

# PERSONAL COMPUTER

**EVERY THURSDAY**

50p OCT 27 - NOV 2 1983 Vol 1 No 34 **NEWS** THE COMPLETE COMPUTING WEEKLY

## **THIS WEEK**

**SPECTRUM SPEAKING**  
We sound out the new synthesiser from Currah

**PROGRAM PULL-OUT**  
Forth, strings and programming efficiency in Micropaedia

**EXCLUSIVE  
PRO-TEST OF  
NEC'S PORTABLE**



**ORIC SECRETS**  
Your key to clean programming

**THE 64 FILE?**  
Pro-Test of a package to keep the records straight

## **EVERY WEEK**

**MICRO GUIDE**  
Fact-finding made easy in Databasics

**POPULAR PROGRAMS**  
Unique cards to collect

# Strengthen your hand

# with *Superbase* 64

The complete information control system for the Commodore 64.

The World Famous Commodore 64.



No matter what your business or interest, with Superbase 64 you have a totally flexible 'record' system, as big as you want it, as fast as you need it.

Create your own formats, enter your records, change layouts and datafields.

Superbase gives you unrivalled control in home or office, business or professional practice, with a range of features including:

### YOUR OWN RECORDS

- Design your own layout
- Calculate and transfer fields
- Record and transfer fields
- Up to 127 data fields
- Up to 127 records
- Number of files limited only by your system
- All record datafields are stored in 128 files through screen HELP
- Screen HELP - add your own fields

### FAST ACCESS

- Open records for high speed search for any file size
- Search and search for any name, date or number
- Sort records into any combinations into any order
- Other records into or generate printed reports
- Browse through records making on any screen

### TOTAL CONTROL

- Links to other programs and EASY SCRIPT for mailshots, high-quality letters, quotes, tables, etc.
- Effective management of invoices, addresses, stock, membership, appointments - any and every kind of record
- English like commands for easy conversational programming, plus built-in BASIC

### DATABASE MANAGEMENT

- Easy to understand menus or alter length - no file reusing needed
- Update files with automatic batch processing
- Calendar arithmetic for effective time management
- Display quantities, enter totals, as you wish
- Formulas for on-screen result calculation

**Precision Software**

**Superbase 64**

Precision Software Limited,  
Park House, 4 Park Terrace,  
Worcester Park,  
SURREY KT4 7JZ ENGLAND.  
Telephone: 01-330 7166  
Telex: 8955021 PRECIS G



**commodore**



## Pull-out and keep Micropaedia

Design, debugging and program structure in our teach yourself programming course

## REGULARS

### Monitor

2

Christmas buyers face Electron famine — page 2; Newbrain rebirth in UK — page 3; IBM extends PC range upwards — page 4; Full report of the International Business Show — page 5; U-Micro challenges Ecomet — page 6; Lucas buries Nascom name — page 9.

### PCN Charts

10

Changing fortunes in the micro marketplace.

### Random Access

13

£10 for your thoughts if your letter is voted a star.

### Routine Inquiries

14

Your problems solved by our team of experts.

### Microwaves

16

Share your computing discoveries with a wider audience.

### Binder offer

44

Keep your PCN collection in order with our dedicated filing system.

### ProgramCards

56

Micro all-sorts with French Test on the Apple, arithmetic quiz on the Vic, Bouncing Babies on the Spectrum and Road Hog on the BBC.

### Readout

69

PCN reviews the new books.

### Databasics

72

Dozens of computing bargains.

### Billboard

81

Dozens of computing bargains.

### Quit/Dateline

88

Cover photograph by Howard King-north

## PCN PRO-TEST: HARDWARE

### Incredible shrinking micro

19

The age of the book-size portable is with us. Latest into the fray is Japan's NEC with its Tandy 100 lookalike, but Geoff Wheelwright discovers a few significant differences.



## PCN SPECIALS



### Oric mapping

25

Gary Williams continues his exploration of the Oric's operating system with a close look at Basic.

## PCN PRO-TEST: SOFTWARE

### Simple 64

31

Bob Chappell examines another contender in the 64 serious software stakes, Simply File — a powerful database for only £60.

### Spectrum on the run

32

Bob Chappell again, this time pounding up hill and through forest from the comfort of the armchair in an entertaining and educational orienteering program.



## PCN PRO-TEST: PERIPHERALS

### BBC spins another disk

37

Having waited so long for the Acorn DFS, Model B owners now face a wide choice of disk filing systems. Bill Davis looks at the chip from Amcom.



### Spectrum speech

39

Now your Spectrum can talk back with a new add-on from Currah. Max Phillips instigates the conversation.

## GAMEPLAY

More arcade-style action for the Atari

47

Fortune telling and criminal detection on the Dragon.

48

Take flight with your BBC in Trench and Canyon.

51

Football and Pool make for a sporting life on the Spectrum

53

## CHARACTER SET

EDITORIAL: Editor Cyndy Miles. Deputy editor Geoff 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. Programs editor Ken 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 Eason. Assistant publishing manager Sue Clements. ADVERTISING: Group advertisement manager Pat Dolan. Advertisement manager Nic Jones. Assistant advertisement manager Mark Satchell. Sales executives Christian McCarthy, Marie-Therese Bolger, Julia Dale, Dik Veenman, Alison Hare, Deborah Quinn. Production manager Eva Wroblewska. Advertisement assistant Jenny Damm. 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. Photos by Quickset, 184-186 Old Street, London EC1. Printed by Chase Web Offset, St Austell, Cornwall. Distributed by Seymour Press, 354 Brixton Road, London SW9, 01-733 4444. Registered at the PO as a newspaper

# Few Electrons for Christmas

By Ralph Bancroft

If you were hoping to buy an Acorn Electron for Christmas you might stand a better chance of finding a needle in a haystack.

Acorn says that it already has advanced orders of 160,000 machines and no hope of satisfying the demand. Those small numbers of Electrons that are starting to trickle into the shops are no sooner put on the shelves than they disappear again, sold to a queue of would-be buyers.

'We are still ramping up production,' an Acorn spokesman said. 'We should reach our target of 25,000 machines a month before Christmas.'

At that level of production it would take Acorn more than six months to clear up the backlog of orders.

To satisfy the demand, Acorn has negotiated with AB Electronics in Wales (which is already one of the sub-contractors on the BBC micro) to start making Electrons. Unfortunately, its production line won't start rolling until the new year.

Acorn is now talking to another British electronics company to open a third factory. 'An announcement of the deal is imminent,' the Acorn spokesman said.

Retailers are finding Electrons in short supply. WHSmith is currently selling the micro in only two branches in London. Existing stocks are sold out and it is uncertain when the next deliveries will arrive. It is not totally upset by the shortage. Apparently some people going into its shops, finding no Electrons on the shelves, are buying BBC Bs instead.

# Trickstick on the way

By John Lettice

East London Robotics is confident that it will have overcome production problems with its revolutionary new joystick, the Trickstick, by the end of this week.

The company has been advertising the joystick for some time now, but a working prototype with a hand-built circuit board has only recently been completed.

East London Robotics' Roger Vellacott said that circuit boards made to this pattern are currently in production, and that it should therefore be possible to meet all outstanding orders by the end of this week. He would not reveal how many Spectrum users were waiting

for the £28 Trickstick, but said that the company had 2,000 Tricksticks 'three-quarters completed', simply waiting for the circuit boards.

The Trickstick is revolutionary in that it uses AC hum — this is what you get when you're in the vicinity of an electricity pylon — to control games. It has low voltage pressure pads on it which vary the voltage depending on how hard you grip. It uses a new method — patent applied for — of producing the effect of a digital to analogue converter, and allows you to move in curves rather than in jerks.

It will work with Kempston compatible games, but gives you the potential of writing much more complex software to go with it. Attacktics, which will be available at the same time as the stick for £7.50, allows movement in 64 different directions.

# Memotech glimpsed in shops

One of the summer's more attractive launches, the new Memotech system, has started to appear in the shops, or more accurately, in a shop. Computers of Wigmore

Street in London's West End took deliveries of Memotech 500 and 512 machines last week, and other retail outlets should have the systems in coming weeks.

The Memotech 500 first emerged in late April (PCN, issue 8) and has since been seen at various computer shows.

The 500 has 32K and will sell for £275. The 512, with a similar spec but 64K, costs £315. Both are based on the Z80A with 16K of Microsoft-compatible Basic in ROM and further RAM dedicated to graphics, which is one of the system's significant features.

The resolution is 256 by 192 pixels and 16 colours are there to choose from. Memotech's Basic includes graphics commands and has 26 reserved graphics characters.

Memotech is on 0993-2977. Computers of Wigmore Street are at 87 Wigmore St, London W1.

# Radifon sets out future for Aquarius

The Mattel Aquarius may well be the cheapest colour computer in the UK, but it probably won't be for long.

Mattel is dropping out of the computer hardware business and the managing director of Radifon Electronics UK, which is due to take over distribution of the machine next year, plans to raise the price of the machine as soon as 'market forces permit' because he

doesn't believe the price of the machine should have been dropped in the first place.

Mattel dropped the price of the bare-bones 4K machine to £59.95 two weeks ago because, according to a spokesman, 'our plan (for marketing the Aquarius) has been somewhat shaken by the losses of the parent company — we have been forced to reduce prices.'

Radifon managing director Alan Leboff didn't indicate what he thought the price should be, but he hinted that last month's £79.95 price was closer.

'We like to make a profit on whatever we sell,' said Mr Leboff. He said that the machine will be

worth any extra money people might have to pay for it, as Radifon has a massive new support plan. First of all, the company is hoping to bring out 50 new cassette programs for the Aquarius by Christmas — and prices are expected to start at about £5.95. The first of those programs should be released next week.

Radifon plans to release an upgraded version of the Aquarius with full-travel keyboard, an extended Basic and a bigger memory capacity, next spring. Provisionally dubbed the Aquarius II the machine will be compatible with existing Aquarius software and be able to take on more complex tasks.

# Business trio due

By Geoff Wheelwright

Three new business micros are planned for release in January — with two of them hoping to outdo IBM and the third setting its sights on the Sirius.

Triumph Adler last week launched what could be the cheapest CP/M-based micro yet.

The Alphatronic PC will sell for about £399 and will include 64K RAM, 32K ROM and software compatibility with the existing range of Alphatronic machines. It will run the CP/M operating system and two 320K disk drives; the first of which costs £379 and the second £310. The extra cost on the first drive is because the disk controller is included with it.

CP/M won't actually come standard with the machine, but will be available for about £30 extra. However, at about £800 for a single-drive CP/M system with full-

travel keyboard, cassette interface, cartridge port, RS-232 and Centronics interface, nobody is likely to complain.

When it does arrive, it will have competition from Sanyo — which is also planning a January release of a cheap business starter system. It's IBM-compatible MBC-555 micro will start at around £699. That price will include a single disk drive and two well-known business packages: Wordstar and Calctax from Micropro.

A second disk drive for the 16-bit machine will go for an additional £300. And British Sanyo officials are hoping to get a £300 to £400 cassette-based cut-down version of the machine (without any disk drives) ready for the January launch.

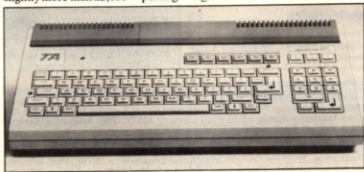
They feel that there's long been a big price gap between the upper-priced machines in the home mar-

ket — stopping at about £400 for the BBC micro — and the lowest-priced business machines — which have started at about £1,000 with disk drives.

Panasonic, meanwhile, has its eyes on wealthier clientele with the planned January introduction of its JB-3000 machine. It hopes to sell the 16-bit MSDOS system for slightly more than £2,000 — putting

it in direct competition with the ACT Sirius.

It will come standard with 96K, run the 8088 processor and will support either colour or monochrome monitors. It's not a totally new machine, however; what will be new is a digital colour plotter which is expected to sell for between £1,300 and £1,800 depending on size.



Triumph Adler's slimline 'tronic' won't hit your pocket.

# NewBrainwave

By Geoff Wheelwright

The Phoenix-like Newbrain micro is due for rebirth in the UK within two weeks.

Tradecom International, the Dutch company which rescued the Newbrain from the hands of liquidators last week, has appointed Brainwave Software as its UK distributor and plans are in the works to put the machines back into stores within the next 14 days. Alan Mann, the owner of Brainwave Software and new Newbrain distributor, is optimistic about the future of the machine.

'In a matter of weeks the machine will be on sale again as if nothing had happened,' said Mr Mann. He added that a few extras will be available for the re-released machine when it hits the shops again.

A new 'improved' version of the disk controller will be used on all new disk and CP/M systems sold for the machine and a networking system has been developed for it by a company in Scandinavia.

Mr Mann said he has contacted many of the old Newbrain dealers with a view to getting them to stock the machine again. He claimed that not one of them had turned his offer down. He said even the bigger dealers — which include the Lasky's chain — have agreed to restock the Newbrain.

The price for the machine will be the same as before the Grundy Business System crash that laid the newbrain low — £234 for the Model A and £260 for the Model AB (VAT must be added to both prices).

The disk drive and CP/M expansions will also maintain their pre-crash prices at £395 plus VAT for a single 200K disk drive and about £1,000 for the top of the range system with twin 800K drives and an additional 64K memory.

But with companies like Sanyo and Advance computers planning to introduce IBM-compatible single-disk computers for under £700, the attraction of Newbrain's 'low-cost' business entry system

begins to pale. Mr Mann, however, is committed to the machine and says he's confident the price and competitiveness of the machine will hold — although he concedes a small price drop could be in the offing. 'The prices are being looked at to see where they could be cut,' he said.

He added that there should be no delivery problems as 'more than a thousand' finished machines are sitting at Thorn-EMI, the company that was making them for Grundy.

He is also promising new software for the machine from his own company — including a new disk-based adventure game. Mr Mann claims that more than 500 packages will soon be available running under Newbrain Basic, and well-known commercial packages (including Wordstar) will be available to run under Newbrain CP/M.

Anyone wishing to buy the Newbrain or become a dealer can call Mr Mann on 0787-237-831 or write to him at Brainwave Software Ltd, Tilbury-Juxta-Clare, Essex.

## HP sets up standards

A big shake-up is on the way for Hewlett-Packard (HP) micros as the company moves to standardise some of its machines' features.

For starters the variety of operating systems currently used by HP will progressively merge. On personal computers, MSDOS and HPUX — (HP's version of the Unix operating system) — are seen as the leading systems.

The company sees MSDOS becoming more Unix-like, the two gradually blending. Lance Mills of HP's personal computer group in California said: 'We are making this move in operating systems for several reasons — but primarily because it will be easier for the user to transport software from one machine to another.'

'In addition, we think that if our machines are more compatible it will minimise the amount of training and expertise needed.' Other areas that will become standardised are disk drives and user interfaces.

HP also sees the present keyboard layout of the HP150 as being the standard.

## Adam out at last in US

Coleco has at last started shipping its controversial Adam home computer — but it isn't saying how many are going out.

Deliveries of the \$700 Adam were first due to go to dealers in August, at which time the machine was expected to sell for \$600. Coleco also planned to ship half a million systems by the end of the year — it has now admitted that it won't reach that target.

## THE LABOURS OF HERCULES

Combining text and graphics on the screen of the IBM PC is the promise offered by this plug-in card available from Reflex (0734-884611). Costing £431 it replaces the standard monochrome card in the PC and spares you the trouble of an extra card and a separate monitor to run graphics applications. If you are running the Lotus 1-2-3 package on the IBM PC the Hercules could be particularly useful as it is said to be the only single card offering that allows you to display all of 1-2-3's graphics. This is no mean feat but from a card called Hercules what else would you expect?



## Micros make film debut at animation festival

Britain's first Computer Animation Film Festival last week showed that you don't need minis and mainframes to generate interesting animated films.

Two entries were developed on BBC micros — one, ironically, to adorn Independent Television's The Krypton Factor. This application formed the basis of the quiz show's mental agility tests. The other was produced for industrial training films on metal fatigue and integrated circuit construction, by the Welding Institute.

The film festival took place at Wembley Conference Centre as part of an annual event called CG83. This combines an exhibition of graphics hardware with a conference on business graphics, computer animation, and computer aided design and manufacture (CAD/CAM).

Computer graphics was once the preserve of universities with enormously powerful mainframes.

But computer animation has already found its way into movies such as Superman III, Star Trek II, Return of the Jedi and particularly Tron. In the past couple of years studios have been set up to provide futuristic or eye-catching animated sequences for television commercials and programme title sequences. The work of several of these companies was on show.

The overall winner of the film festival was the New York Institute of Technology's 'Lab Sampler', the video equivalent of a 'greatest hits' album. It was deemed to make the most artistically creative use of computer animation and it was also technically among the best entries.

The film included part of a BBC 'Arena' programme.

## Fuller order overload

By John Lettice

Fuller Micro Systems, which has been unable to fulfill orders for its Spectrum add-ons, is now confident that the situation is under control. Mail orders for the Fuller Box, the Orator and the FD42 keyboard are now being turned round within 21 days.

But demand for the FDS keyboard with space bar is so great that there is a waiting time of around nine weeks, and a number of smaller dealers may have to wait some considerable time — and renegotiate their dealerships — before they get further supplies.

Fuller's Bob Ryland puts the current problems down to the dealer network growing faster than

Fuller could support. 'Our previous general manager was a bit overzealous in appointing dealers.' This meant that demand for Fuller products from dealers could not be satisfied, and began to disrupt mail orders. 'Our mail order had gone to pot,' says Mr Ryland.

Fuller is therefore now supplying only dealers who pay cash up front, and will be renegotiating with other dealers when supplies allow.

Mail order is now up to date for most products, but the FDS is in short supply because of a combination of heavy demand and production problems. These problems, with the moulds, have now been overcome, but it is still likely to be a long wait.

## VIEW FROM JAPAN



by Serge Powell

## Golf hits the screen, and the ego

Among the many frustrations of living in a land where the native population speaks a different language, has not one but three different alphabets, builds tempting hardware, and crams each and every computer store with games software by the lorry load, is the fact that the language and the alphabets make it somewhere between difficult and impossible to learn to play the games.

To a fun-loving games addict this is like being given a selection of the finest games and not knowing which keys control them. By trial and error you might eventually get there, but anything with a substantial amount of text — an adventure game, for example — is out of the question.

Back home, which for me is a land where two languages are spoken but only one alphabet used, there is a simple way of working off such frustrations. You walk the local golf course and take things out on some poor golf ball, or on the carefully manicured fairways, or the neatly raked bunkers. Maybe can be a rewarding pastime. But in Japan, by the time you add up the green fees, the transportation costs and so on, you could find yourself out of pocket to the tune of \$100 or \$200. In its way this is even more frustrating.

But a compromise is at hand. What could be more logical than to take it out on a computer golf game? The game costs a mere \$3500 yen (about £10), needs only 32K of RAM, and should surely not tax my functional illiteracy. Any 12-year-old ought to be able to knock a white spot around a green screen with a minimum of instruction.

When you approach software in that frame of mind you can begin to understand how far superior artificial intelligence could be to our own. The moment you underestimate it, be prepared for it to show up your naivety in the most humiliating fashion.

I had to be rescued from 'Golf' by my six-year-old son. Having loaded and started the program I was pretty well stymied, but all that the screen was asking for (in the most basic Japanese alphabet) was the player's name and handicap.

The next challenge was to determine in which of eight points on the tee I wanted to position the ball. Also which club I wished to assault it with — there was a choice of 5 wood, 9 iron, sand wedge, pitching wedge and putter. Also what angle I wished it to take off in — the right of the screen was 0°, the top 90°, the bottom 270°, and the other angles proportionate to these bearings.

I was given the option of striking the ball with one of three intensities. This too had to be explained to me, but the hazards of the game were plain to see — which made them child's play, if you'll forgive the expression. In living colour I faced rough to right and left, a bunker on the left, and (in case I ever got close to the green) bunkers to left, right and behind. For comic relief there was a tree in the middle of the fairway.

On the plus side I was offered a cross-section of the hole and thanks to translation from my wife could work out the variable wind speed and direction. Golf is not commonly thought of as a family game but in this household only the cat hadn't taken part by this stage.

The game was for three players. I selfishly took all three hands and hit drives well to the left, along the edge of the fairway, and smack down the middle towards where the tree lay in wait. After numerous false starts I made the green in five.

The visual scale now grew to take in the whole green and its attendant bunkers. A handy distance scale appeared on the screen, and another string of funny characters to tell me which way the green slopes and how well trimmed the grass is. Armed with this information I eight-putted.

So never let it be said that games software is trivial and devoid of educational value. Under the right circumstances it can be highly instructive. But it won't necessarily help you let off steam. There is one great consolation, though; with the money I'm not spending on real golf I can get psychiatric help after a round or two of the computerised version.

# IBM enlarged

IBM has added fuel to the flames of speculation surrounding its Peanut by launching two new versions of its PC, but for corporate rather than home users.

Both of the products that came out of IBM last week are destined for executives linked to a larger system — usually an IBM mainframe. But they could eventually prove important to other PC users of more slender means, as the breadth of software available for the PC in its new versions is bound to increase.

For the record, the units are the 3270-PC and the XT-370. The 3270-PC brings windows to IBM's PC range, seven of them at a time on a high resolution colour screen. Reports from the US say that the system can be attached to such mainframes as the 4300 line and the 308X series, suggesting that IBM has facilitated software development by implementing software capable of making sense of the various mainframe operating systems it uses.

The XT-370 can be linked to an IBM 370 mainframe, and current

users of the PC XT will be able to upgrade to this workstation.

These systems are souped-up PCs for business users. There is still no clear sign of when a souped-down PC, the Peanut, (officially PC Junior) is likely to hit the streets. But the latest speculation (on which IBM disdains to comment) hints at two models, one with 64K and the other with 128K.

The smaller unit is expected to cost around \$750 and the larger system, with twice the main memory and a built-in floppy, about \$1,300. A feature of both is expected to be an infra-red line-of-sight connection between the keyboard and the main unit.

Meanwhile Peanut fever seems to be sweeping some regions of the US, with potential users placing non-refundable deposits with dealers.

This will put them close to the head of the queue when the system is eventually launched; but it also assumes that the thing exists and that it will work, and even IBM has been known to launch computers that didn't work properly.

## An Oasis of add-on units

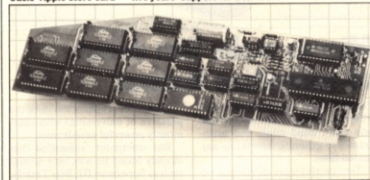
A set of hardware add-ons for Apple and BBC users are the first products to be unveiled by Oasis Electronics.

Oasis (0603 503275) grew out of the instrumentation field and its first batch of products reflects this background. If you have a scientific or educational application that needs the intelligence of a micro, the modules and boards launched

last week could set up the connection.

For both the Apple and BBC micros there are data acquisition modules and EPROM programmer. For the Apple alone there is a firm time store, carrying a real time clock and battery support for 16K of RAM (£169), and an appointment scheduling system with software, clock and memory (£199).

Oasis' Apple store card — five years' support for 16K RAM.



## Microspeech

By Sandra Grandison

Add-on expert Kempston Micro Electronics has produced a speech synthesiser for the Spectrum.

The Kempston  $\mu$  Speech, selling at £29.99, is a plug-in device that retains allophones in the memory as the basis for forming words.

The vocabulary of the synthesiser is infinite and it can include foreign languages. Other features of the system include a built-in speaker, volume control, a comprehensive dictionary and the ability to amplify

the Spectrum beep sound.

Mr Pandaal, manager of the company said: 'This product is primarily aimed at the educational market to be used as a tool. And we shall be developing software in this direction.'

The Kempston  $\mu$  Speech comes with a free cassette which has a dictionary and a musical guessing game on it. You can get your first glimpse of the speech synthesiser at the Northern Computer Fair, November 20 at Birmingham.

■ PCN will Pro-Test the unit in a forthcoming issue.

# IBS cache and carry

By Geoff Wheelwright

All the show-stoppers at last week's International Business Show in Birmingham could have been smuggled out of town together in a small suitcase: none of them much bigger than a breadbox and most a good deal smaller.

The show pointed to a rosy future for portable computers, with new entries from Canon, Sharp, Ricoh and Commodore leading the way. Two of the new machines use a built-in Liquid Crystal Display while the other two have built-in conventional CRT monitors (a colour monitor on the Commodore 64 portable).

The cheapest of the new entries is Canon's X-07—an A-5 battery-operated micro that is expected to sell for about £200 when it's officially released in January next year. The machine will come with Microsoft Basic, 8K of CMOS non-volatile RAM (you don't lose information when you turn the machine off) and a five-key cursor arrangement.

The really interesting bit is this



The Ricoh system's 1 1/2 inch screen — miniaturisation in true Japanese style.

things you can plug into it. The 'Look, Ma — No wires' option uses an infra-red optical data transfer system that allows you to transfer information with a small device that looks like a periscope on both the sending and receiving machines.

The system works like remote control TV module, sending an infra-red signal from one machine which is interpreted by a receiver on the other. It will also have the industry non-quite-standard RS-232C serial interface, so you can send information typed on the X-07 to most larger business micros.

Moreover, the machine uses a unique 'credit card' system of cartridge information storage that not only gives you the now traditional ROM utility programs (such as word processors and spreadsheets) on a cartridge slightly larger than the average credit card, but also extra non-volatile RAM. The RAM is backed up by a thin lithium battery so the cartridge won't lose



Sharp's PC5000: not the newest portable at the show but it looks to be one of the most capable.

information when you unplug it from the X-07.

The RAM cards will come in two sizes: 4K or 8K. More conventional cassette storage is also possible through the cassette port provided on the machine.

Data will be directly dumpable to a printer as the machine supports a standard Centronics interface. But a fully-formatting word-processor is unlikely to fit easily onto the machine as it has only a 20 character by 4 line display.

The keyboard will be a hard plastic non-typewriter job, something like the Tandy Colour Computer — providing five function keys, as well as a shifted 'numeric pad' like the Tandy Model 100 portable.

Slightly upmarket and a good deal less portable than the Canon machine is Commodore's portable version of the Commodore 64.

It will be available 'before Christmas' at an estimated price of about £800 — including a single disk drive and a small built-in colour monitor. It has all the same options as the standard Commodore 64, but should offer good value as a complete portable system with the built-in extras.

Ricoh's portable is something else again. Firstly, it won't be sold in any shops until at least some time next year and secondly, it won't be sold under Ricoh's name. Ricoh will be making computers on what's known as an OEM (Original Equipment Manufacturer) basis and letting any interested company put their name on the product.

And it does look like a product any company would be proud to slap its name on. It's actually a range of two machines. The more interesting of the two is the SP-50, a portable business micro with detached keyboard, built-in 1 1/2 inch screen and up to 576K of CMOS non-volatile RAM.

The screen is a 'pop-up' affair to the left of the processor box and neatly tucks away when it's not being used, so that the keyboard can be clipped to the main box to make the machine portable. The

sized computer with a 16 character by two line display and an RS-232 port. Memory on the smaller machine is also 32K standard, but expansion is only up to 64K.

The machines are manufactured in Japan and Ricoh says it should have English language keyboards for them 'within six months'.

Sharp's new PC-5000 portable rounded up the range of new machines, clocking in with the most expensive price and perhaps the best specifications. It uses the 8088 16-bit processor and will run the MS-DOS operating system, driving a built-in 80-column liquid crystal display. Included is 192K ROM, 128K CMOS RAM (expandable to 256K) and it will sell for £1,295.



Commodore's 64 portable.

SP-50 offers standard RS-232C and Centronics interfaces as well as a TV monitor output.

The basic machine comes with 322K RAM and weighs just under 6 lbs. It also has slots for what look like two disk drives, but in fact appear to be memory expansion cartridges to allow for the move up to 576K. Like most machines of this type, it's expected that some of that expansion will be allowed for inside the machine, with the rest taking place in replaceable CMOS memory cartridges.

The second machine in the Ricoh range is a little pocket-calculator



Periscope up: Canon's heat-seeking communications device.

## Oric lit up

About 7,000 Oric machines have been destroyed in a fire at Kenure Plastics in Feltham, Middlesex, but according to Oric the effect on deliveries won't be too serious.

The blaze began at 9pm on Thursday, October 13 at the assembly plant where the micros are produced. At the time of going to press investigations into the cause of the fire were still being carried out. By the time the fire was brought under

control several thousand pounds worth of damage had been done.

Despite its alternative production arrangements, Oric could hardly have suffered the loss of the systems at a worse time. With Christmas approaching it looks as though every manufacturer is going to need something in reserve.

Meanwhile it seems certain the new ROM will appear before Christmas.

# U-Net rivals Acorn Econet

U-Microcomputers has adapted its U-Net Micronetwork, previously available for Apple II computers, to link the BBC micro in competition with Acorn's own Econet.

U-Microcomputers claims the availability of a comparable Econet product has been hampered by the non-availability of the second 6502 processor. As the 6502s won't be pouring into Acorn's factories until the end of this year, Acorn's level 2 Econet won't be available until early next year.

U-Net organises up to 32 BBC micros into a network. The BBCs can share up to six disk drives and two printers. An advanced feature is the file server/controller unit's ability to act as a printer spooler.

The system also supports an effective password security system. This is especially important, says U-Microcomputers, in the school environment where you want to prevent pupils getting into places where they're not supposed to be. U-Microcomputers feels the U-Net will provide an effective challenge to Level 1 Econet as the Acorn system supports neither of these facilities and is hampered by the Acorn DFS's 31 files per disk side.

The controller/file server is a black box with spare slots for interface cards and various add-ons and 64K or RAM on-board. This costs £450, with an extra £400 or so for software, interface and manuals. An eight-machine configuration would cost around £1,200. The more you net, the less it costs per machine — 20 machines linked up costs about £1,800. U-Micro-computers can be contacted on (0925) 54117/8.

Econet has been there to be shot at for several months now. Originally designed to be a schools networking system using Acorn Atoms, it has never quite made the switch to the BBC environment with much confidence.

The level of network tested by PCN back in March was uncomfortable in operation and barely economical unless the configuration included ten micros.

Further enhancements have been held back by the lack of an officially available, Acorn-supplied second processor. The second level of file-server should provide extra utilities and features, crucial if Econet is to perform the kind of job for which it is intended.

out Canada and the US. They run on Apple, CP/M, and MSDOS systems.

Despite the UK's international reputation for high quality software the US has been a graveyard for many British companies. Silicom International expects Tabs (0264 64166) to fare better than some of the companies that have gone before it across the Atlantic; a spokesman commented: 'We conducted extensive research into the software market in Canada, the US, and finally in the UK, and decided that Tabs offered the best.'

## Tabs set to break into US market

Hampshire software house Tabs is moving into North America through an agreement that will see its business software sold there by a Canadian company.

Silicom International Software Services Inc will sell the Tabs and Eastbytes business suites through-

## Sharp score

Software for Sharp's new MZ700 is rolling out in bulk from Kuma, which has released 20 titles, and plans 20 more for November 14.

The present offering comprises ten games and ten applications and utilities. These include word processing and VAT accounts, a Pascal compiler, a Forth implementation, and a ZEN editor-assembler, with prices ranging from £6.95 to £39.50.

Also out now is a modem interface for the Newbrain, for £80. The software to drive it is £35 and the interface itself interfaces to any modem, the cheapest being the Prism modem at £69. This interface allows you to link the Newbrain to Telecom Gold and electronic

mailbox. Kuma also has a Z80 board and a 64K printer buffer at £80 and £17.

Any competition fans should also note that Kuma has a program out called Competition for the MZ700. Anyone managing to finish this adventure goes into a draw of the first 50 correct entries.

First prize is a printer/plotter for the MZ700 and other prizes, probably peripherals, are yet to be decided.

The game is due out at the beginning of November, when the competition starts, and costs £9.95. All hopefuls should send their entries to Kuma computers Ltd, 11 York Road, Maidenhead, Berks.

## Publishers get in on software act

The trend among publishing houses to sell software with books has drawn in McGraw-Hill with a selection of offerings for Spectrum owners.

Profile 1, spreadsheet database with 12-page manual, can be yours for £9.95, and for an extra £6.95 you can buy the book 'Information Handling for the ZX Spectrum', by C A Street. This describes the way you can write file and data handling routines.

Also on cassette for the Spectrum is 'Spectrum Information Handling Routines', providing 30 programs for use by anyone who has read the above book. This is intended to help you write your own programs.

'The Spectrum Workshop, Word Processing and Beyond', a book by Randle Hurley, describes how to write office and home applications programs.

'We are expecting the series to be added to continually and we are

expanding the list for the BBC micro, Spectrum and Oric,' said John Watson, McGraw-Hill's editor for the UK Computing Series.

'We will also be involved with educational computing as well as software and books for small and medium sized businesses,' he continued.

A piece of software called 'Spectrum' has developed out of Randle Hurley's book, consisting of a full word processor system for the 48K Spectrum.

'We are thinking of making software for the Microdrive when there are enough of them around,' said Mr Watson.

Books and software can be bought direct from the company in Maidenhead, Berks or from bookshops and computer stores which are currently receiving their first deliveries.

McGraw-Hill isn't the only one producing books with complementary software. London based publishing company Doring Kinsersley will be jumping on the software bandwagon in the spring, joining companies such as Mosaic Publishing, Melbourne House, Heinemann and Longman.



**MAGNETIC FLOPPIES** — Another addition to the mass of floppy disks on the market is Xidex's new line of 5 1/4 in 8in Precision flexible disks. With 96 tracks per inch the disks are made of the latest magnetic materials, the company says. To reduce head-to-disk interchange problems due to shifting of the disk in the drive, Xidex has improved the tolerance on the inside diameter of the disk's centre hole by fifty per cent. Contact BFI, 01-941 4066.

## PC gets cards

Add-ons for IBM PC users are among a rash of releases from Dataflex, UK distributor for Ferox International of the US.

Out this week, the IBM Trio Board has two serial ports for either RS232 or Current Loop — a method of connecting up modems. It should be useful to owners of the IBM who want to connect to a mainframe or communications device, and comes with 64K of fitted memory at £257.25 either direct, or from IBM dealers.

This board, like all Dataflex IBM and Sirius expansion boards, comes complete with Magic memory, the company's in-house software which comes on 100RAM disk with the board and is claimed to improve the response time of applications by up to five times. You also get print spooling on Magic Memory.

A further recent addition to Magic Memory is Diary, which lets you record simple one-line entries for appointments — this will be out in late November.

Trio Board's big brother, the IBM Multi, comes with 64K of memory upgradable to 256K and will comprise one parallel and one serial port, an optional second serial port and Magic Memory. This is due out in early November and will cost £339.25 for the basic 64K.

You'll be able to get additional upgrades of 64K, each for £62.75 and additional serial ports for both models are £51.75.

Dataflex also hopes to release a colour controller card for the PC, with a parallel port fitted, costing £264.50 and due to appear some time before Christmas.



## Pro Pascal goes like Blaises!

Pascal is now recognised worldwide as one of the standard languages for microcomputers. It is named after Blaise Pascal, a French mathematician and mystic who in 1644 constructed an "arithmetical machine".

The electronic wonder which is today's microcomputer would make Pascal jump for joy. And in Pro Pascal, the user of such an "arithmetical machine" has a marvellous tool for converting his reliable, well-structured code into fast, efficient machine programs.

For the serious programmer, Pro Pascal is a passport to the three most important microcomputer environments: the 8-bit CP/M world, and the newer 16-bit worlds of CP/M-86 and MS-DOS.

The 8-bit compiler runs on Z80-based micros with 56K RAM and CP/M; the package costs £220 + VAT.

The 16-bit compilers run on 8086/88-based micros with 86K RAM and CP/M or MS-DOS; the price of either version is £320 + VAT.

**Prospero**  
LANGUAGES FOR MICROCOMPUTERS

Prospero Software Ltd. 37 Gwendolen Avenue London SW15 6EP Tel: 01-785 6848.

# DON'T MISS : Bristol's First Personal Computer and Technology Show

**BRISTOL EXHIBITION CENTRE**  
11th, 12th & 13th of November 83

OPEN FRI & SAT 11am - 9pm; SUN 11am - 6pm  
ENTRANCE - ADULTS £1-50; CHILDREN 80p

See: B. B. C., Spectrum,  
Electron, Memotec,  
Atari, Computer  
Clubs, Trade Stands,  
Books, Software —  
Games, Educational,  
Business and lots  
more.



For full details contact  
Bristol (0272) 650465

## WE'VE GOT IT!! BUT HAVE YOU?

### MICROS

KAYPRO II (THE OSBOURNE BEATER) .....	£1350.00
COMMODORE 64 .....	£172.17
SINCLAIR SPECTRUM 16K & 48K from .....	£85.22
ATARI 16K & 48K INC PROGRAMMING KIT from .....	£128.70
VIC 20 starter pack inc cassette unit etc .....	£120.00
SIRIUS 1 .....	£2195.00

### GAMES

Available for most micros including BBC, ATARI, COMMODORE, SINCLAIR, ETC.

### PRINTERS

DRE 8820 .....	£845.00
EPSON RX80T .....	£255.00
EPSON RX80FT .....	£287.00
EPSON FX80 .....	£355.00
EPSON MX100III .....	£408.00
EPSON FX100 .....	£484.00

Interfaces and Cables available for most micros.

### PERIPHERALS

BBC Joysticks (FLC) .....	£15.22
Cassette recorder inc cable for BBC etc. ....	£26.04
14" Colour Monitor .....	£199.00

We also supply many other items including ribbons, paper, etc.

Carriage and insurance rates:— All prices exclude VAT

Printers & Monitors	£8
Games	£0.50p
All other items	£1.00

Please phone or write for further details

**CARIC COMPUTER SERVICES**



9 Woodlands Close, Penenden Heath, Maidstone,  
Kent ME14 2EX. Tel: Maidstone (0622) 61919

**NEW** Another winner from CDS!

## SPECTRUM

# POOL

THE LATEST GAME IN A GREAT RANGE OF SPECTRUM AND ORIC SOFTWARE INCLUDING REVERSI - LEAPFROG - BOZY BOA - GOBBLE A GHOST - CATERPILLAR - 3-D PAINTER (U.K. Rec. Price £5.95 each)

Available from W. H. Smith, Boots, John Menzies and other leading computer stores

**CDS Micro Systems**  
P.O. Box 93, Doncaster, South Yorks DN4 5LX  
TRADE ENQUIRIES WELCOME

P.O. Box 93,  
Doncaster,  
South Yorks DN4 5LX  
**TRADE ENQUIRIES WELCOME**

## Micro floppy, micro price

The Hitachi 3in disk drives have appeared in the UK in a new guise, and the price could tumble as a result.

The 3in microfloppies were developed jointly by Hitachi and Panasonic. The newcomer to the UK is Panasonic's version, essentially the same unit but with minor differences on the driver boards.

According to Panasonic's UK distributor Ambar Components, the units will be sold to systems builders at a rate of around £100 each in quantities of 100. Its official pricing isn't yet determined but the drives should still reach end users for well under £200.

Their capacity is 500K-250K per side, but you can't access both sides without taking the disk out, flipping it over, and putting it back in.

The drives are directly compatible with Panasonic's 5¼in models, using the same recording method, data transfer and disk rotation speed. The track to track access time is three milliseconds.

Ambar (0296-34141) plans an official launch for the disk drives at Compec next month.

## UK software for Lisa appears

The first UK-produced package for Apple's Lisa has been released by Business Systems International (BSI).

Busifile is an information retrieval program selling at £402.50, and it takes advantage of the mouse technology on the Lisa which means you don't have to use the keyboard.

Written in Pascal, some features of the package are built-in tutorial screens and help screens, user defined reporting facilities and integrated work processing and label printing facilities.

Busifile is also available for the Apple III, IBM PC, Sage and Sirius computers. The price is the same but these versions use the UCSD-p system.

BSI is also offering an add-on module for Busifile, converting the package to a multifile structure. This will enable system designers to write application software around Busifile. The next step is a multi-user version which is in the pipeline.

BSI has been closely involved in the Lisa software development program, at Apple's request. Another new piece of software to be released by the company is a prescription label package for £345. Busi Labeller will initially be available for the Kaypro to be featured in PCN, Issue 35 and the Apple range of computers.

# Nascom no more

Lucas Microcomputers has released a new business micro that signals the end of the Nascom name.

Selling at £2,064.25 the Lucas LX Microcomputer is a Z80-based micro with 64K RAM, full qwerty keyboard and a 12in monochrome monitor. Running CPM, users also have a choice of NAS-SYS or NAD. Software available for the machine includes Wordstar, Calstar, FMS 80 and Finas.

The Lucas LX is the first of a series of machines that will come under the Lucas Microcomputer range. And the company, which also produces Nascom machines, has made a historic name change for these computers.

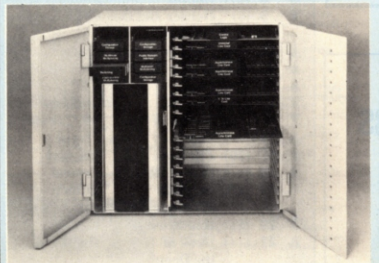
From now on all Nascom micros will be sold under the Lucas LX name except the Nascom 3 which will retain its own title.

In addition, as part of its revised



Lucas LX spells the end for the Nascom name.

strategy the company will be opening up a national network of Lucas Microcomputer Centres to back up their existing and new line of machines. Sic transit gloria Nascom . . .



**CUPBOARD LOVE** — CommPonents is a modular data communications system you can fit in a cupboard. On the right hand side you see the shelf-like hardware boards, with plenty of room for adding the odd half dozen more, while at the top left are software cartridges. Whereas normally hardware and software are provided on the same card, Network Products (08677 4804) has split this to allow greater flexibility. You therefore perform a range of tasks, from low-end networking to talking to mainframes. It's the sort of system that offers a desktop way of linking a few thousand PCs. If you've only got four, Network can link them up for £1,800-£2,000; if you're ITT, the Department of Trade or the CIA, it may cost a little more.

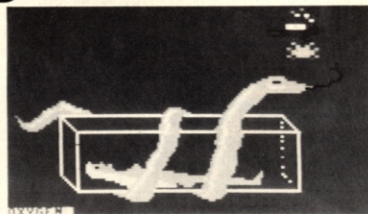
## Cartridge contest

Undeterred by Sinclair's move into cartridge software, Thorn EMI Video has branched out from its Commodore and Atari background into producing Sinclair games.

It has five titles ready for release on November 14 — Gold Rush, Volcanic Planet, River Rescue, Blockade Runner, and Road Racer. These games will cost about £6.95 each.

Last week also saw new games from two new companies. Beyond Software of London (01-240 1042) makes its debut with Up Periscope for the Dragon 32, at £6.95. The company will also produce games for the Spectrum, Atari, BBC, Electron, Commodore 64 and Vic 20.

Joe the Lion is the name of a company rather than a game: a brand in Hyde (061-366 7431) its first products are Bimbo, a maze game for the Spectrum costing £5.45,



Neptune's Daughters — rescue the damsel from the coiled serpent.

Loki, a Nordic version of a familiar theme for the 48K Oric at £6.45, and Challenger, for the BBC B at £7.45.

Also in the Manchester area is English Software (061-835 1358) which has Batty Builders, Tarot Card, Caverunner, Airstrike 2, and Captain Sticky's Gold at £14.95 for

the Atari range—including the new XL systems. For the Commodore 64 at £9.95 there is Neptune's Daughters.

Texas Instruments, a pioneer of cartridge games, has seven new titles out for the 99/4A. The list includes five games.

# HALLS OF THE THINGS

The first totally animated graphic adventure ever. Highly recommended by the computing press. Just one of a fabulous range of Spectrum games available from Crystal Computing.

Available from your local dealer or direct from:

Crystal Computing  
2 Ashton Way  
East Herrington  
Sunderland SR3 3RX  
*Send S.A.E. for catalogue*

# HOME COMPUTERS AT BARGAIN PRICES

COMMODORE 64 £199.95  
DRAGON 32 £159.95  
VIC 20 £133.95

Plus 100's of games, books and accessories for all popular home computers.

## WANTED:

Machine code programmers and quality programs that you may have written.

## VIDEO GALAXY

293 CHISWICK HIGH ROAD,  
LONDON W4

Tel: 01-994 4947

# 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 October 13 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 September 30 and October 13.

## GAMES

### Top Thirty

	GAME TITLE	PUBLISHER	MACHINE	PRICE
▲	1 (3) Jet Pac	Ultimate	Spectrum	£5.50
▲	2 (10) Kong	Ocean	Spectrum	£5.95
▼	3 (1) Flight	Psion	Spectrum	£5.95
▲	4 (15) Zoom	Imagine	Spectrum	£5.50
▲	5 (8) Penetrator	Melbourne	Spectrum	£6.00
▲	6 (7) Manic Miner	Bug Byte	Spectrum	£5.95
▼	7 (2) 3D Tanx	DK Tronics	Spectrum	£5.50
▲	8 (27) Hobbit	Melbourne	Spectrum	£14.95
▼	9 (6) Horace and the Spiders	Psion/Melbourne	Spectrum	£5.95
▲	10 (17) Harrier Attack	Martech/Durell	Oric	£7.95
▲	11 (14) Jumbo Jet Pilot	Thorn/EMI	Atari	£29.95
▲	12 (13) Pool	CDS	Spectrum	£5.50
▼	13 (4) Arcadia	Imagine	Spectrum	£5.50
▼	15 (12) Spawn of Evil	DK Tronics	Spectrum	£5.50
▲	16 (—) Yomp	Virgin	Spectrum	£5.95
▲	17 (20) Zip Zap	Imagine	Spectrum	£5.50
▲	18 (—) Hall of Things	Crystal	Spectrum	£6.00
▼	19 (11) Football Manager	Addictive	Spectrum	£5.95
▼	20 (5) Heathrow ATC	Hewson	Spectrum	£5.50
▲	21 (—) Devil of the Deep	Shepherd	Spectrum	£5.95
▲	22 (—) Xenon 1	IJK	Oric	£6.00
▲	23 (—) Tranz AM	Ultimate	Spectrum	£5.50
▲	24 (28) Monsters in hell	Softek	Spectrum	£6.00
▲	25 (—) 747 Flight	Dr. Soft	BBC	£8.00
▲	26 (—) Zaxxon	Datasoft	Atari	£29.95
▲	27 (—) Hovver/Bovver	Llamasoft	CBM 64	£8.00
▲	28 (—) Armageddon	Ocean	Spectrum	£5.95
▶	29 (29) Mad Martha	Mikrogen	Spectrum	£6.00
▼	30 (9) Gridrunner	Llamasoft	Vic 20	£8.00

## NEW RELEASES

ARMAGEDDON, COMMODORE 64,  
MR. WIMPY\*SPECTRUM 48K,  
RESCUE, SPECTRUM 48K  
ROLLERBALL, COMMODORE 64

\*Copyright of Wimpy International Ltd

# 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 (1) Spectrum	£99	(SI)
▶ 2 (2) Vic 20	£140	(CO)
▶ 3 (3) CBM 64	£299	(CO)
▶ 4 (4) BBC B	£399	(AC)
▲ 5 (7) Oric 1	£130	(OR)
▶ 6 (6) Texas 99/4A	£99	(TI)
▲ 7 (9) Dragon 32	£174	(DR)
▶ 8 (8) Atari 800	£300	(AT)
▼ 9 (5) ZX 81	£40	(SI)
▲ 10 (12) Sharp MZ80A	£349	(SH)
▶ 11 (11) Colour Genie	£168	(LO)
▼ 12 (10) Atari 400	£150	(AT)
▲ 13 (14) Tandy colour	£240	(TA)
▲ 14 (15) Aquarius	£80	(MA)
▼ 15 (13) Lynx 48/96	£225	(CA)
▲ 16 (18) CGLM 5	£150	(SO)
▲ 17 (—) Sharp MZ700	£240	(SH)
▼ 18 (17) Epson HX20	£472	(EP)
▲ 19 (20) Nascom 3	£500	(LL)
▼ 20 (16) Apple IIe	£969	(AP)

### Top Ten over £1,000

▶ 1 (1) IBM PC	£2,390	(IBM)
▶ 2 (2) Act Sirius	£2,525	(ACT)
▶ 3 (8) DEC Rainbow	£2,714	(DEC)
▲ 4 (5) Commodore 8000 series	£1,200	(CO)
▼ 5 (3) HP86A	£1,438	(HP)
▲ 6 (7) Olivetti M20	£2,400	(OL)
▼ 7 (6) Epson QX10	£1,995	(EP)
▲ 8 (—) British Micro	£1,495	(BM)
▶ 9 (9) Ajile	£2,995	(AJ)
▲ 10 (5) Apple III	£2,780	(AP)

AC—Acorn Computers. ACT—ACT. AJ—Anderson Jacobson. 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—Low Electronics. LL—Lucas Logic. MA—Mattel. OL—Olivetti. OR—Oric. SH—Sharp. SI—Sinclair. SO—Sord. TA—Tandy. TI—Texas Instruments.

SENSATIONAL SOFTWARE FROM

# MIKRO-GEN

1 Devonshire Cottages, London Road,  
Bracknell, Berkshire, RG12 2TG  
Tel: (0344) 27317

MORE SENSATIONAL ADVENTURES:—

SAS ASSAULT 1 & 2  
LAND OF SAGAN  
TIMEQUEST

DRAX MAZE  
STAR TREK  
MAD MARTHA 2

All £6.95



SEND NOW FOR DETAILS

# New Generation Software

FREEPOST BATH BA 2 4TD

Every computer needs a **CHATTERBOX!** **SAVE E£££ ONLY £49**

for ZX81 SPECTRUM

NASCOM VIC PET BBC APPLE TRS80 IBM CRAY ETC. Please Enq.

At last! Genuine phonetic synthesis at a sensible price. Gives your computer an unlimited vocabulary (nothing more to buy)! Self contained speaker/amplifier. Sinclair connector etc. PLUS Expansion socket for BIG EARS and Monitor socket for Music Board. Full instructions, technical notes and programme examples supplied with this outstanding educational unit.

OR COMPLETE D.I.Y KIT £39  
DEALER ENQUIRIES WELCOME

As seen on BBC TV "Computer Programme"

## \*BIG EARS\*

SPEECH INPUT FOR ANY COMPUTER

Hugely successful Speech Recognition System, complete with microphone, software and full instructions. **ONLY £49**

BUILT TESTED & GUARANTEED

PLEASE STATE COMPUTER: (X101), SPECTRUM, ATOM, NASCOM, Vic 20, Memon, ZX80/1, PET, TRS80, M2000, APPLE II, BBC MICRO

NEW FAST MACHINE CODE FOR ZX81 SPECTRUM £7.40

## ZX81/SPECTRUM

MUSIC SYNTHESISER (STEREO)

+ 16 LINE CONTROL PORT

Play 3-part music, sound effects, drums etc. Full control of attack, decay and frequency. Input/Output lines provide control and monitor facility for Home Security, Robot Control, Model Railway etc. etc. Works with or without 15K RAM.

Add keyboard to make a five performance polyphonic synthesiser! Full instructions/software included.

AMAZING VALUE AT ONLY **£19.50 (KIT)**  
Extra 23-way connectors at £2.80  
**£25.50 (BUILT)**

## THE COMPOSER

Music Programme for above synthesiser. Enter and play 3 part harmony. Includes demonstration tunes. Recommended £7.40

## COLOUR MODULATOR

RGB in, PAL/UFH out (not for ZX)

**KIT £15**  
**BUILT £20**

## SPECIAL OFFER

SPEECH OUTPUT CHIP SX-01 **I.C. £18**  
Phoneme Speech Processor **DATA £0.60**

Please add VAT at 15% to all prices. Barclay/Access orders accepted by telephone. All enquiries S.A.E. please

**WILLIAM STUART SYSTEMS Ltd**  
Quarleydown House, Cheltenham, Gloucestershire, Wiltshire, Wiltshire, Wiltshire, Wiltshire  
Tel: 098 564 225  
01 221 1191

<b>BLACK &amp; WHITE VISUALS FOR ADVERTISEMENTS</b> (A visual is our artists professional drawing of how the finished art work will look)	
1/4 or Half Page - Pencil Visual	£28.00
Page - Pencil Visual	£38.00
Double Page Spread - Pencil Visual	£76.00

<b>2 TO 3 COLOUR VISUALS FOR ADVERTISEMENTS</b>	
1/4 OR Half Page - 2/3 Colour Visual	£32.00
Page - 2/3 Colour Visual	£58.00
Double Page Spread - 2/3 Colour Visual	£110.00

<b>ALL COLOUR VISUALS FOR ADVERTISEMENTS</b>	
1/4 or Half Page - Full Colour	£90.00
Page - Full Colour	£130.00
Double Page Spread - Full Colour	£190.00

<b>BLACK &amp; WHITE VISUALS FOR CATALOGUES, LEAFLETS, BROCHURES etc.</b>	
2 page B/W Visual	£65.00
4 Page B/W Visual	£115.00
6 Page B/W Visual	£192.00
*Over 8 pages, see our special packages (A) AND SAVE UP TO £185.00	

<b>2 TO 3 COLOUR VISUALS FOR CATALOGUES, LEAFLETS, BROCHURES etc.</b>	
2 page 2/3 Colour Visual	£86.00
4 Page 2/3 Colour Visual	£165.00
6 Page 2/3 Colour Visual	£245.00
*Over 8 pages, see our special packages (B) AND SAVE UP TO £350.	

<b>FULL COLOUR VISUALS FOR CATALOGUES, LEAFLETS, BROCHURES etc.</b>	
2 page Full Colour Visual	£190.00
4 page Full Colour Visual	£306.00
6 page Full Colour Visual	£372.00
*Over 8 pages, see our special packages (C) AND SAVE UP TO £400.	

<b>PACKAGE A - B/W VISUAL FOR OVER 8 PAGES, BROCHURES, CATALOGUES etc. WE CAN DESIGN THE FRONT COVER, BACK COVER AND ONE DOUBLE PAGE SPREAD. ALL MADE UP TO A DUMMY FOR THE VERY LOW PRICE OF £165.</b>	SAVE £185!
---	------------

<b>PACKAGE B - 2/3 COLOUR VISUAL FOR OVER 8 PAGES, BROCHURES, CATALOGUES etc. WE CAN DESIGN THE FRONT COVER, BACK COVER, AND ONE DOUBLE PAGE SPREAD. ALL MADE UP TO A DUMMY FOR THE VERY COMPETITIVE PRICE OF £276.</b>	SAVE £350!
---	------------

<b>PACKAGE C - FULL COLOUR VISUAL FOR OVER 8 PAGES, BROCHURES, CATALOGUES etc. WE CAN DESIGN THE FRONT COVER, BACK COVER AND ONE DOUBLE PAGE SPREAD. ALL MADE UP TO A DUMMY FOR THE EXCEPTIONAL LOW PRICE OF £345.</b>	SAVE £400!
--	------------

<b>VISUALS FOR COMPANY STATIONERY PACKAGE CONSISTS OF A CHOICE OF 6 DIFFERENT DESIGNS OF WHICH ONE IS MADE UP TO LETTERHEADING, ENVELOPE, AND COMPANY CARD.</b>	
B/WHITE	£45.00
2/3 COLOUR	£65.00
FULL COLOUR	£85.00

<b>*LOGO DESIGN, CHOICE OF 6</b>	
B/W - £30, 2/3 COL. - £45, FULL COL. - £72	

<b>VISUALS ON OTHER WORK</b>	
B/WHITE, 2/3 COL. or FULL COL.	
1. POINT OF SALE	From £69
2. STICKERS	From £26
3. DISPLAY CARDS	From £42
4. EXHIBITION POSTERS	From £34
5. CASSETTE LABELS	From £26
6. PRESENTATION FLIP CHARTS	From £85
7. PRICE LISTS	From £72
8. MENUS	From £56
9. CHARTS	From £39
10. PLANS	From £45
11. SHOP FRONT	From £96
12. PACKAGING	From £115
*WHATEVER YOUR NEED - ASK FOR A QUOTE NOW!	

<b>BLACK &amp; WHITE ART WORK FOR ADVERTISEMENTS</b>	
1/4 or Half Page - Flat Art Work	£114
Page - Flat Art Work	£159
Double Page Spread - Flat Art Work	£259
*PRICES INCLUDE ALL COMPONENTS REQUIRED FOR THE COMPLETION OF ART WORK	
*PLEASE ALLOW FOR TYPESETTING	
*ADVERTISING IS V.A.T. ZERO RATED	
*PRICES ARE BASED ON VISUALS PREPARED BY US	

<b>2/3 COLOUR ART WORK FOR ADVERTISEMENTS</b>	
1/4 or Half Page - Flat Art Work	£158.00
Page - Flat Art Work	£185.00
Double Page Spread - Flat Art Work	£295.00
*PRICES INCLUDE ALL COMPONENTS FOR THE COMPLETION OF ART WORK	
*PLEASE ALLOW FOR TYPESETTING	
*PRICES ARE BASED ON VISUALS PREPARED BY US	
*ADVERTISING IS V.A.T. ZERO RATED	

<b>FULL COLOUR ART WORK FOR ADVERTISEMENTS</b>	
1/4 or Half Page - Flat Art Work	£175.00
Page - Flat Art Work	£265.00
Double Page Spread - Flat Art Work	£315.00
*PRICES INCLUDE ALL COMPONENTS FOR THE COMPLETION OF ART WORK. CLIENT TO PROVIDE COLOUR TRANSPARENCIES	
*PLEASE ALLOW FOR TYPESETTING	
*PRICES ARE BASED ON VISUALS PREPARED BY US	
*ADVERTISING IS V.A.T. ZERO RATED	

<b>ART WORK FOR CATALOGUES, BROCHURES etc.</b>	
--	--

<b>BLACK &amp; WHITE ART WORK</b>	<b>2/3 COLOUR ART WORK</b>
2 Pages - £216.00	2 Pages - £276.00
4 Pages - £286.00	4 Pages - £426.00
6 Pages - £356.00	6 Pages - £566.00
*PRICES INCLUDE:	
5% volume corrections on finished art work, copyright, PMT's, printer/publisher instructions, illustration, line drawings etc. exactly following our visual transparencies	
2 Pages - £295.00	4 Pages - £468.00
4 Pages - £468.00	6 Pages - £586.00
*Client to provide colour transparencies	

<b>ADVERTISEMENTS AMENDMENT OF CONTENTS</b>	
The charge is based on the volume of content change and ranges from 10% to 30% on the cost of art work -	
Minimum £12.00	Maximum £95.00

<b>ADVERTISEMENTS DUPLICATION OF ART WORK</b>	
B/W Art Duplication (Per Page)	£32.00
2/3 Colour Art Duplication (Per Page)	£58.00
Full Colour Art Duplication (Per Page)	£150.00

<b>COPY PREPARATION</b>	
Amending clients existing copy, abbreviating, re-writing, and/or improving clients copy. Approx. 700 words per page, price includes corrections, re-writing and proof reading.	
	£45.00

<b>COPY ORIENTATION</b>	
Writing copy from scratch by employing a specialist in the required field. Approx. 700 words per page, price includes corrections, re-writing, proof reading.	
	£75.00

<b>ADVERTISING SPACE HANDLING &amp; BOOKING</b>	
We can handle your advertising requirements: receive calls, investigate publications, negotiate price, book space, organise copy dates, book, amend, cancel, send art work, receive voucher copies, check adverts, organise copy changes, amendments, repeats and deal with all aspects of handling.	
*DO YOU WISH TO RECEIVE BACK ALL DISCOUNTS, COMMISSIONS AND REDUCTIONS?	
*WE CAN ORGANISE THE PACKAGE THAT SUITS YOU MOST.	
*CALL US FOR FULL DETAILS.	

<b>HOW TO START RECEIVING OUR PROFESSIONAL SERVICE</b>	
Whether just starting up or existing advertiser, all you have to do is telephone, write or use the coupon and we will contact you.	
If you wish to have your existing advert professionally designed, please fill in the coupon, enclose your advert along with the hand-written content of the advert, attach your cheque and we will contact you upon receipt to discuss further.	

**HAVE YOU EVER WISHED THAT YOUR ADVERTISEMENTS WERE PROFESSIONALLY DRAWN, YOUR ADVERTISING SPACE HANDLED, AND KNEW THE COST BEFOREHAND?**

**NOW YOU CAN!**

You have been asking us to give you the cost for designing and producing art work for half pages, pages and double page spreads, handle your advertising space bookings, as well as provide you with creative marketing and specialist advice. Well, here it is!

**EMS** . . . that's our Trade Mark!  
See page(s) 17, 28, 29 & 32

POST TO: EMS (Holdings) Ltd  
10 Marshalsea Road London SE1 1HL  
(01)-403 1717

PLEASE: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

I ENCLOSE MY CHEQUE/P.O. FOR £ \_\_\_\_\_

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TEL: (DAY) \_\_\_\_\_ TEL: (EVE) \_\_\_\_\_

**EMS Holdings Ltd.**  
10 Marshalsea Road, London, SE1 1HL  
Telephone: 01-403 1717

**TEL: (01)-403 1717**  
OTHER SERVICES AVAILABLE ON REQUEST

## A reply from Corby Co-op

I have been a PCN reader since the beginning and have found this an advantage in my work. I work at the local Co-op store selling computers — yes, I'm a shop assistant!

However, after reading Stephen Baker's letter in issue 32 I just had to write. I find it very hard to swallow; after all we don't know everything and we are human. I try my best to give the right advice to customers, but there is no way that I or anyone else could possibly know everything about every computer we stock.

I agree there are some assistants who don't even know the basics, but remember, computer sales are new and many sales assistants are on average about 30.

Stephen, if you're reading, how many of those assistants who knew nothing were you? Not very many I bet. I was lucky I got two years on computers at school.

You also have to remember that people who need us don't usually know much about computers themselves or else they might just ask for the one they

### PCN £10 Star Letter



wanted and ask no questions at all. But there are very few computer experts about. Please remember we are trying to help you buy the right computer — something most customers don't know themselves.

I don't mean to go on, but please don't waste our time by trying to catch us out; we do try, you know, as I'm sure many customers will agree.

I am just wondering how Stephen & Co would go about selling a computer. It's not as easy as you think. You can't go on about modems, interfaces, disk drives, ROM and RAM and totally baffle the customer into thinking computers are hard to use and totally beyond them.

Please, readers of PCN, don't make our lives harder by playing tricks on us as we are only trying to help you.

Marco Dawson,  
Corby, Northants.



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

### A welcome BBC (non) bug

I am writing in reference to the BBC Micro's bug (*Microwaves PCN Issue 29*). This is not an operating system bug or even a Basic bug; but is a consequence of having the command OLD available. When NEW is executed, the high byte of the first Basic line number is altered to 255 which LIST etc regards as the end of the program. When OLD is executed, the 255 is replaced by 0 (zero). The net effect is that, if the first line of a program is greater than 255, after OLD it becomes (original line no.) MOD 256.

I am sure we proud BBC owners would rather put up with this (non-existent) 'bug' than lose the valuable facility of recovering a 'NEWed' program.

P. Barwick,  
Grimsby, South Humberland.

### Calling all Kent Oric owners

Where have all the Oric owners in Kent got to? Surely with the volume of sales professed by Oric Products there must be at least a few owners that would be interested in joining a club in this area.

PCN Clubnet has published the contact address for a proposed Kent club for some weeks now but apparently there has been little response. Is it that Oric owners are too insular or afraid of being embarrassed by people who might know more than they do? Come on all you Oric programmers, each one of us is still in the early stages of discovering the marvellous

capabilities of this impressive little machine.

Roger Pyatt, (Orpington 0689-20281) and I wish to broaden our horizons and swap experiences with fellow users. How about contacting him tonight?

John Stubbins,  
Maidstone, Kent.

### Adverts — a cause for concern?

I'm fairly tolerant of advertisements in computer magazines but I was most annoyed at the Oric advertisement on Page 45 (PCN No 28). My objections are:

1 Apart from the word advertisement in small print at the foot of the page it seems to have been laid out deliberately to appear as a magazine feature page.

2 Various criteria for computers which are set out for purely subjective, chosen to reflect well upon the Oric, and therefore meaningless.

3 Most annoying was a photograph in which an Atari Commodore, two Sinclairs and a TI99/4 were posed in front of a dustbin into which pound notes were falling. The visual image clearly meant: these are rubbish, don't throw your money away on them.

I've nothing against the Oric, nor any brief for the computers being rubbishified. I just feel that the advertisement went beyond the bounds of jocular, robust, rivalry. When IBM launched its Personal Computer all the distributors, salesmen etc, were told that rival machines must not be denigrated.

Oric's advertising agency

could learn a lesson from them. Peter Millen, Gregabby, Co. Down, Ireland. We made sure the word advertisement was clearly visible in this case and design of this page is far removed from its editorial neighbours. — Ed.

### Suffering for the Sinclair ZX81

I am writing on behalf of thousands of ZX81 owners, who like myself are suffering from the decrease in 81 software.

I feel that priority is being given, and will always be given, to Clive Sinclair's infamous Spectrum. Only last week I ventured into WH Smith only to find the same, usually old 81 tapes, lying in the same old place. The real heartbreaker is that a certain retailer will not be buying new 81 tapes to sell, but will try and sell the old ones at a cheap rate, then replenish their shelves with Spectrum, Dragon and Oric tapes, and as a final blow, sell the 16K ZX81 for £45. I paid a hard earned £80 for the one then, highly acclaimed ZX81. I am disgusted with the degrading actions of these-retailers and if these things go on, I'm afraid the writing's on the wall for the ZX81.

Paul Hampton  
Cumbernauld

PCN can help. Send us more programs and we'll include them in Program Cards — Ed.

### King of the Island

I own a ZX81 and I've just received a copy of 'Island', a software cassette where you are stranded on, of all things, an island. I've become monster game grade 21 with 30 ZAP rings, 19 ZZZ rings and 2 robots. Also with 17 EXPL rings. I've escaped with 903210 gold pieces and 703621 life points. Can anyone beat me ... ?

Stephen Schofield,  
Reading, Berks.

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.

### Upgrading a 16K Spectrum

**Q** Where could I buy an upgrade kit for my 16K Spectrum? Are there any good 16K adventure games?

*Julius Uzu,  
Hallam, Sheffield*

**A** There are three basic ways of upgrading your Spectrum. First, if you check out the small ads in computer magazines, you'll find upgrade kits consisting of chips which you slot into the sockets in the Spectrum board (on issue 2 and 3 Spectrums) or of a plug-in board for issue 1 machines. If you can't find any locally, try the Buffer Micro Shop on 01-769 2887, or Fox Electronics on Basingstoke 20671.

The second method is to buy the Cheetah RAMpack, which is more expensive, but means you don't have to open up your machine and invalidate your guarantee. Cheetah is on 01-240 7939.

The third method is to contact Sinclair, which will do you a, fairly expensive upgrade which won't invalidate your guarantee.

There are very few 16K adventure games, but try *Arctic's Planet of Death*, and watch out for the green dwarf. As for the chip you also mentioned in your letter, if we mean the same chip, it is already inside your machine!

### Read around the Commodore

**Q** I have recently purchased a Commodore 64, and though I have no complaints about the machine I am far from impressed by the manual supplied. It does not explain the capabilities of the machine very well and some parts are written in a very complicated manner.

Perhaps you could advise me of a book I can buy which will give me more information.

Can you also tell me what the four keys on the right of the keyboard are for? There is nothing in the manual on how to use them.

*J. Friend,  
Sale, Cheshire.*

**A** This is perhaps the most common complaint associated with Commodore's machines although to be fair to the company they have made the position clear enough. The manual that comes free with your 64 (and the Vic for that matter) is the User's Guide. This is aimed solely at the buyer who wants to use commercial software but also gives a very simplified account of the machine's abilities if you want to go further.

Commodore says that it has followed this line to avoid buyers paying for a book they might never use.

Obviously, you do want more information and the official book for you, not surprisingly, is called the Programmers Reference Guide. This is a monster tome containing a vast amount of detail about programming in Basic and machine code, full appendices, memory maps, input/output handling and has a fair sprinkling of demonstration programs.

On the whole, it is well written and certainly worth the money. You should be able to get it from your local dealer.

The four keys on the right of the keyboard are user-definable function keys. In other words, you can use them for whatever you wish — provided that you know how.

From within a Basic program this is easy. Like all other keys they have their own unique CHR\$ codes: F1, F3, F5 and F7 are CHR\$ 133, 134, 135, 136 respectively. The even-numbered keys run from 137 to 140.

So to use them in a program you could do something like the following:

```
10 GETAS: IF AS = "" THEN
  10
  20 IF AS = CHR$(133) THEN
    PRINT "THIS IS F1"
  30 IF AS = CHR$(134) THEN
    PRINT "THIS IS F2"
  and so on.
```

Alternatively, you can do a much faster PEEK to location 203 which holds the value of the current key pressed. Unfortunately these are unique values. The following program will reveal the value of each key as it is pressed. Note that 64 is the value for no key pressed.

```
10 PRINT (clear screen)
20 PRINT (cursor home, 3
  spaces, 3 cursor lefts);
30 PRINT PEEK(203)
40 GOTO 20
```

Although this is better than the first method it still confines you to fairly simple applications within a Basic program. You can, however, get the keys to do extremely useful things, but it takes a good knowledge of machine code to do it. This is because you need to make use of the 64's hardware interrupt facility.

The good news is that many commercial tool kit programs now available make this facility very simple to implement. Among them are Simons Basic, Sysres, Power and a few others. These allow you to define each key to execute a command at a single key press. For example, you might choose to have an automatic RUN and LIST command plus the ability to change screen and border colours simply.

The function keys are extremely useful — it's a shame Commodore made them so difficult to use.

### No problem with issue 3 loading

**Q** I recently bought a Spectrum, and found out that it was an issue 3 machine with the loading hitch. I am now wondering what software I could buy that would load OK.

*David Brown,  
Woodlee Park, Warwick.*

**A** If you're sticking to software produced by the bigger companies, you shouldn't have any problems. PCN has tested most of the Spectrum games in the PCN *Tour 30* on an issue 3 machine, and they all seem to load with no trouble.

Similarly, newly-produced software should have been checked to run on issue 3s by the manufacturer. The only problems you might run into would be with old stock, probably from smaller manufacturers.

### Joystick compatibility

**Q** Is it possible to use joysticks connected to the Fuller Box with Kempston joystick compatible games? And is it possible to upgrade the Fuller Box to the Master Unit by plugging in the speech chip needed?

*Graham Wilson,  
London*

**A** The Fuller Box allows you to use Atari-type joysticks with the Spectrum, and these won't work with Kempston compatible games. Fuller is, however, producing a tape which you load before you load the game, and will allow you to play Kempston games.

As for the Master Unit, yes, you can upgrade your Fuller Box to one, but it is not simply a matter of slotting the G1-SP0256 voice chip into the vacant slot. The standard Fuller upgrade also involves the installation of a 'clock' device to get things running at the right speed.

### Locations in the Oric ROM

**Q** I own a 48K Oric-I and I wish to write machine-code programs. Could you tell me where such routines as the IF, KEYS, DRAW and CURSET are held in the ROM? Also, could you tell me how to find out where other routines are held?

*Mathew Villarud,  
London*

**A** Unfortunately, neither the Oric manual nor Bob Mauder's original book 'The Oric Companion' give the information you require. I wonder why you want the IF routine in the Basic interpreter when you want to use assembly language? In this, there are a number of 'BRANCH' instructions which act like Basic's IF... THEN GOTO... To use these you do some operation like compare the value in a register with another value; this sets a flag. The BRANCH instruction will then pass control to a given label if the condition is met.

There is no need to use the KEYS function in the ROM, you would collect the contents of location 735, then AND this with 127 to get the ASCII code of the last key pressed — see PCN, issue 31.

While you could do a JSR to the DRAW, CURSET etc routines, you would have to know which registers to load with such factors as the row and column of the screen location you were using.

One way to find out more about the routines would be to approach Oric International Ltd. This organisation is on 0990-27641.

# TOP SAVINGS

PRINTERS - Also Available Seikoshia, Oki, Star, Qume, Olivetti, TEC, Mannesman Tally.

<b>Epson</b>	RX80	£ 229
	RX80F/T	256
	FX80F/T	335
	FX100F/T	430
	630(RO)	1699
<b>Diablo</b>	TP1	229
	6100	350
<b>Smith Corona</b>	RPI300S	945
<b>Juki</b>	RPI600S	1165
<b>Ricoh</b>	HR15	419

## COMPUTERS

<b>Commodore</b>	8096	£ 735
	64	165
	1541	165
<b>Epson</b>	HX20	375
	QX10	1600
<b>Spectrum</b>	48	109

Prices exclude VAT. Next day insured delivery £10  
Monday to Friday 9.00-6.00  
Phone for stock availability and out  
of hours collection arrangements

## MAYFAIR MICROS

5th FLOOR 65 DUKE STREET LONDON W1 Telephone 629 2487



# TECHNEG CLWYD TECHNICS LTD

Seikoshia GP 80 £170 Carr. £5

BBC Micro Model 'A' £261.30 Carr. £3  
BBC Micro Model 'B' £348.26 Carr. £3  
BBC 16K RAM Upgrade £25 + p&p £1  
BBC Printer Interface £10 + p&p £1  
Acorn System 3 with 32K Memory £1,400 Carr. £10  
Zenith Z100 16 Bit System from £2.072 Carr. £12



Price: £48.95  
+ £1.50 p&p

ALL PRICES EXCLUDE VAT

We are the Acorn Econet specialist. Let us quote you for your system.  
Education discounts available.

Coach House, Kelsterton Road, Flint, Clwyd.  
Tel: DEESIDE 810518

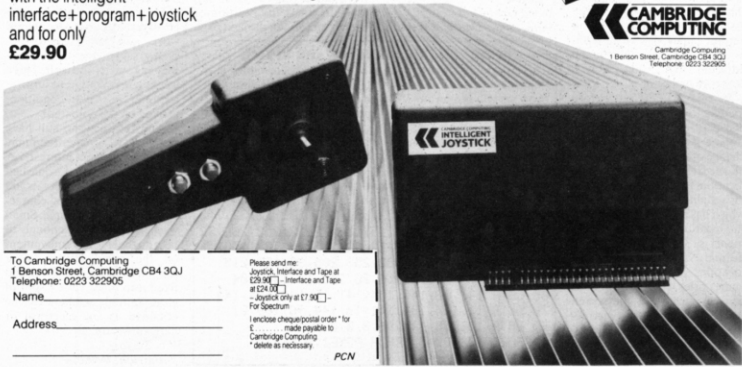
# More

fun & games from your  
Spectrum  
with the intelligent  
interface+program+joystick  
and for only  
**£29.90**

### Interface: \* for Spectrum

\* 1k on board memory \* own rear edge connector - for printers etc. \* compatible with ALL standard joysticks

**Joystick:** \* self centring \* 8 directional microswitched action \* 2 independent fire buttons **Tap:** \* easy to use program, the interface WORKS ON ALL SOFTWARE \* keeps a record of all your games - so you only need to tell it about each game once!



Special Christmas offer  
order two complete sets and  
pay only £57.90



Cambridge Computing  
1 Benson Street, Cambridge CB4 3JQ  
Telephone: 0223 322905

To Cambridge Computing  
1 Benson Street, Cambridge CB4 3JQ  
Telephone: 0223 322905

Name \_\_\_\_\_  
Address \_\_\_\_\_

Please send me  
Joystick, Interface and Tape at  
£29.90 [ ] Interface and Tape  
at £24.90 [ ]  
Joystick only at £7.90 [ ]  
For Spectrum  
I enclose cheque/postal order \* for  
made payable to  
Cambridge Computing.  
\* delete as necessary.

PCN

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



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

### Prevent disaster while programming

When writing a long program, on the Dragon 32, I like to make a backup copy after every couple of lines. I always call these copies "COPYX" ie *COPY1, COPY2, etc.*

But the thinking involved in writing the sections in between always makes me forget what number I am up to. The line: FOR A=474 TO 482:PRINT CHR\$(PEEK(A));:NEXT A print the last file name SAVED or LOADED. If for any reason you like to use the ASCII format for saving and loading then change 474 to 466 and 482 to 474.

Paul Crabtree  
Whitworth, Lancs

### Put your Vic in the middle

If you have ever tried using a Vic-20 on a 12", or smaller television screen, you will know that the off-centring of the screen is annoying and on certain games, can be costly in points. The screen can be adjusted by using POKE 36896,10 or 11.

If this is entered before loading a game ie POKE 36896,10:LOAD this will centre the screen giving a better chance of not being obliterated at the right hand edge. The location for horizontal screen movement as above is 36896 which has a normal value of 12, the location for vertical movement is 36897, which has a normal value of 38. These locations are very useful for games titles where instructions can be moved off, the screen blanked and then new instructions sent on. For example: 1?"[clear screen]" 2?TAB(4);"now you see it"

### BBC Basic — verifying A or B

The BBC program shown here is a verify routine for either model A or B. Type it in, in immediate mode, and press return afterwards. After saving a Basic program, simply rewind the tape to the appropriate place and press function key 0. After you have responded to the prompts, the computer will check whether the file, on tape, is identical to the one in memory.

If your cassette unit does not have a remote facility, you will have to stop the tape between each block. If you have a disk drive, change all references to &E01 to &1901 and from &E00 to &1900.

G M Bhanup, Stirchley, Birmingham.

```
*KEYOCLEAR:DIMA%(TOP-&E01):CLS:INP
UT"FILENAME ";F#:PRINT"SEARCHING
":Z=OPENUP(F#):FOR I=0 TO TOP-&E01
:A%(I)=BGETEZ:NEXT I:CLOSEZ:FOR J
=0 TO TOP-&E01:IF?(&E00+J)<>A%(J)
PRINT"ERROR ";J:NEXT J:ELSE NEXTJ
:PRINT"OK";:I
```

```
3FOR A=38 TO 255:POKE
36897,A:NEXT A
4?"[Clear screen]"
5?TAB(2);"Now you don't"
6FOR A=255 TO 38 STEP
-1:POKE 36897,A:NEXT A
Michael Cairney,
Formby, Lancs.
```

### A swifter 64

Commodore 64 owners may like to try the following poke to speed Basic up:

```
POKE 53265,PEEK(53265)
AND239
```

This blanks the screen to the border colour without destroying the contents of the screen (as in loading and saving). When blanked, Basic runs 5.5 per cent faster. The screen can be returned to normal with POKE 53265,PEEK(53265) OR16

David Gristwood,  
Sunderland, Tyne and Wear.

### Programming sound on the Vic 20

This program is written for the Vic-20. The program is in machine code and locates itself at 02A1 hex or 673 decimal. The program will run on any Vic with any memory configuration.

The program is designed to be an aid for programming sound. After running type: SYS 673,S1,S2,S3,S4,VL

```
Where: S1=Bassvoice — Limits 127-255
S2=Tenorvoice — Limits 127-255
S3=Treblevoice — Limits 127-255
S4=Noise generator — Limits 127-255
VL=Volume control — Limits 000-015
```

```
10 DATA 32,253,206,32,158,215,138,72,32,253
20 DATA 206,32,158,215,138,72,32,253,206,32
30 DATA 153,215,138,72,32,253,206,32,158
40 DATA 215,138,72,32,253,206,32,158,215
50 DATA 138,201,21,16,20,141,14,144,104
60 DATA 141,13,144,104,141,12,144,104,141
70 DATA 11,144,104,141,10,144,96,169,21
80 DATA 141,15,144,96,0,0,0,0
90 FOR I=673 TO 745:READA:POKE I,A:NEXT
Steven Jones, Thorpe Bay, Essex.
```

before the current one runs out of space.

Line 120 allows you to return to the page selection prompt by use of the ESCAPE (control code 27). Lines 120/130 PUT the character to the current page to complete the loop.

I believe that this program will solve many Newbrain system queries about paging and the use of some of the more obscure control codes.

```
10 PUT31,23,68:FORP=1
TO4
20 CLOSE#P:OPEN#P,0,P,
"SI0"
30 PUT#P,22,30,1:
PRINT#P,"Page:";P
40 NEXTP
50 CLOSE#5:OPEN#5,5
60 PUT14:PUT31,22,12,12:
PRINT#0,"Select
Page No.:";
PUT15
70 GET.1195,p$
80 p.004VAL(p$)
100 IFp>4THEN60
110 PUT#P,6:GET#5,a
115 PUT#P,21:GET#P,p,x,y:
IFy>9THENP=p+1
116 IFy>9THEN100
120 IFa=27THEN60
130 PUT#P,a
140 GOTO100
200 END
P M Stevenson,
Fareham, Hants.
```

### Washers for the ZX printer

Sinclair Research has come in for more than the average share of brickbats since the launch of the ZX81 more than two and a half years ago, but may be that should change.

My ZX printer gave me the ghost recently after a lot of hard work and, resigned to not seeing it again, I popped it into a jiffy bag and posted it off. Three weeks later to my great surprise a printer, in perfect condition, arrived on the doorstep!

Any readers who still have problems with paper feed may find this tip of interest. A printer I borrowed squashed the printed lines at intervals and gave somewhat ragged characters. The cure was simple. Small washers, just thick enough to take up the sideways movement on the spool holder, were slipped over the end pieces and fixed into place with a spot of glue. Suitable washers can be obtained at any electrical or hardware shop.

R G Taylor,  
Farington, Hants.

# MICROTANIC COMPUTER SYSTEMS LTD.

## MICROTAN 65 NO OTHER COMPUTER IS AS PERSONAL!

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

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

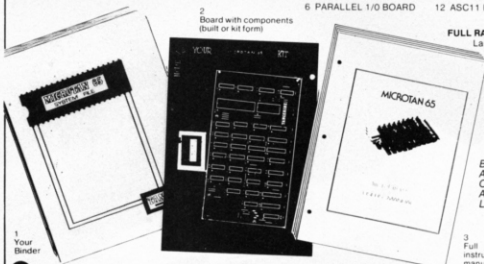
### FLEXIBLE & EXPANDABLE SYSTEM — 1K to 256K!

Just look at the options:

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



Microtan World Magazine



2 Board with components (built or kit form)

1 Your Binder

3 Full instructions manual

### FULL RANGE OF SOFTWARE

Languages available: Machine Code, Assembly, Basic, Forth, and Pilot

### HOW TO ORDER:

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

Post to:  
MICROTANIC COMPUTER SYSTEMS LTD  
16 UPLAND RD, LONDON SE22  
Tel No: 01-693 1137  
Please rush me my starter kit:  
(Please tick!)

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

I enclose my cheque/P.O. for £

Name .....

Company .....

Address .....

.....

.....

.....

.....

.....

.....

.....

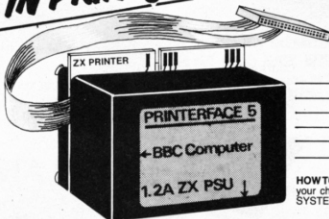
### MICROTAN COMPUTER SYSTEMS LTD

SHOWROOM: 16 UPLAND RD  
DULWICH, LONDON SE22  
TEL: 01-693-1137

MAIL ORDER:  
235 FRIERN RD, DULWICH  
LONDON SE22

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

FOR JUST  
£29.95 + P&P  
YOU CAN PUT  
IT IN PRINT!



You can connect a Sinclair ZX Printer to your 6502 Computer by simply plugging the right PRINTFACE unit to your system giving you up to 43 characters line or 256 Dixel graphics.

For MICROTAN  
(ask for Printface 1)

For DRAGON 32  
(ask for Printface 2)

For ATOM/ACORN  
(ask for Printface 3)

For ORIC  
(ask for Printface 4)

For BBC COMPUTER  
(ask for Printface 5)

For VIC 20  
(ask for Printface 6)

HOW TO ORDER Please enter your requirements in the coupon below, enclosing your cheque or postal order, made payable to: MICROTANIC COMPUTER SYSTEMS LTD. Please allow 14 days for delivery.

**MICROTANIC COMPUTER SYSTEMS LTD.**  
16 UPLAND RD DULWICH  
LONDON SE22  
**TEL: (01) 693 1137**

Post to: MICRO COMPUTER SYSTEMS LTD  
16 UPLAND ROAD DULWICH LONDON SE22

Please send me the following items:

I need "INTERFACE" UNIT for (state your computer system)

I enclose my cheque/P.O. for £

Name .....

COMPANY .....

ADDRESS .....

.....

.....

.....

.....

.....

TEL (DAY) .....

.....

.....

.....

# And you thought you had a good spreadsheet.



A business is only as good as its planning. And good planning depends on finding the right spreadsheet.

Choose the wrong one and you may be making the first in a long line of mistakes.

That's why it pays to be careful. To make sure you get the best.

Which is why you should choose Multiplan.

Multiplan is a very special kind of spreadsheet.

It's simple enough for an inexperienced person to use easily, yet it still offers all the functions and operations you're ever likely to need.

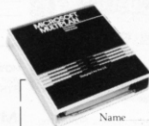
Which means you can undertake really complicated projects if you have to.

So whether you want to know how a 10% rise in inflation will affect the overheads, or what'll happen if your company's sales rise by 20%, you have all the answers at your fingertips.

Which means you can plan the future with confidence.

So if you want to get the most out of your business, fill in the coupon.

And let someone else sell the ice cream.



## MULTIPLAN

Please send me further information on Microsoft Multiplan

Name \_\_\_\_\_  
Position \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_

Tel \_\_\_\_\_

Microsoft, Piper House, Hatch Lane, Windsor, Berks SL4 3QT Tel (07535) 59951.

**MICROSOFT®**  
Right. First time.

PCN

PCN OCTOBER 27-NOVEMBER 2, 1983

Not the Tandy 100 — Geoff Wheelwright discovers more to the PC-8201A than cosmetic changes.

# NEC's mighty midget

**T**he Nippon Electric Company has long been famous in Japan for producing television, home entertainment and video equipment — but until recently has not made too many waves in the UK computer market.

But in the past two months, NEC has launched two very substantial micros in this country: the NEC Advanced Personal Computer (reviewed in *PCN*, issue 30) and the NEC portable PC-8201A. The portable 8201A, due for release this month, is the subject of this review and probably the

object of many double-takes by people who get a strong sense of *deja-vu* when they see the machine.

If you think you've seen it before, you're at least half right. Both NEC's PC-8201A and Tandy's Model 100 portable computer (reviewed in *PCN*, issue 18) were designed by the Japanese company, Kyocera. They share the same processor, have substantially the same built-in word processing system and a similar implementation of Microsoft Basic.

The prices for bottom-line models of each machine are also about the same (£475 for NEC's and £499 for Tandy's) although the NEC comes with twice as much memory as the Tandy 8K base model.

On the outside, however, the two machines look pretty much identical. Although their function and cursor keys are configured differently and the colour scheme is slightly different, you could still be forgiven for the double-take.

But like most fraternal twins, the Tandy and NEC machines have entirely different personalities. It seems that although Tandy and NEC decided they would both produce machines based around the Kyocera, each company had its own ideas about the tasks the book-size portable would be put to.

Tandy took the not unreasonable viewpoint that the machine would become the electronic equivalent of the executive's



The PC-8201A can take up to 64K of non-volatile RAM inside the machine (sockets for which are shown in the small picture on the left) as well as an interchangeable 32K memory module which slots into the left side of the machine. The 32K module is powered by its own battery and will maintain its memory even when not plugged into the computer.

Howard Kingsnorth

daybook and chose to include an address-book, schedule organiser, telecommunications program and text editor resident in ROM. Tandy has been quick to bring out a battery-powered plug-in acoustic modem for the Model 100 and have stressed its compatibility with the Tandy range of business computers.

The NEC machine, however, wears no such pin-striped strait-jacket. It seems that NEC has designed the PC-8201A to be an "open" computer and that the last thing the company wants is for the machine to be limited to the business user.

## Presentation

The machine comes in a small cardboard box replete with pictures of the machine on front and back and either side. It is packed inside with styrofoam and wrapped in plastic.

The box includes a "leatherette" imitation leather case for the computer, three manuals, a set of batteries, a cassette recorder cable and a cassette containing the "Software Application Kit", as well as the computer containing at least 16K of CMOS non-volatile memory.

## Documentation

There are three manuals: one for the computer, one for the applications program cassette and one for the N82 extended Basic built in to the PC-8201A.

Although the documentation is quite complete, it is certainly idiosyncratic and somewhat the worse for wear in its translation from Japanese to English. (The documentation for the 32K RAM cartridge we received with our test model didn't have any English documentation — it was all in Japanese).

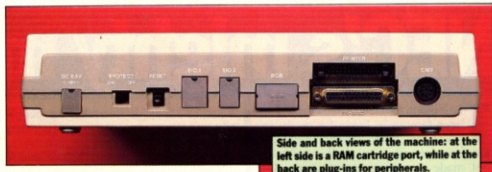
Witness, for example, these gems in the Personal Application Guide: "Schedule Keeper — SCDL: This program is for busy person. Program help you make schedule and keep them."

Or this classic: "The SOUND instruction of the N82-Basic provide such first parameter for decision for musical intervals that gives much finer decisions than so-called semitone music."

However, such picarescos are to be expected whenever a product as complex as the PC-8201A takes a trip halfway round the world. And the mistranslations are few and far enough between that they don't make for more than the odd intriguing aside.

Despite the comprehensive approach there are a few areas which could have done with more explanation. The SIO (Serial Input/Output) interfaces, with their 6-pin and 8-pin BERG modular jacks, are described inscrutably as "available for future expansion of peripherals".

The interface could be designed for use with a disk drive system that NEC has alluded to, but kept safely out of the manual — but even an NEC spokesman wouldn't confirm that. It's unfortunate that since such a lot of work obviously went into the superb design of this machine, NEC couldn't have been sure enough of its future to include details of and plans for the



Side and back views of the machine: at the left side is a RAM cartridge port, while at the back are plug-ins for peripherals.

disk drive.

## Construction

The PC-8201A is a solid machine with a slightly more substantial feel than its Tandy sibling. This is largely due to the way the machine's I/O ports are stacked up at the back of the machine to provide you with a tilted keyboard and screen. This rakish wedge-shaped design improves the readability of the screen.

There are, however, two minor drawbacks to the construction of the NEC. The first is the placement of the battery power supply, which is designed so that it neatly slides out from the back. Perhaps it was my test model, but several times I found the machine sliding away from the power supply when I was carrying it.

The second — and again small — problem with the construction of the machine is the close positioning of the printer and RS-232 ports. If you were using both at once, it could be a tight fit as they sit one above the other.

## Keyboard

The keyboard is a high-quality qwerty job with a good bounce that gives the kind of "feedback" that will make even fans of manual typewriters feel at home. The keyboard layout is interesting, forsaking Tandy's "in-line" key arrangement for a proper cursor keypad, with each key pointing in the direction that it intends to move the cursor. NEC has also dispensed with the "numeric keypad within a keyboard" arrangement that Tandy provides on the Model 100.

There are five function keys, which actually function as ten by having a second set of values when the Shift key is pressed. A Paste key which inserts text from a buffer, and a Delete/Backspace key are incorporated in the main body of the keyboard.

A GRPH key displays user-defined graphics with a value of CHR\$(131) or greater and a CAPS key provides a capitals lock.

## Screen

The PC-8201A (I can never get used to these long-winded numbers as names of computers; why not something catchy, or bland, but easily remembered?) has the same 40-column x 8 line screen display as the Tandy Model 100.

The resolution on this screen is 240x62 dots, giving a quite readable typeface for text and a good resolution for graphics. The dot-resolution is high enough that it allows for development of games to rival



the "Game and Watch" variety of dedicated games.

The NEC doesn't support the range of graphics characters built into the Tandy, but instead allows you to redefine any characters from CHR\$(131) to CHR\$(255). Included in the Personal Application Kit that comes with the machine is a character redefinition program.

## Storage

The machine uses a cassette filing system or non-volatile RAM for storage. But its biggest advantage in this department is the use of bank-switching and plug-in non-volatile memory cartridges.

The PC-8201A can take up to 64K of memory "inside", and an additional 32K through the cartridge port at the side. The bank-switching system is explained in detail in the box below, but summed up in a few words: it gives you the effective equivalent of three RAM-based disk drives.

The expanded machine has three "banks" of memory, each of which can be addressed like a disk drive. Banks 1 and 2 are each 32K sections of memory inside the machine, while Bank 3 is the 32K memory cartridge.

Pressing Shift and function key 5 from the main menu switches you from bank to bank, giving you a new directory for each of them. And there are utilities included on the Personal Application Kit cassette which let you transfer files from one bank to another, copy all the data from one bank to another and write from one bank to another.

This system effectively means that all your day-to-day programs can be stored in one bank of memory (calendar programs, reminders, schedules and utilities), another bank can be used as a scratch "worksheets" for notes, calculations and other work — leaving the exchangeable cartridges to be used for data files.

And since the cartridges are removable, you could have as much "portable" storage as you like — although it would take quite a bit of information to fill up the 96K supplied by the on-board memory and one 32K memory cartridge.

The only drawback to this system which

# Never before has so much been available from so little, to so many.



Never before in the history of modern computers has there been available a totally portable machine with the ability to cope with so many demands, to so many people, in so many different business areas.

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 main 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 micro-cassette 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, Freepost,  
Wembley, Middlesex HA9 6BR.  
Sales Enquiries: Freefone EPSON.  
General Enquiries: 01-902 8892.  
Telex: 8814169.

I would like a demonstration of the HX-20 Portable Computer.

Please send me details of my local stockist.

Name

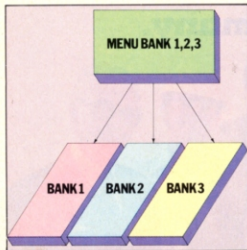
Position

Company

Address

Tel:

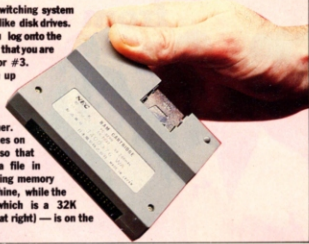
PCN27/10/20



The PC-8201A uses a unique bank-switching system that treats chunks of memory much like disk drives. As the diagram at left shows, when you log onto the machine a menu is displayed showing that you are logged onto a memory bank #1, #2 or #3.

Each bank of memory can contain up to 32K RAM and allows you to store 21 files. Files can also be copied between banks of memory and backed up from one memory to another.

There are write/read protect switches on both memory banks #2 and #3 so that you can't accidentally overwrite a file in those banks. The switch for protecting memory bank #2 is at the back of the machine, while the switch for memory bank #3 — which is a 32K memory cartridge (shown in picture at right) — is on the outside of the cartridge itself.



had chosen.

The IPL command can also be used to turn the machine into a dedicated word processor by causing it to go straight into the TEXT program every time you power up the machine.

### Verdict

The NEC PC-8201A is a gorgeous machine that I would recommend to anyone were its price not stuck at the current level by the high cost of CMOS RAM.

The NEC is still, however, the cheapest in an expensive field. At £475 for the bottom-line machine with 16K, the NEC represents better value than the Tandy Model 100 and Epson HX-20 machines it's currently competing with. There are two questions that will loom large for NEC in launching the PC-8201A in this country: how well can they support the machine — particularly in view of the number of people who will quickly want to upgrade the 16K memory (which costs £59 per 8K up to a maximum of 64K) and how will they fare against the looming competition?

NEC has made the right decision in leaving the 8201A as an "open" machine with lots of memory, but can it compete in the face of the aforementioned £1300 Sharp PC-5000, replete with flip-up 80-column screen, 16-bit 8088 processor running under MS-DOS, 256K maximum bubble memory and disk drive potential?

In short, NEC has produced a very nice machine that probably would have been unequivocally praised to the skies had it arrived here six months ago. But in the face of what else is available now, and at the price, NEC is going to have to make the machine a little more wonderful if it wants to win the battle of the "lap-held" computer market.

—if it works properly — could make disk drives quite superfluous on book-size portables, is the price of the battery-powered memory. At about £200 per 32K cartridge, the memory cartridges are not likely to replace floppy disks or cassette tape in any great hurry.

And that's a shame, because the cartridges are so nice. If they came down to about £50 or so each, they could mount an effective challenge to the Osbornes And Compaqs of this world — but at their current price, the plug-in RAM disks have too little memory for too high a price.

### Expansion

The major expansion capabilities of the PC-8201A have to do with the memory, although there are vague promises for a disk drive system in the future — as well as even more vague talk of producing a TV modulator to run an 80-column screen. But the back of the machine is already packed with expansion potential for add-on goodies:

- The two previously-mentioned SIO connectors.
- The Bar-Code-Reader connector which can use a bar-code wand to read bar codes.
- A parallel printer interface.
- An RS-232C serial connector.
- A cassette interface.

The cost of the peripherals represent a certain dual-mindedness in NEC's pricing department. While the £85 price tag for the battery-operated/Centronics compatible 40-column printer seems more than reasonable, the £20 cost of a printer cable, £21 for the RS-232 cable and £58 for data cassette recorder all seem a bit high.

### Software

Unlike Tandy's Model 100, NEC has included only two programs in ROM: a text editor and a communications program. They share the names of the Tandy programs: TEXT and TELECOM, and they do exactly the same things.

The telecom program allows you to send and receive data from other micros through the RS-232 port, while the text program is a surprising by powerful in-built word processor. Text allows you to write text, format it, do block moves, block deletes and block inserts — all in glorious 40-column display.

NEC has taken a different approach to Tandy in providing software. It has opted for a much nicer version of Microsoft Basic, fewer built-in programs, more programs on tape and some provision for playing games with the machine. The applications tape, for instance, includes two games: a version of the classic Snake game, and a tank maze game where you try to take territory and men from an enemy force.

The financial world has also been represented in the suite of packages with a calculator, an investment portfolio file organiser and the schedule and address programs that reside in the Tandy machine in ROM.

### Basic

The PC-8201A has a relatively standard extended Microsoft Basic that can be edited quite easily using the cursor keys and many of the editing commands available in TEXT. Unlike many Basic editors (such as the one on the Model 100, where you have to go into a special EDIT mode to edit Basic programs) programs can be edited straight from Basic.

You can also use what is known as an IPL file to create programs that are automatically executed when the machine is turned on. If, for example, you wanted to create a Basic file that would prevent anyone who didn't know your machine password from using your machine you would type the short program:

```
BASIC
CLS: INPUT AS:IF AS<>"YOUR
PASSWORD HERE" THEN POWER
OFF ELSE MENU
```

That would cause the computer to shut itself off every time someone entered a password that didn't match whatever you

#### SPECIFICATION

Price	£475
Processor	80C85
RAM	16K, expandable to 64K internally, and up to 64K externally using 32K RAM cartridges
ROM	32K standard, 32K optional
Text Screen	40 characters x 8 lines
Graphics resolution	240 x 62
Keyboard	67 keys, 5 function keys (which can be SHIFTed to provide an additional five) and 4 cursor movement keys
Storage	RAM cartridge or cassette tape (600 baud)
Os/Language	Menu-system and Microsoft Basic
Distributor	NEC, 164/166 Drummond St, London NW1, 01-388 6100

# BATTLE OF



PLUS 10 OTHER  
GAMES



SEVERAL SOFTWARE AND PARTICULAR APPLICATIONS FOR DISABLED

# BRITAIN

**BATTLE OF BRITAIN SIMULATION** war game by Paul Medland takes the scene by storm. Use your 12 fighter bases, 280 aircraft, supply of fuel, food and ammo to defend territory. Your morale is affected by the extent of bombing by German Luftwaffe. Prepare to attack. A game of skill, cunning and wits to run on 16K Vic 20.  
Cost £9.95 (inc. VAT) + 50p P&P. See coupon below.

**ALSO AVAILABLE NOW  
LASER SHOOT:**

You are stationed at a base that is under attack by a guided missile. You must destroy it before it reaches the planet. Using the logic, judge the proportional distances between you and the attackers and block it before disaster strikes.

**AND  
FLIGHT SIMULATOR:**

Imagine yourself in the cockpit of an executive jet, travelling from Birmingham to Luton. By using the artificial horizon and skilful use of air speed and altitude indicators, you are able to control your aircraft and negotiate any obstacle.

**AVAILABLE OCTOBER  
ROBOTICS:**

You are told to construct a Robot to include such elements as high explosives, segmentation alarm beacons etc. You can select which of these criteria to include the ability to depend yourself against the computer controlled alien robots. The stakes are total annihilation of one side or the other.

**AND  
CONVOY:**

As the commander of naval protection vessels, you are responsible for safe guarding the merchant convoy. You must defend yourself from attack by German wolf pack with the use of shells and depth charges.

**FOR EVERY CASSETTE SOLD £1.00 WILL BE DONATED TO THE ROYAL AIR FORCE ASSOCIATION  
MAINCOMP LTD, 1-2 CAMBRIDGE GATE, REGENTS PARK, LONDON NW1 4JN**



# VIC-20

Please send me the following:

Battle of Britain  Free information

I enclose a cheque/PO for £..... (Inc. 50p p&p)

Name .....

Address .....

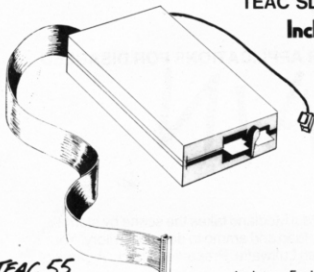
PCN

# BBC USERS CAN ALSO DO IT IN 5 SECONDS!

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

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

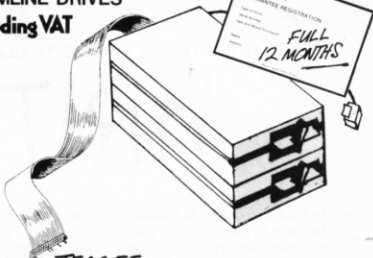
## TEAC SLIMLINE DRIVES Including VAT



**TEAC 55**

SINGLE DRIVES CASED

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



**TEAC 55**

DUAL DRIVES CASED

	Incl. VAT	Excl. VAT
40 TRACK 200K	£320	£278.26
40/80 TRACK SWITCHABLE 400K	£402	£359.59
40/80 TRACK SWITCHABLE 800K	£520	£452.18
DFS KIT	£75	£65.22
P.S.U.	£32.20	£28

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

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

\*Check our special terms for Educational Establishments and Government Departments

**DEALER ENQUIRIES WELCOME**

### HOW TO ORDER

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

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

**ENQUIRE ABOUT OUR 24-HOUR  
GUARANTEED  
DELIVERY SERVICE!**

**Viglen**  
COMPUTER SUPPLIES

UNIT 7 TRUMPERS WAY  
HANWELL W7 2QA  
Tel. (01) 843 9903

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

Please send me the following items:

\_\_\_\_\_

\_\_\_\_\_

I enclose Cheque/P.O. for £ \_\_\_\_\_

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

CARD No \_\_\_\_\_

SIGNATURE \_\_\_\_\_

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

\_\_\_\_\_

Tel (Day) \_\_\_\_\_ Tel (Eve) \_\_\_\_\_



CREDIT CARDS VALID IF SIGNED BY CARD HOLDER.  
ADDRESS ABOVE MUST BE THE SAME AS CARD HOLDER. 264-2

Look after the bytes, and you'll find that the memory looks after itself, says Gary Williams.

# Token gestures for Oric Basic

In common with a number of other microcomputers, the Oric 1 uses what are known as 'tokens' to allow the interpreter to recognise the Basic instruction. This allows more efficient use of memory space by using only one byte for common instructions, rather than one byte for each letter of the instruction.

For example, take the instruction PRINT. If this was stored as individual letters P-R-I-N-T, then it would take up to 5 bytes of memory. However, the statement PRINT is instruction number 186 decimal, which is saved in memory as one byte, ie an 80% saving of memory space.

Words like RESTORE and EXPLODE result in almost 86% saving. This also helps the interpreter when it is searching through the memory for the next Basic instruction.

The start location for Basic programs is location 1280 (HEX 0500) in RAM. PEEKing this and the following locations will reveal a series of decimal numbers that, at first, bear no resemblance to the normal screen listing.

Starting with a 'clean' computer, ie with the power just applied and the screen displaying ORIC EXTENDED BASIC V1.0, type in the following program exactly as listed. If you make a mistake, and you wish to edit the program, then switch OFF and then ON again to make sure all memory is re-set.

```
10CLS
20FORI=1T05
30PRINT"HELLO"
40NEXT
50A=1280:B=1290
60FORI=AT0B:PRINTI,PEEK(I)
70NEXT
80LIST-40
```

Run the program. The screen will clear, display HELLO on five consecutive lines then print two columns of numbers before listing itself up to line 40.

In the table below, the left hand column of numbers represents the RAM locations from 1280 to 1290. The right hand column shows the decimal or binary number associated with each location.

1280	0
1281	7 Pointer to start location of next
1282	5 Basic line. $7+(5 \times 256) = 1287$
1283	10 Basic line number
1284	0 $10+(0 \times 256) = 10$
1285	148 Token number for CLS
1286	0 End of first BASIC line.
1287	18 Pointer to start location of next
1288	5 Basic line. $18+(5 \times 256) = 1298$
1289	20 Basic line number
1290	0 $20+(0 \times 256) = 20$



You will note that it takes two bytes to store the Basic line pointers (also known as link addresses) and Basic line numbers. As discussed earlier, you are allowed to use line numbers up to 65353. One byte can only store up to 255 decimals. Therefore, if you wanted a line to be numbered 1000 then the second byte would be a multiplier for 256. The resultant number would be added to the number in the first byte.

The above is simplified on the Oric by giving you an instruction that looks at both bytes and performs the necessary calculation to give the decimal equivalent. The instruction is DEEK(X), where X in example 1 above would be 1283. PRINT DEEK (1283) Return 1000  
READY  
If you want to continue looking at the

	Location	Number		
Example 1	1283	232	= 3x256 =	232
	1284	3		768 +
Example 2	1283	255	= 255x256 x	255
	1284	255		65280 +

# CDS THE BEST CHANNEL FOR GOOD PROGRAMMES

ACT FAST-  
WE'RE  
CHOOSY!

CDS has built its name on top quality machine code games for Spectrum & Oric.

We are interested in software which meets these criteria, including games for the Commodore 64.

So if you've completed original programmes or have something good in the pipeline, get in touch as soon as you can.



***CDS Micro  
Systems***

10 Westfield Close,  
Tickhill, Doncaster,  
South Yorkshire DN11 9LA  
Telephone (0302) 744129

remainder of the short program in RAM then type the following:

```
A=1291:B=1309:GOTO60 Return
The next block of memory will be displayed, taking you up to the quotation mark at the end of line 30.
A=1310:B=1316:GOTO60 Return
This will take you up to the end of line 40.
```

## Renumbering

With some knowledge of how commands and characters are stored in RAM, it is possible to create a simple renumber routine that will identify the existing line number RAM locations and change the line numbers to whatever is required.

```
60000 CLS:INPUT"Start to re-number
at line":S
60010 INPUT"End re-number
sequence at line":E
60020 INPUT"New start line":L
60030 INPUT"New line
increments":I:L=L-I
60040 A=1281
60050 B=DEEK(A+2)
:IFB<STHENA=DEEK(A):
GOTO60050
60060 IFB>ETHENEND
60070 L=L+I:DOKEA+2,L
60080 A=DEEK(A):
:IFDEEK(A)=OTHENEND
60090 GOTO60050
```

Unfortunately, this simple program will not change any GOTO and GOSUB line numbers in the Basic text. These would require changing, using the normal Basic editing routine, after the above listing had been RUN.

A program to alter all the GOTO and GOSUB flags would first have to identify their position in RAM and store this information, along with the current flag numbers in the following locations, in a temporary buffer. The above routine would then be run concurrently with a comparison routine to note the change in line numbers and substitute the GOTO and GOSUB flags when necessary.

A Basic version of this would probably be so slow that the user would prefer to edit the program in the normal manner. Reference should be made to 6502 machine code textbooks for guidance on developing a fast assembly language program.

The above re-number routine can be merged into existing programs by first loading it into the computer, then LISTing it on screen. Without clearing the screen, load the main program that you wish to alter. When loading is complete, cursor up the screen and copy each of the program lines 60000 to 60090 by using the CTRL 'A' facility in the normal manner. The routine will now be part of your main program. Type RUN60000 Return and you are then able to change program line numbers.

A useful routine to add to any Basic program that has data stored in it is one that gives the equivalent of RESTORE X — where X is a specified line number.

The normal READING of data in a Basic program is sequential. That is, the first READ statement is directed to the first

block of data, wherever that may lie in the listing. Subsequent READ statements are directed to blocks of data after the block read in the previous READ instruction, unless it has been RESTORED, in which case it will start again at the first block of data.

To access a particular block in the ORIC 1, you must first RESTORE, then generate a FOR — NEXT loop to READ and discard unwanted data, until you arrive at the data block required. This is both time consuming and uses a fair amount of variable storage area which may then have to be subjected to the 'garbage collection' routine to clear all unwanted variables. Remember, string variables can be anything up to 255 characters in length, so a lot of memory can be used if your data is being transferred into string variables.

RAM addresses 174 and 175 monitor the progress of the READ instructions and store the current program line number. Unfortunately, DOKEing this location with the desired line number does not give the required result. Locations 174 and 175 are updated by other locations within the system variable block.

One of these is 176/177, which monitors the actual RAM location in the program memory block (1280 upwards) and acts as a pointer to the current data statement. Changing this pointer with a DOKE instruction will give the desired result. For example:

```
60000 CLS:INPUT"Restore line
No.":L
60010 ML=1281
60020 ML=DEEK(ML):
:IFDEEK(ML+2)=
L:THEN60050
60030 IFDEEK(ML+2)>
L:THENPRINT"No such line
line.":GOTO60000
60040 GOTO60020
60050 IFDEEK(ML+4)<<>145
THENPRINT"Not a
DATA line.":GOTO60000
60060 DOKE176,ML+4:RETURN
```

In a normal program, where the above listing would be a subroutine, line 60000 would be 60000 L=X — where X is the desired line number.

In a properly debugged program, lines 60030 and 60050 will be redundant; we can therefore rewrite the subroutine as follows:

```
60000 ML=1281
60010 REPEAT:ML=DEEK(ML):
UNTILDEEK(ML+2)=L
60020 DOKE176,ML+4:RETURN
'L' should be set to the desired line number before you GOSUB60000.
```

The Basic listing is obviously not as fast as a machine code routine but it does use less memory than READING through unwanted data, and looks only at line numbers rather than every bit of data. It is therefore much faster than the FOR — NEXT loop routine.

Data statements should be stored somewhere near the beginning of the program. As the search routine starts at the first line location in RAM, the sooner it meets a match with the desired line number then

the faster the routine. If it is unavoidable that data statements are near the end of a program (this being the standard procedure used by many people) then the following modification for line 60000 will increase the speed of operation.

```
6000 ML=X
Here X is the RAM location of the link address LOW byte, which in turn points to the start of the first data line in RAM.
```

## Keywords

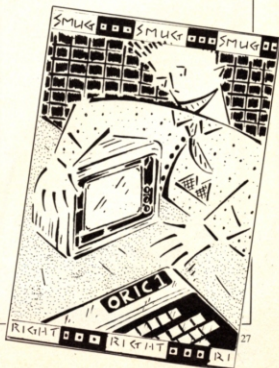
Finally, here are some hidden Basic keywords that are not mentioned in the user's manual. Typing EDIT X, where X is the program line, will list the line on screen with the flashing cursor to the left of the line number. The normal LIST X will list the line, but also prints READY and leaves the flashing cursor at least three lines below the desired position.

The EDIT facility is very useful for changing program lines in HIRES mode. Attempting to LIST when in HIRES results in the required line scrolling up and off the three line TEXT area at the bottom of the screen. You have probably typed TEXT, lost the HIRES screen for comparison and then typed LIST X.

Try typing EDIT X RETURN while still in HIRES mode. You can now change your program line, using the normal CTRL 'A' copy facility, while the HIRES screen is still being displayed — very helpful if you are trying to re-calculate CURSET or CURMOV parameters.

The Basic keywords INVERSE and NORMAL cannot be used. The designers had intended that these facilities be available, and they were included in the glossy brochure that was being sent to prospective customers, but it seems that problems with the ROM meant these keywords were switched off. Attempting to use them will return 'syntax error'.

As you can see, there are many permutations and procedures that can be developed with the knowledge of the Basic storage and system variables locations. There are obviously many other locations that I have not discussed but this article should help you to delve even deeper into the operating system.



# ONE-STOP SHOPPING

**KEENESEST PRICES,  
PROMPT, RELIABLE  
SERVICE ---  
That's TWILLSTAR!**

## BBC MICROCOMPUTER



Model B	£399
Model B & Disc Interface	£469
Model B & Econet	£446
Model B & Econet & Disc Int.	£516
* Disc Interface Kit	£97
* Speech Synthesizer (official BBC)	£54
Teletext Receiver	£225
1.2 Operating System (incl. fitting)	£11.50
Basic 11	£15

\* New in stock. Price incl. fitting.



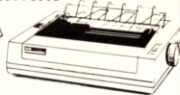
**NOW AVAILABLE  
THE ACORN ELECTRON**  
ONLY **£199.00**

## WORD PROCESSORS

View Word Processor	£59
Word Wise Word Processor	£45

## Logitec-FT 5001

STAR BUY

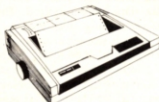


Friction and adjustable sprocket feeding, variety of printing models, (PICA & ELITE pitch) user font registry command, automatic paper insertion, 96 ASCC11 with descender, 8 international character sets, 48 semi graphics!

At the very low price of **£330**

Just look at our prices and selections: but if you don't see what you want please telephone us, as we are unable to list all the items we stock. We will be more than pleased to give you our Best price, and our very best wishes for Christmas!

## DOT MATRIX PRINTERS



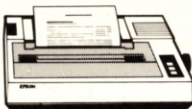
### MANNESMANN MT80

High quality 80 column serial dot matrix printer. Dual density dot addressable graphics, quick tear facility as standard, optional sound reduction kit to give an impressive L55dBa acoustic noise rating. Ability to handle both tractor-fed fanfold and single paper.

Special price of **£295**

FREE CABLE AND PAPER WITH ALL PRINTERS.

### EPSON F80



Epson FX80 F/T	£425
Epson RX80 F/T	£315
Epson FX100 T/T	£499

### SHINWA CP80



80 column, friction and adjustable tractor feed, bidirectional logic seeking, HI-RES graphics and block graphics, sub and superscripts, condensed and emphasised print, and underlining, vertical and horizontal tabs, self test, italic print, etc.

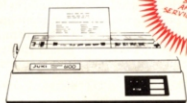
Shinwa CP80 F/T	£289
Parallel Printer Lead	£13
2000 Sheets Fanfold Paper	£15

### ODDS

Official Joysticks	£13
Compatible Joysticks Damping Control	£15
Dust Covers - for various machines - from	£3.95

## DAISYWHEELS

NEWS FLASH!  
ACORN APPROVED & LICENSED SUPPLIER  
NEWCASTLE CENTRE



### JUKI 6100

20 CPS print speed, supports all wordstar features, emulates diablo protocols.

Juki 6100 Daisywheel with 2K Buffer **£395**



### BROTHER HR15

Buffer... 3K byte, shadow printing, super/sub script, carriage skip movement, text reprinting, colour printing (red and black), auto under-scoring, proportional spacing, clear buffer—

Also available with keyboard.

Brother HR15	£431
Keyboard	£176

Silver Reed Printer/Typewriter

inc. RS232C Interface EX43 & 2K Buffer	£395
--	------

(Just plugs into your BBC)

**STAR BARGAIN!**



BBC Model B plus Disc/Interface fitted view, V.D.U. Green Monitor, Juki Daisywheel Printer, 200K Dual Disc Drives and manual and formatting disc. ONLY **£1,360** (incl. all cables)

INVITATION TO **MICRO USER SHOW**  
Westminster Exhibition Centre  
Greycoat Street, London, SW1  
**Dec 8, 9, 10, 11, 1983**  
STAND Nos. 97, 98, 107, 108  
Ask for your complimentary ticket now! Come and see us to pick a special gift for Christmas!  
\* BARGAINS \* SPECIAL PRODUCTS

**TCL**

**Twilstar Computers Limited**

Microcomputers, Peripherals, Software, Service Contracts.

ALL PRICES INCLUSIVE OF VAT.

# to fill your Christmas MICRO stocking!

## MONITORS

### SANYO SM12H



Sanyo 14" Phosphor Green Display, steady 80 character x 24 line display, etc. SM12H

Priced at...**£79**

**SM12N** Sanyo 14" Priced at...**£113**



Phoenix Data Display Monitor - 12" diagonal face, high resolution green and amber. Priced at...**£89**

### PHILLIPS 2006

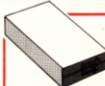


14" colour TV/Monitor...**£255**

Expertly converted, come to use our showrooms and compare. Use it for good resolution colour monitor, or watch your favourite TV programme.

### OTHER

Microwtec 14" 1431...**£247**  
BBC Official 12" ...**£95**



### KOMORI - MICROPROCESSOR CONTROLLED

Ideal for BBC Micro, and any other computers with standard interface 512". Slimline on-board single chip microprocessor reduces TTL count by 70% extra low power requirement, direct drive (no belts), guide rail means completely quiet operation, unique eject mechanism, fast film track to track access time, fully guaranteed. Cased with leads. Priced at...**STAR BARGAIN PRICE £169**

Power supply...**£40**  
Cables Single...**£9.50**  
Cables...**£13.50**

## FLOPPY DISKS



Floppy Disks in packs of 10  
Single sided 40 Track...**£20**  
Double sided 80 Track...**£35**

## BBC Compatible

### KLIX STIK JOYSTICK - SELF CENTRING



Two Fire Buttons

Single - **£17.95**

Dual - **£34**



### SANYO SLIM 3G



The slim 3G Sanyo Cassette Recorder only recently available in the market. ONLY **£28.95** Official BBC Cassette Recorder **£29.95** Cassette Recorder lead **£2.50**



## UTILITY SOFTWARE



Screen Dump Rom...**£17.25**

Analysis Disk...**£15**

Compatible for MX80, FX80 etc.

## NEW BOOKS AND SOFTWARE IN STOCK

\*\*\*\*\*

## FITTING SERVICES AVAILABLE

## SOFTWARE

### ACORN SOFT GAMES

- Creative Graphics...**£9.95**
- Graphs & Charts...**£9.95**
- Desk Diary...**£9.95**
- Murders...**£9.95**
- Snappers...**£9.95**
- Planetoid...**£9.95**
- Arcade Action...**£11.50**
- Rockef Road...**£9.95**
- Melons...**£9.95**
- Arcaclans...**£9.95**
- Siding Block...**£9.95**
- Cube Master...**£9.95**
- Cheats pack...**£9.95**
- Super Invaders...**£9.95**
- Missile Base...**£9.95**
- Snooker...**£9.95**
- Starship Command...**£9.95**
- Dauntly/Revers...**£9.95**

### ADVENTURES

- Sphinx Adventure...**£9.95**
- Philosophers Quest...**£9.95**
- Castle of Rubies...**£9.95**
- Countdown to Doom...**£9.95**

### LANGUAGES

- Lisp...**£16.85**
- Fort...**£16.85**
- Microlist...**£49.85**
- BCPL...**£99.00**

### EDUCATION

- Algebraic Manipulation...**£9.95**
- Peecko Pack...**£9.95**
- Business Games...**£9.95**
- Tree of Knowledge...**£9.95**
- Sentence Sequencing...**£11.90**
- Word Sequencing...**£11.90**
- Missing Signs...**£11.90**
- Number Balance...**£11.90**
- Word Hunt...**£11.90**
- Speed & Light...**£11.90**
- Density & Circuit...**£11.90**
- Chemical Analysis...**£13.80**
- Chemical Simulations...**£13.80**
- Chemical Structures...**£13.80**
- Jars...**£11.90**

### BOOKS

- Creative Graphics...**£7.50**
- Graphs & Charts...**£7.50**
- Lisp...**£7.50**
- Fort...**£7.50**
- View Guide...**£2.50**
- Info View...**£2.50**
- BCPL Manual...**£15.00**

### BBC GAMES SOFTWARE (BUG BYTE)

- Gulnar Wars...**£7.50**
- Oliver...**£7.50**
- Red Lion...**£7.50**
- Music Synthesizer...**£9.50**
- Graphics Package...**£9.50**
- Old Farmer Tyme...**£9.50**
- City Defence...**£9.50**
- (COMPUTER CONCEPT)
- Asteroid Belt...**£8.99**
- Characters...**£6.65**
- Hitch Hiker...**£6.65**
- Snake...**£8.95**
- Space Hawks...**£8.95**



## PROGRAM POWER

- Flea and the Fruit Monsters...**£7.95**
- Danger UMB...**£7.95**
- Music Reader...**£7.95**
- Bandits at a O'clock...**£6.95**
- Swamp...**£7.95**
- Cruiser...**£7.95**
- Alien Swart...**£6.95**
- Command...**£7.95**
- Asteroid Storm...**£7.95**
- Well...**£5.95**
- Bedstone...**£6.95**
- Cave-man Adventure...**£6.95**
- Revers...**£5.95**
- Physics...**£6.95**
- Chemistry...**£6.95**
- World Geography...**£6.95**

## BUSINESS SOFTWARE

- Word Processors Room Based...**£44.85**
- Word Wise...**£59.30**
- GEMINI
- Cash Book Accounts...**£59.95**
- Final Accounts Program...**£59.95**
- Invoices and Statements...**£19.95**
- Commercial Accounts...**£19.95**
- Mailing List...**£19.95**
- Data Base...**£19.95**
- Stock Control...**£19.95**
- Home Accounts...**£19.95**
- Spread Sheet Analysis...**£39.00**
- Bestwick Rom...**£39.00**
- (Also available on 40/80 Disc)

## BOOKS

- 51+ Programs - BBC Micro...**£4.95**
- 30 Hour BASIC (BBC Micro)...**£6.00**
- 6502 Application Book...**£10.25**
- Advanced 6502 Interfacing...**£10.95**
- BBC Micro Revealed...**£7.95**
- BBC Micro Instant Machine Code Including Software Cassette...**£34.00**
- Creative Graphics on BBC Micro...**£7.50**
- Discover FORTH Outcome...**£11.25**
- Easy Prog. for BBC Micro...**£6.50**
- Further Prog. for BBC Micro...**£5.95**
- FORTH Programming (Sams)...**£12.50**
- Advance BBC Micro user Guide...**£12.95**
- Basic Programming for BBC Micro...**£9.95**
- 21 Games for BBC Micro...**£5.95**
- Intro to Micro Beginners Book (3 Ed)...**£9.90**
- The BBC Micro Teach You to Program...**£6.75**
- Micros in the Classroom...**£4.90**
- Practical Prog. for BBC & ATOM...**£5.95**
- Programming the 6502...**£10.75**
- Structured Prog. with BBC BASIC...**£9.50**
- The BBC Micro an Experts Guide...**£7.90**
- 6502 Games...**£9.75**
- Basic Handbook (2nd Ed)...**£15.75**
- Advanced BASIC...**£9.95**
- BASIC Computer Prog. for the Home...**£9.70**
- ALP for BBC Computers...**£8.95**
- BPL for the BBC Micro User Guide...**£15.00**
- Games BBC Computer Play...**£6.95**
- Basic Programming on the BBC Micro...**£5.95**
- 30 Hours Basic...**£5.95**
- 35 Educational Programmes for BBC Micro...**£6.95**



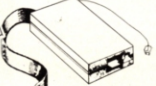
## TORCH DISK PACK

Torch Z80 Disk Pack  
4MHZ 380 Application Processor  
Perfect Software

At Low Net Price

£835.00 Inc. Installation

### SLIM DISK DRIVES



TEAC 55A S/S 40 TRACK...**£169**

100K 5D Single...**£339**

TEAC 55E S/S 80 TRACK...**£220**

200K Single...**£440**

TEAC 55F D/S 80 TRACK...**£269**

400K S/D Single...**£339**

MITSUBISHI...**£269**

400K D/S DD Single...**£339**

FORMATTING DISK & MANUAL...**£10**

\*ALL DRIVES CASSED WITH FREE CABLES

- \* SERVICE CONTRACTS TO EDUCATION AUTHORITIES AT DISCOUNT
- \* OFFICIAL ORDERS FROM DEALERS, GOVERNMENT DEPARTMENTS, COLLEGES AND SCHOOLS WELCOME
- \* ALL PRICES INCLUSIVE OF VAT

## HOW TO ORDER

You may purchase any of the items listed by cheque, Barclaycard or Access. All you have to do is fill in the details in the coupon below and list your requirements on a separate sheet of paper. Post to us and we will despatch within 7 to 14 days. All prices inclusive of 15% VAT. Add £2.50 P&P for orders below £150, over, add £8! P&P

## TELEPHONE ORDERS (01) 574 5271

Credit card holders may order by telephone. Give Card No., Name, Address and item required.

Post to:  
**TWILLSTAR COMPUTERS LTD.**  
17 REGINA ROAD, SOUTHWALL, MIDDLESEX.

I have enclosed my list of requirements along with my cheque/P.O. for £.....

I prefer to pay with my ACCESS/BARCLAYCARD (Delete whichever not applicable)

CARD NO.....

SIGNATURE.....

NAME.....

ADDRESS.....

TEL: (Day).....

TEL: (Eve).....

PCN-I

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

17 REGINA ROAD · SOUTHWALL  
MIDDLESEX · TEL: (01) 574 5271  
(OPEN SIX DAYS A WEEK - 10 a.m. to 8 p.m.)

# TANSOFT

## ORIC Software



### ORIC-MON

Includes mnemonic assembler/disassembler, block move and verify, data and text entry and cassette and printer handling. Includes manual. £15.00 inc. VAT - 16K or 48K

### ORICMUNCH

Munch the Bugmonsters and eat the power pills, clear the maze to reach the high score. £7.95 inc. VAT - 16K or 48K.



### ORICBASE

A complete database system. A sophisticated query language allows you to search and sort your data, keep running totals and print reports. Full manual. £14.50 inc. VAT - 48K.

## House of Death

An impressive follow-up to Zodiac, discover the secrets of the haunted house, avoid the witch and the axe murderer and come away with incredible treasures. £9.99 inc. VAT - 48K.

### ZODIAC

One of our most successful games. Discover the twelve cunningly disguised signs of the zodiac which will lead you to six treasures. Full of puzzles, puns and misleading clues. £9.99 inc. VAT - 48K.

### TANSOFT LANGUAGE MASTERCLASS

If you are going abroad for pleasure or business these courses will give you a basic understanding of the language. Based on the new Gruneberg Link-Word method.



Spanish  
Italian  
German  
French

supplied with program cassette and spoken vocabulary pronunciation cassette. £12.95 each inc. VAT - 48K.

## FORTH

A full implementation of this exciting new computer language. Includes editor and assembler plus language extensions. £15.00 inc. VAT - 48K.



You received your first issue of Oric Owner free with your machine. Why not subscribe now and keep in touch with all the latest developments in the Oric range.

TITLE	QUANTITY	PRICE	*Delete as appropriate.
Orion			
Forth			
Oribase			
House of Death			
Oricmunch			
Oric Owner (6 issues £10.00)			
NAME			
ADDRESS			
I enclose cheque/P.O. Access No.			
Tansoft Ltd., Unit 1 & 2, Techno park,			
Newmarket Road, Cambridge,			
Tel: order hotline:			
(0226) 2261.			

This small data storage system with a proven track record impressed even Bob Chappell.

# 64 Simply files it

**F**or the home user, the most common use for a microcomputer, next to games playing, is in storing and accessing information. Whether for business or home, if the amount of data you need to store is a few hundred records, your information manipulation and retrieval requirements are fairly straightforward, and the maximum price you want to pay for a package is under £70, then Simply File could be for you. It has been around for a while for the Pet series and this new version was written especially for the Commodore 64.

## Features

Simply File offers the ability to create random access files where records can be sorted, grouped and searched, and fields can be automatically calculated and printed out as reports or mailing labels. As a guide to file size, one 1541 disk would hold about 400 records each of 254 characters, assuming the programs were held on the same disk.

Shorter records would enable more to be held.

Files can be output in sequential format for use with other systems and the package can cope with a single or dual disk drive and printers using the IEEE, RS232 or Centronics bus.

The system consists of 11 modules, each of which is automatically loaded as required. The modules are written in Basic, with the addition of machine code routines where speed is necessary. The program disk is not protected, the publisher's philosophy apparently being that protection systems are inconvenient to the end user. They prefer to rely on the low price and the goodwill of the buyer to protect the package from piracy. Single disk users can thus copy the most frequently used modules to a work disk, ensuring that as much disk space as possible is available for the data.

## Presentation

A comprehensive 76-page manual is supplied. There is no index, but the material is laid out in a logical fashion so that finding the appropriate reference is not too much trouble. There is a very good introduction which covers a variety of general but relevant aspects, including backing-up programs, terminology, Commodore disk systems, data security, etc.

A generous collection of sample files is included on the program disk. As the manual has plenty of examples which are linked to these specimen files, you can immediately start experimenting. For those wishing to tailor the system to meet their own requirements, advice is given in the manual; it includes a list and explanation of the major variables.

## In use

You always start by creating or reading in an existing database. Each random access file is accompanied by a set of sub-files which hold indices, block maps, report formats, etc.

When creating a file, the program will ask for the number of records the file will contain, and the maximum record size. Each record can contain up to 20 fields, none of which have to be fixed length. It is then just a question of specifying the titles of each field together with the number and name of the key fields. An index is kept for each key field; there is nothing to stop you indexing every field on the file but space availability and speed would be affected.

File maintenance options are shown in a strip across the screen. Records can be added, amended or deleted and the file stepped through, backwards or forwards. A 'browse' facility displays the record number, one key field and one other field of a record.

An individual record can be selected by-use of the FIND command. If no match is found, the record nearest a match is displayed. This facility is rather restrictive.

Other options include changing the key field, switching between upper and lower case, replicating the last record, calling up

**'It represents  
very good value  
for money'**

a user pre-programmed message, the ability to erase a file and a graceful exit from the program. Most of the options allow you to correct an entry before it is too late. You can transfer to any of the other program modules: re-sort, batch entry, sequential file creation, calculation, sequential file load, mailing labels, and reports.

The mailing label module lets you specify the label format, with up to three labels across a page. If the special field TYPE has been used in the database file, individual groups of records can be selected for printing. If not, all records (from a given starting record number) or just one record can be printed as a label.

One omission is a lining up facility to ensure the labels are properly aligned in the printer. The manual merely tells you to check that the top of the label is under the print head. To be fair, the module allows you to pause or restart while the labels are being printed.

The report is very comprehensive. Headings are automatically centred and column widths allocated. A powerful calculation facility, using very simple steps, allows quite complex arithmetical operations to be carried out on the report fields. In addition, columns can be justified, totalled or averaged. The facilities for setting selection criteria, for records contributing to a report, are impressive.

The format used is extremely simple and the program guides you through each phase of the criteria build-up. This process allows you to set up as complicated a set of criteria as you are likely to need. Criteria operations include equality, less than, greater than, not equal to, alphabetic precedence and antecedence, pattern matching, sliding strings, and record number matching — a generous selection.

The facility to change the contents of files by using the calculation option is equally comprehensive — squares, logs, sines and even random number generation are included.

## Reliability

The package seems reliable, although it lacks some desirable features — for instance, the stop/restore keys are not disabled, not all disk error messages are trapped and reported, and you cannot obtain a directory listing from within the program. The manual gives guidance on what to do in the event of a program crash.

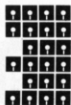
## Verdict

A good all-round information retrieval system whose menu-driven method is particularly easy to use. It has a respectable history and large user base. Although it is a bit weak in the on-screen record retrieval area, and likely to be on the slow side with a large number of records, it more than makes up for these deficiencies with powerful calculation and report generation facilities.

Given the low price of the package and the fact that it includes a built-in mailing list facility, it represents very good value for money.

## RATING

**Features**  
**Documentation**  
**Performance**  
**User interface**  
**Reliability**  
**Overall Value**



Name Simply File System Commodore 64 Price £60 (ex VAT) Publisher Simple Software, 15 Havelock Road, Brighton, Sussex BN1 6GL Tel (0273) 504879 Format Disk Language Basic and machine code Other versions Pet Outlets Mail order and dealers

Bob Chappell takes a crash course in orienteering in the comfort of his own front room.

# Into the Forest

I was sure it had nothing to do with a certain East London soccer team. Maps were involved somewhere along the line, yet more than that I could not say. The ignorance is now resolved and I am a changed man. I have been through The Forest.

As you're probably wondering what on earth I'm on about, let me explain in one word — orienteering. The instrument of my education was a program called, unassumingly, *The Forest*. If you know as little about orienteering as I did, then this program is probably the best practical introduction to the sport you could find.

The Forest is a simulation of the sport of orienteering. With it you can travel miles through the toughest terrain without ever leaving your fireside chair. Orienteering can most simply be described as car rallying on foot, being a cross-country race over difficult terrain, often forest, with the extra dimension of having to navigate your own course.

Armed with a special marked map and a compass, you have to plot and follow your route between a number of control points from the start to the finish. At each control point, a control card is marked as a verification that all the correct checkpoints have been visited. The art lies in successful map reading as much as being fast on your feet.

The program is intended as a training aid for practising the techniques of orienteering and can be used in teaching the understanding of maps and their relationship to the physical world. It also happens to be a very entertaining and demanding sport simulation in its own right and will undoubtedly appeal to those games-players who like their pleasures to be more cerebral. Tackled as a race, yomp or steady stroll, it offers many interesting challenges during the course and much satisfaction on successful completion.

A detailed map of the course is supplied with the package. The screen views the terrain directly ahead. All visible features (trees, towns, lakes, etc) are shown on the horizon which is six metres away. The view covers a 100 degree sector, 50 degrees to each side of the centre. Movement through the country-

side is controlled by the cursor keys. Pressing the left or right arrow key faces you 11.5 degrees to the left or right respectively. Pressing the down arrow causes a 180 degree about-face. The up arrow sets you moving forward, each step being about 1 metre. To stop running press any key except the up arrow.

The direction you are facing can also be changed by altering your bearings; these can be taken and changed at any time. With every change of direction, the display is updated accordingly. A list of the control point codes and descriptions can be displayed, as can your control card which may be punched at any control point. The time elapsed since you started off is displayed on request.

Assistance can be obtained by calling up a menu and getting your current co-ordinates, enabling you to verify your position against the map. Any part of the terrain can be displayed as terrain type, as contours, as a cross-section, as a three-dimensional view, or can be scanned for point features. These features are not there just to get you out of a jam but are intended to instruct by showing the relationship between the map and the ground in a variety of ways. These features are most impressive and geography teachers could find them invaluable as a teaching aid.

You can give up before you've finished — the display tells you which of the control points marked on your card are correct or missing. There is an option to try out the same course on a more complex forest, which is considerably more difficult.

One might think that having completed the course once or twice the challenge would disappear. Not so, for the author has provided a facility to set out your own course over the mapped area. There are a large number of control points laid out in the terrain, only a few of which are used in the preset course. By following a simple question and answer menu, you may use any of these control points to construct your own course. The only restriction is that the start and finish points must be those used in the preset course.

Being able to design then save these

courses to tape extends the interest value of the program indefinitely. With the additional element of competing against the clock and the various facets of the mapping aids, the program offers vast scope for entertainment and instruction.

## Presentation

The whole package has the hallmarks of quality and professionalism. The program comes on cassette packed in a large video-style case. The program is copied to both sides of the cassette and it loaded first time, every time. Inside the case is the printed map. It is very well produced and the scale and legends are clearly marked, as is the course.

The 32 page book that comes with it provides an introduction to orienteering and covers all the features of the program clearly and concisely. There are helpful diagrams complementing the text which assist in understanding trickier concepts such as map orientation for three-dimensional displays.

Although I knew precious little about orienteering before I picked up this book, I found that I could quickly become proficient in using the program effectively and, more to the point, understand precisely what was going on and why. The book is lacking in two places only — in setting up your own course and in restarting the program. Apart from that, the documentation, like the program, is first-rate.

## Getting started

Although the program is very easy to operate, you are well advised to study the manual before plunging into *The Forest*. Of particular importance is the recommendation to use a protractor for taking bearings on your map. The manual gives invaluable advice on navigational techniques — following boundaries, counting paces, lining up on landmarks, checking bearings, etc. I ignored this expertise to start with and, although I had no problems in using the program and made considerable progress across country, I ended up way off course.

On running the program, you are immediately presented with a colourful view of trees and part of a town. This is





# Now a business spreadsheet for home computers

Clear and easy to use

2000 cells  
(600 in 16K VIC 20)

Global column width adjustment

Variable individual column width

Insertion or deletion of rows and columns

Save, load and merge capabilities.

22 mathematical and statistical functions

With Practicalc you can use your 16K VIC 20 or Commodore 64 to carry out sales forecasts, modelling, cash flow projections and much more.

Compare the professional features and power of Practicalc Plus or Practicalc 64 with other spreadsheets.

Compare the price. You won't need a

spreadsheet to calculate the best buy.

Computer Software Associates' products are available from good computer stores or direct from the exclusive distributors - Marketing Micro Software Ltd., Goddard Road, Whitehouse Ind. Est., Ipswich IP1 5NP. Tel: 0473 462721 Telex 987515.

## ALL THIS FROM AS LITTLE AS £29.95

Dealer Enquiries Welcome.

Another great program from



**COMPUTER  
SOFTWARE  
ASSOCIATES**

For more information send this coupon to:  
**Marketing Micro Software Ltd.**

Name .....

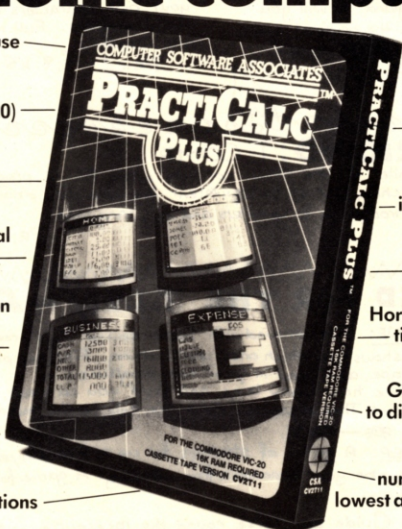
Address .....

.....

Personal enquiry (please tick)

Dealer enquiry (please tick)

Goddard Road, Whitehouse Ind. Est., Ipswich, Suffolk IP1 5NP.



Formatting by cell or whole sheet

Fast alpha-numeric search

Comprehensive instruction manual

Replication across columns and rows

Horizontal and vertical titles can be fixed

Graphics facility to display your results

Powerful alpha-numeric sort, highest to lowest and lowest to highest



**The starting point.**

the starting location. Typing shifted B shows your current bearing and invites you to enter a new one. Having done this, pressing the upward arrow sets you off at a steady pace in the direction selected by your bearing. The scene is quickly updated with every step taken.

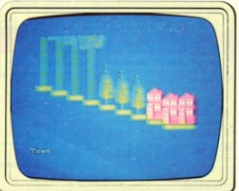
In real life, you would be almost certain to drift slightly from your set course, and since the program emulates this tendency it is worthwhile checking your bearings at regular intervals. Failure to do this had me missing the first control point and having to retrace my steps. Pressing any key other than the upward arrow causes you, and the displayed scene, to remain motionless — but time marches on. Pressing the left or right arrow key while moving has the scene sliding smoothly sideways in the desired direction.

The manual clearly explains the displayed symbols and offers advice on navigating for the control points. With this guidance, I found it very easy to get started and soon had the first three of the 12 control points stamped on my card. It was not long after that that I became hopelessly lost and had to resort to 'cheating' by calling up the assistance menu. This put me back on the right track, although I had wasted a lot of time looking for the control flag in the wrong place.

### In use

The graphic display, with its representations of thicket, houses, moor, grass, lakes and buildings, gives a clear impression of the terrain before you. Eye level is represented by a central square and, as the scene varies in height, it is easy to determine whether you are going uphill or down. Colours are used naturally and effectively.

The contour map option allows you to



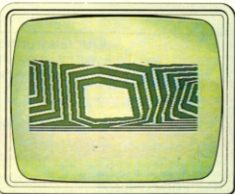
**The result of sideways movement.**

select a fine or coarse map of an area. If the latter, the contour interval can be chosen and the resulting map coloured and lettered (the higher the letter in the alphabet, the higher the contour). Maps can be scaled or drawn covering a given width and height. The orientation of the map can also be specified.

Mapping the terrain gives a coloured and lettered representation of the area, each letter representing a type of terrain (eg g for grass, m for moor, etc).

The point features option allows the scanning of a particular area. The display is exactly how you see it when in the normal mode of traversing the countryside. The scan runs up and down the area in raster scan fashion, covering a strip at a time, just like a lawn mower. The scan displays the co-ordinates at every step and halts at any section containing any point feature (knolls, depressions, boulders, etc) within it — useful for checking out the names and locations of the control flags.

A cross-sectional view of an area can be taken and a three-dimensional view of a particular area can be obtained. In the



**The ordinary contour map.**

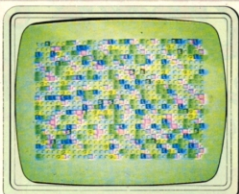
latter, being able to specify the orientation of the view is especially useful.

Setting up one's own course is simple, but you have to know the names and associated descriptions of the control flags you are going to use. Since these can only be found by exploring the terrain (they are not marked on the map or listed in the manual — that would spoil the fun), you need to build up this list yourself. You can't enter new flags or descriptions. Co-ordinates of the control points for your own course do not need to be specified, only the flag codes and associated descriptions. You can have up to 20 control points on your course.

### Reliability

The single key commands and menu of options make the program easy to use. When you have completed a course, your card is displayed along with the time, markings and number of times you cheated. At this point the program is halted by a STOP statement. If you wish to have another race, the manual tells you to type in GOTO 4.

The program loads in two sections — what the manual doesn't say is that you should rewind the tape to the beginning of section two (or even to the beginning of the reel) before executing the GOTO



**A full colour map of the terrain.**

otherwise the program will hang, not being able to find that section to load. One might just as easily power off and on, and reload from scratch.

Punching your control card with the wrong flag code or against the wrong control point is possible, but then this would be possible if you were really orienteering. It is necessary to use the D option to check the control codes and descriptions before punching your card.

Don't think you can cheat by learning the codes for each of the course points, punching them out on your card and going straight to the finish. The program won't let you punch a control on your card unless you are close by the flag in question.

### Verdict

An exceptionally absorbing program and one that is certain to sustain one's interest over a long period of use. If you are looking out for a program that is original, entertaining, instructive, intellectually satisfying and has an unlimited interest span, then I unreservedly recommend The Forest to you. I just hope that this is but the first in a long series of orienteering programs from Mr Relf and Phipps Associates.

**Name** The Forest System Spectrum (48K) Price £9.95 **Publisher** Phipps Associates, 172 Kingston Road, Ewell, Surrey KT19 0SD Tel 01-393 0283 **Format** Cassette **Language** Basic and machine code **Other versions** None **Outlets** Mail order and dealers

#### RATING

**Features**  
**Documentation**  
**Performance**  
**Usability**  
**Reliability**  
**Overall value**



**Contour map showing relative heights.**

# First Check our prices. Then Count the Coupons!

ACCUMULATOR  
DISCOUNT  
COUPONS



- ## 4 SPECIAL OFFER PACKAGES
- Commodore 64 + cassette deck + dust covers**  
If purchased separately these items would cost £278.85. **OUR PRICE £229.00**
  - Commodore 64 + cassette deck + Introduction to Basics Part 1 (Manual and 2 cassettes to take you through the first steps in computing) + DFM Data Base (Information Storage Programme) + 2 dust covers.**  
If purchased separately these items would cost £313.00. **OUR PRICE £257.00**
  - Commodore 64 + VIC 1541 disk drive + Box of 10 diskettes + 2 dust covers.**  
If purchased separately these items would cost £490.00. **OUR PRICE £429.00**

## A Chromasonic special.

On every £5 worth of Software\* you buy from us, over the counter or by mail, we'll give you a 50p ADC. So, with a £20 purchase, you get four ADC's and so on.

## BBC "Special Offers"

**Model 'B' with FREE dust cover £399.00**

Comana Teac Drives with power supply & including Disc Formatter, manual & cables.	
150K Drive 40 Track.....	£225.00 d
200K Drive 80 Track.....	£257.00 d
800K Dual Drive 80 Track.....	£632.50 d

Torch 280 Disk Pack. 800K plus 280 Processor running Torch's own CP/M.....	£839.50 d
Disk Interface (including fitting charge).....	£ 95.00 d
"View" ROM Word Processor.....	£ 59.80 d
Printer Driver.....	£ 9.95 a
Graphs & Charts on cassette.....	£ 9.95 a
MONITORS	
MICROVITEC 1431 "14" Colour Monitor.....	£264.50 d
SANYO HI-RES Green Screen Monitor.....	£114.00 d

**Our Guarantee (2 years on 64's)  
1 full year for labour and parts on all Hardware.**

- Businessman's Starter System.**  
Comprises Commodore 64 + VIC 1541 disk drive + Box of 10 diskettes + VIC 1525 Printer + Box of paper + 3 dust covers.  
If purchased separately these would cost £735.00. **OUR PRICE £649.00**
- |   |           |
|---|-----------|
| New 64 Printer VIC 1526 with cable.....                             | £310.99 d |
| New LOW PRICE - Disk Drive VIC 1541 with cable.....                 | £210.00 d |
| Printer VIC 1525 with cable.....                                    | £212.75 d |
| Book: "Programmer's Reference".....                                 | £ 9.95 b  |
| Easy Script (Word processing package).....                          | £ 75.00 b |
| DFM Data Base - Disk or Cassette (state which required).....        | £ 19.50 b |
| DFM Mail labels (Print labels to your specification).....           | £ 9.50 b  |
| Catalogue (Dedicated filing system).....                            | £ 16.50 d |
| Rating (User orientated filing system).....                         | £ 17.50 d |
| Journal (A financial diary with permanent display).....             | £ 19.50 d |
| Bortek & Microchips (Designed to teach 10/13 year olds basics)..... | £ 12.95 b |
| Sales Ledger.....   | £ 75.00 b |
| Purchase Ledger.....  | £ 75.00 b |
| Easy STOCK.....   | £ 75.00 b |
| Attack of the Mutant Camels (Try and beat hostile Aliens).....      | £ 8.50 a  |
| Motor Mania (A thrilling cross country car race).....               | £ 8.95 a  |
| Dust cover for 64/VIC 1525.....                                     | £ 2.95 b  |
| Joystick.....   | £ 6.90 b  |
| Introduction to Basics Part 1 (see above).....                      | £ 14.95 b |
- \*Many other titles in stock. Free list with first delivery. Or send S.A.E. for full list.

## SPECIAL OFFER PACKAGE

### Commodore VIC 20

+ C2N cassette recorder + Introduction to Basics Part 1 (Manual and 2 cassettes to take you through the first steps in computing) + 1 cassette with four games + Only from Chromasonic. FREE DUST COVER normally sold for £2.95. If purchased separately these items would cost £249.99. **OUR PRICE £134.99**

VIC 1525 Printer with cable.....	£212.75 d
VIC 1541 Disk Drive with cable.....	£210.00 d
16K RAM pack.....	£ 28.95 b
24K RAM pack.....	£ 47.95 b
Joystick.....	£ 6.90 a
4-slit motherboard.....	£ 33.35 c
Dust cover for VIC 20/VIC 1525.....	£ 2.95 b
New Printer/Plotter (4-colour).....	£152.99 d
Super Expander (High resolution cartridge with 3K RAM).....	£ 31.00 b
Programmers Aid cartridge (Adds more than 20 commands).....	£ 28.00 b
C2N cassette unit with cable.....	£ 39.10 c
Sargon Chess (6 levels of play).....	£ 23.00 b
Choplifter.....	£ 24.95 b
VIC Programmer's Reference Guide.....	£ 12.50 b
Introduction to Basics Part 1.....	£ 13.50 b

Send SAE for FREE hardware/software booklet.

## DRAGON 32 Free

Basic Training Manual supplied

\*9 colours \* 32K RAM memory  
\* as standard, expandable to 64K \*  
\* Extended Microsoft Colour basic as standard \*  
\* Typewriter Keyboard \* 64096 CPU \* Advanced sound feature \* 32 columns x 6 lines

**£157.50**

Printer & Cable (GPI00A and necessary cable).....	£232.30 d
Joystick.....	£ 14.95 b
Pair of Joysticks.....	£ 2.95 a
Dust cover for Dragon 32/GPI00A.....	£ 275.00 d
Single Disk Drive with controller.....	£225.00 d
Single Disc Drive without controller.....	£200.00 d
Additional Single Drive.....	£200.00 d
The King (Save the damsel in distress from the gorilla).....	£ 7.95 a
Katerpillar Attack (Stop the caterpillar reaching the bottom).....	£ 7.95 a
Talking Android Attack (This game speaks for itself).....	£ 7.95 a
Translator (Word processor that gives 51 cols. x 24 lines).....	£ 49.95 b
DFM (A powerful easy to use database).....	£ 19.50 d
Racer Ball (Defend your moon base from enemy lasers).....	£ 7.95 a
Scarfan (Run around a maze eating blocks as nasties chase you).....	£ 7.95 a

\*Many other titles in stock. Free list with first delivery. Or send S.A.E. for full list.

Official DRAGON sales and service agents for the whole Greater London Area.

# CHROMASONIC PERSONAL COMPUTERS

88 Junction Road, Archway, London N19 5RD  
**TEL: 01-263 9493 or 5**

## CHROMASONIC PERSONAL COMPUTERS

Send to: Chromasonic Personal Computers, 48 Junction Road, Archway, London N19 5RD.  
Please send me the following items. All prices include VAT.

..... £ .....

..... £ .....

..... £ .....

..... £ .....

..... £ .....

**p&p code** d = £8.00 c = £3.50 b = £2 and a = 60p (if more than one item ordered, add only one total amount - the highest). **p&p** Total £ .....

I enclose my Cheque/P.O. for £ .....

Please debit my Access/Barclaycard no .....

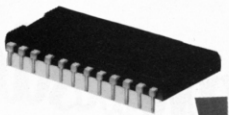
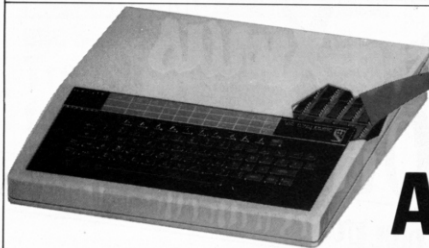
Name: .....

Address: .....

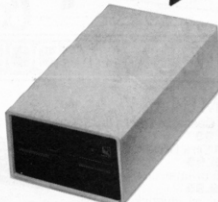
• FREE ADVICE on all aspects of Personal Computers. You only have to ask.  
• DELIVERY: On P.O.'s, Access or Barclaycard, dispatch usually within 24 hrs. Or we'll advise by return. On cheques show stock's days.  
If not completely satisfied, return the goods to us undamaged within 14 days for a full refund including p&p. VAT included in all prices.



Following last week's look at Watford and Acorn DFS chips, Bill Davis checks Amcom's offering.



# A third encounter



The third major selling DFS for the BBC model B comes from Amcom Electronics in Bradford. Like Watford Electronics (*PCN, issue 33*) Amcom cashed in on the fact that the shortcomings, and lack of availability of the Acorn DFS made people who were desperate to expand their BBC machine look elsewhere for the necessary hardware. Unlike Watford, Amcom decided to take a slightly different route.

## First impressions

The DFS comes with a good explanatory manual, a utility disk, a ROM and an eight way dip switch. I was a little confused at first. The inclusion of the dip switch was a little confusing, but a phone call to Bradford and a little more judicious reading of the manual sorted things out — more of that later.

Fitting the ROM proved no problem, assuming you already have a disk interface in place. If you haven't, the entire kit is available (consisting of 11 ICs). You're well advised to get that done by your dealer, unless you really know what you're doing.

The ROM is placed in the first empty socket to the left of the Basic language ROM. The copyright notice appears on screen on switch-on or after BREAK has been pressed.

On switch-on the Amcom defaults to page set at &1500. This means that it gives the user 10 per cent more useable RAM. That's particularly useful if you are using the computer for word processing since the extra is over 1K of space.

## Features

The first thing you find out is that the Amcom system gives you a choice on what system you wish to use. Normally, the machine will default to SYS0 which will make any disks used compatible with the Acorn DFS. This is particularly useful if you exchange disks with friends, since if you have written your disks in the expanded, SYS1 mode they will not be

read by an Acorn DFS.

The expanded mode of the Amcom DFS allows you to write up to 63 files on a disk instead of the Acorn's 31, but it is the layout of the expanded mode sectors and tracks which make for the incompatibility. If you have already written your material on an expanded disk, simply copying the files onto an unexpanded disk will make it perfectly compatible.

There is a built-in formatter on the DFS which allows you to select either 40 or 80 tracks, expanded or normal. The formatter also includes a routine for user-definable parameters to be included for the development of software protection.

Nine new disk commands are contained in the ROM. SYS and FORMAT have already been dealt with. CLEAR is a very powerful extra command which allows you to very quickly clear the whole disk catalogue and sets the system on the disk to the current selected system. Rightly, the manual warns you that this command is irreversible. Think before using!

The other six are extra OPT commands. OPT2 is used to change the number of sectors on a disk. Although the default is set for 5.25in disks some people may want to use 8in disks. An 8in disk normally has 18 sectors per track, so using this command will allow you to use a variety of drives with the DFS. As with OPT2, the OPT3 command allows you to make provision for other drives: this time by changing the number of tracks on the disk. 8in drives have 72 tracks while some drives, such as Tandy, have 35 tracks and, of course, the more normal 40 or 80 tracks.

The start of the DFS buffer is set with OPT5, which used in conjunction with OPT7, sets how long the workspace is to be in 256byte blocks. This allows you to simultaneously COMPACT a disk, and control the amount of workspace. OPT8 allows some 80 track disk drives to read 40 track software. However, some protected 40 track software may be unreadable on 80 track drive units.

I mentioned the dip switch that comes

with the DFS. This is fitted in the two rows of parallel holes that you find to the right of the shift bar on the keyboard. The idea is for certain functions of this, and other DFS's, to be changed. Setting the switches either open or closed, for example, in certain configurations allows the user to make an individual make of disk drive to be totally compatible with the computer.

Other uses for the switches are for 80 or 40 track to be selected on default, normal or extended mode of the DFS to be found on default, and for boot or auto-boot on break.

The utilities disk, which comes with the ROM, has some useful functions on it. Some Acorn disks, for example, have coloured titles on them, which cannot be read by the Amcom DFS. Using this program allows the user to make the disk compatible. A utility program allows you to read single sectors from disk, read them, edit them and resave. There are also screen dump routines for text/graphics for use with NEC and Epson printers, and help pages about the DFS software. A program for converting an Acorn type disk to an extended mode disk and a utility program for down-loading simple cassette-based programs to disk are also included.

## Verdict

All in all I have found the Amcom DFS to be a welcome addition to the family of DFS's around at present. I found the manual well written and easy to use and was most impressed that it came included with the price of the ROM. Watford and Acorn please note!

**Item Amcom DFS Price £34 inc VAT with manual and utilities disk ROM and dip switch Contact Pace Software 0274 729306.**

# AVID COMPUTER CENTRES

## Fantastic Pre-Xmas Computer Offers

Compare our prices with other dealers!

### COMMODORE 64

CBM 64 £199.95

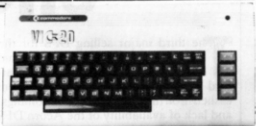
C2N Cassette Deck  
£44.95  
1541 Disk Drive  
£219.95  
1525 printer  
£219.95  
Standard Joystick  
£7.95  
CBM 64 Software —  
cassettes from £4.95

plug-in cartridges from £9.95



### VIC-20

VIC-20 Computer  
£99.95  
VIC-20 Starter Pack  
inc. Cassette Deck  
Intro to Basic  
& 4 games  
£139.95  
C2N Cassette Deck  
£44.95  
16K RAM pack £29.95  
16K/3K switchable RAM pack £34.95  
VIC-20 Software Cassettes from £4.95  
Plug-in Cartridges from £9.95



### SINCLAIR SPECTRUM

Sinclair Spectrum 16K  
Phone for latest low Price  
Sinclair Spectrum 48K  
Phone for latest low Price  
Spectrum Memory Upgrade  
Kit 16K to 48K £22.95  
Sinclair ZX Printer £39.95  
Kempston Joystick Interface  
£14.95



### BBC MODEL B

BBC Model B  
£399.95

BBC Model B with  
Disk I/F £469.95  
Disk Interface Kit  
(Fitted) £95.95  
Cumana 100K Disk Drive £239.95  
Wordwise W/P ROM (Fitted) £45.95  
Quick-Shot BBC Joystick £23.95



### ORIC-1

ORIC 48K  
£129.95

Quick-shot Joystick  
for Oric £23.95  
Oric Colour Printer/  
Plotter £129.95  
(inc. £40 discount  
voucher)



### JOYSTICK

Pro-arcade Joystick  
Heavy duty construction  
micro-switch contacts std.  
for Commodore Atari, etc  
£17.95

BBC version  
£19.95

### MAIL ORDER

All the equipment in this  
advertisement is available by  
Mail Order: FREE delivery by  
Securion: Phone your  
nearest branch for details.

### SOFTWARE

Most branches carry a wide  
range of software for these  
computers. Ask for details.

Also available at certain branches:

**ATARI · TEXAS · DRAGON**



**Bolton (Lancs)**  
Cleartone Video  
166 Blackburn Road  
Tel: 0204 384024

**Bradford**  
Ericks of Bradford  
Fotosonic House  
Rawson Square  
Tel: 0274 309266

**Bristol**  
Radford Hi-Fi  
Sommerville Road  
Tel: 0272 428248

**Croydon (Surrey)**  
Vision Store  
96-98 North End  
Tel: 01-681 7539

**Chelmsford  
(Essex)**  
Rush Hi-Fi Centre  
5-6 Cornhill  
Tel: 0245 57593

**Dunstable (Beds)**  
Target Electrical  
45 Katherine Drive  
Tel: 0582 67750

**Kingston-on-Thames  
(Surrey)**  
Vision Store  
3 Eden Walk Precinct  
Tel: 01-546 8974

**Liverpool**  
Beaver Radio  
20-22 Whitechapel  
Tel: 051-709 9888

**Nottingham**  
ENL Audio Visual  
116-118 Alfreton Rd  
Tel: 0602 784015

**Palmer Green —  
Londner N13**  
SPI Sound Vision  
359 Green Lanes  
Tel: 01-882 5888

**Preston (Lancs)**  
Goodrights  
1 Friargate  
Tel: 0772 57528

**Warwick**  
JCV Hi-Fi & Video  
Wharf Street  
Tel: 0926 493796

Now you can teach your Spectrum to speak, as Max Phillips has been discovering.

# Talking Spectrum

**A**fter the Microdrives, Interface 2 and Prism modem you'd have thought it would be difficult to come up with exciting new add-ons for the Spectrum. But Currah thinks not.

Speech synthesis has always been an offbeat sideline, but it is entertaining, and the company's new Microspeech add-on for the Spectrum should prove particularly so. It comes as a single unit that amplifies Spectrum sound, can say almost anything you like, and can voice all the keys on the keyboard. It costs a very reasonable £30.

But what is more important is the fact that Currah has been out of its way to persuade software houses to support the unit. It will take time to see how well it has succeeded, but the list of houses working on Microspeech software already includes Bug-byte, Artic and Romik.

## Presentation

The Microspeech comes in a display box with an 11 page manual and a demonstration cassette. The cassette means you can plug it in and see (sorry, hear) it do something effective. It provides a sort of tutorial on the unit, and a talking version of a crude adventure game called Mystic Tower.

## Documentation

The Microspeech is properly documented in an 18 page booklet. It's straightforward and comprehensive. All the necessary information, such as a complete list of the available allophones and plenty of examples, is there.

Currah sensibly gives memory usage details and explains how to drive the unit from machine code — both these are essential if programmers are going to write compatible software. There are even extra tips, on increasing the size of the speech buffer, for example. Anyone who thought that a speech synthesiser is a difficult beast to get to grips with will be surprised.

## Design

The Microspeech is a compact black box which sits firmly on the expansion port. The works include a ROM with firmware to drive the unit and to provide the keyboard voice facility. A custom ULA does the actual synthesis work.

The Microspeech takes the Spectrum's TV output and modulates the speech onto it. A second input is taken from the MIC socket so that all normal Spectrum sound is amplified and reproduced through the TV speaker.

## Setting up

Plugging Microspeech into the expansion port is straightforward. It leads then go



into the Spectrum's TV and MIC outputs, and you then connect your TV to the Microspeech.

There are no problems here, as LOADING and SAVEING on a Spectrum involves pulling plugs in and out anyway. As an alternative you can take the line lead out of MIC and pipe speech through your Hi-Fi or tape recorder.

Switch on the Spectrum and you get the usual copyright message plus a sign-on from the Microspeech across the top of the screen. The unit powers up in its keyboard voice mode. Every key you press will be spoken — letters, punctuation, keywords, cursor controls and all.

The chances are you won't hear this at first, as the Microspeech usually needs to be tuned with a small screwdriver so that the sound is picked up by the TV.

However, the setting does vary greatly from TV to TV, and on one I tried it was extremely difficult to get good sound and

a good picture at the same time. The unit is also susceptible to radio interference — other household electrical equipment and even radio stations spoiled the quality, though neither proved incurable or particularly annoying.

## In use

The first thing you notice is that the speech isn't very wonderful. It's a very mechanical, computerised voice — there's none of the smooth quality of more expensive digitising units.

The Microspeech is based on an allophone system, where words are built by stringing together predefined bits of speech. This hasn't the quality of digitised speech but it doesn't need tons and tons of memory, and it has an 'infinite' vocabulary.

Anyway, the mechanical voice only adds to the fun. It sounds exactly how a machine that talks should sound, and

# SEASIDE OFFERS FROM BLACKPOOL

COMMODORE 64 £225 + LYNX £225

ORIC 1 48K £135 + SPECTRUM 48K £125

DRAGON + 3 GAMES £170 + BBC-B £399

We stock Spectrum upgrades, Vic Ram packs, Dragon Demons, Apple Snapshot, BBC joysticks, ZX-keyboards, Texas leads, Atari disc cases, Oric books.  
We got it all

\* GAMES \*\* EDUCATION \*\* BUSINESS \*\* HARDWARE \*

## THIS MONTH'S SPECIALS:

- APPLE ● WIZARDRY. THE ENDLESS ADVENTURE..... £28.95
- ATARI ● DARK CRYSTAL. GRAPHIC ADVENTURE ..... £27.95
- BBC ● BANDITS AT 3 O'CLOCK. AERIAL COMBAT ..... £7.95
- COM 64 ● SIREN CITY. COPS CAR CHASE ..... £7.00
- DRAGON ● CAVE FIGHTER. SUPER SCRAMBLE ..... £8.75
- IBM ● FROGGER ..... £29.95
- LYNX ● COLOSSAL ADVENTURE. MAINFRAME DOWNLOAD £9.95
- ORIC ● ZORGON'S REVENGE. XENON FOLLOW UP ..... £8.50
- SPECTRUM ● CHUCKIE EGG??? ..... £6.90
- TEXAS ● LASER TANK. FUTURE BATTLE GAME ..... £7.95
- VIC-20 ● PINBALL WIZARD..... £7.95
- ZX-81 ● PIMANIA. REACH THE END TO WIN £5,000..... £4.99
- \* ORIC MACHINE CODE TOOL KIT ..... £8.00 \*

"YOU ASK WE SUPPLY"

234 Church Street  
Blackpool,  
Lancashire FY1 3PX  
Telephone: (0253) 22340



HOME COMPUTERS

# THE CONSUMER BUYER'S GUIDE

Essential information  
for the buyer

## FIRST ISSUE

# A=Z

# OF PERSONAL COMPUTERS

A complete guide  
for the personal computer buyer  
containing comprehensive reviews  
of all major personal computer systems

**OUT NOW! £1.95**

## PRINTERS

**MRL**

**FREE!**  
DELIVERY

STAR Dot Matrix

DP510 (100CPB-80COL) - 235

DP515 ( " " " " " " " " ) - 325

Frison & Trotter **SUPER VALU.**



EPSON Dot Matrix

RX80 Frison 248

FX80 P & T 370

JUKI Daisywheel 375

PAPER

RIBBONS

& REFILLS

ETC.

## INTERFACES TO FIT MOST MICROS

e.g. SPECTRUM PRINTER DRIVER (Parallel) WITH FREE CABLE & WORDMANAGER £30

ATARI PRINTER DRIVER (Parallel) WITH FREE CABLE £40

AND MANY MORE ON OFFER!

## DISK DRIVES

10 FLOPPY DISKS

5" £15

5 1/4" SS/DD 400K-150

LOCKABLE CASE

(Both 80 track)

FOR 100 DISKS

5 1/4" DS/DD 800K-210

JUST £19

8" SS/DD -230

**LOOK**

APPLE CAGED £200 CPM CARD £49

Compatible 5 1/4" DISK CONTROLLER £40

TANDY MODEL 3/4 DRIVE KIT £375

(Controller, fittings, power supply, DOS, 1 Drive)

PLEASE ADD 15% VAT

MICRO RESEARCH LTD.

Industrial Unit 5, Houghton Road, LIVINGSTON, EH54 8LJ, West Lothian, Scotland.

0506

31805

LANDAU ELECTRONICS

SPECIALISTS IN

# software

Programmes for all leading home computer & video games including:

APPLE, ATARI, BBC, COLECOVISION, COMMODORE  
DRAGON, ELECTRON, INTELLIVISION, ORIC  
SINCLAIR, SORD, TEXAS, VECTREX  
& MANY OTHERS!

LANDAU ELECTRONICS

IN:

LIONHOUSE, 227 TOTTENHAM CT. RD.

LONDON, W1

TEL: 01-637 3024

AND AT: 215 HIGH ST., SUTTON, SURREY

TEL: 01-643 5494

taking the mickey out of its voice is a whole new hobby. Incidentally, program it for too long and you really do end up talking like it. . . .

The only thing that counts with the quality is that occasionally it is difficult to understand the Microspeech. Mostly, it's the fault of the programmer — either being lazy with his allophones or forcing it to talk too quickly, and 99 per cent of the time there's no problem — particularly since you usually know what it is trying to say.

Programming it is great fun. The first stage is the keyboard voice — a sort of nursery school phase. Microspeech speaks every key and you spend hours looking for keywords or symbols that will beat it. It has a go at most of them although some, such as ?, are a little rough. To spoil the fun, the only thing it chickens out of is ~ (pronounced tilda).

The keyboard voice is a bit of a gimmick. It does actually help with typing — talk about audio feedback — but rapidly becomes annoying. It also gets mixed up with auto-repeats and LOAD and SAVE operations. To turn it off, just enter LET keys = 0.

The Microspeech reserves two Basic variables for its own use. The first is the keys switch (1 for on, 0 for off), and the second is SS, used to speak allophone sequences. To get the Microspeech to

Speech is made up from a set number of allophones. These start off simply with the letters a-z (ignoring x and q) and progress through to complex sounds like (eau), (yy), (wh) and so on. Besides these, apostrophe, comma, full stop and space control the timing of the words.

The Microspeech is capable of intonation. A capital A instead of an a is intoned up. By careful selection (and often refinement) of the allophones and intonation, it is possible to produce some very realistic speech.

## The mechanical voice only adds to the fun

There's a reasonable diagnostic facility. After execution, PRINT SS prints the string, with a \* as a first character if the Microspeech finds it syntactically correct, and a question mark if there are problems with it. Illegal characters in the string are marked with a question mark.

The only problem is noticing if a string is wrong. If it finds illegal characters at run time, then Microspeech just clams up. There's no attempt to speak the string and no error message. It's easy enough to debug if you have short programs, but on a serious venture it could take you days to realise that something that should be spoken isn't being spoken.

Besides running your own programs, the Microspeech should gradually become the catalyst for a large amount of software. The games already available aren't particularly wonderful, being hasty adaptations of existing games, and there

is a danger that much talking software will be of this nature. But the potential to develop programs that actually exploit speech, rather than do it as a throwaway addition, is there.

The other nice thing about having a Microspeech is that it amplifies sound from ordinary games. Currah is the first to point out that it can't guarantee compatibility with existing software, but at worse all you have to do is unplug the unit. So don't buy the unit just as an amplifier — it might not always work. When it does, of course, it makes a tremendous difference to games. . . .

## Verdict

The Microspeech is a capable little synthesiser in a very presentable form. It's nicely made and well packaged and documented. Whether it's of interest to you or not is very much up to you.

If it does receive a lot of software support (and it's not the convert-me-quick variety) then it will be a very attractive buy. Even if it doesn't, its programmability will let you toy with all the current applications for speech. These range from your own games to serious applications, such as aids for disabled people, and tasks where the user can't see a screen. Verbal diagnostics could also prove a real boon for programmers.

Currah has come up with yet another dilemma for the Spectrum owner who fancies a new add-on. At £30, the Microspeech has got to be talking. . . .

**Item Currah Microspeech Price £30**  
Machine ZX Spectrum, 16K or 48K Contact  
Currah Computer Components, Graythorpe  
Industrial Estate, Hartlepool, TS25 2DF

This is the best real-size. The two leads connect to the Spectrum's TV and Mic Plugs and the TV lead runs to the Micro speech. The unit itself goes into the edge connector.

talk, you just assign the speech to SS.

For example, LET SS = "he(l) (oo)" speaks a pretty good "hello". Speech is automatically buffered — once SS has been assigned, the unit gets on with speaking while the Spectrum gets on with the rest of the program. One of the few untidy points with the system is that the LET SS must be followed with a PAUSE 1 statement to ensure it is detected.



# NO LIMIT

Now, a home computer with virtually no limit to its possibilities. The astonishing new Sharp MZ700. A machine with a dazzling array of talents.

First, it's a 'clean' machine. So you are not limited to any one computer language. You have the flexibility to run and write programs in BASIC, FORTRAN, MACHINE CODE, PASCAL, ASSEMBLER and many others. And the MZ700's 512 predefined characters mean you can build up detailed pictures on the screen, without spending time specifying and designing special characters for games and special effects.

Second, it has a memory of 64K. So as your technique improves and develops, you are able to move forward to more and more advanced programming.

All of which makes this the perfect home computer for parents, as well as children.

The MZ700 gives you access to a wide



choice of new software, from only £3.95 per cassette. An additional plotter/printer, costing £129.95, can produce high resolution graphics in 4 colours. A data cassette recorder is an extra at £39.95. Both add-ons fit snugly into this easy to carry compact system with no trailing wires. And you get ten exciting games, free on purchase, including Super Puckman, Circus Star, Snake v. Snake, and Man-Hunt.

The brilliant new MZ700. The no-limit computer. £249.95. From Sharp. Where great ideas come to life.



CPU:	Z80A	1
ROM:	Monitor 4K byte ROM	1
	Character generator 4K byte ROM	1
RAM:	64K byte D-RAM	8
	4K byte V-RAM	2
1/O bus:	Expansion 1/O bus	1
	Additional printer 1/O bus	1
	Cassette READ/WRITE terminals	2
	Joystick terminals	2
RGB MONITOR/VIDEO MONITOR/RF OUTPUTS		

To: Sharp Electronics (UK) Ltd,  
 Home Computer Division,  
 Sharp House, Thorp Road, Newton Heath,  
 Manchester M10 9BE. Tel: 061-205 2333

*Please send me details of the Sharp MZ700.*

Name \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_



Look for this logo on software denoting Sharp Compatible Software.

PCN2

The world of  
**SHARP**  
 where great ideas come to life.

# Do you suffer from PCNitus?

Thousands do! So, specially for all you sufferers who want to keep PCN immaculate, easily accessible and out of reach of grubby hands, we've designed this attractive PCN binder.

It's red, yellow and silver and will hold four month's copies.

No more grappling in the back of cupboards; no more bent and creased pages!

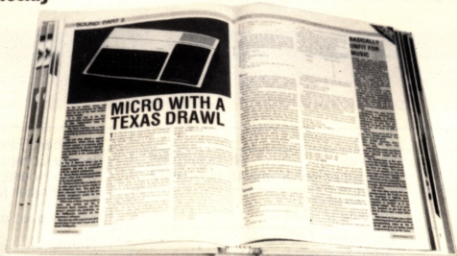
Your copies lie completely flat,

even when the binder is full. You'll be able to read them easily and refer to them quickly. And we'll post the binder to you in a batter-proof package at no extra cost.

It's an attractive price, too. Only £3.50, including postage, VAT and handling. Use the coupon here or, to avoid defacing your copy of PCN, write out your order clearly and send it with payment to the address given.



**ONLY  
£3.50**



BINDER ORDER CARD. Please rush me \_\_\_\_\_ PCN binder(s) at £3.50 each. I enclosed my cheque made payable to Personal Computer News. Please charge my Access/Visa/Diners/American Express card (cheque 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



**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 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:

Ski Run	£5.50	Annihilator II	£5.50
Logger Mania	£5.50	Space Raider	£5.50
Annihilator II (VIC 20)	£4.75	Trek (VIC 20)	£4.75

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

Name .....

Address .....

**commodore**   
 and VIC 20

# For the Commodore 64

SOFTWARE  
you can afford!

*Mondatta*  
Ltd.

Software from  
the States.



## SUPER COPTOR

Fly Super Copter in a Mission to Save your Country from destruction. Beware of "Air Missiles", "Radar Balloons", "Laser Screens". Control your "Super Copter" with split second timing — are you up to it — 9 nerve popping, action packed levels of play.

ONLY £5.65.



## TAX MAN

You are on the run, gathering as much money as possible while being pursued by Taxmen with tax bills in their hands. Ready to pounce on you and make you bankrupt. Can you outsmart them or will they ambush you by hiding in the background.

6 exciting "Arcade Action" levels of play. A completely new version of this "nerve popping" game.

ONLY £5.65.

## DO YOU WANT A SHARE OF THE ACTION - £55,000

Mondatta will pay up to £55,000 for good quality games software. Send details to the Software Development Manager at the nearest address below.

### POST COUPON NOW

Please rush me \_\_\_\_\_ Tax Man at £5.65 each  
\_\_\_\_\_ Super Copter at £5.65 each  
\_\_\_\_\_ 50p post & packing.

Post to: Mondatta Ltd., 38 Cuddington Avenue,  
Worcester Park, Surrey KT4 7DB, England.  
Tel: 01-3370806.  
Mondatta Ltd., Darwen House,  
200 Rathfarnham Road, Dublin 14, Ireland.  
Tel: 01-963250.  
Mondatta Ltd., 888 Seventh Avenue,  
New York, N.Y. 10106, U.S.A.

Enclose Cheque/P.O. for £ \_\_\_\_\_  
(Make payable to Mondatta.)

Name \_\_\_\_\_  
Address \_\_\_\_\_

DEALER  
INQUIRIES  
WELCOME.

FREE  
ENTRY TO A  
DRAW  
FOR C.B.M. 64  
DISK DRIVE  
& PRINTER.

## ATARI ACTION

## ATARI 400/800

## Death in the skies

Name Fort Apocalypse System  
Atari 400/800 (32K) Price £25.15  
Publisher Synapse Software, USA  
Format Disk or cassette Other  
versions Commodore 64 Outlet  
Norwich Camera Centre, 20  
White Lion Street, Norwich NR2  
1QB, Tel (0620) 612537

Piloting a Rocket Copter, your mission is to enter and destroy Fort Apocalypse.

Descending into the first level of defence, you must rescue eight prisoners scattered around the complex. You'll have to manoeuvre through caves, blast impact shields, navigate hyper chambers and flee from rotating field envelopes. As if that's not enough, the tanks, choppers and mines are hot on your trail, and your fuel running low. Completing the Draconis level allows you access to the Crystal-line Caves and eventually to the main target itself, Fort Apocalypse.

## In play

Gravity, pilot skill and number of rocket copters (lives) each have three selectable settings so you have a wide range of challenge. At the top of the screen is the Navatron, a miniature view of the immediate terrain. The game starts with your yellow copter hovering over a fuel station which you must land on to refuel. The

copter faces forward, left, or right. Pressing the fire button when facing front releases bombs, missiles if facing left or right. Graphically superb and to the realistic sound of rotating blades, the copter responds smoothly to the joystick's movements.





Flying over mountainous country in search of the cave entrance soon has you encountering floating mines. These can be shot or flown around. More difficult are the blue robo-choppers which are armed with missiles and relentlessly hunt you down. Ground based tanks scurry back and forth, letting fly with drone missiles which pursue you for a short distance before falling away.

Bombing a hole through the portal below, you enter the caverns. Now the game is filled with sound and fury. When you find a landing pad, touch down — the game restarts from this point if you lose a life. The prisoners are in different locations, running about on the ground. To make a rescue you have to swoop low and touch one. All eight must be saved before you can gain entrance to the next level.

## Verdict

A magnificent game in every respect. For graphics, sound, playability, concept and execution, this program is the top.

Bob Chappell

RATING  
Lasting appeal   
Playability   
Use of machine   
Value for money 



## ATARI 400/800

## This little piggy...

Name Pooyan System Atari 400/800  
(32K) Price £27.95 Publisher  
Datasoft USA distributed in UK  
by Centresoft, Centresoft House,  
Unit 16, Tipton Trading Estate,  
Bloomfield Road, Tipton, West  
Midlands DY4 9AH Format  
Cassette-Other versions  
Commodore 64, Vic-20 Outlet  
Centresoft stockists

Are you sitting comfortably? Then I'll begin. Once upon a time, there were three little piggies and a big, bad wolf. That was once upon a time. In this updated version, Wolfie has sensibly recruited a gang of lupine roughs to help with the dirty deed.

## Objectives

The piglets and wolves confront each other across a chasm too wide to jump. The wolves put Plan X into operation and float down the cliff-face clinging to helium-filled balloons. A quick dash across the valley, a swift shin up the pigs' cliff-ladder then presto — it's bacon sandwich time. The intended lunch has an even daffier idea where one pig sits in a basket which is tied to a rope while the others raise and lower it. Equipped with a bow and arrow, Piggy can now play Robin Hood, thus thwarting the wolves who go crashing to the ground when their balloons are hit.

This calls for plan Y. The wolves start hurling acorns (which look like rocks) as they drift downward. If an acorn hits Piggy square on the snout, Piggy tumbles earthwards

headfirst. If the piglets manage to survive the first attack by 32 wolves, they face Plan Z. The wolves are now grounded, so they use their balloons to float upwards. Some of these balloons have double skins — no foos, these wolves. Any wolf reaching the top helps to push a large boulder towards the edge of the cliff. When seven wolves arrive, the boulder falls. Large rock plus pig in basket = spam.





## In play

The game is simple to play but requires co-ordination and coolness under pressure. Loosing off wildly with your arrows is not recommended but may achieve some result eg striking a wolf's shield causes the arrow to deflect downwards and, if you're lucky or deliberate enough, pop the balloons of any wolves below. It's best to shoot calmly at each of the helium spheres, taking care all the while to dodge the barrage of acorns. The wolves are just like those in comics — long snouted and spindly legged, with comically mischievous expressions. Completing screen two takes you back to the start but naturally everything gets faster and harder.

## Verdict

Excellent graphics, especially the wolves, and a refreshingly different game. First rate entertainment for you, and a happy ending — for the wolves. The Pooyan should have stuck to their house of bricks.

Bob Chappell

RATING  
Lasting appeal   
Playability   
Use of machine   
Value for money 

# DRAGON DIVERSIONS

## DRAGON 32

### Terminal Journey

**Name** Death Cruise **System** Dragon 32 **Price** £6.95 **Publisher** Virgin Games, 61-63 Portobello Road, London W11 **Format** Cassette **Language** Basic **Outlets** Mail order, some dealers.

Death Cruise might sound like a disaster movie, but in fact it's opening up a new field in the home micro market: disaster software. However, it purports to be a version of Cluedo on a cruise liner.

#### Objectives

Dr Sinister, disguised as a crew member or passenger on the Pacific 1, has smuggled a bomb on board ship. You have to identify the doctor, discern what the bomb is disguised as, and locate the room where the detonator is hidden.

Death Cruise has a one-player version and a version for two to four players, and comes with four pages of instructions.

#### In play

The ship has five decks and five rooms per deck, with 25 objects and 49 people on board. You can roam from room to room with 50 commands at your disposal. At any point you can type SUSPECT and input your three suspects, as long as all three are there with you.

It seems grossly unfair but if by chance your three suspicions are correct then you lose the game. The procedure is, when

you're sure of your findings you must type ACCUSE and get all three right to win the game.

Commands are kept simple, such as TAKE, PICK, DROP, or GO.

Finding myself on Deck One I explored all five rooms. I moved to Deck Two and typed GO TV ROOM. "No such place," it said. I tried variations such as GO TV ROOM, but the same answer came back despite the TV Room on Deck Two mentioned in the instructions. On Deck three I tried GO COFFEE SHOP. "No such place" I was told, again contradicting the instructions. GO CINEMA then? "You're on the wrong deck." Not according to the instructions, I wasn't. GO DECK FIVE, I tried. "No such deck," I was informed.

I broke into the program to find that the data stored there contradicted completely the information given in the instructions. The program lists four decks, not five, and many of the rooms are located in different places.

#### Verdict

Even without these not inconsiderable drawbacks, the game was proving something of a dodo. I can't imagine why anyone would want to waste money on this, when you could buy the original board game and have much more fun.

Mike Gerrard

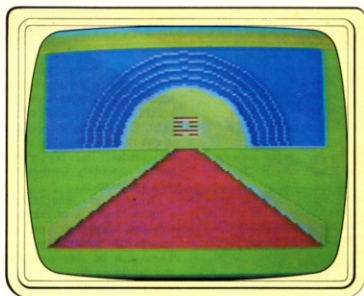
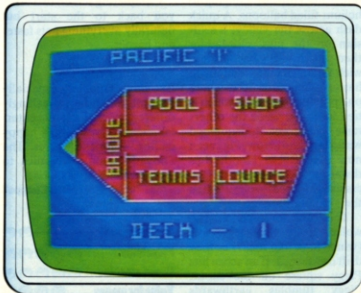
#### RATING

Lasting appeal

Playability

Use of the machine

Value for money



## DRAGON 32

### Ancient Wisdom

**Name** I Ching **System** Dragon 32 **Price** £6.95 **Publisher** Virgin Games, 61-63 Portobello road, London W11 **Format** Cassette **Language** Basic **Outlets** Mail order, some dealers

The I Ching is the name given to the ancient Chinese guidelines used not so much to predict the future as to advise people on their best course of action at a particular moment. The thought of this 4000 year old oracle being put onto a home micro seems incongruous to say the least, but I suppose if you're going to do it then it ought to be on the Dragon.

#### Objectives

The I Ching is made up of 64 hexagrams, which in this case means not the usual six-pointed star but a block of six lines, and each of those lines can be either broken or complete, giving the 64 possible permutations. Originally, the hexagrams were built up using a complicated procedure involving 50 yarrow stalks, while thinking of the question which concerns you. The resulting hexagram is then examined in conjunction with a book of interpretations, to guide you as to what to do.

#### In Play

There's an optional introduction explaining the origins of the I Ching, followed by a graphics screen depicting a rising sun at the end of a long road. It is against this sun that you construct your hexagram.

As there isn't a yarrow stalk function, the whole rigmarole is reduced to the more simple formula,  $R = \text{RND}(2)$ . If R happens to be 1 when you press the space bar then your first line will be broken, otherwise complete.

This is repeated six times to give you your hexagram.

The meaning of your hexagram will then appear. My own first attempt produced number 39, which wasn't the egg fried rice but 'Chien: Obstructions. Advantage will be found in the south and west, but not in the north and east. It will be favourable to meet with the great man. Firm persistence brings good fortune.' What can it all mean?

This is then followed by the second section, the Image, a kind of summing up of how the wise person might behave: 'The superior Man examines himself and nurtures his inner virtue.'

That's all there is to it. Think of your question, hit the space bar, read the advice. Next question, please.

#### Verdict

What else could I do but consult the oracle itself for a verdict? The result was number 6, Strife. 'Although sincere he will be opposed and obstructed.' I'm sure the writer of this program is sincere, and I do believe that the philosophy behind the I Ching could teach much to a lot of people. But I'm afraid that as a piece of software this leaves me cold.

Mike Gerrard

#### RATING

Lasting appeal

Playability

Use of the machine

Value for money



All prices include VAT, postage, packing and insurance against any damage or loss in the post.

★ ★ ★ ★  
★ AND NOW AT ★  
★ 200/2 REGENT ST. ★  
★ ★ ★ ★

# COMMODORE 64 + PRINTERS

## I CHALLENGE YOU TO FIND A BETTER DEAL!



### CRESTMATT SPECIAL PACK £234.95

INCLUDES CBM 64 + CASSETTE C2N +  
THREE TAPE GAMES RETAINED AT £25 OR  
GRANDMASTER CHESS WORTH £17.95 OR £10 OFF!

Commodore 64 Computer .....	£184.95	Juki 6100 (Daisywheel) .....	£399.95
Single Disk Drive 1541 .....	£199.95	VIC Printer 1525 (Dot Matrix) .....	£199.95
Monitor 1701 (Colour + Sound) .....	£199.95	Star Gemini 10x (Dot Matrix) .....	£319.95
Impex 80 Column Board .....	£109.95	E Epson RX80 (Dot Matrix) .....	£274.95
Shinwa CP80 .....	£269.00	E Epson RX80FT (Dot Matrix) .....	£309.95
Epson FX80 (160 CPS) .....	£438.00	Smith Corona TP1 (Daisywheel) .....	£349.95

### OVER 100 CRESTMATT BARGAINS!

FOR: BUSINESS, HOME, PROGRAMMING, EDUCATIONAL, GAMES, ETC.

### BEAT THAT!

RING 01-749 2510 (24 hrs) 434 1736/743 8441

Delivery once cheque cleared within 7 days. Bankers' Drafts, Building Society Cheques, Postal Orders 2 days only.

Extra £3 Datapost or Securicor overnight delivery C.O.D. — for orders above £100 a deposit of £10 required.

**Mail Order, C.O.D.** or visit our showroom at 200/2 Regent St, W1.

**N.B:** All hardware is supplied with all connections, manuals and guaranteed by Commodore for 12 months; guarantee can be extended to 60 months. Send Cheques, Postal Orders, Bankers' Drafts, Building Society Cheques (No Credit Cards) to: CRESTMATT LTD.

Tel: 01-749 2510 01-434 1736 01-743 8441

WORLD-WIDE  
DEALERS' INQUIRIES  
WELCOME

## CRESTMATT LTD.

SHOWROOM:  
200/2 REGENT ST,  
LONDON W1.

MAIL ORDER C.O.D.  
5th FLOOR,  
CHESHAM HOUSE, 136 REGENT ST, LONDON W1.

OVERSEAS ORDERS  
VAT REFUND WILL BE USED TO  
COVER OUR EXTRA EXPENSES

# Free yourself from the Handbook



USE

## MICROGUIDES THE KEYPLATES TO MAKE IT EASY!

Microguide KEYPLATES fit neatly over your computer keys • Gives you an easy to read list of commands • Alphabetically arranged for immediate access • Placed exactly where you require it as part of your computer keyboard • The Keyplates, made of durable plastic, have space for function key notes • Clean-wipe pen for function key identity is supplied •

## MICROGUIDES

### Special introductory offer!

Order now and you will receive a FREE copy of 'Error messages and how to deal with them.'

Keyplate prices

VIC 20 £8-95

DRAGON 32 £8-95

COMMODORE 64 £9-95

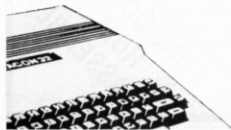
BBC A & B MICRO £9-95



CHEQUES OR POSTAL ORDERS WITH ORDERS TO

## MICROGUIDES

St., James House, 105-113 THE BROADWAY, EALING, LONDON, W13 9BL



# THE ORIC-1 COMPANION

by Bob Maunder

ISBN 0 907211 03 8.

173 pages.

Price £6.95



A thorough reference guide for those Oric-1 owners who want to get to know and use the machine in depth.

Section 1: BASIC Summary  
Section 2: Keywords Guide  
Section 3: Screen Display  
Section 4: Program Organisation  
Section 5: The ROM  
Appendices including  
The MCP-40 Printer

This is the latest in the *Companion* series, acclaimed by Your Computer as 'far and away the best for serious users'.

AVAILABLE FROM GOOD BOOKSHOPS OR  
**Send your cheque for £6.95**  
(UK p&p free) to

## LINSAC

68 Barker Road,  
Middlesbrough TS5 5ES.

**INCLUDES FULL  
ROM DIS-  
ASSEMBLY**



# BBC CHASMS

## BBC B Trench fever

**Name** Trench System BBC Model B  
**Price** £6.95 **Publisher** Virgin Games. **Format** Cassette **Language** Basic/Machine Code **Other Versions** None **Outlet** Retailers

Trench is a version of the end part of the first Star Wars film, specially adapted to fit the BBC.

### Objectives

You're in a spacecraft, whizzing down a trench carved into a planet's surface. You have to get to the exhaust vent down which you can drop a missile into the heart of the planet, and explode it. Along the way you avoid the vast numbers of assailants and lasers.

### In play

The game is very hard. So hard that I lost interest after the first ten or fifteen failures. The graphics are good, I'll give it that much, but the game is so difficult that I thought at first that level 1 must be the hardest not the easiest. When I tried another level I found that where things had been just impossible before, they were now ridiculous.

All of this may well encourage some of you. Many micro users are now finding that most games are too easy, and I suppose for those people this program will be nothing short of manna from heaven.

For me, the worst part was being unable to fire at anything. You can't fire until your battle computer is engaged, and unfortunately that doesn't happen until you've successfully made it some way down this version of the valley of death.

The game is interesting, in that it uses a convincing 3-D effect to show the trench along which you are flying. It's done by showing the trench as a series of boxes, (each with one side missing) fitting inside each other. By switching these boxes the impression of movement is given.

I was also a bit disappointed to only have one go per game. Just when I was starting to get the hang of it, I'd be shot down.





### Verdict

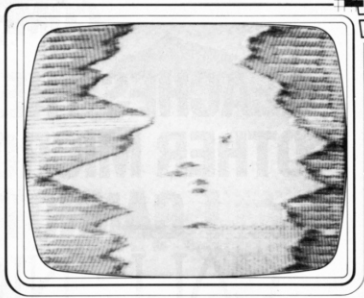
As I said at the start, the game is far too hard for me, but may therefore prove to be an exciting challenge to others. Like the other Virgin games I've seen, the instructions are excellent, the packaging is sensible and the cover is misleading. Another interesting biographical note on the programmer here too — he prefers sound and graphics to number-crunching facilities. There's not a lot of sound in Trench, though the graphics aren't bad.

It's a pity that he seems to have overdone the difficulty to make up for an oversimplistic game.

Piers Letcher

### RATING

- Lasting appeal 
- Playability 
- Use of machine 
- Overall value 



## BBC B Grand canyon

**Name** Canyon System BBC Model B  
**Price** £10 **Publisher** BBC, 35 Marylebone High St., London W1M 4AA. **Format** Cassette **Language** Basic **Other Versions** None **Outlet** Mail order/Retailers

This is all about flying through a prescribed maze and shooting down as much as you can on the way.

### Objectives

Survival is the principle aim, but it's the points that really matter. Encountered on your way are beamers, aircraft, missile boats, mines, gates of fire, and, when you're an expert, the imperial flagship.

### In play

You can use keyboard or joystick. You start about two thirds of the way up the screen, flying down. The canyon narrows, and islands start appearing in the middle. So your first problem is simply to avoid these.

The very first problem encountered is choosing your levels. You can vary the width of the canyon, the quantity of the enemy, and your speed from one to four, so you get 64 possible levels.

After you've started flying you suddenly come across the defending natives. First off you get simple bombers. To score, you must get two out of three that you pass. But after the first, and relatively simple section, you're liable to get a hit from the side if you don't knock them

out. This puts you in a spin, out of control, and doomed unless you pull out in time, so watch out!

As you pass each section, the obstacles grow increasingly difficult and enemy get harder to fight.

The longer you stay alive the better, as each change from day to night, or from night to day, brings you another biplane. If you get shot down, or crash, you start from the beginning of the current section.

The canyons get ever narrower, and even the process of flying becomes exceptionally difficult. Let alone the chances of staying alive for very long against the massive defences. I've now reached level 24, but have yet to beat the final challenge.





### Verdict

I was impressed from the start, since the rather large packet wasn't just filled with hot air. The instructions are clear and well written, and the game gives the user a chance to skip through these on the screen.

Apart from the fact that character, rather than pixel scrolling has been used, the game is excellent. The use of colour and sound is consistently good, and the game is responsive and entertaining. I found it as enjoyable as the purely machine code written Defender. In fact I prefer this, as it allows you to steadily improve. Highly recommended.

Piers Letcher

### RATING

- Lasting appeal 
- Playability 
- Use of machine 
- Overall value 



**PERSONAL  
COMPUTER  
NEWS**

**REACHES THE CUSTOMERS  
OTHER MICRO MAGAZINES  
CANNOT REACH**

**CALL: NIC JONES  
AND HIS TEAM  
ON:**

**01-323 3211**

**3D COMPUTERS**

**THE HOME COMPUTER SPECIALIST**  
ONE STOP SHOPPING FOR  
ALL YOUR COMPUTER NEEDS

**BBC  
MICRO**



**MODEL B  
£399**

**commodore 64**

**£229.00**

**DRAGON 32**

**£155.00**

**ORIC-1**

**£139.00**

**SHARP 48K MZ-80A  
£399.00**

**ELECTRON £199.00**

**SOFTWARE**

LLAMASOFT  
EPYX  
INFOCOM  
INTERCEPTOR  
ON-LINE  
DATASOFT  
BRODERBUND  
RABBIT  
SUPERSOFT  
ABRASCO  
COMPUTER ROOM

**PERIPHERALS**

DISCS SINGLE/DUAL  
TORCH Z80 DISCS  
CUMANA DISCS  
PRINTERS  
JOYSTICKS  
MONITORS  
B&W/COLOUR  
LIGHT PENS  
BBC BUGGY

LARGE RANGE OF BOOKS,  
DISKETTES, CASSETTES &  
PRINTER PAPER ALWAYS  
IN STOCK

Easy parking at all branches

**TOLWORTH**  
230 Tolworth Rise South,  
Tolworth, Surbiton,  
Surrey KT5 9NB.

01-337 4317

**SUTTON**  
30 Station Road  
Belmont, Sutton  
Surrey SM2 6BS.

01-642 2534

**EALING**  
114 Gunnersbury Ave  
Ealing  
London W5 4HB.

01-992 5855

**LUTON**  
1 Manor Road  
Caddington  
Luton  
Beds OU1 4EE

(0582) 767104

**MILTON KEYNES**

Unit 1, Heathfield  
Stacey Rushes  
Milton Keynes MK12 6HP.

(0908) 317832

**NEWBURY**

26 Stanley Road  
Newbury  
Berkshire RG14 7PB.

(0635) 30047



## ON THE BALL

### SPECTRUM

# Queering your pitch

**Name** Football Manager System Spectrum 48K. **Price** £5.95  
**Publisher** Addictive Games Format  
**Cassette Outlets** WH Smiths, Menzies, Boots

The start of the season — you sit by the side of the pitch, breathing in the rich fragrance of grass that has been carefully nurtured all summer — apart from the odd carnival and farewell concert by The Who — in preparation for this day.

Then out of the tunnel, with the roar of the crowd building to a crescendo in their ears, come Stalin, Lenin, Thatcher, Reagan and the rest of the lads — because this isn't the real game, just the next best thing, Football Manager.

### Objectives

You manage a clapped-out team somewhere in darkest Division Four. Your goal, if you'll pardon the expression, is to battle your way up to the top of the First Division, winning the FA Cup as many times as you can on your way.

You can pick any team you fancy, and can rename one (along with the players) if the cream of four divisions holds no joys for you.

### In play

Considering the enormity of the task, even the best of us will take five or six seasons at five to

six hours per season to crack this one, and if you choose the most difficult level you may not crack it at all.

I started out by renaming my team Dundee Utd — Scottish readers would do well to consider a similar course — and ploughed through the player pool, amassing an ill-assorted bunch of history's hard-men.





At the easy level I found it plain sailing. I could manage the team well, snapping up good players when they came on the market, swapping them round so they didn't get too tired, until I had a side that could see off even the First Division giants.

But I forsook the trophies, got over-confident and switched the mode — you can do this in mid-play — to 'genius'. Legs started breaking and groins straining, and my team soon became microcomputing's answer to Tranmere Rovers. Two seasons with no wins and only three goals scored, and I was back on 'easy'. Another feeble season while I paid the bills and repaired the damage.

### Verdict

You bite your nails as the goal-mouth dramas are played out, you can buy Rasputin, sell Kevin Keagan, and if you ever get good at it, you just have to turn up the skill level for your one-way ticket back to the Isthmian League. **John Lettice**

### RATING

**Lasting appeal**   
**Playability**   
**Use of machine**   
**Overall value** 



### SPECTRUM

# Pool hustler

**Name** Pool System 16/48K  
**Spectrum Price** £5.95 **Publisher** CDS Microsystems, PO Box 93, Doncaster, South Yorks DN4 5LK  
**Format** Cassette **Language** Basic  
**Other Versions** None **Outlets** Mail order, Smiths, Boots, Menzies, other dealers

Some companies make the mistake of trying to put an exact replica of a sport or a game onto a micro, which often can't be done. The more successful ones I've seen are programs which accept the micro's limits and produce scaled-down versions. These frequently turn out to be great fun to play, and Pool is in this class.

### Objectives

The name of the game is aiming, of course, and sinking the pool balls into the pockets. The game offers one-player and two-player options.

### In Play

The scaling down means that you have just six coloured balls on the table at the start of each frame, three red at 10 points and three blue at 20 points.

After a few bars from *The Sting* you're ready to play. You aim by moving a small white triangular marker round the edges of the table, this being your sight and the direction in which the cue ball will travel. The marker is moved clockwise with the 'S' key and anticlockwise with the 'A' key.

Once you're happy with the sighting you can then set the

strength of the shot from one to five using the 'L' key. With everything ready you make the shot using ENTER, and of course you miss the pot and the balls click and bounce.





The format of the game is simple in that you have three cue balls and three shots per ball — unless you sink a colour, when you have three more shots. Pot all six colours and you move on to the next frame. Each ball potted scores the value of the ball multiplied by the frame number multiplied by the shots remaining.

Most important, though, is the accuracy and entertainment value of the game, and these seem to be first class. Apart from the odd loss of colour while the balls are moving or passing close to one another, the result of each shot is just what you might expect from the real thing, ie in my case disasters. They bounce off each other or off the cushions at realistic angles, each time accompanied by the appropriate click or bump, and the whole game has a satisfying authentic feel about it. Each ball potted is stored in a box at the foot of the screen, and there's a high-score record at the top along with the current score.

### Verdict

It may not turn you into a Paul Newman or Steve Davis, but although it's simple Pool is well done and good fun, the kind of game I wanted to continue playing. **Mike Gerrard**

### RATING

**Lasting appeal**   
**Playability**   
**Use of the machine**   
**Overall value** 



# THE ACT SIRIUS SX

## 10 Megabyte

## 256K RAM

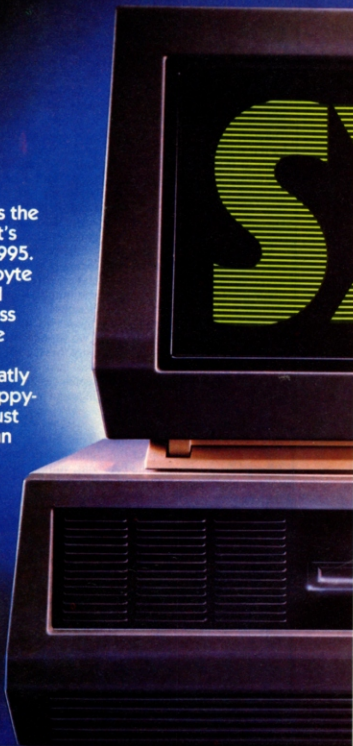
# £3995.00

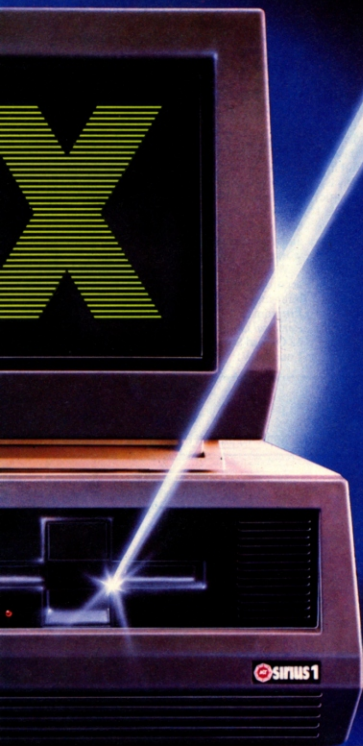
Built with a commitment to quality, the new Sirius SX is the latest addition to the 16-bit ACT Sirius family. And it's available now, at a complete system price of only £3,995. With 256Kbytes of internal RAM and an integral 10Mbyte Winchester hard disk, it is extremely powerful and extremely fast – ideal for those large volume business applications which previously required much more expensive minicomputer equipment.

The Winchester drive is the heart of the machine, greatly improving on both the speed and data integrity of floppy-based systems. Average access time is reduced to just 134 milliseconds while the average transfer rate is an astonishing 104,000 characters per second.

Like all the Sirius range, the Sirius SX is backed by the strength and resources of ACT. The Pulsar range of true 16-bit application software for accounting, planning and word-processing; over 1,000 hardware/software add-on products; ACT Training Centres open to all; nationwide field service; a full range of printers and consumables. And the most complete and professional dealer network in the United Kingdom.

Sirius prices start at just £2,195 for a dual floppy drive system with 1.2Mbytes and £2,695 for the double-sided floppy drive version offering 2.4Mbytes.





## ACT SIRIUS SX : THE FACTS

### WINCHESTER SUBSYSTEM

10.6Mbyte (formatted) 5 1/4" integral Winchester drive  
Twin platters  
134msec. average access time  
Intelligent disk controller  
DMA interface to system memory  
Multiple operating systems  
User configurable

### GENERAL SPECIFICATIONS

256Kbytes RAM  
Intel 8088 16-bit processor unit  
1.2Mbyte double-sided floppy disk drive for back-up  
800x400 pixel, high resolution graphics  
Multiple operating systems  
Parallel/IEEE 488 port  
2xRS232 asynchronous/synchronous ports  
Internal user port

For more information on the new ACT Sirius SX, clip the coupon and return to:



# ACT(UK) Limited

FREEPOST  
Birmingham B63 1BR  
or call: 021-501-2284

Please send me further details of the new Sirius SX

Name \_\_\_\_\_  
Position \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
\_\_\_\_\_

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

PCN OCT 85

# PCN ProgramCards

For the cards this week are four new programs. Two for the Vic-20, one for the Spectrum and one for the BBC model B.

The Spectrum game from Mr J Thurlby, of Farnborough, in Hampshire, is a game that goes by the name of Babyfall. To set the scene: you are standing outside a skyscraper when it catches fire.

Unfortunately there are no megastars about to blow up the ubiquitous water tanks and save the day. So it is left up to you, and the ambulance, to save the occupants of the building. They are jumping out of the windows, hoping that you will catch them. This is easier than it sounds because the inhabitants are babies and therefore very light.

To perform this daredevil act, you have to position yourself at the place where the babies are going to land and let them bounce off you until they land in the ambulance. Be careful, as the game goes on it does get a little harder.

The game itself is written in modular style, that is, each segment is independent

of the others. This method of programming aids debugging and makes the execution of the program easier to follow.

The two Vic programs, from Telstar, are educational. They are quite short and will fit into the expanded machine. They are written from the point of view of being positively competitive, hence the emphasis on timing.

The first program, 'COUNT' displays two dice. The problem is to add the two numbers together and enter the result into the computer as fast as possible. This is a good way of practicing mental arithmetic, but only for two numbers, each between 1 and 6. For more advanced adding, the MEN/ARITH program can be used. This presents you with four numbers, each between 1 and 9. The same rules apply as before, *ie* you are competing against the clock.

In each of the programs, only two chances are given to get the answer right and for the sake of speed, no answers are given.

The BBC program, from Kevin Edwards, of Didsbury, in Manchester, is a game called Road Hog. The idea of this game is to trap the little hog in a maze, so that he cannot move left, right, up or down. The hog gives the appearance of having great intelligence, especially at higher speeds.

## Don't be bashful

If you have any programs that you would like to see in print, of that you think other people would like to see, send them in to ProgramCards. Your submissions should be accompanied by a listing, if possible, and a set of comments on how the program works.

We pay for all the programs we publish according to originality, good programming and length. Send your programs to: Program Editor  
Personal Computer News  
62 Oxford Street  
London W1.

## PCN ProgramCards

### French Test Card 4 of 4

8334FT4/4

```

5000  REM ***** READ PEOPLE, INFS & ENS
5010  REM ***** INTO #S
5020  FOR P = 1 TO 8
5030  READ #P
5040  PF#(P) = #P
5050  READ #P;PE#(P) = #P
5055  NEXT P
5060  FOR UB = 1 TO 6
5070  READ #B
5075  INF#(UB) = #B
5076  NEXT UB
5080  FOR UB = 1 TO 6; FOR PP = 1 TO 8
5090  READ #B
5100  EN#(UB,PP) = #B
5120  NEXT PP; NEXT UB
5130  RETURN
7000  DATA 173,48,192,136,208,5,2      96,225,2,249,9,202,208,245,1
      74,224,2,76,226,2,96
7010  FOR I = 738 TO 758: READ R; POKE I,R; NEXT
7020  RETURN
8000  REM ***** CHECK HOW VERBS GO
8005  INJERSE
9010  HOME
9020  UTAB 5: PRINT "   CHOOSE BETWEEN:": NORHAL
9030  UTAB 10: PRINT "1...SARVOIR"
9040  UTAB 12: PRINT "2...DEVOIR"
9050  UTAB 14: PRINT "3...VOULOIR"
9060  UTAB 16: PRINT "4...POUVOIR"
9070  UTAB 18: PRINT "5...BOIRE"
9080  UTAB 20: PRINT "6...CROIRE"
9095  UTAB 22: PRINT "7...BEGIN A TEST"
9090  GET XX:XX = VAL(XX): IF XX < 1 OR XX > 7 THEN 8000
9095  HOME
9100  IF XX = 7 THEN RETURN
9105  INJERSE
9110  UTAB 1: HTAB 15: PRINT INF#(XX)
9120  NORHAL
9150  FOR I = 1 TO 8
9155  PF# = PF#(I)
9160  U# = EN#(XX,I): IF U# = "AI" THEN PF# = "J"
9170  UTAB 2 + I + 1: HTAB 12: PRINT PF#; HTAB 18: PRINT U#
9180  NEXT I
9190  GOSUB 3700
9200  GOTO 8000
    
```

### Apple/Applesoft Basic/Skinner/Continued

5000	Subroutine to read people, infinitives and endings into PEF#INFS and ENS respectively. People, English and French.
5020-5055	
5060-5076	Verbs.
5080-5120	Endings.
7000	Data fortune.
7010	Do intro tune.
8000	Check how verbs go.
8010-8085	Print menu.
8090	Get reply.
8100	Begin test
8110	Print chosen verb.
8150-8180	Print endings.
8190	Continue prompt.
8200	Return to menu.

# TWICKENHAM COMPUTER CENTRE LTD



commodore



Buy the **BEST**  
**BBC Model A**  
**£299**  
**BBC Model B**  
**£399**  
**BRITISH**  
**COMPUTER**

Wordwise Word Processor  
Software – Acorn, Bugbyte, Computer Concepts  
Acornsoft on Disk • Digitiser Graphics Plotter  
Joysticks for the BBC • 100K Single Disk Drives  
BBC 800K Twin Disk Drives  
Torch 800K Twin Disk Drives with CPN

As supplied to schools,  
local authorities and  
government departments  
by the leading BBC/Acorn  
dealer & service centre

We stock all the extras:  
Floppy disk interface  
Econet network interface  
Voice synthesis circuits  
Cartridge ROM pack interface  
Alternative high-level languages  
Cassette recorders  
Dot matrix printers  
Daisywheel printers  
Teletext & Prestel units  
Monitors + Disk drives  
(subject to availability)

ALL PRICES INCLUDE VAT!  
Post & Packing EXTRA

Another British best!

**Ceedata 8200 Word Processor**  
**FROM £1,995**

64K Internal Memory (up to 256K optional) + Twin floppy disk drives + 60 self programmable keys (all set for Wordstar) + cables + user manual + C/PM manual + C/PM software with utilities + keyboard overlays available.

\* Commodore 64: £229

\* Apple IIE 64K on special offer – phone for latest price

||||| ▶ Now in stock: Acorn Electron £199 ◀ |||||

## ACORNSOFT Software for the BBC

Peeko-Computer Pack	Arcadians	
Algebraic Manipulation Pack	Sliding Block Puzzles	
Creative Graphics Cassette	Cube Master	
Graphs & Charts Cassette	Chess	£9.95 EACH

Desk Diary	<b>Books for the BBC:</b>	
Philosopher's Quest	Creative Graphics	
Sphinx Adventure	Graphs & Charts	
Monsters	LISP on the BBC	
Snapper	FORTH on the BBC	£7.50 EACH
Planetoid		

Daisywheel Printer for BBC (complete with interface) £385  
Star 510 Dot Matrix Printer  
Star 515 Dot Matrix Printer  
Brother Daisywheel Printer  
Juki Daisywheel Printer  
Black & White TV with Monitor conversion  
12" or 14": £55  
Cassette Deck (BBC compatible): £30

Acorn/BBC Main Distributors – Trade Enquiries Welcome

**Twickenham Computer Centre**  
72 Heath Rd Twickenham Middx TW1 4BW (Tel: 01-891 4991)

Delivery extra  
– nationwide  
by Securicor

## PCNProgramCards

## Babyfall Card 1 of 3

8334BA1/3

```

1999 REM main program
2000 CLS : GO SUB 9500: GO SUB 6
000
2010 GO SUB 9000: GO SUB 3010
2020 IF sc<50 THEN LET k$="1": G
O SUB 5000: GO SUB 6000
2030 IF sc<=50 AND sc<150 THEN L
ET k$="1": BEEP .01,10: GO SUB 5
000: GO SUB 6000: LET k$="2": GO
SUB 5000: GO SUB 6000
2040 IF sc<=150 AND sc<300 THEN
LET k$="1": BEEP .01,10: GO SUB
5000: GO SUB 6000: LET k$="2": G
O SUB 5000: GO SUB 6000: LET k$=
"3": GO SUB 5000: GO SUB 6000
2050 IF sc<=300 THEN LET k$="1":
GO SUB 5000: GO SUB 6000: LET k
$="2": GO SUB 5000: GO SUB 6000:
LET k$="3": GO SUB 5000: GO SUB

```

## ZX81

## ZX Basic

Application: Game

Author: J. Thurby

```

5000: LET i$="4": GO SUB 5000:
GO SUB 5000
2060 GO TO 2020
2999 REM dropped baby
3000 PRINT AT a,b;" ";AT 21,b;"G
";FOR i=16 TO 4 STEP -2: BEEP .
2,f: NEXT f
3010 PRINT AT 0,26;" "
3020 LET live=live-1
3030 LET f=27: FOR l=1 TO live:
PRINT AT 0,f;"C": LET f=f+2: NE
XT l
3040 PAUSE 20: PRINT AT 21,b;" "
3050 IF live<0 THEN GO SUB 7000
3060 PRINT AT 21,5;"
3070 RETURN
4999 REM movement of babies

```

2000	Call routines to set up user defined graphics and to display instructions.	2050	move 3 babies.		
2010	Call initialisation and screen display routines.	2060	If score greater than 300 move 4 babies.	3020	number of lives left. Decrement the number of lives left.
2020	If score less than 50 then move 1 baby.	3000	Repeat from line 2020	3030	Display the number of lives left. Type out current position of
2030	If score between 50 and 150 move 2 babies.		dropped baby and put a grave headstone (graphics G) at the place where the baby fell. A short tune is played.	3040	Short wait, remove headstone.
2040	If score between 150 and 300	3010	Clear space for update of the	3050	Check for end of game.
				3060	Clear the bottom line of the screen.
				3070	Return to the main program.

## PCNProgramCards

## Babyfall Card 2 of 3

8334BA2/3

```

5000 IF k$="2" AND INT (RND*5)+1
=3 THEN RETURN
5005 LET a=P (VAL k$,1): LET b=P (
VAL k$,2): LET c=P (VAL k$,3)
5010 PRINT AT a,b;" ";LET c=c+4
: LET a=VAL $$(c TO c+1)
5020 LET b=VAL $$(c+2 TO c+3): B
EEP .01,10: PRINT AT a,b;CHR$(1
43+INT (RND*5)+2)
5030 IF a=18 AND b=26 THEN LET s
c=sc+5: PRINT AT a,b;" ";AT 0,6;
sc: LET c=5
5040 IF a=20 AND cp=b THEN BEEP
.05,2
5050 IF a=20 AND cp<>b THEN GO S
UB 3000: LET c=5
5060 LET p (VAL k$,1)=a: LET p (VA
L k$,2)=b: LET p (VAL k$,3)=c
5090 RETURN
5999 REM movement of catcher
6000 LET cp=cp+4+(INKEY$="8" AND
cp<23)-4*(INKEY$="5" AND cp>4)
6010 PRINT AT 21,c1;" ";AT 21,cp
;"A"
6020 LET c1=cp
6030 RETURN
7000 REM end of game

```

```

7010 CLS
7020 PRINT AT 0,3:"End of game..
";AT 5,3;"You saved ";sc/5;" b
abies in a score o
f ";sc
7030 INPUT "play again ? (y/n) "
: LINE a$
7040 IF a$="y" THEN R/N 2010
7050 GO TO 9999
9000 REM intro
9010 PRINT AT 0,6;"BABY FALL."
9020 PRINT AT 3,0;"The idea of t
his game is to catch the bab
ies as they fall out of the bu
ilding tower block, and carry the
m to the safety of a nearby ambu
lance."
9030 PRINT ""If you drop three
babies the game ends."
9040 PRINT ""Use the arrow keys
"5" and "8" to move left
and right."
9050 PRINT "" You = A Bab
y = C"
9060 INPUT "Press ENTER to start
": LINE a$
9090 RETURN

```

5000	Cause second baby to pause at random intervals.	5040	Check for baby hitting catcher.	6030	catcher.
5005	Set up temporary variables for use in calculations.	5050	Check for baby dropped.	7000-7050	Return.
5010	Remove baby from old position. Increment c to find the next coordinates. Redefine a.	5080	Redefine the array p for baby specified by RS.	8000	End of game display, show score and ask for another game.
5020	Redefine b. Beep to indicate movement. Print new baby (one of six variations in pose).	6000	Return.	8050	Introduction and playing instructions.
5030	Check for baby reaching ambulance safely.	6010	Move catcher to the left if key 5 is pressed or to the right if key 8 is pressed. Rub out old catcher position.	8060	First UDG is graphics A second UDG is graphics C.
		6020	Display catcher in new position. Type graphics 'A' for UDG.		Return.
			Keep note of current position of		

## PCNProgramCards

Babyfall

Card 3 of 3

8334BA3/3

```

9000 REM initialise
9010 LET s$="0402040304040507060
902009111015112012151311140815061
90317041905190620082111221523202
415251826"
9030 BORDER 5:CLS
9040 PLOT 0,135: DRAW 27,0: DRAW
0,-135
9050 FOR f=6 TO 21 STEP 2: PRINT
AT f 0;"■ ■": NEXT f
9060 RESTORE 9080: FOR g=1 TO 2:
READ a,b: PLOT a,b: FOR f=1 TO
4: READ a,b: DRAW a,b: NEXT f: N
EXT g
9070 PLOT 245,15: DRAW 0,-5: DRA
W 6,0: CIRCLE 220,3,3: CIRCLE 24
4,3,3: PLOT 225,14: FOR f=1 TO 1
2: READ a,b: DRAW a,b: NEXT f
9080 DATA 212,22,27,0,0,-19,-27,
0,0,19,242,16,10,0,0,-12,-18,0,0
,12,0,4,2,0,0,-4,4,0,0,-2,-4,0,0
,-4,-2,0,0,4,-4,0,0,2,4,0
9090 LET live=3
9110 LET sc=0
    
```

```

9120 LET c1=21: LET cp=4
9140 DIM P(4,3)
9150 LET P(1,3)=1: LET P(2,3)=1:
LET P(3,3)=1: LET P(4,3)=1
9160 FOR f=1 TO 4: LET P(f,1)=VA
L s$(P(f,3) TO P(f,3)+1): LET P(f
,2)=VAL s$(P(f,3)+2 TO P(f,3)+3
): NEXT f
9170 PRINT AT 0,0;"score";AT 0,6
:sc
9180 RETURN
9500 RESTORE 9170: FOR f=1 TO 7:
READ a$: FOR g=0 TO 7: READ a:
POKE USA a$+9,a: NEXT g: NEXT f
9510 DATA "A",186,186,146,254,16
,16,40,108,"B",206,136,203,255,2
03,136,206,0,"C",56,56,146,254,1
6,16,166,254,"D",6,22,37,88,154,1
03,76,36,"E",36,114,230,69,26,1
64,104,16,"F",27,9,107,127,107,9
,27,0,"G",24,24,126,126,24,24,24
,24
9520 RETURN
    
```

9000	Start of initialisation routine.	9080	wheels, of ambulance.	9470	Display score.
9010	String containing coordinates of baby's flight positions.	9090	Data for ambulance drawing.	9480	Return.
9030	Define colour border.	9110	Define number of lines.	9500	Read a character. Read value and poke it into UDG section of memory. Repeat for all the seven UDG characters.
9040	Draw outline of lower block.	9120	Set the score to zero.		The characters in quotes are typed as graphics 'A' to 'G'.
9050	Draw windows on lower block.	9140	Set up array p.	9510	Return
9060	Read data for drawing outline of ambulance.	9150	Define points s\$.		
9070	Draw window, red cross, and	9160	Define coordinates for starting positions of babies.	9520	

## PCNProgramCards

Count

Card 1 of 3

8334CO1/3

```

1 SC=0
2 T1$="000000"
3 PRINTTAB(8);"███ MAIN DICE"
4 N=N+1
5 I=INT(6*RND*(1)+1)
6 PRINT "      "
7 IFD=1THEN14

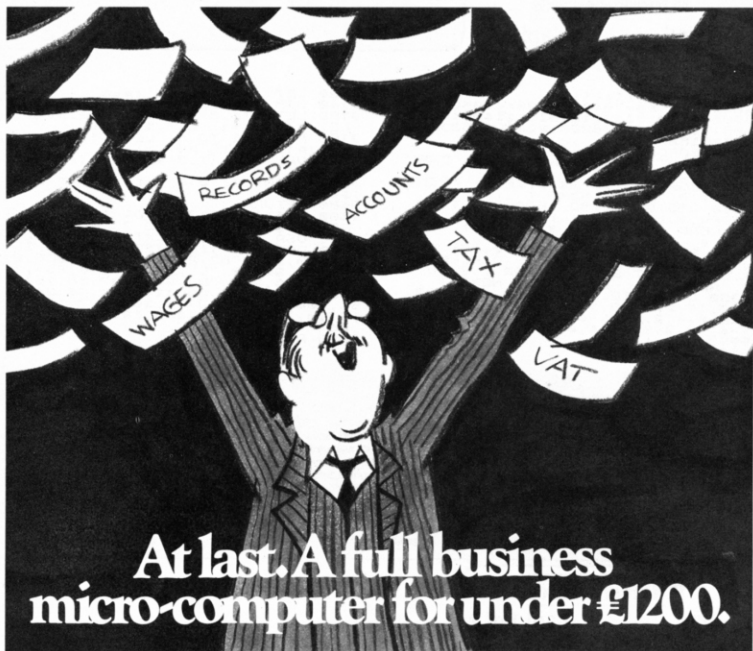
8 IFD=2THEN12

9 IFD=3THEN12
10 PRINT "   ● ●"
11 GOTO15
12 PKINT "   ● |"
13 GOTO15
14 PRINT " |   |"
15 IFD=2THEN20
16 IFD=4THEN20
17 IFD=6THEN22
    
```

## Vic-20 3.5K Commodore Basic

Application: Educational  
Author: Teistar

1	Set the score to zero.
2	Set the time to zero.
3	Print title.
4	Increment N.
5	Get a random dice face.
6	Print top of dice.
7	If the number of dots is one then print blank line.
8	If two then put a dot in the top left hand corner.
9	If three then do the TLHC.
10	Two dots for 6,5,4 dice.
11	Select next dots.
12	Dot the TLHC.
13	Select next dots.
14	Blank line.
15	If two then blank line.
16	If four then blank line.
17	If six then two dots on middle line.



## At last. A full business micro-computer for under £1200.

Because we at NEC make most of the components for our computers, this naturally gives us a price/performance edge over comparable systems.

Which other company could offer a 64K Byte CP/M system like the PC8000, with dual 5 1/4" disc drives and monochrome monitor, opening the door to a wide range of business software - including integrated accounting, word processing, business planning and graphics - for just £1,195?

Whatever the size of your business, the processing power required, or the volume of data you wish to store - up to 20 megabytes on the APC - there is one of NEC's flexible family of personal computers to give you the best price/performance in its class.

**PC-8000 Series**  
Personal Computer. £1,195\*



**Advanced**  
Personal Computer. £1,985\*



**PC-8800 Series**  
Personal Computer. £1,455\*



- \*PC8000 64K CP/M SYSTEM DUAL 5 1/4" DISC DRIVES MONOCHROME MONITOR £1,195 EXCL. VAT
- \*PC8800 64K EXPANDABLE SYSTEM MONOCHROME MONITOR DUAL 5 1/4" DISC DRIVES £1,455 EXCL. VAT
- \*APC H02 128K TRUE 16 BIT MICRO COMPUTER WITH DUAL 1 MEGABYTE 8" DISC DRIVES AND INTEGRAL DISPLAY £1,985 EXCL. VAT

For NEC Business Systems (Europe) Ltd.,  
Computer Division, Freight (no stamp required)  
144/144 Drummond St, London NW1 1YP. Tel: (01) 388 6100

NAME \_\_\_\_\_ BUSINESS \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
PHONE \_\_\_\_\_  
PLEASE TICK: PC8000  PC8800  APC

**NEC**  
BUSINESS SYSTEMS  
(EUROPE) LTD.

**NEC DEALERS:**

Aberdeen Mr D West  
 Tysol Computers Ltd. 0224-647365  
 Bath Mr D Broadway  
 Jade Computers 0745 36397/R and 32570  
 Birmingham Mr A Bell  
 Tempus Business Systems 025 477 9789  
 Bournemouth Mr T Benson  
 Modernists Ltd. 01 953 6368  
 Bridgnorth Mr A S Vincent  
 Jettech Services Ltd. 07462 64548  
 Brighton Mr R Hurst  
 Brighton Computer Centre 0273 67304  
 Bristol Mr J Chapman  
 Centpoint (EPOS) Ltd. 0272 277518  
 Bristol Mr A E. Smead  
 Avon 027 5882632  
 Cambridge Mr J Hartley  
 Euron Research Ltd. 0954 8825  
 Canterbury Mr C B Rames  
 Jinfo Ltd. 0227 83008  
 Charnmouth Mr A K Hathway  
 Fenway Controls Ltd. 0297 60223  
 Colchester Mr M A. Timms M.D.  
 Empire Electronics Ltd.  
 0206 865926-870263-47242  
 Coventry Mr K Hudson  
 Coventry Micro Centre, The (6203) 58942  
 Doncaster Mr B Sawley  
 Datanam Designs (G350) 68066  
 Dundee Mr D West  
 Tysol 0382 22963  
 Eastbourne Mr J East  
 Omega Point of Sale (M) Ltd. 0323 767199  
 Eire Mr J. Heeler  
 Pw 05003 98441  
 Glasgow Mr P Hughes  
 Albany Sales Systems Ltd. 041 226 4757  
 Glasgow Mr H Johnston  
 American Computers & Engineers Ltd. 041 248 2427  
 Grantham Mr E Ford  
 ACC Data Systems Ltd. 0476 66611  
 Guernsey Mr E Fretschke  
 Micrologic Systems Ltd. 0481 28789  
 Herts Ltd Dept  
 Haslemere Mr A Lamont  
 Crown Management Systems Ltd.  
 No Haslemere 042878 3636  
 Haywards Health Mr G Theaker  
 Southern Control Wares Ltd. 034440 4531  
 Hemel Hempstead Mr D Stafford  
 Chelton Datalink 0442 22774  
 High Wycombe Mr M A. Curley  
 Hford Business Machines 0494 446003  
 Huddersfield Mr G A West  
 NMI Computers 0484 682905  
 Kingwood Mr P D. Clayton 0737 83 2738  
 Zebra Systems 01 588 1936  
 Leeds Mr M Cullen  
 Hewarth Computer Services 05324 40265  
 Leicester Mr G A Hill  
 Computer Store (Exeter) Ltd. 0533 882955  
 Liverpool Mr T Best  
 Startec Computers 051 727 787  
 London W1 Mr C. Khan  
 London Computer Centre Ltd. 01 387 4455  
 London W2 Mr A Lockwood  
 Alcotford Office Equipment Ltd. 01 837 3980-5478  
 London WC1/ECC1 R. Sharpe 01 489 6273  
 Benny (Shireland) Ltd. 01 631 8002-7  
 London W1 Mr M R Gadd, Miss K Bird  
 John Lewis Partnership Dept. 827 Bldg & TV  
 Oxford St, London W6A 1EX 01 629 7771  
 London NW9 Mr M Knuffman  
 Borsari Ltd. 01 580 0902  
 London SW Mr R Lagan  
 Intercom Computer Systems Ltd. 01 622 9373  
 London EC Mr B Smith  
 Marchionis Ltd. 01 276 4809  
 London EC Mr D Warren  
 MCS (Microcomputing Centre Bureau) 01 437 1388  
 London N1 Mr J Gibson  
 PDS Marketing (UK) Ltd. 01 837 3165  
 London N1 W2 Mr J A Wynne  
 Professional Data Services Ltd.  
 01 445 6655-646 4889  
 London W2-W10 Mr M Platt  
 SDS Ltd (Selected Software  
 & Computer Systems Ltd) 01 351 5622-6  
 London NW Mr S Viny  
 Shegar Computers Ltd. 01 961 6000  
 Loughborough Mr D O'Sullivan  
 Data Line Systems 0509 37286-7  
 Manchester Mr S Dewar  
 Desktop Computing Ltd. 092 541 5415  
 Central Milton Keynes Mr S. Robbham  
 John Lewis Partnership 0908 63971  
 Macclesfield Mr R Owen  
 Computrol Ltd. 0632 845262  
 Newport, Isle of Wight Mr A Medley  
 Cemus Ltd. 0983 5306  
 Northampton Mr P Scott  
 Basic Computers & Systems Ltd. 0604 710 740  
 Nottingham Mr V Sutt  
 Skytronic Ltd. 0602 78742  
 Oxford Mr A Curley  
 Hford Business Machines 0865 72351 2-3  
 Peterfield (Retail) Mr A. Macleod  
 Strongwight Ltd. T.A. Community Computers 0730 87567  
 Plymouth Mr S Taylor  
 Telford 0752 550816  
 Poole Mr A Thompson  
 Zymex Ltd. 800203 679464  
 Portsmouth Mr P S Palmer  
 RCS Computer & Business  
 Services Ltd. 0705 753194  
 Reading Mr P Madley  
 Computer 100 0734 59666  
 Sandy Mr D Gurney  
 Electron Systems (Sandy) Ltd. 076 780 195  
 Stafford Mr B Balcanquall  
 Computarama 07851 62828  
 Swaffham Mr T M B Hunt, M.D.  
 Breckland Business Systems Ltd. 07660 21637  
 Teignton Mr J Williams  
 CSM Computer Services 0823 76698  
 Weybridge Mr S. Phillips  
 ICI Computers Ltd. 97 54526  
 Whitehaven Mr R Turner  
 H.L. East Whitehaven: 02463 3671  
 Windsor Mr J Gration  
 Computer Electronics Ltd.  
 Windsor: 077535 62028 and 55669  
 Worcester Mr J J. Jukes  
 Datawell Ltd. 0965 425195  
 Worthing Mr S C Shannon  
 Shannon Personnel Ltd. 0953 36247

**ORIC SOFTWARE**

Dept PCN 118 Worcester Rd., Malvern, Worcs WR14 1SS

SPECIALIST SUPPLIERS OF ORIC SOFTWARE

**AMAZING XMAS OFFERS**

PRICES VALID UNTIL DEC 20, 1983



<b>ORIC 48K</b>	<b>£119.95</b> + £2 P&P
<b>ORIC PRINTER</b>	<b>£109.95</b> + £2 P&P
<b>COMPUTER CASSETTE</b>	<b>£39.95</b> + £1 P&P
<b>COMPLETE SYSTEM FOR</b>	<b>£249.85</b> + £5 P&P



**FREE!!** Software catalogue with every purchase or £1 which is deducted from your first order

**ORIC SOFTWARE, Dept WM, 118 WORCESTER RD., MALVERN**

Mr/Mrs/Miss/Ms \_\_\_\_\_  
 Address \_\_\_\_\_  
 \_\_\_\_\_ Postcode \_\_\_\_\_

Cheque enclosed \_\_\_\_\_  
 Please debit my Access/Visa/Amex/Club — with £ \_\_\_\_\_

No. \_\_\_\_\_

I have a 16K Oric 48K Oric My Software interests are:  
 Home— Business— Games— Education—  
 Other (Please specify) \_\_\_\_\_

SOFTWARE WRITERS— Lump sums or royalty payments. Send tapes and details. (Tapes not returned unless return postage is included).

**PERSONAL COMPUTER NEWS****Program converters**

*We need you urgently to convert programs from: Spectrum to Commodore 64; Spectrum to the Vic 20; Commodore 64 to the Vic 20; and Spectrum or 64 to Atari.*

*These conversions are needed for listing books that we are publishing later on in the year.*

**If you are interested please ring Fi Inghold on 323 3211 x365**

**LUNAR JETMAN** - For the 48K Sinclair ZX Spectrum  
**LUNAR JETMAN** - The Ultimate Intergalactic G.A.S. (Graphic Arcade Simulation) Adventure Space Battle.

**LUNAR JETMAN** - Arcade standard, 100% machine code, incredible sound effects, amazing smooth high resolution graphics, the totally new addictive concept and all those extra features you expect from the **ULTIMATE** games people.

Design - The **ULTIMATE PLAY THE GAME** design team.

**PSSST** - 19/48K ZX Spectrum



**JET PAC** - 16/48K ZX Spectrum or 8K Expanded VIC 20

These games should be available from **W.H. SMITHS, BOOTS, JOHN MENZIES, LASKYS, SPECTRUM CENTRES**, other large department stores and all good major software retailers. Alternatively, send the coupon to **ULTIMATE PLAY THE GAME** for immediate dispatch by return, subject to availability.

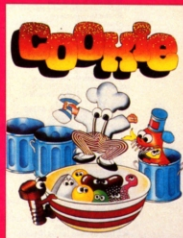
**£5.50** each including VAT, first class postage and packing within UK.

**LUNAR JETMAN** - 48K ZX Spectrum



**ATIC ATAC** - 48K ZX Spectrum

**COOKIE** - 16/48K ZX Spectrum



**TRANZ AM** - 16/48K ZX Spectrum

**ATIC ATAC** - For the 48K Sinclair ZX Spectrum

**ATIC ATAC** - The super spooky 3D horror G.A.S. (Graphic Arcade Simulation) Adventure Game.

**ATIC ATAC** - Arcade standard, 100% machine code, incredible sound effects, amazing smooth high resolution graphics, the totally new addictive concept and all those extra features you expect from the **ULTIMATE** games people.

Design - The **ULTIMATE PLAY THE GAME** design team.

Dealer enquiries welcome. Phone (0530) 411485

Post this coupon to:  
**ULTIMATE PLAY THE GAME, The Green, Ashby de la Zouch, Leicestershire, LE15 5JU**

Please rush me the following:

LUNAR JETMAN

ATIC ATAC

JET PAC

COOKIE

TRANZ AM

PSSST

JET PAC (8K Expanded VIC 20)

Enclose cheque/PO for £

Name \_\_\_\_\_  
 Address \_\_\_\_\_

Post Code \_\_\_\_\_

# PCNProgramCards

Count

Card 2 of 3

8334CO2/3

```

18 PRINT"          | # |"
19 GOTO23
20 PRINT"          | |"
21 GOTO23
22 PRINT"          | • • |"
23 IFD=1THEN30
24 IFD=2THEN28
25 IFD=3THEN28
26 PRINT"          | • • |"
27 GOTO31
28 PRINT"          | • |"
29 GOTO31
30 PRINT"          | |"
31 PRINT"          | |"
32 PRINT"
33 IFN=2THEN36
34 PRINT"          +"
35 PRINT"
36 A=D
37 GOTO4
38 T=D+A
39 PRINT"          ="
40 INPUTT
41 IFT1=TTTHENPRINT"X CORRECT ":SC=SC+1
42 IFT1<>TTTHEN44
43 PRINT"          ":GOTO54
    
```

```

18 Centre dot for 1, 3 or 5.
19 Select next dots.
20 Blank line.
21 Select next dots.
22 Two dots.
23 If one then print bottom blank.
24 If two dot bottom right hand
    corner.
25 If three then dot BRHC.
26 Bottom two dots.
27 Print bottom of dice.
28 Print BRHC dot.
29 Print bottom of dice.
30 Bottom line blank.
31 Bottom of dice.
33 If two dice have been printed
    then continue program.
34 Print plus.

36 Set A to the number of dots.
37 Next dice.
38 Evaluate the total.
39 Print equals.
40 Get answer.
41 If the answer is correct then
    increment the score.
42 If wrong then try again.
    
```

# PCNProgramCards

Count

Card 3 of 3

8334CO3/3

```

44 PRINT"NO,COUNT THE SPOTS AND GIVE ANOTHER ANSWER."
45 SC=SC-1
46 PRINT"X          ="
47 INPUTT
48 IFT2=TTTHEN54
49 PRINT"X NO,THE ANSWER IS";T
50 PRINT"
51 FORT=1TO2000:NEXT
52 GOTO55
53 PRINT"          _____"
54 GOSUB62
55 PRINT"
56 PRINT"TIME = ";TI$;" SECONDS
57 PRINT"YOUR SCORE = ";SC
58 N=0
59 IFT1<>"000055" THENGOTO64
60 GOTO4
61 END
62 FORT=1TO1000:NEXT
63 RETURN
64 PRINT"X WELL DONE"
65 PRINT"X YOU HAVE SCORED ";SC;"X IN ";TI$;" SECONDS
66 PRINT"X PRESS [ Y ] TO GO AGAIN
67 GETA$:IFA$="" THEN67
68 IFA$<"Y" THEN68
69 IFA$<"Y" THEN1
    
```

```

43 Underline.
44 Print the retry prompt.
45 Decrement the score.
46-47 Get second try.

48 Check answer.
49 Print wrong.
50 Underline.
51 Delay.

53 Line.
54 Goto end section.
55-57 Print time and score.

58 Set dice counter to zero.
59 Check time.
60 Restart.
61 End.
62-63 Delay subroutine.

64-66 Final score.

67 Get answer.
68-69 Check reply and act on it.
    
```

# martech games

a spectacular range of software



**HARRIER ATTACK**  
any ORIC-1 £6.95  
any SPECTRUM £5.50

At last a pure machine code, super-fast, action-packed, highly addictive arcade-style game requiring great skill. This game is everything an arcade fanatic could ever hope for — with full colour graphics and explosive sound!

**BRITAIN'S TOP SELLING GAME FOR ORIC 1!**  
(PCN CHARTS)

## BLASTERMIND

48K SPECTRUM £5.50

We have yet to find a more infuriating and downright rude version of a well known game. You too can have insults heaped upon you as you struggle to beat a very sarcastic opponent. Even cheating won't work. Very addictive — until you throw the computer into the T.V. screen.



**CURRAH  $\mu$ SPEECH**  
ONE SIDE OF THIS CASSETTE CONTAINS A VERSION COMPATIBLE WITH THE AMAZING  $\mu$ SPEECH UNIT. PRINTED INSULTS WERE BAD ENOUGH — THIS IS \*\*\*\*



## THE QUEST OF MERRAVID

Vic 20 (16K) £7.95  
Commodore 64 £7.95

The adventurer becomes Merravid, charged with the task of finding, taking and then returning the magic Firestone of the Dwarves. However, overcoming the many novel and original hazards is no easy matter. Careful and imaginative thought is required if progress is to be made and the Firestone tracked down to the lair of the Dragon of Thargon. Even then the Dragon has to be defeated and the stone retrieved. A compulsive, extremely enjoyable and very user friendly adventure.

All Mail Orders (inc. p. & p.) to:

# martech games

9 Dillingburgh Rd., Eastbourne, E. Sussex BN20 8LY

## SINCLAIR OWNERS READ THIS FROM



You've probably heard about MACHINE CODED PROGRAMS and thought "so what! How can they help me?"

Well now you can find out and taste the very real difference by purchasing our latest MACHINE CODED programs. These emulate features of the most modern professional computer (12 years) writing machine coded programs for IBM, ICL, UNIVAC and Sinclair means we know what we're talking about!

## FINANCE MANAGER

is a powerful and flexible MENU DRIVEN program for practically all domestic and business accounting applications. MACHINE CODE has enabled us to produce the very latest professional presentation and editing facilities.

FINANCE MANAGER'S main facilities include:

- **AUTOMATIC DOUBLE ENTRY** — for up to 255 separate accounts with running totals
- **ANALYSIS** — by user-defined transaction descriptions and/or date
- **STANDING ORDERS** — added, applied and removed by date or at regular intervals
- **BALANCE** — all account balances can be listed at any specified date
- **NEW TRANSACTION MARKER** — differentiates between old and new entries
- **PAGE COMMAND** — scroll back and forth through all the accounts
- **RECONCILIATION** — enables the user to check all items against statements
- **FULL SCREEN PRESENTATION** — see it as it happens when you enter, amend or delete
- **SPEED** — this program is very, very fast

P.L.S. print screen or file block move, TAB, delete and insert in line, automatic file dating, date change, etc. . . .

APPLICATIONS: domestic and business accounts, specific and general ledgers, financial budgeting and planning.

## ADDRESS MANAGER . . .

Works on the 16K and 48K Spectrum, in 48K it will store, file, select and retrieve over 400 full addresses (over 1500 individual names). Dynamic Memory Management and compression techniques makes all this possible and there's a lot more:

- **FULL SCREEN INPUT and EDITING** — see it as a page as it happens with insert, delete and TAB Commands.
- **MULTIPLE INDEXING** — 3 way user-defined index enables you to define, catalogue, select and print entries as needed, (essential for the more sophisticated applications.)
- **INSTANT RESPONSE** — yes, this program is very fast.
- **SUPER FRIENDLY** — crash-proof, extremely easy to use and efficient in a way that BASIC can never be.

## MANY USES

- **AT HOME** — [storing addresses, printing out Xmas Card lists etc.]
- **AT WORK** — for mail-order work, internal telephone directory, sorting customers into types, areas, size — you choose
- **CLUBS** — print-out members list, sort different categories etc.

## SPECTRUM CHESS Dare you face The Turk

The original Turk was an eighteenth century automaton, a life-size mechanical figure resident in a Turkish costume and seated behind a wooden cabinet on which a chess board and pieces were placed.

OCPC now offer you the twentieth century equivalent of that Turk — a chess-playing computer program.

**The Turk challenges you to a game of chess!**

## MANY OPTIONS INCLUDE:

- 6 LEVELS OF DIFFICULTY
  - DEMONSTRATION MODE
  - BOARD EDITOR
  - GAMES PRINTOUT FACILITY
  - BLITZ CHESS AGAINST THE CLOCK
  - TWO PLAYER MODE
  - UNFINISHED GAMES CAN BE STORED
  - RECOMMENDED MOVE
- FULL INSTRUCTIONS PROVIDED**



Post order to: Oxford Computer Publishing Ltd., P.O. Box 99, Oxford

Please rush me: FINANCE MANAGER at £8.95  Spectrum only

ADDRESS MANAGER at £8.95 each  Spectrum only

CHESS THE TURK at £8.95 each  Spectrum only

MACHINE CODE TEST TOOL at £9.95 each

Send cheque, postal order or ACCESS No. to above address. Or telephone order with ACCESS No. to (0753) 888866

NAME: .....

ADDRESS: .....

POSTCODE: .....

PCN#10

Available from most branches of

**W H SMITH** and other retailers







# The Entertainers Software Suppliers

1/1 Main Street, Deans, Livingston

TEL: (0506) 410004

## ZX SPECTRUM

Game	Ram	Author	Price
Mozar Maul	16-48	IM	5.50
Leadrig	16	CD	5.50
3D Printer	16	CD	5.95
Nasty Boss	16	CD	5.95
Planet of Death	16-48	AR	6.95
Ship of Doom	16-48	AR	6.95
Invaders	16-48	AR	6.95
Mono Chess	16-48	AR	6.95
Cosmic Debris	48	AR	4.95
Chess Tutor	16-48	AR	9.45
Antispacester	16-48	QU	7.95
The Chess Player	48	QU	6.95
Time Gate	16-48	QU	8.95
Space Invader	16-48	QU	4.95
Need-Out	48	QU	4.95
Meteor Storm	16	QU	4.95
3D Strategy	16	QU	6.95
Vipers Lair	48	QU	6.95
Smugglers Cove	48	QU	6.95
Schizoids	16-48	IM	5.50
An Dikums	16-48	IM	5.50
Zip-Zap	48	IM	5.50
Jumping Jack	16-48	IM	5.50
Zivron	48	IM	5.50
Arctida	16-48	IM	5.50
Invasion Force	16-48	AR	4.95
Cent-Bug	16-48	DK	4.95
Invaders	16-48	DK	4.95
Dictator	48	DK	4.95
3D Tanks	16-48	DK	4.95
Spawns of Evil	16-48	DK	4.95
Meteoroids	16-48	DK	4.95
Gold Mine	16-48	DK	4.95
Frenzy	16-48	OC	5.50
Kang	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
Save Man	16	IP	5.00
3-2-1 Man	16	IP	5.00
The Quest	48	IM	5.00
Hellrow	48	HE	7.95
Night Flight	48	HE	7.95
Spectral Prince	48	HE	5.95
Spacebirds	48	HE	5.95
Trader	48	PI	9.95
101	16	CD	5.95
Pennator	48	ME	6.95
Terror Dwell	48	ME	6.95
Jail Pac	48	UL	5.50
Titan-Ar	48	UL	5.50
Mantic Miner	16-48	BB	5.95
Slip	16-48	BB	5.95

## VIC 20

Game	Ram	Author	Price
3D Time Trek	16	AN	5.95
Zok a Kingdom	16	AN	5.95
Cavern Fighter	UNEX	AN	5.95
Astro Fighters	UNEX	SU	4.95
Wacky Waters	ANY	IM	5.50
Catcha Snatcha	ANY	IM	5.50
Frank	ANY	IM	5.50
Arctida	ANY	IM	5.50
Shastek	ANY	IM	5.50
Harvester	16	PI	7.95
Subspace Striker	16	PI	7.95
Arctida	UNEX	SO	5.00
Space Raider	UNEX	SO	5.00
Asteroid	UNEX	SO	5.00
Gun Fight	UNEX	SO	5.00
Munch Man	UNEX	SO	5.00
Multiron	UNEX	SU	5.00
Grinder	ANY	TE	3.95
Space Rescue	UNEX	SU	6.95
Destroyer	UNEX	SU	7.95
Chopper	UNEX	SU	6.95
Shipper	16	SU	9.95
Puzzle Pack	UNEX	SU	6.95
Trader	16	PI	14.95

## ZX 81

Game	Ram	Author	Price
Inca Curse	16	AR	5.95
Ship of Doom	16	AR	5.95
Krain	16	AR	9.95
Galleons	16	AR	6.95
R Games Pack	16	AR	6.95
Atteroids	16	QU	3.95
Crossa Crossa	16	QU	3.95
Munchies	16	QU	3.95
Crash Course	16	QU	3.95
Maze Death Race	16	PS	3.95
Star Trek	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
Chopology	16	PS	3.45
Tap 1 10 games	1	JK	3.95
Tap 2 20 games	1	JK	3.95
Tap 3 Catacomb	16	JK	4.95
Tap 4 30 Monster Maze	16	NG	4.95
Tap 5 30 Defender	16	NG	4.95
Puckman	16	NE	5.95
Pilot	16	NE	5.95

## SPECIAL OFFERS

- FOR EVERY £5.00 YOU SPEND WITH US YOU RECEIVE A 50P VOUCHER REDEEMABLE AGAINST OUR EVER EXPANDING LIST OF SOFTWARE.
- MANY FUTURE SPECIAL OFFERS ON THE BEST GAMES SOFTWARE AROUND.
- ORDER THREE OR MORE CASSETTES AND RECEIVE A FURTHER 50P VOUCHER.
- POSTAGE AND PACKAGING IS FREE.
- ONLY TOP QUALITY ORIGINAL CASSETTES SUPPLIED.

## The Entertainers Software Suppliers (PCN)

1/1 Main Street, Deans, Livingston. Tel: 0506-410004.

Please supply the following:—

- .....
- .....
- .....
- .....
- .....

Despatch to:—

Name .....

Address .....

Computer .....

Cheque No ..... for £ ..... enclosed.

Please debit my credit card Access/Visa No. ....

Signed .....

## SUPPLIERS KEY

SU — Surmook; SO — Sollar; PI — Pivak; IM — Imagine; AN — Anrog; UL — Ultimate; ME — Melbourne;  
 HE — Hewson Consultants; IP — Impact; AR — Aris; QU — Quikrisc; DK — DK Tronics; OC — Ocean; PS — Pis;  
 PE — Peaksoft; JK — J. K. Grey; NG — New Generation; CD — CDS; TE — Terminal; BB — Bug-Bite.

## DCP MACHINE CODE TEST TOOL

SPECTRUM AND ZX81



## DCP FULL SCREEN EDITOR / ASSEMBLER

SPECTRUM



## DCP MACHINE CODE MASTER TOOL KIT

SPECTRUM



Also available from most branches of W. H. Smith and other retailers. Also from Buffer Micro Spectrum



ACCESS CARD NO.

EXPIRY DATE

# ALL YOU NEED TO CRACK MACHINE CODE

## For the Spectrum 16k & 48k

### Test tools for Spectrum & ZX81/TS1000

The ultimate professional tutor and de-bug program.

We wrote this to help us write Machine Code!!

\* Test and Display Machine Code instructions as they're written • Ideal for both the beginner and expert • Fully documented with 32 page tutorial • HEX: Decimal converter as standard • PLUS • Character Generator of unbelievable quality!

## Full screen editor/ assembler for Spectrum

The latest and most comprehensive Editor/Assembler yet produced.

\* Full Screen 42 col. input/text editor • Assemble to screen/printer and or tape • Assemble derivatives DEFM, DEF3, DEFW, DEFB, DEF.L, ORG, EQU, END • Comprehensive syntax check • Binary, Octal, HEX & ASCII constants • Will even operate as a simple word processor • Fully documented instruction book • Plus Character Generator ... plus, many, many more, all you've ever needed

## Master tool kit for Spectrum

\* Re-number facility • Delete copy and move block function • String search and substitute facility • Variable dump • Cross reference • Trace function • Real time clock and alarm system.

POST TO: OXFORD COMPUTER PUBLISHING LTD., P.O. BOX 99, OXFORD

Please send  Machine Code Test Tool ZX81  Machine Code Test Tool Spectrum

Editor Assembler  Tool Kit

£9.95 each. Any 2 or more £9.25 (Postage free UK only). Overseas add £1 per item.

NAME .....

ADDRESS .....

PCN 27/10

## PCN Program Cards

Road Hog

Card 1 of 2

8334RH1/2

**BBCB**  
**BBC Basic**

Application: Game  
Author: Kevin Edward

```

10 ON ERROR RUN
20 *FX12,0
30 *FX15,1
40 C#=CHR$(133):M=&7F30:T=&7F40
50 MODE7:VDU23;B202;0;0;0:PRINT'TAB(
7)CHR$(131)"** Instructions ***:PRINT"C#
C#"You Guide Your 'o' Round The Maze"
60 PRINT'C#"Trying To Trap The Evil L
ittle '*"'
70 PRINT'C#"So He Can Not Move Up,Dow
n,Left Or"
80 PRINT'C#"Right Using The Following
Controls"
90 PRINT'TAB(12)CHR$(134)"Up ':'":PR
INT'TAB(7)CHR$(134)"Left 'Z' 'X' Righ
t"
    
```

```

100 PRINT'TAB(10)CHR$(134)"Down '/'"
110 INPUT"Enter Speed 1-40 INCLUSIVE 1
=FAST",SPEED
120 IF SPEED<1 OR SPEED>40 THEN RUN
130 PRINT'TAB(8)CHR$(130)"Press Key To
Start":*FX15,1
140 A#=GET#:*FX11,8
150 *FX12,7
160 CLS:FORL=&7C2B0&7C4F: ?L=255:L?920
=255:NEXT
170 FORL=&7C50T0&7FC0STEP40: ?L=255:L?3
9=255:NEXT
180 TIME=0:GDSUB490
190 FORL=1T0200
200 PP=INT(920*RAND(1)+1)+&7C2B:IF ?PP<
>32 THEN 200 ELSE ?PP=255:NEXT
    
```

10	Error trap for escape key to rerun the game.	50	Select mode and set a window, print title.	150	Set auto repeat period.
20	Set auto repeat period.	60-110	Print instructions and get speed.	160-170	Set up playing screen.
30	Clear keyboard buffer.	120	Check speed.	180	Set time to zero and print time on screen.
40	Set C3 to alpha magenta, setup pointers to mode 7 screen memory.	130	Prompt start.	190-200	Place random blocks (char 255) on the playing screen.
		140	Get key and set auto repeat delay.		

## PCN Program Cards

Road Hog

Card 2 of 2

8334RH2/2

```

210 ?T=42: ?M=111
220 X=RAND(4)
230 GOSUB490:ON X GOTO 240,250,260,270
240 F=1:GOTO280
250 F=-1:GOTO280
260 F=40:GOTO280
270 F=-40
280 IF ?(F+T)<>32 THEN 220
290 FORL=1TOSPEED:NEXT
300 ?T=32:T=T+F: ?T=42:SOUND1,-9,RND(20
)+200,1
310R=0
320IF INKEY(-73) THEN R=-40
330IF INKEY(-105) THEN R=40
340IF INKEY(-67) THEN R=1
350IF INKEY(-9B) THEN R=-1
360 IF R=0 THEN 230
370 IF ?(R+M)<>32 THEN 470
380 ?M=32:M=M+R: ?M=111
    
```

```

390 IF ?(T+1)=32 OR ?(T-1)=32 OR ?(T+4
0)=32 OR ?(T-40)=32 THEN 230
400 FT=TIME:FOR L=1T025:SOUND1,-15,L,1
:NEXT
410 CLS:PRINT'C#CHR$(141)"YOU CAUGHT
HIM !!!":PRINT#CHR$(141)"YOU CAUGHT HIM
!!"
420 PRINT'CHR$(131)"It Took You Only
";FT/100" Seconds."
430 *FX12,0
440 *FX15,1
450 PRINT'CHR$133"Another Game ";:INPU
T ANS:IF LEFT$(ANS,1)="" THEN RUN
460 PRINT'"B Y E !":END
470 *FX15,1
480 GOTO230
490 PRINTTAB(8,0)CHR$(131)"Time = ";:I
NT(TIME/100):RETURN
    
```

210	Place you and the hog on the road.	310-350	Get player's key press and alter R accordingly.	400	Note the final time (FT): play the end of game tune.
220	Set X.	360	If player hasn't moved then go back and move the hog again.	410	Print double height catch.
230	Print time onto the screen.	370	If the player is trying to rub a wall then don't move.	420	Tell player how long it took.
	Move hog randomly according to X.	380	Move the player.	430	Set repeat period to 0.
240-270	Move the hog absolute position.	390	If the hog has any spaces around it then continue the game.	440	Clear the keyboard buffer.
280	Check that hog is not running into a wall.			450	Prompt for another game.
				460	Bye.
				470	Clear keyboard buffer.
				480	Continue game.
300	Put the hog onto the screen after rubbing out the old one.			490	Subroutine to print the time on the screen.
	Make random pitch sound.				



# REPRINT SERVICE

If you are interested in a particular article or advertisement in this publication you might like to take advantage of our special Reprint Service. Let our high quality reprints provide an attractive and impressive addition to your portfolio of promotional material

For further details and a quotation, give us a call today

Ring  
**ROBERT BUGGS**  
on

**01-636 6890**  
Ext. 259

## READOUT

Which book would your micro want you to buy?



**Build Your Own Expert System** by Chris Naylor, published by Sigma Technical Press at £6.95 (paperback, 250 pages).

Somewhere else, some time ago, Mr Naylor delivered his verdict on computers. 'High speed morons', he wrote, and this book represents one result of his efforts to turn his own micro, an Apple II, into something with a glimmer of intelligence.

He quickly defines his subject: 'There are two major faults possessed by most existing expert systems . . . that you, personally, don't understand how they work, and that you, personally, haven't got one . . . You become an outcast and a despised person in your own eyes.'

'Expert systems' calls to mind long-winded boffins giving interminable seminars in glorious technobabble. Mr Naylor is no long-winded boffin; at times his book gives the impression that he was anxious to finish it so that he could get out to the pub.

If you have a Spectrum or an Apple system or just a taste for dry humour it should appeal to you. The listings of programs from which your micro might gain wisdom and expertise are given for these two systems, but since they are Basic programs you may be able to adapt them for other machines.

Programs, conducted tours of statistics, whimsical observations and plenty of logic are sustained from the introduction up to the crescendo in chapter 7, 'An Expert on Everything in the Entire Known World'. The idea is that you develop your own expert system as you go along. Thereafter you are shown some of the things you might do with it, and some of the things that people do with existing expert systems. The

book's final contribution is a summary of the steps taken in the construction of the system it proposes.

This is an excellent book on a forbidding subject. Even if you don't build an expert system from it, your money won't have been wasted. **DG**

**Z80 Machine Code for Humans** by Alan Toothill and David Barrow, published by Granada, price £7.95 (paperback, 152 pages).

This book prepares you for the worst by stressing, at the outset, the importance of exercising one's mind with hard mental effort.

But true to its title, it succeeds in taking the nightmares out of machine code, progressing through explanations and exercises in orderly fashion.

The authors explain how to control the speed of machine code and emphasise the usefulness of compilers, interpreters and assemblers when writing your own applications, complete with advice and ideas. Even the chapter on arithmetic and conversion is clearly explained and encouraging in outlook.

Particularly interesting, too, is a chapter labelled 'Relocatable Code', and there is much detail on graphics, giving the routines that form a graphics system. Pixel graphics are dealt with separately.

Collected at the back of the book are various recommended ways of doing repetitive tasks which often trouble the machine code novice. Explanations of binary and hexadecimal number systems follows, as well as an enlightening comparison between Basic and machine code.

And at the end of it all you feel spurred to action. Definitely an encouraging book. **WP**

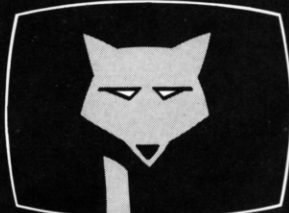
**Z80 MACHINE  
CODE  
FOR HUMANS**



ALAN TOOTHILL  
AND DAVID BARROW

# THE COMPUTER JUNGLE~

## TAMED.



# THE GAME KEEPER

# The Way Out of the

**HARDWARE**

**PERIPHERALS**

**BBC**

BBC B Computer

**£399.00**



BBC B Computer  
with disc interface

**£470.00**

**DRAGON**

Dragon 32 Computer

**£175.00**



**COMMODORE**

Commodore 64

**£199.00**



Commodore VIC 20 KIT

**£139.00**



**ATARI**

Atari A800

**£299.99**



Atari AM400

**£149.99**

**SPECTRUM**

Spectrum 16K & 48K

16K **£99.95**

48K **£129.95**



**ACORN**

Electron

**£199.00**



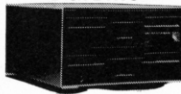
**ORIC**

48K **£139.95**

**NEW!** CGL M5  
Best Value Home  
Computer RRP £149.99  
**OUR PRICE £134.99**  
Mail Order Only

**BBC**

BBC or LVL Single  
Disk Drive



**£265.00**

LVL Dual 100K  
Disk Drive



**£389.00**

LVL Dual 200K  
Disk Drive



**£573.00**

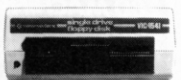
Also BBC 400K Dual  
Disk Drive **£803.00**  
Cabel Monitor **£217.00**

**DRAGON**

Disk Drive **£275.00**  
Joystick **£19.97**

**COMMODORE**

1541 Disk Drive



**£229.00**

also

Quick Shot Joystick **£10.50**  
C2N Cassette Recorder **£44.95**  
1520 Printer Plotter **£169.99**  
1525 Printer **£230.00**

**ATARI**

A810 Disk Drive



**£299.00**

also A410 Recorder  
**£49.45**

**SPECTRUM**

Intelligent  
Joystick **£27.50**  
Printer **£39.95**  
VTX 5000 **£99.95**

**SEIKOSHA**

AP 100A



**£247.00**

**EPSON**

RX-80



**£342.70**

FX-80



**£503.70**

**PRISM**

VTX 5000  
MICRONET MODEM  
FOR THE  
SPECTRUM 48K  
**£99.00**  
Includes free Prestel  
connection.

# Computer Jungle...

## SOFTWARE

### OUR

BBC TOP 20	RRP	PRICE
1. 747 Flight Simulator	£7.95	£7.16
2. Killer Gorilla	£7.95	£7.16
3. Cylon Attack	£7.00	£6.30
4. The Hobbit	£14.95	£13.46

5. Felix & the Fruit Monsters	£7.95	£7.16
6. Felix in the Factory	£7.95	£7.16
7. Sphinx Adventure	£9.95	£8.96
8. Danger LXB	£7.95	£7.16
9. 3D Bomb Alley	£7.95	£7.16
10. Snapper	£9.95	£8.96
11. Number Balance	£11.90	£10.71
12. Demon Decorator	£7.95	£7.16
13. Bandits at 3 o'clock	£7.95	£7.16
14. Philosopher's quest	£9.95	£8.96
15. Starship Command	£9.95	£8.96
16. Galactic Commander	£7.95	£7.16
17. Painter	£8.00	£7.20
18. Bug Byte Oblivion	£7.50	£6.75
19. Bug Byte Old Father Time	£7.50	£6.75
20. Forth	£14.65	£13.19

### DRAGON TOP 20

1. Everest	£7.95	£7.16
2. Defence	£8.00	£7.20
3. Katerpillar Attack	£8.00	£7.20
4. Morocco Grand Prix	£8.00	£7.20
5. The King	£8.00	£7.20
6. Wizard War	£7.95	£7.16
7. Samurai Warrior	£6.95	£6.26
8. Night Flite	£7.95	£7.16
9. Space Monopoly	£8.00	£7.20
10. Ultimate Adventure	£8.00	£7.20
11. Invader Revenge	£8.00	£7.20
12. Dragbugrunner	£8.75	£7.88
13. Dragbug	£12.95	£11.66
14. Don't Panic	£5.95	£5.36
15. Champions	£5.95	£5.36
16. Flipper	£8.00	£7.20
17. Golf	£7.95	£7.16
18. Escape	£8.00	£7.20
19. Dragon Invaders	£8.00	£7.20
20. Jungle Search	£7.00	£6.30

### COMMODORE 64 TOP 20

1. Hover Bower	£7.50	£6.75
2. Frogger 64	£7.00	£6.30
3. Laser Zone	£7.50	£6.75
4. Damsel In Distress	£7.95	£7.16
5. Gridrunner	£7.95	£7.16
6. Galaxions	£7.95	£7.16
7. Scramble 64	£7.00	£6.30
8. Hobbit	£14.95	£13.46
9. Simon's Basic	£50.00	£45.00
10. Token of Ghall	£6.95	£6.26
11. Motor Mania	£8.75	£7.88
12. Crazy Kong	£7.00	£6.30
13. Exterminator 64	£5.99	£5.40
14. Alien Panic 64	£3.99	£3.60
15. Introduction to Basic	£14.85	£13.37
16. Jumpman (import)	£33.10	£29.79
17. Inq (import)	£14.85	£13.37
18. Prctector (import)	£36.70	£33.03
19. Repton (import)	£33.10	£29.79
20. Serpentine (import)	£33.35	£30.02

### COMMODORE VIC 20 TOP 20

1. Arcadia	£5.50	£4.95
2. Bewitched	£5.50	£4.95
3. Gridtrap	£7.95	£7.16
4. Astro Fighters	£6.95	£6.26
5. Gun Fighters	£6.95	£6.26
6. Chopper	£6.95	£6.26
7. Get Lost	£5.95	£5.36
8. Choplifter	£21.55	£19.40
9. Space Rescue	£6.95	£6.26
10. Shark Trap	£16.50	£14.85
11. Gridrunner	£33.35	£30.02
12. Lazer Zone	£29.00	£26.10
13. AE	£33.35	£30.02
14. Astro Patrol	£28.98	£26.08
15. Shadowfox	£7.95	£7.16
16. Fourth Encounter	£25.00	£22.50
17. Barrel Jumper	£8.95	£8.06
18. Conqueror	£15.95	£14.36
19. Alien	£9.99	£9.00
20. Omega Race	£9.99	£9.00

### ADRI TOP 20

1. Zepelin (import)	£28.95	£26.06
2. Planet Fall	£41.35	£37.22
3. Blue Max	£27.80	£25.02
4. Zaxon	£25.95	£23.36
5. Necromancer	£24.95	£22.46
6. Choplifer	£29.95	£26.96
7. FT. Apocalypse	£29.95	£26.96
8. Soft Porn	£21.95	£19.76
9. Strip Poker	£21.95	£19.76
10. Sargon 2	£28.95	£26.06
11. Blade Blackpool	£33.10	£29.79
12. Gorf	£29.95	£26.96
13. Miner 2049ER	£21.95	£19.76
14. Wizard & the Princess	£24.95	£22.46
15. Wizard of War WR	£21.95	£19.76
16. Shamus	£21.95	£19.76
17. Dreibus	£28.95	£26.06
18. Preppie	£21.95	£19.76
19. Preppie 2	£25.49	£22.95
20. Frogger	£24.95	£22.46

### SPECTRUM TOP 20

1. Valhalla	£14.95	£13.46
2. Hobbit	£14.50	£13.05
3. Black Crystal	£7.50	£6.81
4. Jungle Fever	£6.90	£6.21
5. Penetrator	£6.95	£6.26
6. The Train Game	£7.50	£6.75
7. The Train Game	£5.95	£5.36
8. Cookie	£5.50	£4.95
9. Jungle Trouble	£5.50	£4.95
10. Pssst	£5.50	£4.95
11. Terror-Daktal 4D	£6.04	£5.44
12. Chucky Egg	£6.90	£6.21
13. 3D Combat Zone	£5.95	£5.36
14. Styx	£5.95	£5.36
15. Transam	£5.50	£4.95
16. Zip Zap	£5.50	£4.95
17. Z Zoom	£5.50	£4.95
18. Digger Dan	£5.95	£5.36
19. Xadom	£6.95	£6.26
20. Dungeon Master	£7.50	£6.75

### ORIC TOP 10

1. Road Frog	£6.90	£6.21
2. Centepede	£41.35	£37.22
3. Galaxions	£6.95	£6.26
4. Candy Floss + Hangman	£7.50	£6.75
5. Invaders	£7.50	£6.75
6. Light Cycle	£6.95	£6.26
7. Star Fighter	£6.95	£6.26
8. Harrier Attack	£6.95	£6.26
9. Killer Cavens	£5.95	£5.36
10. Reverse	£6.50	£5.85

### ZX TOP 10

1. 3D Defender	£4.95	£4.46
2. Starfighter	£3.95	£3.56
3. Black Crystal	£7.50	£6.75
4. Invaders	£4.95	£4.46
5. M Cooler	£8.95	£8.06
6. Zombies	£5.95	£5.36
7. Jumping Jack	£4.95	£4.46
8. Inca Curse	£5.95	£5.36
9. Maze Death Race	£3.95	£3.56
10. Zak's Kingdom	£5.95	£5.36

**FREE T-SHIRT**  
With all orders  
between £100 - £200

**FREE SWEATSHIRT**  
With all orders  
between £200-£300

**FREE TOUR JACKET**  
ALL ORDERS OVER £300



## RIGHT STOCKS RIGHT PRICES WRITE NOW

Please complete the coupon and post to:  
THE GAME KEEPER, FREEPOST, BIRMINGHAM B23 5BR.

All items in stock at time of going to press.  
Delivery within 14 days or your money back.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

PHONE \_\_\_\_\_

FOR GAMES PURCHASES PLEASE STATE MAKE OF HARDWARE \_\_\_\_\_

Please supply the following

_____	£	_____	£
_____	£	_____	£
_____	£	_____	£
_____	£	_____	£
_____	£	_____	£
_____	£	_____	£

I am entitled to receive my free T-Shirt/Sweat Shirt/Tour Jacket — size S M L

Cheques/P Orders payable to The Gamekeeper.

Orders under £10.00 please add 50p for postage + packaging.

TELEPHONE ORDERS — Please phone your order + card number for immediate despatch. 24 hour phone-in-line 021-364 6108.



# DATABASICS

This six-page guide lists as many of the micros on the market for under £12,000 as possible. In Databasics you'll find all the specifications for the machines, add-ons and software necessary to make your buying decisions.

PCN keeps you up to date in three-week cycles, starting with hardware, then peripherals and finally software.

**PRICE** Specifications listed for each machine indicate what you get for the basic price quoted, which includes VAT.

**PROCESSOR TYPE** A microprocessor is the heart of the computer. The 280 and 6502 are popular 8-bit chips. The 8088 and 80800 are common 16-bit chips. If a machine has an 8-bit and a 16-bit processor we have listed the 16-bit only. Cust. means custom-built.

**SPEED IN MHZ** Speed of the clock used to drive the microprocessor, measured in MegaHertz (million cycles per second).

**STANDARD RAM** Amount of main memory used on the system. The capacity is expressed in kilobytes.

**MAX RAM normally at extra cost** Amount of memory to which the system can be expanded.

**MAX CHARACTERS columns × lines** The number of characters that can be displayed across the screen and the number of lines down.

**METHOD (at extra cost)** This indicates the way the computer displays information. **M** on its own means that a monitor is included in the basic price.

**Tv** indicates that you can plug the computer into a television set. **(M+)** indicates that the monitor costs extra. **LCD** = Liquid crystal display.

**COLOUR CAPABILITY** tells you whether the machine can give colour at the basic price quoted.

**MAX DOT RESOLUTION** gives the maximum number of points across the screen by the number of points down the screen that are available for graphics.

**KEYBOARD** This tells you the type of keyboard that comes with the machine. **W** = word processing, **C** = calculator and **T** = touch-sensitive.

**No OF FUNCTION KEYS** refers to the number of keys that can be used for different jobs by different programs.

**NUMERIC PAD** indicates whether the machine has a separate calculator-style group of number keys to enter data quickly.

**INTERFACES BUILT-IN** shows the number of standard connections built into the machine.

**CASSETTE FACILITY** gives a yes or no as to whether or not the machine can use a cassette to store data.

**CAPACITY PER DISK AND DISK SIZE** tells you how many disk drives come with the machine, and the amount of data in kilobytes (K) or megabytes (Mb) that can be stored on each drive. There are two sizes for disks, 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	£45	Tandy TRS-80 Model 100	£499	Microsolution Brit. Genius	£1,840	North Star Horizon	£2,294	North Star Advantage	£2,766	Cromemco System 2	£3,560	Sord M243	£5,842
Casio PB100	£50	Nascom 3	£549	Globe 101	£1,850	Sanyo MBC 1250	£2,294	Apple III	£2,780	Digital Microsystems 3	£3,576	Archives IV	£5,905
TRS-80 PC4	£50	Commodore 4016	£632	Grundy 8200	£1,850	CasyMini C2	£2,300	Sanyo PC4050	£2,817	Decision-1 Computer 012	£3,674	Sage IV	£5,962
Aquarius	£68	Research Machine 480Z	£650	Genie III	£1,897	Bonsai SM 4000	£2,302	Televideo TS 1602-C	£2,842	Televideo TS 1602-C	£3,714	ICL PC Model 32	£6,037
Laser 200	£70	DAIPC	£684	Toshiba T-100	£1,900	Sharp PC3201	£2,300	Logica VTS Vitesse	£2,863	Adds Multivision	£3,795	Rair Business Computer	£6,037
Sharp PC1251	£80	Apple II	£776	Sord M23	£1,932	HP 85	£2,360	Decision-1 Computer 011	£2,869	Centro Pronto	£3,795	Digital Microsystems 4	£6,210
Jupiter Ace	£90	Commodore 500	£799	Kaypro II	£1,949	HP Series 100, 120	£2,362	DMS Fox	£2,875	Panasonic JDB000	£3,795	Superstar	£6,296
Datsic FX102P	£90	Tandy Model 4	£861	Krypton 800 range	£1,949	Sord M23P	£2,369	Eagle III	£2,950	Kemtron K3000	£3,795	Racal 6000	£6,327
Sinclair Spectrum	£99	HP 75C	£883	Kenilworth 83G	£1,953	TiProf. Computer	£2,386	Zenith ZF-120-22	£2,978	DEC PC 350	£3,850	Eagle 1600	£6,497
T199/4A	£100	Sharp MZ80B	£900	Transam Truscan	£1,985	IBM PC	£2,392	Monroe EC 8800	£2,990	Vector 4	£3,852	T1 System 200-250	£6,695
Tandy TRS-80 Pocket 2	£100	Franklin Ace	£914	Epson QX10	£1,993	Xerox 820 Model II	£2,415	Philips P3500	£3,000	Cliff Club	£3,904	CompuCor 675	£6,780
Commodore VIC 20	£140	Apple IIe	£972	DS Datamachine	£1,995	Haywood 3000	£2,439	Tanberg EC 10	£3,005	Sage II	£4,019	Wicat 150	£6,840
Atari 400	£149	Commodore 8032	£1,129	Tandy TRS-80 Model II	£1,999	LSM4	£2,472	Archives I	£3,003	Eagle IV	£4,190	Sundance I	£6,969
Sord M5	£150	Cromemco C10	£1,350	Kenilworth 83N	£2,012	Canon CX-1	£2,500	Cromemco System 1	£3,025	Tandy TRS-80 Model 16	£4,199	Pascal Mod. Microengine	£7,003
Colour Genie	£168	Commodore 710	£1,144	Caltech Micro	£2,019	Sinus I	£2,525	Wang Professional	£3,076	Hytech H4500	£4,310	Diablo 3000	£7,250
Sharp PC1500	£174	Microdecision	£1,144	Minstrel	£2,024	IO Technolona	£2,525	DEC PC 325	£3,080	BMC Ok 11F800, Model 20	£4,360	Onyx 5001 MU	£7,607
Dragon 32	£178	Fujitsu FMB	£1,150	LSIM3	£2,064	HP 87XM	£2,571	Direct 1000	£3,093	ADS 42	£4,500	Apple Lisa	£7,653
Texas CC40	£180	Sanyo MBC 1000	£1,195	Haywood 9000 Composite	£2,064	Quantum 2000	£2,587	Equator	£3,099	Televideo TS-802H	£4,533	Sundance II	£8,205
Electron	£189	Pied Piper	£1,226	Hawk Model 110	£2,070	Canon AS100	£2,633	Hyperion	£3,100	Country Com ters C1000	£4,542	Haywood Hinet	£8,550
Cam Computers Lynx	£330	Positron 9000	£1,259	Positron 9000	£2,194	Olympia Boss Model A	£2,645	Clenio Table-Tops 925	£3,105	Consoft Concept	£4,542	Altos 856-10	£9,631
Commodore 64	£229	Tandy TRS-80 Model III	£1,299	Research Machines 380Z	£2,147	Seed System 19	£2,600	ITT 3030	£3,105	ICL PC Model 31	£4,939	Micro Five 3000	£10,350
Tandy TRS-80 Colour	£240	Commodore 8096	£1,374	Superbrain JR	£2,150	Enterprise 1000	£2,645	Monroe OC 8810	£3,162	Cromemco System 3	£5,170	Sundance 16	£10,480
New Brain A	£269	Pasca40	£1,437	Future Computers FX-20	£2,156	Facit 6520	£2,645	HP Series 200 Model 16A	£3,211	Micro Five 1000	£5,175	Spectrum	£11,442
Multitech MPS II	£269	NEC PC8000	£1,454	C/WP Cortex	£2,179	Olympia Boss Model A	£2,645	Offic Series 1	£3,214	Fortune 32-16 System 2	£5,204		
Genie II	£299	Signet 2	£1,483	Comart Communicator	£2,180	Britannia Baby	£2,657	Samurai	£3,214	Zeus 4	£5,400		
Atari 800	£300	Magnum	£1,489	Adler Alphatron P2	£2,197	Adler Alphatron P3	£2,696	Torch	£3,214	Hawk Model 2110	£5,405		
Nascom 2	£327	Televideo TS-800 Series	£1,495	Country Com ters C3000	£2,242	Eagle II	£2,702	Sord M223	£3,277	Molecular M200	£5,462		
Genie I	£330	HP 85A	£1,541	Kemtron K300E	£2,242	Almarc 801	£2,708	Kemtron RS180	£3,306	Altos 800 15	£5,663		
Sharp MZ80A	£347	Osborne I	£1,581	Rair Black Box 320S	£2,242	DEC Rainbow 100	£2,714	Columbia PC 1600-1	£3,392	Durango F85	£5,744		
Microtan 65	£389	Signet 1002S	£1,599	Sanyo MBC 2000	£2,242	ICL PC Model 10	£2,754	Digipico	£3,392	Triton 4	£5,744		
BBC Model B	£399	APL Signet	£1,610	Toshiba T-200	£2,242	Milbank SX10	£2,754	OEM Orion	£3,392	Marin Chip M9900	£5,750		
Datsic M10	£431	Basis 106	£1,683	TKM 332	£2,242	Olivetti M200	£2,754	Ayle	£3,400	SW Tech Products S0-9	£5,750		
Powertan HX2	£454	Commodore Spr. Pet 9000E II	£1,719	Bonsai SM 3000	£2,294	Sinus I	£2,754	Barcellos AMT 100	£3,450	BSAF 7100	£5,805		
Epson HX20	£472	Gemini Galaxy 2	£1,719	CAL PC	£2,294	Victor 9000	£2,754	Kalamazoo 1050	£3,450	Compustar	£5,837		

## ABBREVIATIONS

Ap: APL  
As: Assembly  
Ba: Basic  
Co: Cobol  
Cm: Comal  
Fr: Fortran  
Fn: Forth  
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

# HARDWARE

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 (of extra cost)	Colour capability	Max dot resolution	Type of keyboard	No. of function keys	Numeric pad	No. of RS232	No. of Centronics	No. of IEEE 488	No. of others						No. of expansion slots
Adds Multivision	£3,795	8085A	5	64K	256K	80x25	M	640x240	W	28	1		1			1x350K5¼F	CP/M2.2, Muon	Ba	●	A2	Multi user system	
Adier Alphatronic P2	£2,197	8085A	3	48K	64K	80x24	M		W	6	●	2	1	3		2x320K5¼F	CP/M	Ba	●	T1	£327 buys extra storage	
Adier Alphatronic P3	£2,696	8085A	3	64K		80x24	M		W	6	●	2	1	3		2x790K5¼F	CP/M	Ba	●	T1	16 bit option-promised	
Ajile	£3,400	8088	4	256K		80x25	M	640x250	W	10	●	1	1	2		2x320K5¼F	MS-DOS	BaAs	●	A9	PCN issue 13	
Almarc 801	£2,708	280	4	64K	512K	80x25	(M+)	●	W	2				11		2x800K5¼F	CP/M		●	A4	8-bit range goes to 20Mb	
Almarc 1601	£3,445	8086	8	128K	1Mb	80x25	(M+)	●	W	2				11		2x800K5¼F	CP/M86		●	A4	Pseudo 16-bits go to 20Mb	
Aquarius	£68	280A	4	4K	52K	40x24	TV	●	C						1		Cassette	Ba		M7	PCN issue 7	
Altos 800/15	£5,663	280	4	192K	208K	80x24	M		W	8	●		1			1x450K5¼F	MP/M		●	L1	Multi user business machine	
Altos 856-10	£9,631	8086	10	512K	1Mb	80x24	M		W	16	●		6			2x500K5¼F	Xenix	Xenix	●	L1	The 16-bit version	
APL Signet	£1,610	280A	4	64K		80x25	Tv(M+)	●	*	*	2					2x188K5¼F	APL, CP/M	Ap	●	M1	*APL terminal recommended	
Apple II	£776	6502	1	48K	128K	40x24	Tv(M+)	●	256x192	W					8		CP/M, DOS 3.3, UCSD-P	Ba	●	A8	Plenty of software and extras	
Apple IIe	£972	6502	1	64K	128K	80x24	(M+)	●	256x192	W			1	8			DOS	Ba	●	A8	Updated Apple II	
Apple III	£2,780	6502	2	128K	256K	80x24	(M+)	●	560x192	W			1	4		1x140K5¼F	SOS, DOS	●	A8	Will emulate Apple II		
Apple Lisa	£9,775	68000	8	1Mb		120x30	M	792x360	W		●	2	1	3		2x860K5¼F	Lisa	●	A8	PCN issue 1		
Archives I	£3,003	280	4	64K		80x25	M	240x100	W	23	●	2	1	5		2x386K5¼F	CP/M		●	S1	Standard CP/M + graphics	
Archives IV	£5,905	280	4	512K		80x25	M	240x100	W	23	●	1	1	3		1x10Mb5¼H+1x7445¼F	CP/M, MP/M		●	S1	Hard disk version	
Atari 400	£150	6502B	1.79	16K		40x24	Tv	●	320x192	T	3						Cassette	Ba	●	A5	Games computer	
Atari 800	£300	6502	1.8	48K		40x24	Tv(M+)	●	320x192	W	3				7		Cassette	Ba	●	A5	Versatile, good graphics	
Barcellos AMT 100	£3,450	280A	4	64K	256K	80x24	TvM		W	8	●	1	1	2	3		2x500K8F	CP/M	BaCo	●	B1	Up to four users
BASF 7100	£5,805	280A	4	64K		80x24	M		W	26	●	1	1			3x163K5¼F	BOS	Ba	●	C1	Hard disk promised	
Basis 108	£1,683	6502	1	64K	126K	80x24	TvM	●	820x168	W	15	●		1	6				●	C12	Apple bus, Z80, 80 columns	
BBC Micro Model B	£399	6502	2	32K		80x30	Tv(M+)	●	640x256	W	10			1	5	3		MOS	BaAs	●	A1	PCN issue 3
BMC OKI if 800, Model 20	£4,360	280B	5	64K	256K	80x25	M	●	640x200	W	15	●	1				2x340K5¼F	CP/M	Ba	●	E1	Built-in printer
Bonsai SM 3000	£2,294	280	2	64K		80x24	M	80x24	W	14	●	1	1			2x350K5¼F	CP/M		●	B2	CP/M business machine	
Bonsai SM 4000	£2,842	8088	5	128K	256K	80x24	M		W	14	●	1	1				CP/M, MP/M, MS-DOS		●	B2	Z80 for 8 bit software	
Britannia Baby	£2,657	8085	6.14	64K		80x25	Tv(M+)	●	80x25	W	11	●	2	1		2x500K5¼F	CP/M	AsBaCo	●	B3	Cobol language included	
British Micro Mini 803	£1,490	280A	4	64K		80x25	(M+)	●	512x256	W	17	●	1	1	1		2x400K5¼F	OS/M		●	B4	This is CP/M compatible
CAL PC	£2,294	8088	5	128K	256K	80x25	TvM	●	256x512	W	●	2	1	1	5		2x400K5¼F	CP/M	Ba	●	C3	Also Z80B Processor
C-Base 64A	£401	6502	1	64K	192K	40x24	Tv(M+)	●	256x192	W	51	●			8		CP/M, DOS 3.3, UCSD-P	Ba	●	W3	Apple II compatible	
Caltech Micro	£2,019	280A	4	64K	256K	80x24	TvM		W	36	●	1	1	3		2x400K5¼F	CP/M		●	C3	Range of software included	
Computers Lyx	£225	280A	4	48K	192K	40x24	Tv(M+)	●	248x256	W	1		1	1			CP/M	Ba	●	C5	Also 128K with CP/M	
Canon AS100	£2,633	8088	4	128K	512K	80x25	M	●	640x400	W	12	●		1	4		2x640K5¼F		●	C4	Choice of CP/M86 or MS-DOS	
Canon CX-1	£2,500	8089	4	128K	256K	80x24	M	80x25	W	15	●	3	1	1	2		2x320K5¼F	MCX	BaAs	●	C4	Pascal, Fortran as extras
Casio FX 702P	£90	Cust.		2K		20x1	LCD		C								Cassette	Ba		C6	Pocket computer	
Casio PB100	£50	Cust.		0.7K	1.7K	60x1	LCD		C								Cassette	Ba		C6	Business pocket computer	
Casu Mini C Mark 2	£2,300	280A	4	64K		(M+)		*	*		4	1		6		2x1Mb8F			●	C7	*Choose your own terminal	
Cifer Series 1	£3,214	280	4	128K	320K	132x32	TvM		W	40	●	3	1			2x800K5¼F	CP/M		●	C17	Other models available	
Cifer Club	£3,904	280A	4	64K	256K	80x24	M	1024x300 opt	W	20	●	3	1	1		1x800K5¼F	CP/M, MP/M opt, UNIX opt		●	C17	Optional 68000 processor	
Clenio Pronto	£3,795	280A	4	64K	1Mb		Tv(M+)	*	*		2	2		18		2x600K8F	CP/M	Ba	●	C8	*Choice of terminal	
Clenio Table-Top 925	£3,105	280A	4	64K	128K	80x25	M		W	11	●	2	2			2x600K8F	CP/M		●	C8	Watch out for the weight	
Columbia PC1600-1	£3,392	8088	4.77	128K	1Mb	80x24	M	●	640x200	W	10	●	2	1	8		2x320K5¼F	CP/M, MS-DOS	Ba	●	11	An IBM lookalike
Commodore VIC 20	£140	6502	1	5K	32K	22x23	Tv(M+)	●	176x158	W	8			3	1			Kernal	Ba	●	C9	Very popular home micro
Commodore 64	£229	6510	1	64K		40x25	Tv(M+)	●	320x200	W	8							Kernal	Ba	●	C9	Good value for money
Commodore 4016	£632	6502	1	16K	32K	40x25	TvM		W					1	3		Cassette, PETDOS	Ba	●	C9	The original PET	
Commodore 700	£1,144	6509	2	128K	896K	80x25	TvM		W	10	●	1	1	2	1			Kernal	Ba	●	C9	Might be a long wait

Model	Price	RAM	Disk	Printer	Software	Expansion	Notes
Commodore 8032	£1,128	5602	1 32K	96K	80×25	TVM	
Commodore Super Pet 8000	£1,179	6502	2 96K	80×25	TVM		
Compucomp 875	£6,780	280	4 64K	256K	80×25	M	
Comarc Communicator CP100	£5,837	280A	4 64K	512K	80×24	M	
Comarc Communicator CP100	£4,887	68000	8 256K	1M	120×60	M	
Country Computers C1000	£4,542	6502	4 64K	256K	80×24	M	
Country Computers C3000	£2,242	280A	4 64K	256K	80×24	M	
CP1100	£2,639	8086	6 128K	1Mb	(M+)		
Cromemco System 1	£3,025	280	4 64K	64K	80×24	M	
Cromemco System 2	£3,960	280	4 64K	64K	80×25	(M+)	
Cromemco System 3	£5,170	280	4 64K	64K	80×25	(M+)	
Cromemco C10	£1,360	280	4 64K	64K	80×25	M	
CWP Cortex	£2,179	280	4 64K	64K	80×25	M	
DAI PC	£384	8080	2 48K	80×24	Tv(M+)		
Datasec Micro Controller	£431	280	2 16K	80×24	Tv(M+)		
DEC Rainbow 100	£2,714	8086	N/A	64K	192K	80×60	
DEC PC 325	£3,080	PDP11/23	N/A	256K	132×24	M	
DEC PC 350	£3,580	PDP11/23	N/A	256K	132×24	M	
Decision-1 Computer IDC-011	£2,869	Z80A	4 64K	192K	(M+)		
Decision-1 Computer IDC-012	£3,674	Z80A	4 64K	192K	(M+)		
Diablo 3000	£2,300	8085	3 32K	64K	80×24	M	
Digico Prince	£3,392	Z80A	4 64K	64K	80×25	M	
Digital Microsystems DMS-3	£3,376	Z80A	4 64K	64K	80×25	M	
Digital Microsystems DMS-4	£6,210	Z80A	4 128K	1/2Mb	(M+)		
Direct 1000	£3,083	280	4 64K	64K	80×25	M	
DMS Fox	£2,075	Z80A	4 64K	64K	80×24	M	
Dragon 32	£174	6809E	1 32K	64K	32×16	Tv(M+)	
Dragonfly F85	£5,744	6805A	5 64K	196K	80×64	Tv(M+)	
Eagle II	£2,702	Z80A	4 64K	64K	80×24	M	
Eagle III	£2,950	Z80A	4 64K	64K	80×24	M	
Eagle IV	£4,190	Z80A	4 64K	64K	80×24	M	
Engine 1600	£9,497	8086	8 128K	512K	80×25	M	
Electron	£1,199	6502	2 32K	80×32	Tv(M+)		
Enterprise 1000	£2,645	*	8 64K	32K	20×4	M	
Epson FX20	£472	6301	1 16K	32K	20×4	LCD	
Epson QX10	£1,995	Z80	4 192K	256K	80×25	M	
Equator	£3,842	Z80A	4 64K	448K	80×24	M	
Fact 6520	£2,645	Z80	4 64K	128K	80×24	M	
Fortune 3216 System 2	£3,204	68000	6 256K	1Mb	80×24	M	
Franklin Ace 1000	£914	6502	1 64K	128K	40×24	M, Tv	
Fujitsu PMB	£1,156	6809	1 64K	128K	40×24	M, Tv	
Future Computers FX-20	£2,150	8086	8 128K	1Mb	80×25	M	
Gene II	£399	Z80	1.7 16K	48K	64×16	Tv(M+)	
Gene III	£299	Z80	1.7 16K	48K	64×16	Tv(M+)	
Gene III	£1,887	Z80A	3.2 64K	80×24	Tv(M+)		
Colour Gene	£1,668	Z80A	2.2 32K	48K	128×48	M	
Gemini Galaxy 2	£1,719	Z80	4 64K	512K	80×24	Tv(M+)	
Gemini Galaxy 1	£1,850	Z80A	3 64K	512K	80×24	M	
Grundy 8200	£1,850	Z80A	4 64K	256K	80×24	M	
Hawk Model 110	£2,070	Z80A	4 64K	256K	80×24	M	
Hawk Model 2110	£3,405	Z80A	4 64K	256K	80×24	M	
Haywood 9000 Composite	£2,064	Z80A	4 64K	192K	80×25	M	
HP 75C	£883	Cust	N/A	16K	26K	32×1	(M+)
HP 85	£2,360	Cust	N/A	16K	32K	32×20	M

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	Language etc	Other languages available	Distributor	Comments
						Max characters columns × lines	Method (of extra cost)	Colour capability	Max dot resolution	Type of keyboard	No. of function keys	Numeric pad	No. of RS232	No. of Centronics	No. of IEEE 488	No. of others					

# HARDWARE

HP 86A	£1,541	Cust.	N/A	64K	512K	80×24	M	544×240	W			1	1	2	4			HP	Ba	●	H2	CP/M optional
HP 87XM	£2,571	Cust.	N/A	128K	640K	80×24	M	544×240	W	14	●	1	1	1	3	4		HP DOS	Ba	●	H2	Special technical uses
HP Series 100, 120	£2,362	Z80A	3.6	64K		80×24	M	80×24	W	8	●	2			1			CP/M	Ba	●	H2	Top end HP business system
HP Series 200 Model 16A	£3,212	68000	8	128K	750K	80×25	M		W	5		1	1	1	2			HP		●	H2	Genuine 16-bit
Hyperion	£3,100	8088	4.7	256K		80×25	M	320×200	W	10	●	1	1	1			1×320K5¼f	MS, DOS, CP/M 86	BaAs	●	G5	Same as Ajile
Hylech H4500	£4,310	Z80	4	64K	208K	80×25	M	80×25	W	26	●	1			3		2×403K5¼f	CP/M	Ba	●	H3	Standard CP/M micro
IBM PC	£2,392	8088	4.7	64K	576K	80×25	(M+)	●	640×200	W	10	●	1		5		1×360K5¼f	MS-DOS	Ba	●	I9	Slow but reliable
ICL PC Model 10	£2,754	8085	3	64K	256K	80×24	Tv(M+)			W	11	●	2		8		2×700K5¼f	CP/M	Ba	●	I4	Repackaged Rair Black Box
ICL PC Model 31	£4,939	8085	3	128K	256K	80×24	(M+)		80×24	W	11	●	4		8		1×250K5¼f + 1×5MbH	CP/M, MP/M	Ba	●	I4	Multi user Black box
ICL PC Model 32	£6,037	8085	3	256K		80×24	(M+)		80×24	W	11	●	8		8		1×250K5¼f + 1×5MbH	CP/M, MP/M	Ba	●	I4	Top of ICL range
IDS Datamachine	£1,995	Z80	4	64K	1Mb		Tv(M+)			W		2		2	15		2×400K5¼f	CP/M	Ba	●	I8	*Depends on terminal
IO Tech Iona	£2,539	Z80	4	69K	960K	80×24	M	●	160×75	W	12	●	1	1	8	●	2×400K5¼f	CP/M	Ba	●	I5	Good colour versatility
ITT 3030	£3,105	Z80A	4	64K	256K	80×24	Tv(M+)		80×24	W	8	●	1		1		2×280K5¼f	CP/M, BOS	Ba	●	I7	Top end business system
Jupiter Ace	£90	Z80	3.25	3K	51K	32×24	Tv(M+)		64×46	C	●	1		1	●				Fr	●	J1	Native Forth machine
Kalamazoo 1050	£3,450	8085	6	64K		80×24	Tv(M+)		80×24	W	10	●					2×250K5¼f	Kalamazoo	●	K3	Only Kabol language	
Kaypro II	£1,949	Z80	4	64K		80×24	M		80×24	W	●	1					2×200K5¼f	CP/M	Ba	●	C15	A portable business machine
Kemtron K2000E	£2,242	Z80	4	64K		80×24	(M+)		80×24	W	●	2	1		11		1×300K5¼f	CP/M	●	K4	Scientific Keyboard	
Kemtron K3000	£3,795	Z80	4	64K	256K	80×24	(M+)		80×24	W	●	2			14		2×1Mb8F	CP/M, MP/M	●	K4	For scientific use	
Kenilworth 83G	£1,953	Z80A	4	64K		80×25	TvM		160×75	W	10	●	1	1	5		2×350K5¼f	CP/M	●	K5	British portable	
Kontron RSI 80	£3,306	Z80	4	64K	128K	80×25	M	256×512	W	16	●	2	1		8		2×303K5¼f	Kontron	Ba	●	K6	O/S CP/M based
Krypton 800 range	£1,949	Z80A	4	64K	256K	80×24	M		80×24	W	13	●	2	1	8		2×386K5¼f	CP/M	●	T8	Fully definable characters	
Laser 200	£70	Z80A	3.6	4K	64K	32×16	TV	●	32×16	C	●	1		1	●			Ba	●	L14	Cheap colour computer	
LSI M3	£2,064	Z80	2.5	64K		80×24	M		80×24	W	31	●	1	1	1		2×200K5¼f	CP/M	●	L3	Big, British and CP/M	
LSI M4	£2,472	8088	5	128K	256K	80×24	M		160×72	W	31	●	2	1	1		2×400K5¼f	CP/M 86, CP/M80	●	L3	Z80 for 8-bit software	
Logica VTS Vitesse	£2,863	8086	5	64K	256K	80×24	M	●	640×288	W	12	●	1	1	4		2×1Mb5¼f	CP/M, MS-DOS	Ba	●	L4	High-res colour graphics
Magnum	£1,489	Z80	4	64K		80×25	M			W	●	2					2×400K5¼f	CP/M	●	I6	Inexpensive CP/M machine	
Marin Chip M9900	£5,750	9900	3	64K	1.6Mb	80×24	M	24×80	W	8	●	4		12		2×1.2Mb8F	MOS, MDEX	Ba	●	M2	Genuine 16-bit	
Micro Five 1000	£5,175	8088	8	128K	512K	25×80	TvM	512×512	W	20	●	10		2		2×1Mb5¼f + 2×6.3Mb5¼f		●	F2	*Choose your own O/S		
Micro Five 3000	£10,350	8086	5	128K	1Mb	25×80	TvM	512×512	W	20	●	5		3	●	1×10Mb8F		●	F2	*Choose your own O/S		
Microdecision	£1,144	Z80	4	64K		80×24	(M+)			W	●	2					1×200K5¼f	CP/M	Ba, Pilot	●	M9	*Terminal extra
Microsolution British Genius	£1,840	Z80	4	64K		80×24	TvM		80×24	W	21	●	1	1			2×160K5¼f	CP/M	●	M4	'Genius' by nature?	
Microtan 65	£389	6502	1	8K	48K	25×64	(TvM+)			W	●	1	2		●			Ba	●	M8	Expandable in many ways	
Milbank SX10	£2,754	Z80A	4	65K	256K	80×25	M		80×25	W	10	●	2	1			2×350K5¼f	CP/M	As	●	M5	Scientific applications
Minstrel	£2,059	Z80	4	64K	352K					W	●	2	1				2×400K5¼f	CP/M opt	●	H4	Choose your terminal	
Molecular M200	£5,462	Z80	4	64K	320K		(M+)*			W	●	2		1	16		1×10Mb8H + 1×500K8F	CP/M	BaAs	●	G2	*Terminal required
Monroe EC880	£2,990	Z80A	3	128K		40×24	M	240×240	W	32	●	3		3			1×320K5¼f	Monroe	BaPaPilot	●	F3	Only 40-character screen
Monroe OC8810	£3,162	Z80A	3	128K		80×24	M	80×24	W	32	●	3		2	1		1×320K5¼f	Monroe	BaPa	●	F3	Bigger model available
Multitech MPFII	£269	6502	1.2	64K		40×24	Tv(M+)	●	280×192	C	●	1		1	●			Cassette	Ba	●	S8	Apple soft compatible
Nascom 2/3	£327	Z80A	4	2K	64K	16×48	Tv(M+)		48×96	W	●	1		4	●			NAS, SYS	BaAs	●	L5	Old reliable
NEC PC8000	£1,454	Z80	4	32K	64K	80×25	M	●	160×100	W	10	●	2	1			2×300K5¼f	CP/M, NEC, DOS	Ba	●	N1	Superb colour graphics
New Brain A	£269	Z80A	4	32K	512K	80×30	Tv(M+)		640×220	C	●	2		1	●			Cassette	Ba	●	G3	A lot of promise
North Star Advantage	£2,766	Z80	4	64K		80×24	M	●	640×240	W	15	●			6		2×360K5¼f	CP/M	●	T9	16-bit option	
North Star Horizon	£2,294	Z80	4	64K	512K					W	●	2	1	1	9		2×360K5¼f	North Star DOS	Ba	●	T9	*Choose your own terminal
OEM Orion	£3,392	8086	8	128K	896K	80×25	TvM	800×400	W	13	●	11		6			2×500K5¼f	CP/M 86	BaCo	●	O5	*Full communications machine
Olivetti M20	£2,754	Z8000	3	160K	512K	80×25	M	●	512×256	W	●	1	1		5		2×320K5¼f	PCOS	Ba	●	B6	Real 16-bitter

Olympia Boss Model A	£2,645	Z80A	4	64K	80x28	M	●	80x28	W	10	●	1	1	4	2x140K5¼F	CP/M	●	T1	Useful 28 lines on screen			
Oric 1	£7,607	Z80A	4	128K	256K	*	●	*	W	●	5	1	1	●	1x7Mb5¼H	CP/M	Ba	●	O2	*Terminal extra; other models		
Osborne 1	£1,100	6502A	1	16K	48K	40x28	Tv(M+)	●	240x200	C	●	1	1	1	●	Cassette	Ba	●	O3	4-colour printer opt		
Panasonic JD 800M	£3,795	8085A	4	60K		80x24	M	●	80x24	W	21	●	3		2x250K8F	CP/M	Ba	●	O2	Portable, includes software		
Pascal 647	£1,437	Z80A	4	64K		80x24	M	●		W	●	1	1		2x250K8F	CP/M	●	P1	Regular model costs £5,002			
Pascal Modular Microengine	£7,003	WD9000	2	128K	*	*	*	*	*	*	*	4	1	8	2x1.2Mb8F	UCSD-P	Pa	●	P2	*Terminal extra		
Pied Piper	£1,226	Z80A	4	64K		80x24	Tv(M+)	●		W	36	●	1	1	1x780K5¼F	CP/M	●	S11	PCN issue 4			
Philips P3500	£3,000	Z80A	4	64K	320K	80x25	M	●		W	11	●	2		2x0.6Mb5¼F	CP/M	Co	●	P3	Fast O/S as standard		
Positron 900	£1,259	6809	1	64K	256K	(M+)	*	*	*	*	*	4	1	3	O/S	Ba	●	P4	*You choose your terminal			
Positron 9000	£2,134	6809	1	64K	256K	80x24	TvM	●	480x240	W	12	●	4	1	3	O/S	Ba	●	P4	*Multi-user version		
Powertran Cortex	£454	9995	12	64K	192K	40x24	Tv(M+)	●	256x192	W	12	●	1	1	●	Ba18	●	M2	Mainly sold as £340 kit			
Quantum 2000	£2,587	Z80A	4	64K	128K	80x25	M	●		W	18	●	1	5	3x860K5¼F	CP/M	●	Q1	Mono, low-res graphics			
Rair Black Box Model 3/20S	£2,242	8085	5	64K	256K	80x24	(M+)	●		*	2	2	8	2x1Mb5¼F	CP/M	Ba	●	R1	*VDU extra; many versions			
Rair Business Computer	£6,037	8085	5	256K	1Mb	80x25	M	●		W	10	●	2	4	8	1x19Mb5¼H+1x1Mb5¼F	CP/M, PCDOS	Ba	●	R1	Hybrid 8/16 bit	
Rascal 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	2x144K5¼F	CP/M	Ba	●	R3	Widely used in schools		
Research Machines Link 480Z	£650	Z80A	4	32K	256K	40x24	Tv(M+)	●		W	4	2	1	1	2	Cassette	Ba	●	R3	CPN/Net version available		
Sage II	£4,019	68000	8	128K	512K	(M+)	*	*	*	*	*	2	1	1	2x640K5¼F	UCSD-P System	BaAsPaFm	●	T10	*Terminal extra		
Sage IV	£5,962	68000	8	128K	1Mb	(M+)	●	*	*	*	6	1	1	1	2x640K5¼F+1x6Mb5¼H	UCSD-P System	BaAsPaFm	●	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	1x320K5¼F	CP/M	Ba	●	L1	Standard CP/M model		
Sanyo MBC 1250	£2,294	Z80	4	64K		80x40	M	●	640x400	W	●	1	1		2x640K5¼F	CP/M	Ba	●	L1	High-res graphics		
Sanyo MBC 2000	£2,242	8085A	5	64K		80x24	M	●	80x24	W	24	●	2	1	2	2x328K5¼F	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		2x640K5¼F	CP/M 86	Ba	●	L1	Pseudo 16-bit		
Seed System 1	£2,300	6800	2	32K	64K	80x24	M	●	80x24	W	3	2	8	8	2x160K5¼F	DOS 86 Flex	Ba	●	S3	Ageing business machine		
Seed System 19	£2,600	6809	2	48K	1Mb	80x24	M	●		W	3	2	8	8	2x160K5¼F	OS-9	●	S3	Latest from Seed			
Sharp MZ80A	£347	Z80	2	48K		40x25	M	●	80x50	W	●	1	1	●		Sharp Basic	Ba	●	S4	CP/M facility extra		
Sharp MZ80B	£900	Z80A	4	64K		80x25	M	●	320x200	C	10	●	1	2		Sharp Basic	Ba	●	S4	Unusual keyboard		
Sharp PC1251	£79.95	Cust.	.58	4.2K		LCD	24x1	C	18	●	1	1	1	●		Sharp Basic	Ba	●	S4	Pocket computer		
Sharp PC1500	£169	Cust.	1.3	3.5K	11.5K	26x1	LCD	156x7	C	6	●	1	1	2		Cassette	Ba	●	S4	Optional 4-pen plotter		
Sharp PC3201	£2,300	Z80A	2.6	64K	112K	80x25	M	●	160x50	W	10	●	1	5	2x500K5¼F	Sharp Basic	Ba	●	S4	Powerful Sharp Basic		
Signet 10025	£1,599	Z80B	6	64K		80x24	M	●	512x512	W	●	2	1	1	2x200K5¼F	CP/M, Macros	●	S9	Choice of keyboards			
Signet 2	£1,483	Z80	4	64K		80x24	(M+)	●	512x256	W	18	●	2	1	2x200K5¼F	CP/M	●	S9	Multi-user system			
Sinclair ZX81	£45	Z80A	16K	16K	32x24	Tv	64x44	C				1	●	1	Cassette	Ba	●	S5	Sold a million			
Sinclair Spectrum	£99	Z80A	3.5	16K	48K	32x24	Tv	●	256x192	C		1	●	1	Cassette	Ba	●	S5	PCN issue 14			
Sirius I	£2,525	8086	5	128K	896K	80x25	M	●	800x400	W	7	●	2	1	4	2x600K5¼F	CP/M 86, MS DOS	Ba	●	A7	IBM style	
Sord M5	£150	Z80A	4	4K	16K	40x24	Tv(M+)	●	256x196	C	●	1	2	2	Cassette	Ba	●	S6	PCN issue 12			
Sord M23	£1,932	Z80A	4	128K		80x25	M	●		W	14	●	2	1	2	3	2x330K5¼F	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	2x290K3¼F	Sord O/S, SB80	BaPips	●	S6	Complete with suitcase
Sord M223	£3,277	Z80	4	64K		80x25	M	●		W	●	2	4		2x350K5¼F	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	2x1.5Mb5¼F	Flex, Uniflex	●	S7	Top end SWTP			
Spectrum	£11,442	68000	8	256K	4Mb	(M+)	*	*	*	*	*	4	1	16	2x720K5¼F	Mirage	Ap	●	M1	*As terminal		
Sundance I	£6,969	Z80A	4	64K	256K	132x24	M	●		W	4	●	1	1	●	1x7Mb5¼H	CP/M	Ba	●	T2	Ordinary CP/M machine	
Sundance II	£8,205	Z80A	4	128K	256K	132x24	M	●		W	4	●	1	1	●	1x7Mb5¼H	CP/M	Ba	●	T2	Middle-range Sundance	
Sundance 16	£10,480	Z8001	6	256K	1Mb	80x24	M	●		W	●	5	1	1	●	1x14Mb5¼H	BOS	●	T2	Tape backup for hard disk		
Superbrain JR	£2,127	Z80A	4	64K		80x24	M	●	560x240	W	●	2	1	1	2x160K5¼F	CP/M	Ba	●	I10	Bigger models available		
Superstar	£6,296	Z80	4	64K		80x24	Tv(M+)	●	80x24	W	●	1	1	8	1x10Mb5¼H+1x400K5¼F	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	●	80x24	W	2	●	2	1	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	●	2x184K5¼F	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	£240	6809E	1	16K	32K	32x16	Tv	●	256x192	W	●	1	1	●	Cassette	Ba	●	T4	Related to Dragon 32			
Tandy TRS-80 PC4	£50	Cust.	N/A	½K	1½K	12x1	LCD	12x1	C	9	●	1	1	1	Cassette	Ba	●	T4	Low-cost pocket computer			

Make and model	Price inc VAT	Processor type	Speed in MHz	Standard RAM	Max RAM at extra cost	Display		Graphics		Keyboard		Interfaces built-in				Storage		Operating system	Languages inc	Other languages available	Distributor	Comments
						Max characters displayed at 1 line	Method (if extra cost)	Colour capability	Max dot resolution	Type of keyboard	No. of function keys	No. of numeric pad	No. of RS232	No. of Ceramics	No. of EEE-488	No. of others	No. of expansion slots					

# HARDWARE

Tandy Model 4	£861	Z80A	2	16K	128K	80x24	M		80x24	W 10	1	1				1x187K5¼F	TRS DOS	Ba	●	T4	Floppies versions available			
Tandy Model 100	£499	8085	2.4	8K	32K	40x8	LCD		240x62	W	1							Ba	●	T4	Software built in			
Tandy TRS-80 PC2	£130	Cust.	1.3	2.6K	16K	26x1	LCD		156x7	C 6	●						Cassette	Ba	●	T4	Plotter available			
Televideo TS-802H	£4,533	Z80	4	64K		80x24	M		80x24	W 15	●	2	1		1x256K5¼F+1x7Mb5¼H	CP/M		●	C11	●	C11	Recently upgraded		
Televideo TS-800 Series	£1,495	Z80A	4	64K		80x24	M		80x24	W 15	●	2	1				CP/M		●	C11	●	C11	Standard CP/M machine	
Televideo TS 1602-C	£1,323	8088	5	128K	256K	80x24	M		576x424	W 15	●	2	1			2x256K5¼F	CP/M-86		●	C11	●	C11	Graphics, but no colour	
TI Professional Computer	£2,386	8088	5	64K	256K	80x25	M			W 12	●			1		1x320K5¼F			●	T5	●	T5	PCN issue 3	
Texas CC40	£180	Cust.		6K	18K	31x1	LCD		31x1	W 4	●							Ba	●	T5	●	T5	Cartridge software available	
Texas Instruments TI-99/4A	£100	9900	3.5	16K	52K	32x24	Tv(M+)	●	256x192	W	●						DOS	Ba	●	T5	●	T5	This has sprite graphics	
TI System 200-250	£6,695	9900	4	64K		80x24	M		80x24	W 12	●	1				1x5Mb5¼H	UCSD-P, PX10		●	T5	●	T5	Bigger version available	
TMK 332	£2,242	8085A	5	64K		80x24	M		190x96	W 22	●	2	1			2x320K5¼F	CP/M	Ba	●	P5	●	P5	'6502 I/O processor	
Torch	£3,214	Z80*	4/2	96K		80x30	TvM	●	640x256	W 15	●	1	1	4		2x400K5¼F	CPN	Ba	●	T6	●	T6	CP/M compatible	
Toshiba T-100	£1,900	Z80A	4	64K	96K	80x25	TvM	●	640x200	W 8	●	1	1	2		2x256K5¼F	CP/M	Ba	●	O4	●	O4	Pro test March 18	
Toshiba T-200	£2,242	8085	2.6	64K		80x24	M		80x24	W 15	●	1	1	1		2x256K5¼F	CP/M	Ba	●	O4	●	O4	Standard CP/M machine	
Transam Truscan	£1,983	Z80A	4	64K		80x24	TvM		640x288	W	●	2	1	1	5		2x190K5¼F	CP/M		●	T7	●	T7	S-100 machine
Triton 4	£5,744	Z80A	4	64K	160K	80x24	M			W 8	●	1	1	3		2x12Mb8F	MPSL-POS		●	T11	●	T11	Upgradable to Winchester disk	
Vector 4	£3,852	8088	5	128K	256K	80x24	M		640x312	W 15	●	1	1	2		2x630K5¼F	CP/M, CP/M 86	Ba	●	A4	●	A4	8-bit and pseudo 16-bit	
Victor 9000	£2,754	8088	5	128K	896K	80x25	M		800x400	W 7	●	2	1	4		2x600K5¼F	CP/M 86, MS-DOS	Ba	●	D8	●	D8	Same as Sirius 1	
Wang Professional	£3,076	8086	8	128K	256K	80x25	M		800x300	W 16	●	1	1			2x360K5¼F	MSDOS, CP/M80, USCDP	Ba	●	W4	●	W4	8087 co-processor optional	
Wicat 150	£6,846	68000	8	256K	1.5Mb	80x25	M		400x300	W 20	●	2	1	1		2x216K5F	MCS	Ba	●	S10	●	S10	Upgradable to 32 user system	
Wilkes YDB110	£4,025	8086	5	128K	896K	80x24	M		960x624	W 21	●	1	6			2x1.2Mb8F	CP/M 86	Ba	●	W2	●	W2	Standard CP/M machine	
Xerox 820 Model II	£2,415	Z80A	4	64K		80x24	M		1024x512	W	●	2	2	2		2x160K5¼F	CP/M		●	R4	●	R4	Powerful graphics	
Zenith ZF-120-22	£2,978	8088	5	128K	192K	80x25	M		640x225	W 18	●	2	1	1	5		2x320K5¼F	CP/M, MS-DOS, Z Basic		●	Z1	●	Z1	PCN issue 28
Zeus 4	£5,400	Z80	4	64K	320K	80x25	(M+)		80x25	W 11	●					1x6Mb5¼H+1x250K5¼F	CP/M, Muse	As	●	M5	●	M5	Designed as multi-user	

# DISTRIBUTORS

A1 Acorn Computers, Cambridge 245200 A2 Adds (UK) Ltd, 01-949 1272 A3 Ads Ltd, 01-947 4881 A4 Almarc Data, Nottingham 5565 A5 Atari International (UK), Slough 33344 A7 ACT, 021-454 8585 A8 Apple Computers, Hemel Hempstead 60244 A9 Anderson Jacobson Ltd, Slough 25172  
 B1 Barcelona Ltd, Leicester 541574 B2 Bonnal, 01-580 0902 B3 Britannia Computer Ltd, Dudley 233433 B4 British Micro, Watford 8202 B5 Business Computers Ltd, 01-207 3344 B6 British Olivetti, 01-735 6686 B7 Bromley Computer Consultancy, 01-697 8933 B8 C1 Computer Peripherals Ltd, 01-278 7837 C2 Country Computers Ltd, Redditch 29626 C3 Computer Ancillaries, Egham 36455 C4 Canon (UK) Ltd, 01-680 7700 C5 Computers Lynx, Cambridge 315063 C6 Casio, 01-450 9131 C7 Casu Electronics Ltd, Uxbridge 72511 C8 Crenio Computer Systems, 01-670 4202 C9 Commodore Business Machines, Slough 79292 C10 Compucorp, 01-807 0198 C11 Colt Computer Systems, 01-577 2688 C12 Community Computers, Peterfield 87567 C13 Comart, Huntingdon 215005 C14 Computers For All, Basildon 418414 C15 CUK Computer, Plymouth 780311 C16 Country Computers, Redditch 29626 C17 Cret, Melksham 706361 C18 Comart, St. Neots 215005 C19 Ceedata, 01-941 4889 C20 CWP Computers, 01-829 900 C21 Datic, 061-941 2961 D2 Dec Ltd, Basingstoke 59200 D3 Digico, Letchworth 78172 D4 Digital Microsystems, Reading 34388 D5 Direct (UK), Warrington 814072 D6 Dragon Data Ltd, Kenfig Hill 744700 D7 Data General, 01-572 7455 D8 DRG, Weston-super-Mare 415398 D9 Data Applications, Cirencester 61828  
 E1 Encotel Systems, 01-686 9687 E2 Epson (UK), 01-902 8892 E3 Equinox, 01-739 2387 F1 Facki Addo Ltd, Medway 401721 F2 Five Technology, Lichfield 57701 F3 FI Cord, 061-445 7716 F4 Flight Electronics, Southampton 27721  
 G1 Gemini Micros, Amersham 28321 G2 Gecas, 01-629 3758 G3 Grundy Business Computers, 01-943 1901 G4 Globe Business Systems, Weston-super-Mare 83522 G5 Gulfstream, 040 26 4926  
 H1 Haywood Electronic Asoc Ltd, 01-428 0111 H2 Hewlett Packard, Bracknell 63100 H3 Hytech Microsystems, Oxford 726644 H4 Hotel Microsystems, 01-328 8737  
 I1 Icarus Computer Systems, 01-585 5574 I2 Interam Computer Systems, 01-675 5325 I3 IBR Microcomputers, Reading 664111 I4 ICL, Slough 31111 I5 IO Technology, 01-248 4876 I6 Irvine Business Systems Ltd, Irvine 75000 I7 ITT Consumer Products, Basildon 3040 I8 Interactive Data Systems, Milton Keynes 313997 I9 IBM UK Product Sales Ltd, 01-578 4399 I10 Intertec Data Systems, 01-840 1599

J1 Jupiter Carlisle, Cambridge 313473  
 K1 Kien Computers, Nottingham 412777 K2 KGB Micros, Slough 38581 K3 Kalamazoo Business Systems, 021-475 2191 K4 Kemtron, Chester 21817 K5 Kenilworth Computers, Kenilworth 512127 K6 Kontron Computers, St Albans 66222  
 L1 Logitek, Stanfield 426644 L2 Lowe Electronics, Malook 4995 L3 LSI Computers Ltd, Woking 23411 L4 Logica VTS, 01-637 5171 L5 Lucas Logic, Kenilworth 59412 L6 Leicester Micro Systems, Leicester 551869  
 M1 Micro APPL Ltd, 01-834 2687 M2 Microprocessor Engineering, Southampton 775482 M3 Mediatech, 01-903 4372 M4 Microsolution, Chipping Norton 3516 M5 Millbank Computer, 01-891 4691 M6 Micro Networks Ltd, 01-602 7405 M7 Mattel, 01-900 0311 M8 Microtinal Computer Systems, 01-693 1137 M9 Midlectron, Derby 6811  
 N1 NEC 01-388 6100  
 O1 Olympia Base Systems, 01-262 6788 O2 Orc Products International, Ascot 27686 O3 Osborne Computer, Milton Keynes 615274 O4 Office International, Sunbury-on-Thames 85666 O5 OEM, 01-407 3191  
 P1 Panasonic Business Equipment (UK), Slough 75841 P2 Pronto Electronic Systems, 01-554 6222 P3 Phillips Business Systems, Colchester 575115 P4 Positron Computer Ltd, Newton-le-Willows 29741 P5 PHL, 021-745 3033  
 Q1 Quantum Computer Systems, Leeds 458877  
 R1 Rair Ltd, 01-836 6921 R2 Racal, Reading 782158 R3 Research Machines Ltd, Oxford 249866 R4 Rank Xerox, Uxbridge 51137 R5 Salmon Electronics, Darlington 721368 R6 Siring Microsystems, 01-486 7671 R3 Seed, Brownhills 378151 R4 Sharp 548181 R5 Texas Instruments, Bedford 67486 T6 Torch Computers, Cambridge 841000 T7 Transam Microsystems, 01-404 4554 T8 Transex, Bristol 277462 T9 TRW Datacom International Ltd, Windsor 59183 T10 TDI, Bristol 742796 T11 Trivector Commerce, Biggleswade 82222  
 W1 Westrex Ltd, 01-578 0957 W2 Wilkes Computers, Bristol 277399 W3 Woltricon, 01-930 1991 W4 Wang UK, 01-560 4151 Z1 Zenith Data Systems, Gloucester 29451

# LEISUREBASE. NEW NAME IN

Prices correct at time of going to press. Please telephone to verify before making a journey.

Introducing Leisurebase — the friendly new name in microcomputers. You'll find us a friendly bunch and we aim to take a lot of the mystique out of buying microcomputers. You'll find our prices competitive and our product range wide. We also make sure we can support you with a comprehensive selection of peripherals and software.

## Leisurebase No Deposit Instant Credit

No deposit instant credit is available at your local Leisurebase when you use the budget card. Please call in and ask for written details. We also take Barclaycard Visa and Access. (Leisurebase Credit Brokers APR. 30.6%.)

## Part Exchange

If you're looking to upgrade your computer, come to us first as we are often willing to take good quality used equipment in part exchange.

Whichever way you look at it, you'll be better off coming to Leisurebase first.

## SPECIAL OFFER ON PERIPHERALS

Spectravision Quick Shot Joysticks for Atari and Commodore	11.99
Daytel joystick interface for Spectrum	12.99
Benkson TRC6 Cassette Recorder fits computers with standard jack socket	29.99

## NEW ATARI MODELS

By the time you read this we should have in stock supplies of two exciting new models from Atari the 600XL and the 800XL

## LEISUREBASE SOFTWARE

We can't do justice in this ad. to the wide range of software available at Leisurebase stores and the following should be seen as a small selection only.

### RABBIT SOFTWARE

#### For VIC 20

Paratroopers · Anti Matter Splatter · Packacuda · Escape MCP · Quackers · Critters · Cyclons · Race Fun · Myriad · English Invaders · The Catch

ALL AT  
**5.99**

Annihilator · Night Crawler · Hopper · Rabbit Software also available for VIC 64

ALL AT  
**9.99**

### VIRGIN SOFTWARE

For Spectrum: Yomp · Starfire · Sheepwalk · Go!

For VIC20  
Mission Mercury

ALL AT  
**7.99**

### IMAGINE SOFTWARE

For Spectrum: Arcadia · Schizoids · Ah Diddums · Molar Maul · Jumping Jack · Z Zoom · Zip Zap

ALL AT  
**5.50**

For VIC 20: Arcadia · Wacky Waiters · Catcha Snatcha · Frantic

ALL AT  
**5.50**

## TEXAS SOFTWARE — NEW LOW PRICES

Video Chess	34.99	Hunt the Wumpus	14.99
Attack	14.99	Blasto	11.99
Tombstone City	14.99	TI Invaders	19.99
Car Wars	19.99	Alpiner	24.99
Munchman	29.99	Chisholm Trail	19.99
Parsec	29.99	Adventure	24.99
Adventure (cass.)	ea. 14.99	Early Learning Fun	14.99
Number Magic	14.99	Addition/Subtraction I	19.99
Multiplication	19.99	Alligator Mix	24.99
Dragon Mix	24.99	Meteor Multiplication	24.99
Prog. Language extended BASIC	69.99	Mini Memory	69.99



**ATARI 800**  
NOW INCORPORATING A BIG 48K RAM, THE 800 IS ONE OF THE MOST FORMIDABLE HOME MICROS ON THE MARKET. FEATURES INCLUDE: 10K ROM, 16 COLOUR GRAPHICS, FOUR INDEPENDENT SOUND VOICES COVERING 3½ OCTAVES, BASIC CARTRIDGE

1984 - LEISUREBASE PRICE  
**149.99**  
INC. VAT

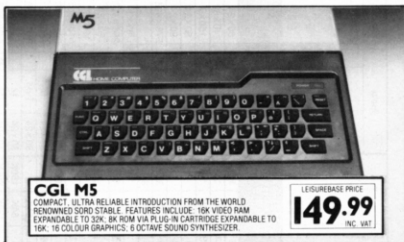
LEISUREBASE PRICE  
**299.99**  
INC. VAT



**SINCLAIR ZX SPECTRUM**  
THE 16K VERSION HAS NOW CRASHED THROUGH THE £100 BARRIER AND BOTH OFFER AMAZING VALUE. FEATURES INCLUDE: 16K BASIC ROM, 8 COLOUR GRAPHICS, 'BE' SOUND COMMAND, FULL SIZE KEYBOARD, WIDEST POSSIBLE SOFTWARE CHOICE.

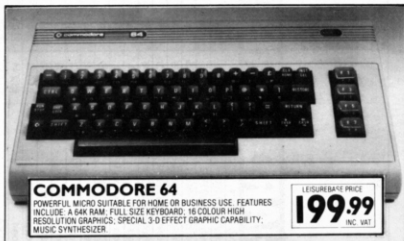
1984 - LEISUREBASE PRICE  
**99.99**  
INC. VAT

1984 - LEISUREBASE PRICE  
**129.99**  
INC. VAT



**CGML M5**  
COMPACT, ULTRA RELIABLE INTRODUCTION FROM THE WORLD RENOWNED SORD STABLE. FEATURES INCLUDE: 16K VIDEO RAM EXPANDABLE TO 32K, 8K ROM VIA PLUS-IN CARTRIDGE EXPANDABLE TO 16K, 16 COLOUR GRAPHICS, 6 OCTAVE SOUND SYNTHESIZER.

LEISUREBASE PRICE  
**149.99**  
INC. VAT



**COMMODORE 64**  
POWERFUL MICRO SUITABLE FOR HOME OR BUSINESS USE. FEATURES INCLUDE: A 64K RAM, FULL SIZE KEYBOARD, 16 COLOUR HIGH RESOLUTION GRAPHICS, SPECIAL 3-D EFFECT GRAPHIC CAPABILITY, MUSIC SYNTHESIZER.

LEISUREBASE PRICE  
**199.99**  
INC. VAT

# THE FRIENDLY COMPUTER

**ATTENTION ALL DEALERS**  
 For details of Britain's newest & brightest Computer Franchise Group contact Erica Woodhouse on 0279 58371 or write in strictest confidence to: Leisurebase, Unit 9, Raynham Road Industrial Estate, Bishops Stortford, Herts. Each new dealer will be allotted an exclusive territory & we urge you to contact us now!

## YOUR LOCAL LEISUREBASE DEALER

### SINCLAIR ZX 81

FAR AND AWAY THE WORLD'S BIGGEST SELLING HOME MICRO AND THE MODEL THAT'S INTRODUCED COMPUTING TO A WHOLE GENERATION. FEATURES INCLUDE 8K ROM, 1K RAM EXPANDABLE TO 16K, INGENUOUS FLAT FACE KEYBOARD, MASSIVE RANGE OF COMPATIBLE PERIPHERALS AND SOFTWARE.

LEISUREBASE PRICE  
**44.99**  
 INC. VAT

### ORIC 1 48K

ULTRA COMPETITIVE PRICE FOR A 48K MODEL. FEATURES INCLUDE SMART, COMPACT STYLING, HIGH RESOLUTION COLOUR GRAPHICS, PRINTER/DISK DRIVE/TELETEXT COMPATIBLE, 8 OCTAVE SOUND WITH HI-FI OUTPUT.

LEISUREBASE PRICE  
**139.99**  
 INC. VAT

### VIC 20 COMPLETE STARTER PACK

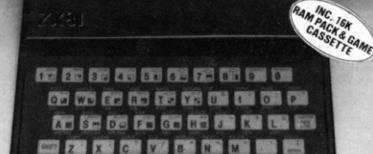
A COMPLETE COMPUTER SYSTEM IN ONE BOX BASED ON THE LEGENDARY VIC 20. PACK ALSO INCLUDES A CASSETTE UNIT, A SIMPLE EXPLANATION OF COMPUTER PROGRAMMING, INTRODUCTION TO BASIC PART 1 AND AN EXCLUSIVE COMPILED TAPES OF 4 COMPUTER PROGRAMS - BLITZ, TYPE-A-TUNE, RACE AND HOPPY.

LEISUREBASE PRICE  
**134.99**  
 INC. VAT

### TEXAS TI 99/4A

SUPER USER FRIENDLY MICRO THAT IS SIMPLE TO USE AND IS EXPANDABLE AS YOUR INTEREST GROWS. FEATURES INCLUDE INTERNAL 26K ROM MEMORY, 16K RAM EXPANDABLE TO 48K, CONTROLLABLE 5 OCTAVE 3 SIMULTANEOUS TONE SOUND, PLUS NOISE GENERATOR, 16 COLOUR GRAPHICS.

LEISUREBASE PRICE  
**99.99**  
 INC. VAT



#### BASILDON

Godfrey Photographic  
 4-5 Landon Main  
 Centre, Landon  
 Tel: 0248 416747

#### BELFAST

APM Studios  
 337 Newtownards Rd  
 Tel: 0232 59710  
 C. Wed

#### BELPER

Opening Soon  
 Harrison Computer  
 Supplies

#### BIRMINGHAM

1 Chapel St  
 Tel: 0773 820202

#### BRADFORD

Photovase  
 18 Cheapside  
 Tel: 0274 308598

#### BRENTWOOD

New store opening  
 Phone 0279 583771  
 for details

#### BURTON ON TRENT

Leisurebase  
 In-store at East  
 Midlands Co-op  
 Tel: 0283 46545

#### CARDIFF

Leisurebase  
 13/15 Morgan Arcade  
 Tel: 0222 394182

#### CHELMSFORD

Godfrey's  
 Photomarket  
 54 High St.  
 Tel: 0245 355230

#### CHESTER

Chester Camera Centre  
 9 Bridge Street Row  
 Tel: 0244 26531

#### COVENTRY

New store opening  
 Phone 0279 58371  
 for details

#### CREWE

Crewe Camera Exchange  
 265 Edleston Rd  
 Tel: 0270 256854

#### DERBY

Leisurebase  
 In-store at East  
 Midlands Co-op  
 Albion St  
 Tel: 0332 44410

#### EDINBURGH

Bejay Micro  
 Hire Services  
 63 Viewforth  
 Tel: 031 229 0332

#### EXETER

Seven Counties  
 (Computers) Ltd  
 7 Pans St  
 Tel: 0392 211212

#### HENLEY ON THAMES

G. Bushell & Son  
 37 Hans St.  
 Tel: 0491 572363

#### KINGSTON-UPON-THAMES

The Computer Shop  
 91 Acree Road  
 Tel: 01 549 0173

#### LEEDS

Leisurebase  
 67A Albion St.  
 Tel: 0532 464335

#### LINCOLN

Leisurebase  
 252 High St.  
 Tel: 0522 22248  
 (C. Wed)

#### LIVERPOOL

In-store at Blackers  
 Department Store  
 16-26 Elbow Street  
 Tel: 051 709 2763

#### MANCHESTER

Chester Camera  
 Centre  
 Mosley Arcade,  
 Piccadilly Plaza  
 Tel: 061 236 5819

#### LEISUREBASE

Upper Mall  
 Morden Way  
 Arnold Centre  
 Tel: 061 822 6562

#### MARGATE

East Kent Computers  
 c/o George Electrical  
 318 Northborough Rd  
 Tel: 0843 24444

#### PENZANCE

Leisurebase  
 14 Causewayhead  
 Tel: 031 229 4407

#### PLYMOUTH

Leisurebase  
 In-store at Dingles  
 Royal Parade  
 Tel: 0752 670505

#### PRESTON

Channel 8 Software  
 51 Farngrave  
 Tel: 0772 320527

#### READING

Leisurebase  
 31 Station Rd  
 Tel: 0734 597795

#### SHEFFIELD

Leisurebase  
 1 Charter Sq.  
 Tel: 0742 25354

#### SHREWSBURY

Shrewsbury Camera  
 Exchange  
 The Maltings, Roushill  
 Tel: 0743 4964

#### ST HELENS

Studio 55  
 55 Crosskirk Rd.  
 Tel: 0744 39496

#### STAMFORD

Stanford Computers Ltd  
 Unit 4 Knyall Rd  
 Industrial Estate  
 Tel: 0279 58371  
 for details

#### STOCKPORT

Stockport Camera  
 Exchange  
 76 Princess St.  
 Tel: 061 477 7041

#### SOUTHAMPTON

Leisurebase  
 19 East St.  
 Tel: 0703 38753

#### SOUTHEAST

Patience Ltd  
 9 Queens Rd.  
 Tel: 0202 49547

#### SWANSEA

Leisurebase  
 218-219 Oxford St.  
 Tel: 0792 476099

#### SUNDERLAND

Saxons (Photomarket  
 & Hi-Fi) Ltd  
 20-22 Waterloo Place  
 Tel: 0783 657578

#### WENBLEY

Leisurebase  
 397B High Rd  
 (opp Argus)  
 Tel: 01 903 0587

#### WESTON-SUPER-MARE

Leisurebase  
 5 Waterloo St.  
 Tel: 0304 24264

#### WORKSOP

BSB Computers  
 11 Carlton Rd.  
 Tel: 0909 486251

### STOCK AVAILABILITY

Whilst your local Leisurebase stores can supply the widest possible range of equipment we are not able to guarantee that every advertised item will be available in each store.

### MAIL ORDER

Many Leisurebase stores are prepared to supply equipment on a mail order basis. Please telephone the store closest for P & P rates.

### HEAD OFFICE/WAREHOUSE

Unit 9, Raynham Road Industrial Estate, Bishops Stortford, Herts. If you require further details contact Eric Wilson on 0279 58371







# Billboard

**Atari VCS** with joysticks and additional paddles, 17 cartridges, £200 one. Tel: Northwood 21503 after 6pm.

**Radio Sony** 1800 dollar swap for CBM 64 or cash. Mr. G. Pitt-Nash, Bloncourt Villa, Cyerbyrn Llandybei, Amnued, Dyffid. Tel: 0534 62602.

**NICKITAM 65**, Tances with 8K RAM, P50, KMA, Vero rack, keypad, 5 slot motherboard, manuals, £100 one. Tel: Leicester 50553.

**IK X81**, two weeks old (boxed) + reasonable tape recorder, all worth £80. Will sell for £60 one. Tel: Kirkwall 4616 after 5.

**Victo 20** + 8K + super expander, program-aided, Aford, 16K expansion unit, C2N cassette recorder, plus loads of software books, etc £200. Tel: 01-644 7450.

**Victo 48K**, excellent condition plus £25 software, manual, leads, books, £74 one. Quick sale. Tel: Oxford (0865) 50345 after 6.

**Apple word handler II** word processing program, provides 80 column screen and upper + lower case, without extra hardware. Tel: 0254 691157 after 6.

**Texas** expansion system with disc control and internal disk drive with 32K RAM. Worth £660, bargain only £520. Tel: Huntingdon 212336. Colin.

**Lynx 48K**, excellent condition for all its money. DE RE, Atari, sound + graphics book, still under guarantee, all with £165. Tel: Bristol (0272) 563162.

**Atari 800 32K**, cassette deck, joysticks, manuals, DE RE, Atari, sound + graphics book, Zaxxon, Preppie, mint condition, £300. No offers. Tel: Paddock Wood 4519 after 7.30pm.

**Updated BBC model B**, compatible printer and disk drive. Potter, 7 Kingswood Close, Firbeck near Workson, North S81 8LJ. Tel: 0709 812825.

**Acorn Atom**, 12K RAM, 12K ROM, floating buffer points, leads, manuals, book of 80 programs, 10 games. Value £360, bargain £180. Tel: 01-328 2928 after 6pm.

**BBC Model B**, new 1.2 OS, £200 + good software including Acornsoft, cassette recorder, 14 B+W TV, leads, £440 one. Tel: 01-666 5906 evenings (Croydon).

**SEKOSIA** CP/M/DI dot matrix printer. As new with spare ribbons, paper and cables. Ideal for home use, £110 one. Tel: 077373.

**Sharp M260K**, As new with Basic, Pascal and games. Includes built-in cassette and monitor, 48K RAM. Will deliver in South-East. £170. Tel: 07373 50866.

**Neobrain** model A complete plus word processor and impressive spreadsheet, printer lead, beginners guide, few games. Bargain at £199. Zen assembler, £25. Tel: (0736) 754845 (Cornwall).

**Lynx 48K**, as new, still under guarantee, boxed with manual, leads, demo tape and user magazine, £175. Tel: Wickford (Essex) 68701.

**Atari VCS** with four cartridges including Pac-Man, Space War, Outlaws and Combat, £100 one. Tel: 0582 65370 (Luton).

**Victo 20** 3K cartridge, various cartridge games, joysticks, manuals. Bargain at only £100. Buyer collects. Tel: 0272 636618 after 4pm.

**BBC Disk Interface**, brand new, £75. Acorn teletext adaptor, brand new. Offers around £250. Castle of Riddles cassette, £6. Tel: Canterbury 750600.

**Oric-1** 48K, under guarantee, plus Chess, Xenon I, Invaders, Super Breakout. Only £120. Tel: 024 8723916.

**Lynx 48K**, excellent condition, 1 month old, boxed with leads, book and 2 cassettes. Still under guarantee, £200. Tel: Wigan 4776.

**Victo 20 starter pack 16K RAM Super Expander**, 2 Cartridges, joystick, £60 of software (including home games, books). All for £180. Tel: Giles (01) 584 1648 after 7pm.

**Spectrum software** 60% off, sale or exchange, all top titles available. Send you lists, see Mike Russell, 10 Gwafst Terrace, Abertillery, Gwent NP23 1AY.

**Buy, sell or swap**, 16/48K Spectrum software. Arcade games, adventures, utilities etc. Interested? Phone Vince or (01) 886 2931 after 5pm.

**Sharp M260K** - 24K, all in one micro with three Basic's and over £200 of software. Still in box, excellent condition. Tel: Rosendale 224614.

**Spectrum software**, lots of original software available at 75% price and software required at 50% price. Send lists to: S Winter, 28 Criss Grove, Gerrards Cross, Bucks.

**ZX81 16K**, three months old, still in box, with £30 worth of software, leads, magazines and manual. £40. Tel: 690 3994 after 5pm.

**Dragonsoft FORTH**, complete with manual, used twice £140, normally £21 95. Send cheque/P.O. to: James Breffini, 37 Parkhead Crescent, Newry, Co. Down, N. Ireland.

**Philips 67000** video game, very good condition, eight games cartridges, including Gunfighter. Will accept £85. 1 Richmond Terrace, Aberdeen, Scotland. Tel: 63267 (evenings).

**Victo 20**, cassette, 1 cartridge + 7 games: Arcadia, Wacky Waiters, Catcha Snatcha, Asteroids, Pac-Man, Crawler, Amok, Omega Race. Cost £230, sell for £160. Tel: Mansfield 861992.

**NEC 8023 PRINTER**, friction and pin feed, unused, boxed with guarantee. Cost £268, accept £100. Tel: 06285 25001 (Maidenhead).

**Dragon 32** users wanted for the Slough branch. Ring John on Slough 35268 or Tom on Slough 24924.

**Acorn Atom** 14K + 36K, BBC Basic, double speed board + over £100 software. Plenty of info and books. £120 one. Tel: Huddersfield (0484) 22358.

**Acorn Atom** 14K + 36K, BBC Basic, Amok, Omega Race. Cost £230, sell for £160. Tel: Mansfield 861992.

**Dragon 32** users wanted for the Slough branch. Ring John on Slough 35268 or Tom on Slough 24924.

**Acorn Atom** 14K + 36K, BBC Basic, double speed board + over £100 software. Plenty of info and books. £120 one. Tel: Huddersfield (0484) 22358.

**Acorn Atom** 14K + 36K, BBC Basic, Amok, Omega Race. Cost £230, sell for £160. Tel: Mansfield 861992.

**Dragon 32** users wanted for the Slough branch. Ring John on Slough 35268 or Tom on Slough 24924.

**Acorn Atom** 14K + 36K, BBC Basic, double speed board + over £100 software. Plenty of info and books. £120 one. Tel: Huddersfield (0484) 22358.

**Acorn Atom** 14K + 36K, BBC Basic, Amok, Omega Race. Cost £230, sell for £160. Tel: Mansfield 861992.

**Tandy** quick printer with two rolls of paper, as new, £70 one. Tel: 0892 25042 (evenings).

**Join the Idiots Club**, send £1 for membership, 1 page facts/catalogue + club badge to: W. Mitchell, Highmore, Greenlane, Welton, Lincolnshire. (Monsons only).

**Wanted BBC model B**. Also consider Sharp M260K, printer (dot matrix, friction and tractor feed). Tel: (0909) 71537.

**Wanted BBC B** within guarantee at a sensible price, depending on cond and extras. For sale Texas TI 99/4A and software, books, £100. Tel: 01-857 4159.

**Dragon 32** plus £100 of quality software + 16K Wordwise printer (dot matrix, friction and tractor feed). Tel: (0909) 71537.

**MCP 40** colour printer/plotter, perfect condition, 2 months old, with box and two rolls of paper + Centronics Dragon Cable. £130. Tel: Steve. (0438) 356404.

**Tandy colour computer 32K** ext. Cassette player, joysticks, Donkey King, Polaris, Wermhole, etc. £350 one. Will sell separately. Still in guarantee. Tel: 031 667 4203.

**ZX81 + 16K**, cassette recorder, joystick, Vix revealed, adventure cartridge, 50+ games, disks (Mata, Arcadia, Crazy Kong). Over £300 new, still guaranteed, £200 one. Tel: (0303) 71754.

**ZX81 16K + ZX printer** + Filecity joystick, £70. Software (Flight Chess, VU-file) and 3 books (Master M/C etc) all for £80. Tel: 01-790 2793 evening or weekend.

**Chess computer**, Boris Diplomat (batteries/mains), boxed, as new. Cost £60, accept £45. Hall, 105 Southford Road, Lancaster LA1 4SD.

**Parascope B** TV television, £40. Ferguson cassette recorder, £15. Both suitable for Micro. Also seven quality BBC games tapes (Acornsoft etc), £35. Tel: Crowthorne 774803.

**Oric 1** 48K, new, complete with tape, full guarantee, only £122. Tel: 01-423 0302 after 6.

**Apple IIe** 80 column card, original Apple connector, in box, as new. £55 one. Tel: 01-402 5061 evenings and weekends.

**TRS-80 IIe 16K** with editor/assistant, debug, Pascal, many books, all manuals and leads, excellent condition. £150. Tel: (Bury St. Edmunds) (0284) 810727.

**Chess Challenger '10'** model CCX. Made by Fidelity Electronics Ltd, USA. Ten levels of play, beginner to tournament practice. Tel: 01-984 536 evenings.

**TRS-80 model I** + 32K interface + 3 disk drives + software, £950 one. Must sell quickly. Write to Dave Milburn, 8 Queens Walk House, Queens Walk, Ealing W5.

**Spectrum 48K**, printer with paper, leads etc. Software inc Hobbit and Incus Carc. £140 one. All A1 condition. Tel: David 01-809 4062.

**DMP-100 printer**, parallel and series input, tractor feed, almost new, £125. Tel: Alan on Voullas (055 585) 641.

**BBC Model A** 2K + 2K, RS232, RGB + manual and leads, £275. Tel: 0656 63284.

**Exchange** my Spectrum software Planetoids, Hungry Horace, Sking, Avenger, 3D Tunnel, Roman Empire + a few others of your ZX81 software. Tel: 0226 710119 after 6.

**Philips 67000** computer in mint condition + Pool, Cosmic Conflict and computer cartridges, only £60 one. Tel: Michael Stowell 01-267 2452.

**Atari TV console**, only one owner plus over £200 of software for only £150 one. Tel: Michael Stowell 01-267 2452.

**ICL Terminaliser**, 10, 20, 60 CFS, RS422, IBM PC compatible, only one owner plus paper and leads, letter quality, upper + lower case, £85 one. Tel: 051-644 6568.

**Sharp M260K** 48K RAM with built-in monitor and cassette player. A reliable and versatile machine, in excellent condition, £185 one. Tel: Burwash, Sussex SS8620.

**Sharp NZ800A** + gamespack and manual, £50 or swap for BBC Micro B. Tel: Newtownham (Scotland) 30575.

**Swamp BBC** software, write in letter to: 86 Leicester Road, Quorn, Leicestershire LE12 8BB.

**48K Spectrum** = DK Tronics keyboard with ZX printer + rolls of paper + books, manuals, all for £120. Games sold separately at half price. Tel: Peter 01-622 5293.

**Commodore 64** cassette recorder, almost new, £250. Tel: Brighton 507749 weekends.

**Perfect owners** - want to sell your free. Torch software? Susan Curran. Tel: 0603 663919.

**BBC disk interface**, ROM offers? BBC data recorder, £20 one. Tel: Cambridge (0223) 245799 after 4pm.

**Atom**, 19K RAM, BBC/Atom Basic, A/D-D/A, colour monitor, C/W cassette in wood case + £100 software, £180. Tel: Melton Mowbray 69119.

**BBC disk interface**, £70. LVII dual 200K disk drives, £340. Microcivic colour monitor, £260. All new Acornsoft cassettes, £4. Microprocessor games, £5.50. Tel: Daventry 3792.

**Spectrum 48K**, two months' old + joystick and interface with nearly 20 games (including Scrabble), £200 one. Tel: Erih 381 45874 evenings & weekends.

**Atari cartridges**, cassettes and disks for sale or swap. Tel: 01-644 3485.

**Spectrum 16K**, five months' old plus recorder, £25. Software including Post, Arcadia, also 3 books and many magazines, £110 one. Tel: (0480) 76683 after 5.

**Dragon software**, Microdeal Plan Invasion, Alcatraz and Morocco Rand Prix. J. Morrison games tapes 2 and 4, £4 each. Tel: 0202 692633 after 6.

**BBC software** for sale. Lots of programs for under £1. Will exchange software too. Barry, 12 Leaboe Gardens, Hertford, Herts. Tel: Hertford 552754.

**Victo 20** cassette printer, joystick, TV 16K, cartridge Basic package, printing paper cartridge, cassette games, very good condition. £450. Tel: 01-207 0273.

**TI-99/4A**, £500 worth of equipment, includes 225. Software including Post, Arcadia, Parsc, TI-Invaders, Munchman, joysticks, 9 modules, 20 cassettes, only £250. Tel: Comberton 2328 evenings.

**Graveland Incisor** from Space + adaptor, £15 one. Printztron Grand Prix colour TV game + adaptor, £25 one. 100 Speedway badges, £70 one. Tel: Keith on 661712.

## 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

# Dragon Dungeon

## QUALITY SOFTWARE FOR THE DRAGON 32

### DRAGON STICKS

The ultimate DragonCoCo analogue sticks, with guaranteed fire button. **£18.95** per pair, post free.



### GIANT'S CASTLE £5.95

#### A Junior Graphics Adventure

Explore the castle, fight the wicked Guardians and rescue the fair Dame to gain a hero's reward! Suitable for ages 7 to 11 (younger if assisted). Editing instructions supplied (to customise general knowledge questioning).

### THE CRYSTAL CHALICE £7.95

#### An Advanced Level Swords and Sorcery Adventure

The Klazr smashed the Chalice and scattered the shards to the four corners of the doomed Kingdom of Quorum. Darkness and evil now hold sway and a thorn-spiked Tanglewood has overgrown the Meadowplain. Your Quest will take you from the Black Lagoon, through the dungeons of the Klazr itself to the rambling Fariands. Brute strength and cunning will both be required. (Clue sheet available on request.)

### BUGGED! £5.95

#### The Tactical Arcade Game

Wave after wave of killer BUGS, deadly BUG NESTS, crafty and homicidal INDI-BUGS and MASS MUTATION from Screens 21 onwards! Survival impossible, but can you make the BUG-BASHER HALL OF FAME? The only way to destroy the little buggers is to roll the EGGS on to them and squash 'em! On-screen Scoring, Wave Data and Lives Left. BE WARNED! Intelligent manoeuvring and lightning tactical decisions count for more in this game than pure arcade reflexes.

### TEMPLE OF ZOREN £7.95

#### An Intermediate Level S.F. Adventure

Previous agents didn't make it, but Terrain Security rely on you to survive this espionage mission long enough to bring back the Golden Orb, a map of Zoren and a sample of the latest Zoren Laser Gun. Out of fuel on landing, you'll also have to solve the problem of getting off the planet!

### MIDAS MAZE £4.95

#### A Movement Game for the Younger Player

All that glitters is not gold! Don't fall into the Devil's Kitchen where escape demands the eating of Power Pies and keep your fingers crossed that the Good Fairy helps you.

### MATHS-TREK! £25.95

#### An Educational Odyssey

To bring the 'Enterprise' back to base, through the Black Holes, Asteroids and Klingon Gunships, you'll have to prove that a Space Captain can handle his maths. Fifty skill levels and six branches of maths selectable. Suitable for ages 6 to 16.

### TREASURE TOMBE £7.95

#### A Real-Time Graphics Adventure

Don your chain-mail and crawl down into Merlin's 90-chamber tomb complex to search for Arthur's treasure. Wizards, Warlocks, Goblins, Vampires and a host of other dungeone-spawn await!

### \*CASH-FLOW £8.75

Money Management for Home and Small Businesses.

### \*CATALOGUE, SORT AND MAIL £8.75

A Filing System, with Sorting and Mailing List facilities. Print-out control and address label facilities.

### \*THE MANAGER £14.95

Both of the above utilities presented as a double cassette package. User-friendly Manuals provided and Menu-driven. (\*Available October 1983)

FOR DEALER AND WHOLESALE SOFTWARE DISCOUNTS PHONE 0335 42639

AVAILABLE AT GOOD SOFTWARE STORES OR BY MAIL ORDER.

DRAGON DUNGEON, MILTON HOUSE, ST JOHN STREET, ASHBOURNE, DERBYSHIRE DE6 1GH  
**Telephone:** Mail Order (0335) 42529. Retail Hours: 9.30 am to 5.30 pm.

## Programs Wanted

We require quality programs for most microcs. We pay cash fees, royalties and distribute in the UK, USA and Europe.

Phone: Basingstoke (0256) 51207

or write to:

### DREAM SOFTWARE

P.O. Box 64, Basingstoke, Hants. RG21 2LB

(Please enclose return postage if you wish your cassette returned)

## WANTED PERSONAL COMPUTERS

all models bought for cash

Morgan Camera Company  
 160 Tottenham Court Road,  
 London W1. Tel: 01-388 2562

## 64 BUSINESS USERS

Hardware including super Epson printers at low prices and lots of good software in stock. e.g. Calc Result, Accounts Packages, Visawrite and Spell, Codewriter, Assembler, Monitor, Programming Utilities and WAIT FOR IT — CENTRONICS INTERFACES.

### THE COMPUTER CENTRE

17 Bridge Street, Leighton Buzzard, Beds.  
 Tel: (0252) 376622 & 382504

## EXCALIBUR SOFT:

C/O AVALON COMPUTING

Presents 'Survival' for unexpanded VIC 20s  
 5 exciting games on one cassette  
**Bomber, Mazeman, Voyager,  
 Terminal Termites, Rings of Titan.**

Only £5.99 inc. p&p.

ALSO see AVALON COMPUTING'S unbeatable range of chartbusting software titles for ALL leading micros. Send a large sae for a comprehensive catalogue.

## AVALON COMPUTING

14 Cliff Road, Horsham,

North Humberside, HU18 1LL

TEL: 04012-5113

## R.C.S. Software for the Sharp MZ 80A

Crazy Car	£3.50
Shoot Out	£3.00
Two Way Attack	£3.00
Missile Attack	£3.00
Maths Solver One	£3.00
Loony Larry	£3.00

More programmes under way.  
 Buy any programme and get Back Music Quiz free.

Cheques and Postal Orders to  
**RCS  
 59 Arkwright Walk  
 The Meadows  
 NOTTINGHAM NG2 2HW**  
 Send SAE for details.

## WHICH EDUCATIONAL SOFTWARE HOUSE:

- 1 Has a new 16-page catalogue out NOW?
  - 2 Has its products ON THE SHELF at your local dealer?
  - 3 Has its products distributed to SCHOOLS by Ward Lock Educational and around BRITAIN by WEBSTERS and other imaginative distributors?
  - 4 Offers ACCESS and 24-hour Answerphone facilities?
  - 5 Has its tapes superbly duplicated by SIMON STABLE'S Real Time Tape Duplicating Service?
  - 6 Is a member of the Computer Trade Association?
  - 7 HAS A SPECIAL XMAS DEALER PROMOTION STARTING NEXT MONTH?
- Watch for our LARGE ads next month!  
 Details (SAE) to:

**chalksoft Ltd.**  
 37 Willowslea Road  
 WORCESTER WR3 7QP  
 Tel: 0905 55192  
TRADE AND EXPORT ENQUIRIES WELCOME

## NEW BRAIN

Business games scientific home and utility.

For your free software list write to  
**Brain soft computer services  
 42, Beatrice Road  
 Southsea, Hampshire**

## VIC 20

32 K SWITCHABLE TO  
3K, 16K, 24K, BLOCK 5

£49.95 inc VAT

16K SWITCHABLE TO 3K

£34.95 inc. VAT

16K STANDARD

£27.95 inc. VAT

All units guaranteed 2 years. Add £1 P&amp;P

Overseas order add £3 P&amp;P

Telephone your Access or Visa card number for despatch by  
return post, or send your cheque/POs to:RAM ELECTRONICS  
(FLEET) LTD

(DEPT. PCN)

106 FLEET ROAD, FLEET, HANTS GU13 8PA

Telephone (02514) 5858

Callers welcome Monday to Saturday  
Half-day Wednesday. Trade enquiries welcomeCHRISTINE  
COMPUTING

TI-99/4A colour computer	£104.95
Compatible cassette recorder	£24.98
Single cassette interface lead	£4.35
Dual cassette interface lead	£5.45
Recorder + single lead	£28.75
Recorder + dual lead	£29.75
Computer + recorder + single lead	£133.50

Software Cartridge —	Extended Basic	£51.50
Minimemory	Parsec	£24.50
Chess	Invades	£17.00

Software Tape — Core!, Blast it,  
Spudz, Code Break/3D Maze, U.F.O.  
all @ £3.50 each.

All prices inclusive, send 50p (refundable on 1st  
order) for full list, Cheques or PO's to:

6 Florance Close, Watford, Herts WD2 6AS.  
Tel: 09273 72941

## Software

SOFTWARE  
FOR YOUR  
CBM 64

SCRAMBLE.....	£6.50
FROGGER.....	£6.50
SPRITE MAN.....	£6.50
CRAZY KONG.....	£6.50
PANIC.....	£6.50
LANDER.....	£9.00
ATTACK OF THE MUTANT CAMELS.....	£7.50
MATRIX.....	£7.50
STAR TREK.....	£6.50
ROX.....	£4.95
GRID RUNNER.....	£7.50

A NEW ADVENTURE  
FOR YOUR 64

DEAD MAN'S GOLD: £8.50

We dare you to seek the treasure and return  
it to the correct grave.NEW ADVENTURE FOR  
YOUR VIC 20 + 16KTHE ENCHANTED CHALICE: £7.50  
Find the Chalice if you can.

Cheques/P.O. to:

**BYTEWELL**  
203 COURT ROAD  
BARRY,  
S. GLAM CF6 7EW  
Tel: (0446) 742491

## 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 included.

The databases are automatically updated as results are entered. This year's  
results are supplied with the package.

Can be used in single 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 (microtapes)

## "POOLS DATA"

Complete record of all English Football League matches 1979-83. Team, scores  
and dates of 10,000 matches held in single format, ready for your analysis.

Similar analysis programs and full documentation included. Available for  
Apple, Spectrum, ZX81 80K, Dragon, Commodore series.

Discs (5 year): £15.95

## Tapes (2

year)

£7.95

all

prices

(P&amp;P in-

cluded)

## SELEC SOFTWARE (PCN)

37 Councilor Lane,  
Chasde, Cheshire  
061-428 7425

## LOOK! LOOK!

QUICK-SHOT deluxe self-centring joystick —  
DRAGON/TANDY COLOR..... £14.95 (£17.95)

New! ELKAN TOP-SHOT self-centring joystick with  
flexible buffering..... £3.95 (+ £1.00 P&P)

Dragon's Tandy Colour Commodore 64 VIC-20 Atari-

Force Spectrum (with interface 2) Buy a pair — offer is

free.

NANCY "quick-reference" cards — easier to use than the

manual!..... £3.95

COMMODORE 64 VIC-20..... £3.95

6502 PROCESSOR..... £2.95

others, e.g. Apple, Tandy, Sinclair available..... £2.95

DRAGON'S EYE on/off indicator..... £3.95

DRAGON'S TAIL joystick extender..... £2.95

Send cash, cheque, credit card no. to:

ELKAN ELECTRONICS, FREEPOST,  
11 Bury New Road, Prestwich, Manchester

M25 6LZ, Tel. 061-798 7813

(s.e.e. for full list/catalogue)

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!

## PROGRAMMERS

We urgently require good quality software for the ZX  
Spectrum. For the right material we offer —  
improved market penetration — Expert presenta-  
tion — Worldwide distribution — Total distribution  
in the U.K. and a high 25% Royalty.

## SPARTAN SOFTWARE

9 Cotswold Terrace, Chipping Norton,  
Oxon.

## ★ STARDUST ★

Original Spectrum programs wanted

STARDUST SOFTWARE  
28 GREENWAY ROAD  
TAUNTON, SOMERSET TA2 6LB

Good royalty rates paid

# TRIPTYCH PUBLISHING LIMITED

## WANTED

For immediate full-time employment.

Young people with home programming experience to work and be trained with a small team of software authors.

If you are interested, please write enclosing details of your experience and samples of your work to:

**David Juster**  
Triptych Publishing Limited  
Sterling House  
Station Road  
GERRARDS CROSS  
Bucks SL9 8EL.

## THE TEACH YOURSELF SPECIALISTS!

Learn the easy way on your Apple, IBM, Sirius or CP/M computer!

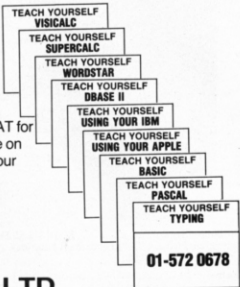
Just £59 including postage and VAT for your own complete training course on disk. Satisfaction guaranteed or your money back.

Also special offers on Apple.

Call now or send cheque to:

## DATA PROFILE LTD

APEX HOUSE, LAWRENCE ROAD  
HOUNSLOW, MIDDXTW4 6DU



## Miscellaneous

# VIDEO GALAXY

## NO. 1 FOR HOME COMPUTERS AND SOFTWARE

Commodore 64 only £199.95  
Dragon only £164.95  
Vic-20 only £133.95  
Spectrum only £98.95  
Spectrum 48K £127.95

100s of games, books and accessories available for all popular home computers including BBC.

VIDEO GALAXY 293 CHISWICK HIGH ROAD LONDON W4  
Tel: 01-994 4947

## BOOK BARGAINS — BARGAIN BOOKS

### BARGAIN BOOKS FOR POPULAR MICROS

That really show you how to get the most out of your computer:  
152 pages, 50 programs and full description of how to run their structures, modify and extend. ISBN 0715617064 **price for £5.95**  
VIC PROGRAMS 1 publishers RPP 06-06 **price for £5.95**  
192 pages, 50 programs and full description of how to run their structures, modify and extend. ISBN 0715617060 **price for £5.95**  
NEW! USING COMMODORE 64 publishers RPP 06-06 **price for £5.95**  
Hot from the great October publication. Starts with Basic, moves through machine code — considered in great detail! Games, graphics, sound peripherals. In depth look at the heart of the machine, appendices, Basic, machine code and machine code assemblies/disassemblers listings. A must for anyone who wants to learn about their assembler listings. A must for anyone who wants to learn about their computer. ISBN 0715617067 **price for £5.95**  
All the above are free of P&P (UK only). Offer closes 30th November 1983.  
State titles required. Cheques or POs.

## JUST-ED

58 St Marys Road, Weybridge, Surrey, KT13 9TZ  
Please print name and address in block capitals.  
Allow for cheque clearance and postage.  
P.S. 500s or other titles for all popular micros, business or general. Free of P&P post FRP.  
Send for free list. State machine type.

**MICROSHOP**  
CALL  
**CHRISTIAN MCCARTHY**  
ON  
**01-636 6890**

## Cassettes

## BLANK CASSETTES!

TOP QUALITY PROFESSIONAL BRAND  
COMPUTER/AUDIO CASSETTES  
AT BUDGET PRICES

Packed in boxes of 10 cassettes  
Complete with labels, inlay cards  
and library cases.

Prices include VAT post & packing

LENGTH	BOX PRICE (10)	QTY	Amount
5 mins	\$4.95		
10 mins	\$4.90		
15 mins	\$4.95		
20 mins	\$5.00		
30 mins	\$5.20		
40 mins	\$5.50		
90 mins	\$7.50		

Cheque/Postal Order enclosed for £

NAME .....

ADDRESS .....

PROFESSIONAL MAGNETICS LTD  
Cassette House, 529 Bunslett Rd, Leeds  
Tel: (0532) 706666  
TRADE ENQUIRIES WELCOME

## Accessories

**DELTA 14 HANDBETS FOR THE BBC**  
Used for years by DATABASE, covers 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 Aid to give analogue spring return joystick plus three button functions.  
The second part is the DELTA 14 "A" adaptor box which connects the 15-way "D" to the user part. This gives 12 buttons on a 4 x 3 matrix. The eighth line selects a second joystick which can be plugged into the adapter box.  
**New, available now** — Program to convert keyboard-played games to run on the joystick and handbet buttons.

DELTA 14B JOYSTICK HANDBET FOR BBC £12.95  
DELTA 14B 11 ADAPTOR BOX AND CABLE £12.95

## DIRECT FROM OUR FACTORY

**CONVERSION PROGRAM CASSETTE £5.95**  
**CONVERSION PROGRAM DISK £3.95**

**IN KIT FORM:** kit contains 1 switched joystick assembly, 2 moulded cast halves, line button, 1.5m5-core = screen cable, fusing screws... **£4.50 per KIT**  
**READY BUILT** with 9-way "D" socket — suit Altan 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 hood: £1.75  
50p  
Din plug 5-way 240 deg... **£2.50**

**AERIAL SPLITTER SWITCHES**  
(Does unpluging T.V. aerial to connect computer)



Cheque or PO with order. Prices quoted INCLUDE VAT. 1st Class Post. 7 day money back guarantee.

**VOLTMACE LTD., PARK DRIVE, BALDOCK, HERTS.**  
Callers welcome Monday to Friday. Telephone: (0462) 894410



## INSTANT IMAGE TRANSFER TO ZX SPECTRUM RD DIGITAL TRACER £55.50



Please send me ..... RD DIGITAL TRACERS at £55.50 each (including P&P and VAT). I enclose cheque for £ ..... payable to RD Laboratories Ltd.

Name .....

Address .....

Send to: Dept. CAM11/83 RD Laboratories Ltd., 20 Court Road Estate, Cwmbran, Gwent NP44 3AS

RD Laboratories also supply the RD 8100 SYSTEM for economic automatic measurement, test and control. The modular-based RD SYSTEM is already used widely in many applications — from scientific experimentation to small-scale energy management systems. Please send stamp and address for brochure.

The high resolution colour graphics of the ZX Spectrum permit accurate presentation of complex or irregular images — maps, technical drawings, even personalities. But entering individual co-ordinates for unusual shapes can be tedious and time-consuming.

The RD DIGITAL TRACER cuts out tedious plotting. It provides instant transfer from original to display file — for screen display, ZX printer printout, or retention on cassette.

The RD DIGITAL TRACER is supplied with tracing sheet, software cassette and full instructions on use. Latest software includes fast colour fill, audible keystroke acknowledgement, fast PAPER colour change and fast LOAD from saved display file.

This is an invaluable tool for engineers, architects and other technicians, and for educational use in the presentation of lectures, and in computer training and application. Designed for the ZX Spectrum, the RD DIGITAL TRACER as supplied is compatible with ZX 81, although high resolution colour graphics are not available on this machine.

The RD DIGITAL TRACER is available from computer shops or direct from RD Laboratories. The direct (UK only) price of £55.50 includes Postage, Packing and full VAT. Send a cheque (payable to RD Laboratories Ltd.) with order for delivery within 28 days, or ask your local dealer for details.

**R D Laboratories Ltd**

20 Court Road Estate Cwmbran Gwent NP44 3AS  
(08333) 74333

### Accessories

#### 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

RHONE — POULENCE

Machine	Price per box 10
Commodore Pet	From £28.00
Tandy	From £20.00
Osborne	£28.00
Apple II	£21.00
Apple III	£25.00
Olivetti M20	£25.00
IBM P.C.	Single sided £24.00
	Double sided £28.00
Siris	Single sided £24.00
	Double sided £28.00

Prices are exclusive of V.A.T. Postage & Packaging included in price.

01-691 7120

**MICROSHOP**  
CALL  
**CHRISTIAN MCCARTHY**  
ON  
**01-636 6890**

#### CABLES & SWITCH BOXES

FREE ILLUSTRATED  
DESCRIPTIVE BROCHURE

Call

DENHAM (0895) 832375

24 HOUR SERVICE

HOMESTEAD ELECTRONICS

24 OXFORD ROAD,

DENHAM, UXBRIDGE,

MIDDLESEX

#### LOOK — COMPUTER STATIONERY

SMALL OR LARGE QUANTITIES AVAILABLE  
Continuous lettering paper — must rule or plain. 500, 1000, 2000 sheet.  
Continuous labels — large range of sizes in packages of 500-5000,  
larger quantities available.

Continuous envelopes, Cleaning kits

Store your work safely in one of our printout binders.

Catalogues on request. Speedy service.

**HCL COMPUTER SUPPLIES**

19 GREENLANDS ROAD, KEMPING,

SEVENOAKS, KENT.

TEL. OTFORD (085692) 2918

THE NO 1 IN MAIL ORDER

### Services

Dear reader, my name is Simon Stable. I specialise in direct data duplicating for the following cassette-based micros: BBC/AS, ZX Spectrum, Electron, Lynx, Oric 1 and Omega 2. (Disc copying by BBC/AS/10 track. Our matrix printed labels to order: blank, blank cassettes).

I'm proud to be sole distributor for Chubbsoft Educational Programs whose new mail order address is: Chubbsoft Ltd, 37 Willowdale Road, Northwick, Worcester. Yours Sincerely, Simon Stable.

FAST TURNOVER **08692 2831** COMPETITIVE PRICES  
46 WEST END, LAUNTON, OXON OX6 0DG.

### Shops

#### Computerama The Midlands Home Computer Specialists

FOR BBC, SPECTRUM &  
ALL LEADING MICRO'S  
STAFFORD: 59 FOREGATE ST  
TEL: 0785 41899

STOKE-ON-TRENT:  
MARKET SQUARE ARCADE  
TEL: 0782 268620

#### MICROLINES

80	£226
82A	£396
92P	£509
92S	£615
83A	£566
93P	£736
93S	£842
84P	£906
84S	£1011

PRICES INC. CARRIAGE, EXC. VAT.

RING FOR PRICE LIST

#### Harrison Computer Supplies

STRUTT STREET, BELPER,  
DERBYSHIRE DES 1UN  
Tel (0773) 820202

## 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 character and restores the keyboard to normal operation. It contains a real-time clock and a large number of 32-bit words support the ZX printer. Allows machine code definition 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 + VAT. Some ready-Converted ZX81's available. Floating point extension ROM — out soon!

#### Coming Soon!

FORTH-IO Cartridge for Spectrum £59 + VAT. Ask for details

#### AND THE OLD FAVOURITE:

Nass-FORTH NASCOM £25 + VAT  
Pet-FORTH for Pet from £25 + VAT

### DAVID HUSBAND

2 Gorleston Road  
BRANKSOME  
Poole BH12 1NW  
Tel: 0202-764724

#### Supplies

### DISKETTE PRICES SLASHED

	Wabash Datafile Nashua		
<b>8" DISKETTES</b>			
Single Side/Single Density	20.00	27.60	20.80
Single Side/Double Density	24.00	26.10	22.10
Double Side/Single Density	25.00	31.00	—
Double Side/Double Density	30.00	31.00	23.40
<b>5 1/4" DISKETTES</b>			
Single Side/Single Density	17.50	19.70	15.60
Single Side/Double Density	20.00	19.70	16.90
Double Side/Double Density	21.50	28.50	19.50
Single Side/Quad Density	27.00	25.80	24.70
Double Side/Quad Density	32.00	36.00	26.00

All prices per box of 10 disks, exclusive of VAT (15%) and carriage (£1 per box). Please contact for discounts (5+ boxes) and full price list.

We stock a wide range of disks (Wabash, Datafile, Nashua and now DENNISON), dot matrix printers, printer ribbons, diskette storage boxes and binders (from £4.50), continuous stationary and antiglare filters, etc.

### CONWAY COMPUTER SERVICES LTD.

PCN 39 Conway Road, London N15 3BB 01-800 1796

MAIL ORDER ONLY

● **Vic 1540** disk drive, disks, Vic file. £175 ono. Vic 1515 printer, good condition needs new ribbon and paper. £150 ono. Tel: 01-301 3930 after 6.30pm.

● **Software Agency** Sell your excess unwanted software through us, any type, any machine. Demand decides price, favourable terms, send original cassettes cartridges with s.a.e. Software: For sale s.a.e. For lists: G.R.P., 81 Openshaw Drive, Blackburn, Lancs, BB1 8RB.

● **Computer Systems** Sales with support Sirius Apricot Superbrain Dbase, Wordstar etc. Comprehensive training. Phone for details Ycoman Systems 806 3125.

● **Can You Write?** One of Britain's largest publishers is planning a new series of computer books. If you could write about microcomputing, send a letter explaining which areas of microcomputing interest you to the address below. Some exciting and lucrative book contracts are now on offer. Box NJC, 4 Little Essex Street, London WC2.

● **Big Discounts** on software, IJK, Program Power, Ultimate, Llamasoft, S.A.E. for detailed list to A.C.K. Data, 21 Salcombe Drive, Redhill, Nottingham.

#### Second User

##### NEW EQUIPMENT

EPSON FX80 Printer	£385.00
ZVM 134 Colour Monitor, 13 inch, Resolution 684 x 480	£400.00
TTL levels RGB SLUT BBC Micro	£400.00
ZENITH 14 Matrix Printers, Serial, kit form	£145
ZVM 121 Green Screen Monitor, 12 inch	£75.00
FLOPPY DISCS BASF Box of 10	£22.50

1 VAT  
CARRIAGE

**AMS**  
Developments  
202, The Grove, Churchfields, Hereford  
Tel: 0432 7081, 0432 8410 (STD CHARGED)

## TIDY UP THOSE WIRES WITH A Compuprint Computer Stand

The ideal answer to keeping your computer tidy. Takes most popular microcomputers including VIC20, Commodore 64, Dragon, Sinclair etc.



### COMPUPRINT COMPUTER STAND

A quality product specially made for Compuprint by a leading plastics fabricator.

Made from a tough acrylic material in a dark smoked effect colour the stand is both highly functional and attractive.

The stand holds the central processor unit, allowing free access to all ports, a monitor and has two spaces to hold either cassette decks or disc drives.

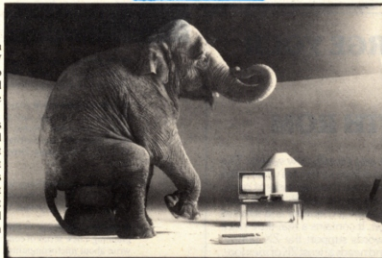
The ample space underneath the monitor holds the assorted wires, leads and power units that accompany smaller computers.

Order your stand in a handy self assembly flat pack direct from the manufacturers for only £19.95 (inc. VAT) plus £3.00 postage.

## Jumbo jive

What you see here is a still from Commodore's current £2m TV advertising campaign designed to 'demonstrate the speed, agility and memory size of the Commodore 64.'

Is Commodore really telling us that the 64 has all the speed and agility of Nellie the elephant? Not exactly—speed and agility is dealt with by a mouse which, unless it's that thing under the table, couldn't make the photo call. We can see it now: 'Commodore users are dead cheesed by delays in the production of a mouse for the 64...'



## SLANTAX ERRORS

### Sensible pricing

Apologies for a price error in last week's *PCN Monitor*. The price of the Sensible Solution applications generator should have read £799.25; not £764.50.

### Crabs in Basic?

In our review of Luna Crabs (*issue 33*), we gave the language used as Basic. This should, of course, have been machine code.

### Lost lines

Part of the amazing *PCN* game got itself shuffled in issue 33 Program Cards, and four lines were lost. The missing lines are 2810 to 2840; fortunately they aren't vitally important as all they do is print: 'Roll up Roll up, win an Acorn Electron, Get the highest score of the show.'

### Bubble on the brain

Someone was blowing bubbles in *Micropedia (issue 33)* and got CMOS technology and bubble memory mixed up.

CMOS uses small amounts of electric current to maintain the memory in a non-volatile RAM chip, while bubble memory has electromagnetically-generated bubbles which spin around a disk-shaped magnetic recording layer.

## NEXT WEEK

10 — *PCN* looks at the hard disk Kaypro portable.  
64 Varieties—a round-up of games for

the Commodore 64.  
*BBC calling* — FX calls on the BBC micro expanded in a new series.  
*Rainbow Bridge*—to Valhalla; a look at the most teasing software release of the year.

*Little Brother* — the promise of portable printing with Brother's EP22. Plus part 6 of our pull-out Programming Guide and the regular weekly look at news, tips, ProgramCards and other features.

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

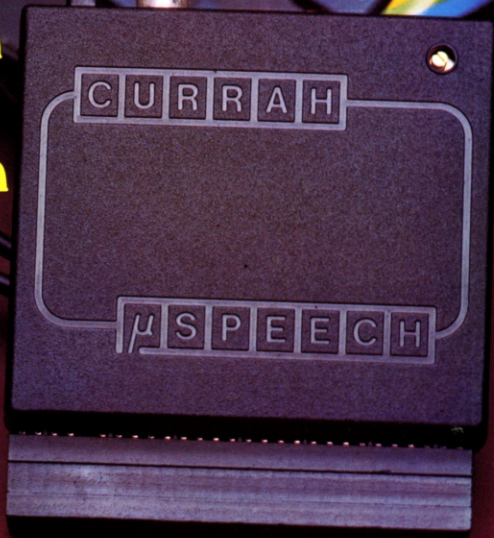
Event	Dates	Venue	Organisers
Lancaster & Morecambe Computer Club Open Day	October 29	Lower Town Hall, Lancaster	Brian Sheldon, 0524 61831
Computertown UK	October 31- November 18	Nailsea Library, Avon	Byte Micro Computing Centre, 0272 851337
Brainwave (Home Computing, Video & Electronics Family Show)	November 4-6	NEC, Birmingham	Clapp & Poliak Europe, 01-747 3131
Software Expo	November 8-10	Wembley Conference Centre, London	Interco, 01-948 3111
Home Computer Exhibition	November 9-13	Dublin	SDL Exhibitions, Dublin 763871
Personal Computers & Leisure Technology Exhibition — HOMTECH	November 11-13	Bristol Exhibition Centre	Tomorrow's World Exhibitions Ltd, 0272 292156/7
Malvern Micro Fair	November 12	Malvern Winter Gardens, Worcestershire	Personal Computer Fairs, Worcester 22659
Manchester Apple Village	November 13-16	Belle Vue, Manchester	Database Publications, 061-456 8383
COMPEC	November 15-18	London Olympia	Reed Exhibitions, 01-643 8040
Computer Aided Design for the Building Professional	November 16	RIBA, 66 Portland Place, London W1	Helen Carpenter, 01-637 8991
Humberside Computer Fair	November 20	Winter Gardens, Cleethorpes	Jenson Lee, 0472 42559

## OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Computer Malaysia	October 25-28	Kuala Lumpur	Conference & Exhibition Management Services, 9A Jalan SS24/8, Taman Megah, Petaling, Jaya, Selangor.
Gulf Computer Exhibition	November 21-24	Dubai	Trade Centre Management, 01-930 3881
Computer Indonesia	November 22-25	Jakarta	Overseas Exhibition Services Ltd, 01-486 1951

# SPEECHLESS??

## Micro Speech lets ZX Spectrum talk!!



### JUST PLUG IN AND USE

Micro Speech is easy to use — simply plug into your Spectrum and TV and enjoy a new dimension; instant voicing of all the keys ..... infinite vocabulary at your command ..... intonation to add character to speech ..... exciting new range of sound and speech games .....

### IT'S AS EASY AS THIS!

LET S\$ = "me(rr)EE) krismus"  
will say "MERRY CHRISTMAS"

### QUALITY SOUND

Micro Speech talks through your TV's loudspeaker, ensuring top quality sound.

### WHAT CAN'T IT DO!

Unlimited vocabulary means that Micro Speech can say anything ..... it can even be made to yodel!  
There is nothing it cannot say!

### NEW SOUND GAMES USING MICRO SPEECH INCLUDE:

- ▣ Attic Attack : Lunar Jetman (*Ultimate*)
- ▣ Colour Clash : Shark Attack : 3D Monster Chase (*Romik*)
- ▣ Fire Birds : Lunar Rescue (*Lyversoft*)
- ▣ Voice Chess (*Artic*) ▣ Mined Out (*Quicksilva*)
- ▣ Mysterious Adventures Part 1 - 4 (*Digital Fantasia*)
- ▣ The Birds and the Bees (*Bug Byte*)
- ▣ Blastermind (*Martech Games*)

## Adding a new dimension with

Available nationwide or direct from Currah

# CURRAH μSPEECH

Send to: MICRO SPEECH OFFER, P.O.BOX 1, GATESHEAD NE8 1AJ or telephone: NEWCASTLE (0632) 824683

Please send me ..... MICRO SPEECH units.

Name (Print clearly) .....

Address .....

Postcode .....

I enclose Cheque/Postal Order payable to "Micro Speech Offer" or debit my Barclaycard/Access account No.

I understand that I can have my money back within 10 days of purchase if I am not delighted. Please allow 21 days for delivery. 12 months parts and labour guarantee.

Signed .....

Ref

ONLY **£29.95** EACH

INCLUDING

▣ FREE SOUND GAME

▣ COMPREHENSIVE MANUAL

▣ DEMO CASSETTE

# PIT YOUR WITS AGAINST THE



In the vast, unexplored regions of outer space, a dot appears on your scanner screen. Suddenly, you are surrounded by enemy fighters. Too late to turn back, you prepare for combat. Your trembling finger reaches for your fire laser button. Who are these fighters out to zap you? Will you live long enough to find out?

Please write quantity of each game required in the boxes provided. Please state computer.

\*Cheque for total amount enclosed £

\*Access/Barclaycard No.

Name

Address

\*Please delete or complete as applicable

To: ARTIC COMPUTING LTD, Main Street, Brandesburton, Driffield YO25 8RG.

**1** Dimension  
Destructors  
48K Spectrum  
£3.95

**2** Galaxians  
16K/48K Spec-  
trum £4.95  
16K ZX81 £3.95

**3** 3D  
Combat Zone  
48K Spectrum  
£5.95

Try these other mind-blowing games from Artic.  
**3D Combat Zone** - the real 3D tank battle game.  
**Galaxians** - classic arcade action  
with nine levels of play.

