC for screen control and I/O.

**CPU:** 6502C microprocessor. 0.56 micro-second cycle. 1.8 Mhz.

**Extended graphics functions:** High resolution graphics. Multi-coloured character set. Software screen switching. Multiple redefined character sets. Player missile (sprite) graphics. Fine screen scrolling. Changeable colour registers. Smooth character movement. Simple colour animation facilities.

**Programming features:** Built in ATARI

BASIC programming language plus 8 other languages. HELP key will provide additional information and menu screens. Syntax checking on entry.

**Input/Output:** External processor bus for expansion with memory and peripherals. 2 controller ports. Serial I/O connector. Monitor output.

**Software:** Over 1000 items of software available including self teaching programs with unique voice over. Education. Home management. Programming aids. Atari user written programs (APX). And Atari's famous entertainment software.

# Experience grows Atari 600XL.



1. Program Recorder.



2. 64K Memory Module.



3. Touch Tablet.



4. Trak Ball™ Controller.



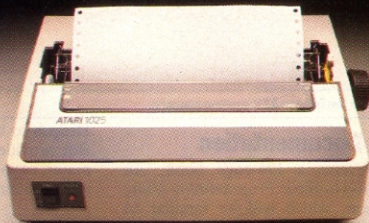
5. Super Joysticks.



6. Colour Printer.



7. Disk Drive.



8. 80 Column Dot Matrix Printer.



9. Letter Quality Printer.

These peripherals will be available soon:  
**1. ATARI 1010™ Program Recorder** for low cost storage and retrieval capability. Data transmission 600 baud. Storage capability 100K bytes on a 60 minute cassette. Track configuration 4 track, 2 channels (digital and audio). Auto record/playback/pause control.

**2. ATARI 64K Memory Module** gives the 600XL a massive 64K RAM.

**3. ATARI Touch Tablet** enables you to paint pictures and draw diagrams, with the touch of a stylus.

**4. ATARI Trak Ball™ Controller** enables

cursor movement in any direction; adds to the pleasure of Atari games.

**5. ATARI Super Joysticks.** Gives you a greater competitive edge over your games.

**6. ATARI 1020™ Colour Printer** plotter. Four colour graphic print capability. 40 column. 10 characters per second. 5, 10 and 20 characters per inch.

**7. ATARI 1050™ Dual Density Disk Drive.** 5 1/4 inch disks holding 127K randomly accessible bytes provides both expansion and flexibility for your 600XL system with DOSIII.

**8. ATARI 1025™ 80 Column Dot Matrix Printer** prints 5, 10 or 16.5 characters per inch. 40 characters per second. Ideal for program listings, financial reports, etc.

**9. ATARI 1027™ Letter Quality Printer** for word processing letters in professional type.

If you'd like to know more about the ATARI 600XL, write to Atari International (UK) Inc., P.O. Box 407, Blackhorse Road, London SE8 5JH and we'll send you all the details.

**The new Atari XL home computer system.** **ATARI**

©ATARI and design. Reg. U.S. Pat and TM Off. TM. Trademark of Atari Inc. The ATARI 600XL is compatible with ATARI 400 and 800 programs

The well-known Dragon 32 has acquired a larger sibling — Mike Gerrard checks the difference.

# Enter the Dragon 64

**W**hen the Dragon 32 roared into life just over a year ago it generated a great deal of interest, not least because it partly reflected the dramatic change in leisure habits that had been taking place in the seventies and eighties. Where, a generation ago, ten-year-olds were playing with model cars and marbles, now they were demanding their own Vics and Spectrums. Toy company Mettoy tried to halt its falling sales by moving into the potentially lucrative home computer market by forming a subsidiary which eventually became Dragon Data.

Its first machine, the Dragon 32, was an instant success and immediately put its name up there alongside the big ones of Sinclair, Commodore, Acorn and Atari. It was ironic, then, that the sales success of the Dragon 32 only created more problems for Mettoy in that it was unable to find funds to back the company's necessary expansion and was obliged to sell a large part of its interest in Dragon Data.

Coinciding with the arrival of Dragon Data's second computer, the Dragon 64, Mettoy went into liquidation, having in the end only a 15.5% shareholding in the Welsh company.

Although the Dragon got a little egg on its face over promised delivery dates of its own disk drive system, which was a few months late, details of its next machine remained under wraps until it was announced towards the end of the summer that a 64K computer would be ready by the end of September. Indeed the machine was ready on time, just, making its debut at the PCW show on September 29, with a promise that the Dragon 64 would be in the shops by the end of November.

One pitfall the company was trying to avoid was that of upward incompatibility, as suffered by ZX users who bought a Spectrum or Vic-20 owners moving up to a Commodore 64. Loyalty was obviously to be catered for, and this has been done by making the new machine work in different modes. One of them is a 32K mode which allows the use of all existing software. This means that inside every Dragon 64 lurks a Dragon 32.

## Presentation

Anyone who is colour blind would have to

look extremely closely to distinguish the Dragon 64 from its predecessor, as the casing and keyboard are identical except that the new machine is in a rather more official-looking grey colour, perhaps hinting that it is going to be aimed slightly more at the business market than before.

The usual connecting leads for cassette and TV are provided, along with the exceedingly heavy mains adaptor. This comes with several feet of wire, and its 9-pin plug fits solidly into the socket at the rear of the Dragon.

buyers with, if not a brand new book, at least an error-free one.

The manual does have an eight-page *Dragon 64 Supplement* which explains the differences between the two machines, these being just three items: the additional memory, an RS232 (serial) interface, and auto-repeating keys.

## Construction

The design and build of the Dragon has its fans and critics, but my own 32 has been receiving heavy use for over a year now and

remains clean and unmarked, with no problems from the keyboard or any of the sockets.

The Dragon's connections to the outside world are, on the left-hand side, a TV socket, reset button (not 100 per cent reliable as it will on occasion wipe the memory rather than merely reset), 5-pin DIN sockets for left and right joysticks and cassette recorder, a parallel printer port for Centronics-type printers, and the new serial interface.

The rear of the machine has the mains socket, a monitor socket and the push-button on-off switch, with the right-hand side having the cartridge slot, which holds things firmly. The mains button could be improved, it is hidden away where you can't see it in normal use. With the average human having considerably less memory capacity than the machine it is possible for the

Dragon to be on when you think it's off. But provided you also switch off at the mains, as you should, there ought not to be any problems.

## Keyboard

There's a fairly conventional qwerty-style keyboard which has a satisfying typewriter feel to it, and the introduction of auto-repeat keys in 64K mode seems also to have done away with a noticeable problem on the 32, caused by the keyboard scanning routine. In checking to see if a key was pressed, the keyboard was scanned a block of keys at a time, and speedy typists found that if they hit two consecutive keys in the same block then the second would frequently not register, a considerable drawback to a machine with business and word processing potential.

Though not referring to this in the 25▶

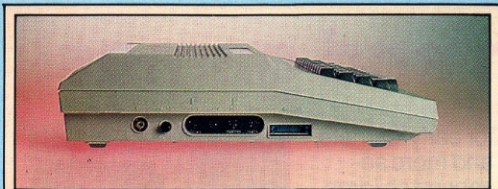


Looks familiar? Compatibility with the Dragon 32 is a prime concern.

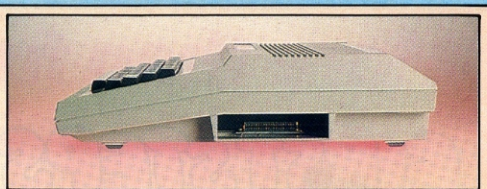
## Documentation

Buyers receive a 176-page book, *An Introduction to Basic Programming Using the Dragon*, which will be familiar to owners of the earlier machine as it is the same. Strangely enough, some references to 'Dragon 32' in the text have been changed to 'Dragon', but not all of them. The drawing at the front of the book is still of the 32, not showing the additional interface that the 64 possesses.

The editing commands and error codes are still incomplete. The latter omits to explain UF and DN errors for instance, and the space battle program listed will still have your opponent's ship firing when you press your own joystick's fire button. In view of the flak that the manual received when the 32 was first reviewed, it seems rather penny-pinching not to provide 64



Side view of the Dragon 64 – you can see the extra serial interface, which is the major difference from the 32, clearly.



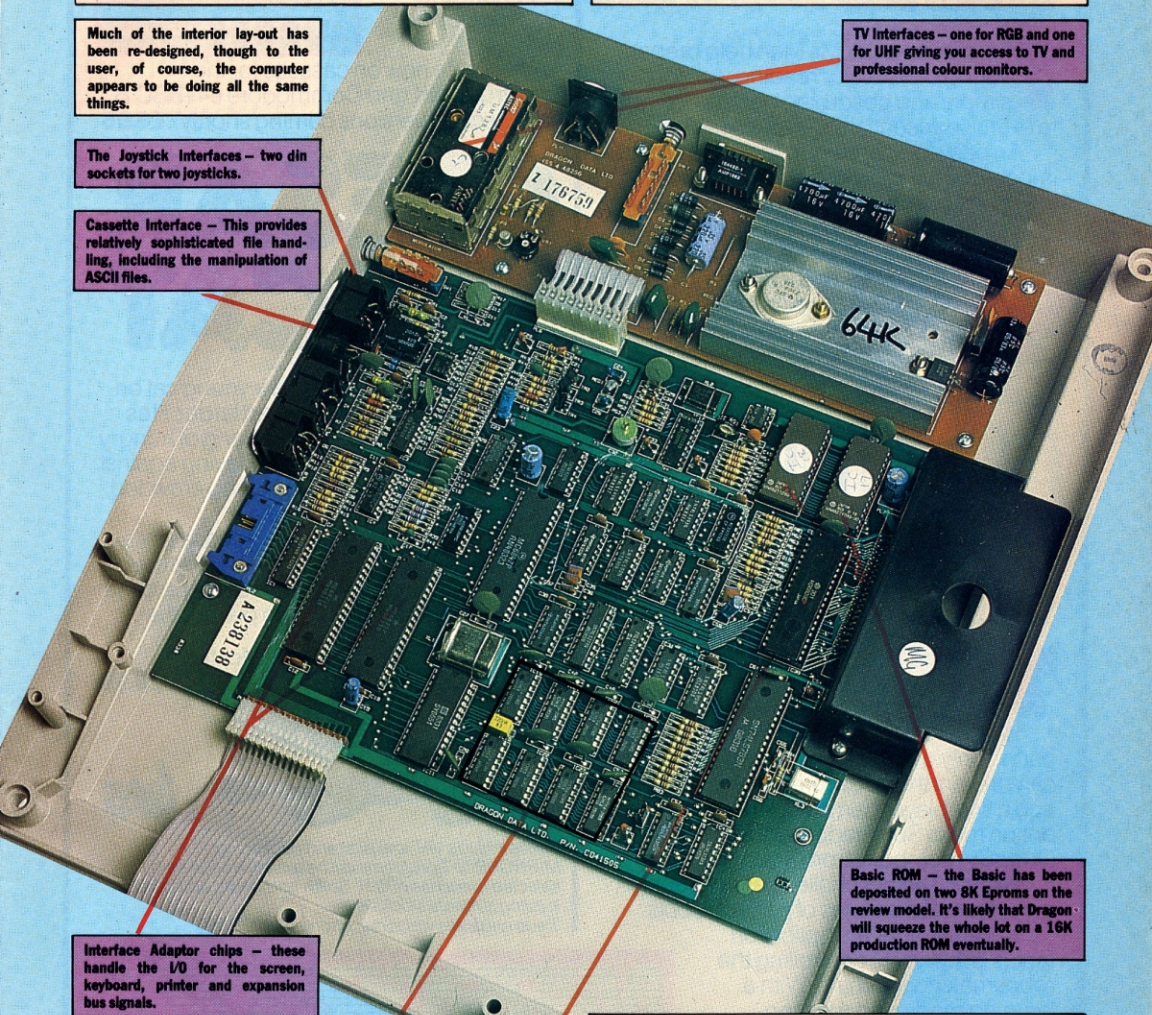
The games port side remains 32ish. Only the more business-like colour scheme distinguishes it from its predecessor.

Much of the interior lay-out has been re-designed, though to the user, of course, the computer appears to be doing all the same things.

The Joystick Interfaces – two din sockets for two joysticks.

Cassette Interface – This provides relatively sophisticated file handling, including the manipulation of ASCII files.

TV Interfaces – one for RGB and one for UHF giving you access to TV and professional colour monitors.

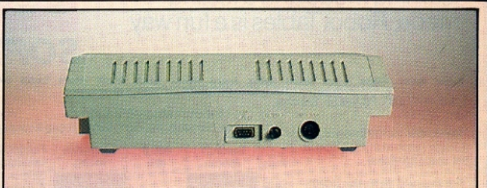


Interface Adaptor chips – these handle the I/O for the screen, keyboard, printer and expansion bus signals.

RAM – the varying configurations of the 32 have been replaced by a single line of eight 64K RAMs.

6809 Processor – the same as the chip in the Tandy Colour Computer so it is easy to convert programs for the Dragon. The 6809 has a close resemblance to the 6502, so it's possible to convert code from this processor as well.

Basic ROM – the Basic has been deposited on two 8K Eproms on the review model. It's likely that Dragon will squeeze the whole lot on a 16K production ROM eventually.



The rear of the 64 reveals sockets for the power, a monitor and the push-button on/off switch.



supplement, the Dragon 64 has no such problems and could keep up perfectly with the fastest typing. The keys also seem to offer slightly more of a bounce-back to them, presumably to discourage lingering and getting auto-repeat, but this also serves to increase the user's typing speed. In view of this improvement it's a pity that the 64 still doesn't offer lower case letters on the screen. These are represented in reverse video (*ie* green against a black block) but do print out as lower case on printers.

## Display

On switching on you are presented with the Dragon Data/Microsoft copyright notice in black against a green background, this being the standard printing layout. Green against black is also possible using completely lower case, and black against orange can be improvised if you know how. Although the machine offers nine colours (buff being the closest you'll get to white) your printing on the screen is limited to these upper case options unless you get a word-processing package or define your own characters using high-res graphics.

This is also the only way to mix text with graphics.

Screen layout is 32 x 16, rather limiting for the text, so for serious word processing a commercial package will be essential.

## Storage

Initially the Dragon 64 is automatically in 32K mode, and a test of several cassettes and cartridges produced no problems with software designed for the 32. To switch to 64K mode you type EXEC (or EXEC 48000 if a previous EXEC address needs to be over-written) when the copyright notice changes from 1982 to 1983 and the cursor flashes blue instead of black.

What happens is that the Basic interpreter is copied into the top of the 64K RAM space and you now have 41,241 bytes available for Basic programming, though this can be increased to 45849 by freeing some of the memory reserved for graphics pages, and of course the full 64K remains available for machine code only programs.

One advantage the Dragon has is that almost any cassette recorder can be used to SAVE and LOAD programs, with disk drives also now available if you require them. Dragon Data is opting for the OS9 operating system, but FLEX will also be available from independent suppliers Microcare.

## Expansion

If your computer doesn't begin and end with the computer itself, the fact that the Dragon 32 has now been around for a year means that expansion is already available. Dragon's own disk drives have appeared at last, and there are also rival drives from Cumana and Premier Microsystems. A range of products is available from companies like Premier and Compusense: screen dumpers, light pens, assemblers, monitors, Forth and so on.

The parallel interface is the essential Centronics-one, allowing you to connect

the Dragon up to most of the best printers around, with the serial interface adding a few more, notably micro manufacturers' 'own brand' printers.

## Basic

The Microsoft Basic chosen by Dragon has attracted a generally favourable response as being one of the better Basic dialects around, both logical and easy to learn, while for speed of response tests show it to be roughly on a par with its obvious rival, the Commodore 64. As well as being reasonably powerful when it comes to graphics commands, it is also fairly close to Basics on one or two other machines, particularly the Tandy Colour Computer.

## In use

The machine received for test couldn't be tuned in properly for sound, the volume of the TV needing to be turned up so high that the buzzing from the set drowned the sound being made.

There is one voice channel covering a range of five octaves, with two Basic sound commands: SOUND and PLAY. SOUND needs to be followed by two numbers representing pitch and duration, both being in the range of 1 to 255, with a pitch setting of 89 producing middle C. The actual noise produced is an organ-like note, and these can be arranged into tunes using the PLAY command.

There are four more useful sound commands, AUDIO ON and AUDIO OFF, which control the output of the cassette recorder to the TV speaker, and MOTOR ON and MOTOR OFF, governing the cassette motor.

In terms of graphics, the maximum resolution is a comparatively meagre 256 x 192, much less than the Commodore 64, Electron or Atari, but commercial software shows that the Dragon is quite capable of emulating arcade-standard graphics.

Though the Dragon boasts eight colours there's the usual proviso which applies to most machines: not all colours are available at the same time in high resolution. In the Dragon there's a kind of sliding scale between the detail available and the colours to go with it. There are five PMODE settings to choose from (there are in fact others not covered by the manual), and at the maximum 256 x 192 resolution, PMODE4, you can only use black and green or black and buff.

Two extremely useful and versatile commands have proved to be GET and PUT. With GET you can take a large or small chunk of the screen and store it in an array, and PUT allows you to retrieve and place it anywhere on the screen.

## Software

A recent list of Dragon software contained over 160 items, these being mostly on the games side and even then the list was far from complete. One advantage the Dragon 64 will have, then, is that the software is tried and tested.

One reason for the large amounts of good software available is that Tandy software converts easily, and many games and adventures have been brought over from the US and adapted.

On the more serious side there are also several word processing packages as well as other business-oriented softwares.

## Support

The only fly in the ointment as regards support for the 64 seems to be the uncertain financial state of the microcomputer industry generally, and to what extent Dragon Data is being affected by that. There will undoubtedly be a lot of back-up for the machine from the manufacturers, from the chain stores who stock the Dragon in their range, from the service agents that Dragon Data has been appointing now that initial guarantees on the 32 are running out, and from the software houses and small dealers, many of whom produce only Dragon products.

## Verdict

Viewed in isolation the Dragon 64 is without doubt an impressive micro which can cater for a wide variety of users: the games player, the small business or the person wanting to learn programming. In terms of Dragon Data's own products, too, the 64 could be seen as a good deal, costing only £50 more than the Dragon 32 yet offering twice the memory.

Unfortunately it doesn't offer much more than is new. The Dragon 32 is probably a little too pricey to compete with its rivals and the 64 is competing with the likes of the Commodore 64 for roughly the same price, and the new Electron will be out in force soon.

It's hard, therefore to see the Dragon 64 emulating the early success of its one-year-old predecessor.

### SPECIFICATION

Price	£225
Keyboard	Typewriter-style, 50 keys plus two shifts and space bar
Processor	M6809
RAM	64K
ROM	24K
Text screen	32 x 16
Graphics screen	Several resolutions available, from 128 x 96 to 256 x 192
Storage	Any cassette recorder, several disk drives available
Interfaces	Two joystick ports, cartridge port, serial and parallel interfaces
Language	Microsoft Basic
Distributor	Dragon Data, Kenfig Industrial Estate, Margam, Port Talbot SA13 2PE

Chris Rust continues his word processing program with routines to manipulate text, print it and save it

# Words and actions

Last week we persuaded the Newbrain to give us a number of pages to type on. Now we want to move text about between pages, printer and tape. Once you've got this under control, you should be well on the way to producing your own word processor.

The Newbrain doesn't care what device you have attached to one of its streams. It will print or read data regardless of source or destination. So one routine can handle all text transfer. Routing is set by specifying two variable stream numbers, so (SOURCE) and tg (TARGET). A third stream, pg (PAGE) specifies the text screen in use, be it TARGET or SOURCE.

The master routine is called PUMP. It controls a number of subroutines to read and print text.

The active ingredients of PUMP are the commands: LINPUT#so (read string from device on stream No so); ?#tg (print string to stream No tg) and control code 5 (send line at cursor) which makes a string available to LINPUT. If you go back to the setting-up listing you will find that this code has been given the variable name rd (READ).

## Trapstring

Use the set-up listing and appendix 3 of the Newbrain manual to unravel the variable names used in the PUT commands. Once mastered, the use of these mnemonic forms makes the program much easier to read.

The routine which elevates PUMP from mindless slave to intelligent servant is TRAPSTRING. TRAPSTRING allows you to define flag strings or characters which, inserted in a line of text, will modify the behaviour of PUMP by setting the routing flag m3.

This basic version of the program has three simple TRAPSTRING functions: "endend" marks the end of the text and halts execution of PUMP.

"endendend" marks the end of a tape file and stops PUMP from trying to read past the end of file. It is needed when LOADING text prepared on a differently configured version of PAGE EDITOR.

"remrem" allows insertion of remarks on the screen display. A line including "remrem" will SAVE but not PRINT.

If you want to define your own functions, the flag should be a word or character which will not occur in normal text. For your own use single graphics characters are more compact. I use the cumbersome flag words to help casual or first-time users.

You may notice that PUMP ignores the bottom line of the PAGE. Unfortunately, LINPUT always forces a line feed so it will not read the bottom line without losing the

top one. If you are worried about this you can always write your own version of LINPUT along the lines of the READ NUMBER routine described later.

## Stream numbers

Three stream numbers are constants, these are:

KEYBOARD stream ky = 105  
 PRINTER stream pr = 108  
 TAPE stream tp = 101

Three variable names are used by the text handling routines:  
 TARGET stream tg  
 SOURCE stream so  
 PAGE stream pg  
 TARGET and SOURCE are the destina-

tion and origin of text being transferred. PAGE is the screen on which the cursor position is set and monitored.

These stream number variables are set at the start of each operation and control a number of multi-purpose routines.

Next week we will look at routines which use PUMP to route text. To get going in the meantime you can output a page to a printer as follows:

tg = pr: pg = 1: so = 1: GOSUB 22000 where 1 is the page number.

The first part of this article appeared in PCN issue 38. Back issues of PCN are available from the PCN Back Issue Service, 53-55 Frith Street, London W1A 2HC. The series will be concluded next week.

## Text handling routines

<b>PUMP</b> Place cursor on top text line of PAGE Check pen position with PEN Read line of text from SOURCE with READ Check line for special functions with TRAPSTRING Print text to TARGET or execute special function	21999 REM PLUP# 22000 yy=3:xx=1:GOSUB22600 22010 GOSUB22500:GOSUB22200:GOSUB22300 22020 ONM3GOSUB22400,23000,23100,23200,2 3300:IFYy= 1 THEN RET 22030 GOTO22010
<b>READ TITLE</b> Place cursor at top left of PAGE Read page title pg*(pg)	22088 REM READ TITLE 22100 PUTpg,hm,rd:LINPUTpg,pg*(pg):RET
<b>READ LINE</b> If SOURCE is a screen then PUT control code rd (5:send line) to source Read PUMPSTRING pm# from SOURCE	22199 REM READ LINE 22200 IFso<=sTHENPUT#so,rd 22210 LINPUT#so,pm#:RET
<b>TRAPSTRING</b> Check PUMPSTRING for special function indicator tp*(t) If indicator present set flag m3 to special function number (same as tp*(t)) array subscript	22299 REM TRAP STRING 22300 m3=1:FORa=1TOTt:IFINSTR(pm#,tr*(a))>0THENm3=a+1:at=t 22310 NEXTa:RET
<b>WRITE</b> Print PUMPSTRING to TARGET	22399 REM WRITE 22400 ?#tg,pm#:RET
<b>PEN</b> PUT control code yx (21: send cursor position) to PAGE GET cursor position as character No xx on line yy	22499 REM PEN 22500 PUT#pg,yx:GET#pg,xx,yy:RET
<b>PLACE</b> PUT control code xy (22: place cursor) to PAGE Which will place cursor at character No xx on line yy	22599 REM PLACE 22600 PUT#pg,xy,xx,yy:RET
<b>READ CHARACTER</b> PUT control code rc (20: send cursor character) to SOURCE GET ASC No of character at cursor position as ch RET	22699 REM READ CHARACTER 22700 PUT#so,rc:GETch:RET
<b>DON'T PRINT</b> If TARGET is not a printer then WRITE PUMPSTRING to TARGET Otherwise ignore this PUMPSTRING	22999 REM DON'T PRINT 23000 IFt>prTHENGOSUB22400 23010 RET
<b>END OF TAPEFILE</b> Set line number yy to appear to PUMP as if bottom of PAGE has been reached This will prevent PUMP from attempting to read past the end of the tape file.	23099 REM END OF TAPEFILE 23100 yy= 1 :RET
<b>END OF TEXT</b> If TARGET is not a printer then WRITE PUMPSTRING (which contains the flag	23199 REM END OF TEXT 23200 IFt>prTHENGOSUB22400 23210 yy= 1 :RET

# The HX-20. For business on the move.



In today's fast moving business world, your information has to move with you. Over the past few years there has been an increasing demand for a totally portable computer with the ability to meet so many challenges.

Epson, with over 20 years experience in designing and manufacturing high quality printers, have produced the HX-20, a precision machine with its own rechargeable power supply that can be used for just about any task within today's discerning business; from data capture to word processing, from card indexing to sales order entry. Communicating with other machines is no problem and the HX-20 is easily coupled to one of our fine printers. You can even link in another computer system by using an acoustic coupler.

Don't be fooled by its size, the HX-20 has all the software back-up you'd expect from a much larger machine and incorporates many "bigger computer" features - 16k RAM expandable to 32k with serial interfaces, a full size typewriter keyboard, its own built in LCD

screen and a dot matrix microprinter. A microcassette facility is available as an optional extra.

A complete computer that will either stand on its own or could be the obvious extension to your existing system.

More and more people are finding out just how big the small compact HX-20 is. Why don't you find out for yourself - you owe it to your business.

**EPSON**  
**Extraordinary product.**  
**Exceptional quality.**

Epson (UK) Limited, Freeport,  
Wembley, Middlesex HA9 6BR.  
Sales Enquiries: Freefone EPSON.  
General Enquiries: 01-902 8892.  
Telex: 8814169.



- Please send me full details of the HX-20.
- Please ask my Epson dealer to contact me.

Name \_\_\_\_\_

Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

Tel: \_\_\_\_\_

PCN 1+2\_20

**YOU CAN'T BEAT THORN EMI'S NEW S**



# PECTRUM GAMES.



Our new Spectrum games have two skill levels. Difficult and impossible.

Unless you happen to be a genius, it could take forever to master them all.

So for around £6.95, you will really be getting your money's worth.

"Volcanic Planet" (on 16k) is a real scorcher. Plant a bomb on the volcanic plug in the evil Zeron underground Metropolis, and escape before red hot lava floods the city. Watch out for the Zeron's bone crushing slaves, they want to tear you apart. If your oxygen or power supplies run out, you're dead.

In "Road Racer" (on 16k) you'll find out if you're skilful enough to drive round a terrifying track at death defying speeds, and reach the black and white flag in one piece.

"Gold Rush" (on 16k) is no walk-over either. Underneath the eerie planet of Oron is a vast cavern full of gold and demons.

You have to get the gold and the deadly demons have to get you.

In "Blockade Runner" (on 16k) the earth is under siege and you must get life-saving supplies through.

When you've avoided the dense meteor shower, the moving laser barriers, the space mines, the tractor beam units and the alien warships, you'll be good enough to try the other 5 skill levels.

"River Rescue" (on 48k) is a runaway success on other formats. It's now available on Spectrum. You'll have to navigate the wildest and most dangerous river on earth in a powerful patrol-boat. But keep a sharp look-out for the killer crocodiles. They haven't eaten all day.

Win, lose or draw, you can't beat THORN EMI's Spectrum games. Now available from WH Smith and other leading software stockists.



**Leaders in home entertainment.**





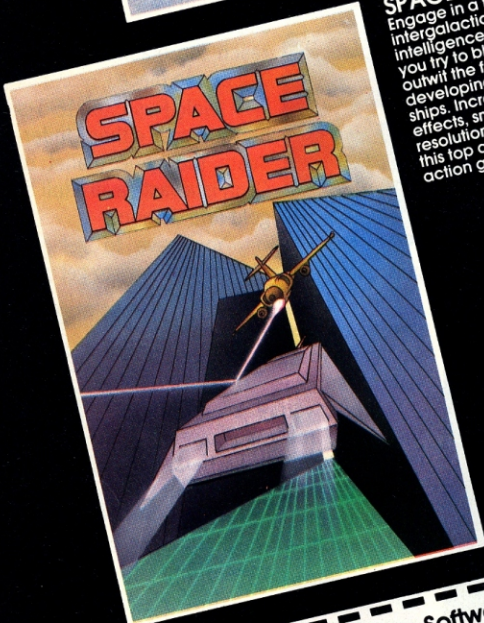
**SKI RUN**  
 All the excitement and skill of the ski slopes with downhill, slalom and giant slalom. Put yourself to the test and record the fastest time! Nine levels of difficulty. High quality graphics and brilliant sound effects!

# Boom Software

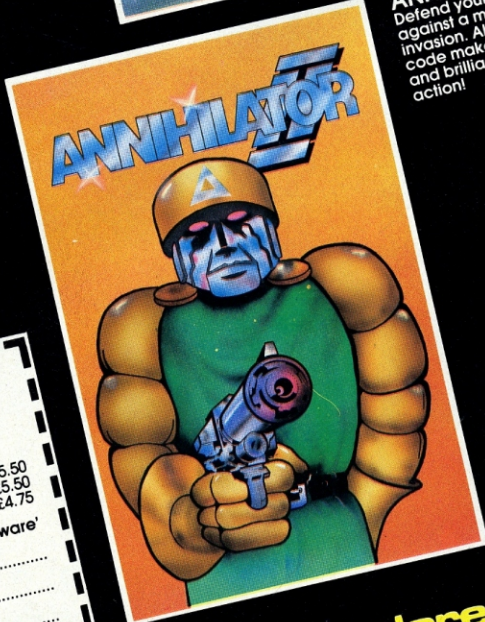
It will blow your mind



**LOGGER MANIA**  
 Can you dodge the logs, traffic, jump your logs, slip the bears, and get home before sunset? A game with a difference written in all machine code with high quality graphics.



**SPACE RAIDER**  
 Engage in a furious intergalactic intelligence battle. As you try to blast and outwit the fast developing alien star ships. Incredible sound effects, smooth high resolution graphics in this top quality arcade action game.



**ANNIHILATOR II**  
 Defend your planet against a mighty alien invasion. All machine code makes for fast and brilliant arcade action!


Post this coupon now to Boom Software  
 2-4 Chichester Rents, Chancery Lane,  
 London WC2A 1EG

Please send me the following:		Annihilator II	£5.50
Ski Run	£5.50	Space Raider	£5.50
Logger Mania	£5.50	Trek (VIC 20)	£4.75
Annihilator II (VIC 20)	£4.75		

Total cheque/PO enclosed £ ..... payable to 'Boom Software'

Name .....

Address .....

**commodore**   
 and VIC 20

# Killer caverns

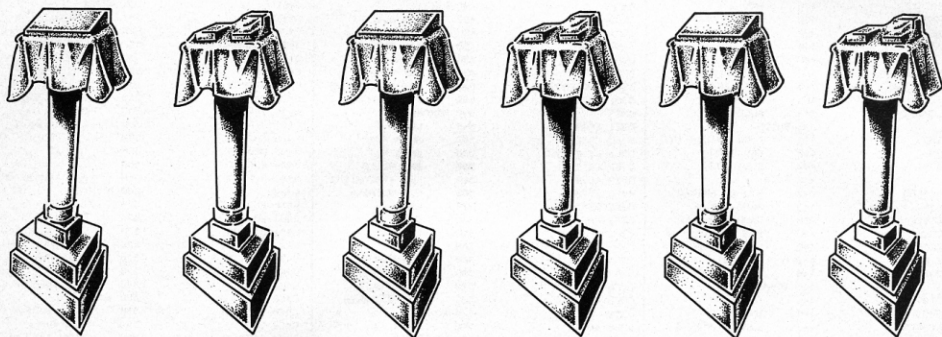
In last week's PCN we began the listing of SS Ram, Darren Eteo's Scramble-type game for the Dragon. If your fingers haven't worn out, this week's instalment

might change that for you. But persevere, because the game's well worth having, and will give you hours of amusement once you've finished.

Remember that you have to be particularly accurate when you're typing in machine code, because it's very difficult to debug it once you've made the mistakes. If you don't have the first part of the article, which appeared in Issue 38, you can get back issues from the PCN Back Issues Service, 53-55 Frith Street, London W1A.

0313 3A	430	ABX	0300	LDX A,Y	430	BNEXT2	048F	500	WRTS1
0314 7A6FCF	430	DEC @PLAYER-1	0300 AE66	LDX A,Y	430	LEAK -1,X	0491 866C	500	LD #12
0317 26EC	430	BNE @LOOP	0301 581F	LDX A,Y	430	LEAK -1,X	0493 B76C	500	STA @PLAYER-1
0319 3B	430	RIS	0304 AF60	LDX A,Y	430	STX A,Y	0494 C0AAA	500	LDD @#AAAA
031A	440	@CHECK	0300 8082	430	SUBA #2	0487	500	BANKED	
031A F0FC0	440	LDD @PLAYER-3	0308 2E7E	430	BDT @NEXT2	0497 ED4A	500	STD ,Y	
031D 188074D	440	CPD ##000+320	030A 18E7030	500	LDT #@TABLE+2	0497 3182D	500	LEAY 32,Y	
0321 2403	440	BHS #H10H	030E 80704E	500	LDA @TABLE	049C 7A6FCF	500	DEC @PLAYER-1	
0322 C30821	440	ADD @33	0311	500	BRPEAT	049F 20FA	500	BNE @BANKED	
0326	440	@H10H	0311 EB66	500	LDB A,Y	04A1 31A9FEB	500	LEAY -304,Y	
0326 1881D3F	440	CPD ##10FF-192	0313 C41F	500	ANDB #31	04A5 BE7012	500	LDX #@PICTURE	
032A 2303	440	BLS @LOW	0315 C11F	500	CPM# #31	C4A5 3003	500	LDA #3	
032C 930821	440	SUBD #33	0315 2015	500	BNE @OKED	04A8 A76FCF	500	LDD @PLAYER-1	
032F	440	@LOW	0319 BE704F	500	LDX #@TABLE+1	04A8 BE7012	500	LDD #@PICTURE	
032F F0FC0	440	STD @PLAYER-3	031C F204E	500	LDB @TABLE	04B0	500	@PUTI	
0332 C41F	440	ANDB #31	031F RE85	500	LDB A,X	04B0 ED01	570	LDD ,X++	
0334 C11C	440	CPM# #28	031F 4A	500	DECA	04B2 ED04	570	STD ,Y	
0336 2308	440	BLS @OKAY	032F AF60	500	STX A,Y	04B7 31A920	570	LEAY 32,Y	
0338 F0FC0	440	LDD @PLAYER-3	033F 4C	500	INCA	04C7 7A6FCF	570	DEC @PLAYER-1	
0338 830801	440	SUBD #1	033F C082	500	SUBB #2	04B8 20FA	570	BNE @PUTI	
033E 200A	440	BRA @STORE	033F F204E	500	STB @TABLE	04C0 3512	570	PULS A,X	
0340	440	@OKAY	033F 5A	500	LSRB	04BE 20A1	570	BRA @RETURN	
0340 C102	440	CPM# #2	033F B720BA	500	STB @TABLE1	04C0	500	@AHAT	
0342 2403	440	BHS @RTO	03FE	500	@OKED	04C0 8155	500	CPM# #55	
0344 F0FC0	440	LDD @PLAYER-3	03FE	500	SUBA #2	04C2 2706	500	@B @WALL	
0347 C30801	440	ADD #1	0400 8181	500	CPM# #1	04C4 1155	500	CPM# #55	
034A	440	@STORE	0400 220D	500	BNE @REPEAT	04C8 2702	500	DEC @WALL	
034A F0FC0	440	STD @PLAYER-3	0404 33	500	RIS	04C8 20C5	500	BRA @RTS1	
034D	440	@RTO	0405	510	@PUT	04CA	530	@WALL	
034D 33	440	RIS	0405 10BE6FCA	510	LDY @PLAYER-6	04CA 890C	530	LDA #12	
034E	450	@XJOY	0409 A03F	510	LDA -1,Y	04CC A76FCF	530	STA @PLAYER-10	
034E BEFC0	450	LDX @PLAYER-3	040B AB3E	510	ADDA -2,Y	04CC C0AAA	530	LDA #AAAA	
0351 850159	450	LDA #2	040B C828	510	LDD #32	04D2 ED04	530	@CLS1	
0354 9110	450	CPM# #10	040B C828	510	LDD #32	04D2 ED04	530	STD ,Y	
0356 2407	450	BNS @GREATER1	0410 C305E	510	ADDA #5FF-123	04D4 31A920	530	LEAY 32,Y	
0358 1E01	450	EXG D,X	0411 F0FC0	510	STD @PLAYER-6	04D7 7A6FCF	530	DEC @PLAYER-10	
035A 830802	450	SUBD #36	0410 1F82	510	TFR D,Y	04DA 20FA	530	BNE @CLS1	
03D 2000	450	BRA @NONE1	0410 BE704E	520	LDA @TABLE	04DC 10E704F	530	LDT #@TABLE1	
035F	450	@GREATER1	0418 8132	520	CPM# #30	04E0 BE704E	530	LDB @TABLE	
035F 9138	450	CPM# #48	0410 2308	520	BLS @OKAY	04E3 3146	530	LEAY A,Y	
0361 2307	450	BLS @SAFE1	041F 8038	520	LDA #48	04E3 10AE84	530	LDD ,Y	
0363 1E01	450	EXG D,X	0421 B7704E	520	STA @TABLE	04E8 10AF84	530	STY ,X	
0365 C3080A	450	ADD #36	0424 44	520	LSRA	04EB BE704E	530	LDB @TABLE	
0368 2002	450	BRA @NONE1	0425 B770BA	520	STA @TABLE1	04E4 8082	530	SUBA #2	
036A	450	@NONE1	0428 33	520	RIS	04F0 B7704E	530	STA @TABLE	
036A 1E01	450	EXG D,X	0428 33	520	RIS	04F3 44	530	LSRA	
036C	450	@NONE1	0429 8902	520	ADDA #2	04F4 B770BA	530	STA @TABLE1	
036C F0FC0	450	STD @PLAYER-3	042B BE704F	520	LDX #@TABLE+1	04F7 3512	530	PULS A,X	
036F 3A	450	RIS	042E 10AF84	520	STY A,X	04F9 10FF65	530	BRA @RETURN	
0370	460	@PUT	0431 B7704E	520	STA @TABLE	04FC	000	@METOR	
0370 10BE6FCA	460	LDY @PLAYER-6	0434 44	520	LSRA	04FC 80A113	000	LDA 275	
037A 8660	460	LDA ,Y++	0435 BE708B	520	LDX #@TABLE+1	04FF 10BE6FCA	000	LDT @PLAYER-6	
037A B76FCF	460	STA @PLAYER-1	0438 C601	520	LDB #1	0503 843F	000	AND #63	
037B 9E0F1F	460	LDA #0000+31	043A E79E	520	STB A,X	0505	000	@PRINTAGIN	
037C C620	460	LDB #32	043C B770BA	520	STA @TABLE1	0505 A73E	000	CPM# -1,Y	
037E 8654	460	LDA #655	043F 8063	520	LDA #3	0509 2303	000	BLS @SURE	
0380	460	@LOOP	0441 B76FCF	520	STA @PLAYER-1	0509 44	000	LSRA	
0380 A784	460	STA ,X	0444 BE7012	520	LDX #@PICTURE	050A 20F3	000	BRA @PRINTAGIN	
0382 3A	460	ABX	0447	520	@NEXT3	050C	000	@SURE	
0387 7A6FCF	460	DEC @PLAYER-1	0447 EC81	520	LDD ,X++	050C C620	000	LDB #32	
0388 2E7E	460	BNE @LOOP	0449 ED4A	520	STD ,Y	050E AB3E	000	ADDA -2,Y	
0388 8660	460	LDA #000	0449 31A920	520	LEAY 32,Y	0510 3D	000	PULS	
038A A784	460	STA ,X	044E 7A6FCF	530	DEC @PLAYER-1	0511 C30E1E	000	AND #661E	
038C 3A	460	ABX	0451 2E74	530	BNE @NEXT3	0514 1F01	000	TFR D,X	
038D A6A0	460	LDA ,Y++	0453 33	530	RIS	0518 8669	000	LDA #3	
038F B76FCF	460	STA @PLAYER-1	0453 33	530	RIS	0518 B76FCF	000	STA @PLAYER-1	
0392 86AA	460	LDA #AAA	0454 80708B	540	@MOVING	0518 10BE7030	000	LDT #@METOR	
0394	460	@LOOP	0457 BE708A	540	LDX #@TABLE+1	051F ED04	000	LDD ,Y++	
0394 A784	460	STA ,X	045A 2081	540	BNE @LOOPA	0521 ED04	000	STD ,X	
0395 3A	460	ABX	045C 33	540	RIS	0523 308820	000	LEAX 32,X	
0397 7A6FCF	460	DEC @PLAYER-1	0450	540	@LOOPA	0526 7A6FCF	000	DEC @PLAYER-1	
039A 2E7E	460	BNE @SLOOP	0450 E680	540	LDB A,X	0528 20F4	000	BNE @LOOPS	
039C 8080	460	LDA #80	045F 2084	540	BNE @IF	0528 33	000	RIS	
039E A784	460	STA ,X	0461	540	@RETURN	052C	000	@IF	
039E 8660	460	ABX	0461 4A	540	DECA	052C 10BE6FCA	010	LDT @PLAYER-6	
03A1 8E55	460	LDA #655	0462 20F3	540	BNE @LOOPA	0530 A63F	010	LDY -1,Y	
03A3	470	STA ,X	0464 33	540	RIS	0532 A63E	010	ADDA -2,Y	
03A3 3A	470	ABX	0465 33	540	@IF	0534 C620	010	LDD #32	
03A6 EC10E8	470	CPM# #10E8	0465 3412	550	PSHS A,X	0538 3D	010	PULS	
03A8 230E	470	BLS @LOOP	0467 8118	550	CPM# #25	0537 C30E1E	010	LDT #@5000+81E	
03A8 10E7C184	470	CPM# #SCREEN+32	0469 2308	550	BLS @OKA	053A 1F01	010	TFR D,X	
03AF 2304	470	BLS @ST	046B 8018	550	LDA #24	053C 10E7024	010	LDT #@DUMP	
03B1 10E70E6	470	LDD #SCREEN+12	046D B770BA	550	STA @TABLE1	0540 8660	010	LDA #6	
03B5	470	@ST	0470 2080	550	LDA #48	0542 B76FCF	010	STA @PLAYER-1	
03B5 10BE6FCA	470	STY @PLAYER-6	0472 B7704E	550	STA @TABLE	0545	010	@DUMPLD	
03B5 33	470	RIS	0475 3512	550	PULS A,X	0545 ED04	010	LDD ,Y++	
03B7	480	@SROLL	0477 33	550	RIS	0547 ED04	010	STD ,X	
03B8 BE272C	480	LDX #0000+300	0478	500	@OKA	0549 308820	010	LEAX 32,X	
03B8	480	@AGAIN	0478 48	500	LSLA	054C 7A6FCF	010	DEC @PLAYER-1	
03B8 A601	480	LDA ,X	0479 BE704F	500	LDX #@TABLE+1	054F 20F4	010	BNE @DUMPLD	
03B8 A780	480	STY ,X++	047C 2080	500	LEAX A,X	0551 33	010	RIS	
03C1 BC1000	480	CPM# #10FF-255	047E 10E954	500	LDB #1	0552	020	@HTS	
03C4 2307	480	BLS @AGAIN	0481 31A9C0	500	LEAY -64,Y	0552 BEFC0	020	LDD @PLAYER-3	
03C8 10E704F	430	LDT #@TABLE+1	0484 10AF84	500	STY ,X	0555 8660	020	LDA #6	
03CA BE704E	430	LDA @TABLE	0487 ED4A	500	LDD ,Y	0557	020	@LOOPA	
03CD 2081	430	BNE @NEXT2	0489 10E3AAA	500	CPM# #AAAA	0557 E684	020	LDB ,X	
03CF 33	430	RIS	048D 2031	500	BNE @AHAT	0559 308820	020	LEAX 32,X	

# Glittering prizes



**PERSONAL  
COMPUTER**  
THE COMPLETE NEWS COMPUTING WEEKLY

  
**THE SUNDAY TIMES**

Vote for the best in microcomputing and you could win a micro and software. As part of the 1984 British Microcomputer Awards, *PCN* is offering all readers the chance to vote for the products that you think are outstanding.

BMA 1984 will be the most important event in the microcomputing calendar. It is organised by The Sunday Times and VNU, publishers of *Personal Computer News*, and *PCN* is hosting two of the awards — Peripheral of the Year, and the Home Software Award.

But because *PCN* readers are involved in all aspects of microcomputing, *PCN* is going to nominate for all ten categories. So if you want to put your favourite product in the limelight, let us

know about it. A panel of *PCN* judges will consider the nominations and forward a selection to a central judging panel of experts in the micro field. They will have the task of deciding the top three nominations in each category and of choosing the winners.

On these pages you'll find a complete list of categories and the criteria on which the products will be judged. Send us your nominations on the form opposite — remembering to include the reasons for your choice. The awards will be presented at a ceremony in London in March — and you could be a winner too.

All correctly completed nomination forms will enter a free draw with two Oric micros and software as the prizes.

## Categories

- 1 Business Micro** This award will be presented to the maker of the machine which, in the opinion of the judges, offers the best value for money. Essential requirements are that the machine has a recommended price of less than £8,000 including operating system, CPU, keyboard, disks and monitor. It must be disk-based, come with at least a 90-day guarantee, and have a wide range of business software.
- 2 Business Software** The business software award will be presented to the software house giving best value for money and optimum efficiency for general business use. The software should be disk-based with a recommended price of less than £1,500 per package or module.
- 3 Home Microcomputer** This award will go to the maker of the machine giving the user ease of programming and displaying the best use of colour, sound and speed. Value for money is again important and the micro must not cost more than £500.
- 4 Home Software** The software house winning this award will have published a product which does the most to aid efficiency in the home. The judges will look for flexibility, value and user friendliness. Top price is £50.
- 5 Creative Software** The award for creative software will be presented to the inventor of a software concept which the judges rule has made the greatest use of and contribution to, microcomputing. The award will also recognise the manufacturer

which first launched the concept as a marketable product.

- 6 Game of the Year** Plenty to choose from here. Which game offers the greatest lasting appeal, playability and use of the machine? As always, value for money counts as well.
- 7 Consumer Award** The consumer award will be presented to the company or individual judged to have done the most to advance consumer understanding and efficient use of microcomputers. The judges will look for an individual or group who have made an outstanding contribution to microcomputing to the benefit of users.
- 8 Peripheral of the Year** This award will go to the most innovative peripheral which enhances the features and potential of a microcomputer. Good value is a key consideration.
- 9 Software of the Year** The recipient of this award will be the software house judged to have published a product providing the simplest way of effectively solving a problem. The software will be judged as an aid so the judges will examine the way it carries out the task the user wants to complete. User friendliness, flexibility and value are of prime importance.
- 10 Microcomputer of the Year** The micro will be the one which, in the opinion of the judges, is the best to have appeared on the market in the year to November 1. User friendliness, flexibility, software support, expandability, good design and price will be taken into consideration. Recommended price must be less than £8,000 and new versions of older models are eligible.

**RULES**

In categories 1-5 (business micro, business software, home micro, home software and creative software) manufacturers may nominate their own products which need not have been made in Britain but must have been available for purchase from retail outlets in the UK by November 1, 1983.

In categories 6, 8, 9, 10 (game, peripheral, software and micro of the year) manufacturers may nominate their own product which need not have been made in Britain but must have been available for purchase from retail outlets in the UK between November 1, 1982, and November 1, 1983.

Employees of VNU Business Publications BV, the sponsors or any individuals associated with the British Microcomputing Awards are ineligible to place a nomination with the exception of the six VNU title judging panels which may each nominate up to six entries.

The decision of the judges is final and no correspondence will be entered into. All nominations must be received by noon on January 5, 1984.



Enter your nomination for each category and explain, in not more than 30 words, the reason for your choice, using another sheet of paper if necessary. You should consider the guidelines given in each category on the facing page.

**Category 1: Business Micro** .....

Reasons for choice .....

**Category 2: Business Software** .....

Reasons for choice .....

**Category 3: Home Micro** .....

Reasons for choice .....

**Category 4: Home Software** .....

Reasons for choice .....

**Category 5: Creative Software** .....

Reasons for choice .....

**Category 6: Game of the Year** .....

Reasons for choice .....

**Category 7: Consumer Award** .....

Reasons for choice .....

**Category 8: Peripheral of the Year** .....

Reasons for choice .....

**Category 9: Software of the Year** .....

Reasons for choice .....

**Category 10: Micro of the Year** .....

Reasons for choice .....

Your name .....

Address .....

Send your nominations (before noon, January 5, 1984) to:  
VNU Business Publications BV,  
British Microcomputing Awards,  
Freeport 38, London W1E 6QZ.



# BIG JOHN'S CROSSWORD

## 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 two 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.

## MICRO ANSWERS

70-71 WILTON ROAD

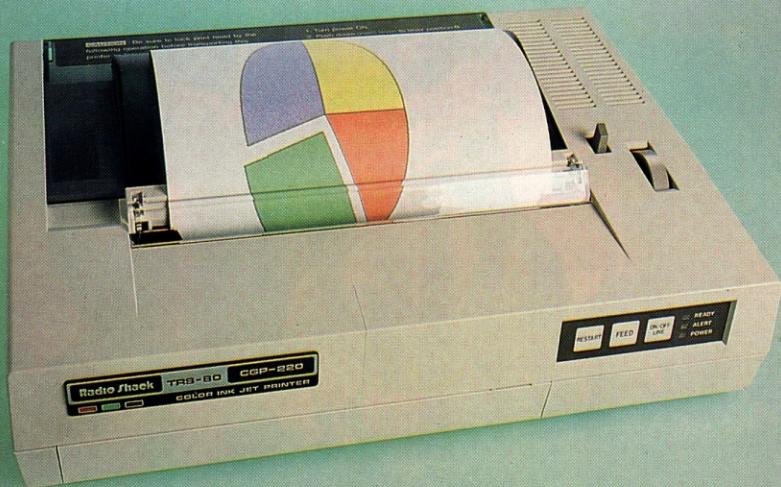
LONDON SW1V 1DE

01-630 5995

MONDAY-FRIDAY 10AM-8.30PM

SATURDAY 10AM-7PM

Getting bored with the old black-and-white? Bill Davies discovers a colourful alternative.



# Technicolour Tandy

A price breakthrough by Tandy is an event in itself, since Tandy watchers have always been aware that the Fort Worth-based computer/electronics company has never attempted to break into the cut-throat low cost market.

At £600 the new Tandy CGP-220 seven colour Ink Jet printer is very competitively priced.

## First impressions

The printer comes in a substantially protected box with polystyrene and polythene covering. Opening the box the

first surprise is the new colour scheme which has been adopted by Tandy for all the new product range. Instead of the traditional black and silver, the CGP-220 is housed in a cream plastic case.

Powering it up for use provided no problems either, since Tandy now ensures that all products are fitted with a three-pin 13amp plug to conform with British standards. Other manufacturers please note.

## Documentation

Here I'm afraid Tandy let me down. In my

experience Tandy computer manuals are generally some of the best on the market, but the manual with the CGP-220 is somewhat lacking to say the least. It's laid out and printed in the normal Tandy printer manual layout, but bearing in mind the revolutionary design/concept of the printer I was disappointed to find there was little in it that actually describes exactly what the printer is and does.

It took considerable time and effort to discover the method of printing. Briefly the printer is a form of spark jet printer. The ink is produced in minute quantities and transferred to the paper by means of a fast high ignition spark, each dot of the matrix requiring a separate function.

To understand how the colours are reproduced one has to step back into basic physics.

In television and monitors, colours are produced by mixing light rays. In this system — commonly known as the RGB method — red, green and blue light rays are projected on a surface and mixing these three colours generates all others.

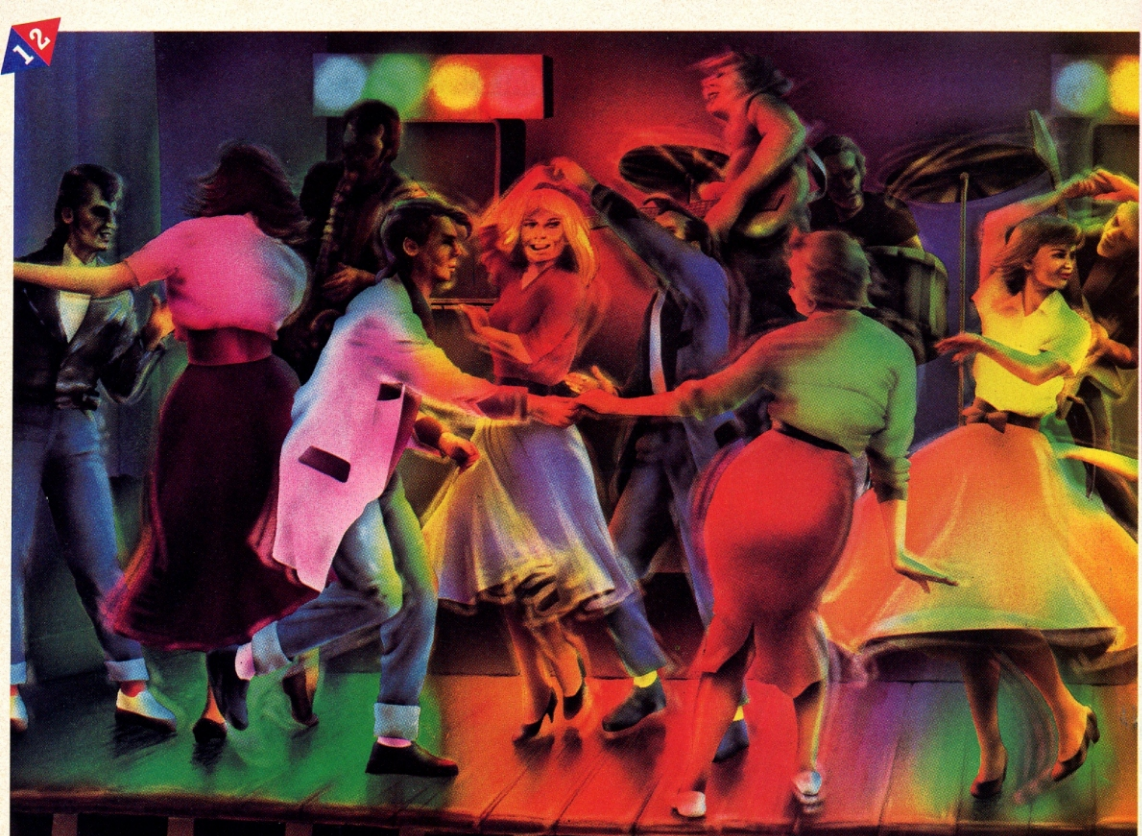
A second method is based on the mixture of pigments such as ink or paint. In

Normally one would send two sets of codes to the printer - "27", known as an ESCAPE code followed by two other digits for the actual function. The CGP-220, being a colour printer obviously requires slightly more information, so there fore one has to send three sets of digits to it when changing colours.

Each colour has been allocated its own number between 48 and 55:

BLACK	48	YELLOW	51	VIOLET	54
RED	49	BLUE	52	WHITE	55
GREEN	50	MAGENTA	53		

so to change the text from black to red for example you would have to send the code 27 (ESC), 84 (telling it you are changing colour), 49 (red). These codes can either be inserted into the text if you are using a word processing program or into the basic program if you are writing a program which requires colour changes.



# Once you've got to grips with the Rock 'n' Roll game, flip-over and get your teeth into Dracula.

New K-tel Doublesiders are great fun and great value which ever way round you look at them.

For only £6.95 you don't just get one top quality computer game, you get two.

When you've finished playing one side simply flip it over (just like a music cassette) and move off on a second totally different, equally gripping game.

Take your choice. Already there are five Doublesiders to choose



**1** It's Only Rock 'n' Roll Can you become a superstar? A Rock 'n' Roll idol...Or are you just another has been?

You've got a lot of energy, a bit of money and a great future. But can you stay the course, stand the heartbreaking disappointments, fraud, scandal, even arrest? Can you capture the hearts and wallets of the public and become a Rock 'n' Roll idol?

**2** Tomb Of Dracula Darkness is falling...The vampires are hungry...You can't go back...Your only chance of survival lies ahead.

The walls are cold and clammy. With each step you remember the horrors ahead; ghouls, zombies and pits of choking slime. In your hand you have but seven silver stakes with which to defend yourself...Dare you face the ultimate evil...and win.

from — three suitable for the ZX Spectrum and two for the Commodore Vic 20 — and there are more to come.

So hurry to the shops now and see for yourself how K-tel Doublesiders really do give you twice the fun with two on one.

## K-TEL DOUBLESIDERS

Only £6.95 EACH



Twice the fun with two on one.

# 2 NEW '60 PROGRAMS'

## FOR THE VIC 20 AND COMMODORE 64

**NOW!** new books join the best-selling *60 Programs* series launched by Pan and Personal Computer News in October.

**Great Value.** Each book is a massive software library – for the price of a single cassette. Explosive games, dynamic graphics and invaluable utilities – all packed into over 300 pages of large format paperback!

**Best-selling software writers** have pooled their talents to bury programming clichés and exploit your micro's potential to the full. The specially commissioned programs take BASIC to the limits and beyond.

**What will you get?** Arcade action games for those of you whose fingers



genre, quizzes, tests of your mental agility, party games, plus a leavening of utility and educational programs.

**Where can you get them?**

From all good bookshops. Or fill in the coupon below and return it to:  
Pan Books Ltd,  
Freeport PO Box 109,  
14-26 Baker Street,  
High Wycombe,  
Bucks HP11 2TD

**For immediate 24 hour service**  
phone 01-200 0200. Use your credit card and take advantage of

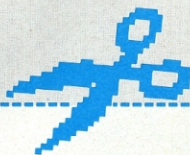
**10 DAY MONEY BACK GUARANTEE**

naturally twitch around the cursor control keys. Tactical games for the more cerebrally minded. Genuinely novel games as well as classics of the



GET MORE OUT OF YOUR MICRO WITH...

## 60 PROGRAMS



**CUSTOMER CHECK LIST**

- | No. of books             | Title                        | Amount |
|--------------------------|------------------------------|--------|
| <input type="checkbox"/> | BBC Micro @ £4.95            | _____  |
| <input type="checkbox"/> | Sinclair ZX Spectrum @ £4.95 | _____  |
| <input type="checkbox"/> | Oric 1 @ £4.95               | _____  |
| <input type="checkbox"/> | Dragon 32 @ £4.95            | _____  |
| <input type="checkbox"/> | Vic 20 @ £5.95               | _____  |
| <input type="checkbox"/> | Commodore 64 @ £5.95         | _____  |

Postage and packing contribution: Please allow 35p for the first book ordered plus 15p for each additional book to a maximum charge of £1.25.

**10 DAY MONEY BACK GUARANTEE**

Total: \_\_\_\_\_

**POST NOW, NO STAMP NEEDED** To: Pan Books Ltd, FREEPOST, PO Box 109, 14-26 Baker Street, High Wycombe, Bucks HP11 2TD. YES, please send me the **60 PROGRAMS** paperbacks. I understand I may return them within 10 days if not fully satisfied and receive **A FULL REFUND.**

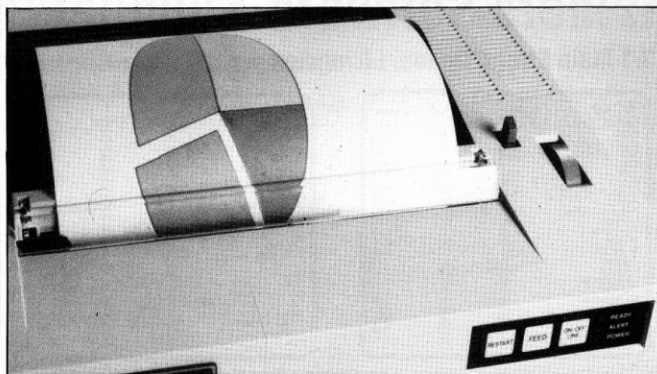
NAME (Mr/Mrs/Miss/Ms) \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 \_\_\_\_\_  
 POSTCODE \_\_\_\_\_  
 I enclose my cheque/postal order for £..... payable to Pan Books Ltd or debit my Access/Barclaycard/Visa/Trustcard Account no: \_\_\_\_\_  
 Signature \_\_\_\_\_



Allow up to 15 days for delivery. This offer available within UK only.  
 Pan Books Ltd, Registered in England. Registration No. 389591.



PCN



The CGP-220 will print either standard or elongated characters, these are selected using the control codes, but the printer defaults to standard text character code on power up.

Although the printer comes with the standard 'American' character set, the European character set can be selected by programming the appropriate control codes. To find the £ sign for example means that you have to instruct the printer to find ASCII character "163".

passes over the paper to produce the text.

The computer communicates with the printer with a series of control codes. These codes are used to tell the printer exactly what you want it to do. As on most printers the information is sent as numbers between 0 and 255. A control code would be used to change the print size, or a linefeed or to change the colour of the text.

Normally you would send two sets of codes to the printer — 271, known as an ESCape code, followed by two other digits for the actual function. The CGP-220, being a colour printer, obviously requires slightly more information, so you have to send three sets of digits to it when changing colours.

Each colour has been allocated its own number between 48 and 55: black, red, green, yellow, blue, magenta, violet, white.

So to change the text from black to red, for example, you would have to send the code 27 (ESC), 84 (telling it you are changing colour), 49 (red). These codes can either be inserted into the text if you are using a word processing program or into the Basic program if you are writing a program which requires colour changes.

The CGP-220 will print either standard or elongated characters. These are selected using control codes, but the printer defaults to standard text character code on power up.

Although the printer comes with an American character set, the European character set can be selected by programming the appropriate control codes.

Tandy say the printer's biggest selling point will be its ability to provide colour printouts of graphics, bar charts, graph tables etc. I have no doubt that this is true — the machine is certainly capable of producing a variety of colours. But the manual is extraordinarily vague about the actual mechanics of it all. As you would expect, many of the instructions in the manual are aimed at the Tandy computer owner, and all the demonstration programs use the LPRINT instruction.

The print speed is very slow — claimed to be about 37 cps. This does mean that anyone wanting to use it to print text will have to wait a long time, and because there is no built-in buffer it will tie up the computer for really long periods while it is performing its tasks.

### Verdict

This printer provides colour printing at a price that many people who may have shied away in the past could well afford. Like all Tandy printers it is fully compatible with most micros on the market, and I am sure will be of great use to educational establishments and businesses who want graphics work carried out, but feel that the very high cost of the other colour printers on the market is not worth it. But for the home user it is an expensive luxury, unless you are really keen on producing colourful graphics dumps.

There is also competition in the form of the Seikosha GP-700A which offers seven-colour print at a lower price — under £500.

35 this method, the colours yellow, magenta and cyan are mixed in different combinations to produce other colours.

The CGP-220 uses the second method. The built-in software in the printer converts what the monitor sees as RGB into mixtures of the coloured inks available. It does mean that you probably don't have the full range of colours available that you would expect to find on your television set, but it should be a close approximation.

### Getting started

Familiarising yourself with the machine is the first thing to do. Although the ink packs should already be inserted when you get the machine, they don't really cause much of a problem. You should have two packs both the size of a packet of cigarettes. One contains black ink and the other has yellow, magenta and cyan. They are contained in rigid containers and the ink is sealed in airtight bags.

With the power off they are inserted into a small drawer located along the bottom front of the machine. After they are installed, you are warned not to take them out until they are exhausted. Being the inquisitive type, I did, with disastrous results — ink all over the place. To protect the ink supply during transportation and lengthy periods of inactivity there is a lever on the top of the printer which can be positioned to seal off the supply.

The printer takes either roll paper or single sheets — there is no tractor feed. Again inserting paper is no problem.

The controls for the printer are located on the front. They are touch sensitive for 'restart', 'feed' and 'on/off line'. Alongside are three LEDs — ready, alert and power.

When you turn the power on the red 'alert' light blinks for about ten seconds as the ink supply is made ready. The red alert light also comes on when you run out of paper or when the printer goes off-line for

any reason. Once the situation has been rectified, pressing the restart key should set the printer off again.

On the top left of the printer alongside the paper platten is a green lever which provides three functions. Locking the carriage for transit, capping and uncapping the ink nozzle, and a pump to provide a better ink supply.

After loading the paper it is advisable to check the ink supply and ensure that all colours are working. Pressing the FEED button immediately after unlocking the carriage should produce a horizontal bar. There is also a self test function which prints out all the alphanumeric symbols. Each line is printed in a different colour.

The next step is to connect it up to the

## 'The printer is exceptionally quiet . . . but slow'

computer. The CGP-220 is provided with serial and parallel connections and there is a baud selection switch for 600 or 2400 baud rate for the serial interface. Since I already use a Tandy printer I had the necessary cable to hand, but it is necessary to watch the pin connections on the parallel cable, since the BBC and the Tandy system differ on the location of two pins. Numbers 10 and 11 have to be changed round, otherwise busy and acknowledge get mixed up.

### In use

The first thing you notice is that the printer is exceptionally quiet, although the print head appears to do an awful lot of work. Each row of dots is printed in a separate operation, which means that for one line of type the print head has to make seven



# The Entertainers Software Suppliers

1/1 Main Street, Deans, Livingston

TEL: (0506) 410004

## ZX SPECTRUM

Game	Ram	Author	Price
Molar Maul	16:48	IM	5.50
Longfrog	16	CD	5.95
3D Painter	16	CD	5.95
Scooby Doo	16	CD	5.95
Priest of Death	16:48	AR	6.95
Ship of Doom	16:48	AR	6.95
Invaders	16:48	AR	6.95
Micro Chess	16:48	AR	6.95
Cosmic Delays	48	AR	4.95
Chess Tutor	16:48	AR	9.45
Astroblast	16:48	OU	7.95
The Chess Player	48	OU	6.95
Time Gate	48	OU	8.95
Space Intruder	16:48	OU	4.95
Mined-Out	48	OU	7.95
Meteor Storm	16	OU	4.95
3D Strategy	16:48	OU	6.95
Velours Lar	48	OU	6.95
Smugglers Cove	48	OU	6.95
Schizoids	16:48	IM	5.50
Ah Diddums	16:48	IM	5.50
Cap	48	IM	5.50
Jumping Jack	16:48	IM	5.50
Zoom	16:48	IM	5.50
Arcadia	16:48	IM	5.50
Invasion Force	16:48	AR	4.95
Centis-Bug	16:48	AR	4.95
Invaders	16:48	DK	4.95
Dictator	48	DK	4.95
3D Tank	16:48	DK	4.95
Span of Evil	16:48	DK	4.95
Meteoroids	16:48	DK	4.95
Gold Mine	16:48	DK	4.95
Frisky	16:48	OC	5.50
Kong	48	OC	5.50
Armageddon	16:48	OC	5.50
Monster Muncher	16:48	OC	5.50
Caterpillar	16:48	OC	5.50
Star Trek	16	IP	5.00
Spec-Man	16	IP	5.00
3-D Maze	48	IP	5.00
The Quast	48	IP	5.00
Heathrow	48	HE	7.95
Night Flight	48	HE	5.95
Spectral Panic	48	HE	5.95
Specvaders	48	HE	5.95
Trader	48	PI	9.95
Gobbie a Ghost	16	CD	5.95
Penetrator	48	ME	6.95
Terror Dada	48	ME	6.95
Jet Pac	48	UL	5.50
Trans-Am	48	UL	5.50
Manic Miner	16:48	BB	5.95
Styx	16:48	BB	5.95

VIC 20 software at discount prices - Send s.a.e. for a full list.

Game	Ram	Author	Price
Star Trek 3000	48	DK	4.95
Slicker Puzzle	16	DK	6.95
Trom	16	DK	6.95
Golf	16	DK	6.95
Dial	16	DK	6.95
Speed Duel	48	DK	5.95
Apple Jam	48	DK	5.95
Personal Finance	48	DK	6.95
Maziacs	48	DK	6.95
Hunchback	48	DK	6.95
Rescue	48	OC	5.90
Digger Dan	48	OC	5.90
Repulsor	16:48	SK	5.95
Firebirds	16:48	SK	5.95
Lunar Jetman	48	UL	5.50
Atic Atac	48	UL	5.50
3D Spacewars	16:48	HE	5.95
Traxx	48	OS	6.95
Anti Attack	48	OS	6.95
Guggaboo	48	OS	6.95
Esquaplaine	48	OS	6.95

## ZX 81

Game	Ram	Author	Price
Inca Curse	16	AR	5.95
Ship of Doom	16	AR	5.95
Kraid	16	AR	9.95
Galaxians	16	AR	5.95
IK Games Pack	16	AR	6.50
Asteroids	16	OU	3.95
Invaders	16	OU	3.95
Munchies	16	OU	3.95
Croaka-Crawla	16	OU	3.95
Mazo Death Race	16	PS	3.95
Alien	16	PS	3.95
Ghost Hunt	16	PS	3.95
Star Trek	16	PS	3.95
Krazy Kong	16	PS	3.95
Hopper	16	PS	3.95
Octopusy	16	PE	3.45
Tube 10 games	1	JK	3.95
Tube 2 Starfighter	1	JK	3.95
Tube 3 Catacomb	1	JK	4.95
Tube 4 3D Monster Maze	16	NG	4.95
Tube 5 3D Defender	16	NG	4.95
Puckman	16	HE	5.95
Pilot	16	HE	5.95

## EXTRA SPECIAL DISCOUNTS

- (1) Orders up to £5.00 - 1 x 50p voucher.  
£5.01 to £10.00 - 2 x 50p vouchers.  
£10.01 to £15.00 - 4 x 50p vouchers.  
£15.01 to £20.00 - 5 x 50p vouchers.  
£20.01 to £25.00 - 7 x 50p vouchers.
- (2) Many special offers on the best games software around.
- (3) Postage and packaging is free.
- (4) Every numbered voucher entitles you to a chance to win our special software prize absolutely free.
- (5) Only top quality original cassettes supplied.

The Entertainers Software Suppliers (PCN), 1/1 Main Street, Deans, Livingston. Tel: 0506-410004.

Please supply the following:-

1.....  
2.....  
3.....  
4.....  
5.....

Despatch to:-  
Name.....  
Address.....

Computer..... Ram.....  
Cheque No..... for £..... enclosed.  
Please debit my credit card Access/Visa No.....  
Signed.....

## SUPPLIERS KEY

SU - Sumlock; SO - Solar; PI - Pixel; IM - Imagine; AN - Anirog; UL - Ultimate; ME - Melbourne; HE - Hewson Consultants; IP - Impact; AR - Artic; QU - Quicksilver; DK - DK Tronics; OC - Ocean; PS - Pals; SK - Softek; PE - Peaksoft; JK - J. K. Grey; NG - New Generation; CD - CDS; TE - Terminal; BB - Bug-Byte.

## FOR THE BBC MICRO SOFTWARE

**TINY PASCAL** - Pascal-T is a 16k Eprom program capable of compiling Source Pascal into a compact and very fast threaded-interpretive-code. Full editor and disc-support are included and the program is supplied together with comprehensive documentation. **PRICE £59.00 + V.A.T.**

**X CAL** - An xPert Computer Aided Learning package in 16k Eprom and support disc. No programming skill required to construct learning 'sessions' as the program is 'screen' driven. Facilities include Text pages, Graphics and Histograms. **PRICE £65.00 + V.A.T.**

**FORTH** - FIG-FORTH in 8k Eprom together with manual. **PRICE £34.72 + V.A.T.**

**LOGO-FORTH** - A 16k Eprom program introducing this very powerful but extremely friendly Turtle-Graphics language. Users also have full access to the Fig-Forth support nucleus. Full documentation is included. **PRICE £59.00 + V.A.T.** (Special discounts available for educational establishments for all the above software)

## HARDWARE

Always in stock Printers, Disc Drives IC's etc.

## FOR THE EPSON HX20

**SOFTWARE** - FORTH ROM including full documentation. **£34.72**  
**HARDWARE** - Expansion Unit, Paper, Microcassettes etc. **Please phone for quotes**

Retail/Mail Orders/Dealer enquiries to:

**HCCS ASSOCIATES**  
533 Durham Road, Low Fell, Gateshead,  
Tyne & Wear NE9 5EY. Tel. (0632) 821924

Retail sales also at:

**HCCS MICROCOMPUTERS**  
122 Darwen Street, Blackburn, Lancs. Tel. (0254) 672214

PCN 1/12

## SPECTRUM JOYSTICK

INCLUDES VAT. P&P

### NO INTERFACE NEEDED



DIRECTLY OPERATES THESE KEYS



**NEW**  
FOR 16K AND 48K SINCLAIR SPECTRUM

PO'S CHEQUES ACCESS OR BARCLAYCARD NUMBERS BY POST FOR DESPATCH BY RETURN CREDIT CARD HOLDERS MAY PHONE 0603 870852 FOR IMMEDIATE DESPATCH

## TO GIVE PRECISION JOYSTICK CONTROL

- ESSENTIAL FOR FLIGHT-SIMULATION & SIMILAR GAMES.
- INCREASES SKILL LEVEL ON GAMES USING CURSOR KEYS.
- SPEEDS GRAPHIC PLOTTING AND DRAWING.
- NO ELECTRICAL CONNECTIONS - ALL REAR SOCKETS FREE.
- FITS & REMOVES IN SECONDS - NO TOOLS REQUIRED.
- NO MODIFICATION NEEDED TO SPECTRUM CASE OR KEYS.

TO:- GRANT DESIGN LTD, BANK HOUSE, REEPHAM, NORFOLK, NR10 4JJ  
PLEASE RUSH ME A SPECTRUM-STICK CONTROLLER. I ENCLOSE CHEQUE/ P.O. FOR £9.95 (PAYABLE TO GRANT DESIGN LTD)  
PLEASE CHARGE MY ACCESS  VISA  CREDIT CARD NUMBER

\_\_\_\_\_

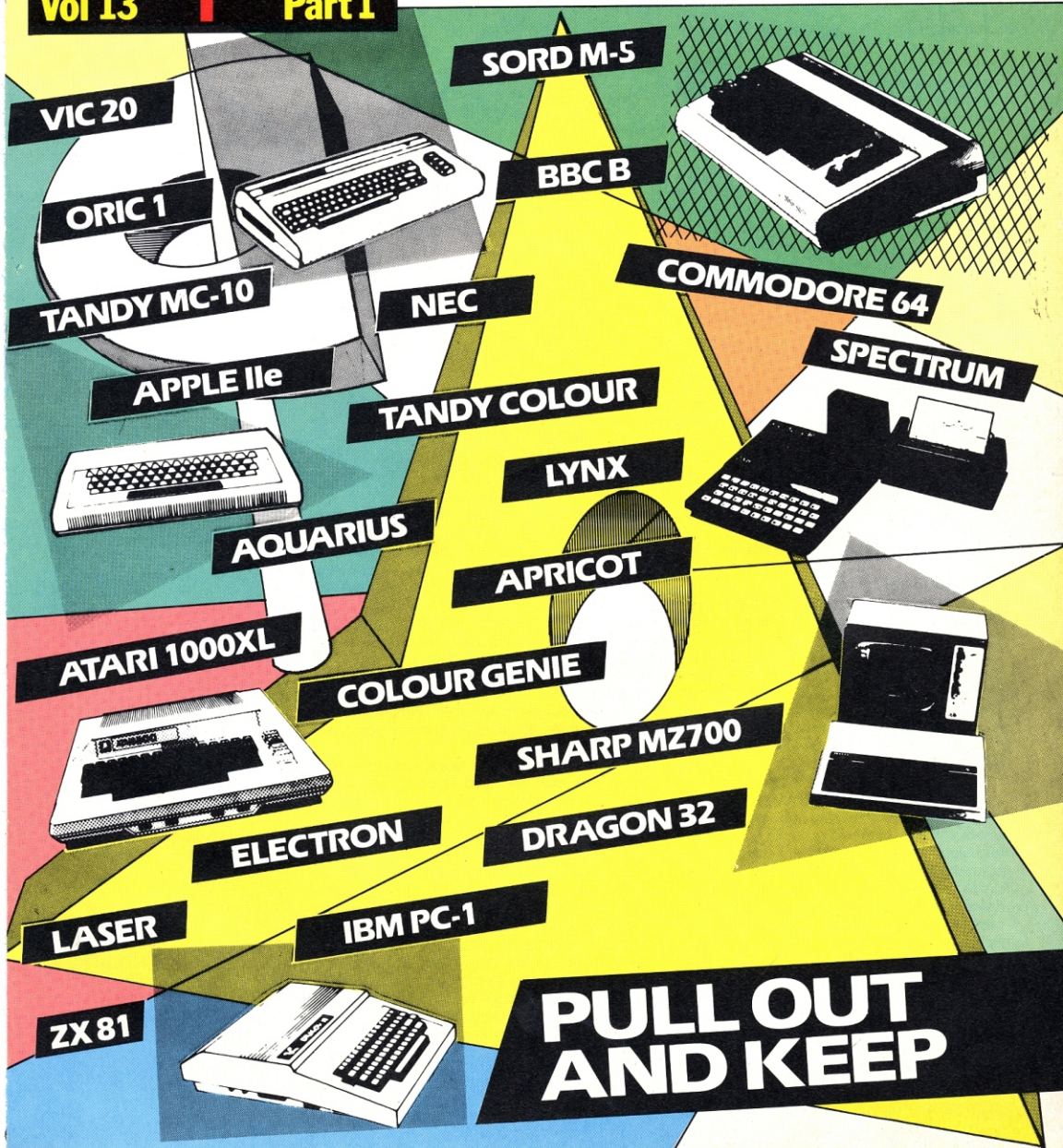
NAME.....  
ADDRESS.....

# PCN

micropaedia

Vol 13 Part 1

# CHRISTMAS MICRO BUYER'S GUIDE



VIC 20

SORD M-5

ORIC 1

BBC B

TANDY MC-10

NEC

APPLE IIe

TANDY COLOUR

COMMODORE 64

AQUARIUS

LYNX

SPECTRUM

ATARI 1000XL

APRICOT

COLOUR GENIE

SHARP MZ700

LASER

ELECTRON

DRAGON 32

ZX 81

IBM PC-1

**PULL OUT  
AND KEEP**

## How to buy a micro

If you're thinking of buying a micro, you've probably already decided you need a guide. And if you've been looking for any length of time, contradictory advice from sales assistants may even have made you wonder if you need a guide to the guides.

But before you despair, remember that micros today are better and cheaper than they've ever been before, so if you choose wisely, you'll get a bargain. But equally, if you get it wrong, and buy a micro that doesn't suit you, you could end up putting yourself off the beasts for a very long time.

So how do you start? If you're new to micros, it's possibly best to stick to the more popular machines, because although you may find a gem just right for you somewhere in the micro jungle, you're much more likely to pick up a complete turkey.

Your first step should be to find out what you can afford — there's no point in spending your time salivating over a Sirius if your wallet will only fit a ZX81. So you should first list the micros that fall into your price range, and then decide between them on the basis of what you want from your micro.

Inevitably you're the one who's going to be best equipped to say why you want to buy a micro, but there are a number of common reasons:

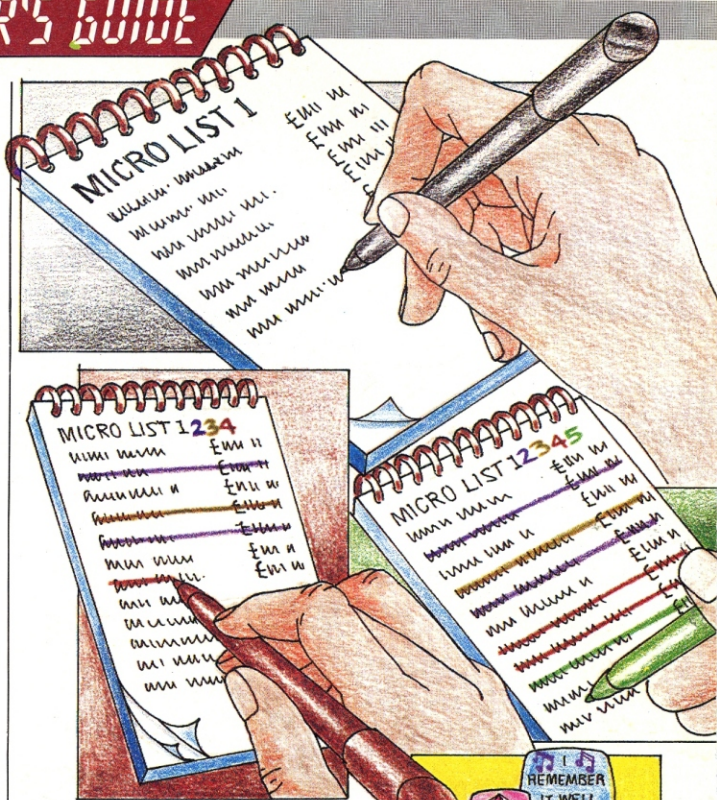
- 1 You feel you want to learn about programming, or
- 2 You want to play games
- 3 You want to use a micro for home filing
- 4 You think a micro would be helpful in your business

It's likely that you'll fall into several of these categories, but bear in mind, the more you want from your micro, the more it's liable to cost. Naturally you'll still want to get the best deal that you can, and therefore you should be looking at the expansion potential of your choice, but again this will cost money.

The availability of software is also something that should concern you. For example, you could buy a dynamic new machine with specifications streets ahead of other micros in its price range. But unless you just want the machine to write your own programs, you'll almost inevitably have to wait, first for the machine, and then for people to start writing and selling the software.

In the case of some machines, the now deceased Jupiter Ace for example, this never happens, so if you decide on a new and untried machine you should either be quite straight in your mind that you're either going to write your own software, or that a wide body of software is guaranteed.

Perhaps a word about guarantees would be in order at this juncture. The micro industry has a sorry track record on promises, to the extent



where it is the exception rather than the rule when a product is launched on time. So when the word is a micro is due to be launched in the next few months, take it with a pinch of salt, as you may find yourself hanging on for a lot longer than you bargained.

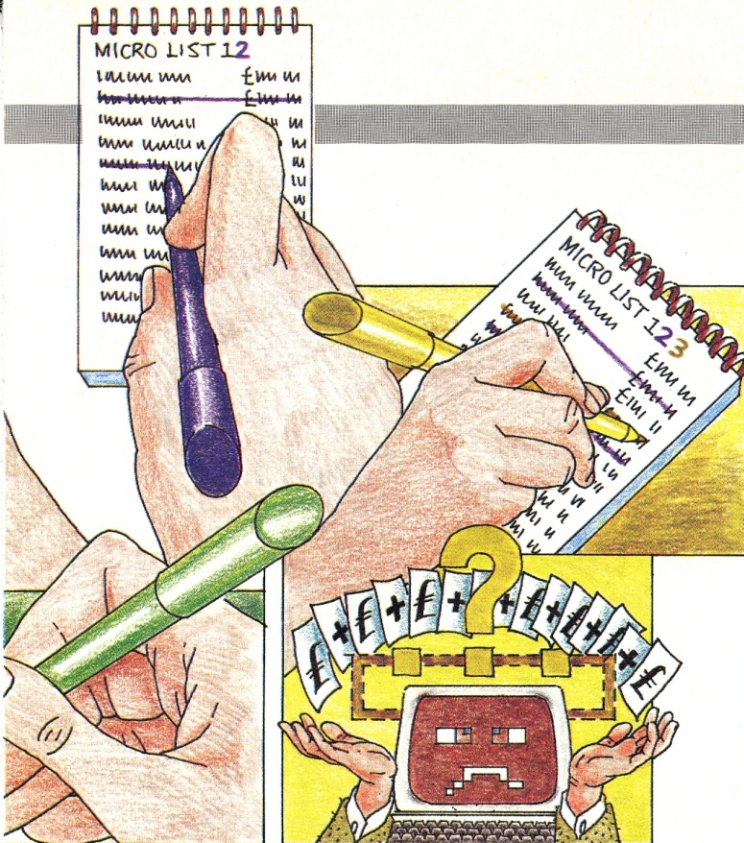
Similarly, if you decide you're going to need add-ons, either immediately or in the near future, buy a machine that already has them available. You could wait a long time — and plenty of people already have — for a printer interface and disk drives for your micro, and if you happened to be buying a micro for word processing, you'd feel pretty silly, check?

If you want a micro to learn about programming, you may not need to be so concerned about support. Unless you're feeling particularly masochistic, you'll probably want to buy one with a good, well-debugged Basic, but provided it's got that, along with good documentation, it's a safe bet you've got enough to get started.

For example, both BBC and Sinclair Basic have been around long enough to be relatively bug-free, and the manuals, although perhaps a little on the turgid side, are informative. Oric and Lynx Basic, on the other hand, are only now starting to shape up, as bugs are found and fixed, and the manuals are still being 'updated' through the good offices of various user groups. Fine machines for those who know what they're doing, but a little dispiriting for a beginner who bought one just after they came out.

For games, your requirements are liable to be





a little different. The first thing you should look at here, naturally, is the games available for the micros on your shortlist. You might also like to bear in mind that it isn't just a question of what's available — you've also got to think about what is available near where you live, unless you want to trust mail order companies.

There are other things you'll need to consider. Does your choice have a built-in joystick interface, and if not, can you buy one for it? You may want to be able just to plug games in, rather than having to wait for them to load from tape, so you must also ask whether or not your machine will take cartridge software.

Finally, ask yourself how much the games cost for the various machines. You may find yourself buying a machine that costs less initially, but in the long run costs you a lot more because of the price of the software.

Using a micro for home filing or for work is again a question of software, but you're also likely to want to use a printer, and if the jobs you intend to do are big, then you may well want disk drives.

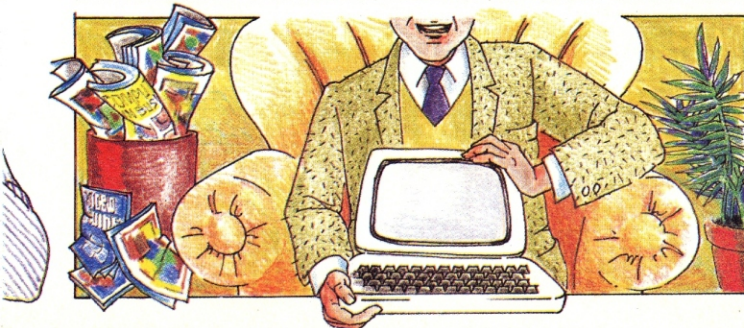
So first you should check to see what software is available, say in fields such as home accounts, word processing and filing. You should also check out a few reviews of these packages, because there's little point in buying a micro that only has third rate and/or inconvenient-to-use serious software supporting it.

For large files, disks will be a must, as slowly and laboriously saving information on tape will take up too much time, and may limit the size and versatility of your files. So make sure your choice of micro can be connected up to a disk system, and also to a printer, if you're going to want written output.

If you're going to spend a lot of time writing on your micro, you'll want a proper typewriter style keyboard. You may find yourself thinking that you could make do with one of the cheaper variants, such as the Oric, but resist this temptation. Keyboards do come in all shapes and sizes, but you can really only do professional word processing tasks on full sizes, full-travel keyboards.

And if you're still confused? Don't despair: as we said at the outset, micros today are incredibly cheap, and really the best way to learn about them is to get on. So, if you can't make up your mind, don't buy an expensive system — buy a cheaper, tried and tested one. Sure, in a year's time you'll probably be thinking of upgrading, but once you've been bitten by the bug, that goes for all of us . . .

- 1 List all the micros you can afford.
- 2 If you have any specific tasks to perform, such as word processing eliminate any micros where this will be impossible/inconvenient.
- 3 Look at the software available for the micros left on the list, and cross off any which are poorly served, or which do not have the software you're liable to need for specialist tasks.
- 4 Look at the peripherals available, and cross off any with problems similar to those under software, above.
- 5 If you've let any micros through on the grounds that software and peripherals are 'coming soon' go back to 3 and 4 and cross them off.
- 6 Ask yourself if there's anything non-standard about the micros still on the list. For example, you need an interface if you want to run any printer but the ZX Printer off the Spectrum, and Commodore machines tend to lock you into Commodore peripherals. Add any extra cost you're liable to incur.
- 7 Now — and only now — look at the specifications of the machines on your shortlist. How many colours do they have? How much memory? What is the screen resolution? Do they have user defined graphics? Do they have sprites?
- 8 Look at the supporting literature.
- 9 If you're still not down to one micro, or if one on your list hasn't turned out to be miles ahead of the others, buy the cheapest.



**Micropaedia Editor:** Geof Wheelwright  
**Contributors:** Igor Thomas, John Lettice  
**Design:** Nigel Wingrove

**NEXT WEEK**

Next week we continue our series of buyer's guides with a look at peripherals — printers, plotters, disk drives, monitors. Don't miss it.

# HARDWARE BUYER'S GUIDE

**O**ver the next 13 pages we'll give you not one, but two complete home micro buyer's guides. Each on its own would be valuable in helping you choose a micro for Christmas, but taken together they are an unparalleled complementary package for the discerning micro buyer.

The first eight pages of this guide consist of details of 17 home micros under £400 and four notable business micros over £900 — comparing similarly-priced machines and giving thumbnail sketches of what software and hardware is available for each machine.

The last six pages is our Databasics section, normally published at the back of the magazine. To make it easy to use with this special Micropaedia buyer's guide, we have put the two together as one quick reference package.

In the comparison charts the machines are compared for price, standard RAM offering, maximum RAM, and the maximum text and graphic resolutions.



**Name** ZX81

**Price** £45 (new ZX-81 starter pack)

**Standard memory** 16K with expansion pack included in starter pack.

**Comments** The original black-and-white soundless 'starter computer' from Sinclair costs £45. With the vast library of software established for the machine over the past few years, it's probably the best black and white first computer you can get. It's also one of the few black and white computers that has survived.

**Interfaces** Cassette, TV and expansion port. The ZX81 is by nature a simple beast, but so many people have felt challenged by its simplicity that a vast range of

peripheral devices from 80-column printer interfaces to disk drive connectors have been developed for it by third-party hardware manufacturers.

**Software** Given the machine's limited memory and graphics — and its lack of sound — some quite stunning packages have been produced for it, most of them games. But with the machine's flat keyboard it's perhaps surprising that a number of software houses have produced professional word processors and spreadsheets for it.

Lots of good games for this starter computer and a surprising number of serious computing utilities.



**Name** Aquarius

**Price** £59.95

**Standard memory** 4K expandable to 52K

**Comments** This micro started life as the Mattel Aquarius, but has been taken over by the machine's manufacturers Radifon Electronics. However, the market pressures that caused the switch to direct sales by Radifon also forced Mattel to drop the machine's price to £59.95 just before it

made that switch. The new price makes the Aquarius one of the cheapest colour computers, although Radifon has indicated they will push the price back up after Christmas.

**Interfaces** The Aquarius currently offers expansion to run an own-brand cassette recorder, a small thermal printer, games paddles and cartridge games. The mini-expander unit also allows memory upgrade, initially with 16K memory pack.

The machine uses a Spectrum-style rubber keyboard and allows for overlays that help to assign specific tasks to different keys in both games and applications packages.

**Software** This has, until recently, been almost exclusively in the cartridge format. Radifon has promised, however, to have 50 cassette programs on the shelves by Christmas — releasing them at the rate of three a week.

Machine	Price	Standard RAM	Max RAM	Text	Graphics
ZX81	£45	1K	16K	32×24	64×42
Aquarius	£60	4K	52K	40×24	80×72
Laser 200	£70	4K	64K	32×16	128×64
Oric 1	£99	16K	48K	40×28	240×200
Spectrum	£99	16K	48K	32×24	256×192

**Name** Laser 200

**Price** £69.95

**Standard memory** 4K (immediately expandable to 20K, with the promise of future expansion to 64K)

**Comments** Until the Aquarius price drop, this machine wore the mantle of the cheapest colour computer in the UK. It is billed as a competitor to Sinclair's Spectrum colour computer and has a good deal in common with that machine: the same type of rubber keyboard, single-key Basic keyword entry and the same Z80 processor.

**Interfaces** The Laser offers the standard TV output, cassette I/O plug-ins, a memory

expansion and the traditional cartridge expansion slot. The 16K RAM expansion — which brings the price of a 20K Laser up to the price of Sinclair's Spectrum (£99) — slots into the said memory expansion slot at the back of the machine.

Promised for the future are printer, joystick and disk drive interfaces.

**Software** This is perhaps the biggest question-mark surrounding the Laser. Although the machine sports a standard Microsoft Basic, it's early days yet to predict how much software will be written for it. Abbox software has committed itself to producing some packages, but it's a 'wait and see' situation.



**Name** Sinclair ZX Spectrum

**Price** £99 (for basic 16K model), £125 (for 48K model)

**Standard memory** 16K or 48K

**Comments** The best-selling colour computer in the UK, with arguably both the biggest third-party peripherals and software base of any machine bar the Apple II.

Although some may gripe about the Spectrum's 'spongy keys', they have kept the price of this machine consistently low. And enough third-party peripheral houses have made their own 'real' keyboard available to mean that this is no longer a major issue.

**Interfaces** Printers, disk drives, (Microdrives), joysticks, cartridge software, networking, memory expansion: you name it, it seems it can be plugged into the Spectrum. Sinclair itself offers the Microdrive, a cartridge software and joystick interface, an RS-232C, Microdrive and network interface and the ZX printer (which can also be used with the ZX81). But that's only a fraction of what's available from third-party peripheral developers.

**Software** Again, there are reams of it, including a lot of very good games.



**Name** Oric-1

**Price** £99 (£79.95 mail-order from Oric)

**Standard memory** 16K expandable to 48K

**Comments** There are actually two models of Oric, the 16K and the 48K, but for the purposes of this buyers guide they are more or less the same machine. After a difficult first year when the Oric was greeted with mixed reactions, and the company had considerable problems with

its ROM, Oric has achieved considerable success in France and a good software base has developed for the machine here.

**Interfaces** It has a keyboard somewhat superior to its major competitor — Sinclair's Spectrum — and supports more standard interfaces, including a built-in parallel interface (to use standard 80-column dot-matrix printers) and Oric's own colour printer/plotter, a plug-in for RGB professional colour monitors and an

expansion 'bus' that will soon take promised three inch disk drives.

Oric has also promised a modem for the machine which will use its built-in Teletext graphics facility to connect to Prestel.

**Software** Here again, Oric has recently found itself recovering from teething troubles. Word-processing, spreadsheet and machine language software is now available, in addition to a growing collection of both arcade and adventure games.

# HARDWARE BUYER'S GUIDE

**Name** Sord/CGL M-5

**Price** £150

**Standard memory** 4K available RAM, 16K video memory (expandable to 32K)

**Comments** Since this machine arrived in the UK last spring, it has consistently been passed off as 'nice, but pricey' by reviewers — but Sord and CGL (Sord's major distributor in the UK) are hoping a drop from £190 to £150 will change all that.

The machine comes with only 4K of memory, but that memory is a good deal more useful than it might appear as the 16K video memory does a lot of work with the screen.

**Interfaces** The Sord comes with interfaces for motor-controlled cassette storage, joysticks, cartridge software (plug-in game and business packages) and colour television display. It also includes a plug-in for Centronics full 80-column printers like the Epson MX-80F/T.

**Software** Software development for such machines as the M-5 is a chicken and egg question. Well-built and high-quality machines like the M-5 always come with some software, but the availability of more depends greatly on whether the machine sells well enough to impress third-party



software houses.

But sales of any machine always depend to some extent on the software available, so the whole thing is rather circular and you're probably going to have to decide whether or not to buy the machine on the basis of what it will do rather than on what it can do just now.



**Name** Commodore Vic-20

**Price** £139

**Standard memory** 5K (expandable to 32K)

**Comments** This old standard from Commodore rivals the Sinclair machines in popularity and — in its current 'starter pack' form — offers very good value. The starter pack includes the standard 3K RAM Vic-20, the dedicated Vic cassette recorder and a cassette including 20 programs.

**Interfaces** The standard Vic comes with joystick port, serial port, expansion slot and user port, and TV output modulator (both the picture and sound are output through the TV).

**Software** The standard Vic-20 comes with a cassette containing 20 programs including 'Type-a-tune', 'Blitz' and 'Hopbit', but that's only the briefest hint of the vast array of software that's been built up for this machine. Software on both cartridge and cassettes is available from Commodore and many other third party software houses.

**Name** Tandy MC-10

**Price** £99.00

**Standard memory** 4K (expandable to 20K)

**Comments** The MC-10 is Tandy's first entry in the under £100 computer sweepstakes and provides a low-cost counterpart to the company's more upmarket Colour Computer. The machine is small — not much larger than the ZX-81 — but supports hard-plastic keys, a printer interface and an RS-232C communications port.

The machine also allows single-key Basic keyword entry and a modified version of Microsoft Basic called Micro Colour Basic.

**Interfaces** Tandy offers a small thermal printer with the MC-10, as well as its range of peripherals such as computer cassette recorders, dot matrix printers and plotters. Tandy is also expected to produce a cheap modem that would allow the machine to 'talk' to other computers over the telephone.

**Software** Given that it uses much the same Basic as the Colour Computer — and that Tandy is certainly capable of putting out lots of its own software — there should soon be a great deal of software available for this machine. But the operative words here are 'should' and 'soon'. Just how true that prediction is depends entirely on Tandy.





**Name** Atari 600XL  
**Price** £160  
**Standard memory** 16K (expandable to 64K)

**Comments** The Atari 600XL is not a great deal different from its predecessors, the Atari 400 and Atari 800. Like the 400, the 600XL has 16K memory as standard kit—but unlike the 400, the price also includes a full travel keyboard, the Basic programming language built into the main board of the machine and expandability to 64K.

At £160, it represents very good value—particularly since it can run the whole range of existing Atari disk, cartridge and cassette software.

**Interfaces** The 600XL uses Atari's non-standard peripherals interface for disk

drives, cassette recorders and printers. Using Atari's standard peripheral expansion interface, you can also hook up standard parallel printers in addition to the new range of Atari dot matrix and letter quality printers. There's also a parallel bus and even a planned Expander box that give you dual RS-232C connectors, a Centronics port and eight other expansion slots.

**Software** There's loads of it—although a surprising amount is still only available in the more expensive cartridge form. But a large range of applications are represented in the Atari software list, including an official implementation of Visicalc and a quite respectable cartridge word-processor called Atariwriter.

**Name** Colour Genie  
**Price** £168  
**Standard memory** 16K RAM (expandable to 32K)

**Comments** Also known as the EACA EG2000, the Colour Genie is distributed by Lowe of Matlock, which offers full support and service. One of the earlier contenders in the USA home micro marketplace, the Colour Genie is generally comparable to both the Vic and TRS-80/1 moulds.

**Interfaces** Like other (more expensive) members of the Genie family, a healthy selection of plugs and sockets ensures that most kinds of add-on can be tailored for the Colour Genie. Serial, parallel, audio, video, cassette, television, and expansion connectors, as well as an internal speaker, are standard fixtures and fittings.

**Software** Supplied with the machine is a demo cassette, containing programs written in Basic. Unless you have some add-ons, you are pretty much limited to using the built-in (Microsoft-styled) ROM Basic language. The semi-high resolution graphics are great for games, but the text display is somewhat resistant to more serious applications.



**Name** Dragon 32  
**Price** £175  
**Standard memory** 32K  
**Comments** The Dragon 32 has a common

heritage with the Tandy Colour Computer, but has traditionally maintained a lower price than its chief (but much larger) rival. Most colour computer software will run on the Dragon, and in the year or so that it's been available the Dragon has built up a good software base of its own—mostly from third-party software houses. Dragon have also been no slouches in producing their own peripherals, releasing both joysticks and a disk drive.

**Interfaces** The Dragon comes with a standard parallel printer interface, plugins for joysticks, a composite video monitor socket, a cassette interface and its own

expansion port. Dragon's recently released disk drive unit and disk controller round out the expansion options—with the disk controller containing an upgraded version of Microsoft Basic.

**Software** The Dragon's compatibility with the Tandy colour computer gave it a software advantage to start with, and with the large numbers of Dragon programs written and released in the past year, the machine is one of the better-equipped popular micros. In addition to a plethora of games, a number of both word-processing and spreadsheet programs have been developed for the machine.

Machine	Price	Standard RAM	Max RAM	Text	Graphics
Tandy MC10	£99	4K	20K	40×24	64×32
Vic 20	£139	3.5K	32K	22×23	160×176
Sord	£150	4K	32K	40×24	256×192
Atari 600XL	£160	16K	64K	40×24	320×192
Colour Genie	£168	16K	32K	40×24	160×102
Dragon 32	£175	32K	32K	32×16	256×192

# HARDWARE BUYER'S GUIDE

**Name** Tandy Colour Computer

**Price** £179

**Standard memory** 16K (expandable to 32K)

**Comments** The Tandy Colour Computer was Tandy's first entry into the low-cost home colour computer market, and as it has been around for some time has developed a good software base and a wide range of peripherals. So far, the colour computer wins out in its contest with the Dragon on the basis of having more peripherals, software and a larger dealer network — but the Dragon still scores over the Tandy by having a better keyboard and more memory.

**Interfaces** Much the same as the Dragon, except that all Tandy peripherals will — of course — work without modification on the colour computer. And the Tandy-Dragon connection can sometimes work in Tandy's favour as many third-party peripherals for the Dragon will run without modification.

**Software** Cartridge software has always been the colour computer's forte, but with the recent rash of cassette programs for the Dragon that could change feature. Although these machines are in competition, Dragon, Tandy and the users of both machines will benefit from more sales of either machine.



**Name** Lynx

**Price** £225

**Standard memory** 48K RAM (expandable to 192K)

**Comments** The Lynx is perhaps less well-known than other micros produced in Cambridge, however it boasts many of the features found in machines costing 50% to 75% more. Including a 'real' keyboard, colour graphics, and loudspeaker, the design of the Lynx micro is of the lightweight desktop variety.

**Interfaces** As with many Z80 based micros, a comprehensive expansion connector allows you to bolt-on peripherals. This is where additional ROM and RAM get grafted on, as well as floppy disk equipment. As supplied, Lynx sports television, cassette, video, RGB, light pen, and serial interface connectors.

**Software** The Lynx contains ROM Basic as standard, although ROM Pascal, Forth and Comal languages are offered. With optional floppy disks fitted, the plethora of CP/M software is available.



**Name** Electron

**Price** £199

**Standard memory** 32K RAM

**Comments** This machine is the much-heralded offspring of the BBC Micro. As such, its principal features are a real keyboard, the BBC Basic language, and almost complete compatibility with existing BBC software. Due to great advance demand, it is presently difficult to find an Electron in stock, so you'd be well advised to check availability before setting your sights on this one for Christmas.

**Interfaces** To compete in the under £200 marketplace, the Electron contains only the barest minimum of built-in interfaces. Apart from cassette, television, video, and RGB connectors, all other peripherals (will) use the large expansion connector. Unfortunately, being yet another very young machine, not even a handful of Electron interfaces can presently be found off the shelf. However, there's a growing range of mail-order bolt-ons.

**Software** The shortage of interfaces means you are restricted in the usefulness of any of the existing BBC software which will run on an Electron. Also, until you can connect a printer, writing your own programs will be somewhat tedious. Content yourself with a few games for Christmas, however, then get serious in the New Year.



**Name** Sharp MZ700

**Price** £275

**Standard memory** 64K RAM

**Comments** Another young machine, the MZ700 offers complete compatibility with its predecessors, the Sharp MZ80 series. As such, the considerable number of school and business MZ80 users will find everything they know, plus more, within this latest machine from Sharp. With its lithe and stylish keyboard, the MZ700 approaches the realm of professional micros, although it is not very well known yet.

**Interfaces** The most prominent feature of the MZ700 is its ability to hold both its optional cassette recorder and colour printer/plotter within its cabinet. Included

in the standard machine are both a real keyboard and internal loudspeaker. Standard connectors include cassette, printer, television, video monitor, RGB monitor, joysticks, and I/O.

**Software** Apart from the Sharp Basic language, a word processor and a few games, there are few MZ700-specific programs available. However, the standard 64K Z80A design and wide range of MZ80 software should be enough.



**Name** Commodore 64

**Price** £229

**Standard memory** 64K RAM

**Comments** The youngest member of the well-known Commodore family (remember the PET?) offers one of the better values for money in Santa's sackful. As well as a real keyboard, you get powerful colour graphics, sound generator, lots of RAM memory, ROM Basic, and a reliable expansion system.

**Interfaces** Like the Commodore Vic 20, the 64 offers serial (RS232), parallel, cassette (Commodore standard), joystick, and television (picture and sound) connectors. A cartridge/expansion connector allows games and peripherals to be fitted quickly and easily, notably Z80 processor, floppy disk, and 80-column screen expansions.

**Software** There's now much software to choose from for the 64 with word processors, databases, and some excellent games. Watch out for a software explosion with the announcement of the CP/M operating system interface for the 64, and if you can afford the prices, American import packages are exceptional.



**Name** BBC Model B

**Price** £399

**Standard memory** 32K RAM

**Comments** Here is the most expensive machine in our list, although by no means the most expensive home micro on the market! There is presently nothing to beat it at this price for versatility. Its very name reinforces its pedigree, as well as assuring additional acceptance by both education and business users. Also, the BBC Basic language is very likely to become a world-wide standard, if it isn't already.

**Interfaces** There are many products available, and countless more in the pipeline. The standard Model B has a full real keyboard, ROM Basic, colour graphics, and sound generator with built-in loudspeaker. Standard connectors

include cassette, printer, television, video monitor, RGB monitor, and analog (includes voltage-measuring, light pen, and joysticks). Also provided, but requiring extra components to be fitted, are speech, network, floppy disk, and second-processor connectors.

**Software** Quite a lot of it and largely of very high quality. There's a wide choice for games players and, thanks to the machine's educational pedigree, a lot of packages in that area too. The majority of what's available comes on cassette although there are many utilities and business applications on plug-in ROMs. Surprisingly little disk software so far. Serious programmers are very well catered for with a number of language implementations.

<b>Machine</b>	<b>Price</b>	<b>Standard RAM</b>	<b>Max RAM</b>	<b>Text</b>	<b>Graphics</b>
Tandy Color	£179	16K	32K	32×16	256×192
Electron	£199	32K	32K	80×32	640×256
Lynx	£275	48K	192K	40×24	256×248
Commodore 64	£229	64K	64K	40×24	320×200
BBC Micro	£399	32K	32K	80×32	640×256

# HARDWARE BUYER'S GUIDE



**Name** Apricot

**Price** £1,890

**Standard memory** 256K RAM

**Comments** The newest addition to the blossoming tribe of true 16-bit micros, and portable as well. Only a very old-fashioned businessperson would not develop technological twinkles in the eyes at finding this marvel under the Christmas tree.

**Interfaces** In step with most business micros, the Apricot has most of the fundamentals included, such as video monitor and disk drives. Connectors provided are minimal but essential: Centronics parallel and RS232 D-type serial. Expansion is obtained through (only) two internal connectors, which may be used to implement the imminent new products.

**Software** Where the Apricot has staked much of its faith is in its built-in 3.5 inch microfloppy disk drives from Sony. Although the machine supports CP/M-86, MS-DOS, and Concurrent CP/M-86, it may be slightly difficult to keep it fed with new disks for a while.



**Name** Apple IIe (Europlus)

**Price** £972

**Standard memory** 64K RAM (expandable)

**Comments** Not to be confused with its (now retired) predecessor the Apple II, the IIe is the current version of 'The thing that started it all'.

**Interfaces** If it moves, it can be interfaced to an Apple. Although the basic machine carries only cassette, video, and games connectors, there is a plethora of interface cards which can be slotted into the internal expansion connectors. This is where the cost starts to mount, as a quick total of essential business add-ons will show. Some dealers may still sell older Apple cards which will not work in the current model, but the bulk of standard cards (printer interfaces, expansion RAM, floppy disk, winchester disk) will work without alteration.

**Software** It's doubtful if anyone actually knows how much there is. Languages, business, education, games. Should any of you feel slightly wary of having to actually write your own programs, no other micro can offer as wide a catalogue of existing software as Apple.

**Name** IBM PC-1

**Price** £2,392

**Standard memory** 64K RAM (expandable to 576K)

**Comments** At last we settle down to our well-earned Christmas rest with the famous IBM PC micro. Actually, the PC is currently available in two versions (three in the New Year), so here we describe the lowest-price model, the PC-1. The entire concept of using micros in business took a big jump when IBM revealed its idea of how to do it. A detached keyboard, a separate cabinet and a standard cabinet and a standard video monitor. All with the unmistakable air of legitimacy which only IBM can exude. Not the cheapest, not the fastest, but what better insurance can you get against micro obsolescence than those three little letters?

**Interfaces** The basic philosophy of the IBM PC is very simple: nothing more than you need. Standard facilities include serial and parallel interfaces and the requisite video monitor output, but like the Apple anything else is extra. The five internal expansion connectors have spawned a truly awesome range of



products, with RAM expansions, high-resolution RGB interfaces, second processors, video digitisers, speech recognition devices, fibre optic systems, and many more.

**Software** Even IBM is a relative newcomer to the micro marketplace, but the amount of software currently available for the PC is more than some other machines will ever see in their lifetimes. Most software for the PC is designed to run under MS-DOS or CP/M-86, the two most popular 16-bit operating systems. Why not come in from the snow, and gather round the nice warm glow of the mighty IBM software furnace.

**Name** NEC PC-8201A

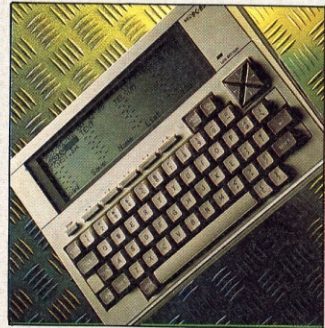
**Price** £475

**Standard memory** 16K RAM (expandable to 128K)

**Comments** Perhaps unfairly, at the bottom of our business person's Christmas shopping list is a true battery-operated professional micro. The eagle-eyed shopper will notice more than a slight physical similarity to the Tandy Model 100, although the NEC is designed differently, has twice as much RAM and actually costs £24 less.

**Interfaces** With its own built-in 40-column screen display and plug-in RAM storage cartridges, the NEC doesn't really need (hence doesn't offer) either video display or disk drive facilities. The main machine memory can be expanded four-fold, although there is no limit to the number of slot-in 32K CMOS RAM storage cartridges which you may use to save your inscrutable data. Provision is made for either serial or parallel printers, a bar-code reader device, and RS232 gadgets (such as modems).

**Software** The NEC is supplied with both Microsoft Basic and a word processor as built-in ROMs, and additional Basic programs on standard cassette tape. The latter include a name & address book, an investment portfolio calculator, and of course some entertainment generators (games).



# DATA BASICS

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 x 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, 5 1/4" 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	Powertran Cortex	£454	Osborne I	£1,581	Country Computers C3000	£2,242	Britannia Baby	£2,657	Cifer Series 1	£3,214	Altos 800/15	£5,963
Casio PB100	£50	Epson HX20	£472	Signet 10025	£1,599	Kemtron K2000E	£2,242	Adler Alphatronic P3	£2,686	Samurai	£3,214	Durango F85	£5,744
TRS-80 PC4	£50	Tandy TRS 80 Model 100	£499	APL Signet	£1,610	Rair Black Box 320S	£2,242	Corona PC1	£2,697	Tiger	£3,214	Triton 4	£5,744
Aquarius	£50	Nascom 3	£549	Basis 108	£1,683	Sanyo MBC 2000	£2,242	Eagle II	£2,702	Torch	£3,214	Marin Chip M9000	£5,750
Laser 200	£70	Commodore 4016	£632	Commodore Spr. Pet 9000	£1,719	Toshiba T-200	£2,242	Almarc 801	£2,708	Sord M223	£3,277	SW Tech. Products S0/9	£5,750
Oric-1	£80	Research Machine 480Z	£650	Gemini Galaxy 2	£1,719	TMK 332	£2,242	DEC Rainbow 100	£2,714	Kontron RS180	£3,306	BASF 7100	£5,805
Sharp PC1251	£80	DAI PC	£684	ACT Apricot	£1,719	Minrol M2215	£2,242	ICI PC Model 10	£2,754	Kaypro 10	£3,340	CompuStar	£5,837
Jupiter Ace	£90	Apple II	£776	Microsolution Brit. Genius	£1,840	Bonsai SM 3000	£2,294	Millbank SX10	£2,754	Columbia PC 1600-1	£3,392	Sord M243	£5,842
Casio FX702P	£90	Commodore 500	£799	Globe 101	£1,850	CAL PC	£2,294	Diaco Prince	£2,764	Diaco Prince	£3,392	Sage IV	£5,952
Sinclair Spectrum	£99	Tandy Model 4	£861	Grundy 8200	£1,850	North Star Horizon	£2,294	OEM Orion	£2,754	OEM Orion	£3,392	Rair Business Computer	£6,037
Tandy TRS-80 Pocket 2	£130	HP 75C	£883	Genie III	£1,897	Sanyo MBC 1250	£2,294	North Star Advantage	£2,766	Barcellos AMT 100	£3,450	Digital Microsystems 4	£6,210
Commodore VIC 20	£140	Sharp MZ80B	£900	Toshiba T-100	£1,900	Casu Mini C2	£2,300	Apple III	£2,780	Kalamazoo 1050	£3,450	Superstar	£6,296
Atari 400	£149	Franklin Ace	£914	Sord M23	£1,932	Seed System I	£2,300	Sanyo MBC 4050	£2,817	Digital Microsystems 3	£3,576	Racal 6000	£6,327
Sord MS	£150	Apple IIe	£972	Kaypro 21	£1,949	Sharp PC3201	£2,300	Bonsai SM 4000	£2,842	Televideo TS 1602-C	£3,714	Eagle 1600	£6,497
Atari 600XL	£160	Mupid 320 GB	£978	Krypton 800 range	£1,949	HP 85	£2,360	Logica VTS Vitesse	£2,953	Acids Multivision	£3,795	Ti System 200-250	£6,595
Colour Genie	£168	Husky Hunter	£997	Kemilworth 83G	£1,953	HP Series 100, 120	£2,362	Decision-1 Computer O11	£2,869	Clenio Pronto	£3,795	CompuCorp 675	£6,780
Sharp PC1500	£169	Commodore 8032	£1,129	Transam Truscan	£1,983	Sord M23P	£2,369	Olivetti M20	£2,869	Panasonic JD800M	£3,795	Wicat 150	£6,846
Dragon 32	£174	Commodore 710	£1,144	NCR Decision Mate V	£1,983	TI Prof. Computer	£2,386	DMS Fox	£2,875	Kemtron K3000	£3,795	Sundance I	£6,969
Texas CC40	£180	Microdecision	£1,144	Epson QX10	£1,995	IBM PC	£2,392	Eagle III	£2,950	DECPC 350	£3,850	Pascal Mod. Microengine	£7,003
Tandy TRS 80 colour	£180	Tulip 1	£1,150	IDS Datamachine	£1,995	Xerox 820 Model II	£2,415	Zenith ZF-120-22	£2,978	Vector 4	£3,852	Diablo 3000	£7,250
Mattel Intellivision	£190	Fujitsu FM8	£1,150	Tandy TRS-80 Model II	£1,999	Haywood 3000	£2,439	Monroe EC 8800	£2,990	Cifer Club	£3,904	Onyx 5001 MU	£7,607
Electron	£199	NEC PC 8001	£1,195	Kemilworth 83G	£2,012	LSM4	£2,472	Philips P3500	£3,000	Sage II	£4,019	Apple Lisa	£7,657
Computers Lynx	£225	Pied Piper	£1,226	Caltext II	£2,019	Canon CX-1	£2,500	Tanberg EC10	£3,000	Tandy TRS-80 Model 16	£4,199	Sundance II	£8,205
Commodore 64	£229	Minstrel	£1,259	Minstrel	£2,059	Sirius I	£2,525	Archives I	£3,003	IBM PCXT	£4,258	Haywood Hinet	£9,500
Sharp MZ700	£250	Tandy TRS-80 Model III	£1,299	Portico Miracle Portable	£2,064	IO Tech Iona	£2,539	Cromemco System 1	£3,025	Hytech H4500	£4,310	Altos 856-10	£9,631
Atari 800XL	£250	Cromemco C10	£1,350	LSIM3	£2,064	HP 87XXM	£2,571	Wang Professional	£3,076	BMCOK 11F800, Model 20	£4,360	Micro Five 3000	£10,350
New Brain A	£269	Commodore 8096	£1,374	Haywood 9000 Composite	£2,064	Quantum 2000	£2,587	DECPC 325	£3,080	ADS 42	£4,500	Sundance 16	£10,480
Genie II	£299	NEC PC 8001	£1,375	Research Machines 380Z	£2,134	Ajile	£2,599	Direct 1000	£3,093	Televideo TS-80ZH	£4,533	Spectrum	£11,442
Atari 800	£300	Pasca 840	£1,437	Research Machines 380Z	£2,147	Canon AS100	£2,633	Equator	£3,099	Country Computers C1000	£4,542		
Nascom 2	£327	NEC PC8000	£1,454	Superbrain JR	£2,150	CP1100	£2,639	Hyperion	£3,100	Corvus Concept	£4,887		
Microtan 65	£389	Signet 2	£1,483	Future Computers FX-20	£2,156	Seed System 19	£2,600	Clenio Table-Tops 925	£3,105	Micro Five 1000	£5,175		
BBC Model B	£399	Magnum	£1,489	C/WP Cortex	£2,179	Enterprise 1000	£2,645	ITT 3030	£3,105	Fortune 32:16 System 2	£5,204		
Sharp MZ80A	£399	Televideo TS-800 Series	£1,495	Comart Communicator	£2,180	Facit 6520	£2,645	Monroe OC 8810	£3,162	Zeus 4	£5,204		
Datacube Micro Controller	£431	HP86A	£1,570	Adler Alphatronic P2	£2,197	Olympia Boss Model A	£2,645	HP Series 200 Model 16A	£3,211	Molecular M200	£5,462		

### ABBREVIATIONS

Ar: APL  
As: Assembly  
Ba: Basic  
Co: Cobol

Cr: Comal  
Fr: Fortran  
Fn: Fortran  
Pa: Pascal

Make and model	Price inc VAT	Processor type	Speed in MHz	Standard RAM	Max RAM — normally at extra cost	Display			Graphics	Keyboard	Interfaces built-in				Storage	Operating system	Languages inc	Other languages available	Distributor	Comments
						Max characters columns x lines	Method (if extra cost)	Colour capability			Max dot resolution	Type of keyboard	No. of function keys	Numeric pad						

# HARDWARE

ACT Apricot	£1,719	8086A	5	256K	768K	80×25	LCD		800×400	W	8	●	1	1	2	2×315K3¼F	MSDOS	Ba	●	A7	PCN issue 37	
Adds Multivision	£3,795	8085A	5	64K	256K	80×25	M		640×240	W	28	1	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	Ba	●	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						2×800K5¼F	CP/M	Ba	●	A4	8-bit range goes to 20Mb	
Almarc 1601	£3,445	8086	8	128K	1Mb	80×25 (M+)	●			W						2×800K5¼F	CP/M86	Ba	●	A4	Pseudo 16-bits go to 20Mb	
Aquarius	£68	Z80A	4	4K	52K	40×24	TV	●	320×192	C							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	Ba	●	L1	Multi user business machine	
APL Signet	£1,610	Z80A	4	64K		80×25	Tv(M+)	●								2×188K5¼F	APL, CP/M	Ap	●	M1	*APL terminal recommended	
Apple II	£776	6502	1	48K	128K	40×24	Tv(M+)	●	256×192	W							CP/M, DOS 3.3, UCSD-P	Ba	●	A8	Plenty of software and extras	
Apple IIe	£972	6502	1	64K	128K	80×24	(M+)	●	256×192	W							DOS	Ba	●	A8	Updated Apple II	
Apple III	£2,780	6502	2	128K	256K	80×24	(M+)	●	560×192	W						1×140K5¼F	SOS, DOS	Ba	●	A8	Will emulate Apple II	
Apple Lisa	£9,775	68000	8	1Mb		120×30	M		792×360	W						2×860K5¼F	Lisa	Ba	●	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	Ba	●	S1	Standard CP/M + graphics
Atari 400	£150	6502B	1.79	16K		40×24	Tv	●	320×192	T	3						Cassette	Ba	●	A5	Games computer	
Atari 800	£300	6502	1.8	48K		40×24	Tv(M+)	●	320×192	W	3						Cassette	Ba	●	A5	Versatile, good graphics	
Atari 600XL	£160	6502C	1.79	16K	64K	40×24	(M+)+Tv	●	320×192	W	5					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					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				BaAs	●	C12	Apple bus, Z80, 80 columns	
BBC Micro Model B	£399	6502	2	32K		80×30	Tv(M+)	●	640×256	W	10							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			W	14	●	1	1			2×350K5¼F	CP/M	Ba	●	B2	CP/M business machine
Bonsai SM 4000	£2,842	8088	5	128K	256K	80×24	M			W	14	●	1	1				Ba	●	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	Ba	●	B4	This is CP/M compatible
CAL PC	£2,294	8088	5	128K		80×25	TvM	●	256×512	W						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	●						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	Ba	●	C3	Range of software included
Computers Lynx	£225	Z80A	4	48K	192K	40×24	Tv(M+)	●	248×256	W								Ba	●	C5	Also 128K with CP/M	
Canon AS100	£2,633	8088	4	128K	512K	80×25	M	●	640×400	W	12	●	1	1	4		2×640K5¼F		Ba	●	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								Cassette	Ba	●	C6	Business pocket computer
Casu Mini C Mark 2	£2,300	Z80A	4	64K		(M+)				C						2×1Mb8F		Ba	●	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	Ba	●	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	Ba	●	C17	Optional 68000 processor
Clenlo Pronto	£3,795	Z80A	4	64K	1Mb	*	Tv(M+)	●								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	Ba	●	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			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							Kernal	Ba	●	C9	Very popular home micro
Commodore 64	£229	6510	1	64K		40×25	Tv(M+)	●	320×200	W	8							Kernal	Ba	●	C9	PCN issue 24
Commodore 4016	£632	6502	1	16K	32K	40×25	TvM	●		W								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	80x25	TvM			W	●	1	1	1	●	Cassette, PETDOS	Ba	●	C9	The 80-column PET		
Commodore Super Pet 9000	£1,719	6502	2	96K		80x25	TvM			W	●	1	1	2	●	Cassette, PETDOS	Ba	●	C9	Top of the range		
CompuCorp 675	£6,780	Z80	4	64K	256K	80x20	M			W	20	●	1	4		2x655K5/4F	CompuCorp	●	C10	Unusual O/S		
Compustar	£5,837	Z80A	4	64K		80x25	M			W	●	2				1x10Mb5H+1x350K5/4F	CP/M	Ba	●	I10	Networking system	
Comart Communicator CP100	£2,180	Z80	4	64K	512K	80x24	M			W	●	2	1	10		2x390K5/4F	CP/M	●	C13	Business CP/M micro		
Corona PC1	£2,697	8088	5	256K	512K	80x24	M	●	640x320	W	1	●	1	1		2x144K5/4F	CP/M	Ba	●	N1	Price includes twin disk drive	
Corvus Concept	£4,887	68000	8	256K	1Mb	120x60	M		720x560	W	10	●	2	1	4		Merlin	Pa	●	K1	A4 shaped screen	
Country Computers C1000	£4,542	6502	1	64K	128K	80x24	M		280x192	W	12	●	1	3		1x10Mb5/4H+1x140K5/4F	DOS, CP/M	Ba	●	C16	Runs all Apple software	
Country Computers C3000	£2,242	Z80A	4	64K	256K							1	1			1x5Mb5/4H+1x500K5/4F	CP/M	●	C16	*Terminal own choice		
CP1100	£2,639	8086	6	128K	1Mb		(M+)*					2	1			2x390K5/4F	CP/M 86	●	C13	Choose your own terminal		
Cromemco System 1	£3,025	Z80	4	64K		80x24	(M+)	●	450x735	W	20	●	1	7		2x390K5/4F	CDOS, Crom	●	C13	Upgrades available		
Cromemco C10	£1,350	Z80	4	64K		80x25	M		80x25	W	2	1				1x390K5/4F	CP/M	Ba	●	C18	Low cost CP/M machine	
C/WP Cortex	£2,179	Z80	6	64K		80x25	M		600x240	W	10	●	1	1		2x360K5/4F	CP/M	Ba	●	C20	Z80 plus 6502	
DAI PC	£684	8080	2	48K		60x24	Tv(M+)	●	255x335	W		1					Cassette	Ba	●	D9	Optional maths chip	
Datasc Micro Controller	£431	Z80	2	16K		40x24	Tv(M+)		80x60	W			1	1	1			Ba	●	D1	Mainly used in labs	
DEC Rainbow 100	£2,714	8088	N/A	64K	192K	132x24	M	●	960x240	W	20	●	2	3		2x400K5/4F	CP/M	●	D2	Versatile business machine		
DEC PC 325	£3,080	POD11/23	N/A	256K		132x24	M	●	960x240	W	20	●	2	1		2x400K5/4F	P/OS	●	D2	Mini in micro clothing		
Decision-1 Computer MDC-011	£2,869	Z80A	4	64K	192K		(M+)*					3	1	1		2x400K5/4F	CP/M	Ba	●	I2	*Buy your own terminal	
Diablo 3000	£7,250	8085	3	32K	64K	80x24	M			W	8	●	1	4		2x1.8Mb8F	DACL	Ba	●	B5	Unusual O/S	
Digico Prince	£3,392	Z80A	4	64K		80x25	M			W	50	●	2	7		2x400K5/4F	CP/M	●	D3	Unusual keyboard		
Digital Microsystems DMS-3	£3,576	Z80A	4	64K		80x25	(M+)*					3	1			2x512K8F	CP/M	●	D4	*Choice of terminal		
Digital Microsystems DMS-4	£6,210	Z80A	4	128K	1/2Mb		(M+)*					4				2x512K8F	MP/M	●	D4	*Depends on terminal chosen		
Direct 1000	£3,093	Z80	4	64K		80x25	M		132x28	W		2				2x300K5/4F	CP/M	●	D5	Standard CP/M machine		
DMS Fox	£2,875	Z80A	4	64K		80x24	M			W	16	●	3	1	1		1.2Mb5/4F	CP/M	●	D4	Portable machine	
Dragon 32	£174	6809E	1	32K	64K	32x16	Tv(M+)	●	256x192	W			1	4	1			Cassette	Ba	●	D6	Tandy colour lookalike
Durango F85	£5,744	8085A	5	64K	196K	80x64	Tv(M+)			W		4	1	12		2x1Mb5/4F	Star Basic	BaCo	●	C3	Built in printer	
Eagle II	£2,702	Z80A	4	64K		80x24	M		80x24	W	●	2	1	1		2x500K5/4F	CP/M	Ba	●	M3	Upgrades available	
Eagle 1600	£6,497	8086	8	128K	512K	80x25	M	●	720x352	W	24	●	2	1	8		1x1Mb5/4F+1x12.5Mb5/4H	MS-DOS, CP/M 86	●	M3	High speed IBM copy	
Electron	£199	6502	2	32K		80x32	Tv(M+)	●	640x256	W	10						MOS	BaAs	●	A1	Excellent beginners' machine	
Enterprise 1000	£2,645		8	64K			M			W	10	●	2	2		2x358K5/4F	Enterprise	●	D7	Micro Nova 16-bit		
Epson HX20	£472	6301	1	16K	32K	20x4	LCD		120x32	W	13	●	2	2			Cassette	Ba	●	E2	Portable bitable	
Epson QX10	£1,995	Z80	4	192K	256K	80x25	M		640x400	W	18	●	1	1	5		2x320K5/4F	CP/M	Ba	●	E2	Expansion required for Valdocs
Equator	£6,842	Z80A	4	64K	448K	80x24	M		255x560	W	14	●	7	1	8		1x5Mb5/4F+1x750K5/4F	CP/M, MP/M, Turbo DOS	●	E3	Two bigger models available	
Facit 6520	£2,645	Z80	4	64K	128K	80x24	M		80x24	W	8	●	2			2x320K5/4F	CP/M, Facit DOS	Ba	●	F1	Concurrent printing	
Fortune 32:16 System 2	£5,204	68000	6	256K	1Mb	80x24	M	●	1024x1024	W	16	●	1	20		2x800K5/4F	Unix	●	I3	Genuine 16-bit		
Franklin Ace 1000	£914	6502	1	64K	128K	40x24	M, Tv	●	256x192	W	●	1	1	4	1		2x140K5/4F	opt CP/M	Ba	●	C15	Apple IIe compatible
Fujitsu FMB	£1,150	6809	1	64K		80x25	(M+)	●	640x200	W	10	●	1	1	4	1		Flex	Ba	●	S2	Good for business graphics
Future Computers FX-20	£2,156	8088	8	128K	1Mb	80x25	M		800x400	W	20	●	2	2		2x800K5/4F	CP/M 86, MS-DOS	●	E1	Business micro, runs CP/M		
Genie II	£299	Z80	1.7	16K	48K	64x16	Tv(M+)		128x48	W	4	●	1		1		Cassette	Ba	●	L2	Speeded-up Genie I	
Genie III	£1,897	Z80A	3.2	64K		80x24	M		160x72	W	8	●	1	1	3		2x700K5/4F	New DOS	Ba	●	L2	CP/M costs extra
Colour Genie	£168	Z80	2.2	32K		40x24	Tv(M+)	●	160x96	W	8	●	1	1	2	1		Cassette	Ba	●	L2	Home games machine
Gemini Galaxy 2	£1,719	Z80	4	64K	512K	80x25	M		160x75	W	10	●	1	1	5		2x400K5/4F	CP/M	●	G1	Low cost British system	
Globe 101	£1,850	8085	3	64K		80x24	M			W	20	●	3			2x325K5/4F	CP/M	●	G4	Wordstar plus Mail Merge inc.		
Grundy 8200	£1,850	Z80	4	64K	256K	80x24	M		160x70	W	10	●	1	1			2x390K5/4F	CP/M	●	C19	Software included	
Haywood 9000 Composite	£2,064	Z80A	4	64K	192K	80x25	M		64x255	W	34	●	2		8		2x320K5/4F	CP/M	As	●	H1	Designed for network
HP 75C	£883	Cust.	N/A	16K	24K	32x1	(M+)			C				1	4		1.3K card reader	HP	Ba	●	H2	Calculator computer
HP 85	£2,360	Cust.	N/A	16K	32K	32x20	M		255x191	W	8	●	1	4	4			Cassette	Ba	●	H2	Engineers' machine
HP 86A	£1,570	Cust.	N/A	64K	512K	80x24	M		544x240	W		1	1	2	4			HP	Ba	●	H2	CP/M optional
HP 87XM	£2,571	Cust.	N/A	128K	640K	80x24	M		544x240	W	14	●	1	1	3	4		HP DOS	Ba	●	H2	Special technical uses
HP Series 100, 120	£2,362	Z80A	3.68	64K		80x24	M		80x24	W	8	●	2				CP/M	Ba	●	H2	Top end HP business system	
HP Series 200 Model 16A	£3,212	68000	8	128K	750K	80x25	M			W	5	1	1	1	2		HP	●	H2	Genuine 16-bit		
Husky Hunter	£997	NSC800	4	80K	208K	40x8	LCD		240x64	C	8	1					CP/M	Ba	●	D10	Waterproof, with metal case	
Hyperion	£3,100	8088	4.7	256K		80x25	M		320x200	W	10	●	1	1	1		1x320K5/4F	MS, DOS, CP/M 86	BaAs	●	G5	Same as Ajlite
Hytech H4500	£4,130	Z80	4	64K	208K	80x25	M		80x25	W	26	●	1		3		2x403K5/4F	CP/M	Ba	●	H3	Standard CP/M micro
IBM PC	£2,392	8088	4.7	64K	576K	80x25	(M+)	●	640x200	W	10	●	1		5		1x360K5/4F	MS-DOS	Ba	●	I9	Slow but reliable
IBM PCXT	£4,258	8088	4.77	128K	640K	80x25	(M+)	●	350x720	W	12	●			8		1x10Mb5/4H	DOS 2	Ba	●	I9	8087 co-processor possible

Make and model	Price inc VAT	Processor type	Speed in Mhz	Standard RAM	Max RAM — normally at extra cost	Display			Graphics	Keyboard		Interfaces built-in					Storage	Operating system	Languages inc	Other languages available	Distributor	Comments
						Max characters columns x lines	Method (at extra cost)	Colour capability		Type of keyboard	No. of function keys	Numeric pad	No. of RS232	No. of Centronics	No. of IEEE 488	No. of others						

# HARDWARE

ICL PC Model 15	£2,702	8085A	5	64K	512K	80x25	M	●		W	●	8					1x13.3Mb5¼H	CP/M, MP/M	Ba	●	I4	Suitable for small business		
IDS Datamachine	£1,995	Z80	4	64K	1Mb		Tv(M+)					2			15		2x400K5¼F	CP/M	Ba	●	I8	*Depends on terminal		
IO Tech Iona	£2,539	Z80	4	69K	960K	80x24	M	●	160x75	W	12	●	1			8	●	2x400K5¼F	CP/M	Ba	●	I5	Good colour versatility	
Intellivision + micro adaptor	£189.90	CP1610	2.4	5K		20x12	Tv	●	160x96	C						1	●		Cassette	Ba	●	M7	Computer adaptor is £89.95	
ITT 3030	£3,105	Z80A	4	64K	256K	80x24	Tv(M+)		80x24	W	8	●	1			1	1	●	2x280K5¼F	CP/M, BOS		●	I7	Top end business system
Jupiter Ace	£90	Z80	3.25	3K	51K	32x24	Tv(M+)		64x46	C							1	●		Fr		J1	Native Forth machine	
Kalamazoo 1050	£3,450	8085	6	64K		80x24	Tv(M+)		80x24	W	10		1					●	2x250K5¼F	Kalamazoo	●	K3	Only Kabol language	
Kaypro II	£1,949	Z80	4	64K		80x24	M			W	●	1	1					●	2x200K5¼F	CP/M	Ba	●	C15	PCN issue 35
Kaypro 10	£3,340	Z80A	4	64K		80x24	M		100x160	W	●	1			2			●	1x10Mb5¼H	CP/M	Ba	●	C15	PCN issue 35
Kemtron K2000E	£2,242	Z80	4	64K		80x24	(M+)		80x24	W	●	2			11			●	1x300K5¼F	CP/M		●	K4	Scientific keyboard
Kemtron K3000	£3,795	Z80	4	64K	256K	80x24	(M+)		80x24	W	●	2			14			●	2x1Mb8F	CP/M, MP/M		●	K4	For scientific use
Kenilworth B3G	£1,953	Z80A	4	64K		80x25	TvM		160x75	W	10	●	1	1				●	2x350K5¼F	CP/M		●	K5	British portable
Kontron RSI 80	£3,306	Z80	4	64K	128K	80x25	M		256x512	W	16	●	2	1				●	2x303K5¼F	Kontron	Ba	●	K6	O/S CP/M based
Krypton 800 range	£1,949	Z80A	4	64K	256K	80x24	M		80x24	W	13	●	2					●	2x386K5¼F	CP/M		●	T8	Fully definable characters
Laser 200	£70	Z80A	3.6	4K	64K	32x16	TV	●	32x16	C			1			1	●			Ba	●	C14	Cheap colour computer	
LSI M3	£2,064	Z80	2.5	64K		80x24	M		80x24	W	31	●	1	1				●	2x200K5¼F	CP/M		●	L3	Big, British and CP/M
LSI M4	£2,472	8088	5	128K	256K	80x24	M		160x72	W	31	●	2	1				●	2x400K5¼F	CP/M 86, CP/M80		●	L3	Z80 for 8-bit software
Logica VTS Vitesse	£2,863	8086	5	64K	256K	80x24	M	●	640x288	W	12	●	1	1		4		●	2x1Mb5¼F	CP/M, MS-DOS	Ba	●	L4	High-res colour graphics
Magnum	£1,489	Z80	4	64K		80x25	M			W	●	2						●	2x400K5¼F	CP/M		●	I6	Inexpensive CP/M machine
Marin Chip M9900	£5,750	9900	3	64K	1.6Mb	24x80	M		24x80	W	8	●	4		12			●	2x1.2Mb8F	MOS, MDEX	Ba	●	M2	Genuine 16-bit
Merlin M2215	£2,742	8085	5	64K		24x80	M			W	22	●	2		2			●	2x780K5¼F	CP/M	Ba	●	B7	Business computer
Micro Five 1000	£5,175	8088	8	128K	512K	25x80	TvM		512x512	W	20	●	10			2		●	2x1Mb5¼F+2x6.3Mb5¼H			●	F2	*Choose your own O/S
Micro Five 3000	£10,350	8086	5	128K	1Mb	25x80	TvM		512x512	W	20	●	5			3		●	1x10Mb8F			●	F2	*Choose your own O/S
Microdecision	£1,144	Z80	4	64K		80x24	(M+)						2					●	2x200K5¼F	CP/M	Ba, Pilot	●	M9	*Terminal extra
Microsolution British Genius	£1,840	Z80	4	64K		80x24	TvM		80x24	W	21	●	1	1				●	2x160K5¼F	CP/M		●	M4	'Genius' by nature?
Microtan 65	£389	6502	1	8K	48K	25x64	(TvM+)			W	●	1	2					●		Tanbug	Ba	●	M8	PCN issue 26
Millbank SX10	£2,754	Z80A	4	65K	256K	80x25	M		80x25	W	10	●	2		1			●	2x350K5¼F	CP/M	As	●	M5	Scientific applications
Minstrel	£2,059	Z80	4	64K	352K								2	1				●	2x400K5¼F	CP/M opt		●	H4	Choose your terminal
Molecular M200	£5,462	Z80	4	64K	320K		(M+)*						2		1	16		●	1x10Mb8H+1x500K8F	CP/M	BaAs	●	G2	*Terminal required
Monroe EC8800	£2,990	Z80A	3	128K		40x24	M		240x240	W	32	●	3		3			●	1x320K5¼F	Monroe	BaPaPilot	●	F3	Only 40-character screen
Monroe OC8810	£3,162	Z80A	3	128K		80x24	M		80x24	W	32	●	3		2	1		●	1x320K5¼F	Monroe	BaPa	●	F3	Bigger model available
Mupid 320-GB	£978	Z80A	4	64K	128K	40x24	Tv(M+)	●	320x240	W	55	●			1	2	1	●		CP/M+	BaAs	●	P6	PCN issue 22
Nascom 2/3	£327	Z80A	4	2K	64K	16x48	Tv(M+)		48x96	W	●		1			4	●		NAS, SYS	BaAs	●	L5	Old reliable	
NCR Decision Mate V	£1,983	Z80A	4	64K	512K	24x80	M	●	640x400	W	20	●						●	2x360K5¼F	CP/M 80	As	●	N3	PCN issue 8
NEC PC8000	£1,454	Z80	4	32K	64K	80x25	M	●	160x100	W	10	●	2	1				●	2x300K5¼F	CP/M, NEC, DOS	Ba	●	N1	Superb colour graphics
NEC PC8001	£1,375	Z80A	4	64K		80x24	M	●	100x200	W	10	●		1				●	2x144K5¼F	CP/M	Ba	●	N1	Price includes twin disk drive
New Brain A	£269	Z80A	4	32K	512K	80x30	Tv(M+)		640x220	C			2			1	●		Cassette	Ba	●	G3	A lot of promise	
North Star Advantage	£2,766	Z80	4	64K		80x24	M		640x240	W	15	●	1			6		●	2x360K5¼F	CP/M		●	T9	16-bit option
North Star Horizon	£2,294	Z80	4	64K	512K								2	1	1	9		●	2x360K5¼F	North Star DOS	Ba	●	T9	*Choose your own terminal
OEM Orion	£3,392	8086	8	128K	896K	80x25	TvM		800x400	W	13	●	11			6		●	2x500K5¼F	CP/M 86	BaCo	●	O5	*Full communications machine
Olivetti M20	£2,869	Z8000	3	160K	512K	80x25	M	●	512x256	W	●	1	1			5		●	2x320K5¼F	PCOS	Ba	●	B6	Real 16-bitter
Olympia Boss Model A	£2,645	Z80A	4	64K		80x28	M	●	80x28	W	10	●	1			4		●	2x140K5¼F	CP/M		●	O1	Useful 28 lines on screen
Onyx 5001 MU	£7,607	Z80A	4	128K	256K								5	1				●	1x7Mb5¼H	CP/M	Ba	●	T2	*Terminal extra; other models
Oric 1	£80	6502A	1	16K	48K	40x28	Tv(M+)	●	240x200	C				1	1			●		Cassette	Ba	●	O2	4-colour printer opt

Osborne 1	£1,581	Z80	4	64K		104x24	M		104x24	W 10	●	1	1			2x185K5/4F	CP/M	Ba	●	O3	Portable, includes software	
Panasonic JD 800M	£3,795	8085A	4	60K		80x24	M		80x24	W 21	●	3				2x250K8F	CP/M	Ba	●	P1	Larger model costs £5,002	
Pasca 640	£1,437	Z80A	4	64K		80x24	M			W	●	1	1			2x250K8F	CP/M		●	W1	Regular CP/M micro	
Pascal Modular Microengine	£7,003	WD900A	2	128K		*	*		*					8		2x1.2Mb8F	UCSD-P	Pa	●	P2	*Terminal extra	
Pied Piper	£1,226	Z80A	4	64K		80x24	Tv(M+)			W 36	●	4	1	1		1x780K5/4F	CP/M			S11	PCN issue 4	
Philips P3500	£3,000	Z80A	4	64K	320K	80x25	M			W 11	●	2				2x0.6Mb5/4F	Turbo-DOS	Co	●	P3	Fast O/S as standard	
Portico Miracle Portable	£2,064	Z80A	4	128K	256K	80x25	M		640x250	W 10	●	2	1	5		2x400K5/4F	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	
Positron 9000	£2,134	6809	1	64K	256K	80x24	TvM	●	480x240	W 12	●	4	1	3		O/S 9		Ba	●	P4	Multi-user version	
Powertran Cortex	£454	9995	12	64K	1Mb	40x24	Tv(M+)	●	256x192	W 12	●	1						BaAs		M2	Mainly sold as £340 kit	
Quantum 2000	£2,587	Z80A	4	64K	192K	80x25	M		160x75	W 18	●	1	1	5		3x860K5/4F	CP/M		●	Q1	Mono, low-res graphics	
Rair Black Box Model 3/20S	£2,242	8085	5	64K	256K	80x24	(M+)					2		8		2x1Mb5/4F	CP/M	Ba	●	R1	*VDU extra; many versions	
Rair Business Computer	£6,037	8088	5	256K	1Mb	80x25	M	●		W 10	●	2		4	8	1x19Mb5/4H+1x1Mb5/4F	CP/M, PCDOS	Ba	●	R1	Hybrid 8/16 bit	
Racal 6000	£6,327	Z80	5	64K	256K	80x26	M		80x26	W 21	●	1	1			1x600K8F	CP/M		●	R2	CP/M languages available	
Research Machines 380Z	£2,147	Z80A	4	32K	56K	40x24	Tv(M+)			W	●	1	1	4		2x144K5/4F	CP/M	Ba	●	R3	Widely used in schools	
Research Machines Link 480Z	£650	6800	4	32K	256K	40x24	Tv(M+)			W 4	●	2	1	1	2		Cassette	BaAs	●	R3	CP/Net version available	
Sage II	£4,019	6800A	8	128K	512K	*	(M+)		*			2	1	1		2x640K5/4F	UCSD-P System	BaAsPaFn	●	T10	*Terminal extra	
Sage IV	£5,962	68000	8	128K	1Mb	*	(M+)	●	*			6	1	1		2x640K5F+1x6MbH5/4	UCSD-P System	PaBaFn	●	T10	*Terminal own choice	
Samurai	£2,754	8086	4.6	128K	768K	80x25	M	●	720x400	W 12	●	3	1	3		2x1.2Mb8F	MS DOS, CP/M 86			●	M6	High-res colour graphics
Sanyo MBC 1000	£1,195	Z80A	4	64K		80x25	M		80x25	W 17	●	1	1			1x320K5/4F	CP/M	Ba	●	L1	Standard CP/M model	
Sanyo MBC 1250	£2,294	Z80	4	64K		80x40	M		640x400	W	●	1	1			2x640K5/4F	CP/M	Ba	●	L1	High-res graphics	
Sanyo MBC 2000	£2,242	8085A	5	64K		80x24	M		80x24	W 24	●	2	1	2		2x328K5/4F	CP/M	Ba	●	L1	Big disk model costs £3,622	
Sanyo MBC 4050	£2,817	8086	5	128K	512K	80x24	M		80x24	W	●	1	1			2x640K5/4F	CP/M 86	Ba	●	L1	Pseudo 16-bit	
Seed System 1	£2,300	6800	2	32K	64K	80x24	M		80x24	W 3	●	2		8		2x160K5/4F	DOS 68 Flex	Ba	●	S3	Ageing business machine	
Seed System 19	£2,600	6809	2	48K	1Mb	80x24	M			W 3	●	2		8		2x160K5/4F	OS-9		●	S3	Latest from Seed	
Sharp MZ80A	£347	Z80	2	48K		40x25	M		80x50	W	●							Ba	●	S4	CP/M facility extra	
Sharp MZ80B	£900	Z80A	4	64K		80x25	M		320x200	C 10	●							Ba	●	S4	Unusual keyboard	
Sharp MZ700	£250	Z80A	4	64K	68K	40x25	Tv(M+)	●	80x50	W 5	●		1	2	1			Ba	●	S4	PCN issue 27	
Sharp PC1251	£79.95	Cust.	.58	4.2K			LCD		24x1	C 18	●							Ba	●	S4	Pocket computer	
Sharp PC1500	£169	Cust.	1.3	3.5K		11.5K	26x1	LCD	156x7	C 6	●	1	1	2				Ba	●	S4	Optional 4-pan plotter	
Sharp PC3201	£2,300	Z80A	2.6	64K	112K	80x25	M		160x50	W 10	●			5		2x500K5/4F	Sharp Basic	Ba	●	S4	Powerful Sharp Basic	
Signet 10025	£1,599	Z80B	6	64K		80x24	M	●	512x512	W	●	2	1	1		2x200K5/4F	CP/M, Macnos		●	S9	Choice of keyboards	
Signet 2	£1,483	Z80	4	64K		80x24	(M+)	●	512x256	W 18	●	2				2x200K5/4F	CP/M			S9	Multi-user system	
Sinclair ZX81	£40	Z80A		16K	16K	32x24	Tv		64x44	C				1				Ba	●	S5	Sold a million	
Sinclair Spectrum	£99	Z80A	3.5	16K	48K	32x24	Tv		256x192	C				1				Ba	●	S5	PCN issue 14	
Sirius I	£2,525	8088	5	128K	896K	80x25	M		800x400	W 7	●	2	1	1	4		2x600K5/4F	CP/M 86, MS/DOS	Ba	●	A7	IBM style
Sord M5	£150	Z80A	4	4K	16K	40x24	Tv(M+)	●	256x196	C			1	2				Ba	●	S6	PCN issue 12	
Sord M23	£1,932	Z80A	4	128K		80x25	M	●		W 14	●	2	1	2	3		2x330K5/4F	Sord O/S, SB80	BaPips	●	S6	CP/M compatible
Sord M23P	£2,369	Z80A	4	128K		80x25	Tv(M+)	●	640x200	W 14	●	2	1	2	2		2x290K3/2F	Sord O/S, SB80	BaPips	●	S6	Complete with suitcase
Sord M223	£3,277	Z80	4	64K		80x25	M			W	●	2	2	4		2x350K5/4F	Sord O/S, SB80	BaPips	●	S6	Standard business machine	
Sord M243	£5,842	Z80	4	192K		80x25	M	●	640x400	W 15	●	4	1	4		2x1Mb8F	Sord O/S, SB80	BaPips	●	S6	Large and powerful	
SWTP SO9	£5,750	6809	2	256K	1.2Mb	80x24	M			W 15	●	1	1			2x1.5Mb5/4F	Flex, Unixflex		●	S7	Top end SWTP	
Spectrum	£11,442	68000	8	256K	4Mb	*	(M+)		*			4		16		2x720K5/4F	Mirage	Ap	●	M1	*As terminal	
Sundance I	£6,969	Z80A	4	64K	256K	132x24	M			W 4	●	1	1			1x7Mb5/4H	CP/M	Ba	●	T2	Ordinary CP/M machine	
Sundance II	£8,205	Z80A	4	128K	256K	132x24	M			W 4	●	1	1			1x7Mb5/4H	CP/M	Ba	●	T2	Middle-range Sundance	
Sundance 16	£10,480	Z8001	6	256K	1Mb	80x24	M			W	●	5	1			1x14Mb5/4H	BOS		●	T2	Tape backup for hard disk	
Superbrain JR	£2,127	Z80A	4	64K		80x24	M		560x240	W	●	2		1		2x160K5/4F	CP/M	Ba	●	I10	Bigger models available	
Superstar	£6,296	Z80	4	64K		80x24	Tv(M+)		80x24				1	1	8		1x10Mb5/4H+1x400K5/4F	CP/M 80	Ba	●	B7	Includes hard disk
Tandberg EC10	£3,000	8080A	2	64K		80x25	M			W	●	7				1x250K8F	CP/M, TOS	Ba	●	T3	Very early machine	
Tandy TRS-80 Model II	£1,999	Z80A	4	64K		256K	80x24	M		W 2	●	2	1			1x500K8F	TRS-DOS	Ba	●	T4	Big business machine	
Tandy TRS-80 Model III	£1,299	Z80A	2	48K		64x16	M		128x48	W	●	1	1	1		2x184K5/4F	TRS-DOS	Ba	●	T4	Standard TRS 80	
Tandy TRS-80 Model 16	£4,199	68000	8	128K	512K	80x24	M			W 2	●	2	1			2x1.2Mb8F	TRS-DOS	BaAs	●	T4	True 16-bit	
Tandy TRS-80 Colour Computer	£180	6809E	1	16K	32K	32x16	Tv	●	256x192	W	●							Ba	●	T4	Related to Dragon 32	
Tandy TRS-80 PC4	£50	Cust.	N/A	1/2K	1 1/2K	12x1	LCD		12x1	C 9	●			1	1			Ba	●	T4	Low-cost pocket computer	
Tandy Model 4	£861	Z80A	2	16K	128K	80x24	M		80x24	W 10	●	1	1			1x187K5/4F	TRS DOS	Ba	●	T4	Floppies versions available	



# Computers by Post

Cash 'n' Carry  
Now Available  
at our Croydon  
Showroom

All Prices  
Include VAT

## Sinclair 48K Spectrum



FREE

2 Best-selling Games from  
IMAGINE, ZIP-ZAP AND  
ZOOM! WORTH £11

£129.95

## BBC Model B

Includes FREE Killer Gorilla  
(Program Power)  
Hunch Back  
(Superior Software)  
Worth  
£15.90



£399.95

## BBC Word Processing Package

BBC Model B  
Disk I F  
Wordwise W P ROM  
Cumana LOOK Disk Drive  
Juki 6100 Daisy Wheel  
Printer + all cables

£1099.95

## Commodore 64



£189.95

Commodore 1541  
Disk Drive £209.95  
Including  
£105 worth of  
Software FREE

## The UK's Best Printer Prices

### DAISYWHEEL LETTER QUALITY

Smith Corona TPI (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 Matrix (S) 139.09+VAT = £159.95  
Remstar ZOI 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) 243.40+VAT = £279.95  
EPSON RX80 F T (P) 269.50+VAT = £309.95  
EPSON FX80 (P) 365.17+VAT = £419.95  
EPSON MX80 F T (P) 399.96+VAT = £459.95  
EPSON FX80 F T (P) 469.52+VAT = £539.95  
Seikosha GPOOR (S) 165.17+VAT = £189.95  
Seikosha GPOORS (S) 182.57+VAT = £209.95  
Seikosha GPOOVC (CBM) 182.57+VAT = £209.95  
Seikosha GP25OX (P + S) 217.35+VAT = £249.95  
Seikosha Friction Feed Adaptor 26.04+VAT = £29.95  
Seikosha GP70OR colour (P) 356.48+VAT = £409.95  
Star DP510 + 2K Buffer (P) 234.74+VAT = £269.95  
Star DP515 + 2K Buffer (P) 304.30+VAT = £349.95  
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

## EPSON HX20 with case



FREE  
Micro Cassette Drive  
(Usual Price £80)  
£399 + VAT  
= £458.85

## VIC-20 Starter Pack

Inc Cassette Deck  
Intro to BASIC + 4 Games  
plus 10 EXTRA FREE GAMES  
£135.95

VIC-20 21K  
Starter Pack  
plus  
FREE DATABASE PROGRAM  
£165.95

### Commodore

VIC 16K RAM inc Database £29.95  
Cassette Program £29.95  
16K/3K Switchable RAM Pack £34.95

VIC-20 5K £98.95  
VIC Package see box above £39.95  
C2N Cassette £189.95

### Commodore 64

1541 Disk Drive see box above £215.95  
1525 Tractor Printer £319.95  
1526 Friction tractor Printer £149.95  
1520 Colour Printer Plotter £149.95  
1701 Colour Monitor £219.95  
Simons Basic ROM £44.95  
Easyscript W P Disk £69.95  
Patspeed Compiler Disk £44.95

### Atari

400 16K inc BASIC £97.95  
800 48K inc BASIC £269.95  
600XL 16K £149.95  
Other New Models phone for prices

Dragon  
New Dragon 64 £219.95  
Dragon 32 £159.95  
Disk Drive inc Controller £259.95

### BBC

Model B See Box Above £81.95  
Disk Interface Kit £39.95  
Model B inc Disk I F £459.95  
Cumana 1x100K Disk Drive £204.95  
Cumana 1x200K Disk Drive £259.95  
Cumana 2x100K Disk Drive £385.95  
Cumana 2x200K Disk Drive £495.95  
Cumana 2x400K Disk Drive £649.95  
Disk Drive Cable, Manual + Form, disk extra £25.00  
Microvitec 14" RGB Monitor £235.95  
Wordwise W P ROM £39.95  
Beeb-calc W P ROM £35.95  
Acorn Electron Phone!

Sinclair  
Spectrum 16K £94.95  
Spectrum 48K see box above  
ZX Printer £37.95  
Kempston Printer I F £39.95  
Kempston Justick I F £17.95  
16K-48K Upgrade £22.95

ORIC1  
48K £129.95  
4 programs game pack £6.95  
Colour Printer Plotter £129.95

## Low Prices on Monitors

### Monochrome

Sanyo 12" med-res green 15 MHz 67.78+VAT = £77.95  
Sanyo 12" hi-res green 18 MHz 86.91+VAT = £99.95  
Phoenix 12" V, hi-res green 24 MHz 92.13+VAT = £105.95  
Phoenix 12" V, hi-res amber 24 MHz 95.60+VAT = £109.95

### Colour

Microvitec 14" std-res RGB 205.17+VAT = £235.95  
Microvitec 14" std-res RGB composite 234.74+VAT = £269.95  
Microvitec 14" med-res RGB 304.30+VAT = £349.95  
Microvitec 20" std-res RGB 286.91+VAT = £329.95  
Sanyo 14" med-res RGB 208.65+VAT = £239.95  
Commodore 14" 1701 Composite 191.26+VAT = £219.95  
Sony Profel 20" RGB composite 405.17+VAT = £465.95  
Sony Profel 27" RGB composite 573.87+VAT = £659.95



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 superceded 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 1 12 83

# AT LAST, A HOME COMPUTER THAT IMPROVES WITH AGE.



## I t's surprising how many first-time relationships with a home computer go sour with age.

You buy an attractive, discounted little machine so that you and the children can learn about computers.

Instead, you learn about its limitations: the dull graphics. The plugs that fall out. The cheap power supply. The unalterable "beginners" language. The stiff, fragile keys. No provision for future developments. If only you'd looked around a bit in the beginning... "Quality costs a little more, but it's usually worth paying for" (Personal Computer News—CGLM5 Review, June '83.)

The CGL M5 is designed and built by Sord, one of Japan's leading computer specialists, with three main ideas in mind.

First, to be easy and fun to learn and operate.

Second, to be rugged enough to last through hours and hours of operation.

And third, to form the basis of a powerful, versatile home computer system that won't need replacing until you're ready for a dedicated business system.

### Built to learn

The CGL M5 is designed to be easy for non-geniuses to use.

"On the M5, most of the work is done for you, and all that is left is the need to work out what to do next, rather than how to do it." (Personal Computer News, June '83.)

If you make a mistake, you can correct it with a simple movement of the cursor. So you only correct that mistake, not a whole line, nor do you have to indulge in complex edit commands.

Budding video game designers and computer artists will love to get their hands on the 16 colour graphics and 32 moveable images called "sprites."

"The M5 makes professional graphic

effects very simple for even the beginner to achieve." (Personal Computer World, Aug. '83.)

### Built to last

"It works first time, doesn't need a lot of mollycoddling and jiggery-pokery to persuade it to continue to do so, and what's even better, it continues to work well. You don't have to balance cold cartons of milk on the top, shove matches in the back to keep the plugs in, or press the keys with several pounds force to make them respond." (Personal Computer News, June '83.)

Being able to build things that work and carry on working without endless maintenance is something at which the Japanese

seem to excel.

### Built to grow

To be truly versatile, a home computer has to understand very different things.

So you need different "languages," which the M5 provides by supplying part of its memory in plug-in cartridges.

"The M5 eliminates the worst limitations on machines at this level, which is that they tend to be stuck with whatever language is provided by the management." (Personal Computer News, June '83.)

The computer is supplied complete with a Basic-I cartridge, a standard integer BASIC language and a simple learning text.

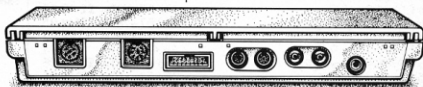
Plug in the Basic-G cartridge, and you can access the M5's incredibly sophisticated graphic and sound capabilities which are far in advance of similarly-priced computers.

Move on to the Basic-F cartridge, and you have scientific, technological and statistical computing power usually available only

on big computers with equally big price tags.

The FALC cartridge provides a tailor-made language for data management, spreadsheet accounts and business problems. Combine FALC with a disc and you could "turn the M5 into a small business machine" (Personal Computer Magazine, August '83.)

Now, take a look at the back of the M5.



Notice the sockets (usually an extra) for a standard

Centronics-type printer, the separate video monitor and hi-fi sound output.

Even the language cartridge socket has hidden potential:

"Unlike most such sockets, this one has 56 internal lines connected to it giving access to just about every function in the computer. This means that just about everything you can think of can be added onto the computer, ranging from a Prestel interface to second processor to use as an intelligent terminal on a timesharing computer"... (Electronics - The Maplin Magazine, March '83.)

Take a look at the home computer that will improve with age.

For a full technical specification of the CGLM5, details of the wide range of supporting software and to find out where to see a complete demonstration, send the coupon to: CGL, CGL House, Goldings Hill, Loughton, Essex IG10 2RR. Telephone number: 01 508 5600.

I'd like to know more about the CGLM5. Please send me a brochure and a list of dealers. PCN 4

Name \_\_\_\_\_

Address \_\_\_\_\_



BUILT TO LEARN. BUILT TO LAST. BUILT TO GROW.

David Janda checks out a chess program and decides the White Knight has earned his chevrons.

**W**hite Knight MKII, by Martin Bryant, has been developed in several stages over a period of years. This is important because one major prerequisite of a good chess program is an experienced chess programmer.

Although dramatically changed since its early days, a similar version was entered at the 1982 PCW Show and won second prize for best amateur program. Since then, it has been tidied up, boxed up, and is made available for the BBC model B by BBC Soft.

### Features

White Knight offers a number of facilities for playing ordinary and tournament chess, as well as for solving chess problems.

The commands allow you to set up the board for problem-solving, self play and so on. Two time clocks give the elapsed time for each player, which can be set.

White Knight gives you an idea of the mechanics of computer chess. When White Knight is thinking of its move, the lookahead depth of its search is displayed below the board. Also, to the right of the board the best line (move) is displayed and this can give you an idea of how the computer is going to play. Unfortunately, you can't turn off this part of the display.

Finally, after the computer's move, the number of positions examined is displayed. Pressing any key while the computer is thinking will abort the search and the best move so far will be played.

The game operates in one of four modes; equality, problem, tournament and average. In equality mode, the program tries to keep its elapsed-time-clock closely matched to the player's. This means that the program will play at a similar speed to the player, though unlike humans the machine doesn't get distracted.

Problem mode is used to solve chess problems. The problem is set up using the alter command and mating combinations of up to five moves can be found. Once a solution is found, you can play the move or tell the computer to go off and try to find an alternative.

Tournament mode offers the more advanced player first and second time controls, the duration of which are decided by the player. The program will not claim a win on time.

Finally, the fourth mode is the one which will be used more frequently than most. In average mode, the only limit is the time for each move with zero seconds being the fastest response time. The longer the time White Knight has, the better it plays so this effectively gives you thousands of levels of play.

Two facilities which are missing from White Knight are the ability to save a game to disk or tape and the ability to get a hard copy printout of the game's progress. Maybe these essential features will be included in later versions.

### Presentation

White Knight MKII comes in a plastic and cardboard affair with the cassette and

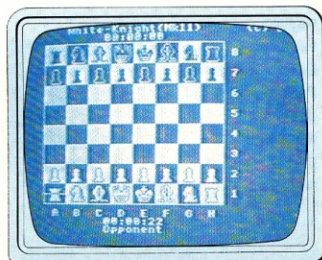


# Going on board

manual.

The instructions are brief and to the point. Everything is there that should be, but a few readings are required before running the program.

First comes the BBC Soft logo, then the Basic loader and finally the object code itself. If you wish to change the foreground or background colours of the display, then you will have to LOAD the Basic loader and change some VDU 19 statements. This is messy, and it should have been taken care of by the program rather than you having to fiddle about with the code.



Pick your gambit

### In play

White Knight MKII plays by brute force and then follows up the high scoring moves in more detail, which is why the more time you give it, the better it plays. However, White Knight will play a reasonable game given a short time; the default for the average mode is ten seconds a move, which also gave a reasonable game. Still on average mode, specifying a longer time per move makes the game harder, and you can go as far as you wish. This is the mode for beginners who wish to 'work their way up' through the levels.

With tournament mode, the 'book' players are going to be disappointed; there are no book openings in White Knight MKII. This isn't surprising as the game was written in only 20K. And whether this affects the whole outcome of the game can be left to the purists to argue. The game was a bit weak in the opening moves, but I don't think this is due to the lack of book openings. Indeed, after the initial moves, White Knight settles down to give you a good run for your money.

If you use a chess board to design and tackle chess problems, White Knight is for



**White Knight vs White Knight**

you. The speed at which it finds mating combinations is very impressive. From a collection of Meredith's chess problems, not one needed more than eight seconds before White Knight came up with one.

There were difficulties with the problem mode though. First, when seeking out a route to mate, White Knight would do its best to avoid a route which involved en-passant for either side, even though en-passant is supported. This may be related to a couple of problems which White Knight refused to answer. To one below is a good example:  
Mrs T B Rowland, 1889.

WHITE Ra5, Rc2, Pe2, Sf2, Pf7, Kf8, Qg4  
BLACK Pd4, Kd6, Re6, Pf4, Pf6

When set up, you can see that the key move is Pe4. After that, black can capture en-passant from the D or F ranks.

Alternatively, the King can retreat, or the Rook can move about. But it doesn't seem to matter because White Knight doesn't want to know.

**Verdict**

White Knight MKII plays a very strong game — especially mid-game — which will suit most people's tastes.

The flexibility in setting up tournament time parameters is a blessing for those wishing to play a more disciplined game, but for those who wish to play at 'levels' the average mode will suit them very well.

I hope the problem mode's difficulties are sorted out, because it is one of the game's strongest selling points. Apart from this, White Knight MKII is very highly recommended.

**RATING**

**Features**

**Documentation**

**Performance**

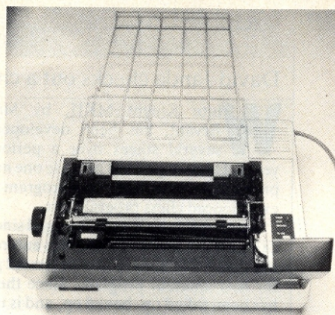
**Usability**

**Reliability**

**Overall value**



**Name** White Knight II Application  
**Chess-playing program** **System** BBC **Price** £11.50 **Publisher** BBC Publications, 35 Marylebone High Street, London W1M 4AA  
**Format** Cassette **Other Versions** None **Outlets** Mail Order/Retail.



**Specifications of the new Walters WM80**

**Printing method:** Impact dot matrix.

**Printing format:** Alpha-numeric: 7 x 8 in 8 x 9 dot matrix field. Semi-graphic (character graphic): 7 x 8 dot matrix. Bit image graphic: Vertical 8 dots parallel, horizontal 640 dots serial/line.

**Character size:** 2.1mm w x 2.4mm h / 7 x 8 dot matrix.

**Character set:** 228 ASCII characters. Normal and italic alpha-numeric fonts, symbols and semi-graphics.

**Printing speed:** 80 CPS, 640 dots/line per second.

**Printing direction:** Normal: Bidirectional, logic seeking. Superscript and bit image graphics: Unidirectional, left to right.

**Dot graphics density:** Normal: 640 dots/190.5mm line horizontal. Compressed characters: 1,280 dots/190mm line horizontal.

**Line spacing:** Normal: 4.23mm. Programmable in increments of 0.35mm and 0.118mm.

**Columns/line:** Normal size: 80 columns  
Double width: 40 columns

Compressed print: 142 columns  
Compressed/double width: 71 columns  
The above can be mixed in a line.

**Paper feed:** Adjustable sprocket feed and friction feed.

**Paper type:** Fanfold. Single sheet thickness: 0.05mm to 0.25mm.

Paper width: 101.6mm to 254mm.

**Number of copies:** Original plus 3 copies by normal thickness paper. (Max 0.25mm. Total thickness of 4 ply).

**MTEB:** 5 million lines (excluding print head life).

**Dimensions:** 377mm w x 295mm d x 125mm h, incl. sprocket cover.

**Weight:** 5.3Kg approx.

**Power requirement:** 240 v ac.

**Data transfer rate:** 4,000 CPS max.

**Synchronization:** By external supplied STROBE pulses.

**Handshaking:** By ACKNLG or BUSY signals.

**The Walters Warranty**

The new WM80 is supplied direct from Walters Microsystems International, the company who makes the dot matrix printer for the Department of Trade and Industry's Micros in Schools Scheme.

Under the Walters guarantee, all warranty work is carried out at our factory, normally within 48 hours of receipt of the machine at our service reception.

# The first matrix printer at a truly micro price.

## £199.

Now you can have a ruggedly built, handsomely styled, highly versatile printer with a performance as impressive as its price.

The new WM80 is an 80 CPS dot matrix printer which interfaces with most popular micro and personal computers. It comes direct from Walters Microsystems International at the unprecedented price of £199 + delivery + VAT by security courier.

### Impressive performance

The WM80 is bi-directional and logic seeking. It prints normal and italic, upper and lower case alpha-numeric characters at 80 columns per line, compressed characters at 142 columns, double width, plus symbols and semi-graphics.

### Programmable functions

The standard interface is Centronics parallel, RS-232C (SERIAL) is available as an optional extra. Programmable functions include variable margins and line spacing, horizontal and vertical tabulation, and 7 international language character sets. In total, it offers a 228 ASCII character set and has self-test facilities.

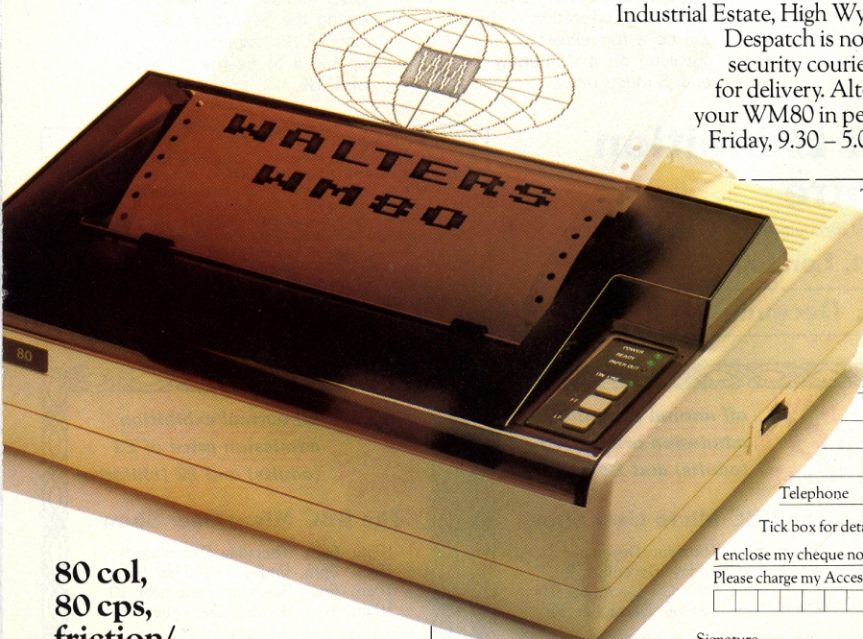
Major control codes include NUL, buzzer, backspace, line feed, horizontal and vertical tabulation, paper advance, carriage return, shift in, shift out.

Paper transport is by adjustable sprocket feed or friction. It uses fanfold paper, from 4" to 10" wide, printing up to three clear copies from an easily changed cartridge ribbon. Life expectancy of the print head is approximately 30 million characters.

### Ordering your WM80

The WM80 can be ordered by 'phone on 0494-32751; or by sending this coupon to: Walters Microsystems International, 'Matrix House', Lincoln Road, Cressex Industrial Estate, High Wycombe, Bucks HP12 3RD.

Despatch is normally within 7 days by security courier, but please allow 28 days for delivery. Alternatively, you can collect your WM80 in person from Monday to Friday, 9.30 - 5.00, Saturday 9.30 to 12.30.



80 col,  
80 cps,  
friction/  
tractor feed

To: Walters Microsystems International Limited  
'Matrix House', Lincoln Road,  
Cressex Industrial Estate,  
High Wycombe, Bucks HP12 3RD.

Please send me  
WM80 printers at £199 + £10  
delivery + VAT = £240.35 each

Name \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

Telephone \_\_\_\_\_

Tick box for details of optional serial interface

Enclose my cheque no. \_\_\_\_\_ for £ \_\_\_\_\_

Please charge my Access/Amex/Barclaycard Card No. \_\_\_\_\_

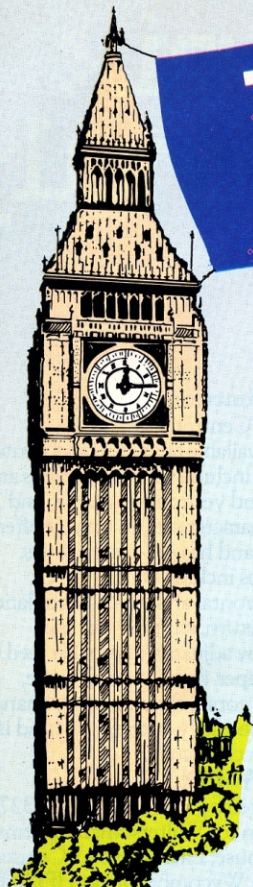
\_\_\_\_\_

Signature \_\_\_\_\_



**WALTERS MICROSYSTEMS INTERNATIONAL**

# THE BBC MICRO USER SHOW



Organised by  
Database  
Publications

The show that attracted record attendances in Manchester and Nottingham now comes to the heart of London - with a fabulous pre-Christmas bonanza of all that's best for the BBC Micro. There are lots more exhibitors, who will be using the show as a launching-pad for the very latest software, plus many hardware devices that are rapidly making the BBC Micro one of the most versatile computers of them all.

- ★ ASK the experts - free advice on all aspects of computing from people who know the BBC Micro inside out.
- ★ CALL in to one of our highly successful walk-in seminars, at which all the famous names from the world of BBC Micro computing will be taking part. Whatever your interest - graphics, machine code, interfacing, education - there will be a top expert speaking on it. (Saturday and Sunday only)
- ★ TRY OUT for yourself the games that will be the top sellers this Christmas - and well into next year.
- ★ FIND out about all the new peripherals for the BBC Micro - disc drives, interfaces, ROM boards, robots and second processors.
- ★ DISCOVER why the Electron - the baby brother of the BBC Micro - has been hitting the headlines and why all the experts are tipping it to be the big seller of 1984.

## Westminster Exhibition Centre

(formerly the Royal Horticultural Halls)

Greycoat Street, London SW1

Thursday to Sunday, December 8 to 11

### Exhibitors include:

Acom Computers, Akhter Instruments, Advanced Memory Systems, BBC Telesoftware, Bradford Office Supplies, Bucon Ltd, Computersolve, CJE Microcomputers, C-Tech, CWP, Clwyd Technic, Clares Micro Supplies, Cumana, Commotion, Deskfair, Economatic, Educational Computing, Eltec Computers, Electronequip, Educational Systems, Glengary Soft, Golem, Kirklands Computers, Kansas City Systems, L.C.L. (Ludinski Computer-Assisted Learning), Lowland Designs, Logic Sales, Micro Aid, Micro Power, Master Class, Microvitec, MW Systems, Miniature Tool Company, Opus Supplies, Oakleaf Computers, Proteus Computing, Pace Software Supplies, R.H. Electronics, Superior Software, SYSTEM, Twilstar Computers, Viglen Computer Services, Watford Electronics.

### SCHOOL PARTIES

Reduced rate tickets are available for schools and colleges. They will be sent first class if you phone Sue Casewell on the Show's Hotline -

**061-456 8383**

**£1**

off normal exhibition  
admission price of £3  
(adults) and £2 (children)

### The BBC Micro User Show

10am - 6pm, Thursday, December 8  
10am - 6pm, Friday, December 9  
10am - 6pm, Saturday, December 10  
10am - 4pm, Sunday, December 11

Westminster Exhibition Centre,  
Greycoat Street, London SW1.

PCN

**£1**

off normal exhibition  
admission price of £3  
(adults) and £2 (children)

### The BBC Micro User Show

10am - 6pm, Thursday, December 8  
10am - 6pm, Friday, December 9  
10am - 6pm, Saturday, December 10  
10am - 4pm, Sunday, December 11

Westminster Exhibition Centre,  
Greycoat Street, London SW1.

PCN

Bryan Skinner feels Basic programmers need more programming aids — does CRF have enough?

# Basic helpmate

CRF (Cross Reference Utility) is a programming aid for use with programs written in Basic on the IBM PC. It doesn't do much and is rather expensive, but it does show there are possibilities which have not yet been explored, which is surprising since there are so many Basic programmers.

## Features

CRF will plough through your Basic program and make up disk files which you can view on the screen or send to a printer. The 'analytical' functions are related to references to variables in your program. One of these will compile a cross-reference list, by line number, of every variable used in the program.

It also provides a breakdown of the number of lines, number of unique variables and explicit variable definitions (such as single precision). It will also pick out miscellaneous definitions such as DEF FN (Figure 1).

The second function gives the same information in alphabetical order of variables (Figure 2). This was more useful since you can see at a glance the line numbers where a variable is used.

The third process allows you to assign comments to variables in order to make your cross reference print out more readable (Figure 3).

## Presentation

CRF comes in a large binder which looks like a book. The colourful, glossy, hard cover is a bit of an oversell for the slim volume and disk inside, and while the cover would be difficult to misplace, the manual might well slip away.

## In use

CRF couldn't be easier to use. The hardest part is making sense of the manual which manages to make the simplest operations

sound complex. There's even a TRANSFER file which allows you to copy all two necessary files your working disk without having to use the IBM's COPY command. The nicest thing about CRF is that it's set up to use the function keys, so when you get the main menu you just hit the keys you want, then F10 to have them all executed.

I entered a very simple program to test CRF initially (Figure 4), though I needn't have bothered as a sample file is provided which lets you see how it works. Your Basic file has to have been saved in ASCII format, as in SAVE "PROG".A. If no extension is given, CRF defaults to .ASC.

Another problem was that you have to make sure there is at least a 38.5K of free space on your working disk for CRF's files.

CRF is fully error trapped. Error 25 occurs if you turn off the printer during printout, returning you to the main menu. CRF will not accept a file in non-ASCII format and will report the problem if there is a lack of space either on the disk or in the disk directory. There's simply nothing else to go wrong.

## Verdict

CRF is a moderately useful piece of software. It is, however, overpriced given its limited scope. Although it's a step in the right direction in terms of Basic debugging and optimising, it would have been nice to have seen rather more facilities included.

The program used to test CRF

```

10 REM SIMPLE PROGRAM
20 REM CIRCLE CIRCUMFERENCE AND AREA FROM RADIUS
40 PI=22/7
50 DEF FNC(RA)=2*PI*RA
60 DEF FNA(RA)=(RA*RA)*2*PI
70 CLS
80 PRINT "ENTER RADIUS ";
90 INPUT RA#
100 RA = VAL(RA#)
110 IF RA < 0 THEN CLS:PRINT RA#;" IS INVALID, PLEASE RE-ENTER":GOTO 80
120 CLS
130 PRINT "CIRCLE OF RADIUS ";RA
140 PRINT "CIRCUMFERENCE =" ;FNC(RA)
150 PRINT "AREA =" ;FNA(RA);" SQUARE UNITS"
160 PRINT:PRINT:PRINT
170 PRINT"PRESS SPACE TO CONTINUE, OTHER KEY TO EXIT"
180 A# = INKEY#:IF A#="" THEN GOTO 180
190 IF A#="CHR$(32)" THEN GOTO 70
200 CLS
210 END
    
```

Fig 4

If you don't specify an extension for the cross-reference files, the extension CRF is provided.

There are one or two limitations that caused problems during review. The most important of these is that CRF will only tackle programs up to about 450 lines long or using a maximum of 850 variable references. These figures are not exact; they will be determined by such factors as the length of variable names etc. This won't be a problem for many users, but reflects badly on the claim that CRF 'enables a programmer to ... achieve maximum capability from a computer system'.

## RATING

- Features
- Documentation
- Performance
- Usability
- Reliability
- Overall value



**Name** Cross Reference Utility (CRF)  
**Application** Programming aid **System** IBM PC  
**Price** £29.27 **Publisher** Sumar Corporation  
**Format** Cassette **Outlets** Mail Order  
 Prentice-Hall Inc., 66 Wood Lane End, Hemel  
 Hempstead, Herts. Spectrum Books (ISBN  
 0-13-194746-X).

Variables by Line Number

40	PI	Fig 1
50	PI RA	
60	RA RA PI	
90	RA#	
100	RA RA#	
110	RA RA#	
130	RA	
140	FNC() RA	
150	FNA() RA	
180	A# A#	
190	A#	

Variables Alphabetically

A#	180	180	190	Fig 2
FNA()	150			
FNC()	140			
PI	40	50	60	
RA	50	60	60 100 110 130	
	140	150		
RA#	90	100	110	

Statistics on CIRCLE.ASC

Total Line Count	20
Lines with Variables	11
Variable References	19
Unique Variables	6
Explicit Variable Definitions:	None
Misc. Explicit Definitions:	50 FNC(RA) 60 FNA(RA)
Elapsed Time:	0 Min 23 Sec

Statistics on CIRCLE.ASC

Total Line Count	20
Lines with Variables	11
Variable References	19
Unique Variables	6
Explicit Variable Definitions:	None
Misc. Explicit Definitions:	50 FNC(RA) 60 FNA(RA)
Elapsed Time:	0 Min 15 Sec

Statistics on CIRCLE.ASC

Total Line Count	20	Fig 3
Lines with Variables	11	
Variable References	19	
Unique Variables	6	
Explicit Variable Definitions:	None	
Misc. Explicit Definitions:	50 FNC(RA) 60 FNA(RA)	
Elapsed Time:	0 Min 14 Sec	
Commented Variables for CIRCLE.ASC		
A#	Continue yes/no	
FNA()	Area of circle	
FNC()	Circumference of circle	
PI	PI	
RA	Radius (user-defined)	
RA#	To trap input errors	

## Add on the Adman way

The Vic 20 really can speak...but only if you use an ADMAN SPEECH SYNTHESISER. It's word power is endless as there is no set vocabulary. Yet operation is simple. The 64 elements of English speech are pre-programmed to let you put your own words together as soon as you switch on. Just imagine...program adventure games with characters that can actually talk!

Also for your Vic 20 there are 8K and 16K RAM PACKS and the ADMAN 3 PORT EXPANSION MOTHER BOARD. With proven designs of the highest quality they are the best value for money around.

Available from Spectrum, Dixons and other major computer accessory shops

**Prices around:**

8k Ram Pack . . . . . £39.95  
 16k Ram Pack . . . . . £49.95  
 Motherboard . . . . . £19.95  
 Speech Synthesiser . . . . . £49.95

To find out more about these products, why not take a lead from our speech synthesiser...go to your local dealer and ask for it! Or post the coupon.

Dept. C, Adman Electronics Ltd., Ripon Way,  
 Harrogate, N.Yorks, HG1 2AU. Tel. 0621 740972

Adman Electronics Ltd. is a member of the Adam Leisure Group PLC

# The Vic 20 speaks out!

Please send me information on Adman Vic 20 Accessories

Name

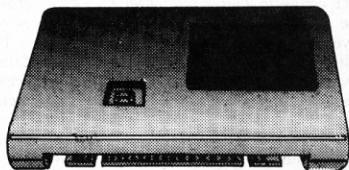
Address

PCN/12/83

# AMAZING !!!

## FOR THE VIC-20

The all *NEW* Fox switchable 16K Ram cartridge can now be (*unlike others*) switched without removing from VIC-20



- ALSO**
- Gives you the option of 16K, 8K or 3K in one cartridge.
  - Simply plugs into rear port.
  - Fully compatible with all existing motherboards.
  - Fully guaranteed (1 year).
  - 14 day moneyback guarantee if not delighted.
  - No re-addressing of existing Basic programs needed.

**ALL THIS FOR ONLY £33.95 INCL.**

SEND NOW TO



## FOX ELECTRONICS

141 ABBEY ROAD, BASINGSTOKE, HANTS. TEL: 0256 20671  
 CALLERS WELCOME

Please send me.....switchable Ram cartridge/s

I enclose £.....or Debit my Barclaycard No.

Name.....

Address.....

Overseas customers please add £3.50

Bob Chappell casts an eye over six Oric games and decides some are more ordinary than others.

# Oric omnibus

## ZORGON'S REVENGE

More like several games in one, this latest from IJK has you attempting to rescue the Princess Zor from the evil clutches of Zorgon. The only way to get into Zorgon's castle is by crossing the moat, which has first to be bridged by dropping magic stones into it. Each of the four stones can only be won by completing a mission.

In Bird Mission, you must catch hold of a flying bird which will transport you to higher levels and Light Bridges where you will find a stone. Beware falling rocks! Space Mission sets you zapping alien craft — the freighter carries a stone. In Spider Mission, you must avoid quicksand, leap for a dangling rope, dodge the spider, and watch out for an unhygienic bird. Quadron Mission has hydra-headed beasts spitting venom at you.

After each successful mission, you get the chance to drop the stone into the moat. When all four stones are in place, you can enter the castle where a further challenge awaits.

With its excellent graphics and concept, this is sure to be a big seller. Undoubtedly one of the best Oric games on the market.

## DRACULA'S REVENGE

Another enemy seeking vengeance is our old fiend, Dracula.

Although you are not the Lone Ranger, you do happen to possess a gun and a plentiful supply of silver bullets. You have therefore been elected to clear the various Transylvanian castles of their unpleasant contents.

What you see on the screen is a cross-sectional view of the castle interior; ladders join the various floors. Pretty soon werewolves will scurry up the ladders to greet you on the top floor — a silver bullet is the antidote. Ghosts can only be disposed of by exposing them to daylight; a leap to a window at

either end of a floor does the trick. Vampires are treated similarly but only when it is mid-day and they never venture onto your floor unless it is safe.

A pleasant enough game with good animated graphics. It lacks variety, though — all you get for surviving is more of the same only faster.

## HELL'S TEMPLE

I have mixed feelings about this one. The game itself is quite good. It's a maze game in which, using single key commands, you do battle against monsters as you search for treasure.

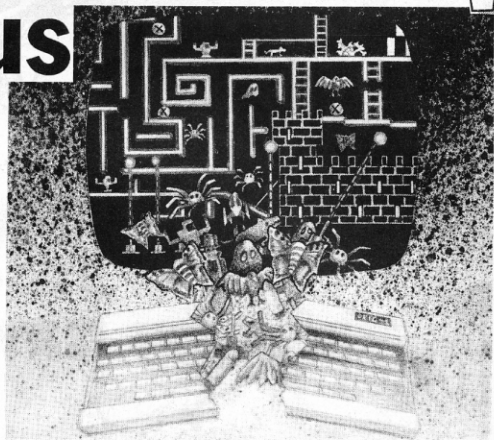
The cassette inlay is a different matter. It says the game is a state of the art adventure — it isn't anything of the sort. It is a standard, multi-level maze game in which nearly every room looks the same (three walls and doorways). The inlay has a grisly picture on the front which smacks more of sensationalism than artistic licence, and talks of hi-res colour graphics. The only interesting graphics come in the title/instruction sequence. Don't expect to see any monsters or objects — you only get to read their names (a small-print leaflet inside the case tells you there wasn't enough room in the program to use graphics to depict any of the monsters).

Finally the inlay says, in bold black lettering, 'parental guidance recommended for children under 16 years'. I can't imagine what they mean unless it's guidance on not believing everything you read since this game wouldn't frighten a timid tortoise.

The game itself is good value for money and is an enjoyable fantasy romp. I just hope Kenema does something about that cover — it could give the game a bad name, and that would be unfair.

## ULTIMA ZONE

From Tansoft comes this shoot-em-down game. Stage 1 has mandarin-faced aliens dropping bombs



down on your ship, which can only move left or right along the lower portion of the screen. If hit, the aliens release a fireball that breaks open a pen, releasing demented butterflies. You have a shield which affords temporary protection from the bombs, fireballs and butterflies.

Stage 2 has you firing at a device which, when hit, moves up or down and shoots sideways at stationary aliens. In Stage 3, you must manoeuvre your craft, frogger-like, through a steady flow of assorted spacecraft in an attempt to dock with a mother ship above. Completion of this gives you the mixture as before, but with faster and more numerous aliens.

Not tremendously varied or original. Nevertheless, the attractive graphics and sound plus sensibly placed control keys make it worth considering if you're looking for this type of game.

## DIGGER

If you're familiar with Apple Panic, the arcade favourite then, Digger will ring bells. You scurry about a multi-level complex, shinning up and down ladders in your endeavours to transport bags of gold to the bank. Monsters try to catch you, but you can thwart them by digging holes, luring them in, and promptly refilling the hole.

You can take a shortcut to another floor by jumping down a freshly dug hole, if you like, as

you have only a limited amount of time to complete your objective. Four skill levels are available and full on-screen instructions are provided.

The animation is rather jerky and the controls could be better placed. The monsters only differ in colour. Not a bad version of the game, though there are likely to be better ones around eventually.

## DIG DOG

Max the Mutt has to recover his buried bones (before the rats get them) by digging underground tunnels. Max can munch the rats if he has enough strength, otherwise they will munch him. And that's about it, really.

A graphically respectable dog doesn't make up for what is not a very interesting game. With little else in it to stimulate, it soon palls, despite Max's joyful sprint across the screen at the start of every game.

INVALID  
MOVE!  
SOUTH--  
CMD

**Zorgon's Revenge** (£8.50), IJK Software, Unit 3C Moorfields, Moorpark Avenue, Bispham, Blackpool

**Dracula's Revenge** (£6.95), Softek International, 12/13 Henrietta Street, Covent Garden, London WC2

**Hell's Temple** (£12), Kenema Associates, 1 Marlborough Drive, Worle, Avon SB22 0DQ

**Ultima Zone** (£8.35), Tansoft, 3 Club Mews, Ely, Cambs CB7 4NW

**Digger** (£6.95), Mercury Microwave, 1 Duxford Walk, Moston, Manchester 10

**Dig Dog** (£6.90), Taskset, 13 High Street, Bridlington, YO16 4PR



# DRAGON 32

**NEW!**

**MRC**

Air combat and ground strike. "joystick" controlled sights cannon fire and bomb release. Full colour. Hi-res graphics, 3D and sound. **£6.50**

**Fruit**

Compulsive, addictive, fruit machine. Using your skill with the holds, turn your £5 stake into £10 and beat the system. Hi-res graphics and sound. **£4.95**

**Look and Learn**

Educational picture recognition. Hi-res graphics, text and colour. Age 3-10yrs. **£4.95**

**Pontoon**

Super Hi-res graphics, full colour definition and card display. Fascinating, absorbing. **£4.95**

**Missile Command**

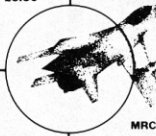
City defence from attacking missiles, progressively difficult. Arcade type. Joystick. **£4.95**

**Graphics Demonstrator**

3D rotation, drawing with joystick, approx. 50 examples of Dragon's impressive graphics. **£4.95**

**Tango Foxtrot 01**

Using your skill, locate the airstrip with the radar scanner. Fly your aircraft through hazardous crosswinds and air pockets to land safely. Watch your fuel, watch your artificial horizon, be sure you are level on final approach. Full colour. Hi-res graphics, 3D and sound. **£6.50**



MRC



# SPACE CRYSTAL

**Space Crystal**

Space trading adventure game. Fascinating 3D space travel on your voyage for the Illudium crystal. Black holes, hyper-drive, gamble planets and space pirates. Full colour and sound. **£6.95**

# ORIC 1

**Flight Simulator**

With airspeed, radar, ground/vertical flight path indicators, artificial horizon and altimeter with continuous flight monitor on engine condition, stall speed etc. Full colour, Hi-res graphics, 3D and sound. **£6.95**

**Moonster**

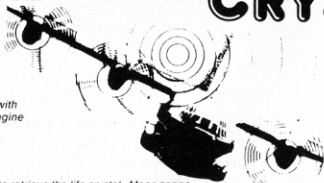
Defeat the guardians of Hyper to retrieve the life crystal. Mean zappo firing gremlins have orders to blast you on sight. Progressively difficult. Arcade type original. **£6.95**

**Quark 3 D Invaders**

Superb update of original arcade game, pushes oric to its limits. Full colour and sound. **£6.95**

**Super Fruit**

Excellent graphics and definition fruit machine. Full colour and sound, holds etc. **£6.95**



FOR

COMMODORE 64K DRAGON 32K  
ORIC 48K AND SPECTRUM 48K

QUARK DATA P.O. BOX 61, Swindon, Wilts. Tel. (0793) 40661.

Please supply.....

Prices incl. p&p. UK only.

Cheque for total amount enclosed.....

Name.....

Address.....



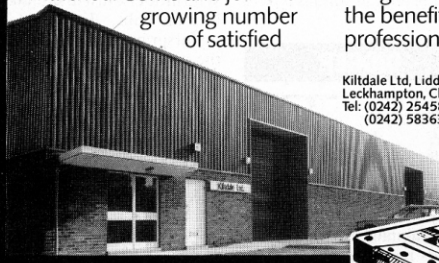
# DATA DUPLICATION

At Kiltdale, we provide the professional data duplication service.

More and more companies are turning to us to provide the quality of reproduction and speed of service that cannot be matched. Come and join the growing number of satisfied

clients - from individuals, to hardware manufacturers such as Commodore and Dragon, to software specialists such as Imagine - who have discovered the benefit of working with professionals.

Kiltdale Ltd, Liddington Industrial Estate  
Leckhampton, Cheltenham, Glos.  
Tel: (0242) 25458  
(0242) 583638



# Kiltdale

QUITE SIMPLY THE BEST

# SPECTRUM

## Ghosts in 3-D

**Name** Haunted Hedges **System** Spectrum 16/48K **Price** £6.95  
**Publisher** Micromega, 230-236 Lavender Hill, London SW11 1LE  
**Format** Cassette **Language** Machine code **Other versions** none **Outlets** Retail.

It did seem that every possible variation on Pac-Man short of Pac-Man on Ice had been tried, but here comes a new one — a 3D version.

### Objectives

In this you're collecting gold coins which are scattered around a more limited version of the famous maze, all the while being pursued by four ghosts. You can pick up one of the ice-picks lying about and become the pursuer . . . until the ice-pick melts, that is. From time to time assorted treasures will appear, and if you can get these before they go again you earn extra points.

### In play

The opening menu offers you several options: pressing I will get you the instructions; S will start the game; E will exit the game; H will hold a game, freezing the frame; pressing keys 1-5 will select the appropriate ghostly intelligence level, from moronic to Mensa; and K will enable you to choose which four keys you would like to use to control the movements.

What 3D means in effect is that instead of looking straight down onto the maze your

viewpoint has been shifted slightly to one side to give the impression of depth, as if the characters were indeed running round a maze of hedges.

This 3D feeling is certainly effective, but although the graphics are impressive in this respect they're not quite matched by the movement of the man.

He does dart about quickly enough, though, and he will continue to run in a particular direction till you press another key, meaning that you can pre-program him to turn the next corner. If you're nippy enough with your three lives and can score 10,000 points you gain an extra life. There's a high-score record at the top of the screen, and each time you complete a screen you get a new one with more gold coins on it, as well as a general increase in speed, of course.



The game is definitely quick enough to be challenging, and four super-intelligent ghosts hurtling round proved too much for me. There's no sound apart from a sprinkling of pinks.

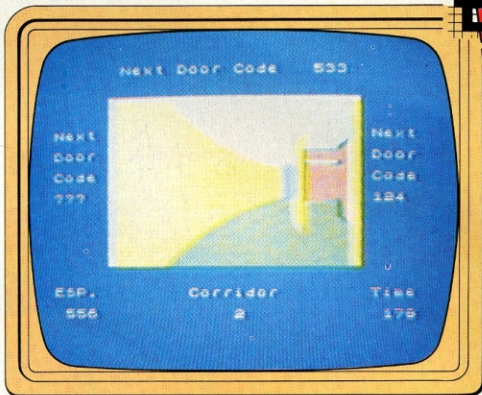
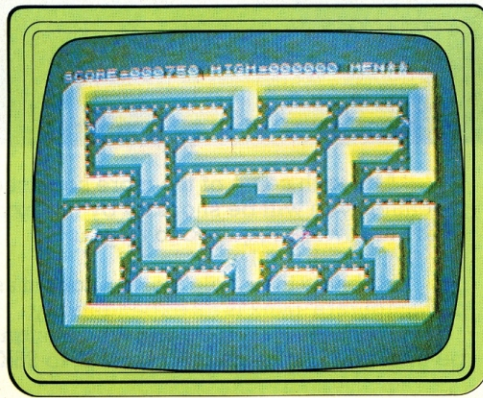
### Verdict

If you have a version of Pac-Man it's hardly worth getting another, but if you're hankering after one and don't insist on a carbon copy . . . well, 3D or not 3D, that is the question? My answer would be yes.

Mike Gerrard

#### RATING

**Lasting appeal**   
**Playability**   
**Use of the machine**   
**Overall value** 



## Sci-fi maze

**Name** Corridors of Genon **System** 48K Spectrum **Price** £5.95 **Publisher** New Generation Software, The Brooklands, Sunnysbank, Lyncombe Vale, Bath BA2 4NA, tel: (0225) 316924. **Format** Cassette **Language** Machine code **Other versions** None **Outlet** Mail order and Spectrum dealers.

Maze games, particularly the three dimensional variety, are becoming quite thick on the ground and authors are having to introduce new elements to tickle the customer's jaded palate. Here's one that has some novel features — circular corridors, sliding doors and code breaking.

### Objectives

Genon is destroying the galactic system. One hope remains — to penetrate the inner sanctum of Genon's computer centre, destroy it, then get out again. A nasty creature called Bogul patrols the corridors and will try to stop you. Doors in front and to either side must be opened for access to the inner layers — they can only be unlocked by a unique code. You are in a race against time and the enemy.

### In play

Supplied with the game is a neat, gold-numbered overlay which transforms the lefthand side of the Spectrum keyboard into an easily distinguishable numeric keypad.

The game starts by giving you an opportunity to practise your skills at code breaking. The screen displays a console surrounded by flashing lights. Rather like the old Mastermind

game, you need to find a three-digit code — the console displays a histogram telling you if a number is correct and in the right sequence. When the histogram shows a pile of six black squares, you've cracked the code.





You then plunge into the corridors, a series of curving red and yellow tunnels. Blue squares ahead or to the side are closed doors which must be opened by typing in the appropriate code. To help you, the top of the screen shows the positions of three adjacent doors, the codes of which are displayed or left as question marks. Entering the correct code causes the door to slide up with a hiss, allowing you entrance.

The steady sound of plodding footsteps alerts you to the nearby presence of Bogul, a round bodied, long-limbed creature. Meeting it head-on is harmful to your health. If you bolt through a door with Bogul close behind, it's advisable to shut it again (with the code) to hinder the creature's progress. Meanwhile, the central computer is opening and closing doors by itself and there is always a chance that the door before you may open by itself and bring you face to face with you-know-who.

### Verdict

An unusual game but the combination of maze-running and code-breaking may prove a bit too complicated for some tastes.

Bob Chappell

**RATING**  
**Lasting appeal**   
**Playability**   
**Use of machine**   
**Overall value** 



After you've owned a micro for a while you begin to wish you'd invested in a bigger memory.

But when you want to upgrade you are suddenly faced with a number of problems the brochures didn't mention.

If you have one of the cheaper models you probably won't be able to upgrade at all.

And with some of the more sophisticated machines you will be shocked by the expense of the hardware required to upgrade.


Not with the Lynx.

Probably the single most important aspect of Computers' Lynx is its expandability.

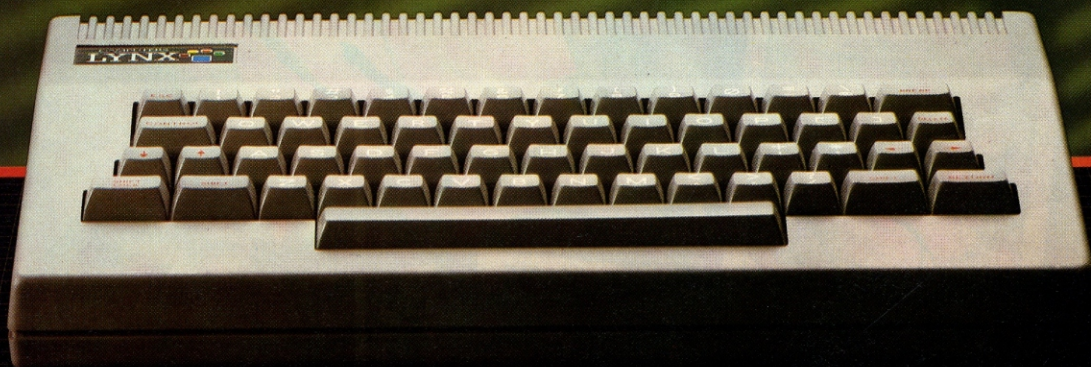
From the start the Lynx was designed to be upgraded—internally. From 48K, to 96K, to a

**48K Lynx £225 96K £299 128K £445**

Lynx micro-computers, peripherals and software are available from selected nationwide dealer network. For your nearest stockist, telephone 0223-315063.



# YOU WON'T HAVE TO BIN A LYNX.



fully professional 128K - and beyond.

The 128K Lynx (available December) with additional Disk Drives opens the door to the exciting world of CP/M\* where you will find a vast range of ready made small business programs from famous software houses.

You can buy into the Lynx system at a level that suits you and your family and be

assured that when you want to move on to bigger things you won't be left with a bin full of electronic junk.

\*CP/M is the trademark of Digital Research Inc.

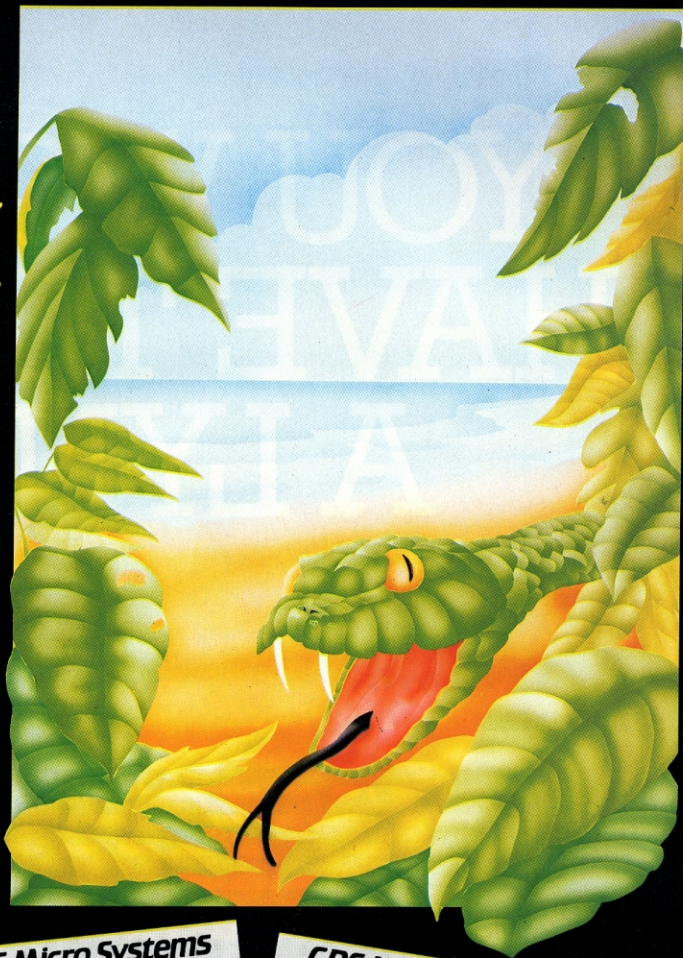


**EXPANDABLE NOT EXPENDABLE**

branches of Dixons, Laskys, John Menzies, Spectrum, Leisurebase, Big M, and a Computers PLC, 33A Bridge Street, Cambridge CB2 1UW.

# Experience CDS programs for yourself...

*This is 'Spectrum Safari'  
a brand new Adventure  
game from CDS.  
Just one of a new  
range of exciting  
programs for 1984....  
Arcade action....  
3D Space adventures....  
Education and pure  
fantasy....*



*new ....  
Spectrum  
Education*

**CDS Micro Systems**

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

\* Selected titles only

Available direct from CDS Micro Systems

Send Cheque or P.O. To CDS 10, Westfield Close, Tickhill, Doncaster DN11 9LA. Tel: (0302) 744129.



*new ....  
Spectrum  
Arcade  
action*





# BBC Model B

## Germ of an idea

**Name** Micro System BBC Model B  
**Price** £7.95 **Publisher** Virgin Games, 61/63 Portobello Rd., London, W11. **Format** Cassette  
**Language** Machine code, maybe a little Basic **Other versions** None  
**Outlet** Retailers/mail order.

Microbe is an excellent, and fast game. It is the first game from Virgin that I've been really impressed by, and I'm still spending far too much time playing it.

### Objectives

You have managed to find your way inside a huge alien. You are the microbe of the title. Your aim is to destroy the alien from the inside. This is of course impossible as the defences of the alien's inner reaches are its various parasites are intent on destroying you, but I am addicted to trying . . .

### In play

Playing the game depends to a certain extent on how fast you can keep pressing the spacebar. That's what you use for firing, and firing is the only way to stay alive.

The microbe appears as a large and brightly coloured hornet type figure. Not that I've ever seen a micro-organism this shape, but if it's fun — who cares? It is attacked by antibodies, red blood cells, amino acids and spores, and you control the microbe across the bottom of the screen with keyboard or joystick.

You do have the option of rising up into the middle of the screen, but it seems like suicide, since you can only fire forwards.

Although it's just another variant on the old space-invaders theme, it really did get me going. It's possibly partly to do with the speed of the game. The microbe fires as often as you press the spacebar, and there doesn't seem to be any limit to the game's speed.

One small criticism is that once you've got to about the 10,000 point mark (and that's not easy) the game just starts repeating. Even so it's never very long before you've been hit. And it certainly gets the adrenalin racing, and the wrist and fingers aching too. It strikes me that if the game was played too much then it might damage the keyboard, although I never had the opportunity to find out what it might do to a joystick.

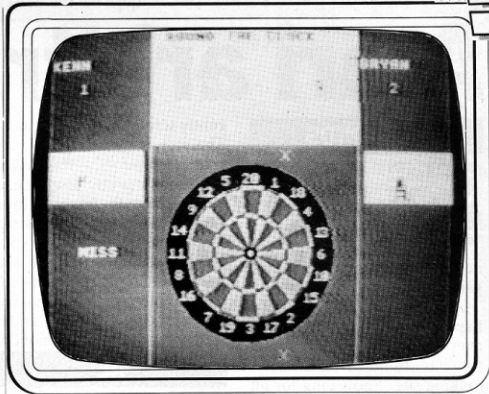
The usual impeccable Virgin instructions, and an interesting biographical note on the programmer, accompany the program, and the usual 'Join the Virgin Games Gang' offer.

### Verdict

The game is wonderful. Apart from some initial loading difficulties (in the end I succeeded with the B side where I'd failed with the A), the game is a great example of what can be done on the BBC. I'm addicted.

Piers Letcher

<b>RATING</b>	
<b>Lasting appeal</b>	☹☹☹☹☹
<b>Playability</b>	☹☹☹☹☹☹☹
<b>Use of machine</b>	☹☹☹☹☹☹☹☹
<b>Overall value</b>	☹☹☹☹☹☹☹☹



## Target practice

**Name** One Hundred & Eighty System BBC Model B **Price** £6.90  
**Publisher** A & F Software 830 Hyde Road, Manchester, M18 7JD  
**Format** Cassette **Language** Basic  
**Other versions** None **Outlet** Mail order/retail.

This game comprises every version of 301 you'd like (even 101, 201 . . . 901), a noughts and crosses game, round the clock, and Shanghai. And the aim is, of course, to beat your opponent.

### In play

It is difficult to come up with a really captivating game that emulates darts.

The feel of the dart in your hand, poised for flight, is missing for a start. It is possibly daft to try, in fact, as any attempt to recreate the atmosphere of live darts is lost the moment you touch the keyboard.

The game does call upon certain skills however. The ability to judge where you are in three dimensions is essential, and you have to guide your dart on its flight.

The screen is split into several sections. The dominant one is the darts board from a frontal view. The BBC's high resolution gives it a welcome clarity.

The next part is the throwing area seen from the side, and it's interesting to see that if you throw your dart a long way above the board it ends up in this area.

The screen also shows the two players, one sitting and the other standing. They don't seem to do anything else.

Talking of two players brings me to one of my most serious criticisms of the whole game: this is that you can't play against the computer.

If you don't happen to have a friend around, you can only use the game for target practice if you play for both people. And when each part of the game is finished you go back to the start. Not quite the start though, as it comes back asking for the second player's name only. ESCAPE will get you right back.

Other aspects are quite unusual too. The dart is lined up first of all in the horizontal plane, and then you loose it off. At that point you start controlling its up and down progress. Tricky, but more irritating than fun.

The horizontal control has a built in shake that is quite hard to master, and the skill level simply determines how bad your shake is. The glide is quite amusing in its own way.

### Verdict

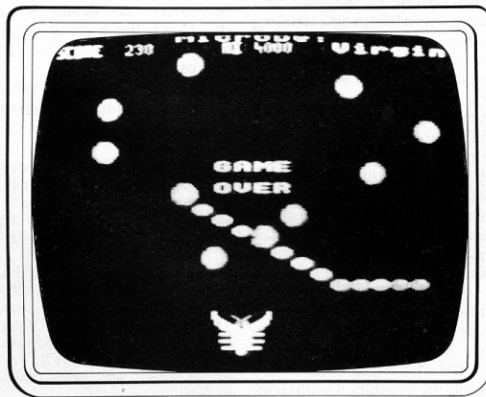
I'm a little bit disappointed with this game, particularly as the BBC has so much potential that is used here.

The graphics are not particularly wonderful and the resources of the machine aren't that well used.

To add to my own particular problems, I've got a disk operating system. To load the program type \*TAPE, PAGE=& E00, CHAIN\*\*\*\*, and the best of luck.

Piers Letcher

<b>RATING</b>	
<b>Lasting appeal</b>	☹☹☹
<b>Playability</b>	☹☹☹☹
<b>Use of machine</b>	☹☹☹☹☹
<b>Overall value</b>	☹☹☹☹☹



These Atari games have been appraised and applauded by Bob Chappell.

# Atari arbitrator

## DIAMONDS



English Software has brought out an excellent version of the tunnel-digging species of arcade game.

A prospector's lot is not a happy one. Digger Dan, an ever-hopeful diamond prospector, has stumbled on a likely-looking site. Shovelling for all he's worth, Dan carves out a series of underground tunnels, searching for the elusive carbon. He is not alone. A blob-like creature is after Dan. Not only that, a tidy soul called a Filler keeps running around filling in the freshly dug tunnels. Fireflies, snakes, ghosts and a demon also give Dan a hard time. The only way Dan can survive to enjoy the fruits of his labours is to undermine rocks so that they fall and impede the monsters — better still, make the cave-in squash the pursuers flat.

There are 16 levels, each of four screens. Finishing the fourth floor on level 16 reveals the Great Diamond — English Software is offering a more tangible reward (a trophy and free software) with an associated competition.

Diamonds is a compulsive game with attractive graphics and sound. A great excuse to skip digging the garden.

## FIREFLEET



Another good one from English Software — which is beginning to produce games to compete with American software for the Atari. Firefleet also has you delving underground, but in a large spaceship. The ship descends through a tortuous maze of caves, bombing away for dear life. The bombs are required for two reasons. Firstly, there are enemy cannons and tanks taking potshots at you as you pass by. Secondly, you need to do a bit of gate-crashing, so to speak.

There are four sectors, of increasingly difficult. Altogether, there are an astonishing 34 different screens of

gently scrolling, crisp graphics. The ship is just a fraction too wide for comfort — this makes the game a pretty tough challenge even on the lower sectors. Some of the twists and constrictions in the caves will have your jaw bouncing off the lino and your heart playing a drum-roll. All in all, a real test of nerve and co-ordination and, at under £10, very good value for money.

## AE



Something to do with the Japanese for Sting Ray, AE is aptly named.

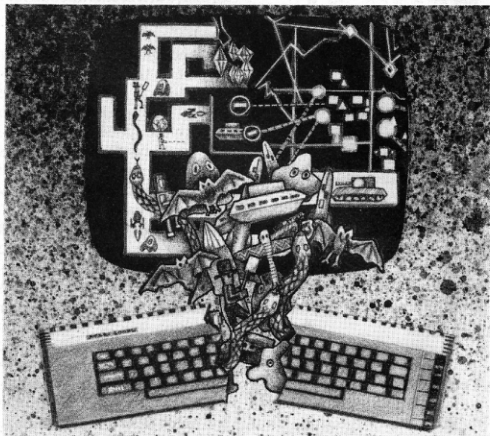
Although the theme is the familiar one of a space showdown, the aliens are a school of robots having every appearance of the aforesaid rays. The game has excellent 3D effects set against interesting backgrounds — the first is a futuristic city.

The robots (planetary vacuum cleaners gone homicidal) come swooping over the horizon in single file, swirling like a kite-tail. After threading their way round a couple of buildings, they are soon right overhead, dropping bombs. Because of the three dimensional effect, shooting back is not easy. You must judge the height and distance precisely.

Holding down the fire button and releasing it at the critical moment detonates an air bomb. You have to explode the missile right in the path of the leader — with luck, the leader and most of the followers will plough into it, going off like firecrackers. However, if just one of the wave escapes back over the horizon, your shooting is wasted as only complete destruction of a wave counts.

To progress to other levels, you have to knock out three waves. Higher levels have different backdrops and the AE use different flying formations, including splitting up to attack singly from every which way.

Due, I believe, to the program not being properly adapted for British TV systems, there is very little colour in the graphics. Nevertheless, the game has excellent 3D effects, good sound and a novel scenario which make it well worth having.



## COMPUTER WAR



Thorn EMI's latest has a grim theme. Based on the film, War Games,

Computer War puts you in charge of NORAD, the North American Air Defense System. On screen is a map of the USA and two banks of flashing lights. Approaching the nuclear bases marked on the map are several white blips — attacking missiles. Someone has broken into the computer and activated its nuclear war simulation program. Unfortunately, this computer doesn't know it's only make believe and unless you knock out the simulated attackers, it will start a global thermo-nuclear war.

Moving a sight across the map to one of the blips and zooming in brings up a scrolling landscape through which you track and shoot down the attacking missile. When a wave of missiles has been stopped, you must attempt a code breaking exercise (pattern matching on the banks of lights). This part is pretty feeble since you don't need to work it out: there are only 12 possibilities, and a simple sequential movement of joystick and fire button solves it quickly every time.

Any missile getting through to a US base brings war closer; if one reaches NORAD itself, war begins.

The whole affair is done very well; the graphics are interest-

ing and it makes effective use of sound. I might have enjoyed it more were it not for the awful reality of the theme — nuclear war. It's not easy to forget this when the program hands out such messages as 'Global nuclear war initiated' as I felt this was one of those subjects too sensitive to be placed in an entertainment context. The program does have a moral, though. As it says, 'The only winning move is not to play'.

## CAVERNS OF KHAFFKA

INVALID  
MOVE!  
SOUTH--  
CMD

A great title for a game and a pretty good game, at that.

A vast complex of claustrophobic chambers is filled with all sorts of hazards and obstacles: acid pits, crushers, moving floors, boulders, darts, bats, deadly walls, etc. Down these mean caves someone must go — you, but very carefully.

Excellent graphics and very, very challenging — makes Kafka's nightmares look like a Disney feature.

**Diamonds, Firefleet** (disk and cassette £9.95) English Software, Box 43, Manchester M60 1BW

**Computer War** (cartridge £29.95) Thorn EMI Video, Upper St Martin's Lane, London WC2N 9ED

**AE** (disk £24.95) Broderbund, USA

**Caverns of Khaffka** (cassette £14.95) Cosmi, USA.

The programs are available from Home Computers, 234 Church Street, Blackpool FY1 3PX. Tel: (0253) 22340 and other Atari dealers.

THIS YEAR  
HAVE AN OLD FASHIONED CHRISTMAS



# PLAY GAMES



**SNOOKER £8.95**  
ZX SPECTRUM VS 03-16  
BBC MODEL B VB 01-32  
VIC 20 3K VV 01-03  
COMMODORE 64 VC 01-64  
ELECTRON VE 01-32



**SHEER PANIC £5.95**  
ZX SPECTRUM VS 02-16



**PITMAN SEVEN £6.95**  
ZX SPECTRUM VS 01-46



**RAPEDES £5.95**  
ZX SPECTRUM VS 4-16



**STAR WARRIOR £6.95**  
ZX SPECTRUM VS 05-16



**DARE DEVIL DENNIS £7.95**  
BBC MODEL B VB 03-32  
ELECTRON VE 02-32



**PENGI £7.95**  
BBC MODEL B VB 04-32  
ELECTRON VE 03-32



**GUSHER £9.95**  
COMMODORE 64 VC 05-64



**BANANA DRAMA £9.95**  
COMMODORE 64 VC 06-64



**ARMAGEDDON £9.95**  
COMMODORE 64 VC 07-64

FANS PLEASE NOTE! ALSO AVAILABLE MAIL ORDER  
FROM VISIONS (SOFTWARE FACTORY) LTD  
1 FELGATE MEWS, STUPLAND STREET, LONDON W6  
TELEPHONE: 01-748 7478

*Visions*

THE ULTIMATE NAME IN VIDEO GAMES



The problem with buying a home computer, as you may already have discovered, is there's often very little software to go with it. Or all that is available is games, games and more games.

There's no such problem, however, with the Commodore 64. It has a more extensive range of serious software than any other home computer.

It also has an unusually large (in fact elephantine) 64K memory, as well as every peripheral you're ever likely to need.

Put simply, this means the computer has the capacity to run more interesting, entertaining and complex programs.

You can teach yourself just about any subject

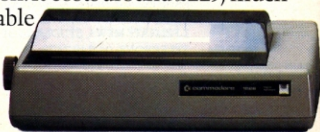
you care to mention, even computer programming.

And for the office there are programs like word processing, financial planning, information storage and stock control.

Finally, when you're mentally exhausted, you can even entertain yourself – yes, with games.

When all's said and done, however, we do have to admit that in one respect the Commodore 64 isn't up with the competition. It costs around £229, much less than any comparable machine.

And that's a fact we hope you'll never ever forget.





**When you have an  
enormous memory there's no end  
to the things you can do.**

Please send me further information on: the 64 computer  64 software   
disk drive  cassette unit  printers  monitor

Name (Mr. Mrs. Miss) \_\_\_\_\_

Address \_\_\_\_\_

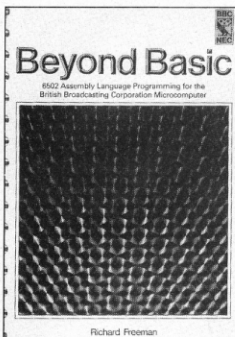
Send to: The Commodore Information Centre, 675 Ajax Avenue, Slough,  
Berkshire SL1 4BG. Or telephone (0753) 79292.



**commodore**

6SPCN112

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



**'Beyond Basic' by Richard Freeman, published by BBC Publications and National Extension College at £7.25 (paperback, spiral bound, 256 pages).**

The daunting complexities of an assembler routine to someone used to a tolerant language like Basic can be very off-putting. One approach to teaching machine code is to combine a self assessment textbook with programs ready to load into the computer. This is what Richard Freeman has done for the BBC micro in 'Beyond Basic'.

It starts with an outline of aims, a brief description of assembly language and reasons for its use. A series of self assessment questions and assignments are intended to test the knowledge acquired from each part of the text. The questions all have solutions at the end of each chapter, and in themselves provide a good deal of useful information. Green text highlights new or important information.

The early units are fairly predictable. It is difficult to devise new ways of explaining binary and hexadecimal or the structure of registers and memory locations. The assembler statements LDA and STA are the first to be introduced and the author takes this opportunity to explain the procedures necessary to include an assembler routine within a Basic program.

The uses of labels and single-byte addition and subtraction are covered in Unit 2 and with Unit 3 describes the processor status register with its various flags, and outlines conditional and unconditional branches, subroutines and the use of the X and Y.

Unit 4 gets into the nitty-gritty of addressing modes,

each of which is covered with examples of applications. This is true throughout the book; the reader is left feeling that the exercises do have practical application.

Multiplication and division are dealt with in Unit 5 and a discussion of lists and tables is well set out in Unit 6. The author begins here to use 400 built-in operating system routines offered by the BBC micro. Unit 7 describes use of the stack, one of the best explanations in the book, and masking, a complicated subject not completely demystified here.

Unit 8 is devoted to operating system calls, which is an area other assembler texts have fallen down on in the past.

Unit 9 covers 16 bit multiplication and division and sorting of strings, again illustrated by practical programs. Unit 10 rounds off the course with sections on common errors and programming style and appendices cover the BBC micro/ASCII character set and the 6502 instruction set.

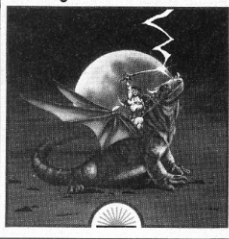
The cassette to go with 'Beyond Basic' includes all example programs listed in the book. However, none of the programs are particularly long and none should be beyond even the one-fingered typist.

I rate the book very highly. It is exhaustive, not exhausting, and covers most of the subject exactly and clearly. **SW**

**the dragon trainer**

a handbook for beginners

brian lloyd



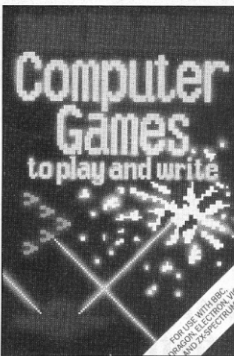
**'The Dragon Trainer — A Handbook for Beginners' by Brian Lloyd, published by Sunshine at £5.95 (paperback 181 pages).**

This is obviously written for first time micro owners which provides an immediate limitation to the book. This person

could become a proficient Dragon user with its aid, without even needing recourse to the manual, but the problem is that few such people exist. Hardly anyone is methodical enough to pick a book off the shelf at the same time as buying a computer. Most of us are more likely to get it home, fiddle around with the leads and sockets until it works, and then start playing. By which time Chapter 1 (possibly more) is redundant.

The introduction itself limits the apparent scope of the book, by saying that it should be read from cover to cover, since this no longer allows the reader the freedom to use the book as a reference guide, for fear of missing something vital.

The book's other major problem is that it doesn't really cover much more than there is in the User Manual, though it is much clearer to read. Also the author has added a 40-page appendix of six programs, but most of these are not particularly inspiring. **PL**



**'Computer Games to Play and Write' by Dan Isaaman, published by Sparrow Books at £1.50 (paperback, 126 pages).**

For just £1.50, this book offers clear and concise help for programmers of the Spectrum, BBC, Dragon, Electron and Vic. Dan Isaaman does this by having most of each program the same for all machines, and then an additional few lines that are machine specific. Though this limits the scope of the games, it doesn't matter too much.

Far more important than their scope is how these games stimulate your creativity and encourage you to write your own computer games. There is even a game at the end of the

book that takes you from a game's concept through to the finished work, explaining in detail what decisions are made and how they are implemented.

The book includes a chapter on Basic and its commands, though I think you would need a pretty good knowledge of Basic to find this useful. From 'Basic . . . isn't like English' to 'using the POKE instruction you can . . .' in just five pages is a little brief.

As a guide to how to write your own programs this is a good buy. Particularly useful are the author's program notes which enable you not only to understand his approach to each game, but also to learn how to change it yourself and gain experience through experimentation. **PL**

**'Games, Graphics and Sounds by Susan Curran and Ray Curnow, published by Windward at £5.95 (paperback, 144 pages).**

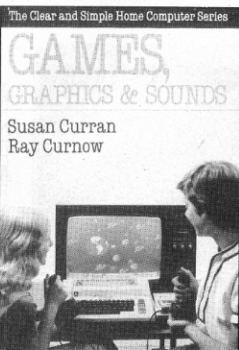
If you're interested in where games began, and what they'll be like in the future, you might find this book useful.

I've only seen one other book by these authors (First steps in Basic), and that also was lucid, and presented in such a way as to make the information it contained as accessible as possible.

It is a lucid and well-presented technical guide to computer games, graphics, sounds hardware and how to write games programs, all with excellent diagrams and summaries.

Half the book consists of programs, which, though not remarkable, give an understanding of how they work.

The programs are in Micro-soft Basic and are, therefore, suitable for most machines. **PL**





# MOGUL

## THE HOTWARE PEOPLE

### METAMORPHOSIS

VIC 20 · COMMODORE 64

You have stumbled into the nest of the Cyglorx and find yourself fighting off the Robot Tanks!

£7.95

### KONGO KONG

VIC 20 · COMMODORE 64

Climb ladders, avoid the barrels thrown by the Crazy Ape—rescue the Damsel.

£6.95

### ZEUS

COMMODORE 64

Your Cone of Cold protects you as you become the Wizard fighting off the Thunderbolts of the angry god—Zeus.

£6.95

### EARTHQUAKE

VIC 20 · COMMODORE 64

A great adventure, you are in a shopping centre during an earthquake. To save yourself you must first help the others!

£6.95

### CREATORS REVENGE

COMMODORE 64

Penetrate the depths of Robot City and kill the Creator. Destroy the robots—but watch out for new robots as they hatch!

£7.95

### SUPER TREK

VIC 20 · COMMODORE 64 · ORIC

Commanding the bridge of your Starship, you explore the Galaxy. Fend off the Klingon attacks with your Phasers.

£6.95

### ANNIHILATOR

VIC 20 · COMMODORE 64

Defend your Planet against Invading Aliens. All machine code makes for fast and furious arcade action!

£5.99

### PYRAMID

VIC 20 · COMMODORE 64

TI 99/4A

A really tough adventure game as you try to ransack the Pyramid. However the builders have left clues everywhere.

£6.95

### POLLYWOG

VIC 20

How do you Pollywog across danger to the safety of his home.

£6.95

### ANNIHILATOR 2

COMMODORE 64

Another Great Game from the author of Annihilator and Metamorphosis—Mike Wacker.

£7.95

### GREAT ADVENTURE PACK

VIC 20 · COMMODORE 64

Three Great Adventures in One Package. African Escape, Hospital Adventure, Bomb Threat. Great Action, Great Value, Great Fun.

£6.95

### PLUS

Four Great Games for the Spectrum 48K

**POTTY PLANTER · ADDER ATTACK · LAS VEGAS LADY · CRASH**

All at **£5.50**

**AVAILABLE FROM ALL GOOD DEALERS  
TRADE ENQUIRIES WELCOME**

MOGUL COMMUNICATIONS LIMITED · 90 REGENT STREET · LONDON W1R 5PT  
Telephone 01-437 3156/7

# PCN ProgramCards

This week marks the end of ProgramCards (pause for silence, grief etc). However, all is not lost. Next week we will be changing the layout and your programs will be listed in a new format. The new style will allow us to pack in more programs, illustrations, photographs of the programs in action, and include more details on how to convert the programs listed, from one machine to another.

The privilege of being the last new program to be featured in ProgramCards goes to Mark Leaver, of Halifax in West Yorkshire. His utility for the Sinclair Spectrum is a machine code routine for clearing the lower third of the screen. This allows users to write programs to draw graphics pictures, and then use the lower part of the screen for text, as in the example.

The machine code routine (printed here) could be altered and then used to clear other sections of the screen, or fill sections with characters. Try experimenting with different techniques.

```

5B04 21 00 50 LD HL,£5000H
5B07 01 00 08 LD BC,£0800H
L: 5B0A 3E 00 LD A,£0
5B0C 77 00 LD(HL),A
5B0D 23 INC HL
5B0E 0B DEC BC
tBOF 78 LD A,B
5B10 B1 OR C
5B11 20 7F JR NZ F7
5B13 C9 RET
    
```

The position in the display file of the beginning of the section to be blanked is placed in the HL registers at the beginning of the routine, and the number of places in the section is placed in the BC register pair. The character to be placed in the file is then put into the accumulator and the program is repeated from the L label (where the accumulator is loaded with zero) until BC reaches zero. Detecting when BC is zero, since no flags are set on the 16-bit register decrements, is done by taking the contents of B and ORing them with C. If both are zero, ie BC is zero, then the result of the OR will be zero.

Note that lines 5 to 30 and lines 9130 to

9100 are unnecessary to the routine itself: they are just there to give a demonstration of where the screen is cleared.

Even though we're changing the format, we will still require programs to put into our pages. In fact, we need even more, so if you have anything that you've written and is, in your opinion, any good at all, send it in.

Just send a cassette or disk containing your masterpiece, and include, if you can, a listing and comments on how it (or they) work. We pay for all the programs we publish on a sliding scale, depending on the originality of the idea, good use of the machine's facilities, good programming technique, and length of program. All your programs will be returned, at our expense, as soon as we've looked them over or published them.

Send them to:  
 Programs Editor,  
 Personal Computer News,  
 Evelyn House,  
 62 Oxford Street,  
 London W1A 2HG.

## PCN ProgramCards

### Lower CLS

### Card 1 of 1

8339LC1/1

```

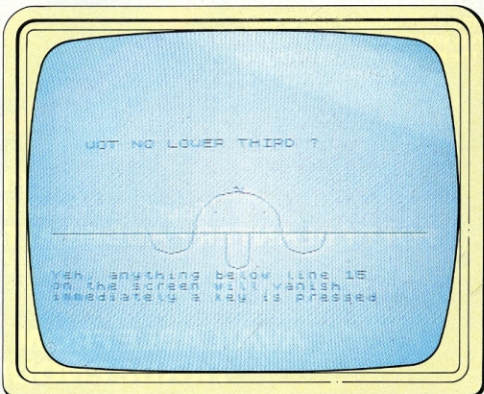
5 PAPER 7: INK 2
10 CLS
11 PLOT 00,50: DRAW 200,00,-PI
12 PLOT 00,50: DRAW 200,00,PI
13 PLOT 60,50: DRAW 300,00,PI
14 PLOT 150,50: DRAW 100,00,PI
15 PLOT 120,80: DRAW 0,0,PI
16 PLOT 100,80: DRAW 0,0,PI
17 PLOT 100,80: DRAW 0,0,PI
20 PLOT 100,50: DRAW 0,-10: DR
AW 16,0,PI: DRAW 0,10
21 PLOT 110,65: DRAW 1,0: PLOT
140,65: DRAW 1,0
22 PAUSE 100: INK 0
23 PRINT AT 7,3:"NOT NO LOWER
THIRD ?"
30 PRINT AT 10,0:"Yes, anything
9 below line 15 on the screen
will vanish": IMMEDIATELY A KEY
0:100 RESTORE: PAUSE 0
315: READ A: POKE 7,A: NEXT A
9110 DATA 33,0,80,1,0,0,0,110
,35,11,120,177,30,047,0001
9120 RANDOMIZE USA 0330001
9130 PLOT 110,65: DRAW 0,0,-PI:
PLOT 143,65: DRAW 0,0,-PI
9200 PRINT AT 10,0:"This is a sm
all subroutine which" is useful
for drawings etc." required to
remain on screen": PAUSE 0:
ing text is executed": PAUSE 0:
RANDOMIZE USA 23300: GO TO 30
    
```

```

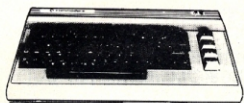
5 Set screen colours.
10 Clear screen.
11-23 Draw picture.
30 Print message.
9100 Reset data pointer and place code into memory.
9110 Data for machine code, note that numbers are in
decimal.
9120 Call routine.
9200 Print another message, wait and then repeat program
from 30.
    
```

## ZX Spectrum 48K Basic and Machine Code

Author: Mark Leaver  
 Application: Utility



# \* Christmas prices have never been this good.



## COMMODORE 64 computer NOW £195.95

plus our 2 year guarantee  
64 STARTER PACK

Commodore 64  
Cassette deck  
Intro to Basic (part 1)  
Quickshot joystic  
Game

**ONLY £255**

## 64 HOME/BUSINESS PACK

Commodore 64  
1541 disc drive  
Box of 10 diskettes

\*\*\* **FREE SOFTWARE** \*\*\*  
EASY SCRIPT (wordprocessor) and diskette  
containing 6 games

**ONLY £395**

## 64 BUSINESS PACK

Commodore 64  
1541 disc drive  
1525 dot matrix printer  
Box of 10 diskettes  
Box of paper

\*\*\* **FREE SOFTWARE** \*\*\*  
EASY SCRIPT (wordprocessor) and diskette  
containing 6 games

**ONLY £595**

We stock a range of books and software for all the computers that we supply. Why not visit our shop and browse around or just try out some software

C2N Cassette deck ..... **£39.10**

1541 Disk drive (+ free software).....	<b>£195.95</b>
1701 Colour monitor .....	<b>£195.95</b>
Quickshot joystick .....	<b>£9.50</b>
Pair of Quickshot joystics .....	<b>£17.95</b>
Intro to Basic (part 1) .....	<b>£14.50</b>
Programmers reference guide .....	<b>£9.95</b>
Easy script (word processor) .....	<b>£69.95</b>
Superbase (data management) .....	<b>£99.95</b>
1525 Dot Matrix printer .....	<b>£195.95</b>
1526 Dot Matrix printer .....	<b>£295.95</b>
1520 Printer/Plotter .....	<b>£149.95</b>
1520 Printer/Plotter .....	<b>£259.95</b>
RX80 Dot matrix printer .....	<b>£299.95</b>
RX80 F/T Dot matrix printer .....	<b>£399.95</b>
FX80 Dot matrix printer .....	<b>£399.95</b>
FX100 Dot matrix printer .....	<b>£545.95</b>
Centronics interface cable .....	<b>£19.95</b>
Software for above cable .....	<b>£7.95</b>
JUKI Daisy Wheel printer .....	<b>£395.95</b>

## BBC

**BBC Model B computer  
£399.00**

**BBC Model B with disc  
interface £469.00**

### TORCH Z80 DISK PACK

2 x 400K (formatted) floppy disc drives  
Z80 second processor  
and the following **FREE** software

1. Perfect Writer (Word processing)
2. Perfect Filer (database management)
3. Perfect Calc (Financial spreadsheet)
4. Perfect Speller (spelling checker)

**All this for only £839.50**

**Our Guarantee (2 years on 64<sup>s</sup>)**

1 full year for labour and parts on all Hardware.

## VIC20



### STARTER PACK NOW £134.95

plus our 2 year guarantee

included: VIC20 computer, cassette deck,  
intro to basic (part 1) and 4 game cassette

**16K RAM PACK ..... £28.95**  
**32K RAM PACK ..... £47.95**

All 64 peripherals, disk drives, printers,  
joysticks work with the VIC20

## DRAGON 32



**DRAGON 32 Computer ..... £157.50**  
**DRAGON 64 Computer ..... £225.00**

(Not available at time of going to press)

Dragon single disk drive  
with Controller card (180K) ..... **£275.00**  
Dragon to Centronics printer cable ..... **£11.95**  
Telewriter (Word processor) ..... **£49.95**  
Tele-Tutor ..... **£25.00**  
Dragon joystics (pair) ..... **£14.95**

## MEDIA SUPPLIES

### DISKETTES by Verbatim

(supplied in boxes of 10)

Single sided, Double density, 40 track **£17.95**  
Single sided, Quad density, 80 track ..... **£24.75**  
Double sided, Quad density, 80 track **£32.75**  
Library cases (Hold 10+) ..... **£1.35**

### C12 Blank programming cassettes

50p each or 10 for ..... **£4.50**

### Plain computer paper

(supplied in 2000 sheets)

11 x 8 **£13.80** 11 x 9 1/2 **£12.65**  
11 x 15 1/2 **£15.52**

We have a wide range of dust covers for the computers and printers etc, that we sell.  
Please phone for details.

We guarantee all our products for 1 year, except 64 and VIC which is 2 years.  
We are an approved service centre for Commodore, Dragon and BBC

Payment may be made by Access, Barclaycard, Bankers Draft, Building

Society cheques or cash. Sorry, cheques need 4 days clearance.

POSTAGE AND PACKING - Please allow £5 per computer, disk drive or printer, this price also covers insurance. **ALL PRICES ARE INCLUSIVE OF VAT**

# CHROMASONIC PERSONAL COMPUTERS

48 Junction Road, Archway, London N19 5RD

**TEL: 01-263 9493 and 9495**

# TWO GREAT NEW BOOKS!

## THE COMPANION TO THE BBC MICRO

**The first book** to explore the scope of the BBC Micro. **Geoff Wheelwright** evaluates the wealth of software and peripherals which have been produced and shows you how all this can be exploited, whatever your experience or expectations.

**Not simply an overview** of BBC BASIC or a compendium of hints and tips, but an invaluable reference book which illuminates for the first time the full potential of your spectacular micro.

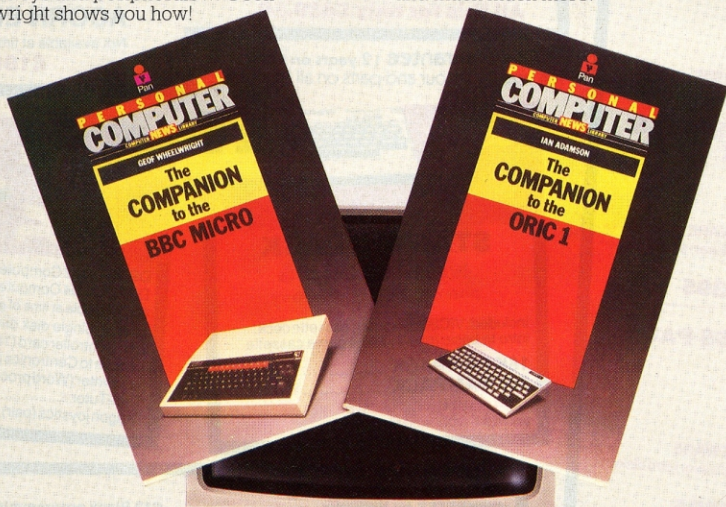
**Take your BBC to the limits** – graphics, sound, word-processing and communications facilities, function keys and peripherals ... Geoff Wheelwright shows you how!

## THE COMPANION TO THE ORIC I

**This is the first book** for the Oric 1 which can be used with the original 1.0 ROM and the revised version 1.1 ROM.

**Ian Adamson** introduces ORIC's BASIC language in an easy-to-follow fashion, giving you a graduated introduction to programming backed up with advanced BASIC techniques and an introduction to machine code programming.

**Program storage**, printer use, programming techniques are all covered, with extensive chapters that offer command of the superb high resolution graphics, colour and sound facilities and much much more.



### Where can you get them?

From all good bookshops. Or fill in the coupon below and return it to: Pan Books Ltd, FREEPOST, PO Box 109, 14/26 Baker Street, High Wycombe Bucks HP11 2TD.

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

GET MORE OUT OF YOUR MICRO WITH...

## COMPANION BOOKS

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 **COMPANIONS ...** paperbacks at £5.95 each 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.

name(Mr/Mrs/Miss/Ms) \_\_\_\_\_  Companion to the BBC Micro

address \_\_\_\_\_  Companion to the Oric 1

\_\_\_\_\_ post code \_\_\_\_\_

I enclose my cheque/postal order for £ \_\_\_\_\_ payable to Pan Books Ltd or debit my Access/Barclaycard/Visa/Trustcard

no. \_\_\_\_\_

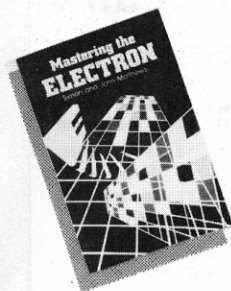
Signature \_\_\_\_\_

Allow up to 15 days for delivery. This offer available within UK only.

Pan Books Ltd. Registered in England Registered No. 389591



# New computer books are cropping up everywhere. Here's the pick of the bunch.



## MASTERING THE ACORN ELECTRON

by Simon and J. Matthews.

This new book will answer many essential questions for newcomers to the Electron microcomputer, showing them not only how to persuade the machine to do what it is asked, but how to do so in a sensible and readable way. The language, graphics, sound, and other features of the Electron, are highlighted and covered in a clear, concise manner.

Dec '83 280pp  
085312 679 8 £5.95

Published by Ellis Horwood Ltd., and marketed by John Wiley & Sons Ltd.



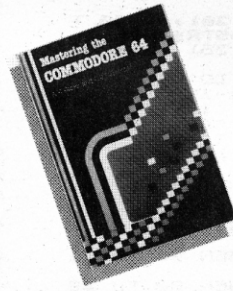
## GETTING STARTED ON THE ORIC-1

by D.G.J. Cole

A complete beginner's guide to ORIC BASIC, assuming absolutely no knowledge of computer programming whatsoever. The book's intention is to teach the reader to make his programs readable and clear and it introduces all the necessary mathematical ideas needed to utilise the ORIC's facilities.

Dec '83 160pp  
085312 656 9 £5.95

Published by Ellis Horwood Ltd., and marketed by John Wiley & Sons Ltd.



## MASTERING THE COMMODORE 64

by A.J. Jones and G. Carpenter

**Contents:** Review of BASIC; Some BASIC Tools; Manipulating Data; Memory Management; Sound; Principles of Graphics; Moving Graphics; Peripherals; Input/Output; Introduction to Machine Code Programming on the 6510; Using an Assembler/Editor; Tables.

Dec '83 260pp  
085312 654 2 £6.95

Published by Ellis Horwood Ltd., and marketed by John Wiley & Sons Ltd.



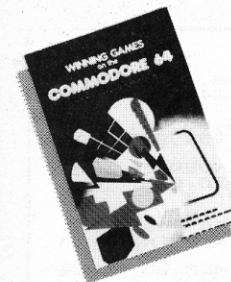
## MASTERING THE ZX-SPECTRUM

by L. Moore

This book is about how to enjoy your Spectrum through learning programming and handling the machine: it dispels the mental block which sometimes occurs for beginners, that of grasping and understanding the building of a program. It also contains a number of useful indexes, usually missing in other programming books, which make it much easier to find the information required.

Dec '83 192pp  
085312 700 X £5.95

Published by Ellis Horwood Ltd., and marketed by John Wiley & Sons Ltd.



## WINNING GAMES ON THE COMMODORE 64

by T. Barrett and S. Colwill

Taking the reader from a simple understanding of BASIC, this book builds up in single stages the techniques of graphics programming on the Commodore 64. It contains many advanced tips and hints which will help the reader to write fast-moving graphics games in BASIC.

**Contents:** Section I—Graphics Games; Section II—An Adventure Game; Section III—How to Write Card Games.

Jan '84 160pp  
085312 695 X £5.95

Published by Ellis Horwood Ltd., and marketed by John Wiley & Sons Ltd.



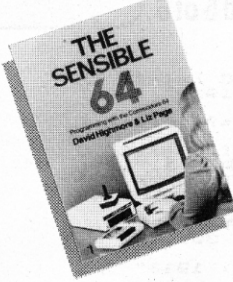
## WINNING GAMES ON THE VIC-20

by T. Barrett and A.J. Jones

This book offers a collection of games which can be played out on the VIC-20 computer. After reading the machine user's manual, the computer user should have no trouble in keying in and running the programs: the text is supplemented by a chapter on redefining graphic characters, containing detailed instructions on the character generator program CHARGEN.

085312 697 6 144pp  
£5.95

Published by Ellis Horwood Ltd., and marketed by John Wiley & Sons Ltd.



## THE SENSIBLE 64

by D. Highmore and L. Page

This book provides the reader, whether an experienced programmer or beginner, with a simple, concise explanation of the first sensible computer for business or leisure use. Topics covered include: the keyboard and function keys; user-defined and multicolour graphics; screen displays and bit mapping; creating and using sprites; sound effects and music; programming with a disk drive; using a graphic printer.

09467 05 00 3 128pp  
£5.95

Published by Microbooks and marketed by John Wiley & Sons Ltd.

JOHN WILEY are major publishers and distributors of books and software for the computing world. As well as Wiley professional reference books and software an extensive range of titles for the student and hobbyist is available by other leading publishers including ELLIS HORWOOD, NCC, SIGMA TECHNICAL PRESS, SINCLAIR BROWNE, SULIS SOFTWARE. Ask for further details now at any good bookshop or computer store.



John Wiley & Sons Ltd.

Baffins Lane,

Chichester

West Sussex

PO19 1UD

# The **EMAX**

## ARCADE PROFESSIONAL

### ...built to take a lot of stick!



**FOR THE OPERATOR  
WHO HAS  
EVERYTHING  
EXCEPT PERFECTION!**

**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

GENUINE 2-HANDED CONTROL  
TOTAL QUADRANT ACCURACY  
2/4/8 WAY GATE INTERCHANGE  
**Aim for nothing less than  
Total Game Control**



**THE ARCADE PROFESSIONAL**  
Registered Design

# PRICE £38.50

(VAT INCLUDED)

For VIC 20 — COMMODORE 64 — ATARI —  
SPECTRUM (with Interface)

EMAX COMPUTING. Manufacturers of Professional Equipment for Quality ARCADE VIDEO CABINETS.  
EMAX Computing is a wholly-owned subsidiary of EUROMAX Electronics Ltd.

from **EMAX**  
COMPUTING

PINFOLD LANE INDUSTRIAL ESTATE  
BRIDLINGTON, NORTH HUMBERSIDE  
TEL: (0262) 602541/2. TELEX: 527381 EMAX G

NAME .....

ADDRESS .....

.....

.....

.....

QTY:	PRICE	Total
ARCADE PROFESSIONAL	£38.50	
Spectrum Interface	£11.50	
P&P		£1.85
Enclosed Cheque/P.O.	£	

**ALL TRADE ENQUIRIES WELCOME**

# PCNProgramCards

Shipment

Card 4 of 6

8339SH4/6

```
4035 IF T=1 AND H$(17 TO 20)="02
04" THEN GO TO 4050
4040 IF T=2 AND H$(17 TO 20)="03
05 THEN GO TO 4050
4050 GO TO 4090
4060 IF VAL H$(33 TO 36)=1000 T
HEN LET H$(12 TO 15)=STR# 1000
4065 IF VAL H$(33 TO 36)=0 THEN
GO TO 4090
4070 LET A=VAL H$(33 TO 36): LET
H$(33 TO 36)=STR# (A-1000)
4090 IF T=1 THEN LET C#=H$
4095 IF T=2 THEN LET C#=H$
4099 REM *****
4100 LET Q=INT (RND*4)+1: LET A$
(10 TO 11)=STR# Q
4110 LET X=1: FOR F=1 TO LEN A$:
PRINT INK 7;AT 21,0;A$(X TO F)
4120 IF F>=32 THEN LET X=X+1: PR
USE 5
4130 NEXT F
4140 IF INKEY$="y" THEN GO TO 41
60
4145 IF INKEY$="n" THEN GO TO 42
00
4150 GO TO 4140
4160 IF T=1 THEN LET H#=F$: LET
U$=D$
4165 IF T=2 THEN LET H#=C$: LET
U$=E$
4167 IF VAL H$(12 TO 15)X=0 THEN
GO TO 4210
4170: FOR F=1 TO LEN U$ STEP 4:
IF H$(17 TO 20)=U$(F TO F+3) THE
N GO TO 4174:
```

```
4172 NEXT F: STOP
4174 IF LEN U$(F TO F+4)=4 THEN
LET H$(17 TO 20)=U$(45 TO 48):
GO TO 4176
4175 LET H$(17 TO 20)=U$(Q#4+F T
O Q#4+F+3)
4176 PRINT AT VAL U$(F TO F+1),U
AL U$(F+2 TO F+3): PAPER 0;
4177 IF T=1 THEN PRINT PAPER 0;
INK 2;AT VAL H$(17 TO 18),VAL H$
(19 TO 20): "AE"
4180 IF T=2 THEN PRINT PAPER 0;
INK 5;AT VAL H$(17 TO 18),VAL H$
(19 TO 20): "EF"
4182 IF H$(17 TO 20)(">")="1324" THE
N GO TO 4190
4183 BEEP 1,30
4184 LET H$(24 TO 28)=STR# 1000:
LET H$(12 TO 15)=STR# 0
4186 PRINT PAPER 0;AT 13,24: "
": LET H$(17 TO 20)=U$(1 TO 4)
4190 IF T=1 THEN LET C#=H$
4195 IF T=2 THEN LET C#=H$
4196 GO TO 1150
4199 REM *****
4200 IF T=1 THEN LET H#=F$
4205 IF T=2 THEN LET H#=C$
4210 IF VAL H$(24 TO 28)X=0 THEN
GO TO 4270
4220: FOR F=1 TO LEN F$ STEP 4:
IF H$(29 TO 32)=F$(F TO F+3) THE
N GO TO 4230:
4225 NEXT F: STOP
```

4035-4040	Check that lorries are in factories	4090-4095	Replace updated results back into current player's string.	4170-4172	Get current position.
4060	If amount of stock held is 1000 then load lorry with 1000.	4100	Select random distance to move truck or boat.	4174-4183	Position lorry.
4065	If amount of stock is zero then continue.	4110-4150	Ask if trucks to be moved and respond.	4184	Beep when lorry is 'in port.'
4070	Subtract 1000 from current amount of stock.	4160-4165	Get current player's road data and status strings.	4180-4192	Transfer load from lorry to ship.
		4167	Check that lorry has a load.	4200-4205	Replace status string.
				4210	Get current status string.
				4220-4225	Check that there is something in ship before it is moved.
					Get position of ship

# PCNProgramCards

Shipment

Card 5 of 6

8339SH5/6

```
4230 IF Q<LEN F$(F TO F+4)=4) TH
EN LET H$(29 TO 32)="1913": GO T
O 4240
4235 LET H$(29 TO 32)=F$(Q#4+F T
O Q#4+F+3)
4240 PRINT AT VAL F$(F TO F+1),U
AL F$(F+2 TO F+3): PAPER 1; "
4245 IF T=1 THEN PRINT PAPER 1;
INK 2;AT VAL H$(29 TO 32),VAL H$
(31 TO 32): "CD"
4250 IF T=2 THEN PRINT PAPER 1;
INK 5;AT VAL H$(29 TO 30),VAL H$
(31 TO 32): "CD"
4255 IF H$(29 TO 32)(">")="1913" THE
N GO TO 4290
4257 BEEP 1,35
4260 LET Q=VAL H$(24 TO 28)*(INT
(RND*4)+1)+VAL H$(11 TO 21): LET
H$(11 TO 21)=STR# Q: LET H$(24 TO
28)="0000"
4265 LET H$(29 TO 32)="1424": PR
INT PAPER 1;AT 19,13: " "
4290 IF T=1 THEN LET F#=H$
4295 IF T=2 THEN LET C#=H$
4300 GO TO 1150
6995 STOP
6999 REM *****
9000 RESTORE 9020: FOR F="USA" "A"
TO "USR" F"+7
9010 READ A: POKE F,A: NEXT F
9020 DATA 0,53,53,53,53,53,24,0
9030 DATA 0,240,240,252,252,252,
96.0
```

```
9040 DATA 0,3,3,15,15,127,63,31
9050 DATA 0,192,192,240,240,254,
254,248
9060 DATA 0,15,15,63,63,63,12,0
9070 DATA 0,252,252,252,252,252,
43,0
9080 PRINT AT 3,9: INVERSE 1: "##
SHIPMENT###": INVERSE 0;AT 5,6;
"J. Donnelly 1983"
9090 PAUSE 50
9100 PRINT AT 11,4: "Do you want
the rules?":AT 13,4: "and instruct
ions (y/n) "
9110 IF INKEY$="n" THEN GO TO 91
00
9115 IF INKEY$="y" THEN GO TO 91
30
9120 GO TO 9110
9130 CLS: PRINT AT 1,1: "SHIPMEN
T is a "boss's" game of busin
ess strategy.
9135 PRINT AT 4,1: "The aim is to
make as much money as you
can within a certain number
of days."
9140 PRINT AT 8,1: "You must buy
stock, deliver it to EX-PORT by
truck, and from there by ship
to your buyer at IN-PORT."
9145 PRINT AT 13,1: "Each player
gets the chance to buy stock an
d move either ship or truck ONCE
a each day."
```

4230-4255	Moveship.	4265	Position ship back at in port.
4257	Beep when in port.	4290-4295	Replace the status strings.
4260	Update the capital with the profit made and remove the cargo from the ship.	9000-9070	Define the ships and the lorries.
		9080-9120	Ask for instructions and act upon the results.

## PCNProgramCards

Shipment

Card 6 of 6

8339SH6/6

```

9147 PRINT AT 18,3;"Press any key
to continue."
9149 PAUSE 0:CLS
9150 PRINT AT 1,1;"Each player will
start with $10000 in capital
and $1000 of stock. One truck
and one ship."
9155 PRINT AT 5,1;"You will be asked
each day if you want to buy
stock. If you do press y and
at the prompt input how much
you are buying."
9160 PRINT AT 11,1;"After that you
will be given a number of places
to move and asked if you want
to move your truck."
9165 PRINT "If you answer yes your
truck will be moved otherwise
if your ship is loaded it will
be moved."
9167 PRINT AT 18,3;"Press any key
to continue."
9169 PAUSE 0:CLS
9170 PRINT AT 1,1;"There will also
be NEWS for you at random points
in the game. This can be to
your advantage or not as the
case may be."
9175 PRINT AT 7,1;"Each players
day will be updated between
turns."
9180 PRINT AT 11,1;"In a moment
you will be asked for how many

```

```

""days"" you want to play. Try
between 40 and 70."
9190 PAUSE 500
9200 INPUT "How many days? ";G:
CLS:GO TO 10
9499 REM *****
9500 DATA "If your ship is at sea
a half your stock is stolen.",24,
.25,.5
9501 DATA "Your production is
doubled due to oversight !!!",33,36,
.2
9502 DATA "Fire at the factory
destroyed nearly all your stock.",
33,36,.25
9503 DATA "Strike at Ex-Port costs
you 50% of your capital in warehouse
costs.",18,.5
9504 DATA "Your buyer says he'll
pay double for your next shipment
if your ship has left Ex-Port.",
24,28,.2
9505 DATA "Your driver has half
his load stolen.",12,15,.5
9506 DATA "Your factory goes on
strike for one day costing you 2
5% of your stock.",33,36,.75
9507 DATA "The stock exchange thinks
your worth money. Your stock
is now worth four times as much.",
33,36,.4
9900 SAVE "Shipment" LINE 1

```

9130-9190 Playing instructions.

9500-9507  
9900Data for news items.  
Line used to save the program  
to autounit.

## PCNProgramCards

Monitor 64

Card 5 of 8

8339MO5/8

```

2060 IFSS=1THEN3010
2070 CO#=RIGHT$(CO$,LEN(CO$)-F):IFLEN(CO$)<>10THEN500
2080 IFLEFT$(CO$,1)<>". "THEN500
2085 IFMID$(CO$,6,1)<>". "THEN500
2090 H#=MID$(CO$,2,4):GOSUB600:IFH=-1THEN500
2095 SA=H
2100 H#=RIGHT$(CO$,4):GOSUB600:IFH=-1THEN600
2110 EA=H
2120 IFER<=SATHEN500
2130 PRINT:PRINT:OPEN2,1,1,NA$:PRINT#2,SA:PRINT#2,EA
2140 FORS=SATOEA:PRINT#2,PEEK(S):NEXT:CLOSE2:GOTO200
3000 REM*****
3001 REM MEMORY LOAD ROUTINE
3002 REM*****
3003 IFCO$="L"THENNA$="":GOTO3010
3005 SS=1:GOTO2005
3010 PRINT:OPEN2,1,0,NA$
3020 INPUT#2,SA,EA
3030 FORG=SATOEA:INPUT#2,A:POKEG,A:NEXT:CLOSE2:GOTO200

```

2070 Remove the file name from the front of CO\$.

2080-2085 Check to see if the first and sixth characters are full stops.

2090-2110 Jump to 600 to convert hexadecimal addresses back into decimal.

2120

2130-2140

3000-3030

Check to see if the start address is less than the end address.

Save the data in memory to tape.

Load data from tape into memory at the same place it was saved from.

## SPECTRUM & ZX81 EDUCATIONAL SOFTWARE



### CALPAC LEARNING SERIES

Use our Computer Assisted Learning PACKs to help your children with their school work. The programs in the series use moving colour graphics and sound to make learning more enjoyable. Each pack contains four programs and is suitable for use with the 16K or 48K Spectrum. Program notes are supplied.

**VOLUME 1 (from 6 years)** **£9.50**  
Tens and units addition and subtraction with detailed help facilities; powerful, easy to use drawing program; English comprehension applied to American Indians.

**VOLUME 2 (from 7 years)** **£9.50**  
Roman history; spelling tester with easy entry of your own lists; flexible table-tester; homophones.

**VOLUME 3 (from 9 years)** **£9.50**  
Nouns, verbs, adjectives and adverbs; tenses of verbs; biology of the flower; long division tutor.

Additional features of the CALPAC LEARNING SERIES include:  
 ● Spelling checkers  
 ● "Help" call up routine  
 ● Easy insertion of subject material of your own choice into the programs.

**CALPAC C10-LEVEL CHEMISTRY** **£7.50**  
Four clearly presented revision/tutorial programs. The subject matter has been carefully structured to cover the most important aspects of:

- Elements, compounds and mixtures.
- Structure, bonding and properties.
- Redox, electrolysis and the activity series.
- Acids, bases and salts.

48K Spectrum and 16K ZX81 versions of the cassette are available. Please specify which you require.

Our software is available by direct mail from:

### CALPAC COMPUTER SOFTWARE

108 Hermitage Woods Crescent, St Johns, Woking, Surrey GU21 1UF

For further details please telephone: 048-67 2584

We have a demonstration cassette available for retailers or schools



# FIRST FOR electron SUPPORT!

**THE SIR RANGE OF ACORN ELECTRON PERIPHERALS:**  
Plug-in (no soldering) modules, allowing further edge-connector expandability.

### PRINTER/JOYSTICK INTERFACE

Allows use of any BBC-compatible joysticks; full centronics printer capability; complete firmware support. Now available **£45.00**

### 8-ROM EXTENSION BOARD

Based on our best-selling BBC ROM Board; allows use of up to 128K of firmware including most BBC ROMs now available **£40.00**

ALSO:- FOR THE BBC MICRO:

**THE SIR ROM BOARD (16 ROMs)**

**£35.00**

Please telephone for full details.  
ALL PRICES QUOTED ARE EX-VAT

**SIR COMPUTERS LTD**  
91 WHITCHURCH RD, CARDIFF CF4 3JP  
Tel: (0222) 621813

L060

# Micro Post

## Best Selling Computers delivered to your door.

\* Delivery within 14 days or full refund.

- \* Discount Prices.
- \* Free Securicor delivery.
- \* ACCESS/CHEQUE OR POSTAL ORDER.

**TEXAS  
TI-994A**  
**£88.00**  
inc. VAT.



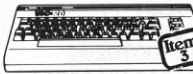
16k memory, full typewriter keyboard, colour and sound.

**VIC 20**  
**£89.50**  
inc. VAT.



U.K. Produced. Massive software range from only £1.99.

**COMMODORE  
64**  
**£189.00**  
inc. VAT.



Massively powerful best seller for games, business and leisure use.

**ORIC 48K**  
**£134.00**  
inc. VAT.



Full 48k, excellent quality product, high resolution graphics.

**SHARP MZ 700**  
**£247.00**  
inc. VAT.



Just launched Japanese computer with proven reliability and power.

**SEIKOSHA  
GP100A/  
PRINTERS.**  
**£199.00**  
inc. VAT.

Dot matrix, tractor feed.

To:- Micro Post,  
P.O. Box 16,  
Rugeley,  
Staffs.

Please send me:-  
Item Price Total  
\_\_\_\_\_ £ \_\_\_\_\_

I enclose my cheque/postal order for £.....  
or debit my Access card

\_\_\_\_\_

Signature .....

Name .....

Address .....

Your remittance should be made payable to:-  
MICRO POST.

BLOCK CAPITALS PLEASE.

PCN 3

## PCN Program Cards

**Monitor 64**

**Card 6 of 8**

8339MO6/8

```

4000 REM*****
4001 REM MEMORY MODIFY ROUTINE
4002 REM*****
4005 IFLEN(CO$)<>29 THEN 500
4010 AD$=MID$(CO$,2,4)
4020 H$=AD$:GOSUB600:IFH=-1 THEN 500
4030 AD=H:FORG=5 TO 27 STEP 3:IFMID$(CO$,G,1)<>" " THEN ER=1:G=27
4040 NEXT
4050 IFER=1 THEN ER=0:GOTO 500
4060 CO$=RIGHT$(CO$,23)
4070 FORG=1 TO 23 STEP 3:H$=MID$(CO$,G,2):GOSUB600:IFH=-1 THEN 500
4080 POKERD,H:AD=AD+1:NEXT
4090 GOTO 200
4500 REM*****
4501 REM MACHINE CODE 'FILL' ROUTINE
4502 REM*****
4510 D=2:SS=0:IFLEN(CO$)<>14 THEN 500
4520 IFMID$(CO$,2,1)<>"0" OR MID$(CO$,7,1)<>"0" OR MID$(CO$,12,1)<>"0" THEN 500
4525 H$=MID$(CO$,3,4):GOSUB600:IFH=-1 THEN 500
4530 A1=H:H$=MID$(CO$,8,4):GOSUB600:IFH=-1 THEN 500
4540 A2=H:H$=RIGHT$(CO$,D):GOSUB600:IFH=-1 THEN 500
4542 IFSS=1 THEN 4610
4545 IFA2<A1 THEN 500
    
```

4000-4005 Check if the length of CO\$ = 29. If no then goto 500. 4010 Takes four characters, starting from the second, from CO\$ and store in AD\$.	4020 4030-4040 Checks to see if spaces are in the correct places. 4050 4060-4090 Pokes the data into memory.	4500-4540 4545 Decodes the command. Checks to see if the second address is less than the first address.	
--	---	--	--

## PCN Program Cards

**Monitor 64**

**Card 7 of 8**

8339MO7/8

```

4550 IFA1=A2 THEN POKER A1,H:GOTO 200
4560 POKE 252,INT(A1/256):POKE 251,A1-256*PEEK(252)
4570 POKE 254,INT(A2/256):POKE 253,A2-256*PEEK(254)
4580 POKE 2,H:SYS 40710:GOTO 200
4600 REM*****
4601 REM MACHINE CODE 'MOVE' ROUTINE
4602 REM*****
4605 D=4:SS=1:IFLEN(CO$)<>16 THEN 500
4606 GOTO 4520
4610 IFA2<A1 OR (H<=A2 AND H)=A1) THEN 500
4620 POKE 252,INT(A1/256):POKE 251,A1-256*PEEK(252)
4630 A2=A2+1:POKE 821,INT(A2/256):POKE 820,A2-256*PEEK(821)
4640 POKE 254,INT(H/256):POKE 253,H-256*PEEK(254)
4650 SYS 40740:GOTO 200
5000 REM*****
5001 REM RETURN VALUES IN REGISTERS
5002 REM*****
5010 PRINT"■■■■REGISTERS:-■■■"
5020 PRINT"R = ";H:PEEK(780):GOSUB 700:PRINT H$;
5030 PRINT"X = ";H:PEEK(781):GOSUB 700:PRINT H$;
5040 PRINT"Y = ";H:PEEK(782):GOSUB 700:PRINT H$;
5050 GOTO 200
    
```

4550-4580 Pokes the required data into memory for use by machine code subroutine and the calls the machine code subroutine. 4600-4605 Checks the length of CO\$. 4606 Jumps to 4502 to decode the command.	4610 4620-4650 Checks to see that AD3 is not between AD1 and AD2, or if AD2 is less than AD1. Pokes the required data into memory for use by machine code subroutine and then calls the machine code subroutine.	5020-5040 Convert decimal numbers in memory locations 780-782 into hexadecimal numbers by jumping to 700.	
--	---	---	--

# PERSONAL COMPUTER NEWS

## "MICROPAEDIA BINDER"

A library of microcomputing at  
your fingertips. Only £3.50.

The Micropaedia section  
of Personal Computer News,  
builds up week by week  
into an invaluable  
source of reference  
on a wide spectrum of  
Microcomputing subjects.

### BINDER ORDER CARD.

Please rush me \_\_\_\_\_ PCN Micropaedia binder(s) at £3.50 each.  
I enclose my cheque made payable to Personal Computer News. Please  
charge my Access/Visa/Diners/American Express card. \_\_\_\_\_  
(delete where not applicable)

Account No. \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

Town \_\_\_\_\_

Postal Code \_\_\_\_\_

Signed \_\_\_\_\_

Send to Personal Computer News, Binders Department, 53/55 Frith Street, London W1A 2HG.

## THE BEST RANGE of SOFTWARE for HOME MICROS

Also  
**VIDEO  
GAMES**  
for ATARI  
COLECO  
INTELLIVISION  
VECTREX

NOW IN STOCK:

Vast Number of Titles for

ATARI 400/800 · SPECTRUM ZX 81 · APPLE  
BBC MICRO · VIC 20 · DRAGON · LYNX  
ORIC · TEXAS T199 · COMMODORE 64

**THE LARGEST SELECTION  
OF GAMES IN THE WORLD**

# GAMES CENTRE

Send NOW for  
**FREE  
MAIL  
ORDER  
CATALOGUE**

Branches: BRIGHTON 52 Western Road  
NOTTINGHAM 31 Lister Gate  
BIRMINGHAM 141 New Street  
BOURNEMOUTH 60 Commercial Road  
BRISTOL 15 Broadmead LONDON 22 Oxford Street

Main Computer & Mail Order Branch:

**22y Oxford St · London W1A 2LS**

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_



PCN 1/12

# THE FABULOUS CASSETTE

# 50

FROM **cascade**

**ONLY £9.95**  
(INC. P&P and VAT)

**VALUE that's  
out of this world**

## 50 GAMES ON ONE CASSETTE

DRAGON BBC A/B Spectrum apple ATARI ORIC-1 ZX81 VIC 20

It is impossible to tell you everything about the 50 games on CASSETTE 50 but they include many types such as maze, arcade, missile, tactical and logic games, to suit most tastes in computer game playing.

CASSETTE 50 will appeal to people of all ages and the games will provide many hours of entertainment for all the family at a fraction of the cost of other computer games.

**EXPRESS DELIVERY - ORDER NOW**

Please send me by return of post, Cassette 50 at £9.95 per tape. I enclose a cheque/postal order for

£ \_\_\_\_\_ made payable to Cascade Games Ltd.

Please debit my  No. \_\_\_\_\_

SPECTRUM  ORIC-1  ZX 81  VIC 20   
BBC A/B  DRAGON  ATARI  APPLE

Cascade Games Ltd.,  
Suite 4, 1-3 Haywra Crescent, Harrogate,  
North Yorkshire, HG1 5BG, England.  
Telephone: (0423) 504526. PCN 1/12/83

**Dealers & Stockists enquiries welcome.**

# PCNProgramCards

## Monitor 64

## Card 8 of 8

8339MO8/8

```

5100 REM*****
5101 REM ALTER VALUES IN REGISTERS
5102 REM*****
5105 IFLEN(CO$) <> STHEN500
5110 Z=0:N$=MID$(CO$,2,1)
5120 IFN$="A" THENZ=780
5130 IFN$="X" THENZ=781
5140 IFN$="Y" THENZ=782
5150 IFZ=0 THEN500
5160 H$=RIGHT$(CO$,2):GOSUB600:IFH$=-1 THEN500
5170 POKEZ,H:PRINT:GOTO200
6000 REM*****
6001 REM DISPLAY SYNTAX FOR COMMANDS
6002 REM*****
6004 PRINT:PRINT:PRINT" D AAAA.BBBB - DISLAY MEM"
6005 PRINT" M AAAA.BBBB.CCCC - MOVE MEM"
6010 PRINT" F AAAA.BBBB.CC - FILL MEM"
6015 PRINT" G AAAA - RUN MEM"
6020 PRINT" S"CHR$(34)"FILE NAME"CHR$(34)".AAAA.BBBB - SAVE MEM"
6025 PRINT" L"CHR$(34)"FILE NAME"CHR$(34)" #OR JUST L - LOAD MEM"
6030 PRINT" J A=AA #OR X=AA #OR Y=AA - ALTER REGS"
6035 PRINT" X"TAB(26)"- EXIT":PRINT" R"TAB(26)"- DISPLAY REGS"
6040 PRINT"NOTE- ALL SPACES AND FULL STOPS MUST BE INCLUDED AS ABOVE."
6050 PRINT"ALL NUMBERS MUST BE IN HEX AND OF THE LENGTH SHOWN."
6060 PRINT:GOTO200

```

5100-5170 Decodes command and alters the required register with the new data.

6000-6060 Displays the syntax for all the commands.

# PCNProgramCards

## Basic Search

## Card 1 of 1

8339BS1/1

### BBCA/B BBC Basic

Application:Utility Author:Steven McLean

```

10MODE 7:VDU14:@%=5:PROCin
20AZ=&83:P%=(USR(&FFF4)AND&FFFF00)/&100:N%=P%:C%=0
30REPEAT
40IF ?N%=&D:IFN?1=&FF:C%=1:GOTO 80
50IF ?N%=&D:L%=(N?1)*256+(N?2):N%=N%+4:B%=0
60IF?N%=Q%:PROCout
70N%=N%+1
80UNTIL C%=1
90PRINT"CHR#131;"Search Complete.""CHR#130;"Another search?";
100REPEAT A$=GET$:UNTIL INSTR("YyNn",A$)
110IF A$="Y" OR A$="y" RUN ELSE VDU 10,13,15:PAGE=P%:END
120DEFPROCin
130CLS:PRINT TAB(0,3)CHR#131"This routine will search for all"
140PRINT CHR#131;"references to a given string of"
150PRINT CHR#131;"characters.""CHR#131;"keywords are ignored."
160PRINTTAB(0,10)CHR#130:;INPUT"Enter string: " Q$
170S%=LEN(Q$):Q%=ASC(Q$)
180ENDPROC
190DEFPROCout
200IF LEFT$(N%,S%)=Q$:IF B%=0:PRINT"L%:B%=1
210IF LEFT$(N%,S%)=Q$:IF B%>0:PRINT TAB(7,VPOS)("(";B%;")":B%=B%+1:N%=N%+S%-1
220ENDPROC

```

10	Set graphics and page modes, numeric field width. Input string.	50	L%= line number, set N% to first byte of line.	90-110	If another search required then RUN else line feed, page mode off, return to default page.
20	Find default page (P%), initialise byte indirector (N%=P%) and end flag (C%).	60	If this byte = first byte of string then PROCout	120-180 190-220	Input required string.
30	Main loop	70	Next byte.		If matching string is found, print line number. Further matches update the number of occurrences.
40	Check for end of program marker.	80	Until end of program found (line 60).		

# Wild West shootout

This electronic rifle from Stack Computer Services will take you from keyboard or joystick control into a new dimension. It'll turn your living room into a shooting gallery. All the fun of the fair without leaving home!

And we're giving away ten light rifles, each worth £29.95, in this Wild West competition. With the rifle will be three games to get you started — Grouse Shoot, High Noon and Shooting

Gallery — and a connector for use with the Spectrum 48K, Vic 20 or Commodore 64. The rifle is attached by 12ft of cable to give you good shooting range.

So, just follow the rules, send in your answers and don't delay . . . the first ten correct entries pulled from the hat after the closing date will be the winners.



In 1881, when men were men and cowboys chewed the bullet, a silver mining town in Arizona, heart of the Wild West, was ripped by gun-blazing feuds. The Clanston gang oiled their holsters and rode into bloody battle with the Earps (of Wyatt fame). As Doc Holliday the dentist coughed and spluttered and added his ebbing strength to his friends the Earps (thereafter known as the goodies) the townsfolk cleared the streets and the coffin maker ordered more wood.


How the sad and sorry story ended is legendary. The Clanstons lost, the town rejoiced and the brothers were buried. But do you know where they were laid to rest. where they ended their last journey after the OK Corral shoot-out?

The program below will give you the answer, but first you have to put the jumbled and unnumbered lines in the right order and then, when you have the print out you must pick out the name of that famous spot by discarding all irrelevant letters we've thrown in as a smoke screen. Then find out the name of the famous mining town, write both answers on the entry form and send it to PCN Wild West Shoot-out, 62 Oxford Street, London W1A 2HG by the closing date of December 21.

## Rules

No entries will be accepted after December 21 and the competition is not open to any person employed by VNU Business Publications or their relatives, or to any person employed by Stack Computer Services.

The Clanstons are buried at .....  
 The town is called .....  
 I would like a Stack rifle for my ..... microcomputer  
 Name .....  
 Address .....

Telephone number (please include code) ..... 

```
L=VAL (MID$ (B$, (T*4)+1, 3))
B$=B$+C$+D$
N=39
PRINT CHR$ (L-N)
NEXT T
B$="146211031664122615911239"
N=VAL (MID$ (A$, 8, 2))
A$=STR$ (SQR (N))
C$="1793130715731278"
D$="1119316561201"
FOR T=0 TO 13
```

**Clear out** Burroughs printer 150 LPM 48 characters ASCII £95, dot matrix printer with keyboard £45, or £125 lot. Can deliver. Tel: Rushden 311803.

**Intelligence** with voice module and 23 top cartridges: Tron, Lock n' Chase, Space Spartans etc, excellent condition, £250; will split. Tel: 051-734 0444.

**Newbrain A Beginner's guide**, 5 months old. Offers 01-889 3571.

**Acronics MPU** 1000 cartridges, Invaders, Treasure Hunt, Shooting Gallery, Soccer, Grand Prix, Supermaze, £7.50 ea or £39 for all six. Tel: 0475-20740 (Greenock).

**Cromeco** high resolution colour graphics system. Complete 760x340 pixel system with graphics software. New, cost over £3500, offers around £2000. Tel: Aberdeen (0224) 572933.

**Wanted BBC A or B**, realistic price paid. Will collect within 100 miles of Sheffield. Tel: Dinnington 563038.

**ZX1 16K** plus 7 games including Space Invaders to swap for similar computer, 3, O'Neills Villan, Camlough, Newry, Co Down, Ireland. BT357LF.

**ZX1 16K**, Six months old, £30 worth of software, leads, magazines and manual, still in box £50 ono. Tel: St Agnes 3473.

**BBC B Software**, Seven high quality games, new £64, e. Acornsoft, 1JK, Invaders, Rocket Raid, Arcadians, Frogger, £32 ono. Tel: Wormley (Surrey) 3207 after 5pm.

**5 1/4" floppy disks** for sale £1.25 each. Used once. Also Atari owners interested in forming Users Group North London. Tel: Brian 01-444 0718.

**CBS Colecovision** inc. Donkey Kong £110 Turbo Drive Module £35, Zaxxon £20, sold together £150. All under guarantee. Tel: Bognor 821090.

**Sharp MZ80A**, with software manuals, books, dustcover, value £150. 14 months old, £350 ono. Tel: 01-251 0959 after 5pm.

**Vic 20 + 16K Arfon** unit + sup. exp. m/c mono. Forth, Speech + 3 cartridges, best cassette games, books £350 ono or split; swap other computer. Tel: Adrian, Basingstoke 792976 eves.

**Vic 20 C2N** cassette 3k expansion cartridge Star Battle, cartridge Chopper game, Race game and more £90 or swap for CBM64 and cash. Tel: 01-946 2946.

**ICL Termiprinter**, 10,20,60 cps, upper and lower case with paper and leads. Suit BBC/RS232 needs 'dat' board hence £55. Tel: 051-644-6568 (Merseyside).

**Sharp MZ80K** 48K, Assembler, Disassembler, Basic compiler, Forth, extended Basics, Games etc. £225. Tel: 0246 36958. Drabbie.

**Atari 400** 16K with 32k RAM board, tape recorder, defender cartridge and other tapes, quickshot joystick a book of games etc. Tel: 01-650 5795. £200 ono.

**TRS-80BC1** pocket computer £40, printer cassette interface £40, standard cassette interface £10, ono. Tel: Aldershot (0252) 26761 (also games cassettes).

**HP-41C Calculator** with Financial pak and two extra memory paks, £120. Tel: Saffron Walden 0799 24244 eves.

# PCN Billboard

**Atari 800** 48K £200, disk drive £200, recorder £30, interface £80, all in new, boxed, 20 games Zaxxon Galaxian etc. **TE6 10/40(R)** Daisywheel printer. Brand new (unwrapped). RRP £1477 sell £900 ono or exchange Sharp MZ80B or similar. Tel: 0268 285406 eves/weekends (Basildon).

**Apple games**: Blackpool, Wizardry, Mummys Curse, Choplifter, Deadline, Dark Crystal, Wolfenstein, Deathstar, Alivader, many more plus business, utilities. J. Davey, 44 Hazelmere Road, Stevenage, Herts.

**Atari 800**, 48K, Basic & cassette player, boxed as new, 4 months old. Books & magazines, £260. Tel: Watford 26838 (Eve).

**Dragon 32, DMP 100K** printer, cassettes, books, manual and magazines. All worth £500 the lot. As new £375 ono. Tel: 0202 21604 any time.

**CBS Colecovision** complete with Donkey Kong cartridge and joysticks, £120. Also Zaxxon and Venture for above. £15 each, guaranteed as new. Tel: Hexham 60294.

**Texas TI199/LA**, includes minimemory, extended Basic, Personal record keeping, Budget management, Chess, Tombsome City, Soccer, Attack, Video games, £200. Tel: Portsmouth 694521 Tony Jackson.

**ZX1 16K** with Fuller F402 moving professional keyboard and case. Built-in power supply and reset switch. Worth £101. £35 ono. Tel: 01-961 0441 after 6pm.

**Spectrum 16K**, As new. Two sets of leads manuals etc, £55 worth of software including Defender, Scramble, Invaders, £85. Tel: 01-961 0441 after 6.30pm.

**Vic-20, 16K RAM**, adventure cartridge, Vic Revealed book, joystick, cassette recorder, over 50 games/utilities (Matrix, Panic, Arcadia, Kong...). Still guaranteed, £140. Tel: (0303) 77154.

**Video Genie** with expander and disk drive. Needs minor repair. Progs, books, etc. £350 ono. Tel: Dorking 881785 (Gearing).

**Sharp MZ80K** as new, many programs, advanced Basic (as MZ80A) £245 ono. Tel: 01-289 3109.

**Spectrum 48K**, Kempston joystick, printer and eighteen cassettes including The Hobbit, Chess, Assembler, Disassembler Super C Compiler, Pimania, £175 the lot. Tel: 01-444 5351.

**Vic 20 + 16K RAM**, cassette recorder plus various books and games, incl. Arcadia, Fantastic etc, £140 for quick sale. Tel: (061) 775 0345 after 5pm.

**Atari 800 48K**, 410 recorder, Basic, joystick, manuals, several games on offer. Hurry!! Tel: Bob on 01-828 2923 after 5pm.

**Apple Graphics** Tablet £150, Versawriter mechanical tablet £75, Textwriter £50, Parallel printer interface card £20. Tel: Reading (0734) 866372, D.J. Bromley.

**Atari 400**, 16K, tape recorder, Basic, Preppie 1 and 2, Stratos, Picnic Paranoia, 13 others, 1 joystick, £199 the lot. Tel: Dunstable (0582) 67572.

**BBC B** plus £100 of software. All for only £300. Tel: Steve, 01-790 7228 after 4.15pm.

**Vic-20 + 3K**, cassette unit, super expander, game paddles, programmer reference guide, tons of mags and software. Excellent condition. Offers? Tel: Folkestone 0303 77135.

**Apple II Europlus** diskdrive, controller, professional monitor, loads of software, disks, books, manuals, excellent condition. Lessons if you want, £750. Tel: (0244) 677712 eve. Chester.

**Atari Software** disk or cassette to swap. Tel: Jim, Sheffield 875902 between 2 and 7pm.

**ZX Printer** hardly used (boxed), must sell £20 ono. Send to A O'Hanlon, 21 Birkenhead Way, Paisley PA3 2OR.

**Acorn Atom**, 12K+12K 5A PSU, software: Chess, Galaxian, Invaders, 3D Maze, Asteroids, full documentation and manual, £65 for quick sale. Tel: 0865 739545.

**Atari VCS** five cartridges: Defender, PacMan, Combat, Breakout, Night Driver, joysticks, paddles, hardly used. Worth £200. Accept £85 ono. Tel: 01-428 6075.

**Sharp MZ-80B** with extra Hi-Res graphics RAM, MZ-80FO dual disk drive, MZ-80PS character/graphics printer. A £2500+ system in mint condition. £1750 ono. Tel: Bradford (0274) 875049.

**Phillips G7000** Video game, as new, still in original box, complete with Satellite cartridge. £50 or offers. Tel: 051-339 6826.

**Wanted Spectrum, Ori-1** or similar, suitable for beginner, must be in good condition, preferably boxed. Tel: Portsmouth (0705) 327116. Sarah. Will collect.

**Sharp MZ80K** 48K RAM, SP5025 extal Basics with manuals including software: Star Trek, Mexican Adventure, Wizards, Castle, Mad Max and more. User Club magazines, £250. Tel: Bradford 0274 668247.

**48K Spectrum** for sale with joystick and sound amplifier plus £200 of the best software £250. No offers. Anyone selling BBC software please tel: 0760 338387.

**Tandy TRS-80** Model 1 L11, 16K with monitor and much software etc, £150 ono. Tel: 01-994 1963.

**Tuscan 64K**, Professional, cased with 4-8" disk drives, MX80 FTII and Daisywheel printers, I/O board and terminal, all with desk. £1250. Tel: Horsham 69040.

**ITT2020** 64K (compatible Apple II), Autostart ROM, 3.3 DOS latest disk drive, 80 column card, Philips Amber monitor, business software, £700 ono. Tel: 03632 3714.

**Hewlett Packard HP87A** personal computer system, 32KB, HP1B, manuals, £1300 ono. Tel: Kim on Egham (0784) 38441 (day), 01-673 5884 (eve).

**Atari 400/800** software for sale, Mountain King cartridge, £17, Boulders & Bombs cartridge, £17 + lots of other cartridges & cassettes, boxed as new, perfect. Leeds 0532 531960.

**Wanted BBC B** in good condition, software considered. Write to: Neil, 6 Myrtle Close, Robinswood, Gloucester, GL4 9YP. Prompt reply guaranteed.

**UK101** 32K Geggion 16/32 printer, interface case, software. £100. Tel: 01-319 0098 (Carpenter).

**Atari 400** 16K with recorder, joysticks, paddles, cartridges, many programs and books, £160. Tel: (093 287) 2808 (Surrey).

**Disc Drive BBC**, Massive 800K storage capacity. Complete with original packing, manual and leads. Retail £925. Absolute bargain at £575 ono. Tel: 01-472 3507.

**Atari 400** as new, Basic, manuals, Sea-Dragon, Diamonds, F. Apocalypse, Preppie II, Chess, Stratos, Star Raiders. Guaranteed, £225 incl copy utility. Tel: Andrew, 0942 606649 after 6pm.

**Apple Games**, Blackpool, Mummy's Curse, Dark Crystal, Cranston, Wolfenstein, Aphsal, Wizard + Princess, Wizardry, Zork. Many other arcade games. J. Davey, 44 Hazelmere Rd, Stevenage, Herts.

**BBC Official 800K** disk drives £695. LVL dual 200K disk drives £320. Interface £70. Microcut Colour Monitor £260, all new. Davenport 3792.

**HP-41CV and Extended** functions module for sale, complete with manuals. Includes synthetic programming book. £210 ono. Ask for Robin Ezra 01-591 1478, eves.

**Spectrum Software**, 15 original tapes, Zoom, Miner, Trans-Am etc, plus printer, paper. Cost £96. Sell £45. Tel: Romford 67069 after 4pm weekdays.

**TRS-80 Model I** Level II 48K RAM includes expansion interface, leads, software etc, or part exchange for BBC Model B. £350. 51 Owenford Rd, Radford, Coventry CV6 3FQ. Tel: 0203 598955.

**Commodore Disk Drive**, Model 3040, two printers model 3022, Interop interface for Vic-20 or 64. Will split, any reasonable offer accepted. Tel: Reading 0734 470172.

**Epson HX20** portable, printer, micro cassette, LCD screen, 16K. Perfect condition, £375 ono. Tel: Dave 06706 368992.

**ZX1 16K** £37. Software, including Magzons, Flight Simulation and Chess. Games book plus other programs. £45 ono. Tel: 061-653 6355 (Manchester) after 6pm.

## Billboard Buy & Sell Form

To place your Billboard ad, fill in the form on the left, with one word per space, up to a maximum of 24 words. Send the completed form, together with a cheque or postal order for £1.50 made payable to VNU Business Publications, to:

**Billboard, Personal Computer News, 62 Oxford Street, London W1A 2HG.** Note that we cannot guarantee that your ad appears in any specific issue, and that we cannot accept ads from commercial organisations of any sort.

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.

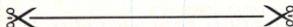
## SOFTWARE

### COMMODORE 64

The best 6 games 4 the best micro send s.a.e. for full list

**KONG** *anirog*, **GRIDRUNNER** *anirog*,  
**SKRAMBLE** *anirog*, **3D TIME TREK**  
*anirog*,  
**HOVER BOVER** *llamasoft*, **ATTACK OF THE MUTANT-CAMELS** *llamasoft*

All games rushed to your door for only £7.95 each which includes P.P.



NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_



## SEASONAL GAMES BARGAINS



### COMMODORE 64

Scramble	£7.00
Kong 64	£7.00
Hotbit	£11.50
Purple Turtles	£6.80
3-D Deep Space	£6.30
Fort Appocolyps (in port)	£21.00
Pooyan (in port)	£17.95

### SPECTRUM

Ah Diddums	£4.60
Zip Zap	£4.60
Arcadia	£4.60
Jet Pac	£5.00
Lunar Jet Man	£5.00
Atic Atac	£5.00
Valhalla	£12.00
Manic Miner	£5.00
Tong	£5.00
Bugaboo	£5.95

Try the Forest a different type of game £8.65 critically acclaimed in PCN

"If satisfied tell your friends, if not tell us"

CHEQUES & P.O.'s to

## LA MER SOFTWARE

22 WEST STREET, WESTON-SUPER-MARE, AVON BS23 1SU



**STICKY FINGERS SOFTWARE**  
 69 Dorset St, Bradford,  
 West Yorks BD5 9QP.  
**Programs wanted now!**

For All Your Micro Needs

## MICROWAY

Computer Centre

39, High Street, Rainham, Kent.  
 Tel: (0634) 376702

Oric 48K £40 Software	£139.95
Commodore 64	£229.00
Dragon 32	£169.00
Dragon Disc Drive and Controller	£275.00
BBC Model B	£399.00
Acorn Single Disk Drive	£265.00
Disc Interface (inc fit)	£99.00
Silimire Curmana Disc Drive CS50A	£244.95
Spectrum 48K	£129.95

+ Full range of software for all makes of micro.  
 + Microvitec monitors + Printers CP80 £332.35  
 + many others RX80 £332.35

HT Tiger Business Computer £3,214.00

CREDIT FACILITIES NOW AVAILABLE

## POOLS PREDICTION

### "POOLSWINNER"

The most sophisticated Pools Prediction Aid available. Gives probabilities of score draws, draws, homes or aways, based on two databases holding over 20,000 matches (includes).

The databases are automatically updated as results are entered. This year's results are supplied with the package.  
 Can be used in simple mode, or with parameter adjustments to develop your own unique forecast method.

Fully documented, available now for Apple, Spectrum (48K), Dragon, ZX81 (16K), Commodore 64, BBC (B) (others — please enquire).  
 £15.00 (discs/tapes)

### "POOLSDATA"

Complete record of all English Football League matches 1978-83. Team, scores and dates of 10,000 matches held in simple format, ready for your analysis. Starter analysis programs and full documentation included. Available for Apple, Spectrum, ZX81, BBC, Dragon, Commodore series.

5 years Data £15.00 2 years Data £7.50

## SELEC SOFTWARE (PCN)

37 Councilor Lane,  
 Cheshire, Cheshire  
 061-428 7425



### Calling all NEWBRAIN owners

Copy your screen to a printer with our unique graphic dump routines. Suitable for most printers, please specify on ordering. £6.00.

**CENTRONICS.** Printers interface. Suits most printers £49.95.

**SPACE FIRE** (Space Invaders) £4.00. Typo Ltd, 30 Campkin Rd, Cambridge CB4 2NS. Tel: Day 0487 842083. Evn 0223 322394.

**MICRO PAGER** box. £29.95 add an extra 32K ROM to your NEWBRAIN. We will blow your 8K programs for you. Write for details, enclosing S.A.E.

**JOYSTICK** and demo program £19.95 for the Newbrain and the Oric, ANTHONY ASHPTAL.

**TYPING MASTER** £15.00. **MORTGAGE** and **MATHS** plus £5.00 each. **MEMOPAD** £10.00 gives you all the features for word processing. Join the New Brain users £5.00 group subscription includes 6 Newsletters and special offers, first issue out now.

**GFG MICROSYSTEMS**, 36, Armlinge Way, Cambridge CB4 2UE TELEPHONE (0223) 315120

### LYNX SOFTWARE

LABRYNTH — 3D maze game	£4.75
REVERSALS — our version of traditional board game in fast machine code	£4.75
CHANCELLOR — run UK economy for 10 years	£4.75
SPACE TREK — Zap the Klingons	£4.75
THE WORM — our best yet, guide Wilberforce to the flowers, you will not want to stop	£5.95
DISASSEMBLER — examine machine code programs in standard Z80 mnemonics	£4.75

Cheque/PO to  
**QUAZAR COMPUTING**  
 Dept PCN, 29 Western Road,  
 Newicks, Sussex

Other programs also available, send for details



WITH  
 TOP  
 THE  
 MICRO  
 SWOT  
 TO  
 GET

### 48K SPECTRUM USERS

For details and an order form write, enclosing a STAMPED ADDRESSED ENVELOPE to—

### MICRO-SWOT,

FREEPOST,  
 55 Nash Square,  
 BIRMINGHAM B42 1BR  
 (no stamp required)

SPECIALISTS IN PROGRAMS FOR SECONDARY SCHOOL SUBJECTS

## 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!**

## TURBO CHARGE YOUR ZX 81!

with our **ZX 81 — FORTH ROM** with multi-tasking

Replaces your basic ROM to give you a totally new system. The unique screen editor allows you to edit programmes while other programmes are executing. Runs more than ten tasks at once. Schedule tasks to run from 50 times per second to once a year. Ideal for control purposes. Uses all ASCII characters and restores the keyboard to normal operation. It contains a real-time clock and a large number of 32-bit words. Supports the ZX printer. Allows machine code definitions and needs at least 2K of memory. Supports 16K, 32K, and 64K Ram-Pack. Three times faster than fig-FORTH, but fig compatible. Available as a "fit yourself EPROM", with an extensive manual for £25 x VAT. Some ready-Converted ZX81's available. Floating point extension. ROM — out soon!

**Coming Soon!**  
FORTH-I/O Cartridge for Spectrum £59 + VAT. Ask for details

**AND THE OLD FAVOURITES:**  
Nas-FORTH NASCOM £25 + VAT  
Pet-FORTH for Pet from £25 + VAT

**DAVID HUSBAND**  
2 Gorleston Road  
BRANKSOME  
Poole BH12 1NW  
Tel: 0202-764724

## CHRISTMAS RELEASES

- DRAGON 32**  
**MONSTER MATHS:** Menu-driven education for 8-14 year olds with 9 levels of difficulty. Testing area estimation, times tables, simple arithmetic, mental arithmetic and logical thinking **ONLY £6.95**
- HOOKED!** Entertaining fishing game for 1/2 players of all ages. Optional joysticks, 100% hi-res. Many difficulty levels **ONLY £5.75**
- BBC B**  
**EMPIRE:** Exciting strategy game for one player. Defeat the evil Beeb empire! 8 difficulty levels **ONLY £6.95**
- SCIENCE 1:** Physics education for 11-16 year olds. Routines covering lenses, mirrors, balances, thermometers and meters. All in hi-resolution with full notes **ONLY £6.95**
- SPECTRUM 484**  
**JERICO ROAD:** Full featured educational adventure set in biblical times. With 2 playing levels. As featured on T.V. **ONLY £5.75**

Send cheque/PO to us at



Family Software Specialists  
189 ETON ROAD, ILFORD, ESSEX IG1 2UQ.  
Telephone: 01-514 4871  
All goods despatched within 24 hours

# CAMBRIDGE LEARNING SELF-INSTRUCTION COURSES



## GSC SUPERKIT £19.90

Learn the wonders of digital electronics! This practical kit for beginners comes complete with an instruction manual, components, and EXP300 breadboard to teach you all the basics of digital electronics. The course needs no soldering iron; the only extra you need to buy is a 4½V battery. Using the same board you can construct literally millions of different circuits. The course teaches boolean logic, gating, R-S and J-K flipflops, shift registers, ripple counters, and half-adders. It is supported by our theory courses

### DIGITAL COMPUTER LOGIC £7.00

which covers: basic computer logic; logical circuit elements; the design of circuits to carry out logical functions; flipflops and registers; and

### DIGITAL COMPUTER DESIGN £9.50

Our latest, most up-to-date course on the design of digital computers, both from their individual logic elements and from integrated circuits. You are first shown the way in which simple logic circuits operate and then, through a series of exercises, arrive at a design for a working machine. **GUARANTEE** No risk to you. If you are not completely satisfied, your money will be refunded upon return of the item in good condition within 28 days of receipt.

Other courses available include: MICROPROCESSORS & MICROELECTRONICS @ £6.50 COMPUTER PROGRAMMING IN BASIC @ £11.50.

CAMBRIDGE LEARNING LIMITED, UNIT 142 RIVERMILL SITE, FREEPOST, ST IVES, CAMBS, PE17 4BR, ENGLAND. Tel: ST IVES (0480) 67446.

VAT No: 313026022

\*Please allow 28 days for delivery in UK.

All prices include worldwide postage (airmail is extra — please ask for prepayment invoice). Giro A/c No: 2789159.

- ..... SUPERKIT (S) @ £19.90
- ..... DIGITAL COMPUTER DESIGN (D) @ £9.50
- ..... DIGITAL COMPUTER LOGIC @ £7.00

Telephone orders from card holders accepted on 0480 67446 Overseas customers (including Eire) should send a bank draft in sterling drawn on a London bank, or quote credit card number.

I enclose a cheque/PO payable to Cambridge Learning Ltd. for £ ..... (\*delete where applicable)

Please charge my: \*Access/American Express/Barclaycard/Diners Club/Eurocard/Visa/Mastercharge/Trustcard

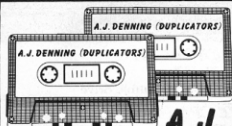
Expiry Date ..... Credit Card No. ....

Signature .....

Name .....  
Address .....

Cambridge Learning Limited, Unit 142 Rivermill Site, FREEPOST, St Ives, Huntingdon, Cambs PE17 4BR, England. (Registered in England no 1328762).

## Accessories



### A.J. DENNING (DUPLICATORS)

**QUALITY CONTROLLED CASSETTE DUPLICATING QUALITY & SERVICE AT COMPETITIVE RATES**

**QUALITY** — Constant Stringent Checks Made Throughout Production.  
**SERVICE** — Despatched Normally Within 10 Days From Receipt Of Master.  
**PRICE** — C10 From 28p Including Case. C15 From 31p Including Case.  
 CONTACT US NOW FOR YOUR PERSONAL QUOTATION

**A. J. DENNING (DUPLICATORS)**

19 The Crescent, Henleaze, Bristol BS9 4RW

Tel: (0272) 623267

**DELTA 14 HANDBASES FOR THE BBC**  
 Used for years by DATABASE owners these high specification handsets have 14 pushbuttons to take the strain off of your keyboard. The DELTA 14 comes in two parts. One handset will plug into the A'id to give analogue spring return joystick plus three button functions. The second part is the DELTA 14B/1 adaptor box which connects the 15 way 'D' to the user port. This gives 12 buttons on a 4x3 matrix. The eighth line selects a second joystick which can be plugged into the adaptor box.  
**New, available now — Program to convert keyboard-played games to run on the joystick and handset buttons.**

**DIRECT FROM OUR FACTORY**



**DELTA 14B JOYSTICK HANDBASE FOR BBC £12.95**  
**DELTA 14B/1 ADAPTOR BOX AND CABLE £13.95**  
**CONVERSION PROGRAM CASSETTE £5.95**  
**CONVERSION PROGRAM DISK £8.95**

**IN KIT FORM:** kit contains 1 switched joystick assembly, 2 moulded case halves, fire button, 1.5m 5 core + screen cable, fixing screws... **£4.50 per KIT**  
**READY BUILT with 9 way 'D' socket — suit Atari or Vic 20**..... **£5.95 each**  
**SPECTRUM PROGRAMMABLE INTERFACE** — to enable above joystick to work on the SPECTRUM. Will convert any keys to joystick directions. Complete with program tape..... **£24.00**  
**'D' connectors 9-way female plug or 15-way male plug complete with hoods**..... **£1.75**  
**Din plug 5-way 240 deg**..... **50p**  
**AERIAL SPLITTER SWITCHES** (Saves unplugging T.V. aerial to connect computer)..... **£2.50**



Cheque or PO with order. Prices quoted INCLUDE VAT. 1st Class Post. 7 day money back  
**VOLTMACE LTD., PARK DRIVE, BALDOCK, HERTS, BSG7 6EP**  
 Callers welcome Monday to Friday. Telephone: (0462) 894410



# 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!

## 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.  
 48-48 Bevois Valley Road, Southampton. Tel: 0703 25831

All shops closed all day Monday.

# STELL SOFTWARE

— For top quality programs

**GIVE YOUR CHILDREN A Happy Christmas!**

with these top quality educational games.



### MONEY

(Spectrum 48K)  
 — an introduction to coins and notes and their use in shopping. Many detailed sections with excellent graphics and sound. 4-10 years old.



### MATHS INVADERS

(Spectrum 16/48K, BBC B/Electron)  
 Load your gun with the right answer and shoot the questions before they land on you. Makes learning to add, subtract, multiply and divide, great fun. 4-12 years old.

Also, look out for: Identikit (48K Spectrum), Time (48K Spectrum, BBC B/Electron), Missing Words (48K Spectrum), Railroader (BBC B/Electron), Micros for Children — 1 (16/48K Spectrum).

Spectrum programs only £6.95 BBC £7.95  
 All programs are attractively packaged in red boxes, with colourful pictures of each game.

Most titles will be available from larger branches of Boots, John Menzies, W.H. Smiths, and good computer shops.  
 Stell Software, 36 Limefield Ave, Whalley, Lancs BB6 9RJ.

## No 1 in EDUCATION

## 15 41 ALIGNMENT SERVICE

Make sure your drive is at a peak performance with an update service, £20 + carriage.  
**Just out** — 64 service ind/garage invoice prog. and 64 retail point/sale prog.  
**64 Specialist.** SAE for software and hardware lists to Milton Keynes Music and Computers, 17 Bridge St, Leighton Buzzard, Bedfordshire. Tel: 05263 76622. Closed Thursdays.

## Clubs

## ORIC-1 OWNERS.

Tangerine created Oric-1 now TUG creates the rest. An independent users group with a solid reputation for progressive system support. Monthly newsletters, meetings, software, hardware, reviews, advice and lots more. We have a proven record of performance on our system. Join TUG. You'll like us, we do! Send £1.00 + S.A.E. (A4) for sample newsletter and details.  
**Tangerine Users Group, 1 Marlborough Drive, Worle, Avon BS22 0DQ.**

## Insurance

### Insure your computer

Impact damage, fire, theft and transit cover for all your computer equipment.

£1 to £1500	Cover £8 p.a.	with £10 excess
£1501 to £2500	Cover £16 p.a.	with £15 excess
£2501 to £8000	Cover £16 p.a.	with £25 excess
£8001 to £10000	Cover £20 p.a.	with £25 excess

With or without liability for further details.

**KGJ Insurance Brokers (Stourbridge) Limited**

6 Hagley Road Stourbridge  
 West Midlands DY8 1JK  
 Tel: Stourbridge (STD code 03843)  
 5333/2545/77391



**· VALUE · APPLE · VALUE ·**

**BASE UNITS**

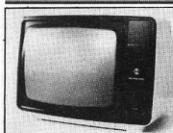


**100% APPLE COMPATIBLE**  
**£349.00**  
 + £52.35 VAT

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

**COMPUTER CARRYING CASE**

Suitable for Spectrum, Oric, Lynx, Sord, Vic 20, Commodore 64, or computers of similar size. The hard case is finished in black with twin lockable fasteners and carrying handle. Separate pockets hold computer/manual, leads, power pack, cassette player and five cassettes. Folds flat for storage.

**£13.95** inc VAT +

Post and packing £2

Dust covers also available for any computer, printer etc. Dealer enquiries welcome.

**SHERBORNE DESIGNS**

Victory House, 8A The Rank, North Bradley, Trowbridge, Wilts. Tel: 02214 4425

**COMPUTER CONSUMABLES**  
**QUALITY DISKS AT COMPETITIVE PRICES**

PHONE — POULENCE

Machine	Price per box 10
Commodore Pet	From £20.00
Tandy	From £20.00
Osborne I	£20.00
Apple II	£20.00
Apple III	£21.00
Olivetti M20	£25.00
IBM P.C.	Single sided £21.00
	Double sided £25.00
Sirius	Single sided £24.00
	Double sided £33.00

Prices are exclusive of V.A.T. Postage & Packaging included in price.

**01-691 7120**

● 50 BBC(I) GAMES, educational and utility programs on one cassette. Includes Tron, Zaxxon, Physics, Maths, Tempest, Dr Who and many others, all for £6.95. (All orders despatched in 48 hours). Send to: Ranjan, 3 Wensley Close, Harpenden, Herts.

**SPECTRUM RAM UPGRADE 16K-48K**



A GREAT NEW DEAL!

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.O.s to: FOUNTAIN COMPUTERS LIMITED

Bishops Court, Bishopstoke, EASTLEIGH Hants, SO5 6PE (0703) 616505

SORRY, NO OVERSEAS ORDERS ACCEPTED (including B.F.P., Channel Islands and Eire).

**Microshop Classified**

● Lynx 48K genuine bargains. FRENCH (four parts). ENGLAND'S HISTORY (four parts). Each programme £5. Other software available. Telephone for details Stonesfield 203. Write M. Lawson, "Rosemary", Woodstock Road, Stonesfield, Oxford.  
 ● 100% off all computer games, Spectrum, Vic20, BBC etc, s.a.e. to: Sphinx Computer Software, Bracken-Moor House, Stanley Road, Stocksbridge, Sheffield. Telephone 0742 887013.

**Books**

**SPECTRUM — COMMODORE 64 — B.B.C. MICRO BOOKS**

Popular Micro Books are Great Gift Ideas. They are gifts that offer excellent value for money, are instructional and enjoyable. Is there someone you care enough about to help them really get into their micro?

**FOR THE NOVICE**

The Working Spectrum Sunshine £5.95  
 Let your Commodore 64 Sunshine £5.95  
 Let your B. C. Micro Teach you to Program Interface £5.95

**INTERMEDIATE**

Spectrum Machine Code Made Easy Vol. 1 Interface £5.95  
 Using Commodore 64 (Intermediately to serious) Duckworth £9.95

**ADVANCED**

The B. C. Micro Revealed Interface £7.95  
 Spectrum Machine Code Made Easy Vol. II Interface £5.95

Commodore 64 Machine Code Master Sunshine £5.95  
 Functional Forth for the B. C. C. Sunshine £5.95  
 P&P Free. Allow for cheque clearance and postage. All carry a no quibble, no nonsense guarantee. If dissatisfied return within 30 days and claim money back. Cheques, P.P.s (Please print name and address) U.K. only P&P Free. Europe add £1. **JUST-ED**

58 St. Mary's Road, Waybridge, Surrey KT13 9PZ  
 p.s. 100's of other titles. Send for free list state machine type.

**Shops**

**Computerama**

**TORCH Z80 DISC PACK**  
 inc £1,000 of software  
**ONLY £835** incl. VAT

**ADVANCED USER GUIDE FOR BBC**  
**ONLY £12.95** + £2 carr

**BBC · SPECTRUM · COMMODORE · & ALL LEADING MICRO'S**

58 FOREGATE ST. STAFFORD 41899

STOKE-ON-TRENT MARKET SQUARE ARCADE HANLEY 268920

# SPECTRUM MECHANICAL JOYSTICK

## AT LAST — a joystick with no interface

Clips on and off without interference to plug-ins.

Operates cursor keys only and leaves hand free for other controls.

**Price £9.95**  
inc. VAT plus 55p P & P.  
(Cheque/P.O. for £10.50 please)



Please order to:

E.E.C. Ltd. 1 Whitehouse Close,  
Chalfont St. Peter, Bucks, SL9 0DA

Name \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

### Software

#### MORGAN CAMERA

S/H Computers in stock, 9/11/83. Big stuff inc. Sord M23 inc. Twin 8 inch disc drive and colour monitor £399. N.E.C. 8001 B.E. inc. double disc and high-RES Monitor £795. D.C. Personal C.P.M. based, double disk and monitor inc. Word Star. Super calc E985, big centronics printer £250, Azom Atom 12K, 8K £70. New 3 brain A.D. £195. ZX Spectrum 48K £39. ZX81 and 16K £35. Vic 20 £85. Casio FX-702P £39. ITT 2020 £299. Vic disc drive £150. Pet printer £225. Centronics 739 £225, shuttle at £10, the caverns of Mars £15, Shamus £15, Star Raiders £10, Defender £15. Atari assembler editor £25, all prices inc. VAT. Morgan Camera Co. 160 Tottenham Court Road, W1. 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

P.O. Box 64, Basingstoke, Hants. RG21 2LB  
(Please enclose return postage if you wish your cassette returned)

### Services

Dear reader, my name is Simon Stable. I specialise in direct data duplicating for the following cassette-based micros: BBC A/B, ZX Spectrum, Electron, Lynx, Onic 1 and Dragon 32. Disc 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 Chalkgate Educational Programs whose new mail order address is: Freeport O.F. Chalkgate Ltd. 37 Wilkewise Road, Northwick, Worcester. Yours Sincerely, Simon Stable.

For further information about real-time cassette copying write or phone  
FREEPOST, 46 WEST END, LAUNTON, OXON OX60 812

### MICROSHOP

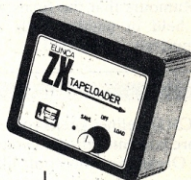
CALL  
CHRISTIAN MCCARTHY  
ON  
01-636 6890

# ZX OWNERS

## BANISH LOADING PROBLEMS

Send S.A.E for Leaflet.  
STATE ZX81 or SPECTRUM.

**ELINCA PRODUCTS LTD.**  
Lyon Works, Capel Street,  
Sheffield 6. (tel. 0742 339774)



for only

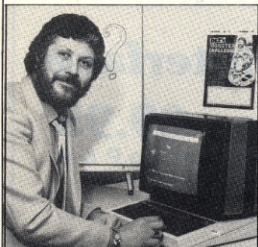
**£14.99**  
Inc. VAT - Post FREE

# Calling all ATARI and COMMODORE 64 OWNERS!

Enthusiastic (and good!) owners of Atari and Commodore 64 machines wanted to do program conversions for forthcoming publications. Please ring:

**Jane Green**  
**PCW Books**  
**01-323 3211 x329**

## Hairy offer



Not to be outdone by Softek's £1,000 prize (Issue 35), Twig Systems is offering £10,000 to the winner of its 'Monster Challenge'.

All you have to do is risk permanent brain damage solving six games to get to the final challenge in London, which may be televised. Dave Lee Travis, the Hairy Monster, involved in the development of the challenge, comments: 'These games will have people beating their heads on the floor with frustration.'

Rumours that the finals will be held in padded cells are completely unfounded.

## Look ahead

The Acorn Electron may have made a slow start but you have to take your hat off to the speed and efficiency of user friendly company Orbit.

With Electrons apparently as rare as a win over the All Blacks, Orbit has already established the Independent National user Group for the Electron. It plans a monthly magazine and a free cassette with eight programs.

It may strike you as premature or even an act of faith to join a user group before you have the machine. But as it's Acorn, you know it makes sense.

## NEXT WEEK

**Peripherals** PCN's Micro-paedia pull-out gives you a Buyer's Guide to add-ons.

**Hardware** The Spectrum's US cousin, the Timex/Sinclair 2068, gets a UK road test.

**Software** Pro-Tests of a music package for the BBC, a database manager for the Commodore

**Newbrain** Part three of a series that shows you how to write-it-yourself for the micro that found a Dutch uncle.

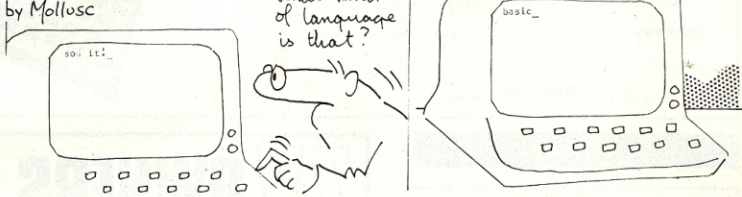
**Gameplay** Reviews of games for the Dragon 32, Vic 20, Spectrum and Atari.

## SYNTAX ERRORS

### A hash of it

If you've tried opening hashes in the first part of our Newbrain WP article, issue 38, you'll have discovered that the line of program under the heading Screens on page 31 should read: OPEN 1,01, L50.

PAL-2000  
by Mollusc



## 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
Ninth ZX Microfair	December 3-4	Alexandra Pavilion, Alexandra Palace, London N22	ZX Microfair, 01-801 9172
BBC Micro User Show	December 9-11	Westminster Exhibition Centre	Database Publications, 061-456-8383
Your Computer Christmas Fair	December 15-18	Wembley Conference Centre	Reed Exhibitions, 01-643 8040
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	Stanley Wire Advertising Ltd., 01-253 6637
Acorn Education Exhibition	January 25-27	Central Hall, Westminster	Computer Marketplace (Exhibitions) Ltd, 01-930 1612
Communications & Computer Systems Fair — CABLES	February 2-4	Pontin's, Prestatyn, Wales	Pontin's Ltd., 07456 2267
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
Essex Apple Village	March 25-28	Festival Hall, Basildon, Essex	Database Publications, 061-456 8383

## OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Computer Indonesia	Nov 22-25	Jakarta	Overseas Exhibition Services Ltd., 01-486 1951
Computer Dealers Exhibition	November 28-Dec 2	Las Vegas, USA	Interface Group Conference & Exposition Management, 160 Speen St., Framingham, MA 01701, USA
Personal Business Computer Show	February 29-March 3	Hong Kong	Overseas Exhibition Services Ltd., 01-486 1951

Your choice is crystal clear

## 'The Hobbit'

The Hobbit floppy tape system is the ideal alternative to an unreliable cassette recorder and an expensive disc drive.

This is a professional digital recorder designed specifically for users of micro computers.

The Hobbit is completely under the control of your computer - no more pressing RECORD/PLAY/FAST FORWARD, etc.

Absolutely no danger of accidentally overwriting other files on the cassette. The Hobbit uses an internal filing system similar to that used by a disc, thus ensuring that there is no redundant space on your cassettes.

The Hobbit is significantly faster than an ordinary cassette recorder (READ/WRITE speed 6000 data bits/sec., ordinary cassette recorder average 960 data bits/sec.)

Typical file access time is 22 seconds; maximum is 90 seconds.

Up to 5 files may be opened simultaneously. Random access files are fully supported.

Two Hobbits may be connected to your computer to form a dual drive system.

### NO COSTLY DISC INTERFACE REQUIRED

No hidden extras - the Hobbit comes complete with everything you need, including one certified digital cassette.

The Hobbit is available now for BBC and NASCOM computers.

### Special Features for the BBC

**Zero Memory Option** The standard Hobbit operating chip sets PAGE to 1C00. With the Zero Memory Option the Hobbit does not use any of your precious RAM, thus making the transfer of programs from ordinary cassette to Hobbit even simpler.

**Power Supply** Power is taken from the external power outlet socket on the BBC computer. If your computer is not fitted with this socket a suitable power supply is available from us.

### Special Features for the NASCOM

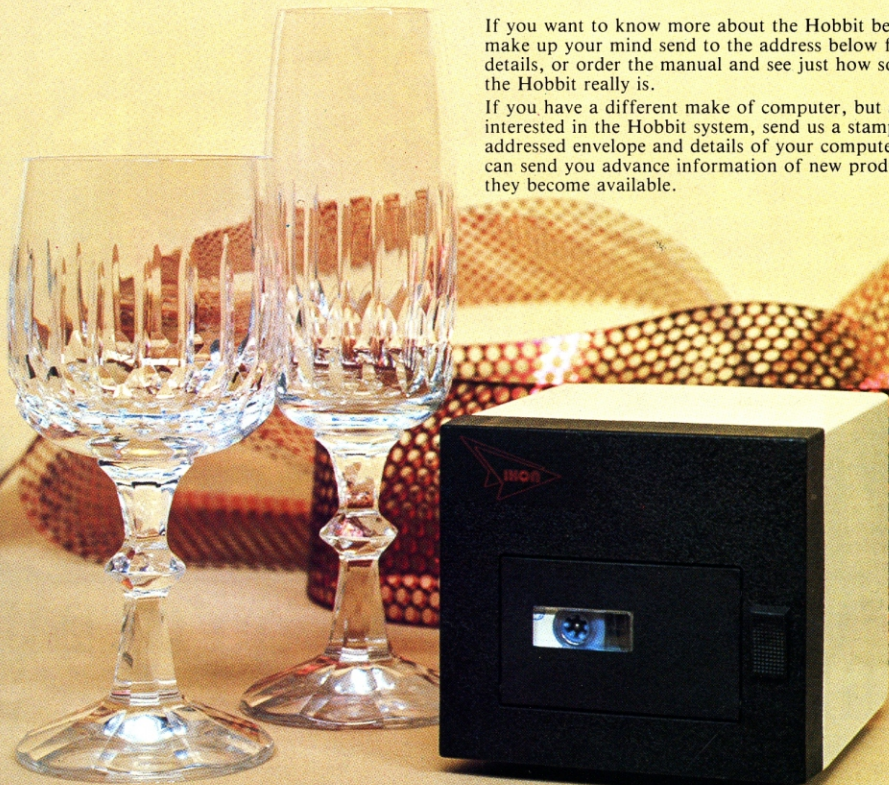
**Microsoft Basic Upgrade Kit** Enables you to read and write files from BASIC using PRINT and INPUT statements - no more PEEKS and POKES! Supplied on a Hobbit cassette.

Operating system available in 2 x 2708 or 1 x 2716.

Normal address D000 - other addresses are available on request at no extra charge.

If you want to know more about the Hobbit before you make up your mind send to the address below for more details, or order the manual and see just how sophisticated the Hobbit really is.

If you have a different make of computer, but are interested in the Hobbit system, send us a stamped addressed envelope and details of your computer so that we can send you advance information of new products when they become available.



Available from most good computer shops or direct from:- IKON COMPUTER PRODUCTS, KILN LAKE, LAUGHARNE, DYFED.  
Tel. 099 421 515. BBC Hobbit £135.00 + £3.00 p&p. BBC Second drive £120.00 + £3.00 p&p. Zero Memory Option £25.00 (£18.00 if ordered with the Hobbit). Power Supply £12.00. Manual (ordered separately) £1.50 (No VAT; refundable on purchase of Hobbit). Nascom Hobbit (unboxed) £120.00. Nascom second drive £94.00. Basic Upgrade Kit £10.00. Box of 6 cassettes £17.50. Cleaning cassette £3.50. Please add VAT at the current rate to the above prices. ACCESS AND VISA ACCEPTED.

**IKON**  
COMPUTER PRODUCTS

# ocean

## TOP OF THE CHART

	GAME TITLE	PUBLISHER	MA
▲	1 (2) Kong	Ocean	Spect
▲▲	2 (6) Manic Miner	Bug Byte	Spect
▲▲▲	3 (1) Jet Pac	Ultimate	Spectr
▲▲▲▲	4 (4) Zoom	Imagine	Spectr
▲▲▲▲▲	5 (8) Hobbit	Melbourne	Spectr
▲▲▲▲▲▲	6 (5) Penetrator	Melbourne	Spectr
▲▲▲▲▲▲▲	7 (10) Harrier Attack	Martech/Durell	Oric

**HUNCHBACK**

HELP!

OFFICIALLY LICENSED BY CENTURY ELECTRONICS

**ocean**

## We've got a hunch you're going to like our latest best seller . . .

Dealers: The bells, the bells, the bells ringing from your till after you have stocked our best selling software range will make you deaf. But hear this, our dynamite selling range is available from all major distributors.  
Phone: 061-832 7049

Available now for the  
ZX Spectrum  
Commodore 64  
Oric 1  
and soon for  
Dragon 32, Atari 400/800  
and Acorn Electron.

MORE FUN  
MORE CHALLENGE

Ocean Software is available from selected branches of **WOOLWORTH, W H SMITH, Boots, John Menzies, LASKYS,** major Department Stores and all good software dealers. For your nearest stockist  
Phone: 061-832 9143.

Ocean Software, Ralli Building, Stanley Street, Manchester M3 5FD.