

**P E R S O N A L**

# COMPUTER

**Every Thursday**

THE COMPLETE COMPUTING WEEKLY

**NEWS**

JUNE 23-JUNE 29, 1983 VOL 1 NO 16

**35p  
Only**

**Atari v BBC:  
which one's  
for you?**

**We compare,  
page 38**

## **THIS WEEK**

**ZX81 COUNTDOWN**  
Maths tips to help  
you program

**SPECTRUM SCRABBLE**  
Screen version of the  
old favourite

**BBC TORCH PACK**  
Turn your BBC into a Torch  
for half the price

**COMMODORE 64 SOFTWARE**  
Word processing packages  
on trial

## **EVERY WEEK**

**PCN MONITOR**  
Latest news from home and abroad

**PCN PROGRAMCARDS**  
Popular programs to cut out and keep



**SpectrumSpectrumSpectrum  
Special Offer, page 13  
Micropaedia,  
part 3**

# VIC20 GAMES FROM QUICKSILVA

## TORNADO VIC20 GAMES FROM QUICKSILVA



VIC20  
+ JOYSTICK

**TORNADO:** In the midst of the Colony Wars ships are attacking you from the air; you have three types of ground base to bomb. Features: Full Colour, Hi-Res Graphics, Sound, Increasing Speed, High Score, Progressive Difficulty, Random Landscape, Explosions. By Chartec for the unexpanded VIC20 + Joystick.

## PIXEL GAMES

### HARVESTER & BRAINSTORM

A cut-throat strategy game to reap valuable boosterspace around the planet Delta. Hi-Res Graphics and lots of fun for two to four players. For the unexpanded VIC20.

### STARQUEST/ ENCOUNTER

A voyage of discovery and adventure in the cosmos. With the help of your onboard computer you seek a habitable planet amidst the perils of deep space. For the VIC20 + 16K RAM.

QUICKSILVA are proud to introduce Skyhawk written by Chartec for the VIC20 personal computer, many more amazing games to come!

**SKYHAWK:** Features Multi-colour, Hi-res 3-D Effect Graphics, Realistic Scrolling Landscape, Aircraft Landing and Refueling, Radar and Aircraft Status Displays, High Score Save, Full Sound Effects, Varying Formations of Attacking Aircraft, Extra Life at 3000 pts, Fuel Low Warning, Realistic Explosions. For the VIC20+3K or 8K expansion + Joystick.

## PIXEL POWER



VIC20 8 OR 16K

To create user-definable characters  
in your own programs.

PIXEL

## HARVESTER



VIC20 UNEXPANDED

A Cut-Throat game of Strategy & Fun  
Plus - BRAINSTORM

PIXEL

### PIXEL POWER

A graphics workshop packed with useful features such as Create, Amend, Save and View Set. For the VIC20 with 8K or more added RAM.

### SUBSPACE STRIKER & ZOR

It comes from out of nowhere and then vanishes back into the ether. With your deadly animat torpedoes, you unleash havoc in the Federation's Spacelanes. For the VIC20 + 16K RAM.

### TRADER

A trilogy of 16K programs that combine to give an epic 48K graphic adventure. As a galactic trader, you deal with some very bizarre customers indeed. Will you live to tell the tale? Supplied in a box with extensive instruction booklet.

## STARQUEST



VIC20 16K GAME

A voyage of Adventure and Discovery  
Plus ENCOUNTER-IO Game

PIXEL



For the VIC20 + 16K  
RAM.

Please send your order to:  
QUICKSILVA LIMITED,  
PALMERSTON PARK HOUSE,  
13 PALMERSTON ROAD,  
SOUTHAMPTON.  
TEL: (0703) 20169.

ADDRESS .....

SUPPLIED ON CASSETTE

NAME .....

PLEASE SEND ME THE GAMES  
AS TICKED  
Total cheque/P.O. enclosed \_\_\_\_\_  
Cheque payable to Quicksilva Limited.

Tornado	£5.95	<input type="checkbox"/>
Skyhawk	£7.95	<input type="checkbox"/>
Trader	£14.95	<input type="checkbox"/>
Subspace Striker + Zor	£7.95	<input type="checkbox"/>
Starquest + Encounter	£7.95	<input type="checkbox"/>
Pixel Power	£7.95	<input type="checkbox"/>
Harvester + Brainstorm	£7.95	<input type="checkbox"/>

**WARNING:** These programs are sold according to QUICKSILVA Ltd's terms of trade and conditions of sale. Copies of which are available on request.



## PULL-OUT

### Micropaedia

#### Spectrum: Part 3

ZX language barrier, Printer interface, Games and business software, Multilingual programming, Books to read

## REGULARS

### Monitor

2

Torch plans Independence Day coup, page 2; much ado about the Computer Fair, page 3; a new approach to graphics, page 4; BBC disk interface drought, page 5; Kaypro brings 10Mb portable to the UK, page 10; and more of the week's news.

### Random Access

15

Rhymester reaps £10 reward

### Routine Inquiries

16

Richard King steps in . . .

### Microwaves

19

### Gameplay

#### Spectrum

48

Scrabble on your micro

### BBC

50

Teaching games take the test

### Spectrum

54

Horace returns, plus Barney Bootlace

### ProgramCards

#### T199/4A

56

Give your videos a good name

### Spectrum

62

Ten-pin bowling — your pitch

### Atari

63

Pirate Island — keep searching!

### Readout

67

### Clubnet

68

Richmond Club celebrates

### Databasics

74

Your primer on peripheral prices

### Billboard

80

### Quit/Datelines

88

Cover photograph by Naru

## MENU

June 23-June 29, 1983 Volume 1 No 16

## PCN SPECIALS

### Number-crunching ZX81

20

Teach your Sinclair — with a little help from Czes Kosniowski and John Ewing — how to get its sums right.

### Buying from the US

Advice from Barry Miles on how to get American suppliers to deliver fast.

### Atari Graphics

Turn your Atari into an artist's canvas with this simple program by Edmund Bamber.



## PCN PRO-TEST: SOFTWARE

### Four on the 64

30

Pete Gerrard tabulates the performance of four word-processing packages for the Commodore 64.

### CP/M Simplified

32

Simplifile, a package that replaces the tough CP/M commands with a more approachable set, is reviewed by Ted Ball.

## PCN PRO-TEST: PERIPHERALS



### Prof in print

35

Ian Scales checks out the MPF-II thermal printer, designed to partner the MicroProfessor . . .

### Torch lights BBC

. . . and wonders whether, in marketing the Z80 Disk Pack for the BBC micro, Torch is undercutting its own main product.



36

## PCN PRO-TEST: HARDWARE

### Atari vs Acorn

38

The Atari 800 price-cut now puts it in competition with the BBC micro. Andrew Tollyfield makes a timely comparison . . . and brings the Commodore into the same arena.



**CHARACTER SET** EDITORIAL: Editor Cyndy Miles Deputy editor Geof Wheelwright Production editor Keith Parish Managing editor Peter Worlock Sub editor John Lettice  
Richard King Peripherals editor Ian Scales Listings editor Sandra Grandison Editor's assistant Harriet Arnold Art director Jim Dansie Art editor David Robinson Assistant art editor  
Floyd Sayers Art assistant Dolores Fairman Publisher Fiona Collier Publishing manager Mark Eisen Publishing assistant Jane Green ADVERTISING: Advertisement director John  
Cade Advertisement manager Nic Jones Assistant advertisement manager Sue Hunter Sales executives Robert Stallibrass, Matthew Parrott, Bettina Williams, Ian Whorley, Sarah  
Barron, Roxanna Johnston, Christian McCarthy Production manager Eva Wroblewska Advertisement assistant Jenny Dunne Subscription enquiries Simon Maggs Subscription  
address 53 Frith Street London W1A 2HG 01-439 4242 Editorial address 62 Oxford Street London W1A 2HG 01-636 6890 Advertising address 62 Oxford Street London W1A  
2HG 01-323 3211 Published by VNU Business Publications, Evelyn House, 62 Oxford Street London W1A 2HG © VNU 1983. No material may be reproduced in whole or in  
part without written consent from the copyright holders. Photoset by Quickset, 184-186 Old Street, London EC1. Printed by Chase Web Offset, St Austell, Cornwall.  
Distributed by Seymour Press, 334 Brixton Road, London SW9, 01-733 4444. Registered at the PO as a newspaper

# Torch flares

By Geof Wheelwright

Torch Computers is about to take the wraps off major additions to its range of software and computers.

The long-awaited 68000-based Torch 700 Series (or Super Torch), the hard-disk version of the existing Torch, the Torchnet local area network and the new version of its Torchmail service should see the light of day on July 4.

The Torch 700 has three processors — a 68000, Z80 and 6502 — enabling it to run both the Unix and CP/M operating systems. It comes with dual drives as standard and a 20Mb hard disk is optional.

PCN sneak-previewed the Torchmail Plus, Torch hard disk and Torchnet systems in Cambridge last week.

Torchmail Plus takes interactive mail one step further than simply getting information from another Torch — it actually allows you to take control of other machines and give them orders. The key to the system is the Torch Obey — or Tobey — language and its associated compiler.

Tobey is used to set up an Obey file which contains all the information necessary to get the computer to execute various timed events. A Torch spokesman suggested, for example, that you could use Mail Plus to tell a Torch in Boston to ring a Torch in Ontario, or tell one in Australia to run WordStar. There are also conditional clauses so that you can ask the Torch originally giving the Obey command to send

back a message IF its command has been executed or ELSE try again later.

The Torch hard-disk system is configured with a standard Mitsubishi 80-track drive in the top and a 20 or 10Mb hard disk where the bottom drive normally sits.

The Torchnet local area network is an advanced version of Acorn's Econet system. However, Torch has added a few features of its own: Attach, Permit, Forbid and Detach. The first will give you control of another machine's disk drives — allowing both Read and Write; the second permits and defines access to your machine along the network; the third forbids access; and the fourth detaches you after logging on to someone else's drives.

## Kitemark for exhibitions



A shakeout could be on the way for the burgeoning exhibition and show industry. The Computer Trade Association has taken up the cudgels on behalf of its members, who say the public and industry alike are being ripped-off by computer exhibition organisers.

The CTA is setting up an exhibitions approval list. Only those shows which meet the standards laid down by the CTA will appear on it and the association expects that only 50 per cent of current exhibitions would make the grade.

The CTA urges you to look out for the CTA logo.

## Acorn Electron to be BBC compatible

Acorn's Electron, on course for an August launch, will be able to accept the 'sideways ROM' developed for the BBC Micro.

The sub-£200 Electron will take up to six sideways ROM software chips using an expansion interface called the Elk — which will also give the machine a printer interface, games paddles and an RS232 socket.

If it sounds as if the Electron has a

lot in common with the BBC Model A, reflect for a moment on the fact that Acorn plans to discontinue the Model A when the Electron is launched. The Electron will come standard with 32K, composite, RGB and UHF video sockets, the same DIN cassette I/O as the BBC, ten programmable function keys (accessed through a combined Caps Lock/Function key), and an expansion port underneath the machine

for the Elk and cartridge software.

Another possible casualty in the Electron launch is Acorn's ageing Atom computer. At the very least, it will probably drop in price.

Like the Atom, the Electron will support the Econet local area network — but it is also likely to use standard BBC disk drives.

Acorn says production models of the machine have already started arriving from Singapore.

## Micro Marketing

Last week we gave you a telephone number through which to contact Micro Marketing. We would like to make it clear that this number was erroneous — CG Hacking & Sons Ltd has never had any connection with Micro Marketing and Giles Hacking's employment with the company ceased some time ago. We apologise unreservedly for any embarrassment or inconvenience caused them.

## Zorba's dance

Businesses looking for a portable to do the more tedious tasks can add the Telcon Zorba to their list of possibilities.

At £1,834 the Zorba comes with a 7in green screen giving 80 columns by 25 lines, two 5¼in floppy disk drives holding 400K each, full qwerty keyboard and a Z80.

In addition, the machine offers

parallel, serial, IEEE 488 and modem interfaces if you want to expand the system. And as part of the package, £500-worth of software is thrown in.

At 22lbs the Zorba may be too heavy to take out dancing, but the distributor claims it's virtually an unbreakable case, and the machine comes with a 90-day guarantee.

For information contact Sun Computing on 01-890 1440.



## Intractable problems block removable Winchester

By Ian Scales

The chances of getting your hands on fast, reliable and above all removable hard disks took a nose-dive last week.

Seagate's removable Winchester disk has been removed from the market. The California-based drive manufacturer has produced about 200 of the units for evaluation, but has decided not to go ahead with widespread marketing for at least the next nine to 12 months.

Dave Karlstrom, Seagate Technology's director of marketing, told PCN the company was doubtful that enough reliable media could be produced to ensure adequate supply for its customers. Seagate expects an average of ten removable disks to be taken up for every unit sold.

He said that at this stage there were only two major manufacturers producing the disks and this could lead to problems. Removable Winchester drives have been on drawing boards for some time and it looked as though Seagate would be the first major company to offer users the advantages of the hard disk's access speed and data capacity with the added advantage of floppy-style removability.

Winchesters achieve their advantages by being finely engineered and sealed from dust and dirt, so making them removable involves a lot of practical problems.

Apparently these problems have yet to be solved as Seagate experienced a high defect level during testing.

## US/Jap pact

Japanese and US companies are joining forces to develop standardised micros so you can load programs on to any machine in the way you play any record on a hi-fi.

More than a dozen Japanese companies, including giants NEC and Matsushita, are spearheading moves to standardise the specs of home computers, but much of the development work is being done by Microsoft. Software maker Sierra On-Line is the only other US company involved at this stage.

The group intends to produce low-cost micros that will conform to a standard specification and run software regardless of the make of hardware. If it works, most Japanese home computers will become virtually interchangeable from the point of view of software

— Sony, Toshiba, Hitachi, Fujitsu and Mitsubishi are reported to have accepted the idea.

But the large US micro makers, like Texas Instruments, Commodore, Atari and others, have too much money invested in current systems to give the idea a second thought.

The spec developed by Microsoft is called MSX. In its present form it is thought to refer only to software on cartridges, but this is an increasingly common means of software supply and the standard could give cartridges a further boost.

None of the companies involved has yet announced plans to build a machine to the MSX spec, but Microsoft says several could do so when the group makes its next move in July.

# Absent micros dominate show

By Ralph Bancroft and Richard King

Last week's Computer Fair at Earl's Court had two memorable features: a cacophony of noise created by hundreds of arcade addicts trying out the latest games software and the products that should have been there but weren't.

Sinclair, for example, had taken a large stand, and very impressive it looked too. But closer inspection revealed that there was not even a cardboard cut-out of the Micro-drive promised in the brochure.

This was a trick repeated by Acorn which was promising demonstrations of its Prestel and Teletext adaptors for the BBC micro. There was no Prestel adaptor and the Teletext adaptor on show was flicking through pages of Ceefax too fast to be read.

To be fair, Acorn did manage to demonstrate machines that were running the long-awaited second processors. But don't get too excited. The word is that Acorn is still tweaking the systems to give the user access to a reasonable amount of extra memory.

Joining Sinclair and Acorn was Commodore which promised in the brochure 'for the businessman, the Commodore 700 and 500 computers will be available for hands-on experience'. True, there was a

solitary 700 among a sea of Vics and 64s, but the 500 repeated its non-appearance act of the previous week's Commodore Show.

Two companies that did get their new products to the show were Dragon and Campusers.

The Dragon was to be seen in its 64K upgrade version and running a disk drive under the OS9 operating system. The drive was of the half-height style that still takes up as much space as a full height model because the power supply sits underneath it.

Computers has put the power supply for the Lynx disk drive at the back rather than underneath, making it one of the longest disk drives ever produced. Also on the Lynx stand was the new 96K Lynx and the first issue of the Lynx User magazine.

The latter will be much sought after by Lynx owners. It contains material not in the micro's manual. Nothing essential, you understand — just lists of machine code routines and system variables.

Oric was demonstrating its four colour printer/plotter which goes on sale shortly for around £170 but still could only offer promises on the disk system and telephone modem.

Two interesting add-ons for the Oric were to be found on the Pase

stand. One is a joystick interface that costs £15 and allows you to hook up two Atari-type joysticks. Pase says that software being produced by Salamander, A + F and IJK, will be compatible with the interface.

Sinclair owners had a show 'village' all of their own. The emphasis was mainly on software, the majority of which was games (of the noisy variety mentioned above). One software, or to be more precise, firmware product being demonstrated was a word processor for the ZX81 called X-word. It comes as a plug-in ROM pack which has the added virtue of providing the ZX81 with an RS232 interface. The accompanying literature claims that it is a 'professional class word processor'. This may be a bit optimistic when you take account of the ZX81's 32 column screen and decidedly un-typewriter like keyboard.

On the hardware side, Micro-Myte was demonstrating its recently launched acoustic modem for the ZX81 and the Spectrum. It operates at 1200 baud and costs only £48.

But before you get too enthusiastic you should know that you can't use it to communicate with Prestel or the hobbyist bulletin boards that operate at 300 baud.

## Memotech's triple talker



Multilingual Memotech.

Of the two new machines launched at the show, the Memotech MTX500 was the more expensive at £275. For the money you will get a range of facilities that will set it up as a keen competitor to the BBC micro. It will be in the shops in August.

The micro uses the ever-popular Z80 processor with 32K of RAM and 16K of ROM. In addition there is 16K of RAM dedicated to the video display which generates a screen that can use 16 colours (all at the same time) for 40-column text or 256x192 pixel graphics with sprites.

The machine is housed in a black aluminium case not much bigger than a keyboard. The keyboard has 79 typewriter-style keys that include a numeric and cursor control keypad and eight user-definable keys.

Coming out of the backs of the machine are two joystick ports, a Centronics parallel printer port, an uncommitted input/output port, a 2,400 baud cassette interface, connection for a TV that includes sound output, video monitor output, hi-fi output for three-voice sound and a dedicated games cartridge port.

The micro comes with not one but three languages in the ROM. The Basic has been designed to allow easy manipulation of the display and uses a structured form of programming. Logo has been included to exploit its graphics facilities.

The third language is called Noddy and Memotech describes it as 'a very simple method of programming the computer to display information or ask questions and then move on to another display depending on the previous response.'

The ROM also includes an assembler/disassembler for machine code programming.

Initial software releases are versions of well-known games like Pacman, Frogger, Minefield, and Space Invaders. Other games software is promised.

Expandability is a key feature of the machine and the company is promising an 80-column video board, RS232 interfaces, and floppy disk interfaces to run CP/M. The RAM can be expanded to 512K and the ROM to 72K.

Memotech made its name building Sinclair add-on units.

## £70 for colour Laser

The launch of the Laser at the show brings down the cost of colour computing to £70. It will be in the shops next month.

Admittedly for £70 you don't get much. Just 4K of RAM, 16K ROM, rubber keyboard (as on the Sinclair Spectrum), and graphics limited to a resolution of 128x64 pixels and eight colours.

The micro has a cassette interface and TV output.

To make the most of this micro you will probably have to add to your budget £30 for the 16K RAM pack, £20 for a pair of joysticks and another £20 for a Centronics-compatible printer interface.

Programmers can take advantage of the Microsoft Basic that comes with the machine in a 16K ROM. Additional languages scheduled for release on tape in August are Laser Basic (described as a 'high speed programming language for the beginner') and Laser Forth. They will cost £6 each.

As would be expected most of the software that will be released with



Colour need not burn a hole in your pocket with the Laser, but the extras might.

the machine are games. Games for the 4K machine will cost £4 and those needing the 16K RAM pack will cost £5.

The Laser will be sold through the Computers for All chain of independent retailers as well as at least one (as yet unnamed) High Street multiple.

Later in the year there should be extra add-ons for the micro including a light-pen (£20), a four-colour printer/plotter (£150) and a 64K RAM pack (£150).

The Laser is virtually the same system in terms of size and specification as the Textet, Pro-Tested in PCN's first issue.

## VIEW FROM AMERICA



## Gloves off in battle for 256K

By Chris Rowley

The global market for semiconductor chips is estimated at \$14.6 billion now, in the mid-year of the 64K RAM generation, but we ain't seen nothing yet. Already Japanese advance men have been touting specimens of the next generation, the 256K RAM chips, on American sales trips. 256K RAM may be worth \$4 billion by 1989. These Japanese visits have produced considerable unease in the US semiconductor industry, the Pentagon and the Reagan administration.

Round by round the struggle for dominance in silicon chips has been intensifying between the USA and Japan and each new generation of chips ups the ante required to stay in the game. Since the Japanese companies like Hitachi and NEC were the decisive victors in the 64K RAM round, taking 70 per cent of the market, they've been able to generate great amounts of investment capital for the 256K round.

The Americans realise they're about nine months behind in the current race, but still have hopes of staying in the struggle for a number of reasons. First off they hung on to the finer market points, like CPUs and custom-designed chips. They believe they're well ahead in Computer Assisted Design (CAD) software for the next generation of chips. Finally, they're comforted by the thought that America is the mother of markets and the rage for customised chips here is bonding large customer and chip makers closer and closer together.

However, mistakes on the US side have hurt the Americans badly. They have been investing less in the future, putting only 15 per cent of sales back into new chip production while the large Japanese firms have been spending 25 per cent.

Since the Japanese automated in the mid-seventies on an awesome scale while the Americans shifted production jobs overseas to low-waged nations the Japanese firms now have an inherent advantage in production of dynamic RAMs. Their near automatic plants turn out mass volume chips with very low defect ratios due to lack of human dust, dandruff, sweat and so on, and that means high profitability.

In addition, the Japanese won the early 4K RAM round, which gave us the calculator boom. Hence they stayed with CMOS chip technology which is once again in favour. CMOS stands for *Complimentary Metal Oxide Semiconductor* because it has paired transistors throughout. This gives low-power dissipation and hence less heat.

However, the US Defence Department is growing steadily more concerned about the situation because the best seller in each generation of chips is the dynamic RAM and without big sales of RAMs it's hard for chip companies to generate the capital for the next round.

The feeling that a predatory Japan obeying only the demands of a covert economic ear is out to destroy the brightest growth feature of the US economy is in the air. Moreover, the next round, the 256K era, will be great for personal computer users whoever wins. The first round of popularly priced 256K chip-based machines should show up on the market in time for Christmas 1985. At the same time chip technologies will be merging into each other.

The kinds of semiconductor machines, power transistors coated with CMOS circuitry, portable computers the size of wristwatches with 64K RAM memories — there's no end to this sort of business. The curve from here seems to go straight up the graph towards infinity.

The Pentagon is concerned because without a strong semiconductor industry to rely on there'll be nobody to build the custom chips for tomorrow's military needs. The idea of consigning that sort of work to Japan brings on uncontrollable shudders in Washington.

So far the Reagan administration has pretty much kept its hands off this potentially explosive situation. The Defence Department has announced a major drive to develop the 4Mb chip, leapfrogging both 256K and 1Mb generations entirely. Also Anti-Trust rules were relaxed for US chip makers, letting them pool research efforts. But if the Pentagon really lights up in alarm the administration is certain to intervene. Already the Japanese are furiously building plants in the US, having read the tea leaves well.

## Vectrix twins cram in colour

A new trend in graphics peripherals was shown by the Sintrom group last week. It has brought the Vectrix series of graphics processors which have been available for some time in the States, to the UK.

There are two models, the VX128 and VX384, which differ in the amount of memory they have — the VX128 has 128K, so it isn't hard to guess how much the VX384 has.

The machines differ from 'normal' graphics processors in that they appear to the computer to be printers, either serial or parallel.

The parallel version conforms to the Centronics standard and the serial to RS232. This is considerably different, since most graphics terminals (eg Tektronics) use complicated mainframe protocols.

The two machines, though they obey the same commands and are thus interchangeable, have con-

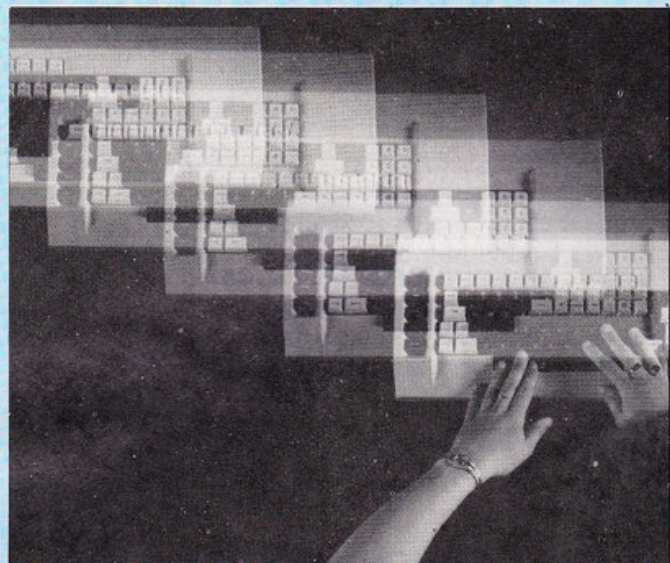
siderably different capabilities. The VX128 has a fairly ordinary eight-colour palette (usual RGB colours), but the VX384 can display any 512 colours from a total palette of 16.8 million!

The quality of such images is quite incredible, but it's a pity that it takes about 20 minutes to draw a complicated screen.

The hardware consists of an 8088 processor which drives an NEC7220 graphics processor. This is backed up by the RAM, which is split into a program area and a screen area.

Picture storage is generally by means of storing the vectors, which keeps file-sizes down, though image dumps can be done too. The VX128 will set you back £1,990 and the VX384 £3,490.

Sintrom is on Reading (0734) 875464.



Opticians probably have a name for it, but Comart calls it the CP520MP and the trick photography is to demonstrate that while you're using this machine five of your friends can be on-line as well. Like other systems in Comart's all-British (well, mostly British) Communicator range the CP520MP is based on the S100 bus and it includes 'slave' single card micros with a Z80 and 64K of RAM for each user. Each runs CP/M, to give you some applications to choose from. The system starts at £6,995 — Comart is on (0480) 215005.

## Wider range for High St hardware

The prices pot will be kept boiling when WH Smith extends its micro shelf space at the beginning of next month.

Smiths plans to open three Computer Shops on July 1 at its Birmingham, Croydon and Northampton stores — the main difference from its existing Computer

Know-How departments will be in the range of hardware on sale. The Sinclair systems will be joined by Commodore's 64 and Vic 20, the Oric 1, the Apple IIe, BBC Model B, and Mattel Aquarius.

A spokesman for the chain said: 'Prices are a little difficult to pitch at the moment, they're jumping around so much. But I think you'll find one or two surprises.'

Smiths will open 'one or two' more Computer Shops before Christmas, but it will be some time before it decides how far to extend the idea through the rest of the chain.

# Drive drought

The chips are down for Acorn yet again. The disk interface for the BBC micro is practically unavailable and the drought is likely to continue for the next month — bearing in mind that if the official version states a month it's likely to be two or three.

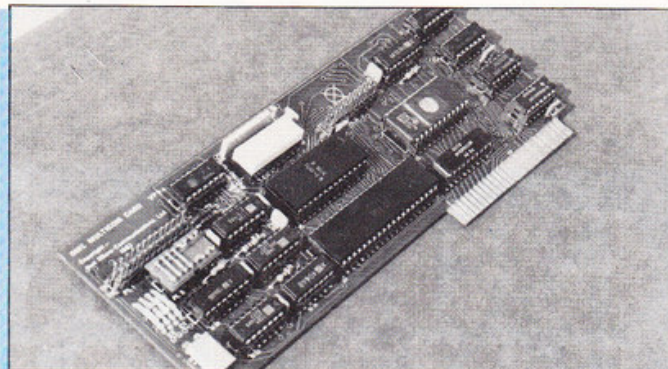
This is bad news for BBC owners with their hearts set on buying disk drives — without the interface, of course, there is no way of getting them to work with the micro.

Acorn is probably just as sorry. According to a spokesman the company greatly underestimated the demand for drives. The BBC was originally intended as a home

and schooled educational micro and in this market it was thought unlikely that the take-up rate for expensive disk drives would be great. According to Acorn, though, there has been unexpected enthusiasm for the machine among business-users.

The advanced planning and ordering involved in getting the right chips to the right place at the right time doesn't really allow for sudden increases in supply, so there's not much that anybody can do except sit tight and wait, says Acorn.

This is also bad news for users interested in configuring the Torch Pack (see page 36).



**COM CARD**—This card may not turn your Apple inside out but it could make it the core of a handy little communications system. The Multicom card, from Owl Micro-Communications, slots into the Apples II+, IIe and III and holds serial and parallel interfaces with a clock. If you want to use it with modems and the appropriate software you can hook your Apple into an electronic mail system or a larger computer network. The card costs £190 from Owl on Sawbridgeworth (0279) 723848.

## PCN Charts

You've followed the micro charts — now here's the games top 30 compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets in the four weeks up to June 16 and, like the micro charts, do not take account of mail order sales. We'll be keeping them up to date, showing new positions every two weeks, so watch for the changing status of your favourite games.

The micro charts this week show the number of machines sold in the two-week period ending two weeks before publication date

(June 23), so they tell the story in the high street between May 27 and June 9. Neither mail order nor deposit-only orders are included and 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, will be updated every alternate week. Watch the arrows to see how they're doing.

PCN Charts are compiled by MRIB (Computers), London, (01) 408 0250.

### GAMES

#### TOP THIRTY

GAME TITLE	PUBLISHER	MACHINE	PRICE
1 Donkey King	Microdeal	Dragon	£8
2 The Hobbit	Melbourne House	Spectrum	£14.95
3 Flight Simulation	Psion	Spectrum	£5.95
4 Arcadia	Imagine	Spectrum	£5.50
5 Penetrator	Melbourne House	Spectrum	£6.95
6 Panic	BugByte	Vic 20	£7
7 Miner 2049er	Big Five	Atari	£28.95
8 Blitz	Commodore	Vic 20	£4.99
9 Parsec	Texas	TI 99	£25.95
10 Croaker	Program Power	BBC	£7.99
11 Planet of Death	Artic	Spectrum	£6.95
12 Horace Goes Skiing	Psion	Spectrum	£5.95
13 Choplifter	Broderbund	Atari	£29.95
14 Space War	Microdeal	Dragon	£8
15 Cosmiads	BugByte	Vic 20	£7
16 Transylvanian Tower	Richard Shepherd	Spectrum	£6.50
17 Time Gate	Quicksilver	Spectrum	£6.95
18 Zaxxon	Datasoft	Atari	£29.90
19 Space Invaders	Texas	TI 99	£17.95
20 Star Raiders	Atari	Atari	£24.90
21 Moon Raider	Program Power	BBC	£6.95
22 Cosmic Invaders	DragonData	Dragon	£19.95
23 Flight	Tansoft	Oric	£7.95
24 Planetoid	Acornsoft	BBC	£9.95
25 3D Escape	New Generation	Spectrum	£4.95
26 Hungry Horace	Psion	Spectrum	£5.95
27 ET Phone Home	Atari	Atari	£28.95
28 Monster Maze	New Generation	ZX81	£4.95
29 Gridrunner	Llamasoft	Vic 20	£6
30 Wacky Waiters	Imagine	Vic 20	£5.50

### HARDWARE

#### Top Twenty up to £1,000

MODEL	PRICE	DISTRIBUTOR
► 1 (1) Sinclair Spectrum	£99	(SI)
► 2 (2) BBC Model B	£399	(AC)
► 3 (3) Sinclair ZX81	£40	(SI)
▲ 4 (6) Atari 400	£150	(AT)
▼ 5 (4) Oric 1	£100	(OR)
▼ 6 (5) Dragon 32	£200	(DR)
▲ 7 (9) Vic 20	£170	(CO)
▲ 8 (10) Atari 800	£300	(AT)
▲ 9 (13) Texas TI 99	£150	(TE)
▼ 10 (7) Lynx 48	£225	(CA)
▼ 11 (8) Newbrain A	£228	(GR)
▼ 12 (11) Epson HX20	£472	(EP)
▲ 13 (14) Colour Genie	£224	(LO)
▲ 14 (18) Jupiter Ace	£90	(JU)
▲ 15 (16) Commodore 64	£345	(CO)
▼ 16 (12) Sharpe MZ80 A	£549	(SH)
▲ 17 (19) Apple II E	£969	(AP)
▼ 18 (17) Sharp PC 1500	£170	(SH)
▲ 19 (—) Tandy Colour	£240	(TA)
▲ 20 (—) Sord M5	£218	(SO)

#### Top Ten over £1,000

► 1 (1) Osborne 1	£1,581	(OS)
► 2 (2) Sirius 1	£2,754	(ACT)
▲ 3 (4) IBM PC	£2,392	(IBM)
▼ 4 (3) Apple III	£2,780	(AP)
▲ 5 (8) HP 86A	£1,541	(HP)
▼ 6 (5) Commodore 8032	£1,129	(CO)
▲ 7 (9) Sanyo MBC 1000	£1,195	(SA)
▲ 8 (10) DEC Rainbow	£2,714	(DEC)
▲ 9 (—) Televideo TS 800	£1,495	(CCS)
▼ 10 (7) Superbrain II	£2,070	(IC)

AC Acorn Computers. ACT — ACT Sirius. AP — Apple Computers. AT — Atari International. CA — Computers. CCS — Colt Computer Systems. CO — Commodore. DEC — Digital. DR — Dragon Data. EP — Epson. GR — Grundy Business. HP — Hewlett-Packard. IBM — IBM. IC — Icarus Computers. JU — Jupiter Cantab. LO — Lowe Electronics. LL — Lucas Logic. OL — Olivetti. OR — Oric. OS — Osborne Computers Corporation. SA — Sanyo. SH — Sharp. SI — Sinclair. SO — Sord. TA — Tandy. TE — Texas Instruments.





# GREAT NEW SOFTWARE DEAL

**Buy 'n Try** - the sensible way to shop for software. Simply buy any item from our software range. Try it out at home. If it's not exactly what you expected, then we'll buy it back for a full 80% of the price you paid against another purchase of equivalent or greater catalogue value .... any time within 1 month of purchase.

Which means you can keep right up to date with the latest software and games releases without making costly mistakes.

## How it Works

Example: Buy a game for £10. If it's not as good as you thought, then we'll buy it back for £8 against your choice of another game worth £10 or more. Just send us the difference. There's just one simple rule .... we can only agree to buy back software that's in working order.

Look at our super selection and complete the order form to take advantage of the hottest software deal ever, or telephone your order to **Software Centre on 01-487-5974**, quoting your Access/Barclaycard number (24-hour telephone service).

## B.B.C. MICRO

	Mem Reg'd Supplier	Code No	Price
Space Pirates	16K Bug Byte	02B001	£8.00
Space Warp	32K Buy Byte	02B002	£9.00
Golf	32K Bug Byte	02B003	£5.50
Dragon Quest 1	16K Bug Byte	02B004	£11.50
Fruit Machine	B Bug Byte	03B006	£5.50
B.B.C. Airlift	B Bug Byte	02B007	£5.50
Polaris	32K Bug Byte	02B008	£5.50
B.B.C. Chess	32K Bug Byte	02B009	£8.00
B.B.C. Backgammon	A/B Bug Byte	02B010	£8.00
B.B.C. Multifile	16K Buy Byte	02B011	£15.00
B.B.C. Micro Derby	A/B Buy Byte	02B012	£5.50
Swoop B/A	32K Micropower	24B029	£7.99
Alien Destroyers	32K Micropower	24B030	£7.99
Galactic Commander	32K Micropower	24B031	£7.99
Timetrek	32K Micropower	24B032	£7.99
Laser Command B/A	32K Micropower	24B033	£7.99
Astro Navigator B/A	32K Micropower	24B034	£5.70
Chess B/A	32K Micropower	24B035	£7.99
Footer B/A	32K Micropower	24B036	£7.99
Adventure	32K Micropower	24B037	£7.99
Cowboy Shootout	32K Micropower	24B038	£6.85
Munchyman	32K Micropower	24B039	£6.85
Seek	32K Micropower	24B040	£6.85
Eldorado Gold B/A	32K Micropower	24B041	£6.85
Roulette B/A	32K Micropower	24B042	£5.70
Reversi 2 B/A	32K Micropower	24B043	£5.70
Filer	32K Micropower	24B044	£10.30
Micro Budget	32K Micropower	24B045	£7.99
Constellation B/A	32K Micropower	24B046	£6.85
Disassembler	32K Micropower	24B047	£6.85
World Geography	32K Micropower	24B048	£6.85
Where B/A	32K Micropower	24B049	£6.85
Junior Maths Pack	32K Micropower	24B050	£6.85
Startrek/Candyfloss	A or B I.J.K. Software	33B001	£6.50
6 Games	A or B I.J.K. Software	33B002	£4.50
Mutant Inv/Breakout	A or B I.J.K. Software	33B003	£6.50
Beep Beeb B or A	32K I.J.K. Software	33B004	£4.50
Beebmunch B or A	32K I.J.K. Software	33B005	£6.50
Super Hangman B or A	32K I.J.K. Software	33B006	£4.50
3D Maze B or A	32K I.J.K. Software	33B007	£4.50
Invaders A	32K I.J.K. Software	33B008	£5.50
Invaders B or A	32K I.J.K. Software	33B009	£7.50
Wordpro B or A	32K I.J.K. Software	33B010	£10.50
Atlantis/Scramble	32K I.J.K. Software	33B011	£7.50
Flags	32K I.J.K. Software	33B012	£4.50
Hyperdrive	32K I.J.K. Software	33B013	£6.50
Strato Bomber	32K I.J.K. Software	33B014	£7.50
Creative Graphics	A/B Acornsoft	53B051	£9.95
Arcadians	B Acornsoft	53B052	£9.95
Sliding Block Puzzles	B Acornsoft	53B053	£9.95
Snapper	B Acornsoft	53B054	£9.95
Desk Diary	A/B Acornsoft	53B055	£9.95
Cube Master	B Acornsoft	53B056	£9.95
Tree of Knowledge	B Acornsoft	53B057	£9.95
Lisp	A/B Acornsoft	53B058	£16.85
City Defence	B Bug Byte	02B059	£7.50
Space Invaders	B Bug Byte	02B060	£7.50
Galaxy Wars	B Bug Byte	02B061	£7.50
Asteroid Belt	Comp. Concept	60B073	£7.80
Space Hawks	Comp. Concept	60B074	£7.80
Golden Baton	Digit. Fantasia	61B075	£10.30
Time Machine	Digit. Fantasia	61B076	£10.30
Arrow Death 1	Digit. Fantasia	61B077	£10.30
Arrow Death 2	Digit. Fantasia	61B078	£10.30
Pulsar 7	Digit. Fantasia	61B079	£10.30
Circus	Digit. Fantasia	61B080	£10.30
Feasibility Experiment	Digit. Fantasia	61B081	£10.30
Frogger	I.J.K.	33B088	£7.50
Croaker	Micropower	24B108	£7.99
Dragon Rider	Salamander	62B109	£7.95

## B.B.C. MICRO cont.

	Mem Reg'd Supplier	Code No	Price
Tanks	Salamander	62B110	£24.95
Compencies & Statements	Gemini	63B115	£19.95
Home Accounts & Budget	Gemini	63B116	£19.95
Decision Maker	Gemini	63B117	£5.95
Stock Control System	Gemini	63B118	£19.95
Selective Mailing List	Gemini	63B119	£19.95
Commercial Accounting	Gemini	63B120	£19.95
BBC Word Processing	32K A or B Gemini	63B121	£19.95
Beebcalc	Gemini	63B122	£19.95
Moonraider B/A	32K Micropower	NEW	£7.99
Galactic Commander B/A	32K Micropower	NEW	£7.99
Spacemaze B/A	32K Micropower	NEW	£6.85
Maze Invaders B/A	32K Micropower	NEW	£5.70
Startrek A or B	32K Micropower	NEW	£5.70
Killer Gorilla B/A	32K Micropower	NEW	£7.99
Croaker B/A	32K Micropower	NEW	£7.99
Barrage B/A	32K Micropower	NEW	£7.99
Labyrinths of LaCoshe B/A	32K Micropower	NEW	£7.99
Painter B/A	32K Micropower	NEW	£6.85
Caveman Adventure	A or B Micropower	NEW	£6.85
Yahtzee B/A	32K Micropower	NEW	£5.70
Wall B/A	32K Micropower	NEW	£5.70
Mastermind	A or B Micropower	NEW	£4.55
Music Processor B/A	32K Quicksilver	NEW	£14.95
Algebraic Manipulation B/A	32K Acornsoft	NEW	£9.95
Arcade Action B/A	32K Acornsoft	NEW	£11.65
Cube Master B/A	32K Acornsoft	NEW	£9.95
Forth B/A	32K Acornsoft	NEW	£16.85
Word Hunt B/A	32K Acornsoft	NEW	£11.90
Sphinx Adventure B/A	32K Acornsoft	NEW	£9.95
Peeko Computer B/A	32K Acornsoft	NEW	£9.95
Rocket Raid B/A	32K Acornsoft	NEW	£9.95
Meteors B/A	32K Acornsoft	NEW	£9.95
Missing Signs B/A	32K Acornsoft	NEW	£11.90
Number Balance B/A	32K Acornsoft	NEW	£11.90
Sentence Sequencing B/A	32K Acornsoft	NEW	£11.90
Planetoid B/A	32K Acornsoft	NEW	£9.95
Super Invaders B/A	32K Acornsoft	NEW	£9.95
Painting B/A	32K BBC Soft	NEW	£10.00
Fun Games B/A	32K BBC Soft	NEW	£10.00
Music B/A	32K BBC Soft	NEW	£10.00
Beebmón	A or B Micropower	NEW	£10.30
Draw	A or B Micropower	NEW	£10.30
Chemistry	A or B Micropower	NEW	£6.85
World Geography	A or B Micropower	NEW	£5.95
Physics	A or B Micropower	NEW	£6.85

## COMMODORE 64

Monopole	Rabbit	13K002	£9.99
Grave Robbers	Rabbit	13K003	£9.99
Sprite Editor/Graphic Generator	Rabbit	13K004	£9.99
Adventure Pack 1	Rabbit	13K005	£9.99
Attack on Mutant Camels	Llarnasoft	52K006	£8.50
Rox 64	Llarnasoft	52K007	£4.95
Gridrunner	Llarnasoft	52K008	£8.50
Colonels House	Rabbit	13K009	£9.99
Grand Master Chess	Audiogenic	16K012	£17.95
Renaissance	Audiogenic	16K013	£8.95
Motor Mania	Audiogenic	16K014	£8.95
Super Skramble	Terminal	NEW	£9.95
Star Trek	Interceptor	NEW	£7.00
Panic 64	Interceptor	NEW	£7.00
Frogger 64	Interceptor	NEW	£7.00
Centropods	Rabbit	NEW	£5.99
Pakacuda	Rabbit	NEW	£5.99
Escape MCP	Rabbit	NEW	£5.99
Cyclons	Rabbit	NEW	£5.99
Lunar Lander	Channel 8	NEW	£9.95
Superfont	English Soft	NEW	£6.95
SpriteMaker	English Soft	NEW	£6.95
Vixplode - 64	Albraso	NEW	£8.50

**NB. Software Centre is not a software library.**

# DRAGON 32

Mem Req'd	Supplier	Code No	Price
Ghost Attack (cart)	Dragon Data	17C007	£24.95
Cave Hunter (cart)	Dragon Data	17C008	£24.95
Starship Chameleon (cart)	Dragon Data	17C009	£24.95
Chess (cart)	Dragon Data	17C011	£24.95
Dragon Selection One	Dragon Data	17C012	£7.95
Dragon Selection Two	Dragon Data	17C013	£7.95
Personal Finance	Dragon Data	17C016	£7.95
Graphic Animator	Dragon Data	17C017	£7.95
Computa Voice	Dragon Data	17C018	£7.95
Typing Tutor	Dragon Data	17C022	£7.95
Alcatraz	Microdeal	21C028	£8.00
Defense	Microdeal	21C029	£8.00
Dragon Invaders	Microdeal	21C030	£8.00
Escape	Microdeal	21C031	£8.00
Mansion Adventure	Microdeal	21C032	£8.00
Jerusalem Adventure	Microdeal	21C033	£8.00
Williamsburg Adventure	Microdeal	21C034	£8.00
Ultimate Adventure	Microdeal	21C035	£8.00
Phantom Slayer	Microdeal	21C036	£8.00
Planet Invasion	Microdeal	21C037	£8.00
4 Games Pack 1	Microdeal	21C038	£8.00
4 Games Pack 2	Microdeal	21C039	£8.00
4 Games Pack 3	Microdeal	21C040	£8.00
Racer Ball	Microdeal	21C041	£8.00
Scarfman	Microdeal	21C042	£8.00
Space Monopoly	Microdeal	21C043	£8.00
Space War	Microdeal	21C044	£8.00
Storm	Microdeal	21C045	£8.00
Invaders Revenge	Microdeal	21C046	£8.00
Donkey King	Microdeal	21C047	£8.00
Flipper	Microdeal	21C048	£8.00
Katerpillar Attack	Microdeal	21C049	£8.00
Strategic Command	Romik	10C050	£9.99
Adventure 2	Microdeal	21C055	£8.00
Adventure 3	Microdeal	21C056	£8.00
Light Pens	Microdeal	21C060	£8.00
Trek	Salamander	62C061	£9.95
Wizard War	Salamander	62C062	£7.95
Vulcan O's & X's	Salamander	62C063	£7.95
Games Compendium	Salamander	62C064	£7.95
Golf	Salamander	62C065	£7.95
Grand Prix	Salamander	62C066	£7.95
Star Trek	P.S.S.	64C067	£7.95
Tex Star	P.S.S.	64C068	£12.95
Dragbug	P.S.S.	64C069	£12.95
Attack	P.S.S.	64C070	£7.95
Datapien	P.S.S.	64C071	£12.95
Cosmic Zap	Microdeal	21C072	£8.00
Android Attack	Microdeal	21C073	£8.00
EL Diablero	Dragon Data	17C074	£7.95
Database Management System	Gemini	63C075	£19.50
Home Accounts & Budget	Gemini	63C076	£19.95
Dragon Calc	Gemini	63C077	£19.95
Monster Mine	Gem Software	NEW	£7.95
Sultan's Maze	Gem Software	NEW	£7.95
Golf	Gem Software	NEW	£7.95
Space Mission	Gem Software	NEW	£7.95
Alien Blitz	Gem Software	NEW	£7.95
Character Generator	Gem Software	NEW	£9.95
Games Pack I	Gem Software	NEW	£7.95
Games Pack II	Gem Software	NEW	£7.95
Games Pack III	Gem Software	NEW	£7.95
Gempack IV	Gem Software	NEW	£7.95
Eduquiz I	Gem Software	NEW	£9.95
Eduquiz II	Gem Software	NEW	£9.95
Funmaths I	Gem Software	NEW	£9.95
Chateau	Gem Software	NEW	£7.95
Family Programs	Shards Software	NEW	£6.95
Fun and Games	Shards Software	NEW	£6.95
Live and Learn	Shards Software	NEW	£6.95
City Defence	Shards Software	NEW	£5.75
Pirate	Abrasco	NEW	£8.50



**FOR USE ON VIC20 + 16K,  
DRAGON, COMMODORE 64,  
ORIC 1, SINCLAIR ZX81 + 16K.**

**CENTRESPREAD SC**  
A fast flexible spread-sheet program. Set up the spread and test 'what-if' options. Centrespread calculates formulae on columns and lines. Superb forecasting and planning aid. **£19.95**

**DATABASE SC**  
A powerful database management program to select and sort complex data from any of twelve fields. Ideal for records, home accounts, mail lists, stock lists etc. **£19.95**

**NB When ordering please state computer model**

**THE BEST WAY TO BUY**  
Software Centre's great Buy 'n' Try deal stops costly mistakes by making sure you only keep what you really want.



## SINCLAIR SPECTRUM

Planet of Death	Artic	25D001	£6.95
Inca Curse	48K Artic	25D002	£6.95
Ship of Doom	48K Artic	25D003	£6.95
Espionage Island	48K Artic	25D004	£6.95
Reversi/Othello	Moi	25D005	£7.95
Club Record Contr	48K ICL	27D006	£9.95
Collectors Pack	48K ICL	27D007	£9.95
G1: Games 1	ICL	27D008	£4.95

Mem Req'd	Supplier	Code No	Price
G2: Games 2	ICL	27D009	£4.95
G3: Games 3	ICL	27D010	£4.95
G4: Games 4	ICL	27D011	£4.95
G5: Games 5	48K ICL	27D012	£4.95
Pastimes 1	ICL	27D013	£4.95
Pastimes 2	ICL	27D014	£4.95
Space Raiders	Psion	27D015	£4.95
Planetoids	Psion	27D016	£4.95
Hungry Horace	ICL	27D017	£5.95
Biorhythms	ICL	27D018	£6.95
History 1	ICL	27D019	£6.95
Geography 1	ICL	27D020	£6.95
Inventions 1	ICL	27D021	£6.95
Music 1	ICL	27D022	£6.95
English Literature	ICL	27D023	£6.95
Chess	48K Microgen	06D024	£7.95
Flight Simulation	48K Psion	28D025	£7.95
VU-CALC	Psion	28D026	£8.95
VU-FILE	Psion	28D027	£8.95
VU-3D	Psion	28D028	£9.95
Acadia	Imagine	05D029	£5.50
Scramble	Micro Gen	06D030	£5.50
Master Chess	Micro Gen	06D031	£6.95
Sorcerers Castle	Micro Gen	06D032	£5.50
Cosmic Raiders	Micro Gen	06D033	£5.95
Krazy Kong	48K Cotech	07D034	£5.50
Spectral Invaders	Bug Byte	02D037	£5.00
Spectres	Bug Byte	02D038	£8.00
Aspect Editor	Bug Byte	02D039	£9.00
Nightlife	16/48K Hewson	70D042	£5.95
Speak Easy	48K Quicksilva	12D046	£4.95
Time Gate	48K Quicksilva	12D047	£6.95
Chess Player	48K Quicksilva	12D048	£6.95
Space Intruders	16K Quicksilva	12D049	£4.95
Meteor Storm	16K Quicksilva	12D050	£4.95
Meteoroids	DK Tronics	09D063	£4.95
3D Tanx	DK Tronics	09D064	£4.95
Centipede	DK Tronics	09D065	£4.95
Ground Force Zero	DK Tronics	09D066	£5.00
Football Manager	16K Addictive	50D070	£6.95
Gobbleman	16/48K Artic	25D071	£4.95
Invasion Force	16/48K Artic	25D072	£4.95
Frog/Showdown	16/48K Artic	25D073	£4.95
Spectrum Assembler	48K Artic	25D074	£9.95
Voice Chess	48K Artic	25D075	£9.95
Schizoids	Imagine	05D076	£5.50
Ah Diddums?	Imagine	05D077	£5.50
Adventure A	Artic	25D078	£6.95
Adventure B	Artic	25D079	£6.95
Adventure C	Artic	25D080	£6.95
Adventure D	Artic	25D081	£6.95
Invaders	Artic	25D083	£4.95
Galaxians	Artic	25D084	£4.95
Bug 1	Artic	25D085	£2.50
Bug 2	Artic	25D086	£7.00
Forth	Artic	25D087	£29.95
Micro Chess	Artic	25D088	£6.95
Chess	Artic	25D089	£9.45
Krakit	Artic	25D090	£9.95
Arcadia	J.K. Greye	32D091	£4.95
Penetrator	Melbourne H.	65D092	£6.95
Hobbit	Melbourne H.	65D093	£14.95
Spectrum 1	Melbourne H.	65D094	£5.95
Spectrum 2	Melbourne H.	65D095	£5.95
Spectrum 3	Melbourne H.	65D096	£5.95
Mined Out	Quicksilva	12D097	£4.95
Ground Force	Titan	22D098	£5.00
Mad Martha	Microgen	06D099	£6.95
Mines of Saturn	Microgen	06D100	£5.95
M Coder	P.S.S.	64D101	£8.95
Ghost Hunt	P.S.S.	64D102	£4.95
Maze Death Race	P.S.S.	64D103	£4.95
Database Management Systems	Gemini	63D104	£19.50
Home Accounts & Budget	Gemini	63D105	£19.95
Decision Maker	Gemini	63D106	£5.95
Stock Control System	Gemini	63D107	£19.95
Selective Mailing List	Gemini	63D108	£19.95
Commercial Accounts	Gemini	63D109	£19.95
Monster Mine	Gem Software	NEW	£7.95
Space Mission	Gem Software	NEW	£7.95

**SOFTWARE CENTRE 24 HOUR HOT-LINE ORDER SERVICE 01-487-5974**

## SINCLAIR ZX81

Space Invaders	Microgen	06E001	£3.95
Breakout	Microgen	06E002	£3.95
Bomber	Microgen	06E003	£3.95
ZX Chess	Microgen	06E004	£6.50
Sorcerer's Castle	Microgen	06E005	£3.95
1K ZX Chess	Sinclair	20E006	£2.95
Thro the wall/Scramble	Psion	28E007	£4.95
Super Gloop/Frogs	16K Psion	28E008	£4.95
1K Games Pack	Sinclair	20E009	£5.95
Planet of Death	16K Artic	25E010	£5.95
Inca Curse	16K Artic	25E011	£5.95
The Ship of Doom	16K Sinclair	20E012	£5.95
Espionage Island	16K Sinclair	20E013	£5.95
Toolkit	16K Sinclair	20E014	£5.95
Reversi/Othello	16K Moi	26E015	£6.95

**COPYRIGHT WARNING: IT IS AGAINST THE LAW TO COPY SOFTWARE PURCHASED FROM US**

# SINCLAIR ZX81 cont.

	Mem Req'd	Supplier	Code No	Price
Games 1		ICL	27E016	£3.95
Junior Education 2		ICL	27E017	£3.95
Business & Household 3		ICL	27E018	£3.95
Games 4		ICL	27E019	£3.95
Junior Education 5		ICL	27E120	£3.95
Family Quiz 6		ICL	27E121	£3.95
G12 Fantasy Games		Psion	28E122	£4.75
G13 Space Raiders		Psion	28E123	£4.75
G1 Super Program 1		ICL	27E124	£4.95
G2 Super Program 2		ICL	27E125	£4.95
G3 Super Program 3		ICL	27E125	£4.95
G4 Super Program 4		ICL	27E127	£4.95
G5 Super Program 5		ICL	27E128	£4.95
G6 Super Program 6		ICL	27E129	£4.95
G7 Super Program 7		ICL	27E130	£20.95
G8 Super Program 8		ICL	27E131	£4.95
G10 Backgammon		Psion	28E132	£5.95
G14 Flight Simulation		Psion	28E133	£5.95
E1 English Lit. 1		ICL	27E134	£6.95
E2 English Lit. 2		ICL	27E135	£6.95
E3 Geography		ICL	27E136	£6.95
E4 History		ICL	27E137	£6.95
E5 Maths 1		ICL	27E138	£6.95
E6 Music 1		ICL	27E139	£6.95
7 Inventions 1		ICL	27E140	£6.95
E8 Spelling 1		ICL	27E141	£6.95
G11 Chess		Psion	28E142	£6.95
G9 Biorhythms		Sinclair	20E143	£6.95
B3 VU-CLAC		Sinclair	20E144	£7.95
B4 VU-FILE		Sinclair	20E145	£7.95
B1 Collectors		Sinclair	20E146	£9.95
B2 Club Records		Sinclair	20E147	£9.95
QS Scramble	16K	Quicksilva	12E148	£3.95
QS Invaders	16K	Quicksilva	12E149	£3.95
QS Asteroids	16K	Quicksilva	12E150	£3.95
QS Defenda	16K	Quicksilva	12E151	£3.95
Mazogs	16K	Bug Byte	02E175	£10.00
Invaders	16K	Bug Byte	02E176	£4.00
Adventure		Bug Byte	02E177	£8.00
ZXAS Assembler		Bug Byte	02E178	£5.00
ZXTK Toolkit		Bug Byte	02E179	£6.00
ZXDB D/smbler & Debugger		Bug Byte	02E180	£6.50
Damsel and the Beast		Bug Byte	02E181	£6.50
Dictator		Bug Byte	02E182	£9.00
Star Trek		Bug Byte	02E183	£5.00
Constellation		Bug Byte	02E184	£8.00
Multifile	16K	Bug Byte	02E185	£17.50
Awari		Sinclair	20E186	£6.95
Games Pack 1		Sinclair	20E187	£4.75
Games Pack 2		Sinclair	20E188	£4.75
Asteroids		Sinclair	20E189	£4.95
Centipede		Sinclair	20E190	£4.95
Defender		Sinclair	20E191	£4.95
Space Invaders		Sinclair	20E192	£4.95
Games 1 10 Games				
Games 2 Starfighter	1K	J K Greye	32E001	£3.95
Artist	1K	J K Greye	32E002	£3.95
Games 3 Catacombs	16K	J K Greye	32E003	£4.95
Games 4 3D Monster Maze	16K	J K Greye	32E004	£4.95
Games 5 3D Defender	16K	J K Greye	32E005	£4.95
Football Manager	16K	Addictive	50E193	£5.95
Gobblerman	16K	Artic	25E194	£3.95
Namir Raiders	16K	Artic	25E195	£3.95
Galaxy Warrior/Star Trek	16K	Artic	25E196	£6.50
Invasion Force	16K	Artic	25E197	£3.95
Assembler	16K	Artic	25E198	£9.95
Chess 11		Artic	25E199	£9.95
Chess	1K	Artic	25E200	£2.95
Krakit		Artic	25E201	£9.95
Galaxians		Artic	25E206	£3.95
Games	1K	Artic	25E207	£6.00
Sword of Peace		Artic	25E208	£6.50
Toolkit		Artic	25E209	£5.95
Forth		Artic	25E210	£14.95
Bug		Artic	25E211	£7.00
Assembler		Bug Byte	02E212	£5.00
Invaders		Bug Byte	02E213	£4.00
Adventure		Bug Byte	02E214	£8.00
Mazogs		Bug Byte	02E215	£10.00
Pilot		Hewson	70E216	£5.95
Puckman		Hewson	70E217	£5.95
Games		Microgen	06E218	£3.95
Scramble		Microgen	06E219	£3.95
Frogs		Microgen	06E220	£3.95
Paintmaze		Microgen	06E221	£3.95
Asteroids		Microgen	06E222	£3.95
Tempest		Microgen	06E223	£3.95
Games	1K	Microgen	06E224	£3.95
Debug		Microgen	06E225	£3.95
Asteroids		Quicksilva	12E226	£3.95
Croaka Crawla		Quicksilva	12E227	£3.95
Munchies		Quicksilva	12E228	£3.95
Trader		Quicksilva	12E229	£9.95
Starquest		Quicksilva	12E230	£3.95
Super Nine		Quicksilva	12E231	£9.99
Database Management System		Gemini	63E232	£7.95
Decision Maker		Gemini	63E233	£5.95
Monster Mine		Gem Software	NEW	£4.95
Space Mission		Gem Software	NEW	£4.95

# BUY 'N TRY MEANS 80% OFF YOUR SECOND PURCHASE

\* Personal callers welcome .... come along see our super selection!

## VIC 20

	Mem Req'd	Supplier	Code No	Price
Vic Forth (cart)		Adda	01V001	£38.95
Vic Stat (cart)		Adda	01V002	£28.95
Vic Graph (cart)		Adda	01V003	£28.95
Facemaker	16K	A S K	14V004	£8.95
Twister	16K	A S K	14V005	£8.95
Number Chaser	8K	A S K	14V006	£8.95
We Want to Count	16K	A S K	14V007	£8.95
Frogger	3K	Rabbit	13V008	£9.99
Space Storm		Rabbit	13V010	£6.99
Rainbow Towers		A S K	14V012	£8.95
Number Gulper		A S K	14V013	£8.95
Super Worm		Rabbit	13V014	£4.99
Night Flight	3K	Rabbit	13V015	£4.99
Rabbit Writer	16K	Rabbit	13V016	£19.95
Rabbit Base	16K	Rabbit	13V019	£14.99
Home Office	8K	Navajo	18V020	£12.95
Decision Maker		Creative	19V021	£14.95
Loan Analyser		Creative	19V022	£14.95
Car Costs		Creative	19V023	£14.95
Home Inventory		Creative	19V024	£14.95
Household Finance		Creative	19V025	£14.95
Forth (cart)		Audiogenic	16V026	£24.95
Monitor (cart)		Audiogenic	16V027	£19.95
Bonzo	8K	Audiogenic	16V028	£7.95
Tomb of Drowan	16K	Audiogenic	16V029	£12.95
Trashman (cart)		Audiogenic	16V030	£19.95
Pit	3K	Audiogenic	16V031	£7.95
Astro Blitz (cart)		Audiogenic	16V032	£19.95
Boss	8K	Audiogenic	16V033	£14.95
Tank Attack (cart)		Audiogenic	16V034	£19.95
Outworld (cart)		Audiogenic	16V035	£19.95
Blockade		Audiogenic	16V036	£6.95
Amok		Audiogenic	16V037	£6.95
Vicalc		Audiogenic	16V038	£8.95
Alien Blitz		Audiogenic	16V039	£7.95
Sky Math		Audiogenic	16V040	£6.95
Space Division	3K	Audiogenic	16V041	£6.95
The Alien	3K	Audiogenic	16V042	£7.95
Vicat	3K	Audiogenic	16V043	£8.95
Hangman/Hang Math		Audiogenic	16V044	£7.95
Math Hurdler/Monster Maze		Audiogenic	16V045	£7.95
Sea Wolf/Bounce Out/Vic		Audiogenic	16V046	£8.95
Code Maker/Code Breaker		Audiogenic	16V047	£7.95
Kosmic Kamikaze	3 or 8K	Audiogenic	16V048	£7.95
Minikit		Audiogenic	16V049	£7.95
Golf		Audiogenic	16V050	£7.95
Spiders of Mars (cart)		Audiogenic	16V051	£19.95
Cloudburst (cart)		Audiogenic	16V052	£19.95
Renaissance (cart)		Audiogenic	16V053	£19.95
Satellites and Meteorites (cart)		Audiogenic	16V054	£19.95
Meteor Run (cart)		Audiogenic	16V055	£19.95
Magnificent Seven	3K	Audiogenic	16V056	£4.95
Mikro Assembler (cart)		Audiogenic	16V057	£48.95
Wacky Waiters		Imagine	05V149	£5.50
Catcha Snatcha		Imagine	05V150	£5.50
Arcadia		Imagine	05V151	£5.50
Castlemath	16K	Audiogenic	16V058	£8.95
Arcadia		Imagine	05V059	£5.50
Martian Raider		Romik	10V072	£9.99
Mind Twisters		Romik	10V073	£9.99
Shark Attack		Romik	10V074	£9.99
Multisound Synthesizer		Romik	10V075	£9.99
Sea Invasion		Romik	10V076	£9.99
Space Attack		Romik	10V077	£9.99
Chess	16K	Bug Byte	02V078	£7.00
Asteroids		Bug Byte	02V079	£7.00
Another Vic in the Wall		Bug Byte	02V080	£7.00
Panic		Bug Byte	02V081	£7.00
Cosmiads		Bug Byte	02V082	£7.00
Backgammon	3K	Bug Byte	02V083	£7.00
Scramble		Bug Byte	02V084	£7.00
Blitz		Commodore	04V103	£4.99
Hopbit		Commodore	04V104	£4.99
Race		Commodore	04V105	£4.99
Strategic Advance	16K	Commodore	04V106	£4.99
Simplicalc	16K	Commodore	04V107	£19.95
Vic Stock Control	8K	Commodore	04V108	£19.95
Vic Writer	8K	Commodore	04V109	£19.95
English Language	8K	Commodore	04V110	£9.99
Maths 1	8K	Commodore	04V111	£9.99
Maths 2	8K	Commodore	04V112	£9.99
Biology	8K	Commodore	04V113	£9.99
Chemistry	8K	Commodore	04V114	£9.99
Physics	8K	Commodore	04V115	£9.99
Apple Tree Birds	3K	Commodore	04V116	£4.99
Engine Shed	3K	Commodore	04V117	£4.99
Lighthouse & Subtraction	3K	Commodore	04V118	£4.99
Quizmaster	8K	Commodore	04V119	£9.99
Know your own I.Q.	8K	Commodore	04V120	£9.99

# CALLING DEALERS

If you want a bit of the action .... and a share of the success ... call us right away.

COPYRIGHT WARNING: ALL LISTED PROGRAMS ARE PROTECTED BY COPYRIGHT

Know your child's I.Q.  
Know your own personality  
Robert Carrier Menu Planner  
Vic Money Manager  
Vic Road User & Highway Code  
B.B.C. Mastermind  
Type & Tune  
Programmers Aid Cart.  
Machine Code Monitor Cartridge  
Missile Panic  
Road Runner  
Android Attack  
Space Hopper  
Star Wars 2  
Mawai Attack  
Space Wars/Battle Zone  
Space Fortress  
Space Attack  
Innovative 1  
Innovative 2  
Innovative 3  
Wizard & Princess  
Tornado  
Harvester  
Pixel Power  
Trader  
Subspace Striker  
Starquest  
Moons of Jupiter  
Grand Master Chess  
Choplifter (cart)  
Apple Panic (cart)  
Serpentine (cart)  
Mangrove  
Country Garden  
Kaktus  
Rabbit Call  
Abductor  
Blitzkreig  
Gridrunner  
Andres Attack  
Database Management System  
Invoices & Statements  
Home Accounts & Budget  
Decision Maker  
Stock Control System  
Selective Mailing List  
Commercial Accounting  
Critters  
Anti Matter Splatter  
Skramble  
English Invaders  
Pakacuda  
Escape MCP  
Cyclons  
The Catch  
Paratroopers  
Vixplode  
Android Attack  
Fly Snatcher  
Alien Hunter  
Double Trouble  
Catcha Troopa  
Skramble  
Jumpin Jack  
Triad  
Griptrap  
Astro Fighters  
Chopper  
Destroyer  
Gunfight  
Space Rescue  
Space Bomber & Man on the Run  
Puzzle Pack  
Starship Escape  
Data Pack  
Scorpion  
Multitron  
At the Circus

[illegible]

	Mem Req'd	Supplier	Code No	Price
Bug Off			34G052	£21.99
The Eliminator	32K	Adventure Intl	34G053	£17.99
Preppie	16K	Adventure Intl	34G054	£21.99
Sea Dragon	16K	Adventure Intl	34G055	£25.49
Stratos	16K	Adventure Intl	34G056	£25.49
Tutti Frutti	16K	Adventure Intl	34G057	£17.99
Temple of Asphai	32K	Automated Simuls	35G058	£29.75
Upper Reaches of Asphai	32K	Automated Simuls	35G059	£14.75
Invasion Orion	24K	Automated Simuls	35G060	£18.50
Hellfire Warrior	32K	Automated Simuls	35G061	£29.75
The Keys of Acheron	32K	Automated Simuls	35G062	£14.75
Danger in Drindisti	32K	Automated Simuls	35G064	£14.75
Datestones of Ryn	32K	Automated Simuls	35G065	£14.75
Rescue at Rigel	32K	Automated Simuls	35G067	£22.00
Star Warrior	32K	Automated Simuls	35G068	£29.75
Crush, Crumble & Chomp	32K	Automated Simuls	35G069	£22.00
Ricochet	16K	Automated Simuls	35G070	£14.75
Monster Maze		Automated Simuls	35G072	£29.75
Platter Mania		Automated Simul	35G073	£29.75
Alien Garden		Automated Simuls	35G074	£29.75
Action Quest	16K	J V Software	36G075	£22.00
Ghost Encounters	16K	J V Software	36G076	£22.00
Journey to the Planets	32K	J V Software	36G077	£22.00
Gorf	16K	Roklan Corp.	37G078	£33.25
Wizard of Wor	16K	Roklan Corp.	37G079	£33.25
Battle of Shiloh	48K	Strategic Simuls	38G080	£31.00
Tigers in the Snow	40K	Strategic Simuls	38G081	£31.00
Firebird	4K	Gebeil Software	39G082	£29.50
Embargo	8K	Gebeil Software	39G083	£33.00
Guardian of the Gorn	32K	In-Home Software	40G084	£22.00
Sentinel 1	24K	In-Home Software	40G085	£22.00
Pool 400	16K	Innovative Design	41G086	£29.50
Choplifter	16K	Broderbund	42G087	£29.50
Stellar Shuttle	32K	Broderbund	42G088	£23.55
Moon Shuttle	16K	Datasoft Inc.	43G089	£31.40
Zaxxon	16K	Datasoft Inc.	43G090	£31.40
Astro Chase	32K	First Star Software	44G091	£22.00
Venus Voyager	16K	English Software Co.	45G092	£19.95
Baja Buggies	16K	Gamestar	46G093	£22.00
Claim Jumper	16K	Synapse Software	47G094	£27.50
Claim Jumper	16K	Synapse Software	47G095	£29.95
Shamus	16K	Synapse Software	47G096	£27.50
Shamus	16K	Synapse Software	47G097	£29.95
Picnic Paranoia	16K	Synapse Software	47G098	£27.50
Picnic Paranoia	16K	Synapse Software	47G099	£29.95
Necromancer	16K	Synapse Software	47G100	£27.50
Necromancer	16K	Synapse Software	47G101	£29.95
Survivor	16K	Synapse Software	47G102	£27.50
Survivor	16K	Synapse Software	47G103	£29.95
Shamus II	16K	Synapse Software	47G104	£27.50
Shamus II	16K	Synapse Software	47G105	£29.95
Stargate Courier	16K	Syncro	48G106	£27.50
Laser Ants	16K	Syncro	48G107	£18.50
Laser Ants	16K	Syncro	48G108	£26.75
Astron IX	16K	Syncro	48G109	£18.50

\* Denotes cartridge



When we send your software order, you'll find a return address label and a list of the buy-back prices for each item ordered.

Remember, we are pledged to buy back your software against a new purchase of equivalent or greater catalogue value, provided you purchase it from us. And you get a full month to decide whether to keep your software or benefit from the buy-back option.

Of course, if you wish to return two or more software items against the purchase of a more expensive item ... then provided that their initial purchase price does not exceed that of the new program you want ... we'll be happy to help.

**BRANCHES: LEICESTER**

30 New Walk Leicester.  
Tel (0533) 532704.

## ILFORD

426 Cranbrook Road,  
Gants Hill, Ilford, Tel 01-554-6574.

## SOUTHAMPTON

The Software Centre, 112 East Street,  
Southampton, SO1 1HD. Tel 0703-24703.

Please rush me the following programs, and put me on the Software Centre mailing list for program up-dates and great special purchase offers. I confirm that I shall not attempt to copy any program bought from Software Centre.

Name	Code No	Price
Name	Code No	Price
Name	Code No	Price

Cheque ( ) Postal order ( ) enclosed.

Total order value £

Please debit my Access ( ) Barclaycard ( ) in the sum of £ ..... Account no. ....

My computer is (make) ..... Model .....

Memory ..... Peripherals

Name ..... **SEND TO:**

Address .....

128 WIGMORE STREET

Post code ..... Customer Tel. No. ....

Signed ..... Please allow up to 14 days for delivery

**SEND TO:  
SOFTWARE CENTRE  
128 WIGMORE STREET  
LONDON W1  
01-487-5974  
OR YOUR NEAREST BRANCH.**

# Mobile 10Mb

The UK's first portable with a hard disk on board should be in the shops in August.

Needless to say it comes from the US — the Kaypro 10 (PCN, Issue 12) is produced by the Californian outfit Non-Linear Systems. Driven by a Z80, with 64K of RAM, it includes in its striking electric-blue case a 9in screen and a 10Mb Winchester disk. It costs \$2,795 in the US — in this country it should set you back about £3,000.

Portability is a loose term for a device that weighs 31lbs, and even in Non-Linear's promotional brochure the Kaypro-toting execu-

tive is grimacing markedly.

But the system gives you what by current standards is a vast capacity, and even if its Z80 CP/M orientation is unexciting it at least guarantees you access to plenty of software. In the US the Kaypro 10 is sold with business applications included, and UK distributor CK computers of Plymouth (0752 780311) may follow suit.

If you want to program it yourself it offers S-Basic, optional Pascal, Fortran, Macro assembler, and Cobol. Its interfaces are two serial ports and one parallel Centronics-type.



**ET LANDS** — This is not strictly a personal computer — it's a terminal. But this terminal is worth a second glance — it's called the ET550 Executive Terminal and may be the forerunner of the type of device anybody who works in an office in ten or 20 years' time will be expected to work on. It's also fairly 'personal'. The keyboard is a numeric keypad and the 5.25in display has a special non-glare screen accommodating 12 lines by 40 columns so it can share a desk with other necessities rather than oust them. The terminals will cost £350 from Newbury Data on Staines (0784 61141).

## Cincom's personal approach

The way multinational mainframe software suppliers are falling over themselves to get into the personal computer business must be gratifying to micro enthusiasts.

Cincom Systems is the latest, with its Manage series designed to bring personal computing to businessmen who sit at IBM3270 terminals hooked into mainframes.

The first two elements of the series are Man-Graph and Man-Text—graphics and text processing software that look a cut above the average cassette. But they're also a notch above the average cassette price — Man-Graph costs £5,695 and Man-Text between £9,800 and £17,500, and then you need about £34m for the mainframe.

## Taming of Unix

Unix commands *à la carte* are Root Computers' way of taking the strain out of using the hefty 16-bit operating system.

Root aims to make Unix more approachable for business users by hiding it behind a menu-driven front-end. Unix has long been a commercial ugly duckling, despite its promise as a multi-user, multi-tasking operating system for 16-bit micros, but Root feels it offers too many facilities.

The company is trying to sign up the hardware manufacturers to bundle the package, Rootmap, along with their Unix systems. It provides a set of menus complete with help files to cover each of the Unix commands, and there are optional £100 add-ons to the basic £200 system to give users a diary facility, a spooler, electronic mail,

and for £500 the ability to add and tailor their own command menus: putting their most commonly used commands at the top level, say, to make the system faster to use.

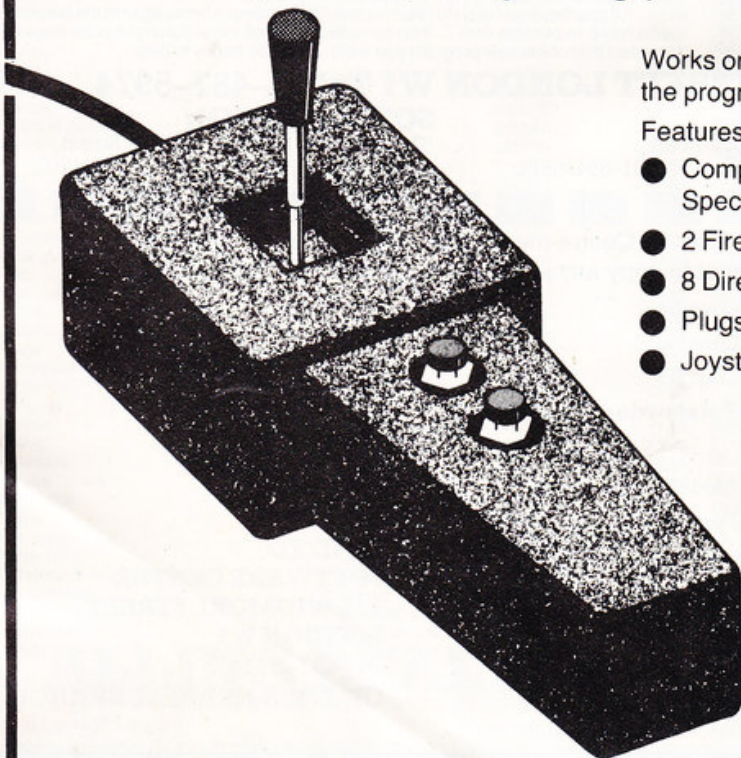
So far, Root has signed up Torch, GEC, Plessey, Bleasdale and Cifer for its Unix implementation on top of which Rootmap will run.

'The Unix manual is about 3in thick,' said Andrew Twigger, Root's applications director. 'So we have harnessed as much of that flexibility as possible within a menu-driven product, along with user help at every stage.'

Rootlink, Root's own implementation of the UCSD p-system under Unix, will also be available as an option on the Rootmap menu. And Root reckons that Rootmap will also make a programmer training aid in Unix commands.

## At last! A joystick that works!

Cambridge Computing bring you the first intelligent joystick.



Works on all existing software — regardless of which keys the program uses. No need for specially written software.

Features:

- Compatible with:  
Spectrum, ZX81, Jupiter Ace
- 2 Fire buttons
- 8 Directions
- Plugs into edge connector
- Joystick and Interface £26.00

Name .....

Address .....

Please send me ..... joysticks @ £26.00 for the Spectrum ☐ ZX81 ☐ Jupiter Ace ☐

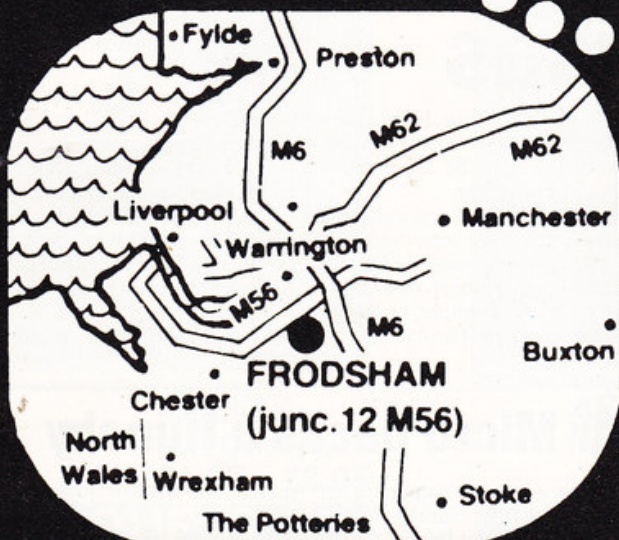
Cheques and P.O.s made payable to:

Cambridge Computing,  
1 Benson Street, Cambridge CB4 3QJ.

Dealer enquiries welcome — please ring C P Lloyd on  
Cambridge (0223) 522905

# northern computers

THE  
COMPUTER  
CENTRE  
OF THE  
NORTH



THE  
showroom  
for all the  
leading  
micros

easy parking off the M56 (junc 12) \* VIC 20 \* VIC 64

\* BBC micros \* Newbrain \* Acorn Atom \* Books

\* Apple 11e, 111 \* Dragon \* Electron \* Games

\* Sinclair Spectrum, \* IBM P.C.

Secondhand computers \* EASY PAYMENTS

ALL ACCESSORIES SALES AND SERVICE \*

northern  
computers

Churchfield Road,  
FRODSHAM  
Cheshire WA6 6RD

TEL: FRODSHAM (0928) 35110

\* UNBEATABLE PRICES \*

WE WILL PURCHASE AND PUBLISH YOUR PROGRAMS: Call Steve Rhodes for details

# Setting a cat . . .

Get set for Lisa-like graphics with attendant mouse for Commodore machines.

Commodore demonstrated a range of software using these techniques at the Consumer Electronics Show in Chicago and the company has confirmed that the products will be available in the UK at the same time as they are released in the US.

The software series runs under the title of Magic Desk and each program is priced at under \$100 in the US. Prices for the UK have yet to be announced.

As with Lisa, Magic Desk uses pictures on the screen to represent functions. So for the 'Type and File' word processing program a typewriter, wastepaper basket and filing cabinet are used. A hand-held device is used to move a pointer around the screen and select an option.

Everyone else would call one of these a mouse. Commodore calls it a cat.

Commodore is cagey about when Magic Desk will be available in the UK and how much it will cost.

'We do not announce products until they become available,' said John Baxter, Commodore's marketing manager. 'All I can tell you is that it will be released in the UK at the same time as it is released in the States.'

'We operate our own pricing policy in the UK, charging what we think the market will bear and what we think the product is worth. As a result some of our products are cheaper than they are in the States while others are more expensive,' he said.

## Parallel line for Sinclair

Spectrum users who want to hook up their micro to a Centronics-type printer can take a look at an interface from Hilderbay.

The Centronics-type parallel interface comes with special printer software, a simple word processor, cable and plug for £45 including VAT.

A deluxe version of the interface for around £55 comes with a customised version of the Tasword Two word processor package.

With this interface you don't have to remove the ear socket from the Spectrum when saving a program.

Hilderbay is also offering users a chance to try out three of its business packages with a demo tape for £3.95.

The cassette has excerpts from Stock Control, Payroll and Statutory Sick Pay programs.

If you buy one of the packages the £3.95 is deducted from the cost.

Mick Salem of Hilderbay said: 'The demo tape gives the user a taste of what a package is like before he decides whether or not he wants it.'

Contact Hilderbay on 01-485 1059.

## . . . among the Lisas

Five months after its launch in the UK Apple's Lisa (PCN issue 1) is due to hit the streets in August.

Full-scale production of the machine in the US has already started and dealers in the UK should begin to get their stocks by July.

The 'mouse' system will cost you £8,500 plus VAT and it will come with seven fully integrated software

packages and will use several languages.

The 16-bit micro uses the 68000 Motorola processor, has two 860K floppies and one 5Mb Profile hard disk and runs an operating system called Apple Lisa. Apple is also throwing in one of its dot matrix printers to complete the package.

The machine will come with a one-year guarantee and will be

available from Lisa Information Centres around the country. Apple says there should be 150 of these centres by next year.

In the user-friendliness stakes the Lisa seems to have been overtaken by developments since its launch. But none of its notional competitors — VisiOn, for example, or Microsoft's mouse, or Gavilan — has delivered yet.



**DELTA BELTER** — If you play games on the BBC micro you can, quite literally, bash the living daylight out of your keyboard. This Delta 14 handset is designed to relieve the keyboard of such punishment. It is an adaptation of the handset used for the Database video game and costs £10.95. An optional adaptor box costs £13.95 and allows you to use all 14 keys, which can be configured to work with the more complicated games. The Delta 14 is manufactured by Voltmace (0462-894410), which is currently negotiating with software companies to produce options in future products that make use of the handset's capabilities.

## Mr Micro backs a Hunchy

Two new adventure games are out from Mr Micro — Hunchy, for the 48K Spectrum, and Bengo, for the unexpanded Vic 20 — both costing £6.90.

Hunchy features a hunchback who has to leap around flames and avoid flying spears to rescue Esmeralda, who is trapped in a tower. But in order to be rescued, Esmeralda must shove her heart out of the turret window so that Hunchy can touch it — only then is he immune to harm.

This arcade-type game features

speech, and standard joysticks can be used.

Bengo is a strategy arcade-type game about an atomic Eskimo who has to slide blocks of ice at the snow yeti, who keep trying to trample him. This one comes complete with music to liven things up.

James Gregory, managing director of Mr Micro, says the company aims to bring out two games a month — ten more will be out by the end of July.

Mr Micro is in Manchester on (061) 728 2282.

## Twindata gets Sirius Control

If Master Control Programs continue to catch on at their present rate MCP could soon lose its sting as a term of abuse.

The latest control program comes from Twindata and is intended for the Sirius under CP/M-86. A version for MSDOS is on the way. Twindata's Structured Menu System (SMS) should give you a framework to put all your systems and applications software in one magnificent basket.

SMS comes up with power-on and it takes you straight into a series of menus — the functions it offers may be from the operating system or from applications suites, according to how you have built the

structure and what you've included in it.

SMS is two main programs, one to create files of function descriptions and the standard menu display, and one control program to display menus and control selections. It takes no extra storage from Microsoft Basic and according to Twindata is straightforward to set up and use.

The cost of protection from an operating system will in this case be less than £100. For the MSDOS version, which is due out in July, it will be roughly the same.

The systems now covered by software of this type include Torch, Commodore and Sirius.

## Software mart for Spectrums

Spectrum users can now buy, sell or exchange secondhand software through an organisation called the Exchange Society (VGES).

The organisation has been formed by a group of Spectrum enthusiasts, and it hopes to encourage people to use a much wider range of software.

If you want to sell software, VGES's computer will match the software you want to sell to potential buyers.

It's then up to purchaser and seller to make the transaction.

To prevent software being ripped

off, VGES stresses that all software must be original with the relevant cartons and instructions.

If it isn't the information will be passed on to the appropriate authorities.

To help improve the service and cover its cost, a fee of 50p per program is charged. At the moment VGES is a pilot scheme which plans to run until the middle of 1984. If successful it will be taken up commercially.

For further information contact The Secretary, VGES, 25 Rona Road, London NW3 2HY.

# PCN SPECIAL OFFER

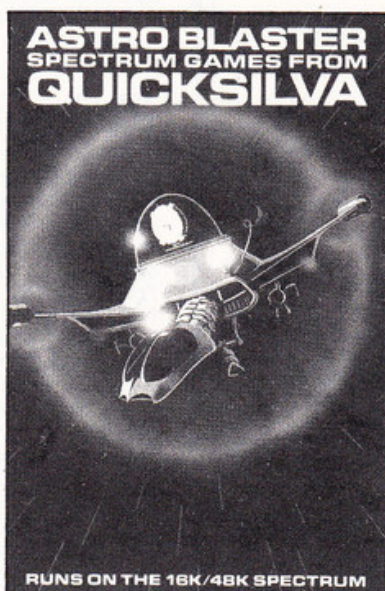
# SAVE MONEY ON SPECTRUM GAMES

Here's your chance to save £1 on one of five top Spectrum games from John Menzies.

SAVE  
£1



**FRENZY**  
from Quicksilva  
~~£4.95~~ £3.95



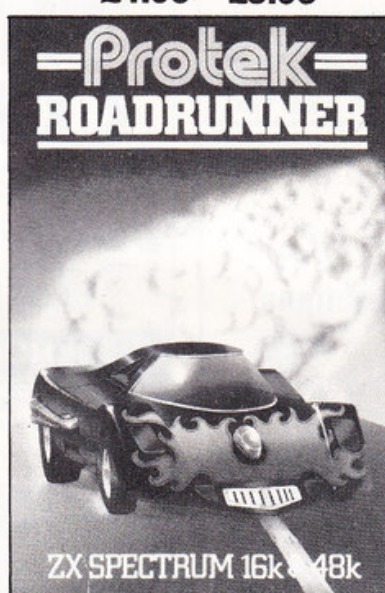
**ASTRO BLASTER**  
from Quicksilva  
~~£4.95~~ £3.95



**3D DESERT PATROL**  
from Computer Rentals  
~~£4.95~~ £3.95



**THE BLACK HOLE**  
from Quest  
~~£5.49~~ £4.49



**ROADRUNNER**  
from Protek  
~~£5.95~~ £4.95

To get PCN every week, send off the subscription card in this week's issue. Don't miss this offer because your newsagent has sold out!

# John Menzies

Just cut out and keep the coupon below together with those in the next three issues. When you've collected all four take them to a branch of John Menzies with a computer department and claim your £1 off any one of the top five cassettes pictured here. That's all you have to do! But remember, don't delay. This offer closes on July 30, 1983.

This PCN special offer is available only at John Menzies stores with a computer department. No part value will be accepted, and the coupons cannot be used for discount on other lines.

Offer closes on July 30, 1983

PCN  
SPECIAL  
OFFER

**LIMITED OFFER**  
**DEDUCT 10% IF BUYING**  
**TWO OR MORE TAPES**

**QUALITY SOFTWARE FOR**  
**THE DRAGON 32K**

- GOLDEN APPLES:- Steal the apples, then defeat the warlock £8.45
- PLANETARY TRADER:- Choose your cargo, then deliver it - if you can £5.95
- SURPRISE:- Spells, giants, a magic ring - but not another 'Lord of the Ring' £8.45

**NEW SOFTWARE FOR THE SPECTRUM**  
**(£7.95 EACH)**

- STAR FIRE (48K only):- Rid the galaxy of the Xtardan battle cruisers, a game of strategy and skill
- GOLF:- (16K & 48K):- Who's the Champion, then?
- YOMPER (16K & 48K):- Command the Paras and complete the impossible
- SHEEPWALKER (48K only):- Sheepdog trials in your living room

**Price includes postage and packing. All tapes guaranteed**

**TAPESOFT (Dept PCN)**

55 Morley Road, Twickenham, TW1 2HG.

**Master 64** INTRODUCTORY OFFER  
PRICE £125 + VAT!

MASTER is a totally new concept... a complete package for program development. Now it's available for the CBM 64, with 95 new commands, including Basic IV... as well as Toolkit functions, keyed access to disk, screen management, user-definable input zones, report generator, 22-place arithmetic, date control, data compression, string search, screen plotting, screen dump, optional software protection key, and more... As well as the CBM 1541 disk, Master can support all CBM disk models 4040 to 9090 with its (optional) IEEE interface, and is supplied with a full User Reference Manual, Quick Reference Guide and demo programs.

**Vizawrite 64** SPECIAL OFFER  
PRICE £65+VAT!

Designed especially for the CBM 64, VizaWrite 64 is a high-performance, low-cost word processor, with on-screen formatting. VizaWrite takes full advantage of the 64's colour, graphics and memory features, and supports virtually any printer. It can even read text from Wordpro, Wordcraft or Silicon Office files... Together with VizaSpell, VizaWrite 64 offers the ultimate in personal computer word processing!

Master 64 and VizaWrite 64 are just two of our fine Commodore products... please telephone or write for free CBM catalogue!

ORDERING INFORMATION: ADD 15% VAT TO QUOTED PRICES. ORDER BY POST/TELEPHONE/PRESTEL, USING CHEQUE, ACCESS, BARCLAY CARD OR OFFICIAL ORDER. TELEPHONE 01-546-7256 FOR SAME-DAY DESPATCH, POST FREE EXCEPT ON CREDIT OR OVERSEAS ORDERS. (REF A15)

**Calco Software**

LAKESIDE HOUSE, KINGSTON HILL, SURREY KT2 7QT TEL 01-546-7256

**TELEMATICS WEST**

**Specialists in Telecommunications**

TORCH Hardware and Software  
 Also Z80 Disk Pack for BBC Micro

**We selected TORCH for our own demanding requirements. We can now offer it to you.**

*Ring Richard Thompson  
 for details and demonstration*

**TELEMATICS WEST**

31 Dyer Street  
 CIRENCESTER  
 Glos. GL7 2PP

Telephone:  
 (0285) 68349

Telex: 437269

**THE HOME COMPUTER**

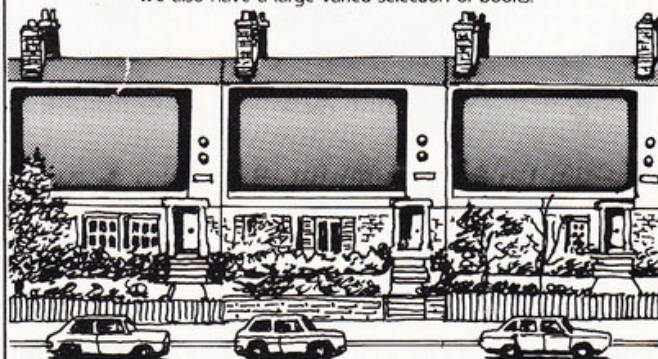
*We specialize in Micro-Computers for  
 home and business*

**CURRENTLY IN STOCK**

BBC MODEL '13' DRAGON 32 NEWBRAIN MODEL A  
 NEWBRAIN MODEL AD ORIC-1 (48K) ZX SPECTRUM (16K)  
 ZX SPECTRUM (48K) ATARI 400 ATARI 800

**HUGE SOFTWARE RANGE  
 IN EXCESS OF 340 DIFFERENT TITLES**

*We also have a large varied selection of books.*



**COMPUTASOLVE LTD.**

MICRO COMPUTER SYSTEMS FOR THE MODERN BUSINESS

**8 Central Parade, St. Marks Hill, Surbiton, Surrey.**

**Telephone 01-390 5135**

**Open 9.30 - 18.30 Monday-Saturday**



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

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.

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

## Ballad of the BBC blues

Ode to an Impatient Games and General Use Computer Looney

Me, Oh I'm a simple chap,  
Sometimes in a bit of a flap,  
But I do really feel the lack  
Of a Beeb games cartridge pack.

Both the Vic and Dragon too  
Can load programs quick as  
'boo'  
So I looked 'ere and I looked  
there  
I bet I looked near everywhere.

## PCN £10 Star Letter



But perhaps I should not fret  
'Cos with a present I'll be met  
Then when shortly and in a bit  
Someone will get up, not sit  
To fill the gap so it is plugged  
To make me happy, not so  
bugged  
Oh, cassettes, yes they are great  
But really I've no time to wait.

So someone had better make a  
chip  
To better my life and make it hip  
There now bosses, get of your  
backs  
To make me a couple of ROM  
game packs!

David Dunning  
Chard, Somerset

Alas we know the troubled scene  
That makes us all of plug-ins  
dream

So let us hope that 'ere the fall  
That cartridge comes to help us  
all!

('Tis likely that by late July  
We'll have the kit, but bye and  
bye

'Tis common now for promised  
dates

To be more than a trifle late!)  
Ed.

## The great cable fable

In Micropaedia on disk drives (issue 12), you suggest that 'a computer compatible version of this machine (laser vision disk system) would need no cable'.

Are you seriously suggesting that data to and from the computer would be transmitted using infra red?

This suggests that the computer would have to be 'pointed' at its disk drives, which would seriously restrict the manoeuvrability of the system.

R McGillinarity  
Aberdeen

*Wielding of a copy cutting knife, well honed to trimming over-long articles to the space available on a page, sadly chopped off a subsequent paragraph in this article which would have said: 'But any plans for cordless computers would first have to overcome the problems of transmitting large amounts of data very quickly without airwave 'noise' and the inherent limitations on the number of signals that could be transmitted at once via infra-red.' A sad trimming well spotted by the sharp-eyed man from Aberdeen — Ed.*

## Lore of the marketplace

I know micros are supposed to make you come face to face with the future, but this is ridiculous . . . Have you heard the one about the micro manufacturer that ran a series of ads featuring testimonials for a 'cheaper' 16K version you couldn't actually buy when the ad first came out, together with a modem which 'is certainly unusual in a machine of this price'? I wouldn't have said it was particularly unusual, in that, like an awful lot of other add-ons for an awful lot of other machines, it isn't actually out yet.

Then there's the software company that advertises its word processor as 'Compatible with most micros. See table.' On tearing down the page to the table you find it's compatible with the BBC A, B and Torch.

And as for the (various) companies claiming such things as 'the ultimate game for the x micro' and 'after this all other games will be like watching paint dry', etc etc — you have to ask yourself if you really want to

do this to your relationship with your micro. Once you've seen the ultimate, I would have thought, you'd be forced to sell the old chip-rack and take up something more challenging. Hang-gliding, for example.

M Lawrence,  
Guildford, Surrey

## Atari owner hits back

Is Atari-bashing now a national pastime? Your joystick review was less than complimentary, despite the fact that for a standard joystick I have never heard a bad word before now.

Second, Qix. Your reviewer's tactics might work with one Qix, but what about two? He/she neglected to mention just how far they got.

Last, the entire business end of the micro market, and many of the home computers are based on the Z80. Only an idiot would claim any other CPU could match it.

Also I disapprove of splitting programs between issues as with Time Bomb, thus 'black-mailing' us into buying subsequent issues rather than one-offs that interest us.

There! I've said it. I think I'll go and have a lie down . . .

Marc Freebury,  
Reading, Berkshire

Opinions vary . . . and review-

ers must be honest in saying what they found. And splitting programs is merely a matter of allocating space to be fair to all micro users. Only the long ones run from one week to another — Ed.

## What's your game?

I have purchased the magazine from the first issue but as an Atari 800 owner I am completely dissatisfied with the content of the reviews in Gameplay.

Since its inception you have written on only six Atari games compared with 21 for the Spectrum. The nearest rival to the Spectrum is the Dragon, with 13 game reviews (six in one issue). Even the Vic 20 has seven reviews.

I do not mention the lack of ProgramCards (one only) as these are contributed by readers. However, Gameplay is, I assume, an editorial decision alone.

I shall be pleased if you will rectify the situation.

L Lazarus  
Hendon, London NW4

Point taken . . . more Atari on the way (and how about a few programs from all you Atari addicts for ProgramCards?) — Ed.



I suppose that means the computer's not working again!

Lost in a maze of bits and bytes, trapped in a forest of errors or bugged by Basic? Access our HELP page . . . edited this week by Richard King (Max Phillips is in holiday mode).

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

## Atari language school

**Q** I am a novice saving hard to buy an Atari 800, mostly because there is an Atari Club where I work. I have asked them which language I should concentrate on, since I have read in PCN that there are other useful languages.

I had decided on Forth, but back came their answer, 'Get into Basic, it will give you a proper grounding from which to study more sophisticated languages.'

Then came your Star Letter, 'Is Basic a low level language?' in PCN issue 13, and this set me doubting again. On behalf of myself and others who may be confused, please give us some much needed guidance on this language business.

Fred Bennett,  
Bexleyheath, Essex

**A** I'm afraid I can't give you a definitive answer, since there are so many considerations involved. The essential details are that it is only useful to worry about a language that a) you can actually get (it's not worth learning PL/I if you're thinking about buying a Spectrum, 'cos it just won't fit), and b) each language is designed to solve a particular set of problems, or to do a specific task.

That said, there is your need. If you just want to get an idea about how a computer works, and no more, then Basic is quite OK. Just don't expect to write a really large or complex program in it.

It isn't that Basic is less capable than other languages, just that certain facets of Basic tend to engender 'bad' programming habits, which mean that there is more likelihood of making an error in the logic. This is mostly ascribed to the lack of 'structured' control in a program . . . see the perennial discussion of the relative merits of the GOTO statement.

If you need speed, but expect to modify the program at a later date, then Forth is a good choice but be warned, it isn't all that easy. This is partly because of the 'unnatural' way it works,

using Reverse Polish Notation. Rudely described as backwards.

The other reason is because a lot of programmers don't bother to lay out their programs so that others can see what's going on. However, if you learn it well, use it properly and stick to some set of 'rules' about how you present a listing, then it's a very good choice.

For getting the absolute maximum performance, the only real choice is machine-code, but this has the problem that it is very hard to write well, and takes a long time. The most essential tools if you take this route are a really good editor, a decent assembler and a library of useful subroutines. For commercial programming, add a link-editor and a debugger. (With these you could even write your own language, but it'll take time!)

The Atari has several languages available:

**Atari Basic:** a fairly standard Microsoft type, with enhancements for graphics and sound.

*Atari International.*

**Basic compiler:** produces a machine-code program by translating Basic.

**Lisp:** a sophisticated Artificial Intelligence language, which comes complete with an editor, prettyprinter for programs and more.

*Datasoft Inc, 9421 Winnetka Avenue, Chatsworth CA 91311. (213) 701-5161.*

**Basic A+:** a more structured Basic not dissimilar to BBC Basic, which works with the very sophisticated OS/A operating system.

**C/65:** a version of C which has almost all the features of the definitive C language, and which generates machine-code. My choice for 'real programming'.

**MAC/65:** a complete machine-code development system with

a very good assembler and a co-resident editor, this works with other OSS products.

*Optimized Systems Software, 10379 Lansdale Avenue, Cupertino, CA 95014 (408) 446-3099.*

**VALForth:** part of a complete suite of programs, but especially good at graphics and sound. Suitable for professional work.

*Valpar International, 3801 E. 34th St, Tucson, AZ 85713. (602) 790-7141.*

**Atari Pascal:** has all the major features of Pascal, but isn't totally to UCSD standard.

**Deep Blue C:** An implementation of the Small-C language. Derived from the systems language C, it helps in developing real C programs.

*Atari Program Exchange, Box 3705, Santa Clara, CA 95055. (408) 727-5603*

**ATMAS:** a complete development system for machine language programs, it comes with an editor and a macro-assembler.

*ElComp Publishing Inc, 53 Redrock Lane, Pomona, CA 91766. (714) 623-8314.*

## Comment on my commas

**Q** When I try running the following simple program, and enter a string with a comma in it, I find that the first part of the string up to the comma is printed, but not the rest. The computer doesn't give an 'Extra ignored' error, so I think it is something to do with separating data.

```
10 INPUT A$
20 PRINT A$
```

I want to be able to enter strings with commas in so that I can print out posters on my Epson printer. How do I get the computer to accept the comma in an INPUT statement?

P Patel,  
Hornchurch, Essex

**A** You are quite right, the comma is used in Basic to separate data fields. In Micro-soft Basic a check is made and if you enter too many fields, then you get the non-fatal 'Extra ignored' error. In BBC Basic this doesn't happen, but nonetheless the comma isn't acceptable in an INPUT statement.

There are two ways to overcome the problem. One is to accept another character which you don't need (such as £) and to translate that on output.

This isn't very easy on the operator, as you can imagine.

Another (and better) way is to use one of the statements which reads the keyboard directly, such as GET, GET\$, INKEY or INKEY\$, and then to concatenate each character to the string.

The problem now, though, is that we will have lost the editing features in the INPUT statement. This isn't good enough, so the best thing to do is to build a PROC which will do what we want.

The solution shown below (or a variation of it) has been implemented in virtually all versions of Basic, and it is a sign of the shortcomings of the available Basics that such 'systems' routines have to be written at all, and one major reason why more flexible languages are a better weapon in the long run, though they may be harder to learn.

## Dragon border is well guarded

**Q** Is it possible to change the border colour on the Dragon, and can I use a black and white monitor with it? As far as I know, it can only use colour monitors.

David Newbold,  
Birmingham

```
1000 DEFPROC WORDIN(MIN,MAX,X,Y):REM pass parameters
1010 LOCAL P$,BS$,CR$,L: BS$ = CHR$(8): CR$ = CHR$(13): REM declare locals
1020 REPEAT: REM loop around
1030 PRINT TAB(X,Y) I$;: REM print in right place
1040 GET P$: PRINT P$;: REM get character and print
1050 IF P$ = BS$ AND L: REM if backspace and got some already
1060 THEN L = L-1: I$ = MID$(I$,I,LEN(I$)-1): REM then chop one off
1070 ELSE IF P$ <> CR$ AND P$ <> BS$: REM but if not <CR> or <BS>
1080 THEN I$ = I$ + P$: L = L + 1: REM then add it to the end
1090 ENDIF
1100 UNTIL (P$ = CR$ AND L >= MIN) OR L = MAX: REM until we have enough
1120 = I$: REM return what we got
1130 ENDPROC
```

## ROUTINE INQUIRIES

**A** The Dragon uses a 6847 graphics processor, and this is what actually chooses the colour of the border. Dragon Data says there is no way to change this, as far as they know.

On your second question, it is possible to use a B & W monitor with any computer... just don't ask us why it isn't in colour!

### Where are the missing links

**Q** In March this year I bought a Lynx computer for myself. I was very pleased with it — and still am.

However, I now wonder if I made the right decision. At the time of buying I was told and read that coming 'soon' was software, disk drives, printers, CP/M compatibility, expansion etc — none of which is available to me now. I even read worrying reports of the machine having interfacing problems.

Other contenders for me when I bought the Lynx were the Dragon or the Oric, both of which now have a wealth of software available. They are also well documented with books, reports, games etc.

Very little is written about the Lynx, even though it holds position number seven in your PCN Charts. Have I bought the wrong machine or will my patience be rewarded?

Colin Snow,  
London

**A** Patience is supposed to be a virtue and virtue is supposed to be its own reward. But enough of these homilies. When will your Lynx reward you?

The answer from the horse's mouth (or should it be the Lynx's fangs?) is that it won't be long.

To take your points in the order in which Computers expects to fulfil them:

**June** A 96k Lynx was imminent at the Computer Fair last week; it will sell for £299. An upgrade for your 48K machine will cost £89.95.

**July** To drive a serial printer from a 48K Lynx you'll need a lead which will cost £3.99, and which will come with a cassette — no extra charge — holding printer routines.

**August** An interface for a parallel printer, price £49.95, is due. Disk drives are also scheduled to arrive in this month. A single-sided, double density, 40

track 5¼in floppy will cost £343.85 — double-sided version is due 'later'.

Computers also expects to launch a joystick interface (£14.95) for the Atari-compatible Discwasher Point-Master.

**Autumn** A 128K machine that will run CP/M is scheduled for release in the season of mists and mellow fruitfulness.

As for software, Camsoft is on the point of releasing seven new games, Gem Software has another five on the way, and Level Nine Computing is producing adventure games.

### A portion of chips

**Q** A friend of mine has emigrated and left me all his bits and pieces. One was a board with a Z80 CPU, a Z80 CTC and P10, as well as two unknown RAM chips (SEMI 35392CP) and three EPROMS (F2708) with the usual support chips.

I find that the EPROMS are classed in the catalogue as 8K, yet they are described as being 1024 × 8 bits, which would seem to suggest that they are in fact 1K and not 8K.

Which is the correct method of describing these chips?

I don't know what the board is, nor what it does, though it has some interesting chips on it.

E Hardy,  
Stanley, Co Durham

**A** Memory chips are usually described in terms of the number of bits which are accessible without changing the signal on the address-lines, though this is not an infallible check.

In the case of EPROM and static RAM, most chips are arranged so that a full eight bits are returned with a single access, which makes them 'byte-wide' chips.

Dynamic RAM, on the other hand, is usually one bit wide, so that you need four for a nibble, eight for a byte, and a 16 for a word.

Of course, depending on the actual design of the circuit, bit-wide chips can be made to work as byte-wide, or vice-versa, but it isn't often worth the extra work!

A 2708 EPROM returns a full byte for each access, so it is really a 1K byte chip, but there is a tendency to use the alternative (and equally correct) description of '8K bit'.

# A NEW ELAN WILL BE LAUNCHED ON SEPT 14.

Elan Home Computers start up on September 14.  
Elan Computers Ltd., 31-37 Hoxton Street, London N1 6NJ.

## MAKE MONEY FROM YOUR HOBBY

### TOP ROYALTIES PAID FOR SPECTRUM AND ZX81 SOFTWARE

ORIGINAL GAMES EDUCATIONAL AND  
BUSINESS PROGRAMS WANTED

SEND TO OR PHONE

**GALAXY SOFTWARE**

62A WEST STREET

HARWICH

ESSEX

HARWICH 52446



### Apple IIe 64k computer

only **£599\*** + VAT  
Immediate Delivery!!

\*(When purchased with a part-exchange)

### Save an extra £39.00

by buying a bundle comprising:  
Apple IIe 64k  
Disk Drive with controller  
80 Column Card  
12" Green Screen Monitor

Bundle price only  
**£999\*** + VAT

\*(When purchased with a part-exchange)

Disk Drive with Controller	£270
Disk Drive without Controller	£199
12" Green Screen Monitor	£99
Apple III Monitor with Stand	£125

### Apple III

Apple III 256k with monitor	£2099
Profile (5Mb Hard Disk)	£1495
Additional Disk Drive (143K)	£270
Parallel Interface	£129
OEM Prototyping Board	£32
Vinyl Carrying Case	£49

### Software (Apple III)

Visicalc III	£169
Mail List Manager	£99
System Software (SOS)	£175
Quickfile III	£60
Applewriter III	£133
Business Graphics III	£105
Access III	£89
Catalyst	£128
Script III	£75

Other Software prices on application

### Software (Apple IIe)

Visicalc	£145
Visitrend/Plot 3.3	£182
Multiplan	£160
Applewriter IIe	£105
Business Graphics	£109
Quickfile IIe	£60
Senior Analyst	£145
APM	£137
Apple Plot	£38
Pascal	£149
Pilot	£69
Fortran	£112
Logo	£122
Super Pilot	£129
Wordstar	£230
Mailmerge	£130
Word Handler	£98
Visischedule	£180
Other Software prices on application	

### Sirius

Sirius equipment is available within 48 hours at unprintable prices. Please phone for details.

### Operating Systems & Display

Z80 Microsoft Card	£215
Z80 Microsoft Card (Ile)	£325
Z80 Digitek Card	£145
Videx 80 Col System	£189
40/80 Column Switch	£25
80 Column 64K	
Expander Card	£149
Prototype/Hobby Card	£12
IEEE 488 Card	£235
TV Modulator	£14

### Epson Printers

RX80	£279
FX80	£379
MX100F/T Type 3	£420
FX80 Tractor Feed	£35
IEEE Adaptor Board	£65
Serial Adaptor Board	£65

### Other Printers

Apple dot Matrix	£349
Apple Daisywheel	£1150
TEC 40cps Daisywheel	£1095
TEC 55cps Daisywheel	£1295

Other Printer prices on application

### Accessories

Numeric Keypad	£78
Paddles	£20
Joystick	£34
Cooling Fan	£45
Voltage Stabiliser	£230
Acoustic Coupler	£200
10 Floppy Disks	£20
Listing Paper 9"	£20
Listing Paper 16"	£29
Monitor Stand	£18
Vinyl Carrying Case	£17

### Apple II Accessories

Integer Card	£99
Eurocolour Card	£73
Language Card	£106
Paddles	£20
Joystick	£26
Numeric Keypad	£78

### Interfaces

Serial Printer Card	£70
Parallel Printer Card	£70
Wizard 16K Buffered I/F	£139
Wizard 16K to 32K Upgrade	£25
Thunder Clock	£84
8 Channel A/D Converter	£245
Grappler	£99

### Software (Apple II)

Applewriter 1.1	£39
Apple Plot	£38
Applewriter 2	£89
Circuit Analysis	£23
Apple Super Pilot	£129
DOS Tool Kit	£41

### Export Orders Welcome!!!

Barclaycard & Access accepted but subject to a 5% surcharge Payment welcome by cash, bank draft, Building Society cheque. Please allow 7 days for cheque clearance. Instant credit available shortly.

### Delivery

We are open for collection:  
Monday - Friday  
10am - 5.30pm  
Saturday 9am - 5.00pm  
Delivery by Securicor:  
please add 5%  
Smaller items are sent by post unless otherwise requested.

# APPLE IIe £599\*

With your old micro, working or not, taken in part exchange.  
(ZX80/81 welcome!!)  
Please phone us if you don't have a part exchange.

(+ VAT)

## HOME COMPUTERS at GREAT PRICES



## 10/11 Salisbury Square, Old Hatfield, Hertfordshire.

Telephone: Hatfield (07072) 65551

Cut this coupon for free price list

Name \_\_\_\_\_

Address \_\_\_\_\_

PCN



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.**

## Come-back for Vic repeats

Many people are not aware that the Vic 20 has an auto-repeat facility built in, and not just on cursor keys and INST/DELETE key. All keys will repeat just by typing the following: POKE650,128

By messing around with POKEing location 651 you can adjust the amount of time your Vic waits before it starts repeating. To return to normal type, POKE650,0. You have to turn it back on after turning off and resetting the computer.

PEEK(197) is current key pressed. This program works out values for all keys:

```
10 ?“(CLS) (10 Cursor
DOWN)”PEEK(197)
20 GOTO 10
```

Henry Shinnors,  
Shannon, Ireland

## BBC PLOT thickens

BBC owners who have studied the user guide may be curious to know what the PLOT commands which are marked 'for future expansion' are actually going to do. Well, it appears that in the new operating system OS1.00 onwards this 'future expansion' has been undertaken to a small extent in the provision of some new graphics

commands which are as yet undocumented in the user guide.

These provide a limited 'fill' ability by starting at the point specified by PLOT xx,x,y and searching right and left until a pixel is found that is not in the current background colour. It then draws a line between them, producing a single line-fill utility.

Running the program below will give you a good idea of what these commands are capable of.

James Bridson,  
Barnsley, Yorks

## The depths of the Spectrum

I have seen many ways of using the bottom two lines of the Spectrum screen, but I have found the easiest way. This is to simply type:

INPUT "message"; rest of line

The Spectrum sees the input, uses the bottom lines, and does not seem to bother about the lack of a variable. INK and PAPER etc parameters may be used as normal.

I have also found that the INPUT message may be printed anywhere on the normal screen, by using # streams, eg:

```
INPUT #2;"message",#0;
[var]
```

The #0 after the message is necessary to reset the input stream to the keyboard. An error message results if this is not done. The message may be printed on the printer if the #2 is changed to a #3. Also fun may be had by using the OPEN # commands to switch the output streams about.

#2 is the screen 's'  
#0 + #1 are the keyboard 'k' eg  
OPEN #2, 'k'  
#3 is the printer 'p' OPEN #2, 'p' = screen → printer.

Jonathan Watmough,  
Banchory,  
Kincards

## A clean break with the Dragon

The following routine will allow the Break key on the Dragon 32 to be turned on and off at will. This is particularly useful in games using the cursor keys, as the left/right cursors are directly below the Break key and can so lead to an impromptu end to a game. The following should be entered in direct mode:

```
POKE 411,228
POKE 412,203
POKE 413,4
POKE 414,237
POKE 415,228
```

To disable the Break key use:  
POKE 410,236

To enable the Break key use:  
POKE 410,57

A Williams,  
Southport, Merseyside

## Oric screen widened, scroll derolled

On the Oric, the run time variable at addresses 621 and 622 (26D and 26E in hexadecimal) stores the start of the display file. When switched on the value stored is 48000 (BB80 in hex). In HIRES mode it is 48960. (Check it by PRINT DEEK (621).) Also, the number of lines that can be displayed is stored in address 623. In TEXT mode it is 27, HIRES it is 3.

The above information is useful as we can change them by POKEing at the above addresses. For example, we can increase the size of the screen to include the top line (normally for messages) by entering:

```
DOKE 621,47960
POKE 623,28
CLS
```

Also we can protect parts of the screen from being scrolled by reducing the appropriate number of lines in 623. Other effects can be achieved by experimenting.

H E Lim,  
Moss Side, Manchester

## Some POKEs for the Spectrum

Here is a collection of PEEKs and POKEs for the ZX Spectrum that readers may find useful:

■ POKE 23561,n. This gives the time that a key must be held down before repeating in fiftieths of a second. Initially 35, this can be POKEd to 255 for almost no repeat, or any other convenient values.

■ POKE 23692,255. Scroll counter. POKEing this to 255 during a program stops the computer asking 'scroll?' when the screen is full.

■ POKE 23609,n. This varies the keyboard click length. Increasing its value to about 35 will give a more audible bleep.

■ PRINT PEEK 23627 + 256\* PEEK 23628-23755. This gives the amount of memory being used by a program and should be entered as a direct command.

The symbol 'n' above should be replaced with any desired number.

Paul Smith,  
Cheam, Surrey

## Sharp ROM dismantled

I've been dissecting the ROMs in my Sharp PC1251. Some of the words I've found that aren't in the Basic manual are COM\$, KEY, SETCOM, ROM, DMS, PEEK, DEBUG, OUTSTAT, INSTAT, CALL and POKE. Most are self explanatory, though some still need figuring out.

If you feel like a little research yourself, you could enter the program :10A\$=" (space)". Now POKE 32823,92 and list line 10. It's changed to A\$="L". Trying other values reveals all the keywords and some graphics symbols.

Norman Bailey,  
Bracebridge Heath,  
Lincs

```
0REM ** NEW PLOT COMMAND ** BBC OS 1.00+ **
1REM ** JAMES BRIDSON, BARNSELEY **
2:
10MODE5:VDU19,2,4,0,0,0:radius=250:VDU29,640,512:
20MOVE0,radius:FOR angle=0 TO 2*PI STEP PI/15
30DRAW radius*SINangle,radius*COSangle:NEXT:DRAW0,radius:GCOL0,1
40FOR Y%=radius TO -radius STEP -4:PLOT77,0,Y%:NEXT:GCOL0,2
50FOR Y%=-512 TO 512 STEP 4:PLOT77,radius+12,Y%:PLOT77,-radius-12,Y%:NEXT
60COLOUR0:COLOUR130:PRINTTAB(5,2)"PLOT 77,X,Y":PRINTTAB(3)"FILLS BOTH WAYS"
70PRINTTAB(5)"TO BOUNDARY"
```

Czes Kosniowski and John Ewing show you how iteration can help with your sum clearance.

# The ZX81 sums up

**I**terations, functions, floating point, denominators — what's all this got to do with your personal computer? More than you'd think.

Mathematics plays a major role in computing and computers are a great help to mathematicians. One technique, iteration, is used to calculate the answers to almost unsolvable equations. The basic idea is to take your problem and re-arrange it into a special iteration formula.

You then take a guess at what the answer might be and stick it in the formula. The result is a better guess at the solution. What do you do with it? Stick the new approximation back in the formula and get an even better one out.

You can get a computer to keep doing this, round and round, until the approximation is as close to the real answer as you need to go.

Lots of big expensive computers spend their time doing such calculations, but you can try out similar things on your own micro. What's more, you'll find similar things are already going on inside your computer. If you ask it for some simple calculation such as the square root of 7 (PRINTSQR(7)), it's got to get the answer from somewhere.

This article looks at some of the rewards and pitfalls of iteration with some simple examples and programs. You may need

to know about iterations to get a degree in Computer Science, but you don't need a degree in Computer Science to understand and use them. . .

If you take any positive number  $X$  and compute the average of  $X$  and  $3/X$ , the result  $(X+3/X)/2$  is again a positive number, and you can repeat, or iterate, the process to get another number again and again.

Your computer can do this easily using Program 1 (see opposite). Lines 40 and 50 are used to slow down the printout, and you can change this to suit your micro. ZX81 users will also need to add a SCROLL statement at the beginning.

What happens when you run it? No matter what positive number you INPUT, the numbers printed approach the number 1.73205081, which the computer calls 'the square root of 3'. If in line 30 you replace the number 3 by some other number, then the program will calculate the square root of that number.

The process 'put in  $X$ , get out  $(X+3/X)/2$ ' is an example of a function. Iterating functions — feeding the output back into the input — is a common and useful process in mathematics and computing. Your computer is well-suited for such operations, but beware, there are some pitfalls.

Here's another simple example. Take a number between 0 and 1, multiply it by 2, subtract 1, and take the ABSolute value of it. (You might write  $X \rightarrow \text{ABS}(2*X-1)$  to indicate this function.) You can now iterate this function by feeding the output back into the input — again and again.

For example, if you start with 0.6, then the output is 0.2, since  $\text{ABS}(2*0.6-1)=0.2$ . If you then feed in 0.2 the output is 0.6 since  $0.6=\text{ABS}(2*0.2-1)$ . When you continue

**Experimentation with the value of  $L$  in the function  $x \rightarrow L^4 * X * (1-X)$  can produce the sort of values shown in the graphs below.**

iterating you simply get the following sequence:

0.6, 0.2, 0.6, 0.2, 0.6, 0.2, 0.6, . . .

That was easy. But what happens with other numbers? Your computer can give you a clue with Program 2. Try various numbers between 0 and 1. You will see that the printed numbers bounce around for a while, but eventually get to 0 and then 1 for evermore.

But wait! What happens when you INPUT 0.6? We know what should happen, but after a few steps the computer gets the answer slightly wrong, and then it's *all* wrong! There's nothing wrong with your computer — this is just one of those pitfalls that we mentioned earlier on.

Why does the computer get it wrong? Let's go through the process step-by-step. First we INPUT 0.6 which the computer stores as a binary number:

0.100110011001100110011001101010

Most micros store numbers using 32 binary digits or bits and round off the number. Some micros, such as the ZX81, use 32 bits and 'chop' rather than round off. In such a case 0.6 would be stored as:

0.1001100110011001100110011001

Whether or not numbers are rounded off and the actual number of bits used is irrelevant, since the same thing will go wrong — even if our computer used a hundred or more bits. After this it multiplies by 2 — this is easy, just shift the decimal point to the right to get:

1.0011001100110011001100110100

Then it subtracts 1 to obtain:

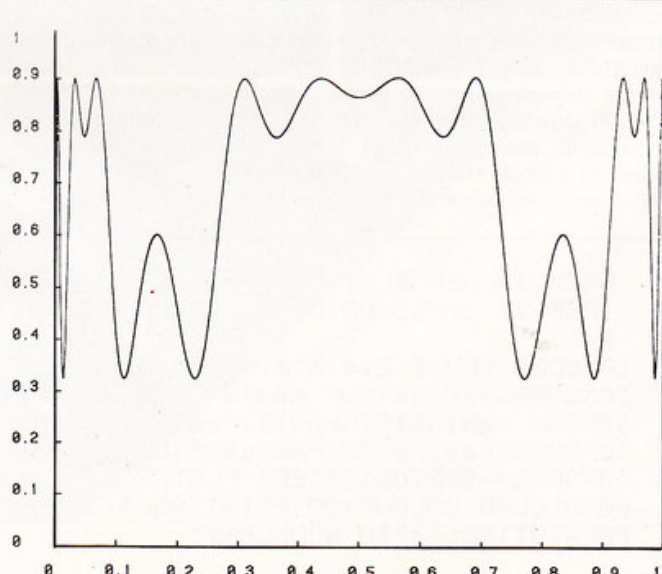
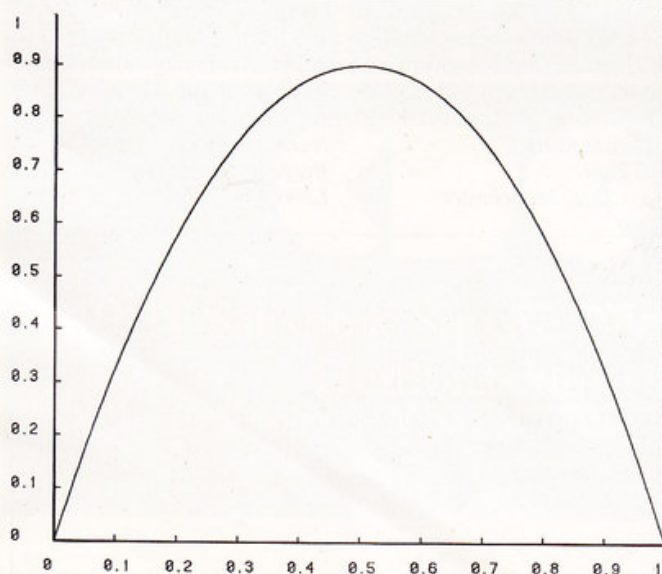
0.0011001100110011001100110100

Finally it goes back and repeats the process with this new number. The result on iterating is shown in the printout.

You can see that after 31 iterations you get 0, and then 1 ever after. For the ZX81 this takes 32 iterations. In fact, by counting the number of steps it takes your computer

```
1 REM PROGRAM 4
5 LET L=0.7
10 INPUT X
20 PRINT X
30 LET X=L*4*X*(1-X)
40 FOR I=1 TO 200
50 NEXT I
60 GOTO 20
```

READY.



```
1 REM PROGRAM 1
10 INPUT X
20 PRINT X
30 LET X=(X+3/X)/2
40 FOR I=1 TO 200
50 NEXT I
60 GOTO 20
```

READY.

```
2
1.75
1.73214286
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
```

RUN

```
2
1.75
1.73214286
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
```

RUN

```
7
3.71428572
2.26098901
1.79392099
1.73311772
1.73205114
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
1.73205081
```

to reach 0 from 0.6, you can estimate the number of bits your computer uses to store a number.

All this is fine, we now know *why* the computer went all wrong. But what can we do about it? Is there a way in which the computer will do the correct thing under iteration? The answer is yes, and the key is to look at what happened to 0.6.

The solution is to replace the calculated value at each step by the printed value. This is achieved by converting X into a

```
1 REM PROGRAM 2
10 INPUT X
20 PRINT X
30 LET X=ABS(2*X-1)
40 FOR I=1 TO 200
50 NEXT I
60 GOTO 20
READY.
```

```
0.100110011001100110011001101010 = .6
0.00110011001100110011001100110100 = .2
0.10011001100110011001100110011000 = .6
0.00110011001100110011001100110000 = .199999999
0.10011001100110011001100110100000 = .600000001
0.0011001100110011001100110011010000 = .200000003
0.10011001100110011001100110000000 = .599999994
0.0011001100110011001100110011000000 = .199999998
0.10011001100110011001101000000000 = .600000024
0.0011001100110011001100110011000000 = .200000048
0.10011001100110011001100000000000 = .599999905
0.00110011001100110011000000000000 = .199999809
0.10011001100110011010000000000000 = .600000381
0.00110011001100110100000000000000 = .200000763
0.10011001100110011000000000000000 = .599998474
0.00110011001100110000000000000000 = .199996948
0.10011001100110100000000000000000 = .600006104
0.00110011001101000000000000000000 = .20012207
0.10011001100110000000000000000000 = .599975586
0.00110011001100000000000000000000 = .199951172
0.10011001101000000000000000000000 = .600097656
0.00110011010000000000000000000000 = .200195313
0.10011001100000000000000000000000 = .599609375
0.00110011000000000000000000000000 = .19921875
0.10011010000000000000000000000000 = .6015625
0.00110100000000000000000000000000 = .203125
0.10011000000000000000000000000000 = .59375
0.00110000000000000000000000000000 = .1875
0.10100000000000000000000000000000 = .625
0.01000000000000000000000000000000 = .25
0.10000000000000000000000000000000 = .5
0.00000000000000000000000000000000 = 0
1.00000000000000000000000000000000 = 1
1.00000000000000000000000000000000 = 1
```

STRing and then taking its VALue. However, on some computers this still causes problems because of exponential notation; so we add 1 before converting to a string and then remove the 1 from the string before taking its value. We now have a new program, Program 3. Note that Sinclair users should replace line 34 by LET XS=STRS(X). Running this program produces the correct result.

Another way to make the computer do the correct thing is to replace lines 34 and 36 with the single line:

```
35 LET X=INT(100000000*X+.5)/100000000
```

This will work for any decimal with eight or fewer digits, provided your machine is accurate to nine places.

You can now input various decimal numbers between 0 and 1, and see what happens. For example, if you input 0.04 then after ten iterations you return to the start. If you input 0.168 then after 50 iterations you return to the start. But for some numbers you never return to the number you started with; instead you get a sequence that repeats. Such a repeating sequence is called a cycle, and this concept is important in what is called 'group theory' — an elementary account may be found in *Puzzle it out: Cubes, Groups and Puzzles* by John Ewing and Czes Kosniowski.

```
1 REM PROGRAM 3
10 INPUT X
20 PRINT X
30 LET X=ABS(2*X-1)
34 LET X$=MID$(STR$(X+1),3)
36 LET X=VAL(X$)
40 FOR I=1 TO 200
50 NEXT I
60 GOTO 20
```

READY.

RUN	.92	.84
.6	.84	.68
.2	.68	.36
.6	.36	.28
.2	.28	.44
.6	.44	.12
.2	.12	.76
.6	.76	.52
.2	.52	.04
.6	.04	.92
.2	.92	.84
.6	.84	.68
.2	.68	.36
.36	.28	.44
RUN		.44
.22	RUN	.12
.56	.255	.76
.12	.49	.52
.76	.02	.04
.52	.96	.92
.04	.92	

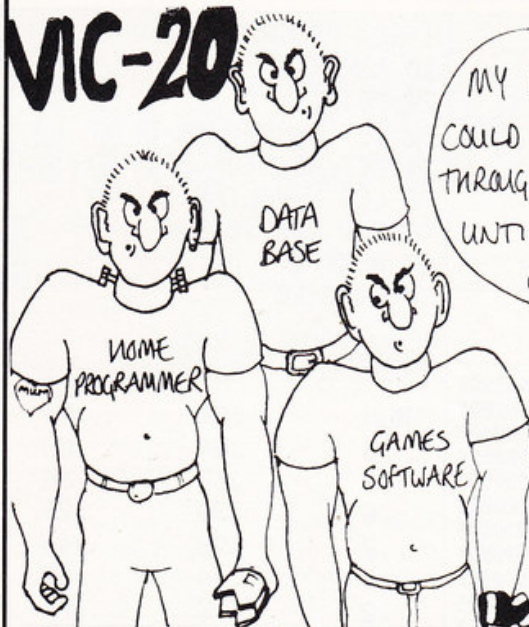
There is in fact a simple way to predict what will happen to any number and what the length of the resulting cycle will be. Write your decimal as a fraction and cancel any common factors (for example,  $0.255 = 255/1000 = 51/200$ ). Now write the denominator as  $(2^A) \cdot (5^B)$ . The result will be that after  $A+1$  iterations you get a cycle of length  $2 \cdot (5^B - 1)$ . For example, for 0.255 the denominator is  $200 = (2^3) \cdot (5^2)$  and so after iterating three times the numbers repeat every ten times. Try it with various other numbers.

Iterating functions can be a great way to experiment with your computer. In fact such experiments have recently been looked at by mathematicians and physicists, and words like *Strange Attractors* and *Chaos* have been used to try to explain why things happen as they do.

A good function to experiment with is  $X \rightarrow L \cdot X \cdot (1-X)$  for different values of L. Try letting  $L=0.7$  and then iterate for different values of X between 0 and 1. Use Program 4 (see far left), there are no pitfalls here!

You might be surprised what happens when you experiment with different values of L between 0.7 and 1. Next time you have a spare moment or two, try iterating some other functions on your computer — you may discover something new and unknown.

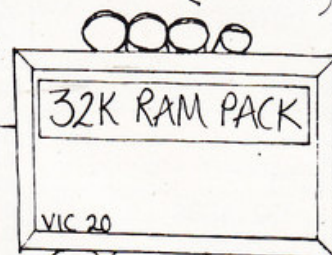
# VIC-20



MY BOYS  
COULD 'BYTE'  
THROUGH ANYTHING...  
UNTIL THESE  
CAME ALONG!!

## £49-99

(INCLUSIVE)



**'GEMINI'  
SOFTWARE**

1. DATA BASE
2. STOCK CONTROL
3. MAILING LIST
4. INVOICE/STATEMENT
5. HOME ACCOUNTS
6. COMMERCIAL A/C

£19.95  
(inc)

BUY SOFTWARE AND RAM PACK  
TOGETHER FOR £59.99 (inc)

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

Please send me ☐ 32K RAM Pack/s @ £49.99  
Software Number ☐ 32K RAM Pack @ £59.99

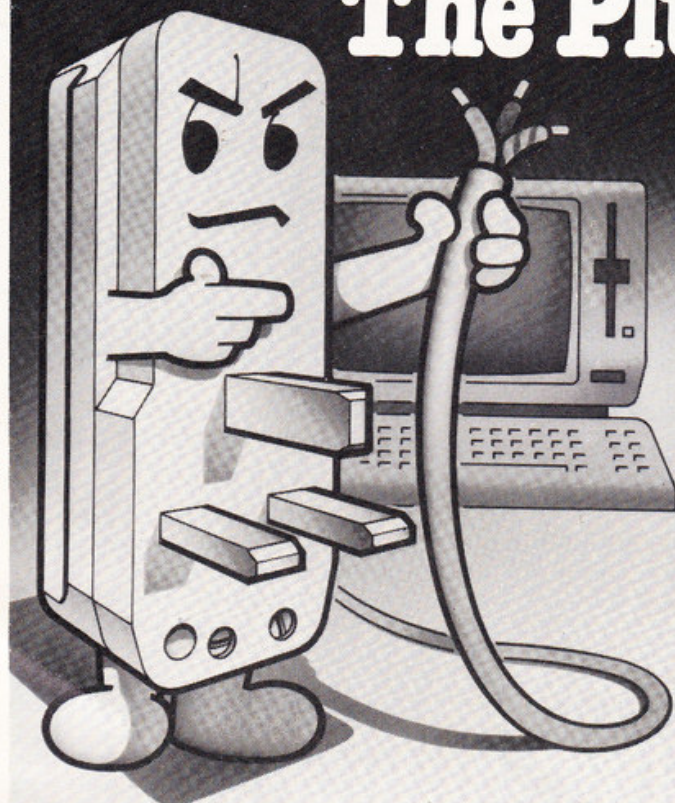
I enclose cheque/PO for £ \_\_\_\_\_

SEND TO: **PLUS 80 LTD.**  
(No stamp needed) **FREEPOST**  
**HARROW**  
**MIDDLESEX HA2 0BR**

01-423 6393

\* 28159 bytes  
\* Allow 7 days

# The Plug says 'No' to dirty power.



## WHY

Because dirty power is the most likely cause of the unexplained errors and circuit malfunctions which can upset all micro based products and their users.

## HOW

The Plug with its own built in filter and transient suppressor reduces the effect of electrical noise and spikes and increases the reliability of both hardware and software.

**Protect your computer from unnecessary power problems, say 'No' to dirty power.**

*The Plug is available from dealers or direct from the manufacturer*



R.R.P. £15.50 including p.p.  
Dealer enquiries welcome.

**WARNING: Unfiltered power can  
damage your computer's health.**

FOR FURTHER INFORMATION CONTACT:

**Power International Limited** 2A Isambard Brunel Road,  
Portsmouth, Hampshire. PO1 2DU. Tel. (0705) 756715

Barry Miles offers some Sterling advice on buying micro-wares from the United States.

**W**e now have a thriving micro industry in the UK, but the whole thing started in the United States. Often machinery and hardware add-ons are available in the US much earlier than over here, and similarly, a lot of good newsletters spring up in the States, as do program exchanges and libraries.

All of this is leading to the small matter of arranging payment for mail-order purchase of US products. The natural thought is to go to the Post Office and ask about international money orders. But the result is far from encouraging.

I was given a very attractive leaflet which explained how simple it all was. There were just two snags — first, you must specify the amount you want to send in Sterling. At first sight this is no great problem, but if you want to send \$50 to someone, it is not very helpful if the sum he gets is \$48.50 or \$51.50.

The recipient won't have problems cashing your cheque, because payments to the US and Canada are made in local currency, so the recipient won't have to pay fees and lose on the exchange rates to cash a cheque in Sterling. But the second snag is how much it costs you.

Many unkind words have been written about Post Office counter clerks, but this one was pure gold. Looking round furtively to see that he was not overheard he said quietly: 'I think you may find the banks are cheaper.'

I thanked him profusely, and tried my bank, Lloyds. The branch was helpful, but equally expensive. An air mail transfer by banker's draft would cost about £4.26, and a cable transfer and draft would be over £10. One alternative would be to send one of my own cheques to America, expressed in dollars. This could be paid into the American bank, but the person paying it in would be charged a large amount by his bank for handling it.

There is another snag: the goods would be more than a little delayed, because the recipient would be unwilling to send the goods until the cheque had been cleared. This is important, as you don't want to buy something which will be obsolescent by the time you get it.

### By banker's draft

I heard a rumour that Barclays Bank might be able to help, so off I went again.

Here I heard about the 'International Money Order', which is a cheque drawn on Barclays Bank International, in New York, therefore having the status of a banker's draft. (I should explain what a banker's draft is: it's a cheque drawn by a bank itself, on a bank, and is therefore virtually guaranteed, and trusted accordingly.)

The money order is prepared for you on the spot, and, amazingly, you don't need to be a Barclays Bank customer to get one. The charge is only £1. I sent one of these off to California by air mail, and had the goods in seven days.

But that isn't the end of the story. If you have a Barclaycard or Access card,

# Uncle Sam's check-out

overseas mail-order will be even easier. Many US suppliers will accept payment with these, so all you need to do is to quote your Visa card or MasterCard number. It is important that you use those names, because Barclaycard and Access are unknown in the States. You must also quote the expiry date on the card.

In case you are worried about sending your card through the mail, don't be: just quote its number in your letter and you will have no problem.

It appears that the credit rating is checked very quickly (by satellite I'm told), so goods are shipped immediately. The charge for the goods is converted at a fair exchange rate by the credit card companies, and does not usually hit your account for two or three months.

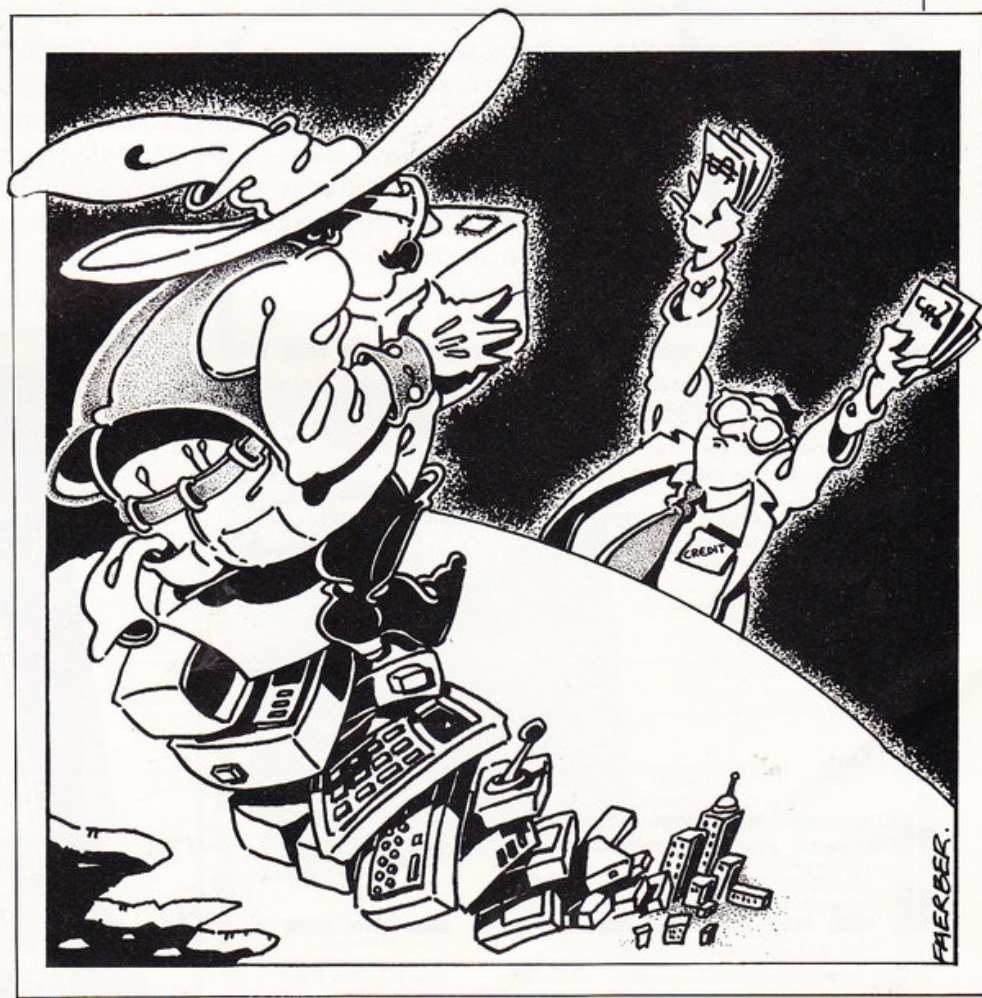
For really high-speed action, I suggest the following: find out the time-difference

between the UK and the state you are phoning, and make an international call by STD to America. I know this sounds expensive, but if you tell them you are calling from England, they will deal with you very quickly, and the rates are not too expensive for a one-minute call.

Give your address twice, and don't forget the postcode. State your card number and expiry date clearly, and define exactly what you want, if possible referring to a magazine advertisement. Finally, tell them whether you want air mail or first class mail.

Usually they are so impressed that you bothered to phone that the goods come out on the same day and you may well have them in three or four days.

All you need now is for customs to release them quickly without bothering to collect the duty...



From the  
publishers of  
Personal Computer World

# SLAYS INFERIORS



lots of micro magazines pretend to take computer games seriously. But seriously, as a person with the perspicacity to read this magazine, you know better. Yet you still want to play games with your micro, rather than let your micro play games with you. So that's why from July onwards, you can buy a special magazine

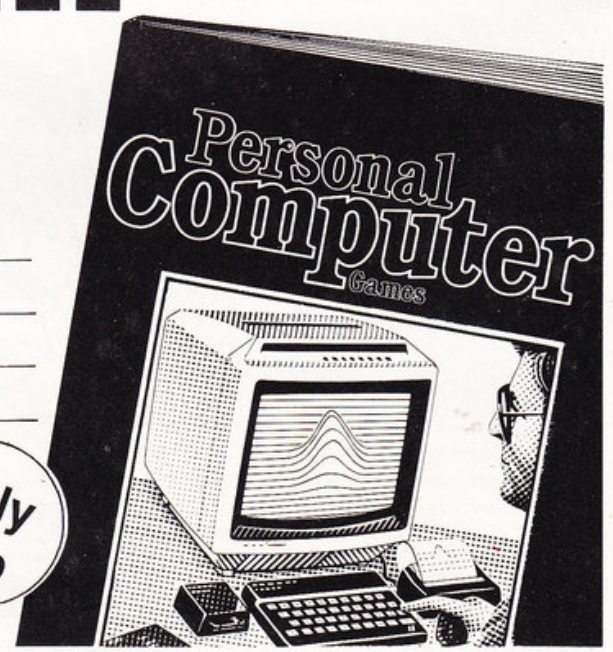
published by VNU called 'Personal Computer Games' which will help you do just that. No matter what micro you own, 'Personal Computer Games' will tell you everything you've ever needed to know about the games you can play with your micro. And the wherewithal of playing them. Make sure you don't miss out. Shoot on down to your newsagent, or use the coupon below to order your copy. Now! And start winning, winning, winning.

- ☐ I enclose my cheque made payable to Personal Computer World for £1.35 (P & P inclusive)
- ☐ I enclose my postal order payable to Personal Computer World for £1.35
- ☐ Please debit my American Express/Access/Barclaycard (delete where not applicable)

Account no. \_\_\_\_\_  
Signed \_\_\_\_\_  
Name \_\_\_\_\_  
Address \_\_\_\_\_

Please send this order, with your remittance to: Personal Computer World, Circulation Dept., Freepost 38, London W1E 6QZ.

only  
85p



## HAVEN HARDWARE ZX PRODUCTS & JUPITER ACE

4 ASBY ROAD, ASBY, WORKINGTON, CUMBRIA CA14 4RR.

New retail outlet in Whitehaven Town Centre at  
85 Scotch Street, Whitehaven, Cumbria

PRICES INCLUDE VAT AND P & P. SAE FOR DETAILS.

Some of the products are also available from the following agents:

THE BUFFER SHOP, MICROWARE, LEICESTER.

### ZX80 & ZX81 HARDWARE

Repeating Key Module KIT £3.95 BUILT £5.95 (As reviewed by *Popular Computing Weekly*)  
Inverse Video Module KIT £3.50 BUILT £4.95 (As reviewed by *Popular Computing Weekly*)

Keyboard Beeper Module KIT £6.95 BUILT £8.50

Keyboard Entry Module KIT £2.95 BUILT £4.95

Input/Output Port KIT £10.95 BUILT £14.95

(Can be used with 16K RAM and printer without motherboard)

Programmable Character Generator KIT £17.95 BUILT £24.95

3K Memory Expansion BUILT for only £12.00

The most reliable memory expansion available

Full-Size Keyboard with Repeat Key - The first of its kind

Built version plugs in. KIT £26.95 (Postage £1) BUILT £24.95

ZX81 Edge Connector £2.95 ZX81 Edge Cards £1.50

### ZX SPECTRUM HARDWARE

ZX Spectrum Edge Connector £3.50 ZX Spectrum Edge Cards £1.75

ZX Spectrum Input/Output Port KIT £11.95 BUILT £15.95

ZX Spectrum Sound Amplifier KIT £3.95 BUILT £5.95

### ZX SPECTRUM SOFTWARE CASSETTES

Fruit Machine Colour graphic representations of fruits. Including HOLD and GAMBLE £4.95

Solitaire Alpha-Numeric move entry. £4.95

Patience The popular card game (cheat proof) £5.95

Mancala The Chinese Logic Game. £5.95

REPULSER Repel the alien invasion. £4.95

### BOOKS

Cambridge Collection £4.95 Cambridge Colour Collection £6.95 Cassette £2.95

WE ALSO STOCK A LARGE RANGE OF RESISTORS, CAPACITORS, ETC.

Access Card Orders Accepted

Ring 094 686 627

(24 hr. ANSAPHONE)



JUPITER ACE £85.00

### JUPITER ACE

INPUT/OUTPUT

PORT

KIT £13.95

BUILT £17.95

## BBC MICRO



Make the most of your BBC Microcomputer with three publications written by the experts LET YOUR BBC MICRO TEACH YOU TO PROGRAM, by Tim Hartnell, £6.45, with 40 complete programs including Othello. THE BBC MICRO REVEALED, by Jeremy Ruston. If you've mastered your computer and you want to progress, this is the book for you, £7.95. INSTANT BBC MICRO MACHINE CODE by Jeremy Ruston. This compiler allows you to enter programs in BASIC and then have them changed automatically into machine code, gaining a speed increase of up to 10 times, £34.95 including cassette.

Interface Publications, VW 44-46 Earls Court Road, LONDON W8 6EJ.

Please send me the books indicated above. I enclose £

Name .....

Address .....

\*(reg. TM)

## ZX SPECTRUM & ZX81 EDUCATIONAL SOFTWARE

### Spectrum Junior Education £7.50

Use your Spectrum to help your children with their school work. This cassette contains eight attractive, easy-to-use programs for the 7 to 11 age group.

Topics include English comprehension, spellings, homophones, junior science, maths and history.

- ★ Entering your own questions and answers allows you to adapt two of these programs for exercises in any subject area.
- ★ Moving colour graphics and sound are extensively used to improve motivation.
- ★ Use the "draw" program to produce pictures, maps and diagrams.

Suitable for the 16K or 48K Spectrum. Program notes are supplied.

### O-Level Chemistry (C1) £7.50

This cassette contains four clearly presented revision/tutorial programs. The subject matter has been carefully structured to cover the most important aspects of:

- ★ Elements, compounds and mixtures.
- ★ Structure, bonding and properties.
- ★ Redox, electrolysis and the activity series.
- ★ Acids, bases and salts.

48K Spectrum and 16K ZX81 versions of the cassette are available. Please specify which you require.

Professional Computer Assisted Learning materials from:

CALPAC COMPUTER SOFTWARE

108 Hermitage Woods Crescent, St Johns,  
Woking, Surrey GU21 1UF.

SPECTRUM JUNIOR EDUCATION J2 AVAILABLE

OVERSEAS ORDERS: £6.50 (\$11.60) PER CASSETTE; INCLUDES AIRMAIL POSTAGE

Linsac's ZX Companion series has received excellent press reviews:

"Far and away the best" — *Your Computer*

Thoughtfully written, detailed and illustrated with meaningful programs ... outstandingly useful" — *EZUG*

'The Spectrum Games Companion' is the latest addition to the series and is aimed at the games player and programmer alike. Twenty-one games designed specifically for the ZX Spectrum are included, with clear instructions on entry and play. Each program is explained fully with complete details on how it is designed and written. Introductory chapters show how to set up and use the Spectrum and how to create your own games. Later sections cover number games, word games, board games, simulation games, dice games, card games and grid games. If you want to enjoy your ZX Spectrum and learn its secrets at the same time then this is the book for you!

Bob Maunder is co-author of 'The ZX80 Companion' and author of 'The ZX81 Companion'. He is a Senior Lecturer in Computer Science at Teesside Polytechnic, holds an MSc degree in Computer Science, and is a Member of the British Computer Society.

The Spectrum Games Companion is available from good book shops, or send £5.95 to:

## THE SPECTRUM GAMES COMPANION

Bob Maunder

LINSAC

ONLY  
£5.95

LINSAC (P.C.N.) 68 Barker Road,  
Middlesbrough, Cleveland TS5 5ES

ISBN 0 907211 02 X

Postage is free within the U.K. —  
add £1 for Europe or £2.50 outside Europe.

# QUESTION

## WHERE CAN I BUY

NEWBRAIN 'A' 32K	FOR	£268.00
NEWBRAIN 'AD' 32K	FOR	£298.00
SINCLAIR ZX81 1K	FOR	£48.00
SINCLAIR SPECTRUM 16K	FOR	£99.00
SINCLAIR SPECTRUM 48K	FOR	£129.00
ORIC-I 48K	FOR	£168.00
SINCLAIR ZX PRINTER	FOR	£39.00
SINCLAIR ZX81 RAM PACK	FOR	£28.50
SEIKOSHA GP-250X PRINTER	FOR	£260.00
SEIKOSHA GP-100A PRINTER	FOR	£215.00
BMC BM12E GREEN MONITOR	FOR	£100.00
SANYO SCM12H GREEN MONITOR	FOR	£100.00
SANYO SCM12N GREEN MONITOR	FOR	£85.00

**CARRIAGE:** 1 item £4.00, 2 items £3.50 each, 3 items £3.00 each, 4 or more FREE

## ANSWER:-



**MICROCELL COMPUTER SYSTEMS**

*New Brain*

APPOINTED STOCKIST

**FOR ACCESS PHONE ORDERS, PLEASE RING (0532) 681366**

MICROCELL COMPUTER SYSTEMS, P.O. BOX MT12, LEEDS 17, YORKSHIRE	
NAME _____	PLEASE SEND ME
ADDRESS _____	
_____	
SIGNED _____	TOTAL £
FOR OUR COMPLETE PRICE LIST	+ CARRIAGE £
	TOTAL ENCLOSED £
PLEASE TICK <input type="checkbox"/> PLEASE DEBIT MY ACCESS NO <input type="checkbox"/>	

Be quick on the draw with your joystick. Key in this Etch-a-Pad program by Edmund Bamber.

## Portrait of the Atari as an artist

When we first opened Edmund Bamber's letter containing his Etch-a-Pad, it looked pretty innocuous. But when we tested it, we found a professional-looking graphics package that would be worth its place in any Atari 400/800 owner's program library.

The program runs in Basic, isn't very long, and lets you use your Atari joystick to draw shapes in up to 16 colours on screen. There are five mode options — A,B,C,D and E.

The first three allow you to draw in four different colours. Mode D gives you

up to 16 colours — although you may have to turn up the colour on your TV to see the subtle gradations in this mode.

The fifth mode — mode E — uses only two colours, black and white. But it does feature an erase facility using the joystick. In the first four modes, you can also erase parts of the screen by filling in areas with the background colour.

Here is the documentation: a drawing program using five of Atari's graphic modes, each giving you a choice of three different pen-widths and up to 16 pen/drawing colours — plus a choice of 255

background colours (which are available while drawing).

### Instructions

**Press** the trigger to switch on the cursor  
**Push** the joystick forward (up) to select pen colour (Super-resolution mode E has only one colour plus Erase. To erase in Super-resolution, hold the joystick forward and press Start).

### Options for paddles

**Paddle (2)** selects background colour.

**Paddle (3)** selects pen size.

The background colour is also selectable by placing the pen over the colour indicator at the top right of the screen.

**Amendments** — delete lines 30 and 32 to select single pen widths if you have no paddles.

### Variables in the program

**R** Graphics mode

**PA** Paddle

**BA** Colour update

**YA** Max. Y. Axis

**S** Stick (0)

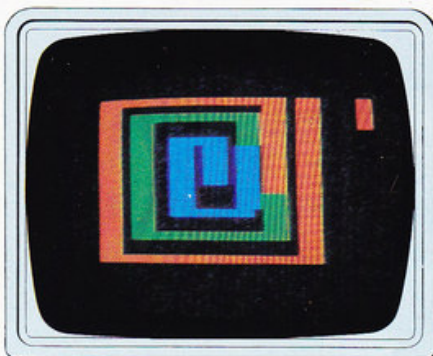
**B** Present Colour

**XA** Max. X. Axis

```

1 REM *****ETCH/A/PAD*****
2 REM *****BY*****
3 REM *****EDMUND*BAMBER*****
4 DIM A$(1)
5 GOSUB 250:GOSUB 54:GOSUB 90
6 GRAPHICS R+16:B=0:X=INT(XA/2):Y=INT(YA/2)
10 IF STRIG(0)=0 THEN GOTO 40
12 IF PADDLE(2)<228 THEN GOSUB 300
14 IF PA>228 THEN PA=15
16 POKE 712,PA:COLOR B
20 GOSUB 150
25 PLOT X,Y
30 IF PADDLE(3)>170 THEN DRAWTO X+2,Y
32 IF PADDLE(3)>85 THEN DRAWTO X+1,Y
34 IF (X=XA-1) AND (Y=1) THEN GOSUB 290
35 GOTO 10
40 COLOR B:FOR D=1 TO 50:NEXT D
42 S=STICK(0):IF B>BA THEN B=1
44 IF S=14 THEN B=B+1
48 PLOT XA,4:DRAWTO XA,1:PLOT XA-1,4:DRAWTO XA-1,1:SOUND 0,B+25,10,8
50 IF PEEK(53279)=6 THEN GOTO 10
52 IF S=7 THEN GOSUB 90:GOTO 8
53 GOTO 40
54 GRAPHICS 2+16:IF E6:"ARTIST'S ETCH/A/PAD":? E6:
56 ? E6:"PRESS TRIGGER / PUSH UP TO CHOOSE COLOR":? E6:
58 ? E6:"PUSH RIGHT TO REDRAW"
60 ? E6:"PRESS START TO DRAW"
62 FOR D=1 TO 5
64 FOR I=0 TO 255
66 POKE 710,I
68 SOUND 0,1,6,14
70 NEXT I
72 NEXT D
74 FOR D=1 TO 1000:NEXT D
76 ? CHR$(125):GRAPHICS 2+16:IF E6:
80 ? E6:"PRESS START TO BEGIN"
82 FOR I=0 TO 255:POKE 710,I
84 IF PEEK(53279)=6 THEN RETURN
86 NEXT I:GOTO 82
90 SOUND 0,0,0,0:GRAPHICS 2:IF E6:"choose resolution":? E6:
92 ? E6:"(A)LOW res 4 COLOR":? E6:
94 ? E6:"(B)MED res 4 COLOR":? E6:
96 ? E6:"(C)HI res 4 COLOR":? E6:
98 ? E6:"(D)HI res 16 COLOR"
100 ? "PLEASE ENTER YOUR CHOSEN RESOLUTION":? " (A) (B) (C) (D) or (E) FOR
    SUPER RESOLUTION 1 COLOR"
102 INPUT A$
103 IF A$="E" THEN 118
104 IF A$="D" THEN GOTO 116
106 IF A$="C" THEN GOTO 114
108 IF A$="B" THEN GOTO 112
110 R=3:XA=37:YA=23:BA=4:RETURN
112 R=5:XA=77:YA=47:BA=4:RETURN
114 R=7:XA=157:YA=95:BA=4:RETURN
116 R=11:XA=77:YA=191:BA=16:RETURN
118 R=8:XA=317:YA=191:BA=1:RETURN
120 RETURN
150 S=STICK(0):IF S=7 OR S=5 OR S=6 THEN X=X+1
155 IF S=11 OR S=10 OR S=9 THEN X=X-1
160 IF S=14 OR S=10 OR S=6 THEN Y=Y-1
165 IF S=13 OR S=9 OR S=5 THEN Y=Y+1
170 SOUND 0,0,0,0:SOUND 0,S+(X+Y)/2,10,8
175 IF X>XA THEN X=XA
180 IF X<1 THEN X=1
185 IF Y>YA THEN Y=YA
190 IF Y<1 THEN Y=1
195 IF B=4 OR B=16 THEN GOSUB 210
200 RETURN
210 COLOR 2:PLOT X,Y:COLOR B:PLOT X,Y
220 RETURN
250 GRAPHICS 2+16:IF E6:"ARTIST'S ETCH/A/PAD":? E6:
255 ? E6:" YOU WILL NEED A JOY STICK plyr (1) jack TO DRAW WITH AND"
265 ? E6:" (optional)A PADDLE plyr (2) jack TO CHANGE THE COLOR OF THE BA
    CKGROUND (3) TO CHANGE PENSIZE"
270 ? E6:"ARTIST'S ETCH/A/PAD"
275 FOR D=1 TO 3500:NEXT D
280 RETURN
290 PA=PA+7:RETURN
300 PA=PADDLE(2)
305 RETURN
310 END

```

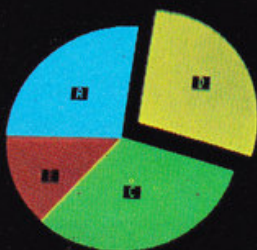


These screens show the menu for Etch-a-Pad and two pictures created using the program.



Construction Costs Profile

A - Materials (24%)  
B - Labor (33%)  
C - Overhead (33%)  
D - Land (27%)



# The new TI Professional Computer. If you want the business edge, it's the answer.



Today's business manager is faced with a world of questions, often tough. Questions about productivity. Cost control. And the bottom line.

To help you come up with sharper answers and alternatives, to give you the business edge, we introduce the new Texas Instruments Professional Computer. The one with the power, the expandability, the easiest-to-use keyboard, extremely high resolution graphics, and a broad array of software.

All the leading operating systems and programming languages are available. You can use many

popular application programs from the best software suppliers to help you create spread-sheets, do word processing, construct graphics, communicate with other data bases or create your own.

All of which lets you control assets, manage your time, and make projections for tomorrow's performance - today.

And for a clear "hard copy" printout of information, you can rely on the new 850 Series printers, made by Texas Instruments especially for the new TI Professional Computer.

The TI Professional Computer

helps you make better business decisions based on better information. With the performance and reliability you expect from TI.

In short, it's the answer.

For full information phone 0234 223000 or write to Texas Instruments, Manton Lane, Bedford MK41 7PA.

  
**TEXAS  
INSTRUMENTS**  
Creating useful products  
and services for you.

## SPECIFICATIONS

### System Unit

16-bit, 8088 microprocessor  
64K byte RAM, expandable to 256K bytes  
4K byte graphics display memory  
5-slot expansion bus

### Keyboard

Specially designed low profile  
Popular typewriter layout  
97 keys, including 12 function keys  
Separate numeric keypad and cursor control clusters  
Tactile response, for quick positive entry  
Upper- and lower-case letters

### Display Units

12-inch monochrome (green phosphor) or  
13-inch full-colour, 25 lines x 80 columns  
High resolution, 720 x 300 pixels

### Mass Storage

Built-in 320K byte diskette standard  
Additional internal storage of 320K byte  
diskette, or 5 or 10 Mbyte Winchester disks  
optional

### Communications Options

TTY, 3780  
3270 SNA stand-alone  
3270 BSC and SNA cluster

### Operating Systems

MS™-DOS, Digital Research™ CP/M-86®,  
and Concurrent CP/M-86™ UCSD p-System™

### Languages

BASIC, COBOL, FORTRAN, Pascal

### Applications Software

Over 100 programs available from the most  
popular software vendors such as Microsoft,  
Ashton-Tate, Micro-Pro, IUS, Sorcim, MPST,  
Lifeboat and others

### Printers

150-cps TI 850 Series for most applications

FOOTNOTES: MS-DOS is a trademark of Microsoft Corporation. CP/M-86 and Concurrent CP/M-86 are trademarks of Digital Research Inc. UCSD p-system is a trademark of the Regents of the University of California.

Word-processing packages for the 64 are on the increase. Pete Gerrard has a word for them.

# Pro processing on the Commodore 64

Peter Schrank

**W**ord processing and the Commodore 64 seem to be a popular match at the moment, with a rash of packages appearing in recent weeks. I took a look at four of the main contenders — all of them claiming to turn your micro into a fully-fledged word processing system.

All you need is the 64, a disk drive and a printer.

## Wordpro 3 Plus/64

This is the latest in a long line of word processing programs from Steve Punter, who has been writing these for Commodore machines since the year dot.

### Features

Text is not formatted on the screen as you type, but is prepared for the printer by a series of special formatting commands which can be embedded in the text area.

There are a couple of serious limitations with Punter's work which prevent it from being 'the ultimate word processor' for the 64. First, there is no scrolling window, which places a severe limitation on the 40-column screen.

Second, it is impossible to perform background printing while carrying on your writing, so the machine is tied up for quite long periods handling the printer. However, none of the other packages tested offered this facility either.

### Presentation

Because this is an extremely competitive area publishers must be prepared for criticism of the slightest flaw, and presentation suffers here. The manual has been imported from the US and no attempt has been made to anglicise the text.

More important, the American version of the program is slightly different and in order to correct the anomalies a tatty piece of paper has been inserted into what would otherwise have been a very smart manual.

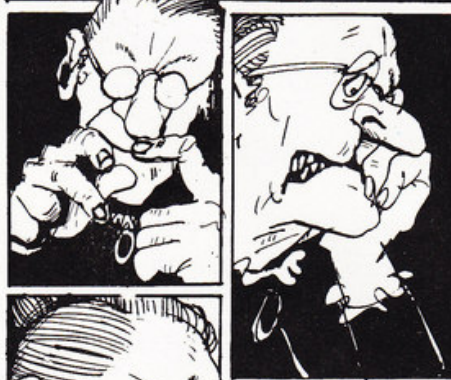
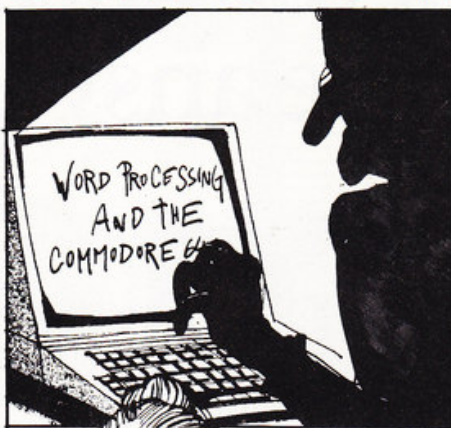
These quibbles aside the manual is very good for the newcomer, being instructive without condescension.

### In use

Having loaded the master disk you first select the number of lines of text you require in the main text area, while an extra text area takes care of mailouts, information inserts and the like.

However, the maximum number of lines is only 329 — this is a waste when you consider the 64K of memory on the machine.

Having selected the type of printer to be used, the disk drive and printer device numbers, you are presented with a blank



text area and two lines of display showing the current control information, *ie* insert, extra text, numeric modes, and current cursor position.

The commands are quick to learn and easy to remember — all are handled by a special CONTROL key which allows all other keys on the keyboard to have special functions.

### Reliability

I found Wordpro virtually impossible to crash, but there are two serious flaws in the package, and these mean you have to be particularly careful.

Quite often you need to look at the disk directory to find the name of a particular document and although Wordpro allows this, it will wipe any text you have in memory at the time without warning.

Exiting the system is only a three-keystroke operation and soon becomes semi-automatic, so there should be more warning that you haven't permanently stored the text.

### Verdict

Wordpro is getting a mite long in the tooth now, and in competition with more recent products it is inevitably going to suffer. A number of changes would have to be made before it could be considered a commercial proposition.

Not least of the changes would be a lower price. Better products are available for half the cost.

### Vizawrite

Vizawrite suffers only one of the limitations of Wordpro — the background spooling of files. That aside, it is only a step away from being a very good system, that step being the lack of any kind of data sorting.

On the plus side, it can read data files prepared by most of the other word processors and has a powerful text moving facility. Unlike Wordpro, you are not confined to full screen lines but can define true ranges to text and move them about the main text area at will.

That text area is very large — more than 850 lines of text can be stored in memory at one time, at last making use of all that memory.

### Presentation

The manual is well packaged and presented, covers everything with extreme thoroughness and is a definite improvement on the others, being written in English.

It is not condescending, assumes you

know about computers and covers each command competently and quickly. Its sole failing is the assumption of prior knowledge. Presented to newcomers it would likely provoke a few cries for help.

## In use

Vizawrite, like Wordpro, comes on a protected disk. So after loading and running the master program you are well advised to remove the master disk (why only one?) and insert a work disk for storing your text.

This package does format your text as you type.

A scrolling window gives you the effect of an 80-column screen and the method of setting tabs (numeric or alpha) will be readily appreciated by anyone used to an electronic typewriter.

Commands used to format text (you still have to do this) are again easy to remember and you have a number of specially defined characters to aid with some of the commands.

One quirk: typed spaces are displayed as dots on screen, not spaces.

## Reliability

This is a difficult, if not impossible, program to crash. Vizawrite handled all appointed tasks with ease. Global printing of files was straightforward, although I would like to see this performed as a background operation, rather than tying up the computer for long periods.

Mailouts, inserting specific information in text, and so on, are a simple task once you are used to the method employed by the program — not the most logical of routines.

## Verdict

It's a distinct improvement over Wordpro, but there are a couple of features which could be added to make it even better value for your £69.

The scrolling screen is virtually a necessity on a 40-column screen and the ability to read files created by other packages is a definite plus in its favour.

## Quick Brown Fox

This package can be dismissed quite briefly. It is dismally slow, dreadfully awkward to control — in short, definitely not a pleasure to use.

There appears to be no logic behind the author's choice of command keys and you are confronted by an apparently random choice of letters representing the commands.

It is possible to do most of the operations you'd normally want to carry out on a word processing system, but it is hard work doing so. If you're inserting text, or — heaven forbid — have made a mistake, you must go into a separate editor mode to make your alterations, then return to text mode to carry on writing.

And you need to use long strings of commands to do the simplest of operations which most other packages can achieve with two or three keystrokes.

If it was this package or nothing, I think

I'd be tempted to stick with my typewriter. And at £60 it's overpriced for the amount of work you'd be able, or inclined, to do.

## PaperClip 64

Out of the four packages I've looked at here, this offers the most features and is probably the easiest to use.

Like the rest, PaperClip will not do background printing, nor will it check the spelling of a document. If you want those sort of facilities, you should take a look at yet another package, Easyscript.

## Features

Essentially, PaperClip can do everything that the other three can do, plus it has the ability to sort data in alphabetical order.

Formatting and other commands are very easy to remember, using in many cases the same syntax as Wordpro. It will also read files created by the majority of other word processing programs, and with its text area of 829 lines it compares favourably to the others.

Two final points in its favour are the ability to perform simple numerical sums within the text area, and the ease with which you can read a disk directory without losing vast amounts of text.

## In use

PaperClip is well presented, with a good, readable and error-free manual. It's fast and simple to use, relying on embedded format commands and a Video Output mode in which you can see how your document will look when printed.

Everything that applies to Wordpro and to Vizawrite also applies here, including the ability to change screen, border and background colours if you wish. It's suited both to newcomers and to experienced users and it is difficult to lose text without realising it. It's very reliable, almost impossible to crash, and equipped with a comprehensive array of error messages in case you should attempt the impossible.

For a fuller review of PaperClip, see *PCN Issue 6*, where we looked at a version for the Pet.

## Comparison table

Name	Wordpro 3	Vizawrite	PaperClip
Max. text area	329 lines	875	829
Global printing	Yes	Yes	Yes
Search/replace	Yes	Yes	Yes
Column manipulation	No	Yes	Yes
Mailouts	Yes	Yes	Yes
Sorting	No	No	Yes
Spelling checker	No *	No	No *
Background printing	No	No	No **
Calculations	No	No	Yes
Video output	No ***	No	Yes
Screen scroll	No	Yes	Yes
Different printers	Yes	Yes	Yes
Word wrapping	Yes	No	Yes
Word count	No	No	Yes

\* Other programs exist to allow this but are not built in.

\*\* Command exists but is not implemented

\*\*\* Available on the 80-column Commodore versions

## Rating

### Quick Brown Fox

Features  
Documentation  
Performance  
Usability  
Reliability  
Value



Price £60 Publisher SPT Electronics, Tollesbury, Essex, tel (0621) 868484 Other versions Vic 20 Outlets Contact publisher

### Vizawrite 64

Features  
Documentation  
Performance  
Usability  
Reliability  
Value



Price £69 Publisher Viza Software, 9 Mansion Row, Brompton, Gillingham, Kent, tel (0634) 813780 Other versions None Outlets Mail order, Commodore dealers

### Wordpro 3

Features  
Documentation  
Performance  
Usability  
Reliability  
Value



Price £125 Publisher Professional Software Other versions All earlier Pets Outlets Wego Computers, 22a High Street, Caterham, Surrey, tel Caterham 49235

### PaperClip 64

Features  
Documentation  
Performance  
Usability  
Reliability  
Value



Price £86 Publisher Batteries Included Other versions Commodore 8000 Outlets Kobra Micro Marketing, PO Box 28, Henley-on-Thames, Oxon, tel (04912) 2512

If you have to wrestle with CP/M's syntax, Ted Ball has a package that could help you get to grips with it.

# CP/M simplified

**C**P/M's widespread use on 8080 and Z80 systems is due far more to its having been first and to the vast amount of CP/M software available than to any intrinsic merits as an operating system or its ease of use.

Simplifile allows you to carry out the most commonly needed operations in a simple manner, without the complexities of syntax you find in the CP/M commands such as PIP and STAT.

Simplifile is provided on a single-sided, single-density 8in floppy disk, and can be used on any CP/M system that will read a disk in this format.

## Features

When you use Simplifile there is a screen display in two parts: the "Disk Area" in the top three lines which shows general information about your disk, and which you use for giving global commands; and the "File Area" in the rest of the screen which shows information about your files, and which you use for giving commands on individual files.

Simplifile allows you to carry out almost all tasks by moving the cursor around the screen and giving single key commands.

The file commands available are:

- ? Display File Commands
- B Backup file
- C Copy file, with new name
- E Erase file
- G Goto file (move cursor to file)
- L List file on printer
- M Mark file for Mult
- N Next screen
- P Previous screen
- R Rename file
- T Make this top row
- U Copy file to another User Area
- V View file on screen
- X Execute program
- Control-P List screen on printer
- Escape Move cursor to Disk Area

To use these commands you move the cursor alongside the file name and press the appropriate key. Where you have to give extra details—for example with Copy and Rename where you have to give the new file name—Simplifile asks for the extra information it needs.

The centre section of the Disk Area is used for the general commands, and to use these you move the cursor to the command you want and press RETURN. "Exit" takes you back to CP/M, and "FLst" lists all the file information for the disk onto the printer.

"Sort" allows you to get the File Area details listed in order of name, type (extension), size, or date. "Mult" is used together with the File Command "M" and allows you to Backup, Erase or List any number of files at once.

To use Mult you first go through the File Area typing "M" beside the names of the

files you want Mult to operate on, then move the cursor to Mult in the Disk Area; press RETURN, which brings "Backup Erase List" onto the screen; and then move the cursor to whichever of these you want and press RETURN again.

Another useful feature is a separate program called FINETUNE. This allows you to set the date format to MMDDYY, DDMMYY or YYMMDD; set the List command to print with or without line numbers; change the line drawing symbols for the screen display; and set up an "Execute Command Program List". This is a list of up to five file names which can be executed together by a single "X" command, so you can, for example, put in a program name and the names of the files the program is to use, which saves typing out all the file names every time.

One limitation, however, is that the list must not be more than 19 characters so you have to use very short file names.

## Presentation

The disk is labelled with the program name and the disk format, and comes in a manilla envelope at the back of the ring binder containing the manual.

The manual is well laid out, and consists of an explanatory section with examples to help you learn how to use Simplifile, and a reference section giving full details of all the commands and the various system messages.

The section on error messages tells you what kind of mishap causes the message and what to do in response.

## Getting started

To install Simplifile you have to copy the Simplifile disk onto your working disk and use one of two programs from the Simplifile disk, TERMINAL or TD, to configure Simplifile to work with your terminal.

TERMINAL automatically configures Simplifile for any of 24 common types. If your terminal is not among them you have to use TD which asks you to specify the control characters etc, used by your terminal.

Although the installation procedure is simple you may have problems with machine-dependent details apart from the terminal configuration. For example, the Vector 3 which I used has double-density

disk drives, but it can read single-density disks.

However, to read single-density disks you have to use the drive names E and F instead of A and B, and the instructions do not mention that things like this can differ from system to system.

There is, however, a phone number and the names of two people to contact if you have any problems with Simplifile.

## In use

The single key commands make Simplifile easy to use, and to remember. There is a 'help' command which gives a list of the commands with brief statements of what they do.

Simplifile is intended to provide easy access to the computer for straightforward operations like listing files or running standard programs, and it appears to be suitable for use by people who only need to use the computer occasionally.

## Reliability

Simplifile has comprehensive error-checking built in, and will give a message if you type in an invalid date or an invalid command. The program will also ask you to confirm before it carries out an operation like ERASE.

The error messages are brief but informative, and the manual features a full explanation of all the messages.

## Verdict

Simplifile replaces some of the commonly used CP/M commands with a new set of commands that are much easier for a casual user to learn. The facilities provided have been well thought out and Simplifile could be very helpful in an office or similar environment where there are many people who do not use the computer regularly but sometimes need to run a standard program or get a printout of a file.

But if you regularly have to use features of CP/M beyond PIP, STAT, ERA, REN and DIR, which Simplifile replaces, it will not do very much for you.

## RATING

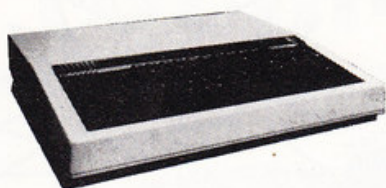
- Features
- Documentation
- Performance
- Usability
- Reliability
- Overall value



**Name** Simplifile **Application** Simplified extension to CP/M Operating System **System** CP/M, with 8in discs **Price** £75 **Publisher** Selven Systems, 3/5 Guithavon Street, Witham, Essex CM8 1BJ, **Format** SSSD 8in disk **Language** Machine code

DISK AREA					
DISK INFO			DISK COMMANDS		
* SimpliFile *			Sort	Mult	Current: A Backup: B Date: 081082
Disk Left: 128K			Exit	FLst	User: 0 Id: DISTRI
File: 3 of 42				Help	<< D i s k M e s s a g e s >>
CMD	Name	Type	Size	ChgDat	Description
--DISTRI	DID		2K	073082	SimpliFile's private file
File1	COM		2K		
File2	COM		14K	083082	This important file

The Simplifile screen is divided into the Disk Area (the top three lines on the screen) and the File Area (everything below the top three lines). The Disk Area contains information and commands that relate to the whole disk. The File Area contains information about the individual files on the disk.



## BBC Machines

Model 'A' £299  
16K RAM 32K ROM. Full  
colour, high-resolution  
graphics (+£7 p+p)

Model 'B' 32K RAM 32K  
ROM £399  
16 Colour graphics (+£7 p+p)

14" RGB Colour Monitor (as  
used in the BBC Computer  
programme) £279  
(+£9.50 courier)

Sanyo Colour Monitor  
£228.85 (+£9.50 p+p)

Lead for Sanyo £8.05

12" Green Monitor £95  
(+£6.50 courier)

BBC Joystick £13 p.pair  
(+£1 p+p)

## BBC Software

Monsters, Meteors, Rocket  
Raid, Tree of Knowledge,  
Philosopher's Quest, Sphinx  
Adventure, Snapper,  
Planetoid, Arcadians, Super

Invaders, Castle of Riddles.  
All at £9.95  
(+£1 p+p) on each item

Forth £16.85

Arcade Action £11.90  
(+£1 p+p)

## GTM Software

Word Build: An educational  
game using colour and full  
graphics, sound and en-  
couragement fully error trap-  
ped, supplied with full docu-  
mentation for own word list  
input. Fully adaptable to any  
child needs (4 to any age).  
£5.95 (+£1 p+p)

Smiler (phonic spelling  
game): aids the teaching of  
the letter sounds and spell-  
ings. Emphasises consonant  
and vowel recognition  
£5.95 (+£1 p+p)

If purchased together on one  
tape £11.00 the pair  
(+£1 p+p)

## Accessories for BBC Computers

Cassettes per 10 £4 (+£1 p+p)

Verbatim single sided double  
density disks, box of 10  
£22.50 (+£1 p+p)

GP80 and GP100 ribbon  
£4.75 (+£1 p+p)

Printer Cable (parallel)  
£15 (+£1 p+p)

6522 buffers £4.75 (+£1 p+p)

DIN to Jack cassette leads  
£3.50 (+£1 p+p)

BBC Machine dust covers  
£3.95 (+£1 p+p)

## Disk Drives

BBC Disk Drive (100K)  
£239 (+£4 p+p)

GTM Single Disk Drive  
(100K) £224.25 (+£4 p+p)

BBC Double Side and Densi-  
ty (800K) £799 (+£4 p+p)

GTM 800K (manual and util-  
ity disk included)  
£450 (+£4 p+p)

## Printers

Acorn GP 80A Printer £199  
Lowest ever price!  
(+£4.50 p+p)

Acorn GP 100A Printer £228  
(+£4.50 p+p)



Barclaycard and Access welcomed

**ALL PRICES INCLUDE VAT**

**GTM**

**NEW SHOWROOM**  
864 YORK ROAD, LEEDS  
Tel. (0532) 647474

# Arcade Action For The ZX Spectrum

SPECTRAVISION  
JOYSTICK  
£9.95  
(arcade action,  
pistol grip,  
ATARI®  
Compatible)



Protek  
JOYSTICK  
INTERFACE  
£14.95

If you want Arcade quality control for your Sinclair ZX Spectrum, you'll find the Protek combination hard to beat. The Interface is compatible with some of the best Arcade games from top software publishers including:

**Flight Simulation by Psion**

**Slippery Sid by Silversoft**

**Spectrapede by Protek**

Plus many more.

The Protek Joystick Interface is simple to use. It just plugs in at the back of your Spectrum and is compatible with any "Atari type" Joystick Connector. We recommend the Spectravision Joystick at only £9.95 for a Pistol Grip Joystick with a top and base fire button plus specially contoured shape and rubber suction cup footing for single hand operation.

Both units are available separately from

TRADE  
ENQUIRIES  
WELCOME

Subject to availability. Prices correct  
at time of going to press.

## =Protek=

COMPUTING LTD.

®Reg. Trade Mark

Clydesdale Bank Building  
High Street, South Queensferry  
Edinburgh EH30 9HW  
Tel. 031-331 4400

Available at larger branches of  
**John Menzies**  
and all good computer stores

The MPF-II is a new thermal printer for a new micro. Ian Scales finds out how Microprofessional it is.

# Prof in print



The MPF-II gives good quality printing, but the price may be a stumbling block.

**T**he MPF-II thermal printer is designed principally for use with the MicroProcessor (PCN issue 9). Its usefulness doesn't stop there, however, for this little printer is capable of interfacing to a range of micros including the Apple II or any computer with a parallel Centronics interface.

This review was based on using the MPF as a companion to the MicroProfessor. The printer is a thermal type and uses 4.4in-wide paper from a roll which sits inside the case.

Printers of this kind are basically used for printing out listings rather than conveying information to other people so it's not the sort of output you send to your bank manager requesting an extension to your overdraft. That said, it is actually quite readable.

Installation is a fairly straight-forward procedure — there aren't many bits and pieces to get tangled up in. When using it

with the MicroProfessor it was a simple matter of connecting the cable to the right holes in either unit.

Unfortunately the cable goes from the left side of the computer to the left side of the printer — work that one out.

In everyday use the printer is activated by three separate commands. A straight-forward PRINT command will output the text on the screen. In addition there are three Basic commands: PRTON will print out everything after each PRINT command. PRTOFF will put it on the screen instead and HC will copy the graphics or characters from the screen to the printer.

Graphic print quality is actually very good. The graphics displayed here (right) come straight from a routine featured in the manual.

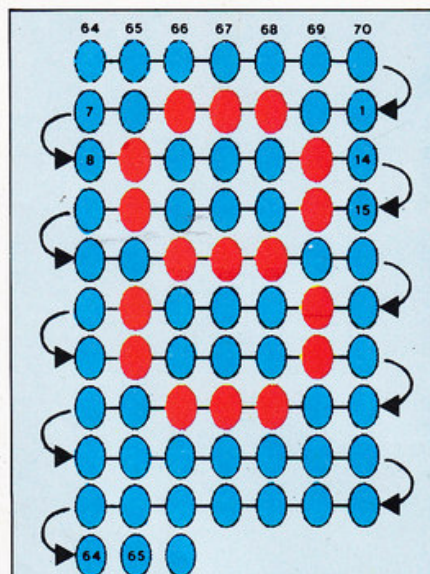
Printing speed is just over 100cps which seems pretty reasonable. The paper is the standard 2.5in-diameter thermographic.

The sound level was particularly impressive. It wasn't whisper quiet like Apple's Silentyte but then it wasn't nearly as slow either.

It is possible to interface the MPF printer to any type of computer with access to a Centronics interface (this could include the BBC micro or the Spectrum with an add-on interface) and the unit supports the full ASCII character set with upper and lower case.

Although the MPF printer performed well, it also costs rather more than might be expected for a unit of its type and limitations. At £180 it isn't too far away from some of the cheaper dot matrix impact printers.

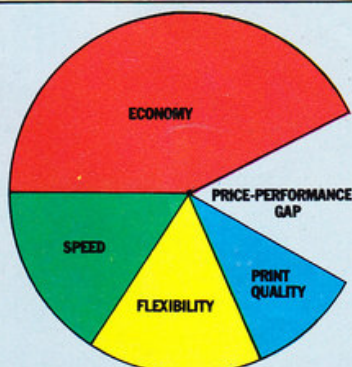
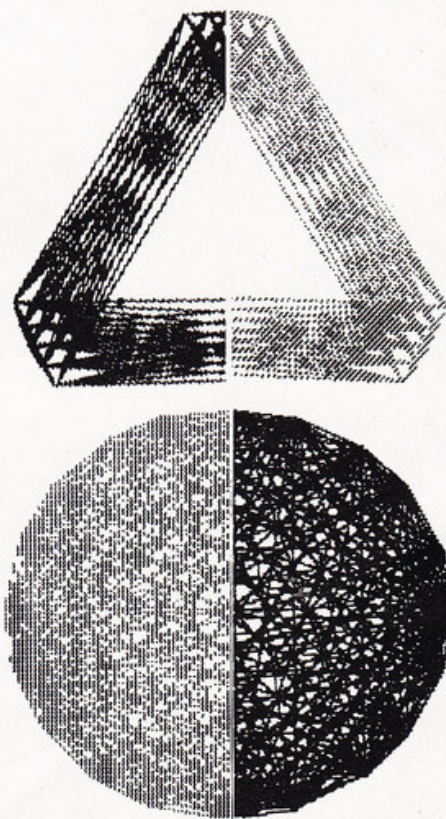
**Item MPF-II Printer Interfaces MPF-II, Apple II, Centronics Manufacturer Multitech Price £185 inc VAT Distributor Sirtel (0733) 313 444**



Multitech boasts that the MPF printer is simultaneously a thermal, matrix and line printer — indeed it is.

It has 40 thermal elements mounted on a single arm and spaced proportionally across the width of the paper. This moves back and forth the distance of one character. The paper is fed through a distance of one dot once the thermal heads have completed their character-width pass. They then go back the other way. Each of the thermal heads builds up a single row of characters down the page in a matrix of 7 by 10 dots.

The thermal heads create dot impressions by quickly heating up the paper when they touch it. The coating on the paper then changes colour.



A high printer capability in one direction will probably cause either a low capability in another or a higher price. Economy is a negative way of expressing price.  
If a printer has lots of everything it will close the price/performance gap.

Would you put a Torch to your BBC? Ian Scales sheds a little light on the question.

# Torch packs a punch

**T**he BBC Micro was conceived by Acorn as, if not a 'bare bones' micro, then at least one with enough ins and outs and spare places for future goodies like second processors and networking options.

It's ironic that Acorn has been notoriously slow in getting these upgrades off the drawing board and into the shops in reasonable quantities. The honour of offering the first major BBC upgrades has gone instead to Torch Computers whose Z80 disk pack is now widely available.

This system is two 400K, double-sided disk drives and a Z80 card which plugs into the Tube. This card is blessed with 64K of RAM, of which 63K is available for programs and data.

But first, a bit of background. The Torch micro uses the BBC main board with its 6502 processor as the input/output handler. This does the job of outputting to the screen, scanning the keyboard, and so on. The program processing work is undertaken by a Z80 processor and memory which runs a 'look-alike' version of the industry-standard 8-bit operating system, CP/M.

Torch cheekily calls this CPN (Control Program Nucleus) — well, they don't claim to be good at dreaming up spurious acronyms. It was a natural progression therefore, for Torch to reverse the process and package the non-BBC part of the Torch for BBC users. This is essentially what the Z80 disk pack is.

The disk unit is designed to go under the BBC, which is a bit of a nuisance really. Although it makes a nice picture it also lifts the computer another three inches off the work surface so that in ordinary circumstances you could be typing up by your

chest. You can always get a lower desk although this leaves the disk doors in an unusual place, or you could buy a bigger desk and have the drives alongside.

## Installation

Installation is a tricky business. If you can't uncork a wine bottle without launching a fleet of little corks into the beverage then it's probably unwise to undertake what turns out to be a similar job inside your expensive BBC micro.

You have to prize the power leads from their fiddly sockets on the board; be warned, metal fatigue sets in surprisingly quickly and it's easy to snap the connectors. The power is re-established from the disk drives by a cable fed through the Econet hole. There are also a number of chips to be put in the right places, and if you don't already have a disk interface there are even more — get the dealer to do the job for you.

The drive ribbon cable goes in the disk drive port and the Z80 card is adhered to the underside of the BBC's lid, its ribbon cable feeding down past the keyboard and into the Tube socket on the outside of the case.

The disk cabinet is a rather robust beast

of sheet metal construction. It won't break your back, but its addition to your BBC systems will make the micro more sedentary than it may have been before. Still, when you shell out £800 it's nice to get something that doesn't look as if it came from Woolworth's.

The Z80 card is compact — about the size of two cigarette packets, but as it's tucked away inside the cabinet you'll forget you've got it.

Now, a word or two about CPN. As mentioned earlier, CPN is a compatible variation of CP/M. Torch claims it's much more flexible than CP/M and has more built-in commands, making it easier to use. The original CP/M stands for Control Program for Microprocessors and acts as a



disk operating system for Z80-based microcomputers. CP/M is a subject on which many people in the microcomputer industry hold strong opinions. Its good points include being around long enough to have lots of applications programs written under it and to have lots of people who understand how it works.

Its bad points include being around long enough to look a bit 'unfriendly', especially

say it tends to throw up meaningless error codes and demand equally meaningless strings of commands to get programs to do anything. Before CP/M enthusiasts start reaching for pen and paper, it's important to say that the advantages undoubtedly count most — friendly new whizz-bang operating systems aren't worth much to the average micro user if they expect him to write his own applications programs because 'as yet only a word processor and spreadsheet are available and they cost the earth.'

## Features

Unlike CP/M, CPN is resident in ROM and is always a couple of keystrokes away — it doesn't have to be booted into the system at the start of a session.

Due to its long pedigree, the CP/M library of programs is vast and Torch's offshoot already has a host of CP/M programs adapted for it. Fortunately this adaptation only involves getting the programs onto the Torch disk format, so no major difficulties are involved.

Not the least of the available applications is the ever-popular Wordstar word processing package. This seems to have developed a cult following. The fact that gigantic books have been written just to introduce it indicates something of its popularity, and speaks volumes for its complexity.

Other packages available for the Torch, and therefore the Z80 Card, include such CP/M chestnuts as Mail Merge, Spellstar, Calestar and Supersort. More prosaic applications like integrated accounting suites are also catered for.

The economies of the exercise make interesting reading. A BBC Model B costs £399. Add another couple of hundred pounds for a monitor and a further £95 for the disk interface. With the Disk Pack costing £800-odd you have a Torch micro, minus its communications facilities, for less than half the Torch's £3,200 price tag. Admittedly you don't get any of the Torch's superb built-in communications facilities, but for less than £100 it's possible to buy a hard-wired modem for access to Micronet. You also have the facilities of the BBC for games and so on.

The only question about the Z80 disk pack is whether it's a peripheral for the BBC, or a system which depends on a BBC to act as a peripheral.

It would appear that Torch has actually undercut its own flagship product.

**Item** Z80 Pack Machine BBC Micro  
**Manufacturer** Torch **Price** £780 plus VAT  
**Contact** REW, Charing Cross Rd. 01-240 3386

## Second opinion

Turning a BBC micro into a Torch for only £780 sounds just too good to be true. Therefore as a committed Torch user I was somewhat wary of what users would get for their money.

First the bad points. You won't get the detachable keyboard of the Torch with its dedicated function keys and numeric keypad. Nor will you get the excellent built-in colour monitor. Finally, you won't get the built-in autodial/auto-answer modem.

These are features I certainly missed. I also disliked the idea of designing the drives to sit under the micro. Using the Beeb in this way made for a very uncomfortable typing position (to be fair, you can of course place the box elsewhere).

Negative points disposed of, I have only praise for the drives. Linked up to the BBC it operated just like the Torch. Most application programs would use the CPN mode (that's the Torch version of CP/M) for which there is a wealth of software available. Games players can switch to the Basic mode and run software written for the BBC. It's an ideal solution as you get the best of both worlds.

In operation, the drives performed well and I was able to switch between the Torch itself and the drives and vice-versa. In fact, this piece was written on the BBC using the drives and the Wordstar disk from the Torch. The disk was then replaced in the Torch for re-editing and printing out.

If you want to get dual disks for the BBC machine the price may seem high. But with the Z80 card, 64K of memory and CPN operating system included in the price it can only be a sound investment.

Ralph Bancroft

to new users. CP/M was designed in the days when micros were usurpers on the computer scene. Most of the people who were expected to play round with them were already experienced in the esoterics of mainframe and mini computing and didn't notice how unfriendly it was.

Its detractors — and there are many —

Shootout at the UK corral — who'll win your money in the £400 range? Andrew Tollyfield referees.

# ATARI VS ACORN

It is only a short time since the BBC was considered the ultimate, all-singing all-dancing home computer — with the single proviso that you can get your hands on one first. At under £400 it was streets ahead of the competition, until...

From across the ocean happenings in the micro marketplace were being observed by, among others, Atari — a subsidiary of Warner Brothers which, coincidentally, has a finger in the television pie. It already had a micro which in its time had been highly regarded — the Atari 800. However, it did come with a rather hefty price tag.

Sundry stories of price wars, market shares and peer group pressure later, Atari has brought the price of its prize product directly in line with the BBC.

And there's more than just a passing monetary resemblance between these two machines. Both offer extensive colour and sound facilities, a real keyboard in similar sized consoles, and both employ the 6502 microprocessor.

Perhaps most important of all, both have extensive software support: the Atari by virtue of its age, the BBC because of the excitement and high regard it has provoked.

The question, then, is how far do the similarities extend beneath the surface?

## Atari 800

The Atari comes in a robust console with a full travel qwerty keyboard which features four dedicated function keys on the left side. The housing is quite large but it is impossible to stand a console on it because of the prominent bump at the back.

This has a hinged lid which reveals two sockets into which you can plug games cartridges or ROMs. Under Atari's new low cost deal, one of these will be filled by

the Basic cartridge (in the old days you had to buy it separately).

Removing the lid completely reveals a further four slots for memory modules. One of these must be the 10K operating system ROM, while the others can hold expansion RAM — three 16K modules giving the 800's 48K. A bonus point for design here: when you lift the lid the computer switches off to prevent possible damage by inserting cartridges with the power on (Commodore please take note).

At the front, under the keyboard, are four connectors for games paddles and joysticks which further reveals the game-playing pedigree of this machine. However, around the side is provision for more serious expansion. You'll find an I/O connector and monitor socket together with the power connection, on/off switch and TV channel select switch.

## Inside

The internal layout of the Atari is surprisingly complex with components spread over several interconnecting printed circuit boards. There is a cast aluminium chassis which safely guides the memory modules into their sockets. This is an expensive form of construction, but is the price of Atari's history — a box into which you plugged the bits you wanted. Now Atari is having to sell it complete with all the old 'extras', much of the design is dated if not redundant.

The main processor is the stalwart 6502 as used on the Apple, Pet, and the BBC itself. However, there are also three special purpose chips which provide the great flexibility in sound and graphics.

## Documentation

The Atari comes with no less than three manuals. The first, a slim user's guide concerned solely with connecting up all the

different bits, shows in living colour how disk drives, printers and cassette recorders can be chained together, which is why you get only one input/output socket.

The second manual is a friendly, American-style (read nauseating) guide to Basic, Inside Atari Basic. It does, however, contain plenty of example programs and explains the language reasonably clearly.

Third is the Basic Reference Manual which gives details of all the commands, statements and functions. My main criticism of this is that it comes in loose-leaf form, punched for the US-standard three-ring binder which is not easily available in this country. I tied mine together with string.

None of the above gives much detail on assembler or machine code programming, although machine code routines can be called from Basic. Further, Atari is amazingly secretive about its machines and you will find no details of circuits, chips or connectors which will allow you to make the most of the micro. The situation is such that US magazines and user group newsletters are full of users' discoveries, although this illicit exploration should not be necessary.

## Display

A wide range of display options are available, and it is the graphics for which the Atari range is rightly famed. The comparison tables give full details but two points are worthy of special note.

First, the Atari was among the first, if not the first, micro to offer sprite graphics. Sprites are user-defined graphics characters which are controlled by a separate processor so they are very fast and easy to program. They also give a 3D effect because each sprite is assigned a priority so that they can pass in front and behind other



**July 4th  
1983  
will be  
Independence  
of  
America  
Day**

438 sprites and background objects. Full collision detection is also available.

Second, although the colour palette on the Atari is the now standard 16 options, it is unique in offering 16 shades of each colour — a total of 256. This makes possible startlingly realistic 3D displays.

In short, although the cold figures of the Atari display may not look the most impressive, the colour display on screen is near impossible to beat.

## Basic

Atari Basic is a fairly standard implementation but it looks dated in comparison to more recent, structured versions, and there are some serious omissions. There is no renumber facility, for example, and only numeric arrays are supported.

Real and string (but not integer) variables are allowed and variable names can be up to 120 characters long but may not include reserved words. Numeric variables are stored with ten-digit accuracy.

There is no limit on the length of string variables, other than available memory, but they must be dimensioned before use.

Most of the standard arithmetic operators and functions are provided but the accuracy of these appears poor in some cases. For example,  $7 \uparrow 2$  gives 48.99999463 and a glaring omission is the lack of user-defined functions.

String functions include ASC, CHR\$, VAL, STR\$ and LEN but there is no MID\$, RIGHT\$ or LEFT\$. Sub-strings are accessed by subscripts of the type A\$(5,10) which is non-standard but similar to the method used on the Sinclair Spectrum.

The only structured statements are the common FOR...NEXT, IF...THEN, GOTO, GOSUB, and ON...GOSUB, ON...GOTO. Logical operators can be used in IF statements.

Keyboard input is limited to the INPUT statement with no single key equivalent of GET or INKEY.

The Basic does support the sound and graphics facilities. The sound is generated through the TV speaker and you can control pitch and volume as well as the distortion level, the latter command giving the Atari its flexible sound abilities.

The screen editor is good with full cursor control and both characters and lines can be inserted or deleted.

## Storage

Most users will begin with the Atari 410 cassette unit. This is a dedicated system and the only one you can use with the machine. Transfer rate is a respectable 1200 baud and the 800 has full motor control of the cassette.

One noteworthy feature is that the cassette is actually a two track stereo system, digital data stored on one track and the second holding audio output.

This means that, for example, the computer can display on screen what is said on the audio track — a useful feature for applications like learning a new language.

For mass storage a disk unit is necessary

and Atari's version is the 810. This comes in a sturdy, if somewhat oversized, case with a separate I/O cable, together with a comprehensive manual and two disks — an OS disk and a blank formatted disk.

The DOS is menu-driven and offers you the choice of copying, renaming, deleting, locking or unlocking files, and of formatting or duplicating disks.

This resides in a 5K block of RAM and is loaded automatically when the micro is switched on.

I found some of the menu commands hard to use without consulting the manual, which seems to make the menu feature somewhat redundant.

Filenames are limited to eight characters and the directory can hold up to 64 filenames. A useful feature is a wild-card directory search.

Storage is on standard single-sided single-density 5¼in floppies but is limited to 88K — very little compared to more recent disk capacities.

On the whole, I found the disk system to be a little slow and rather awkward to use.

## BBC Model B

Like the Atari, the BBC comes as a single console with an integral keyboard but the case is not as strong. It is large enough to support a monitor but the case bends visibly if you try it.

The keyboard has 63 keys, including ten programmable function keys, with auto-repeat on most.

At the rear of the case are power on/off

switch, RS432 serial port, and connectors for TV, monochrome and RGB monitors, cassette recorder and analogue input.

Beneath the keyboard are further connectors for disk, printer, user port, 1MHz bus and the legendary Tube interface. The BBC was definitely designed with expansion in mind.

## Inside

The internal layout is very simple with a single printed circuit board, keyboard, and internal power supply.

There are a number of empty sockets on the PCB, some allowing for future expansion such as the disk and Econet interfaces which are not fitted as standard. Others allow the addition of ROM software.

The model B comes with 32K of RAM which can be expanded only with the addition of a second processor, and 32K ROM — a 16K Basic and 16K operating system. The main processor is a fast version of the 6502.

## Documentation

The BBC comes with a Welcome booklet which gives instructions on connecting up the basic system and running a series of demonstration programs. Also included is the user guide, a daunting and weighty tome on BBC Basic.

The latter starts at a fairly low level but rapidly ascends into detailed discussions which might leave the beginner struggling.

There are plenty of independent introductions to the BBC available, however,

### SPECIFICATION

Model	Atari 800
Price	£299.99
Processor	6502 at 1.8MHz
RAM memory	48K
ROM memory	10K OS, plus ROMpacks
Text screen	(variable, see table)
Graphics screen	(see table)
Keyboard	56-key, full travel, qwerty layout with five dedicated function keys
OS/language	Atari Basic
Manufacturer	Atari International (UK), Slough 33344

### SPECIFICATION

Model	BBC Model B
Price	£399
Processor	6502 at 2MHz
RAM memory	32K
ROM memory	32K
Text screen	(variable, see table)
Graphics screen	(see table)
Keyboard	63-key, full travel, qwerty layout with ten programmable function keys
OS/language	BBC Basic
Manufacturer	Acorn Computers, Cambridge 245200

### SPECIFICATION

Model	Commodore 64
Price	£345
Processor	6510 (upgraded 6502)
RAM memory	64K
ROM memory	16K
Text screen	40×25
Graphics screen	320×200, eight sprites (24×21 pixels)
Keyboard	66-key, full travel, qwerty layout with four programmable function keys
OS/language	Commodore Basic
Manufacturer	Commodore Business Machines, Slough 79292

# PCN PRO-TEST HARDWARE

The internal construction of the Atari is very solid with a cast metal frame for the cartridges. This makes it tough enough for children.

This piggyback board carries such miscellaneous items as video modulator, power switch, TV connections, port, and function key switches.

Just peeking out from under the cast frame is the main processor board. This is where you would find the 6502, RAM and the famous ANTIC chip.

The keyboard is standard. It is connected to the main board by the wide rainbow cable.

Considering the sheer noisiness of many Atari games, the little speaker seems tiny, but that's because you'll usually have the sound coming from the TV.

ATARI CX853 MEMORY MODULE™ 16K RAM

ATARI CX853 MEMORY MODULE™ 16K RAM

ATARI CX853 MEMORY MODULE™ 16K RAM

ATARI CX853 MEMORY MODULE™ 10K ROM

LEFT CARTRIDGE

RIGHT CARTRIDGE

LEFT CARTRIDGE

BASIC

COMPUTING

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

LANGUAGE

The speaker on the BBC is small, and unlike the Atari is the only method of producing sound output, since that is not added to the TV signal.

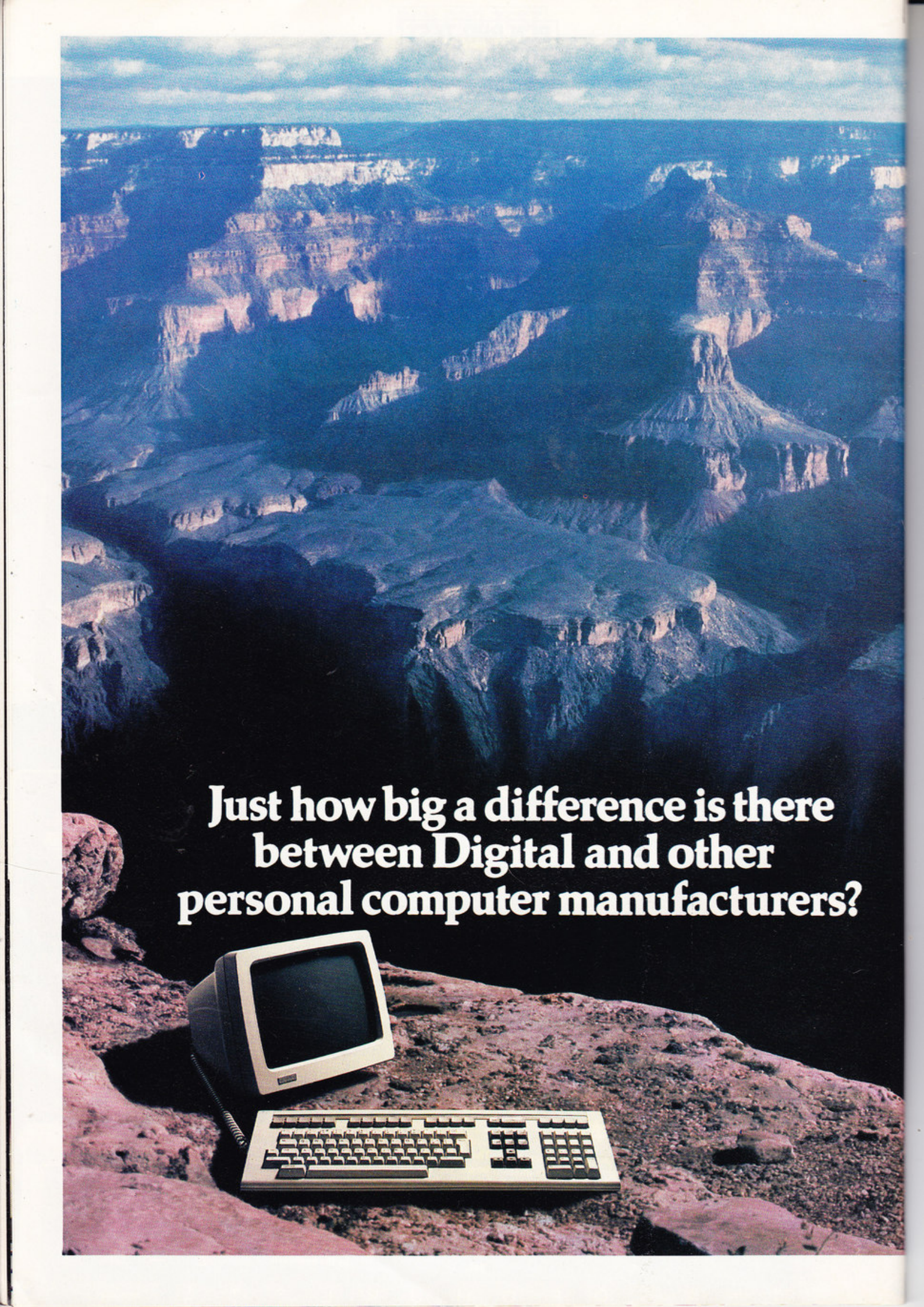
A major point in the BBC's favour is its internal power-supply. This means you can't leave it behind.

The back edge of the BBC board carries the connections for the "normal" interfaces, such as the TV, paddles and tape. The unpopulated area at the left hand side is where Econet may go one day.

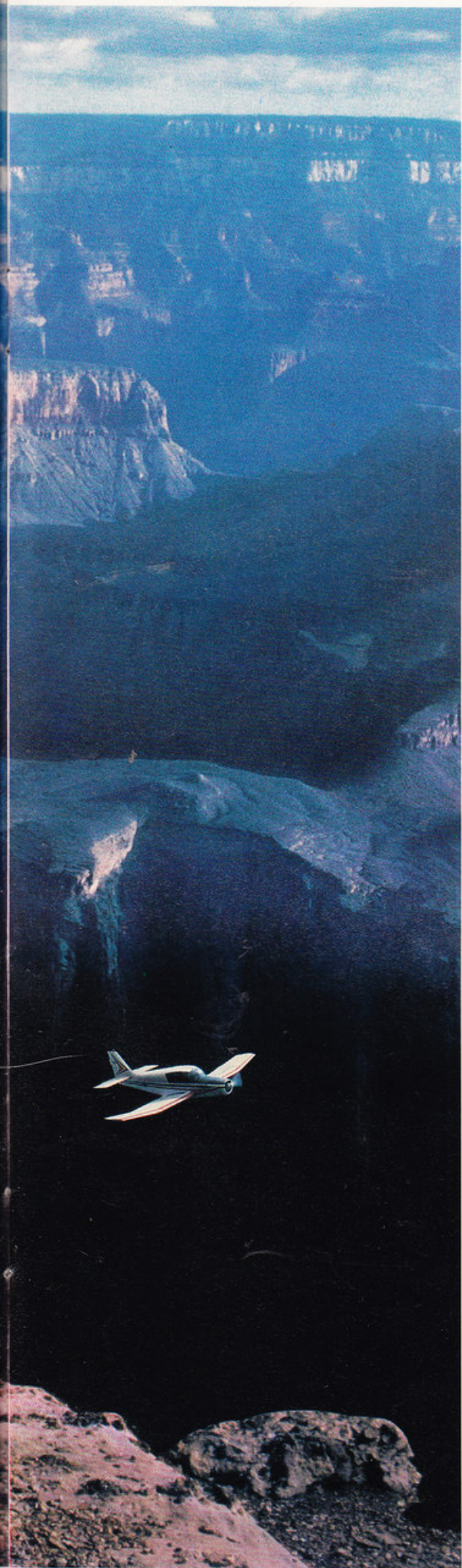
Inside the BBC, things are less crowded, mostly because there is no provision for additional cartridges. ROM-based programs can be added though, such as VIEW, which is mostly obscured by the keyboard.

CAUTION  
Hazard of Electric Shock  
No user serviceable parts  
Disconnect from mains supply  
before removing mounting screws  
INSULATION CLASS 1  
MICRO COMPUTER POWER SUPPLY  
MODEL No AA 11660  
Output: 5V 3.75A, 5V 0.7A, 12V 1.25A

CTRL A S D F G H J K L + \* : ; RETURN

A vintage personal computer setup, including a CRT monitor and a keyboard, is placed on a rocky ledge. The background is a vast, deep canyon with layered rock formations, likely the Grand Canyon, under a blue sky with scattered clouds. The computer is positioned in the lower-left foreground, providing a stark contrast between modern technology and the ancient natural landscape.

**Just how big a difference is there  
between Digital and other  
personal computer manufacturers?**



The gap, believe us, is wide.

And the confusion surrounding personal computers, widespread. Because the term 'personal' computer now stretches to include a multitude of machines, with a diverse range of functions and capabilities.

So let's set the record straight. And get down to business. Over the past quarter century Digital's main objective has been to personalise the computer. Permitting direct access to *real* computing power to whoever wants it.

Digital were the first company to mass produce minicomputers, and the PDP-11 is, in fact, the world's most popular minicomputer today.

A fact that makes Digital the world's largest manufacturer of minicomputers. Which, in turn, makes it less of a surprise that Digital have now developed a range of personal computers unrivalled in their ability to meet today's professional requirements. From the dual micro-processor Digital Rainbow to the highly advanced Digital Professionals, the first personal computers with the ability to perform numerous functions at once, there's a Digital personal computer to suit practically any need.

And the Digital difference becomes even wider when you consider Digital's unique service back-up, which includes access to our Customer Information Centre, service support, software services and maintenance. And in the unlikely event of anything going wrong, Digital guarantee to deal with any problem, on site, within 8 working hours anywhere on the UK mainland.

Plus you automatically get a free 12 month warranty to cover all our hardware and software.

For further information fill in the coupon, or call the Customer Information Centre on Basingstoke (0256) 59299. A list of Dealers is shown overleaf.

To: Customer Information Centre, Digital Equipment Company Limited, Jays Close, Basingstoke RG21 4BS.

Please send me details of Digital's professional Personal Computers.

NAME \_\_\_\_\_  
POSITION \_\_\_\_\_  
COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
TELEPHONE NO. \_\_\_\_\_

PCN 23-6

**Doing more. The Digital difference.**

**digital**

# Where to find your nearest Digital Authorised Personal Computer Dealer.

## LONDON

Beauchamp Computer Systems Ltd.,  
115 Fulham Road, London SW3.  
Tel: 01-581 8134.

The Computer Terminal, 44 Cathedral Place,  
London EC4. Tel: 01-236 2187.

Demotab Ltd.,  
99-101 Regent Street, London W1.  
Tel: 01-439 3971.

(Market Research & Advertising Agencies)\*

Guestel Ltd., 6-12 New Bridge Street,  
London EC4. Tel: 01-583 2255.

Matmos Electronics Ltd.,  
14-16 Childs Place, London SW5 9RX.  
Tel: 01-373 6607.

(Opticians & Ophthalmologists)\*

Micro Business Systems PLC, Cannon Street,  
London EC4. Tel: 01-621 1122.

Personal Computers Ltd., 220-226 Bishopsgate,  
London EC2M 4JS. Tel: 01-377 1200.

Planning Consultancy Ltd., 46/47 Pall Mall,  
London SW1Y 5JG. Tel: 01-839 3143.

Rank Xerox (UK) Ltd., The Xerox Store,  
84 Piccadilly, London W1V 9HE.  
Tel: 01-629 0694/5.

The Xerox Store, 110 Moorgate,  
London EC2M 6SU. Tel: 01-588 1531/2.

The Xerox Store, 76-77 Holborn,  
London WC1V 6LS. Tel: 01-242 9596/7.

Software Sciences, Thorn (EMI) House,  
14 Old Park Lane, London W1. Tel: 01-499 7099.

Software Sciences, 88 Old Street,  
London EC1. Tel: 01-253 1480.

Sumlock Bondain Ltd., 263-269 City Road,  
London EC1V 1JX. Tel: 01-250 0505.

Sytec Products Ltd.,  
25 Bruton Lane, London W1. Tel: 01-409 1244.

(Pressure Vessel Design, Surveying,  
Structural Analysis)\*

## HOME COUNTIES

Dataview Ltd., Portreeves House East Bay,  
Colchester, Essex CO1 2XB. Tel: 0206 865835.

Ferrari Software Ltd., 683 Armadale Road,  
Feltham, Middlesex. Tel: 01-751 5791.

GSI Ltd., Stanhope Road, Camberley, Surrey.  
Tel: 0276 62282.

(Motor Dealers & Manufacturers)\*

Key Computer Centres, Enterprise House,  
Terrace Road, Walton-on-Thames, Surrey.  
Tel: 09322 42777.

Micro Business Systems PLC,  
119-120 High Street, Eton, Berkshire.  
Tel: 07535 55211.

Microfacilities Ltd., 7-9 Church Road,  
Egham, Surrey. Tel: 0784 31333.

Rank Xerox (UK) Ltd., The Xerox Store,  
3/4 William Street, Slough, Berkshire SL1 1XY.  
Tel: 0753 76957.

**AUTHORISED**  
**digital**  
**PERSONAL COMPUTER**  
**DEALER**

STC Micros, West Road, Harlow,  
Essex CM20 2BP. Tel: 0279 443421.

Sytec Products Ltd., Cord House,  
The Causeway, Staines, Middlesex.  
Tel: 0784 63911.

## SOUTH/SOUTH EAST

Bartholomews Business Systems Ltd., Portfield,  
Chichester, Sussex. Tel: 0243 775111.

(Agricultural Suppliers, Farming)\*

Computerland  
(Sperrings Computer Shops Ltd.),  
Spencer House, 12-14 Carlton Place,  
Southampton. Tel: 0703 39571.

Software Sciences, Abbey House,  
282-292 Farnborough Road, Farnborough,  
Hants. Tel: 0252 544321.

South East Computers Ltd., 15 Castle Street,  
Hastings, Sussex. Tel: 0424 426844.

South East Computers Ltd., 31 Watling Street  
Canterbury, Kent. Tel: 0227 59917.

South East Computers Ltd., 29 High Street,  
Maidstone, Kent. Tel: 0622 681263

## SOUTH WEST

Computacenter, Theatre Square, Swindon,  
Wiltshire SN1 1GN. Tel: 0793 612341/2.

Rank Xerox (UK) Ltd., The Xerox Store,  
Bristol & West House, Broad Quay,  
Bristol BS99 7AX. Tel: 0272 277828.

Software Sciences, Unit 39, Southfield Road,  
Nailsea Nr. Bristol. Tel: 0272 851462/3.

South Coast Computers Ltd.,  
South Coast House Wimbourne Road,  
Ferndown, Dorset. Tel: 0202 893040.

Whymark Computing, 20 Milford Street,  
Salisbury, Wiltshire SP1 2AP.  
Tel: 0722 331269.

## MIDLANDS

4B Microcentres Ltd., 13/14 North Bar, Banbury,  
Oxon OX16 0TE. Tel: 0295 66555/50796.

Micro Business Systems PLC, Wirksworth,  
Derbyshire. Tel: 062-9823120.

MMS Ltd., Ketwell House,  
75-79 Tavistock Street, Bedford MK40 2RR.  
Tel: 0234 40601.

Zygal Dynamics PLC, Zygal House,  
Telford Road, Bicester, Oxon OX6 0XB.  
Tel: 08692 3361.

## NORTH EAST

Microware Computers Ltd., Diamond House,  
Whitelock Street, Leeds. Tel: 0532 434377.

Microware Computers Ltd., Priory House,  
1133 Hesse High Road, Hull HU4 6SB.  
Tel: 0482 562107.

Whessoe Technical & Computing Systems Ltd.,  
Brinkburn Road, Darlington.  
Co. Durham DL3 6DS. Tel: 0325 60188.

## NORTH WEST

Cytek (UK) Ltd., Sandringham House,  
9 Warwick Road, Old Trafford,  
Manchester M16 0QQ. Tel: 061-872 4682.

Micro Business Systems PLC,  
Birchwood Science Park, Warrington.  
Tel: 0925 822261.

Rank Xerox (UK) Ltd., The Xerox Store,  
Pearl Assurance House, Derby Square,  
Liverpool L2 9QR. Tel: 051-236 7512.

## WALES

Rank Xerox (UK) Ltd., The Xerox Store,  
South Gate House, Wood Street,  
Cardiff CF1 1EW. Tel: 0222 40118.

Sigma Systems Ltd., 266 North Road,  
Cardiff CF4 3BL. Tel: 0222 34865/69.

## SCOTLAND

Micro-Centre (Complete Microsystems) Ltd.,  
30 Dundas Street, Edinburgh EH3 6JN.  
Tel: 031-556 7354.

Micro Business Systems PLC,  
Turnhouse Airport, Edinburgh.  
Tel: 031-333 1000.

Pilgrim Business Machines Ltd.,  
28 Walker Street, Edinburgh.  
Tel: 031-226 5528.

(Solicitors)\*

Pilgrim Business Machines Ltd.,  
Northfield Place, Aberdeen. Tel: 0224 645104.

Rank Xerox (UK) Ltd., The Xerox Store,  
166 Hope Street, Glasgow G2 2TG.  
Tel: 041-333 0495.

## NORTHERN IRELAND

Systems Plus Ltd., 19 Glengormley Park,  
Newtownabbey, Northern Ireland.  
Tel: 023-134 2117.

## DIGITAL UK HEADQUARTERS

Digital Equipment Co. Limited, P.O. Box 110,  
Reading RG2 0TR. Tel: 0734 868711.

\*Vertical market application speciality.

**digital**

# Launch your BBC micro with the Torch Z80 disc pack.

If you already have a BBC Model B micro, then you know that it is not a toy. But neither is it suitable for business or for serious programming because it lacks the access speeds and massive storage capacity that only floppy discs can provide.

The answer is a TORCH Z80 DISC PACK. The twin discs store up to 800K of data and programs, while the Z80 processor board provides an extra 63K of user memory and Torch's CP/M\* compatible operating system – giving access to the largest range of software currently available.

For the business user, this means sophisticated word processing, financial and stock-control packages. For the programmer who has outgrown BASIC, the TORCH DISC PACK can handle more compact, powerful, and specialised languages – such as PASCAL, C, FORTRAN, LISP and COBOL.

The TORCH Z80 DISC PACK comes complete with a range of useful software, including a full disc function test, a character redefinition program, a music generator, a Z80 monitor and system demonstrations.

TORCH gives you the power and programming space to launch your BBC micro into the world of serious computing.

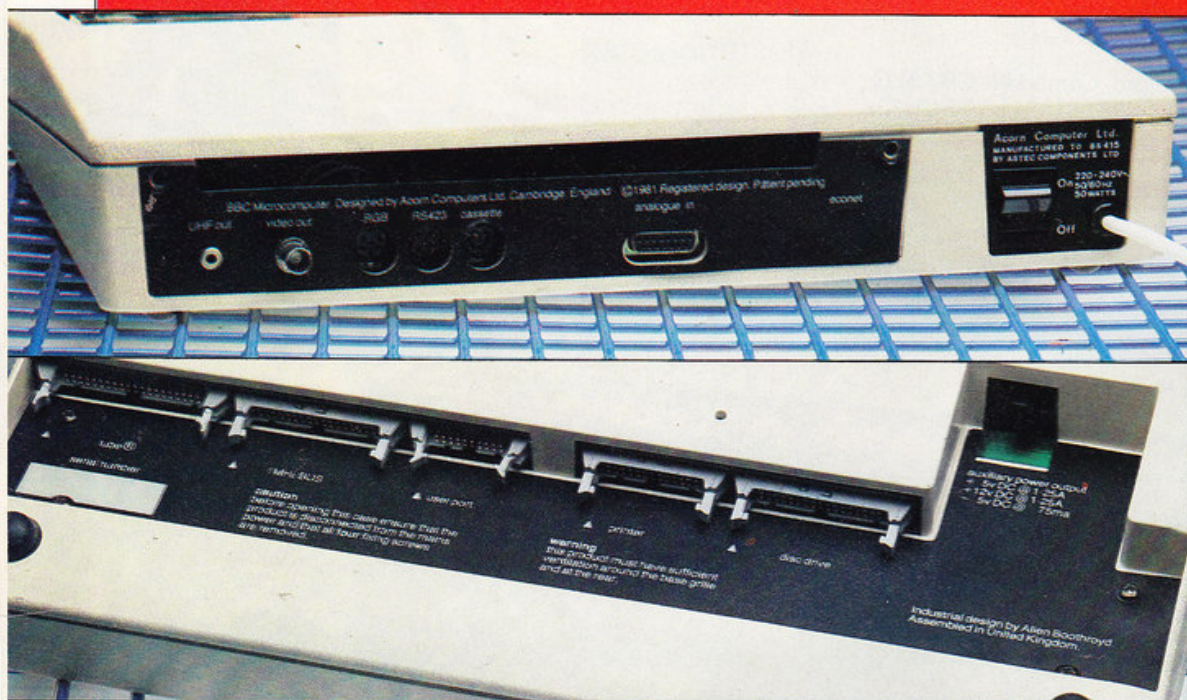
**TORCH**  
COMPUTERS 

Abberley House, Great Shelford, Cambridge CB2 5LQ.  
Telephone: (0223) 841000 Telex: 818841 TORCH G.





Above left, the Atari's cartridge slots. At the front are two slots which take the Basic or other language cartridges, plus games or utilities. At the rear are four slots for the 10K operating system pack, and additional memory. On the right, the interfaces at the front are for game paddles and joysticks.



Left is the rear of the casing with connections for video output, RS432 port, cassette output and analogue input.

At left, the underside of the BBC has interfaces for disk and printer, as well as the user port, 1MHz bus and the Tube.

and the manual has good points such as the forty sample programs and information on assembler code programming.

Circuit diagrams and pin connections for the I/O ports are also included.

## Display

The clarity of the display is much better than Atari's (on the same monitor) although there is a slight flicker.

There are eight display modes offering differing degrees of resolution and the basic palette is eight colours. The remaining eight of the claimed 16 are flashing colour combinations.

Up to 32 user-defined characters can be created although this can be extended to allow redesign of the entire character set. The VDU commands provide considerable control over this and other display

features and also allow you to do remarkable things with colour.

## Basic

BBC Basic is far more extensive than Atari Basic and includes a range of commands for structured programming which make the use of GOSUB and GOTO virtually obsolete.

It supports real, integer and string variables, all of which may be used in arrays, and variable names can be any length and can include reserved words.

Other features include not only standard arithmetic functions but TAN, ASN, ACS, MOD and DIV (integer division), and extra string functions such as EVAL, which evaluates a string as an arithmetic expression, and INSTR, which searches for a substring.

Perhaps the most important BBC extensions to Basic are the structured control statements. IF...THEN...ELSE, REPEAT...UNTIL and PROC...END PROC are supported. Procedures can have local variables, which is a feature found on few other Basics.

Sound on the BBC is particularly impressive. It is provided by four channels through the micro's built-in speaker. The SOUND command controls amplitude, pitch and duration, while ENVELOPE can create up to four different pitch and amplitude envelopes.

The screen editor is a little unusual in that there are two cursors — for read and write — which allow lines or parts of lines to be copied from any screen position into the line being typed, a powerful feature when mastered.

## Storage

The BBC will use most ordinary audio recorders for cassette storage and also offers remote motor control if your cassette player has a REMOTE socket. Transfer rate is switchable between 1200 and 300 baud.

For disk storage you must first buy — and have installed — the Disk Filing System ROM, which costs around £100. After that you have a choice of single or double drives.

The DFS has some 28 commands covering all functions on the Atari and some extras. The separate language dictates that you keep the disk system guide handy.

Surprisingly, only 31 filenames can be stored in the directory and the DFS takes up an extra 3K of RAM despite being held in ROM. The management of the disk space is also a little complicated.

## Conclusion

The Atari is still virtually untouchable for game playing, but the BBC has a number of advantages for educational and practical use, and for learning programming.

It has a far superior Basic, a wider range of graphic and sound modes, with the commands to control them, and a superb range of interfaces.

Set against this, the Atari is more solid and the plug-in cartridge facility is not confined to games. Other languages and utility software can also be used.

There is little to choose between the disk systems: the BBC offers greater capacity and a greater range of commands but you do need to buy the DFS, adding to the cost.

One area in which there is no dispute is speed. The BBC must be among the fastest machines around.

In terms of expansion the BBC comes out far ahead, but against this must be reckoned the delays Acorn is experiencing in producing its add-ons.

# Commodore's contender

There is a third contender if you're looking for a 'real' computer in the £300 range — the Commodore 64. And it is indicative of how much the Atari 800 has been forgotten that so many micro users and watchers tend to see this machine as a direct competitor to the BBC Model B, regardless of Commodore's early descriptions of their new baby as the 'Apple eater'.

At first sight the Vic, CBM's other downmarket success story, had two failings: a 22 column screen, and 3.5K of user memory. The 64 remedies these with a vengeance, offering a 40 column screen and more than 38K of the full 64K memory complement available (with an extra 16K for machine code or data storage).

However, seasoned Vic owners know now that the 64's baby brother has other shortcomings, and Commodore has done nothing to remedy them in its latest mass-market offering.

If anything the problem has been exacerbated because of the extra facilities available on the 64. Simply stated the problem is this: here you have a machine offering 255 foreground/background colour combinations, eight sprites available and arguably the most advanced sound synthesiser incorporated in a micro, yet the Basic is near as damn it identical to that on the early Pets, which had none of the above.

In other words, the potential of the 64 is enormous, but you have no tools to help you exploit it. It is as if Commodore set out to design the best home computer in the world, and then deliberately nullified its finest points.

Apart from these special features, the 64 has a lot to recommend it. The construction is excellent, the keyboard is superb, with sculpted keytops, 66 alphanumeric and control keys, and four programmable function keys.

The main processor is the 6510, essentially the same as the 6502 in the Atari and BBC but with extra I/O facilities. It is this which gives the 64 its superb graphic and sound potential. It means the main processor can farm out the graphics handling to the Video Interface Chip and

the sound to SID, the Sound Interface Device.

Because one chip is handling these subsidiary functions there is a great improvement in speed all round. The main processor can look after the program, keyboard and other input while its slaves get on with their own task.

The extra I/O facilities also offer the prospect of linking a second processor — like a Z80 to run CP/M.

In terms of storage, the 64 has more in common with the Atari than with the BBC. Like the Atari it uses a dedicated cassette system, which means almost guaranteed problem-free loading and saving, but does add another £45 to the price.

Alternatively, the 64 owner has a selection of disk drives. First choice would seem to be the Vic 1541 drive, developed for the Vic 20.

This is a dedicated unit with the disk operating system on ROM in the drive, so you need no extra software to use the system. Disk format is single-sided single-density (as on the BBC) but the 64 formats them to give almost 170K storage per disk, in up to 144 program or sequential data files.

You can also use the larger single and double drive units available for Commodore's 'serious' machines through the IEEE-488 serial port.

Other interfaces include two nine-pin game ports through which you can connect joysticks, paddles and light pens, a built-in RS232 interface for connection to printer or modem, an eight-pin user port which can connect to a voice synthesiser or another computer, and a 44-pin expansion connector.

This then is a machine well worth a closer look. The lack of an extensive Basic is a severe drawback, but could be remedied when Commodore introduces its Simon's Basic cartridge, although this could add up to £50 to the price of the system.

However, Commodore has vowed to repeat its pre-Christmas sales blitz with the Vic last year, and the talk is (PCN, issue 14) that the price will plunge to around the £200 mark.

### GRAPHICS TABLE

	Atari	BBC	Commodore 64
Max resolution	320×160	640×256	320×200
Memory req'd	7900	20480	8000
Graphic modes	9	8	3
Sprites	Yes	No	Yes
Text (max)	40×24	80×32	40×25
Colour range	16	8	16
Graphics commands	Yes	Yes	No

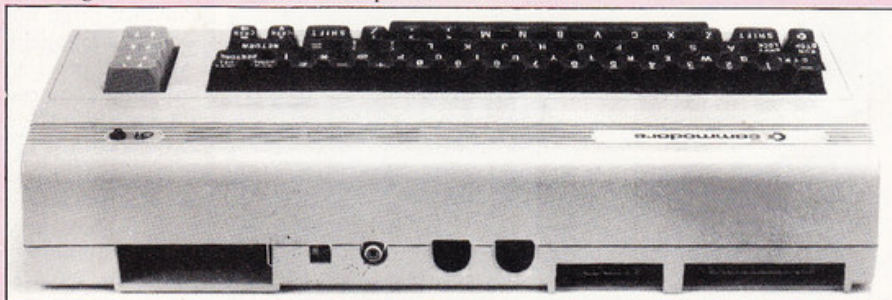
### SOUND TABLE

	Atari	BBC	Commodore 64
Sound channels	4	3	3
Range	3 oct	5½ oct	8 oct
Envelopes	None	four	three
Filtering	No	No	Yes
Output	TV	internal	TV, hi-fi

### DISK TABLE

	Atari	BBC	Commodore 64
Price	£299	£250*	£299
Capacity	88K	100K	171K
Disk format	SS,SD	SS,DD	SS,DD
Tracks	40	40	35
Others	Yes	Yes	Yes

\*BBC Disk Filing System ROM £100 extra.



The Commodore 64 interfaces, from left, the expansion port for plug-in cartridges (not compatible with the Vic 20), the channel selector and TV connector, audio/video output and the serial port for disk drives and printer. Next is the cassette port and at far right the user port.



What's your game? Find out in PCN's weekly freeze-frame of the action.

# SCRABBLE

## SPECTRUM

## Numb's the word

**Name** Computer Scrabble System  
**48K Spectrum Price** £15.95  
**Publisher** Psion Software 01-723  
**6919 Format** Cassette **Language**  
 Machine code **Outlets** Mail order  
 from Sinclair Research 0223 353204  
 and dealers.

It's man versus machine. In one corner, the humble human, confidence shattered. In the other, the amazing 48K Spectrum, winning at Scrabble.

This really is genuine Scrabble, played not just adequately but aggressively by a computer. It's an amazing program to watch and use, even if you can't stand the game.

### Objectives

Just like the real thing, the idea is to score the most points by building up a crossword on the playing board. Up to four people can play, any one or all of which can be the computer. Besides four skill levels, the computer also acts as an automatic board, tile bag and scorer.

### First impressions

When you've got a program this good, you'd expect professional presentation. It is... complete with presentation box, labelled cassette, genuine Scrabble logos and a ten-page booklet.

Instructions are divided neatly into two sections...

Scrabble-the-game and Scrabble-the-program. They follow the box-lid tradition of presenting lots of info in a concise and clear manner.

The program's not bad either. There's a faithful reproduction of the board and a simple, consistent, foolproof user interface. Little things, like the option to use a B&W TV, add to the impression of professionalism.

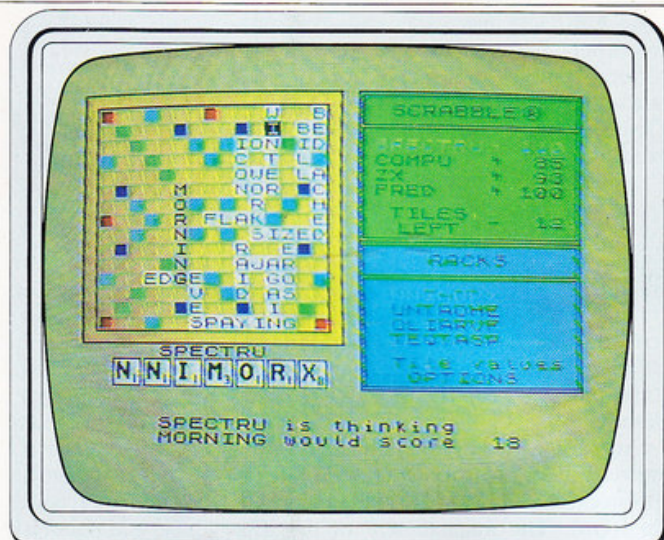
Just a couple of barrel-scrappers. You can't fit either 'Spectrum' or 'Computer' in as the name of the Computer's player. And you've no way of interrupting an all-computer game. Believe me, you'd think twice about pulling the plug and reloading this one.

Computer Scrabble caters for most of the real game. You can view your rack, reorder or change letters. A 'juggle' option even imitates the absent-minded shuffling of your letters. There's access to information such as the symbols for premium squares, letter values and distribution, as well as running scores and a count of remaining tiles.

When the computer is playing, you can optionally see it 'thinking'. You can see it shuffle its rack and make trial attempts at placing its words. If this isn't running as a demo in WH Smiths et al within weeks, I'll eat my Spectrum.

### In play

Computer Scrabble plays a good game. Almost too good. We simple hacks take a pride in knowing the odd word or two. It isn't that rewarding to have the



plastic nasty fighting back. Game two, level four, I start with 'Creel'. It plays 'Coze' with the Z on a triple letter square. 35 points.

Response times are superb. Level one is around three seconds. Level four is around a minute. It sounds frustrating but it's a lot quicker than I can manage.

There are a few differences from the human version. For starters, it's hard to fiddle with your rack in your head in-between turns. And you're playing in full view of the opposition. There's a tendency for three human players to club together to beat the computer.

Having the racks on view might be a problem. If you're such a good player that knowing what the other guy has got is an advantage, then be warned. And yes, you can't see what the Spectrum's got unless its 'thinking' option is on.

The Spectrum checks your words when you place them. If it's not in its seemingly endless 11,000 word dictionary, it challenges.

If you tell it the word is okay, it trusts you. If you've tried to cheat or simply mistyped the word, you lose your go. I know that's in the real rules. But most of the time, a long face can convince three human players to let you try again.

But the most annoying feature is that you can't challenge it. I don't mind 'Id', 'En', 'Em', 'Re' and so on. But I'm not keen on its love of 'Ta' as a word. Oi, now hang on a mo. If we're going to play dirty, there's all sorts of colloquialisms, exclamations and so on I could come up with. Scrabble is an awful game for causing arguments and divorces among peo-

ple. And here I am arguing with a computer.

To place your word, you use the arrow keys to move a cursor to the square you want to start on. Then you press 'A' or 'D', depending on whether the word is run across or down. You can type the word, the Spectrum automatically filling in any letters you cross already on the board.

The Spectrum displays the word and its score. You've then got the option to place it or not. This is great... you can try out words and have their scores calculated for you. It saves a fair amount of strain on your mental faculties.

### Verdict

Well, there goes another game. Prey to the microchip revolution. Scrabble on a computer, particularly a £130 computer, sounds impossible enough. But Dr Peter Turcan, Little Genius and Psion software have done it and I doubt if anyone else will bother with producing their own version.

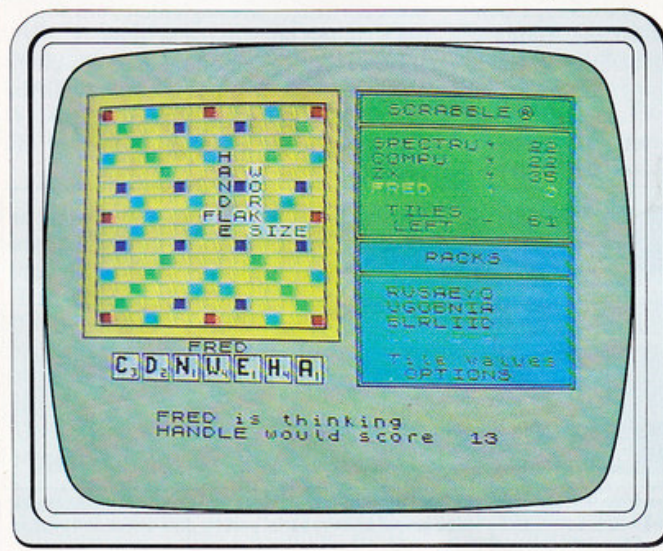
If you like Scrabble, then you shouldn't miss this one. Even if you can't stand computers, a dedicated and tireless opponent is worth the price of a Spectrum.

If you don't like Scrabble, don't be taken in by the fancy graphics. Being thrashed by this thing is a lot less pleasant than losing to your little sister. Psion has a real winner. On a triple word square.

Max Phillips

### RATING

Lasting appeal	★★★★
Playability	★★★★
Use of the machine	★★★★
Value for money	★★★★





from: **£39.95**

**PROFESSIONAL WORK STATION** WITH 'COFFEE' FRAME, TEAK MELAMINE WORKTOP AND COURTESY PANEL AND CASTORS. FITS ALL LEADING MICROS.

**Model A:** 610mm deep, 1010mm wide, 695mm high  
**Model B:** As above + 305mm x 1010mm upstand

Supplied K.D.  
 Assembled in minutes.



**DE-LUXE VDU/OPERATORS CHAIR**  
 FULLY ADJUSTABLE SEAT, FULLY ADJUSTABLE SPRUNG BACK AND UPHOLSTERED IN RICH BEIGE TWEED. 'COFFEE' FRAME, TWIN WHEEL CASTORS OPTIONAL. SUPPLIED K.D., ASSEMBLED IN SECONDS.

**Video 1:** Seat height 410/560mm on glides.

**Video 2:** Seat height 450/600mm on castors.

from: **£29.95**

**VERY SPECIAL DEALER SCHEME AVAILABLE!**

To: 'WORK STATION', FREEPOST, PROSPECT MILL, HINDLE STREET, DARWEN, LANCs.

Please send me:

- ☐ **Model A** @ £39.95 + £4.95 p&p
- ☐ **Model B** @ £49.95 + £4.95 p&p
- ☐ **Video 1** @ £29.95 + £3.95 p&p
- ☐ **Video 2** @ £32.95 + £3.95 p&p

Please allow 14 days for delivery

I enclose cheque/postal order payable to: 'WORK STATION' for £

Or: please charge my Access account no.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NAME:

ADDRESS:

POSTCODE:

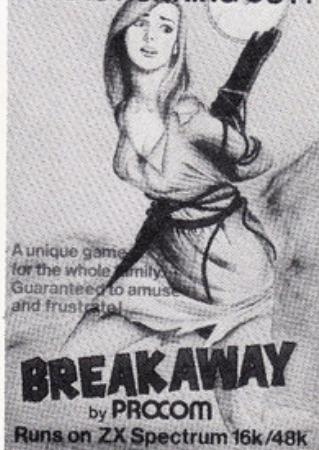
SIGNATURE:

# IT'S NEW

It's Frustrating!

## BREAKAWAY

TIME IS RUNNING OUT!



**BREAKAWAY**  
 by PROCOM  
 Runs on ZX Spectrum 16k/48k

A game with a motif of "Rescue the Damsel", with high resolution graphics and escalating skill levels. In particular the game teaches keyboard layout since highest scores are achieved by pressing indicated keys as quickly as possible.

A game for all the family to play on the ZX Spectrum

**ONLY £5.95**

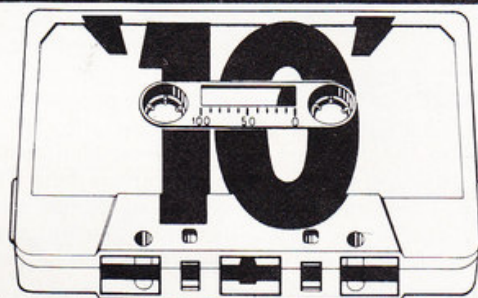
from your nearest good software stockists or direct from Procom Software

**PROCOM**  
 309 High Road,  
 Loughton, Essex.

★ DEALER ENQUIRIES WELCOME

# STARTECH

**Absolutely the lowest prices!**



# BLANK DATA CASSETTES

## £5.95

Inc VAT  
 Postage and Packing 45p

Computer Grade Data Cassettes suitable for use in all of today's home computers. Each comes with its own case.

Tick for further information:  
☐ **VIC 20 PRODUCTS**  
☐ **COMMODORE 64**

All prices subject to availability or change without notice.

PLEASE SEND ME

**Pack of 10 Data Cassettes**

Qty Price Inc TOTAL

1 £6.40 inc 45p

Name

Address

I enclose Cheque, P/O for

CREDIT CARD ACCESS BARCLAY CARD (24hr. ANSWERPHONE SERVICE)

1 2 3 4 5 6 7 8 9 0

Pro-CWS

**STARTECH** 208 Aigburth Rd, Aigburth, Liverpool L17 051 727-7267



Games should be fun, and these days it seems that the same can be said of education. With so many Beebs going into schools it is not surprising that educational software is now becoming available, some of it even suitable for pre-school children. So I and my pre-school daughter sat down at the Beeb to test-drive a handful of lessons.

I was very impressed by the Chalksoft offerings. All of its programs have been debugged on real kids and have been written by a combination of teachers and programmers to meet a real educational need.

Because they are intended for use by children the ESCAPE and BREAK keys are trapped. It is therefore difficult to end a program, though you do have the choice at each stage of deleting or finishing. The company guarantees that all its tapes will load—and to my astonishment I loaded five tapes in a row with not a single lost block.

The programs are prepared for the 48K Spectrum, Vic 20 and 32K BBC.

All the programs are interactive and adequately self-documenting, though for the first two a hard copy is also supplied, along with some useful ideas for their use in teaching.

## LETTERS

Letters and Capital Letters are very similar. The use of colour is good, but after a time the sound gets on your nerves. Happily you are given the choice of turning it off.

Each of the nine programs on two cassettes takes a group of letters. The child can choose a letter from the group and it is drawn in colour on the full screen. Left to its own devices the letter is deleted after 30 seconds and redrawn in a new colour. Alternatively a new letter from the group of similar or dissimilar designs is drawn, either on a clear screen or over the previous letter so that the child can see the similarities/differences. It would be nice if all the programs could be loaded at once so that one could switch between them, but with only 32K...

## PUNC-MAN

Punc-Man is a delightful variation of the arcade-type game that sets out to teach punctua-

# School for software



tion. There is a choice of short stories which are written on the screen in Mode 7 characters.

Once there Noshier comes out and gobbles the capitals (replacing them with lower case) and the punctuation. The child then uses the cursor keys to steer Punc-Man round the screen to replace them. There is a choice of stories and the punctuation gets progressively more complex. The game is best on a monitor as in Mode 7 not all the characters are clearly differentiated on a colour TV.

## REVERSALS

Reversals is for children with reading problems: a short story is displayed (again in Mode 7) and a seagull flies around reversing some key letters. The child has to move another gull around and replace the reversed letter with the correct version. Even more than Punc-Man a monitor is needed.

The programs are very difficult to stop other than by CTRL/SHIFT/BREAK.

Like Chalksoft, GTM encourages users to get into its programs to change them and even gives instructions in Wordbuild and Smiler how to do it.

## SMILER

Smiler gives a choice of three-letter words and the child has to fill in the missing letter. A sad or smiling face is produced by a right or wrong choice. Interactivity is taken as far as recording incorrect responses and saying 'you have tried <letter> before'.

This sort of program needs to be 100 per cent accurate and Smiler is not. Even for the three-letter words the data statements are not complete so that real words (say, cop and fop) result in a visit from Sidney Sad rather than Sammy Smiler.

The game would need considerable supervision as the instructions are much more difficult than the words of the tests. There is a choice of sound or no sound.

## WORDBUILD

Wordbuild produces a series of letters in alpha order from which words have to be made. There is a choice of levels of difficulty (even easy four letter combinations are hard) and a choice of word-subject groups. Control is mainly from the arrow and RETURN keys—and their response rate is surpri-

singly slowed by the program.

The correct ordering of the letters results in parts of a house being built and a score is maintained while building is in progress.

This program is difficult and boring at the same time.

## HIGH FLYER

High Flyer is a very long program—about six minutes to load. It is based on 22 sets of homophones (words that sound alike, but are spelled differently). The child is given a choice of the two spellings and has to decide which one is needed to fill a gap in the sentence at the top of the screen.

The 'come on' is at the bottom of the screen—a plane flying from London to Paris. If you get the correct answers you make it, while too many wrong answers use up fuel and you plunge into the sea.

## EARLY ONE

Early One is one of a series for young readers from H&H Software, all of whose tapes I had trouble loading.

Pictures of objects such as a cot are displayed. Then the child steers the cursor along an alphabet until it is below the initial letter of the word illustrated. Later, the child must pick the middle, then last letter, and finally whole words. A raspberry sound greets wrong choices, and two points are given for getting it right first time.

With supervision a bright five-year-old can work it out, but it would be better if the letter keys were used. The real problem is the quality of the graphics. Neither my daughter nor I could fathom what some of the pictures were. And we were equally foxed by another section of the game, where more crude pictures must be matched with similarly crude sound versions of nursery rhymes. We recognised hardly any.

**Chalksoft**, Lowmore Cottage, Tonedale, Wellington, Somerset TA21 0AL, (082 347) 7117 Letters, £9.95; Capital Letters, £9.95; Punc-Man, £7.95; Reversals, £7.95. **GTM Computers**, 864 York Road, Seacroft Road, Leeds, (0532) 647474 — Smiler, £5.95; Wordbuild, £5.95; High Flyer, £9.95. **H&H Software** 53 Holloway, Runcorn, Cheshire (09285) 65566. Early One, £6.50.

# Pete Shelley

IN TUNE WITH THE TIMES



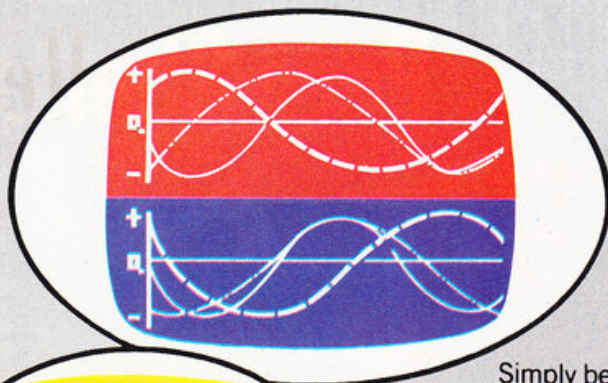
NEW ALBUM XL1  
INCLUDES COMPUTER PROGRAMS  
FOR SINCLAIR ZX SPECTRUM



XL1 PLUS DUB MIX ALBUM  
DOUBLE VALUE CASSETTE TWO  
ALBUMS FOR THE PRICE OF ONE

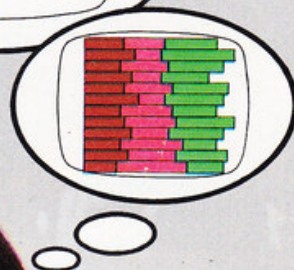
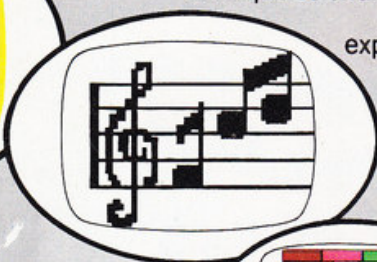


# For those that do,



$$a \frac{dy}{dx} - by = f(x)$$

$$a \frac{d^2y}{dx^2} - b \frac{dy}{dx} + cy = f(x)$$



The do's and don'ts of the new CGL M5 home computer reveal why it is such a remarkable family computer. Unrivalled in its range.

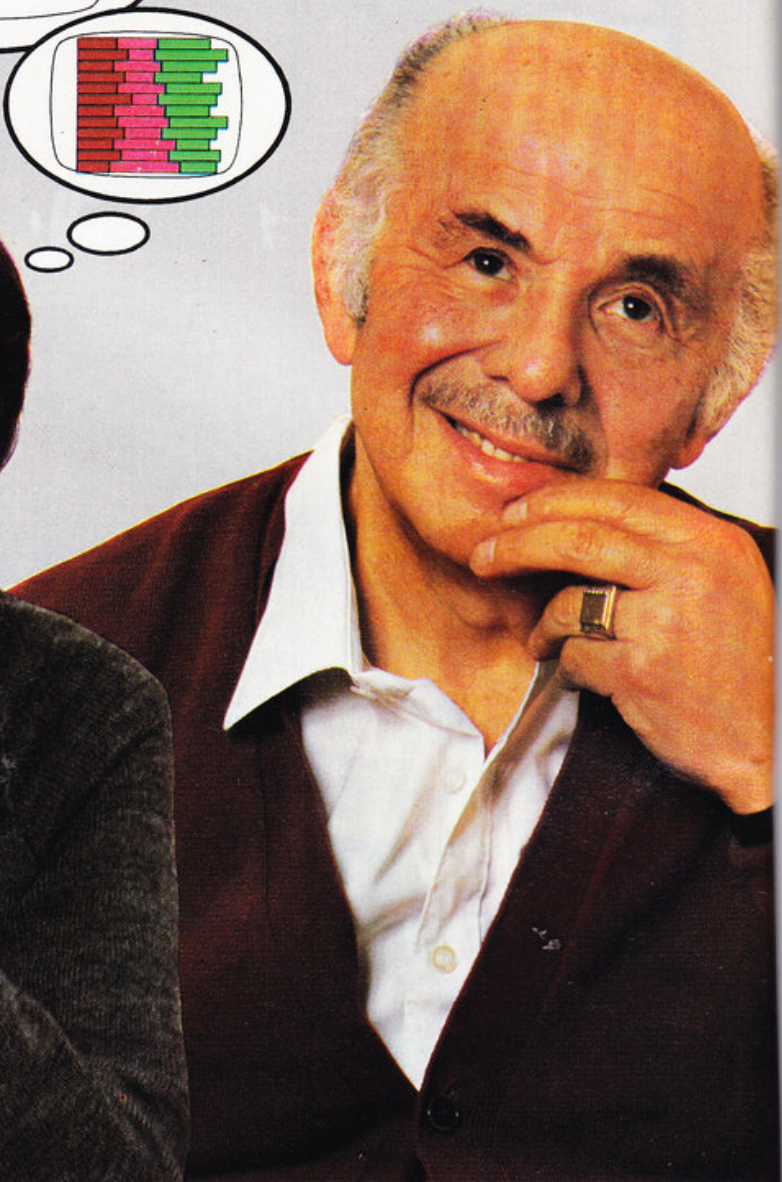
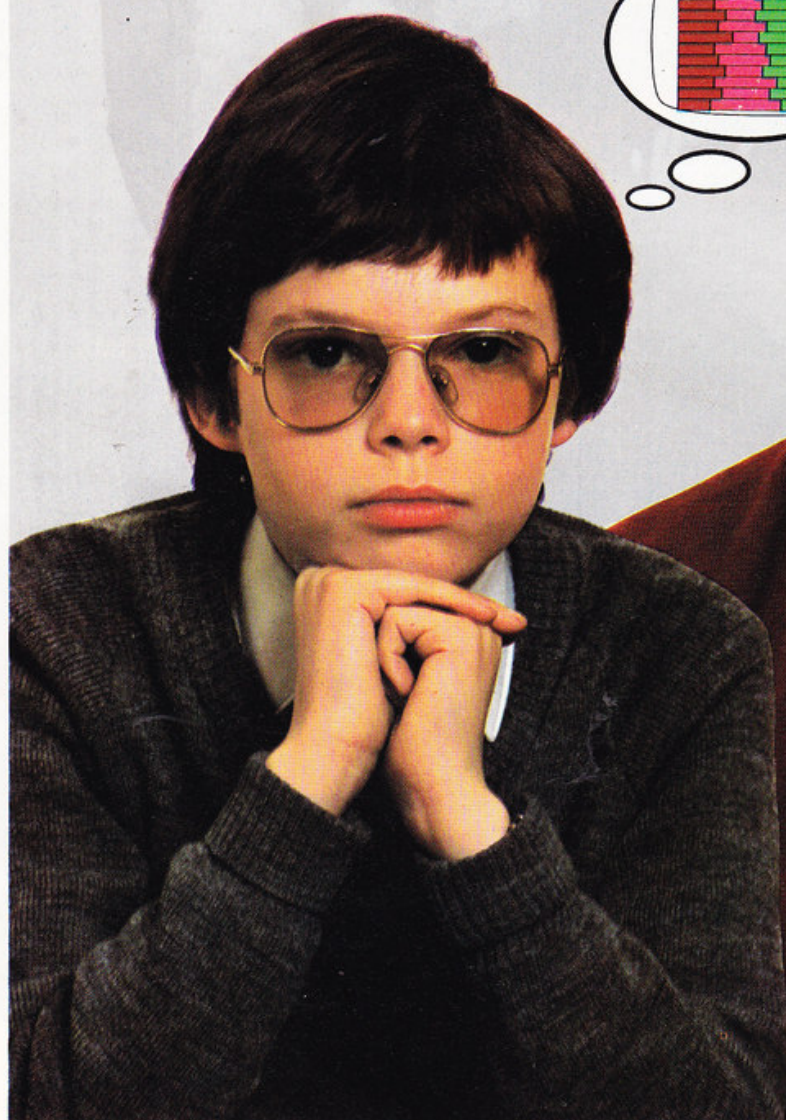
For those family members that do revel in creating their own personal computer programmes the M5 will test all their abilities. And teach them many more.

Alternatively for those that don't want to become so involved in programming the M5 couldn't be more fun.

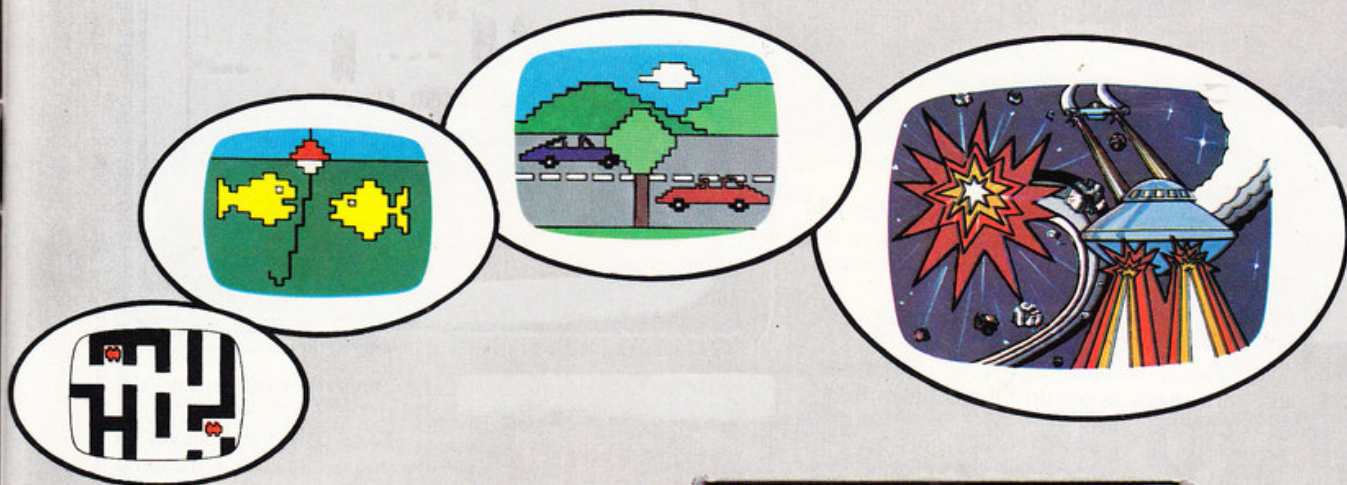
How can one computer be all things to all users — from a sixty year old to a six year old?

Simply because the CGL M5 has been developed in Japan as a sophisticated 'add-on' computer system. With the back up of a unique software system.

As your computer abilities grow so the CGL M5 will expand to meet them. One of the first things you'll



# those that don't



discover about the M5 is its amazing colour and graphic reproduction, whether it's bringing life to your own animation or pre-programmed cassettes and cartridges.

The graphic modes capability of the M5 is just one of the features that sets this computer in a class of its own.

It also incorporates a mini-synthesiser. Slot in the Basic G cartridge and you can compose to your ears' delight. The addition of a Basic F cartridge lets you do more complicated scientific, technical and arithmetical applications. There's also the FALC cartridge which gives you an easy to use data management and family accounting package.

And the CGL M5 is still growing. With an ever expanding library of cassettes and cartridges. Do yourself and your family a service — don't buy a home computer until you've found out more about the remarkable CGL M5.



**CGL M5**  
HOME COMPUTER

# and those that might.

For full details and a technical specification of the new CGL M5 send us this completed coupon. Apart from the full-colour brochure we'll also rush you the address of your nearest stockist. Be sure to see a demonstration.

The CGL M5. It might be the best family decision you'll make for years.

Name

Address

Tel. No.

Post the completed coupon to Computer Games Limited, CGL House, Goldings Hill, Loughton, Essex IG10 2RR.

PCN/20/6/83

# HEROES AND VILLAINS

**SPECTRUM**

## Wholly weblocked

**Name** Horace & The Spiders **System** Spectrum 16K or 48K **Price** £5.95 **Publisher** Psion with Melbourne House, available through Sinclair Research (0223) 353204 **Format** Cassette **Language** Basic **Outlets** Sinclair dealers; mail order from Sinclair Research, Stanhope Road, Camberley, Surrey.

In this, the third saga of Horace the Hungry, our hero has graduated from ski-ing to spider-hunting. So this is a game to bring out the very worst in all haters of creepy-crawlys.

### Objective

You have got to destroy the poisonous spiders that lurk in a cave high in the Spider Mountains by stamping on them. But to get to the cave, you have to avoid sentinel spiders that block your path, scale hills, and cross a perilous spider bridge.

### In play

Horace can move in four directions. To move up, down, left, and right the Q, Z, I and P keys are used. He can also take a running jump, so to speak, by combining the keys.

After loading, the screen fills up with Horace on a path, and it isn't long before a bright red, vicious-looking spider blocks his path.

To jump over spiders requires crucial timing, otherwise you land on top of the spider and lose one of your four lives.

The hills are easy to climb over; but the spider bridge is harder to beat. To cross the bridge you have to jump from thread to thread. It sounds easy, but as soon as the spiders sense you are on their bridge they try to reel you in, so you've got to be fast. And sometimes your key-presses seem to have no effect.

Safely across the bridge, and you are in the cave with a few aimless-looking spiders mending a giant web.

You can make holes in the web by using key V, B, N, or M until the web gives way. As soon as you do this the spiders bridge the gap and try to mend it. This is when they can be killed by stamping on them but this proved to be pretty difficult. As soon as a key was pressed not only did Horace walk, he kept on walking. That made it pretty difficult to get him into position to kill the spiders.

But by using the left and right keys in quick succession, trigger-finger style, you can keep control over him.

### Verdict

This game is one that I would only recommend with reservation. The keyboard layout is awkward, the game is difficult to control. But it does have a certain addictive quality, and the graphics and sound, while pretty simple, do work well — especially the satisfying crunch when you stamp on a spider!

**Trevor Jones**

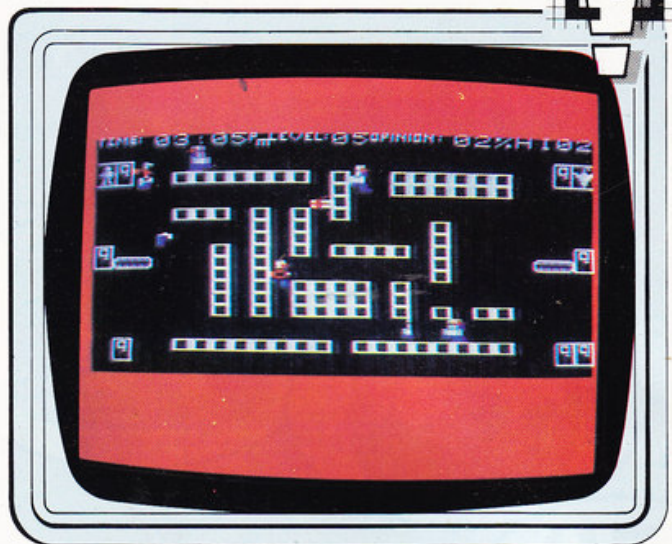
### RATING

**Lasting appeal**

**Playability**

**Use of machine**

**Value for money**



**VIC20**

## Gumshoe blues

**Name** Catcha Snatcha **System** Vic 20 **Publisher** Imagine Software, 051-2360407 **Price** £5.50 **Format** Cassette **Language** Machine code **Outlets** Mail order, high street dealers.

It was 2.15 in the afternoon, and I'd been working non-stop for the past five hours. There'd been no chance for a lunch break, and I was thinking about a long drink and some time off. So far that day I'd picked up six missing kids, caught four crooks, and taken care of two parcel bombs.

Just another day in the life of detective Barney Bootlace.

### Objectives

You are Barney, a down-on-his-luck store detective. Your job is to uphold law and some semblance of order amid this chaos. Miss too many shoplifters, ignore the odd parcel bomb, and your boss will be after you. Keep him happy and you get to move up to the next floor.

### In play

The screen display is impressive, to say the least. Along the top are various numbers which show the time of day, your current rating in your boss's eyes expressed as a percentage, and the current floor level.

The graphics in Catcha Snatcha are little short of superb. The action takes place around a maze of counters and in each corner is a set of doors. These represent the missing children office, lost property,

the manager's office, and the main exit.

When you spot thieves in action you have to work out a route that will intercept them on their way to the exit because poor old Barney just hasn't got the speed to overtake them. As if this wasn't enough (and believe me, it is) every so often one of the international terrorists — who apparently pick up their groceries at the store — will leave behind a parcel bomb. You must pick it up and carry it into the street.

When you receive three written warnings you lose the game. When you reach a 99 per cent rating your boss sends you upstairs where things are... precisely the same.

There are problems with the game. For one, the sound effects are rather pathetic — a tedious ticking of the clock, and some clicking sounds which, I suppose, represent footsteps.

For another, Barney is a has-been. He can barely keep up with the shoppers at the best of times, and once they get the exit in sight, they take off like Seb Coe going for the tape.

### Verdict

Catcha Snatcha is a very clever idea with excellent graphics. Unfortunately, it fails in too many areas. The speed difference between Barney and the crooks is so unfair it simply becomes frustrating, and there is too little difference in levels to offer much incentive.

But in the war against crime, a man's gotta do what a man's gotta do. I gave up.

**Peter Worlock**

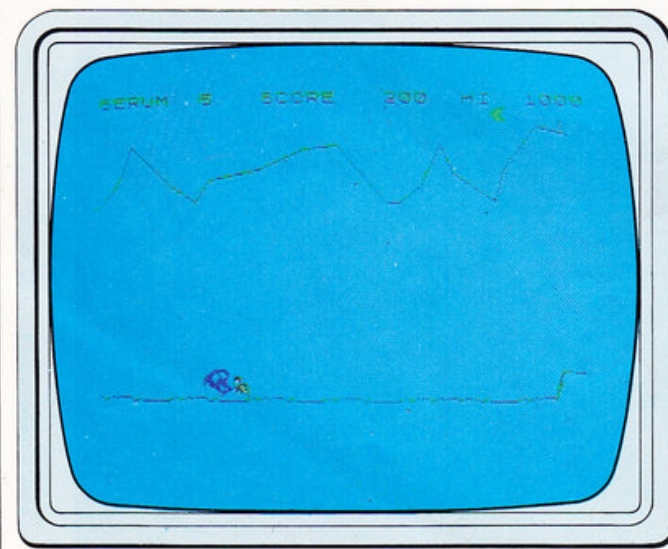
### RATING

**Lasting appeal**

**Playability**

**Use of machine**

**Overall value**



## Add on the Adman way

The Vic 20 really can speak...but only if you use an ADMAN SPEECH SYNTHESISER. It's word power is endless as there is no set vocabulary. Yet operation is simple. The 64 elements of English speech are pre-programmed to let you put your own words together as soon as you switch on. Just imagine...program adventure games with characters that can actually talk!

Also for your Vic 20 there are 8K and 16K RAM PACKS and the ADMAN 3 PORT EXPANSION MOTHERBOARD. With proven designs of the highest quality they are the best value for money around.

Available from Spectrum, Dixons and other major computer accessory shops

Prices around:

8k Ram Pack . . . . . £39.95  
16k Ram Pack . . . . . £49.95  
Motherboard . . . . . £19.95  
Speech Synthesiser . . £49.95

To find out more about these products, why not take a lead from our speech synthesiser...go to your local dealer and ask for it! Or post the coupon.

Dept. C, Adman Electronics Ltd., Ripon Way,  
Harrogate, N.Yorks, HG1 2AU. Tel. 0621 740972

Adman Electronics Ltd. is a member of the Adam Leisure Group PLC

# The Vic 20 speaks out!

Please send me information on Adman Vic 20 Accessories

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

PCN/7/83

## MAKE MONEY FROM YOUR HOBBY

### TOP ROYALTIES PAID FOR SPECTRUM AND ZX81 SOFTWARE

ORIGINAL GAMES EDUCATIONAL AND  
BUSINESS PROGRAMS WANTED

SEND TO OR PHONE

### GALAXY SOFTWARE

62A WEST STREET  
HARWICH  
ESSEX  
HARWICH 52446

Let's face it — the sound from your Dragon 32  
wouldn't win any prizes at an Eisteddfod.  
You need a:—

### Dragon 32

### Sound Extension Module

- Fully-cased module plugs into cartridge port
- Provides 3 channels of sound; 3-note chords and harmonies over 5 octaves
- Uses new BASIC command. No need to 'Peek' or 'Poke'
- Many built-in sound effects (e.g. bomb, laser)
- Music and graphics can occur together without loss of speed
- Based on popular, well-proven sound generator
- Two Input/Output ports included
- User manual provided, with examples

Cheque/P.O./Access No. to:—

J.C.B. (MICROSYSTEMS)  
29 SOUTHBOURNE ROAD  
BOURNEMOUTH BH6 5AE  
Tel: (0202) 423973

ONLY  
**£34.95**  
inclusive

Write or phone for further details

# PCN ProgramCards

Nine annotated ProgramCards this week will keep owners of TI99/4A, Spectrum and Atari machines busy. Don't forget to cut them out, paste them onto a board and file them in your rapidly increasing program library.

## This week

All you home video buffs equipped with a TI99/4A should take advantage of our first presentation, from John Waters, of Ealing, London.

His program allows you to define and record on a video recorder a series of titles for home-produced videos. Features available are a choice of colours for background, foreground and text, and static or rolling titles with the special facility of diagonal display.

Neat stuff, eh! But you can have only the first half this week.

Contributor Joseph Donnelly, of Dublin, has obviously spent quite some time on the bowling lanes and has applied his evident skill to produce an effective game.

Running on the Sinclair Spectrum, Bowling requires all the skills of the real thing (well, nearly all). You'll find it as difficult in this game to get a strike as Arthur Scargill does.

Atari owners can pick up Philip Green's saga of Pirate Island where they left off last week. Philip is a 16-year-old from St Helens, Lancashire. We will be as sneaky as him and keep the last two cards close to our chest until next week.

## Oops!

Andy Grant, of Culloden, Inverness, was sharp-eyed enough to spot an error in Tim Green's Oric-1 program, Cupid. A small change is needed in line 4090, where the first number in the data statement was printed as '46840'. This should have been '46440'.

A more complex problem to solve cropped up in the Atari Time Bomb game from P Lister. Many of you had no luck at all with this one but the following substitutions should ease your frustration:

Lines 370, 2240 and 2330 Replace 'Z' with 'Reverse video Z'.

Line 410 Replace all 'v's with 'Reverse video v'.

Line 2800 Replace 'Congratulations' with the same in reverse video.

Lines 4080, 4090 and 7400 Replace Alpha literals with the same in reverse video.

Line 4010 Replace 'GOSUB 95110' with 'GOSUB 9510'.

These adjustments should make the game playable.

## A RUN for our money

We pay for published programs, so why not give us a RUN for our money?

Contributions should be sent on disk or cassette, with a plain paper listing and brief notes to:

Programs Editor, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

All disks and cassettes will be returned, at our expense, after consideration or publication.

## PCN ProgramCards

### Video Titler Card 1 of 6

8316VT1/6

A useful program for producing titles for video cassettes

```
100 REM VIDEO SCREEN TITLES
110 CALL CLEAR
120 REM TITLE PAGE
130 GOSUB 1050
140 CALL HCHAR(1,2,42,31):: CALL
    VCHAR(2,2,42,20):: CALL HCHAR(2
1,2,42,31):: CALL VCHAR(2,32,42,
20)
150 DISPLAY AT(7,9):"VIDEO TITLE
S"
160 C$="FF81BDA1A1BD81FF" :: CAL
L CHAR(37,C$):: CALL HCHAR(20,21
,37,1):: DISPLAY AT(20,22):"5/19
83."
170 FOR T=1 TO 700 :: NEXT T
180 CALL CLEAR
190 REM INSTRUCTIONS
200 DISPLAY AT(1,2):"***** INST
```

### TI99/4A TI Extended Basic

Application: general interest  
Author: John Waters

```
RUCTIONS *****
210 DISPLAY AT(2,3):" THIS PROG
RAMME ENABLES YOUTO CREATE TITLE
S FOR HOME VIDEO PRODUCTIONS."
220 DISPLAY AT(6,3):" IT OFFERS
THE CHOICE OF ROLLING OR STAT
IC TITLES AND YOUR CHOICE OF
SCREEN SHADE, TYPE COLOUR OR T
YPE BACKGROUND COLOUR."
230 DISPLAY AT(12,3):" THESE FU
NCTIONS OPERATE WITHIN THE PRO
GRAMME BY THE INPUT OF INFORMATI
ON WHEN REQUESTED."
240 DISPLAY AT(17,3):" WITH BOT
H STATIC & ROLLINGTITLES THE LIN
E ENTERED WILLCENTRE ITSELF HORI
ZONTALLY ON THE ROW CHOSEN BY Y
OU."
```

100-170  
180-240

Set up title screen display  
Displays operating information

# YOUR SEARCH FOR COMPUTER GAMES ENDS HERE AT...

## MICROSPOT

**MERSEYSIDES LARGEST SOFTWARE STOCKISTS.** We have in stock over 400 fantastic programmes all at highly competitive prices and suitable for your Atari, Dragon or Vic 20 computer. Ring us on our hotline **NOW** for a copy of our latest price list. It's all you'll ever need!



**Over 250 programmes** by more than 50 software houses.

### NEW ATARI PROGRAMMES

Up, up and away  
Zaxxon  
Miner 2049 er  
Fort Apocalypse  
Choplifter (ROM)



**Over 70 programmes** in stock by

Imagine Bug-Byte  
Rabbit Commodore  
Romik Thorn  
Postern Llamasoft

Happy Disk £199.00  
48K Upgrade £90.00  
Atari 800 48K £399.00



**Over 50 programmes** in stock by

Microdeal  
Abacus  
M.C. Lothlorien  
Romik  
Dragon Data

### NEW DRAGON PROGRAMMES

Donkey King  
Caterpillar  
Maths Tutor  
Earth Rescue

NOW IN STOCK



You need look no further than  
**MICROSPOT**  
15 Moorfields, Liverpool L2 2BQ.  
Hotline: **051-236 6628**

**£17.95**  
For Atari

## The Cheapest Rampacks In The World

Available Now

### ZX SPECTRUM 32K RAMPACK

Simply plugs into user port at rear of computer and increases your 16K Computer instantly to 48K

**£39.95**

- Fully Compatible with all accessories
- No need to open computer and invalidate guarantee
- Why send your computer away and wait weeks for upgrade
- Fully cased, tested and guaranteed.

**ZX81 16K RAMPACK £19.75**

**ZX81 64K RAMPACK £44.75**

### NOW MAKE YOUR SPECTRUM TALK!

The Cheetah "Sweet Talker" just plugs into the back of the computer using the existing power supplies. Fully cased. Easy to program any word, sentence or phrase.

Simply incredible at **£34.95**

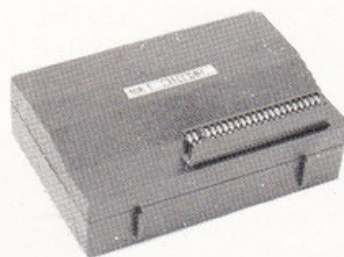
All Units: Fully Cased and Guaranteed. Secure No Wobble Design. Fully Compatible with all accessories.

**PRICE INCLUDES VAT and P&P.** Delivery normally 14 days. Export orders at no extra cost.

Send cheque/P.O. Payable to:-

**CHEETAH**

MARKETING LTD.  
DEPT PCN.  
359 THE STRAND  
LONDON WC2 R0HS  
Tel: 01-240 7939  
Telex: 8954958



16K ZX81 & 32K ZX Spectrum Ram Packs now available at larger branches of **John Menzies**

8316VT2/6

```

250 INPUT " PRESS ENTER TO CONTI
NUE:";A$
260 REM RECORDING INSTRUCTIONS
270 CALL CLEAR
280 DISPLAY AT(1,2):"* RECORDING
INSTRUCTIONS *"
290 DISPLAY AT(2,2):" CONNECT T
HE OUTPUT LEAD FROM THE PAL MO
DULATOR TO THE AERIAL INPUT ON
YOUR VIDEO RECORDER."
300 DISPLAY AT(7,2):" SWITCH ON
TI-99/4A & VIDEORECORDER."
310 DISPLAY AT(10,2):" TUNE IN
A SPARE VIDEO CHANNEL TO THE
SIGNAL FROM YOUR COMPUTER."
320 DISPLAY AT(14,2):" ANYTHING
NOW DISPLAYED ON YOUR TELEVISIO
N SCREEN -FROMYOUR TI-99/4A VIA

```

```

THE VIDEO-CAN BE RECORDED."
330 DISPLAY AT(19,2):" A TIME L
AG OCCURS BEFORE TITLE DISPLAY
FOR SWITCHING VIDEO TO RECORD MO
DE."
340 INPUT " PRESS ENTER TO CONTI
NUE:";A$
350 REM TITLE INFORMATION
360 CALL CLEAR :: F=0 :: GOSUB 1
050
370 DISPLAY AT(1,2):"*** TITLE
COMPOSITION ***" :: DISPLAY AT(3
,2):"PLEASE INPUT THE FOLLOWING
INFORMATION:"
380 DISPLAY AT(7,2):"HOW MANY TI
TLE LINES" :: DISPLAY AT(8,2):"
(1-24) ?" :: ACCEP
T AT(8,26)VALIDATE(DIGIT)BEEP:L

```

250 Prompt and response to  
continue  
260-330 Display of user recording  
instructions

340 Prompt and response to  
continue  
350-360 Perform screen colour routine  
370-380 Title information prompts,  
number of title lines

8316VT3/6

```

390 DISPLAY AT(10,2):"SCREEN COL
OUR (1-16) ?" :: ACCEPT AT(10,2
6)VALIDATE(DIGIT)BEEP:S
400 DISPLAY AT(12,2):"TYPE COLOU
R (1-16) ?" :: ACCEPT AT(12,2
6)VALIDATE(DIGIT)BEEP:TC
410 DISPLAY AT(14,2):"TYPE BACKG
ROUND COLOUR?" :: ACCEPT AT(14,2
6)VALIDATE(DIGIT)BEEP:TB
420 DISPLAY AT(16,2):"STATIC OR
ROLLING" :: DISPLAY AT(17,2):"TI
TLES (S/R) ?" :: ACCEPT
AT(17,26)VALIDATE("SR")BEEP:TT$
430 T=ASC(TT$)
440 IF T=83 THEN 470 ELSE 450
450 DISPLAY AT(19,2):"HORIZONTAL
OR DIAGONAL" :: DISPLAY AT(20,2
):"ROLLING (H/D) ?" :: A
CCEPT AT(20,26)VALIDATE("HD")BEE

```

```

P:F$
460 F=ASC(F$)
470 DISPLAY AT(22,2):"ARE THE AB
OVE ENTRIES" :: DISPLAY AT(23,2)
:"CORRECT (Y/N) ?"
480 ACCEPT AT(23,26)VALIDATE("YN
")BEEP:D$
490 D=ASC(D$)
500 REM TITLE COMPOSITION
510 IF D=89 THEN 520 ELSE 360
520 CALL CLEAR
530 CALL SCREEN(S):: GOSUB 1030
540 OPTION BASE 1
550 DIM LL$(24),R(24)
560 CALL CLEAR
570 M=-1 :: W=0
580 FOR A=1 TO L
590 IF (F)=68)*(F<=72) THEN 600 E
LSE 640

```

390 Screen colour prompt and  
response  
400 Text colour prompt and  
response  
410 Background colour prompt and  
response  
420 Static or rolling title prompt and  
response

430-460 If rolling selected, choose  
horizontal/diagonal  
470-490 Prompt and response for  
correctness of entered data  
500-590 Display chosen screen colours,  
setup arrays

# AMDEK X-Y PLOTTER BY Roland DG

## DXY-100 Plotter for Business, Graphics & Engineering

- **NEW**

Priced at under £700.00

- **BIG**

Up to A3 with standard pens and paper

- **INTERFACE**

Centronics compatible

- **PROGRAMMABLE**

Easy and in Basic

- **EXPANDABLE**

Optional OR1 Rom

- **OPTIONAL ROM**

OR1 optional EP Rom  
for under £30.00



Distributor:

**Roland (UK) Ltd.**

Great West Trading Estate

983 Great West Road,

Brentford, Middx TW8 9DN

Telephone: 01-568 4578. Telex: 934470

Main Retail Agent:

**Future Music Ltd.**

10 Baddow Road, Chelmsford, Essex.

Telephone: Chelmsford 352490

# Captain



# WHAT'S YOUR

Welcome to the Incredible World of Captain Lasersound!  
Join me on a journey to the Fun Palace of The Universe!



Captain Lasersound PRESENTS  
Lasersound PRESENTS  
Lasersound PRESENTS  
Lasersound PRESENTS  
**A Galaxy of New  
STAR Cassettes  
making their  
Screen Debut!**

The waiting's over, they're here. A sensational collection of mind warping games, created to stretch the barriers of human endeavour. Do you dare to accept the challenge of Captain Lasersound and enter into the electronic wonderland, a world where only the ultimate warriors survive.



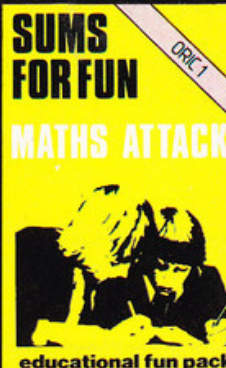
**BIG TEN  
SUPER GAMES PACK**  
SPECTRUM 16/48K  
£5.00

Fantastic collection of arcade thorough-breds and exciting newcomers. Superb hi-res graphics make this pack a visual bonanza. This compendium starts where others finish.



**EGG FARM**  
SPECTRUM 16/48K  
by Paul A. Thomson and Lyndon John Knowles  
ZX Spectrum 16K/  
48K **£5.50**

You just love eating those green eggs. But watch out, mother hen is getting angry and when she does the feathers start to fly. A fast arcade game that can make even the bravest turn chicken.



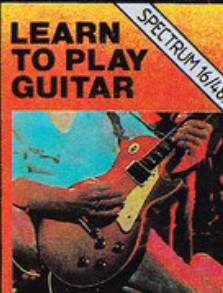
**SUMS  
FOR FUN**  
ORIC I  
**MATHS ATTACK**  
educational fun pack  
by J. S. Bailey  
Oric I. **£5.00**  
Fun while learning with this dual program cassette. Full colour and excellent graphics combine in a shoot-them-down concept. Only the correct answer will bring success. This cassette serves as an ideal method of introduction into computer assisted education.



**Hummer  
house of horror**  
superb 3d graphics

by STEPHEN CURTIS  
ZX Spectrum 48K  
**£7.00**

It's too late now to start crying for help. You're on your own, that is apart from the evil spectres that frequent the House of Horror. Is there escape? Or will you be forever entombed in Hummer, house of horror!



**LEARN  
TO PLAY  
GUITAR**  
SPECTRUM 16/48K  
educational  
fun pack  
by Douglas Barr  
ZX Spectrum 16K/  
48K **£6.00**

Using sound and graphics this cassette provides a progressive stage by stage introduction to guitar playing. Starting from the basics of tuning and going right through to song accompaniment. The graphics and sound facilities combine together to make every step clear and concise. This program is ideal for aspiring musicians.

**FREE  
Captain  
LASERSOUND  
POSTER**  
with EVERY order!

Dealer and Export  
enquiries welcome.  
**HOT LINE**  
**01-555 8104**

- Please rush me by return of post.
- ☐ HUMMER, house of horror!....£7.00
  - ☐ Lasersound GAMES PACK.....£5.00
  - ☐ Sums for Fun/Maths Attack.....£5.00
  - ☐ EGG FARM.....£5.50
  - ☐ Learn to play GUITAR.....£6.00

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

LASERSOUND, STRATFORD WORKSHOPS,  
BURFORD ROAD, LONDON E15.  
CHEQUES PAYABLE TO  
LASERSOUND SOFTWARE

Captain Lasersound Copyright © 1985 Lasersound Ltd. Captain Lasersound created by Lee Roy Brown. All rights reserved. The character of Captain Lasersound is entirely fictional. No actual person living or dead should be inferred. Captain Lasersound is the trademark of Lasersound Ltd.

## Bowling Card 1 of 2

8316B1/2

A short simulation of ten-pin bowling

```

1 REM Ten Pin Bowling
3 DIM s(5)

5 FOR f=0 TO 7: READ a: POKE USR "A"+f,a: NEXT f
10 FOR f=0 TO 7: READ a: POKE USR "B"+f,a: NEXT f
15 LET x=20: LET k=19
20 GO SUB 7500
25 FOR q=1 TO 10
30 FOR p=1 TO p1

32 RESTORE 9019+p: READ b,c: BORDER b: PAPER c: CLS

35 GO SUB 8010

40 FOR t=1 TO 2
50 FOR k=18 TO 26: PRINT AT x,k;" b": FOR f=1 TO 3: GO SUB 70: NEXT f: NEXT k
60 FOR k=27 TO 19 STEP -1: FOR f=1 TO 3: GO SUB 70: NEXT f: PRINT AT x,k;" b ":
NEXT k: GO TO 50
70 IF INKEY#<>"1" THEN RETURN
80 FOR f=x TO 0 STEP -1: PRINT AT f,k;"b": IF f>=12 THEN PRINT AT f+1,19;"
"
85 IF f=5 AND k=22 AND t=1 AND RND<.5 THEN GO TO 200
95 PRINT AT f+1,k-1;" " : IF f>=12 THEN LET k=k-(INKEY#="5")+(INKEY#="8"): I
F k=18 OR k=28 THEN GO TO 110: NEXT f
100 FOR n=1 TO 4: NEXT n: NEXT f
105 GO TO 130
120 PRINT AT 16,4;"Gully ball !": FOR d=1 TO 130: NEXT d: PRINT AT 16,4;"
"
130 NEXT t
135 GO SUB 6000

140 FOR d=1 TO 130: NEXT d
145 NEXT p
150 NEXT q
160 CLS : FOR d=2 TO p1*2 STEP 2: PRINT AT d+5,6:"PLAYER ";d/2;" SCORE =";s(d/2
): NEXT d: PRINT AT 1,10:"END OF GAME"
170 INPUT "Another Game ";A$
180 IF A$="Y" THEN RUN
190 STOP

```

Sinclair Spectrum  
Spectrum BasicApplication: game  
Author: Joseph Donnelly

3	Define array for player's scores and calculator
5-10	Define balls and pins
15	Initialise variables
20	Perform instructions routine
25	Start of frame loop (10 frames)
30	Start of player loop (up to 4 players)
32	Set screen colours for each player
35	Perform routine to draw alley, pins and ball
40	For two balls
50-60	Move ball horizontally until "1" (shoot) is pressed
70	Check for shoot else return
80-85	Rollin', rollin', rollin'...
95	Check for left/right adjustment; check off lane
100-105	Slow down
120	Oops! Down the gully
130	Next ball this frame
135	Perform routine to check result and update score
140	Pause
150	Next frame
160-190	Display final scores, end game, another game or finish.

## Bowling Card 2 of 2

8314B2/2

```

200 FOR f=5 TO 0 STEP -1: PRINT AT f,19;" " ;"b";" " ;AT f+1,22;" " : BEEP .
5,f: NEXT f: LET s(p)=s(p)+30: GO TO 140
6000 REM CHECK AND PRINT SCORE
6005 LET s(5)=0
6010 RESTORE 9010
6020 FOR u=1 TO 10: READ a,b: LET s(5)=s(5)+(ATTR (a,b)<90): NEXT u
6025 IF s(5)=10 THEN LET s(5)=15
6030 LET s(p)=s(p)+s(5)
6040 FOR u=2 TO p1*2 STEP 2: PRINT AT u+5,10;s(u/2): BEEP .01,p1*u: NEXT u
6050 RETURN
7500 PRINT AT 6,8;"Ten pin bowling": PLOT 64,119: DRAW 120,0: PRINT AT 8,3;"For
one to four players."
7510 PAUSE 40: PRINT AT 10,3;"There will be ten frames with two shots per
player each frame. If you can knock"
7512 PRINT " all ten pins you will get 30 points. Otherwise one point p
er pin."
7515 PRINT TAB 3
7520 PRINT TAB 3;"Press the ""1"" key to shoot.";TAB 3;"You may steer the ball w
ith";TAB 3;"the ""5"" and ""8"" keys."
7530 PAUSE 30: INPUT "How many players 1-4 ":p1: IF p1<1 OR p1>4 THEN GO TO 753
0
7540 BORDER 1: PAPER 5: INK 0: CLS : RETURN
8000 REM DRAW ALLEY
8010 RESTORE 9010: PLOT 150,15: DRAW 0,150: PLOT 151,15: DRAW 0,150: PLOT 224,15
: DRAW 0,150: PLOT 225,15: DRAW 0,150
8020 FOR f=1 TO 10: READ a,b: PRINT BRIGHT 1;AT a,b;"a": NEXT f
8030 PRINT AT x,k;"b"
8040 PRINT AT 1,0:"FRAME ";q: FOR f=2 TO p1*2 STEP 2: PRINT AT f+5,0;"Player ";
f/2;" " ;s(f/2): NEXT f
8050 RETURN
9000 DATA BIN 00011000,BIN 00011000,BIN 00111100,BIN 00111100,BIN 00111100,BIN 0
0011000,BIN 00011000,BIN 00000000
9005 DATA BIN 00000000,BIN 00111100,BIN 01111110,BIN 01111110,BIN 01111110,BIN 01
111110,BIN 00111100,BIN 00000000
9010 DATA 2,20,2,22,2,24,2,26,3,21,3,23,3,25,4,22,4,24,5,23

9020 DATA 1,5
9021 DATA 2,6
9022 DATA 6,4
9023 DATA 0,7

```

200	STRIKE!
6000-6050	Routine to check result and update/display score
7500-7540	Routine to display instructions and players prompt
8000-8050	Routine to draw alley, pins and ball
9000	Data statements for pin character
9005	Data statements for ball character
9010	Data statements for pin positions
9020-9023	Data statements for ball start point for each player.

**PCNProgramCards****Pirate Island Card 4 of 9**

8316PI4/9

**Atari/Atari Basic/Philip Green/  
continued**

```

750 PRINT "1.SWIM":INPUT F:?"?"
760 IF F=1 THEN PRINT "You are on a sandy beach."
765 PRINT
770 ? "VISIBLE ITEMS sea gull,rocks,wicked looking pirate."
775 PRINT
780 ? "1.EXAMINE SEAGULL"
790 ? "2 LOOK ROCKS"
800 ? "3.TRADE WITH PIRATE"
805 ?
807 ? "PLEASE TYPE IN ORDER":INPUT G
810 IF G=3 THEN ? "":GOTO 850
820 IF G=1 THEN ? "":PRINT "YOU SEE NOTHING SPECIAL"
825 PRINT
830 IF G=2 THEN ? "":PRINT "YOU CAN SEE A GOLDEN CHEST BURIED DEEP IN THE MIDDLE OF THE ROCK"
835 PRINT
840 GOTO 780
850 ? "PIRATE GRABS RUM AND DROPS AN OLD SHOVEL, FALLS ASLEEP. AN OLD DIARY FALLS FROM HIS POCKET"
855 PRINT
860 PRINT "1.TAKE SHOVEL"
870 PRINT "2.READ DIARY"
875 ?
877 ? "PLEASE TYPE IN ORDER":INPUT H
880 IF H=1 THEN ? "":GOTO 910
890 IF H=2 THEN ? "":GOTO 930
910 PRINT "YOU NOW HAVE THE SHOVEL TO DIG"
915 PRINT
920 GOTO 870
930 PRINT "DAY 20,22nd MAY 1951.Went exploring, found an old pirate's ship hidden in a cave planning to build it"
935 PRINT "And escape from this Island"
937 PRINT
940 PRINT "DAY 21,23rd MAY 1951.Tried to build it up,but the dra....."
945 FOR I=1 TO 2200:NEXT I
947 PRINT "?"
950 PRINT "1.DIG":INPUT I
960 IF I=1 THEN PRINT "":PRINT "YOU HAVE FOUND 4 STICKS OF DYNAMITE"
970 PRINT

```

750 760-807	What a choice! New location, details and response
810-840	Actions
850 855-877	Yohoho! Details, prompt and response
880-890 910-920	Response action Action
930-945	Nosey
947-950 960-970	Prompt and response Action

**PCNProgramCards****Pirate Island Card 5 of 9**

8316PI5/9

```

980 PRINT "1.TAKE DYNAMITE"
990 PRINT "2.BLOW UP ROCK":INPUT J
1000 IF J=1 THEN ? "":GOTO 1040
1020 IF J=2 THEN ? "":GOTO 1090
1030 GOTO 980
1040 PRINT "YOU NOW HAVE THE DYNAMITE"
1045 PRINT
1050 PRINT "1.BLOW UP ROCK":INPUT K
1060 IF K=1 THEN ? "":?"THE ROCK BLOWS UP WITH A BIG BOOM,AND THROWS OUT A GOLDEN CHEST"
1065 PRINT
1070 PRINT "1.TAKE CHEST":INPUT L
1080 IF L=1 THEN ? "":GOTO 1110
1090 ? "FIRST YOU NEED 4 STICKS OF DYNAMITE"
1095 ?
1100 GOTO 980
1110 ? "GREAT! YOU HAVE FOUND 1 TREASURE"
1115 PRINT
1120 PRINT "1.GO WEST":INPUT M
1130 IF M=1 THEN ? "":?"You are in a spooky grave yard filled with old bones and empty rum bottles."
1135 PRINT
1140 PRINT "SOME EXITS ARE WEST"
1145 PRINT
1150 PRINT "1.GO WEST":INPUT N
1160 IF N=1 THEN ? "":?"You are at the edge of the island"
1165 PRINT
1170 PRINT "VISIBLE ITEMS:palm tree,large cave"
1175 PRINT
1180 PRINT "1.GO TREE"
1190 PRINT "2.GO CAVE":INPUT O
1200 IF O=1 THEN ? "":GOTO 1230
1210 IF O=2 THEN ? "":GOTO 1260
1220 GOTO 1180
1230 ? "YOU ARE NOW AT THE TREE,YOU CAN SEE A PIRATES LAMP ALREADY LIT HANGING ON IT"
1235 PRINT
1240 PRINT "1.TAKE LAMP":INPUT P
1250 IF P=1 THEN ? "":GOTO 1280
1260 ? "FIRST YOU NEED A PIRATES LAMP"
1265 ?
1270 GOTO 1180

```

980-1030	Prompts and response
1040-1080	Details, prompts and responses
1090-1100	Action
1110-1115 1120-1175	Well done Recognise this code?
1180-1190 1200-1220	And this? What to do?
1230-1250	Action, prompt and response
1260-1270	Bellogical!

# BBC OWNERS

Why not consider the HOBBIT FLOPPY TAPE SYSTEM for your computer?

The HOBBIT gives you all the facilities you would expect from a floppy disc at a fraction of the price.

## Brief Specifications

- ☆ Read/Write speed of 750 BYTES per second
- ☆ Capacity: 101K BYTES per CASSETTE
- ☆ Average access time 22 seconds
- ☆ Up to 138 FILES per CASSETTE
- ☆ Completely automatic — no buttons to press
- ☆ Fully built, boxed and tested. Just plug in and go
- ☆ System can support TWO DRIVES

Available from stock  
**PRICE £135.00 plus VAT**

Also available for NASCOM computers  
**PRICE £120.00 plus VAT**

Access and Barclaycard accepted

For more details contact:

**Ikon Computer Products**

KILN LAKE, LAUGHARNE, CARMARTHEN,  
 DYFED SA33 4QE.

Tel: Laugharne (099 421) 515

# ICL

ICL brand Flexible Discs and Computer Tape are now available from Memorex. Ring the number on the dial below for IMMEDIATE despatch.



# MEMOREX

# OSBORNE



## BUSINESS PACKAGES

- \* Osborne 1 with double density disk drive
- \* Printer
- \* Amber/Green screen monitor
- \* All leads
- \* Free Software

INCLUSIVE OF MAILMERGE, WORDSTAR 3, SUPERCALC BASIC

SPECIAL OFFER £1,599 (plus VAT)

\*Card Sort — this program will sort your cardbox files on any field of a card £49.95

**GEM SYSTEMS LTD**  
 (DEPT MCS)

2 CRAWFORD ROAD, HATFIELD,  
 HERTS AL10 0PG  
 TEL: (07072) 66148

For further information send coupon to:  
 GEM SYSTEMS LTD (Dept MCS)  
 2 Crawford Road, Hatfield, Herts AL10 0PG

NAME .....

ADDRESS .....

TEL. ....

PCN16

**PCNProgramCards****Pirate Island Card 6 of 9**

8316PI6/9

```

1280 PRINT "YOU NOW HOLD THE LAMP TO ENTER THE CAVE"
1290 PRINT "2.GO CAVE";:INPUT Q
1295 ?
1300 IF Q=2 THEN ? ">":PRINT "You are in a dark cave."
1305 PRINT
1310 PRINT "VISIBLE ITEMS:pirate ship with dragon guarding it."
1315 PRINT
1320 PRINT "1.GO SHIP"
1330 PRINT "2.FIGHT DRAGON";:INPUT R
1340 IF R=1 THEN ? ">":GOTO 1370
1350 IF R=2 THEN ? ">":GOTO 1390
1360 GOTO 1320
1370 ? "YOU CAN'T THE DRAGON WON'T LET YOU"
1375 PRINT
1380 GOTO 1320
1390 ? "YOU HAVE SLAIN THE DRAGON WITH YOUR SILVER SWORD"
1395 PRINT
1400 PRINT "1.GO SHIP";:INPUT S
1410 IF S=1 THEN ? ">":? "YOU ARE NOW ON THE JOLLY RODGER,YOU CAN SEE A HATCH GO
ING DOWN BELOW THE SHIP"
1415 PRINT
1420 PRINT "1.GO HATCH";:INPUT T
1430 IF T=1 THEN ? ">":? "You are below deck,VISIBLE ITEMS:Sign saying Long John
Silver was here,Old box"
1435 ?
1440 PRINT "1.OPEN BOX";:INPUT U
1450 IF U=1 THEN ? ">":? "YOU ARE NOW AT THE BOX,AND YOU CAN SEE A SHINING GOLDE
N CROWN"
1453 ?
1455 PRINT "1.TAKE CROWN";:INPUT V
1460 IF V=1 THEN ? ">":? "GREAT!! YOU FOUND SECOND TREASURE"
1465 PRINT
1470 PRINT "1.CLIMB ON DECK";:INPUT W
1480 IF W=1 THEN ? ">":? "You are now back on deck,VISIBLE ITEMS:Wood"
1485 PRINT
1490 PRINT "1.LOOK WOOD"
1500 PRINT "2.SET SAIL";:INPUT X
1510 IF X=1 THEN ? ">":GOTO 1540
1520 IF X=2 THEN ? ">":GOTO 1600
1530 GOTO 1490

```

1280-1530 Surely you can work it out now...

**PCNProgramCards****Pirate Island Card 7 of 9**

8316PI7/9

```

1540 ? "IT LOOKS LIKE THERE'S BEEN A HOLE IN THE DECK WHICH HAS BEEN PATCHED OVE
R WITH WOOD"
1545 PRINT
1550 ? "1.LIFT WOOD";:INPUT Z
1560 IF Z=1 THEN ? ">":? "OH,NO YOU HAVE LIFTED THE WOOD AND THE WHOLE SHIP HAS
COLLAPSED ON YOU,YOU ARE DEAD"
1570 PRINT
1580 PRINT "HIT Y FOR ANOTHER TURN";:INPUT Y$
1590 IF Y$="Y" THEN 5
1595 GOTO 1580
1600 ? "HOLD YOUR HORSES,YOU WILL HAVE TO WAIT FOR THE TIDE TO COME IN"
1610 FOR I=1 TO 500:NEXT I: ? ">"
1620 ? "THE TIDE IS IN,NOW YOU CAN SET SAIL,SO GET GOING"
1625 ?
1630 PRINT "1.SET SAIL";:INPUT AA
1640 IF AA=1 THEN ? ">":? "YOU HAVE CAST OFF,WHERE DO YOU WANT TO GO,I THINK T
HAT YOU HAD BETTER CHECK THE MAP"
1645 PRINT
1650 PRINT "1.READ MAP";:INPUT BB
1660 IF BB=1 THEN ? ">":? "THE MAP SAYS THAT YOU CAN EITHER SAIL FOR SAVAGE ISLA
ND,HAWAII ISLAND OR UNKNOWN ISLAND"
1665 PRINT
1670 PRINT "CHOOSE THE ONE YOU WISH TO SAIL TO"
1675 PRINT
1680 PRINT "1.SAIL FOR SAVAGE ISLAND"
1690 PRINT "2.SAIL FOR HAWAII ISLAND"
1700 PRINT "3.SAIL FOR UNKNOWN ISLAND";:INPUT CC
1710 IF CC=1 THEN ? ">":GOTO 1750
1720 IF CC=2 THEN ? ">":GOTO 1860
1730 IF CC=3 THEN ? ">":GOTO 1780
1740 GOTO 1680
1750 ? "AFTER A WEEK AND A DAY YOU LANDED ON SAVAGE ISLAND,AND THE BLACK PIRATES
KILLED YOU WITH YOU OWN SWORD"
1755 PRINT
1760 ? "HIT Y FOR ANOTHER TURN";:INPUT Y$
1770 IF Y$="Y" THEN 5
1775 GOTO 1760
1780 ? "YOU ARE NOW SAILING FOR THE ISLAND OF UNKNOWN"
1790 FOR I=1 TO 1000:NEXT I: ? ">"
1800 ? "OH NO YOU HAVE BEEN PULLED IN BY A WHIRLPOOL"
1805 PRINT
1810 FOR I=1 TO 50:NEXT I
1820 ? "YOU ARE DEAD"
1825 ?
1830 ? "HIT Y FOR ANOTHER TURN";:INPUT Y$
1840 IF Y$="Y" THEN 5
1850 GOTO 1830

```

Continued next week

# DON'T JUST STAND THERE...



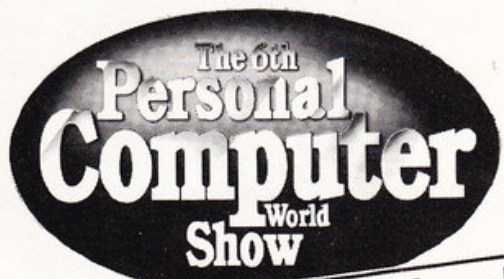
## USE THE FAST LANE

**28th September-2nd October Barbican Centre, City of London**

The PCW Show is Britain's most popular micro event. Hardly surprising, with over 200 exhibitors showing an exciting range of micros, software and peripherals — for business and commerce, education, science, industry and the home.

But if you use a micro at work

(or are thinking of buying one) you can avoid the crush. Just clip the coupon below and send it with your business card and a cheque for £2.00 (normal price £3 at the door!). We'll send you a special "Fast Lane" ticket. And you won't have to play the waiting game.



**28th September-trade only  
Entrance by invitation**

### THE FAST LANE

Please send me one "Fast Lane" ticket to the 6th PCW Show.

I enclose my business card and a cheque for £2.00 made payable to the "Personal Computer World Show".

NAME.....

ADDRESS.....

.....

.....

Send to Amanda Stephens  
PCW Show, 11 Manchester Square  
London W1M 5AB



**'Kids and the Atari' by Edward Carlson, published by Prentice-Hall (paperback, spiral-bound 216 pages) at £16.95.**

*Kids and the Atari* is chiefly intended to be used as a text book in schools for teaching youngsters of about 10 to 14 the joys of Atari Basic.

Ideally it would be used in a classroom where all students have access to an Atari computer on which the 33 lessons constituting the bulk of the book could be practised. Almost every page is adorned with illustrations, included, no doubt, with the aim of holding the attention of young students where the text may fail.

Being a US edition it is obviously riddled with 'spelling mistakes' — color and so on. This would normally be a quibble, but with the book aimed at impressionable minds it may cause some hesitation among teachers.

The book is very well thought out — since it's aimed at children the subject-matter has been adapted accordingly. There's a 'pizza topping' program and a 'What is your favourite group program', for instance, in place of the mundane topics usual in books purveying Basic.

There are assignments (with answers, so teachers new to computers can rest easy) and a comprehensive glossary of terms.

Without access to an Atari, a person can still learn something from the book but not enough to make it worth the phenomenal £16.95 price-tag. **AMB**

**'Pascal Compiler Validation' edited by Brian Wichmann and Z.J. Ciechanowicz, published by John Wiley & Sons (0243 829121) at £9.75 (hardback 176 pages).**

It's not often you find a book which is affordable, largely free of errors, misprints and misinformation, and offering a wealth of up-to-date material

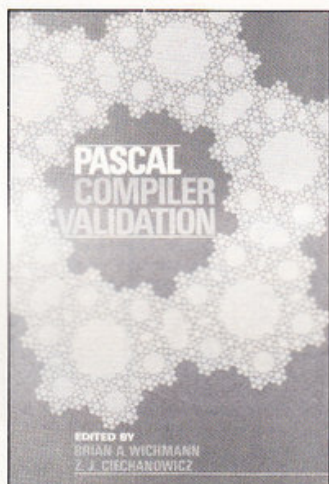
from a wide variety of well informed sources, is it?

*Pascal Compiler Validation* consists of contributions mainly from the UK and other European countries, which perhaps explains why there are so few of the errors which permeate most American publications.

Many aspects of software proving are dealt with from the standpoint of the user, implementer, standards organisation and manufacturer. References are made to Ada, the Algols, Basic, Cobol, Coral, the Fortrans, Pearl and several others, highlighting the many problems associated with the standardisation of these languages and validation of their high-level language processors.

Validation is essentially concerned with the testing of a compiler both for quality and unambiguous reporting of and recovery from errors in programs. It is also concerned with conformity to a language definition and hence the complete detection of all possible errors — a daunting task!

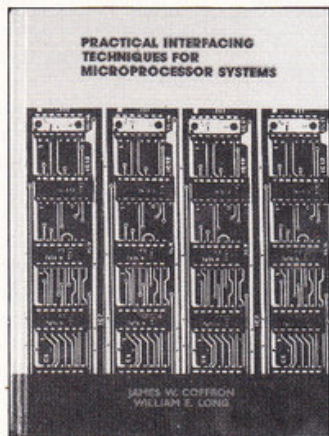
This book, together with the Pascal Validation Suite and the ISO Standard (BS 6192) should



shed light on what a rigorously defined, powerful yet simple language requires for its correct implementation, and will assist Pascal users to realise its full potential as a general-purpose problem-solving tool.

Details of the Validation project, history, development and notes on the use of the Pascal Validation Suite are given, including some extracts from the suite itself in an appendix of program listings. The problems of interpretation of results are discussed, as are the more esoteric questions of 'correct', 'wrong', 'illegal', 'fragile' or merely 'suspicious' programs.

The two editors from NPL, who themselves contribute chapters on validation, testing procedures and the suite itself, are to be congratulated. The presentation of so much diverse information is concise, readable — and illuminating, with many valuable references to papers and other published work on all aspects of software design, implementation and testing. **NW**



**'Practical Interfacing Techniques for Microprocessor Systems' by James Coffron and William Long, published by Prentice-Hall International (0442 58531) at £25.15 (hardback 395 pages).**

After the honeymoon period of learning to use and program your computer, the next step is to make it earn its keep by monitoring and controlling an external system.

To achieve this requires additional electronic hardware and the accompanying software to drive the system. And this is where *Practical Interfacing Techniques for Microprocessor Systems* comes in. It is aimed at engineers, technicians and the serious hobbyist.

The book is hardware-orientated. It explains a potentially difficult subject carefully, with a good blend of factual information and enough examples of how the techniques work in practice. This isn't, however, a book of electronic projects for your micro.

Devices are explained with the aid of pin connections, circuit diagrams, schematic drawings and software listings.

Topics include interfacing to ROM, RAM, dynamic memory, various I/O devices, analogue-to-digital and digital-to-analogue converters, bus systems, and serial and parallel data transmission.

Detailed attention is given to interfacing I/O devices on the

Tandy TRS80 Z80 based micro.

This book might prove difficult for the absolute beginner, but it gives a solid base of information which can be built upon to do more complicated things such as the often-quoted 'use your micro to control your central heating, train set etc'.

The book is well thought out and the attention to detail and good layout make it an enjoyable text. **TJ**

**'The Oric 1 Program Book' by Vince Apps, published by Phoenix Publishing Associates (Watford 32109) at £5.95 (paperback, 123 pages).**

This type of book is awaited with much anticipation by a host of new Oric owners. It's another bumper program listing book for micro owners with the time and patience to type in programs rather than buying them for £5-£6 a time off the shelf on cassette.

The programs cover such subjects as 'Alien Storm', 'Anagram', 'Chase' and 'Missile Defence'. There are explanations of the games and details on altering the routines.

Of course these games don't have the complexity and playability of most of the tape games, but it does make you wonder at the apparent price discrepancy. Presumably it costs more to print an unprotected paperback book than it does to produce a tape.

So why do book publishers feel happy to publish 50 unprotected programs for £5.95 while games software enterprises wring their hands over tape 'piracy', yet make fortunes from their grossly overpriced products? If a book publisher can bring out a book like this for £5.95 why not bring out a tape with programs for the same price? **IS**



Clubnet keeps you in touch with the microcosm of personal computer enthusiasts throughout the UK. It is divided into two sections — clubs and user groups.

We publish a list of these two groups on alternate weeks. This week it is the turn of clubs, which are listed alphabetically by county.

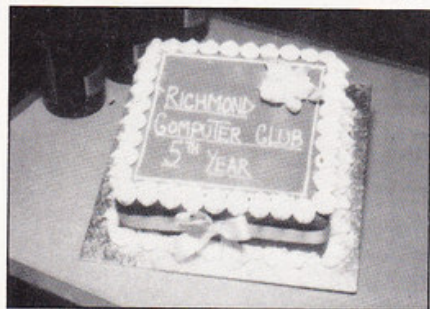
Each issue will also focus on the activities of an individual club or

group with a fly-on-the-wall report. This week we feature the Richmond Computer Club.

If your association has something special on the agenda or if you've just started a new one, contact us at *Clubnet*, *Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HS.

The club listing below is based on that of the Amateur Computer Club.

# Revelry in Richmond



Happy birthday, dear Richmond CC (top). Bob Forster shows members some machine programming techniques (above).

It was ginger ale popping and cake eating at Richmond Computer Club last week as members celebrated the club's fifth anniversary.

Five years is a long time for a computer club to be going, and since its inception membership has more than doubled.

Bob Forster, chairman of the club, told me: 'When the club began there were 14 members. We used to meet at my house but as the club grew we ran out of space, so we shifted to the Richmond Community Centre where we now meet.'

The club now has 35 members on its books and on my visit there was practically a full house.

Members — both adults and children — set up their Bees, Pets, Sharp MZ80K and Atari machines with all accessories for the evening's session. Meetings tend to be run informally with a short talk on a specific subject and a free-for-all for the rest of the evening.

Bob Forster himself gave the talk, on machine programming. As he addressed a small group of members at the front of the

room, a few members retreated to the back of the room for some serious game playing.

Bob, specialist in the 6800 microprocessor, has been a hobbyist for 18 years, repairing machines and writing his own software. He owns a Pet and a BBC.

'When the club first started,' he said, 'there were mainly elderly people, but when the BBC came on the scene it encouraged younger people to join. We get a good mix of people here who come from a wide range of professions.'

The club was the first to evaluate the BBC Micronet unit and during the meeting members were able to read the latest news on the club on its Club Spot pages on Micronet and keep in touch with other clubs' activities around the country.

Sandra Grandison

**Name** Richmond Computer Club **Venue** Richmond Community Centre, Sheen Road, Richmond, Surrey. **Meetings** Second Monday of the month **Contact** Bob Forster, 01-892 1873.

**NEXT WEEK:** Busy evening among the Sinclair Users of Colchester

## CLUBS

### AVON

**Bristol** Micro Computer Club. Meets at the Pavilion, Southend Road, Filton, Bristol, every other Tuesday. Subs: £1. Contact Darryl Collins, 60 Mackie Rd, Filton, Bristol BS12 7NA, tel: 0272 792982.

**Multi-User Club** produces bi-monthly magazine, subs: £7.50. Contact Valerie Boyde-Shaw, Nailsea SS1337.

**Worle** Computer Club. Meets at Woodsprings Inn Functions Rooms on alternate Mondays at 7-10.30pm (annual subs: £12). Contact SW Rabone, 18 Castle Road, Worle, Weston-super-Mare, Avon, tel: 0934-513068.

### BEDFORDSHIRE

**Bedford** Amateur Computer Club. Meets at Star Rowing Club, Bedford, on the first and third Tuesday of each month at 8pm (annual subs: £3). Contact Rowan Bird, 74 High Street, Great Barford, Beds MK44 3LB, tel: 0234-870763.

**Chilthorn** Computer Club. Meets at Five Bells, Eaton Bray, Near Dunstable, Leighton Buzzard on second and fourth Monday of each month (annual subs: £2 senior members, £1 under-14s). Contact Steve Betts, 42 Wallace Road, Eaton Bray, Bedfordshire LU6 2DF, tel: 0525-220922.

**Luton College** Computer Club. Contact John Rodger, tel: 0582-3411.

**Luton** Computer Club. Contact J P Fletcher, 1 Trowbridge Gardens, Luton, Beds LU2 7JY, tel: 0582-450687.

### BERKSHIRE

**Easthampstead** Computer Club. Meets at Easthampstead Park School, Easthampstead Park Mansions, Bracknell, on the first Wednesday in month at 8pm. Contact Brian Poulton, tel: 0344-84423.

### BIRMINGHAM

**Birmingham** Amateur Computer Club. Meets at CBS Consultants, Watery Lane, Small Heath, Birmingham 10, on the first and third Wednesday of each month at 7pm (annual subs: £4.20 adults, £1.50 juniors). Contact Dr M Bayliss, 125 Berryfield Road, Sheldon, Birmingham B26 3UU, tel: 021-743 7197.

### BUCKINGHAMSHIRE

**Aylesbury** Computer Club. Meets at Quarrendon Youth Club every Friday at 7.30pm (annual subs: £5). Members also meet at Mandsville County Secondary School the first Thursday of each month at 7pm. Contact Ken Knight, 22 Mount Street, Aylesbury, tel: 0296-5181.

**Chilthorn** Microcomputer Club. Meets at the Garden Centre, School Lane, Chalfont St Giles, on the first Wednesday of each month (annual subs: £4 for six months). Contact Mrs W Tibbitts at Ellwood, Deanway, Chalfont St Giles, Buckinghamshire, tel: 024-07 4906.

**Iver** Computer Club. Contact P A Seal at 1 Ormonde Flats, Church Road, Iver Heath, tel: 0753-652792.

**Iver** Computer Society meets at Huntsmoor room, Iver Village Hall on the second and fourth Thursday every month at 7.30. Contact John Haigh, 141 Leas Drive, Iver Bucks, SL0 9RP.

### CAMBRIDGE

**Cambridge** Microcomputer Club, meets on the third Wednesday of each month. Contact Derek Tripp at 3 Spurgeons Avenue, Waterbeach, tel: 0223-315662.

**Haverhill** Microcomputer Club, meets at St Marys' Church Hall, Camps Road, Haverhill, on the second, third and fourth Wednesday of each month at 7.30 to 10.30pm (annual subs: £3 adult; £1 OAP and students; meetings 25p). Contact Andrew Holliman, at 5 Trinity Close, Balsham, Cambridge CB1 6DW, tel: 022 029-583.

**Peterborough** Personal Computer Club meets at Crosfield Electronics Social Club, fortnightly on Mondays. Contact Andrew Pike, tel: 0733-44342 after 5pm.

### CHESHIRE

**Altrincham** Computer Club. Meets at N. Cestrian Grammar School, Durham Road, Altrincham, fortnightly. Contact Martin Hickling at 39 Barrington Road, Altrincham, Cheshire WA14 1H2, tel: 061-941 4547.

**Brunel** Computer Club. Meets at St Werburgh Community Centre on alternate Wednesdays at 7 to 10pm. Contact Mr R Simpson at 4 The Coots, Stockwood, Cheshire.

**Cheshire** Computer Club. Contact W Collins at 37 Garden Lane, Chester, Cheshire.

**Crew** Computer Users Club meets at Buffaloes Club, Earl Street, Crew, Cheshire, on the third Thursday of each month at 8pm. Contact Bram Knight on 0270-623375.

**Holmes Chapel** Micro Club meets at Liesure Centre, Holmes Chapel at 7.30 to 9.30pm on the first and third Tuesday of each month (annual subs: £5 adults; £2.50 children, OAP and students. Or weekly subs: 30p adults, 20p children).

Contact Margaret Baker, at 1 Helton Close, Crew, Cheshire, tel: 0477-34238.

**Kinder Peek** Computer Club meets at Bew Mills School every Monday, sub: £2 per quarter, £1 members under 11. Contact John Eary, New Mills 43 70.

**New Mills & District** PCC meets at New Mills School, fortnightly on Fridays at 7 to 9.30pm, meetings 35p. Contact Mr G M Flanagan at 11 Sundown Close, New Mills, Stockport, Cheshire SK12 3DH, tel: 0663-44051.

**Northwest** Computer Club meets fortnightly, meetings 25p. Contact John Lightfoot at 13 Aston Drive, Frodsham, Warrington, Cheshire WA6 7PU, tel: 0728 31519.

**Northwest** Computer Club, weekly

meetings. Annual subs: £1; meetings 30p (visitors 50p). Contact Tom Wyatt at 29 Summer Lane, Halton, Runcorn Cheshire WA7 5PG, tel: Runcorn 77545.

**Mid-Cheshire** Computer Club meets at Winsford Library on the second Friday every month at 7.30pm contact Dave Clare, Winsford 51374.

### CLEVELAND

**Cleveland** Micro Club meets on the second and third Tuesday of each month, under 18s on second of the month, over 21s on third Tuesday of the month. Contact J Telford at 13 Weston Crescent, Norton.

**Stockton** Amateur Computer Club meets at YMCA, Stockton, each alternate week at 7-9pm. Subs: adults £4, families £6, juniors £2, meetings 30p. First week: programmer's evening, second week: workshop/games evening. Contact Peter Cheshire, 60 Croft Road, Eaglescliffe, Stockton-on-Tees, Cleveland TS16 0DY.

### CORNWALL

**Cornish Radio** Amateur Club — Computing Section. Contact Bob Reason at 24 Mitchell Road, Camborne, Cornwall.

**Cornwall Area** Computer Club. Contact M F Grove at 35 Causeway Heard, Penzance.

**St Austell** Computer Club and Computer Town meets at ECIP Labs, Penpew Road, St Austell, fortnightly on Mondays at 7.30pm. Contact N G Day at 2 Clendale Close, St Austell, Cornwall PL25 3DD.

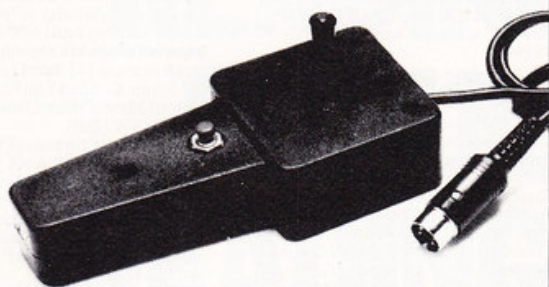
### DERBYSHIRE

**Derby** Micro Society meets at Littleover Church Hall, Sheperd Street, on every other Thursday at 7pm. Annual subs: £5, £2.50 children, £7.50 for families, 50p entrance non-members. Contact Mike Riordan, tel: 0332-769440.

**Glossop** Computer Club. Contact John Dearn, 2 Spinney Close, Glossop, Derbyshire.

From the people who really know . . .

# JOYSTICKS



Now available — Joysticks for:

**DRAGON — £15.95 incl.**

**BBC — £17.95 incl.**

Fully proportional joysticks in smart injection-moulded case. Available for Dragon and BBC Micros. These light action, precise mechanism joysticks give rapid, ultra-reliable control of all your favourite games.

**Compact size • Precise action  
Long life • Competitive prices**

Also — Joystick utility — just £5.00 incl p&p!

Convert your non-joystick programs to work with joysticks!

- ★ Works with any program using INKEY.
- ★ Compatible with most ACORNSOFT games.
- ★ Easy to use — just press the keys you want to transfer.
- ★ Compatible with all operating systems.

To order contact:

**Clares Micro Supplies**

222 Townfield Road, Winsford, Cheshire.

TEL: (06065) 51374.

# WARNING

## SPECTRUM-ZAP (2.0)

### IS NOT A GAME . . .

Spectrum-ZAP (2.0) has been designed to enable you to make copies of your expensive and fragile software. Spectrum-ZAP (2.0) will work on both 16K or 48K Spectrums and since it uses none of the program area will copy a full 16K or 48K machine code or basic tape, even if it cannot be broken into!

**SPECTRUM-ZAP (2.0) — £5.95**

MAIL ORDER: SCIMITAR SOFTWARE, DEPT PCN  
3 PALACE GATES ROAD, WOOD GREEN,  
LONDON N22 4BW

From selected retail stores:

PHILIP COPLEY, OSSETT, WEST YORKSHIRE.  
D. J. COMPUTERS, TOWN SQUARE, STEVENAGE.  
CASTLEHURST, WHETSTONE, LONDON N20.  
MICRO-SOURCE ZWOLLE, NEDERLAND.

**Now available...  
for the BBC micro**

# Beeb BEEB

## The ROM based spreadsheet program

0790 15

	A	B	C	D	E
1 MONTH		JAN	FEB	MAR	
2					
3 UNIT £		6 67	3 14	22 45	
4 LABOUR		32	43	65	
5 PAPER		05	12	43	
6					
7 SUBS. TOT		7 04	3 69	23 53	
8 VAT		1 06	55	3 53	
9 TOTAL		8 10	4 24	27 06	

### BEEBCALC

Following on from WORDWISE this ROM based spreadsheet program is extremely simple to use through still very powerful. For applications that require a 'spreadsheet' or a table of figures to be manipulated this ROM will be invaluable. It need not be limited to just the obvious business applications of financial planning but is also ideal for home budgeting, etc. Includes many special features such as the ability to transfer 'sheets' to WORDWISE for inclusion into reports. 40 or 80 column screen display. changeable column widths etc.

**£34.00+ £1.00 p&p + VAT**

See you on  
Stand 71  
at the  
**BBC MICRO  
USER SHOW!**



# COMPUTER CONCEPTS

Dept PCN 4

16 Wayside, Chipperfield, Hertfordshire. WD4 9JJ

Telephone: Kings Langley (09277) 69727

## DEVON

**Exeter & District Computer Club** meets at Exeter School, Magdalene Road, Exeter, on the second and fourth Tuesday every month. Annual subs: £7.50 adults, £2.00 for students. Technical library. Contact T G Holden, 14 Greenville Avenue, Teignmouth, Devon TQ14 9NT.

**Exeter & District Amateur Computer Club** meets second Tuesday every month. Annual subs: £7.50. Contact Doug Bates, Fortescue House, Stoke Cannon, Exeter. Specialist meetings on third and fourth Tuesday.

**Torbay Users Computer Club** meets at Devon Computer Services, 96 Dartmouth Road, Paignton on Mondays fortnightly. Annual subs: £2.00 juniors, £5.00 adults, meetings 20p, children welcome. Technical library available.

## DORSET

**Bournemouth Area Computer Club** meets at Kinson Community Centre on the third Wednesday every month. Annual Sub: £5 adults; £2.50 juniors. Contact Peter Hibbs, 54 Runnymede Avenue, Bournemouth, Dorset BH1 19SE, tel: 0202 576547.

**TOPIC** meets at Canteen English Truck Centre on the second and fourth Wednesday every month at 7pm. Annual subs: £5, reduced fees for students. Contact David Washford, 1 Alexander Road, Bournemouth, Dorset BH6 5JA.

**Purbeck Computer Club**, contact 31 North Street, Wareham, Dorset BH20 1AD.

## DURHAM

**Darlington Computer Club**, weekly meetings and informal discussion. Technical library available. Contact L Boxell, 8 Vane Terrace, Darlington DL3 7AT, tel: 0325-67766.

## ESSEX

**Genius Computer Club**, subs: £1 ZX81 members, £1.50 Spectrum members. Contact 30 Webber House, North Street, Barking, Essex.

**Brentwood Amateur Computer Club**, proposed new club. Contact R Sadler, 18 Wancote Road, Brentwood, Essex CM15 9HD.

**Springfield Computer Club** meets on the first Friday of every month. Contact Stephen Cousins, 1 Aldeburgh Way, Springfield, Chelmsford, Essex CM1 5PB, tel: 0245 50155.

**Colchester Microprocessor Group** meets at University of Essex on the second and fourth Wednesday of every month at 7.30pm. Annual subs: £5. Contact Information Centre, University of Essex, near Colchester.

**Stanway School Computing Club**, only school members at present. Contact G Floyd, c/o Physics Department, Stanway School, Stanway, Colchester, Essex.

**Dragon Independent Owners Association**, produces newsletter, gives discount on software, subs: £8. Contact Doug Bourne, School House, Nevron Road, Rayleigh, Essex.

**Romford Club**, a new club. Contact Mr D Norden, 138c Church Road, Romford, Essex.

**South East Essex Computer Society** meets at Hockey Club at Roots Hall, near Southend Football Stadium on Wednesday at 7.30pm. Open to members over 14. Contact Robin Knight, 128 Little Waking Road, Little Waking, Southend-on-Sea, Essex, tel: 0702-218456.

## GLOUCESTERSHIRE

**British Amateur Electronics Club**. Independent club with newsletter, beginner's section, library, annual exhibition catering for all ages. Contact Mr J Margetts, 3 Bishopstone Close, Golden Valley, Cheltenham.

**Cheltenham Amateur Computer Club** meets on the third Tuesday of each month at 7.30pm. Contact Mike Pullin on 0242-25617 or Robin Phelps on 0242-584343.

**GCHQ**, Contact D W Adam, 16 Court Road, Prestbury, Cheltenham.

**Cheltenham Amateur Computer Club** meets at Prestbury Scout Headquarters, on the third Tuesday of every month at 7.30pm. Annual subs: £3. Contact M Hughes, 36 Riverviews Way, Cheltenham, Gloucs.

## HAMPSHIRE

**Commodore Computer Club**. This new club meets on the first Friday of every month at Bury House, Bury Road, Gosport at 7.30pm. For further information contact Brian Cox, Fareham 280530.

**Fareham and Portsmouth Amateur Computer Club**. Contact Alan Smith, c/o Francis Close, Lee-on-the-Solent, Gosport, Hants PO13 8HB, tel: 0705-550907.

**RAF Odiham Computer Club**. Contact c/o Officer i/c, Royal Air Force, Odiham, Nr Basingstoke, Hants.

**Southampton Amateur Computer Club** meets at Medical Science Building, Bassett Crescent, East Southampton, on the second Wednesday of every month at 7.30pm. Annual subs: £5, £3.50 students & OAPs. Contact P Maddison, 'Gardenways', Chilworth Towers, Chilworth, Southampton SO1 7JH.

## HEREFORD

**Hereford Amateur Computer Club**, proposed new club. Contact Stuart Edinborough, 2 Warwick Walk, Bobblestock, Hereford HR4 9TG, tel: 0432-269700.

## HERTFORDSHIRE

**Harpden Microcomputer Club** meets at Silver Cap, Harpenden on alternate Mondays. Annual subs £2.50. Contact David James, 5 Ox Lane, Harpenden, Hertfordshire AL5 4HH.

## HUMBERSIDE

**Grimsby Computer Club** meets at Grimsby Central Library fortnightly on Mondays at 7.30pm. Contact Jensen Lee, 29 Park View, Cleethorpes, tel: 0472-4259.

**Scunthorpe & District Microprocessor Society** meets at Community Centre, Lindun Street, Scunthorpe, every Tuesday at 7.30pm. Annual subs £2, families £5. Contact G Hinch, 21 Old Crosby, Scunthorpe, South Humberside DN15 8PU.

## KENT

**Canterbury ACC** proposed new club. Contact L Fisher, 21 Manwood Avenue, St Stephens, Canterbury, Kent CT2 7AH.

**Medway Amateur Computer & Robotics Organisation** meets on the first Tuesday and third Wednesday of every month. Annual subs £5. Contact Paul Cameron, Small Community Centre, Lordwood Lane, Lordwood, Chatham, Kent, tel: 0634-63036.

**North Kent Amateur Computer Club** meets at Lecture Theatre, Charles Darwin School, Jail Lane, Biggin Hill, Kent, on the first Thursday of every month at 7.30pm. Annual sub £3, £1 students. Contact Iain House, 28 Canadian Avenue, Catford SE6 3AS, tel: 01-690 5441.

**Orpington Computer Club** meets at The Large Hall, Christ Church, Chaterhouse Road, Orpington, Kent, every Friday at 8pm-10.30pm. Insurance cover for all members' equipment while on club premises. Contact Mr R Pyatt, 23 Arundel Drive, Orpington, Kent BR6 9JF, tel: Orpington 20281.

**Amateur Computer Club**, annual subs: £4.50 (£2 for under 18s, OAPs). Contact Rupert Steele, St John's College, Oxford OX1 3JP.

**National Personal Computer User Association**, annual subs £12. Contact

Eric Keeley, 11 Spratling Street, Manston, Ramsgate, Kent.  
**Sevenoaks School Computer Club**. Contact G Sommerhoff, Technical Centre, Sevenoaks School, Sevenoaks, Kent, tel: 0732-456340.  
**Tonbridge & Tunbridge Wells ACC**. Contact Ray Szatkowski, 1 Cromer Street, Tonbridge, Kent, tel: 0732-355960.

## LANCASHIRE

**Blackburn Micro Computer Club**. Contact Roger Longworth, 12 Sharp Close, Accrington, Lancs.

**Bolton Computer Club** meets at E4/24 Bolton Institute of Higher Education, Deane Road, Bolton, on Thursdays. Annual subs: £1. Contact David Atherton, 16 Douglas Street, Asherton, Manchester M29 9FB, tel: 0942-876210.  
**Burnley Computer Club** meets at Carleton Hotel, Standish Street, on Tuesdays 7.30-11pm. Contact Clive Tallon, 27 Bassett Street, Burnley, Lancs BB10 3EQ.

**Chorley Computer Club** meets at Townley Arms, Chorley, every other Tuesday at 8pm. Contact Chris Hicks, 131 Market Street, Chorley, Lancashire.  
**Ribble Valley Computer Club** meets at Staff Canteen, Pendle Carpets Ltd, West Bradford, on the second and fourth Monday of every month at 7-9pm. Contact Ian Thornton-Bryar, 25 Southfield Drive, West Bradford, Clitheroe, Lancs BB7 4TU.

**Lancaster & Morecambe Computer Club**. Contact Sarah Blackler, tel: 0524-33553.  
**South Chadderton Computer Club** meets at Turf Lane Centre, Turf Lane, Chadderton, on Thursdays at 7-9.30pm. Contact Mr Jakeman, 26 Marble Street, Derker, Oldham, Lancs. Tel: 061-678 0547.

## LEICESTERSHIRE

**East Leake Computer Club**. Contact Andrew Jones, 59 Bateman Road, East Leake, Loughborough, Leicestershire LE12 6NN.

## LINCOLNSHIRE

**Lincoln Computer Club**, meets at Blandings Public House, High Street, Lincoln on the first and third Wednesday of every month. Contact John Clifford, 448 Newark Road, Lincoln LN6 8RX, tel: 0522 2168.

**Skegness Computer Club**, meets at County Hotel every other Monday, 7-9.30pm. Contact Reg Potter, 118 Beresford Avenue, Skegness, tel: 0754 3594.

## LIVERPOOL

**BBC Microgroup Liverpool** meets at Old Swan Technical College, Liverpool, on the first Wednesday of every month. Contact Nick Kelly, 56 Queens Drive, Walton, Liverpool L4 6SH.

## LONDON

**Croydon Micro-Computer Club** meets on the first and fourth Tuesday of every month. Contact Vernon Gifford, 111 Selhurst Road, Selhurst SE25 6LH, tel: 01-653 3207.

**Computer Users Club**. Contact Tony Latham on 01-304 3910.

**East London Amateur Computer Club** meets at Harrow Green Library, Cathall Road, E11, on the second and fourth Tuesday of every month at 7-10pm. Annual subs: £5. Contact Fred Linger on 01-554 3288.

**Forum-80 London**, contact Leon Jay on 01-286 6207.

**Forum-80 Wembley**, contact Victor Saleh on 01-902 2546.

**Harrow Computer Group** meets at Harrow College of Higher Education, Room W24, Northwick Park, on alternate Wednesdays at 7pm. Contact Bazyle Butcher on 01-950 7068.

**Imperial College Microcomputer Club** meets at room 145, level 1, on Tuesdays at 7.30pm. Contact Tim Pantone, c/o I.C. Union Office, Prince Consort Road, London SW7 2BB.

**London School Computer Club**. Contact Burlington Danes School, Dane Building, DuCane Road, Hammersmith, London.

**Metropolitan Police Amateur Computing Club** meets on the first Thursday of every month at 7pm. Contact S Farley on 01-725 2428.

**68 Microgroup** meets at Regents Park Library, Robert Street, NW1, on the third Tuesday of every month at 7.30pm. Annual subs: £5. Contact Jim Anderson, 41 Peabworth Road, Harrow, Middlesex.

**North London Hobby Computer Club** meets at the Polytechnic of North London, Holloway, London N7 8DB, on every Monday, Tuesday, Wednesday and Thursday during term time and one evening a week during holidays. Annual subs: adults £25, family £40, jobless, pensioners, poly students £5. Contact Robin Bradbeer 01-607 2789.

**Paddington Computer Club** meets at Paddington College, 25 Paddington Green, London W2 1NB. Contact Peter Hill on 01-723 5762.

**Post Office HQ Microcomputer Club** meets at room B145, River Plate House, 12-13 South Place, off Moorgate, on the second Thursday of every month. Contact Vernon Quaintance, British Telecom Enterprises, Cheapside House, 138 Cheapside EC2U 6JH, tel: 01-726 4716.

**The SOBAT Computer Club** meets once a fortnight. Subs: £4. Produces monthly letter. Contact Mr T Kavani, Berridge House, Hillfield Road, London NW6.

**South East London Microcomputer Club** meets at Thames Polytechnic, Greens Ends, Woolwich SE18, on alternate Wednesdays at 7pm. Annual subs: £5. Contact Peter Philipps, 61 Grainger Road, SE3, tel: 01-853 5829.

**Southgate Microcomputer Club** meets at Room B106 Southgate Tech, fortnightly on Thursdays at 7.30pm. Annual subs: £5. Contact Kevin Pretorius on 01-882 2282. See Prestel page 25820645 for details.

**West London Personal Computer Club** meets at Back room, Fox & Goose pub, Hanger Lane, Alperton, on the first Tuesday of every month at 7.45pm. Annual subs: £5 adults, £2.50 under 16s & pensioners. Contact Graham Brain on 01-997 8986.

## MANCHESTER

**Manchester Computer Club** meets at the Department of Computer Science, Manchester University, Oxford Road, Manchester, on the first and third Thursday of every month at 7.30pm. Contact David Wade, 061-941 2486.  
**Small Business Computer Users Club**. Proposed new club to meet the last Tuesday every month, subs: £7.50. Contact K Wadsworth on 061-740 7232 after 5pm.

## MERSEYSIDE

**Bolton Computer Club** meets Room E4/E24 Bolton Institute of Higher Education, Deane Road, Bolton, on Thursdays. Annual subs: £1. Contact David Atherton, 16 Douglas Street, Atherton, Manchester M29 9FB.

**Merseyside Microcomputer Group** meets at Merchant Taylor's School, Crosby, on second Thursday every month. Contact Mr F Shaw, 14 Albany Avenue, Eccleston Park, Prescot, tel: 051-426 5536.

**Southport Computer Club** meets weekly. Contact Ian Bristone, 28 Weld Road, Southport, Merseyside PR8 2DL, tel: 0704-64524.

**Wirral Microcomputer Users Group** meets at Birkenhead Technical College every Monday. Contact J Phillips, 14 Helton Close, Birkenhead, Merseyside L43 9HP.

## Remember

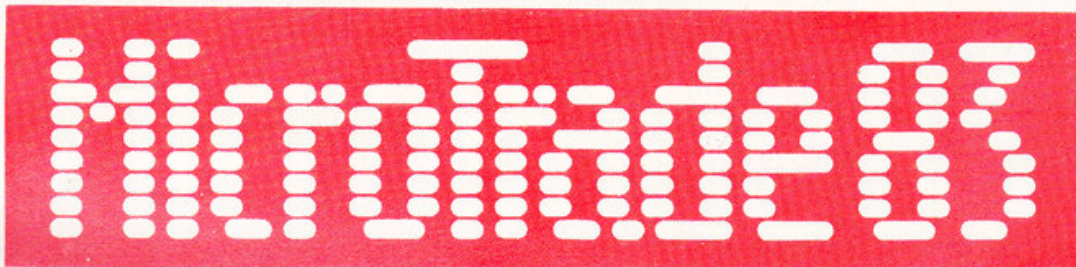
Let us know about your micro club or user group so we can be sure the information printed here is up to date. Drop a card to Sandra Grandison, Listings Editor, at *Personal Computer News*, 62 Oxford Street, London W1A 2HG, or give her a call on 01-636 6890.

# MOST OF THE PEOPLE READING THIS AD SHOULDN'T BE READING THIS AD...

Unless, that is, you're over 18 and a bona fide computer retailer or distributor or thinking of becoming one. If so, you're invited to **MICROTRADE 83** at London's Barbican Centre from 6-8 July.

**MICROTRADE 83** is unique. Not only because there will be many new products and services on display, from Act, Burroughs, Logica, Portico and Sharp, amongst others, but because it's the only microcomputer show for the trade alone.

Which means everyone will be speaking the same language – with exhibitors looking for retailers and distributors and visitors talking availability, margins and support.



**SPONSORED BY MICROSCOPE  
BARBICAN CENTRE, LONDON.  
6-8 JULY.**

**Make a stake in the future.** Phone Timothy Collins on 01-486 1951 for **your free invitation**, or send your letterhead or business card marked 'MICROTRADE' to Montbuild Ltd 11 Manchester Square London W1M 5AB (01-486 1951)

MICROTRADE 83 is a trade-only show. No-one under 18 admitted  
**For special MICROTRADE travel and accommodation arrangements contact:**  
**Pharoah Hughes Associates – 01-995 8995.**

# MIDDLESEX

**Sunbury** Computer Club meets at St Benedicts Hall, Napier Road, Ashford, on the last Tuesday of every month at 8pm. Contact Simon Taylor, 8 Priory Close, Sunbury-on-Thames, Middlesex. Contact Simon Clark, 83 Watling Street, Towcester, Northants NW12 7AG.

# NOTTINGHAMSHIRE

**Ashfield** Computer Club meets at Carsic Junior School, St Mary's Road, Sutton in Ashfield on the first and third Thursday every month. Annual subs £3. Contact Derrick Daines, c/o Cuttings Avenue, Sutton in Ashfield, Notts.

**Eastwood Town** Micro Computer Club meets at Devonshire Drive Junior School every Wednesday at 5.45pm. Annual subs: £5.50 adults, £2.75 juniors, £4.50 OAPs. Contact Ted Ryan, 15 Queens Square, Eastwood, Nottingham NQ16 3BJ.

**Nottingham** Microcomputer Club meets at Friends Meeting House, Clarendon Street, Nottingham, on the first Tuesday of every month. Annual subs: £5.50 adults, £2.50 juniors, OAPs. Contact Mr E Harvey, 68 Roseleigh Avenue, Nottingham NG3 6FH. tel: Nottingham 608491.

**Workshop** Computer Group. New club, first meeting June 14 in Workshop library lecture room. Contact Mr Andrews, Workshop 487327.

# NORFOLK

**Anglia** Computer User Group. Contact Jan Rejzl, 128 Templemere, Sprowton Road, Norwich. tel: 0603-29652.

**East Anglian** Computer User's Group meets at Crome Community Centre, Telegraph Lane, Norwich. Contact Gill Rijzi, 88 St Benedicts, Norwich.

**South Northants** Computer Group meets at Anchor House, Moat Lane, Towcester, on Wednesdays at 7.30pm.

# OXFORDSHIRE

**Association of Computer Clubs.** Annual subs: £5, £2.50 under 18s and OAPs. Contact Rupert Steele, St John's College, Oxford OX1 3JP.

**Microcos** meets at Clarendon Lab, Parks Road, Oxford, every week during term. Contact Rupert Steele, St John's College, Oxford OX1 3JP.

**Oxford** Personal Computer Club. Annual subs: £8. Contact Len Phelps, Southport Cottage, Sutton Courtenay, Nr Abingdon, Oxon OX14 4AU.

**Ridgeway** Computing Club meets at Swan Hotel, East Ilsley, on the second Tuesday every month. Contact Mike Magney, Beavers, South Street, Blubury, Didcot, Oxon OX11 0JU.

# SHROPSHIRE

**Ludlow & District** Microcomputer Club meets at Diocesan Education Centre, Lower Galdeford, Ludlow, on the second Monday of every month at 7.30pm. Annual subs £7.50 family, £5 adult, £2.50 student.

**Shrewsbury** Micro Club meets at Shrewsbury Shirehall once a month. Beginners' Basic course and many machines on display. Contact Mr V Ives, 6 Bramley Close, Severn Meadows, Shrewsbury SY1 2TP.

**Telford** Computer club meets at Telford ITEC on every Monday 6-9pm. Annual subs: £3.50, £1.50 unemployed. Contact John Murphy, 10 Brichmore, Brookside, Telford TF3 1TF. tel: 0952-595959.

# SOMERSET

**Sharp M280** Club, contact Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset.

**Yeovil** Computer Club. Contact D G Carrington, 2 Romsey Road, Yeovil, Somerset BA21 5XN.

# STAFFORDSHIRE

**Alsager** Computer Club, meets at Alsager Comprehensive School, Stoke-on-Trent, Staffs, fortnightly on Tuesday. Contact Rex Charlesworth on 09363-77270.

**The Amateur Computer Club** of North Staffs meets on the third Wednesday every month. Annual subs £3. Contact J Roll, 16 Hill Street, Hednesford, Staffordshire WS12 5DS.

**ICL Birmingham** Branch Micro Club, c/o WBA Ecclestone, 26 Browns Lane, Tamworth, Staffs.

**Tame Valley** Computer club, contact Tim Marshall, 32 Milton Avenue, Leyfields, Tamworth, Staffordshire B79 8JG.

# SUFFOLK

**Suffolk** Microcomputer Club meets monthly. Annual subs £5. Contact Mr S Pratt, c/o Microtek, 15 Lower Brook Street, Ipswich, Suffolk.

# SURREY

**Ashted** Computer Club meets on the last Thursday of every month. Contact P Palmer, 8 Corfe Close, Ashted, Surrey.

**Thames Valley** Computer Club meets in Griffin Pub, Caversham. Annual subs £1.50 a meeting. Contact Phil Warn, Reading RG4 8TA.

**Thames Valley** Amateur Computer Club meets at Griffin, Caversham, on the first Tuesday every month. Contact Brian Quarm, 25 Roundway, Camberley, Surrey GU15 1NR. tel: Camberley 22186.

**Ewell** Micro Club, contact Dave De Silva, 316 Kingston Road, Ewell, Surrey KT19 0SU.

**Farnham** Computer Club, meets at Farnham 6th Form College, Morley Road, Farnham, Surrey on the second Wednesday every month. Annual subs: £2. Contact Adam Sharp, 14 Thorn Road, Boundstone, Farnham, Surrey.

**West Surrey** Computer Club meets at Paddock Room, Green Man Public House, Burpham, Guildford, the first Thursday of every month. Annual subs £5. Contact Chris Karney on 0483-68121.

**ITN Computer** Club meets on Fridays. Contact A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE. tel: 0485 62035.

**TI Home** Group, annual subs: £12. Contact P Dicks, 157 Bishopsford Road, Morden, Surrey.

**CBBS London** meets on Sundays 4-10pm. Contact P Goldman, PO Box 100a, Surbiton, Surrey KT5 8HY.

**Sutton Library** Computer Club meets at Central Library, St Nicholas Way, Sutton, Surrey, on the first Friday of every month at 6pm and second and third Tuesday of every month. Annual subs: £6, £4 OAPs, £2 family. Contact Dave Wilkins on 01-642 3102.

**Atari** Computer Enthusiasts meets at 8 Cosdach Avenue, Wallington, Surrey SM6 9RA. subs: £20. Contact Adrian Miles, tel: 01-647 1713.

**Association of London** Computer Clubs, contact Len Stuart, 89 Mayfair Avenue, Worcester Park, Surrey KT4 7SJ.

**Worthing & District** Microcomputer Club meets at Rose Wilmot Youth Centre, Littlehampton Road, Worthing, on alternate Sundays 11am-1pm. Annual subs £4 adults, £2 students, £5 family. Contact B. Thomas, 11 Gannon Road, Worthing, W. Sussex, BN11 2DT. tel: 0903 36785.

**Richmond** Computer Club meets at Richmond Community Centre, Sheen Road, on the second Monday of every month at 8pm. Contact Bob Forster, 18a The Barons St Margarets, Twickenham, Middlesex, tel: 01-892 1873.

# SUSSEX

**West Sussex Microcomputer** Club meets at Room RO6, Robinson Road Annexe, Crawley, on the first and third Monday every month. Annual subs: £6 adults, £3 students. Contact J Clarke, 31 Hyde Heath Court, Pound Hill, Crawley, W Sussex, tel: 0293-884207.

**Mid-Sussex Microcomputing** Club. Contact Jeff Hayden, 2 Hillary Close, East Grinstead, W Sussex RH19 3XQ.

**Micro Enthusiasts**, new club proposed. Contact G Diannage, 16 Malvern Street, Hove, Sussex BN3 3YR.

**Arun** Microcomputer Club meet at Wick Amenity Centre, Wick Farm Road, Littlehampton, W Sussex, on the first Monday of every month at 8pm, and third Sunday of every month at 6pm. Fees: £3 six months, £1 joining fee. Contact P Cherriman, 7 Talbot Road, Littlehampton, West Sussex DN17 7BL.

# TYNE & WEAR

**Newcastle upon Tyne** Personal Computer Society meets at Room D103, Newcastle Polytechnic on the first Tuesday of every month. Annual subs £6. Contact Pete Scargill, 21 Percy Park, Tynemouth, tel: 0632-573905.

# WEST MIDLANDS

**Cannock** Computer Society meets at Cannock Computer Systems, Old Penkridge Road, Cannock, fortnightly. Annual subs: £3 adults, £1 students. Contact Terry Sale, 20 Redwood Drive, Chase Terrace, Walsall WS7 8AS.

**Walsall** Computer Club meets at Park Hall Community School on the second and fourth Monday every month 6.45-9.45pm. Annual subs £5 adults, £3.50 students. Contact Alison Hunt, 58 Princes Avenue, Walsall, W Midlands, WS1 2DH. tel: 0922-23875.

**National Westminster** Personal Computer Society. Contact P Moore 021-2366176, ext 382.

**Central Program Exchange**, annual subs: full membership £25 Europe, small users service £10 Europe. Contact Mrs Judith, tel: Wolverhampton 28521.

**West Midlands** Amateur Computer Club meets at Enfield School, Love Lane, Stourbridge, on the second and fourth Tuesday every month. Annual subs £4, £3 full-time students. Contact John Tracey, 100 Booth Close, Brierley Hill, Kingswinford, W Midlands, tel: 0384-70097.

# WILTSHIRE

**Chippenham and Calne**, proposed new club. Contact Matthew Jones, Pinhills, Calne SN11 0LY.

# WORCESTER

**Worcester & District** Computer Club meets at Old Pheasant Inn, New Street, Worcester, on the second Monday every month at 8pm. Contact D Stanton, 55 Vauxhall Street, Rainbow hill, Worcester WR3 8PA.

# YORKSHIRE

**Barnsley Co-Operative** Computer User Group meets at Co-Op Social Club, Pogmore, Barnsley, on the last Tuesday every month at 7.30pm. Annual subs £1. Contact James Bridson, c/o 39 Kereforth Hall Road, Barnsley, South Yorks S70 6NF. tel: 0226-41753.

**Doncaster** Amateur Computer Society meets in YMCA, Wood Street, on the first Wednesday every month. Contact John Wilkinson, 316 Bawtry Road, Doncaster, S. Yorkshire, tel: 0302-868379.

**Greenhead** Grammar School Computer Club. Contact Brian Smith, Greenhead Road, Keighley, West Yorks BD20 6EB. tel: 0535-62828.

**Huddersfield** Computer Club meets every Monday. Contact Chris Townsend, 760/4 Manchester Road, Linthwaite, Huddersfield, tel: 0484-657299.

**Leeds Microcomputer** Users Group meets at 8 Regent Street, Chapel Allerton, fortnightly on Thursday at 6pm. Contact David Parsons, 22 Victoria Walk, Horsforth LS18 4PL.

**Program Power**, contact R Simpson, 5 Wemsley Road, Leeds LS7 2BX. tel: 0532-683186.

**Pennine & District** Computer Club meets at 26 Mill Hey, Haworth, W Yorks, on Saturday and Sunday. Contact Douglas Bryant, 26 Mill Hey, Haworth, W Yorkshire, tel: 0535-43007.

**Shipley College** Computer Group meets on Tuesdays. Contact Paul Channell, tel: 0274-595731.

**South Yorkshire** Personal Computer Group meets at General Lecture Theatre, St Georges Building, Mappin Street, Sheffield, on second Wednesday every month at 7.30pm. Annual subs: £4. Contact Paul Sanderson, 8 Vernon Road, Tetley, Sheffield S17 3QE.

**Thurnscoe & District** Micro Users' Club meets at Thurnscoe Comprehensive School, Physics Lab, Clayton Lane, Thurnscoe, every Wednesday at 7.30pm during school term. Contact Mr James Davis, 62 Tudor Street, Thurnscoe East, tel: 0709-893880.

**West Yorkshire** Microcomputer Group meets on Tuesdays. Contact Phillip Clark, c/o Suite 204, Crown House, Armley Road, Leeds LS12 2ES. tel: 0532-632532.

**York** Computer Club meets at the Enterprise Club every Monday at 8pm. Contact K Thomas, Green Lea, Ripon Road, Harrogate, North Yorkshire HG1 2BY. tel: 0904-38239.

# SCOTLAND

**Bishopton** Computer Club meets at 'Cwa Ben', Sachelcourt Avenue, Bishopton, Renfrewshire, on Sunday once a month (next meeting May 22 at 2.30pm). Contact Alasdair Law, 10 Dungalss Road, Bishopton, Renfrewshire PA7 5EF.

**Edinburgh** Home Computing Club meets at Claremont Hotel, Edinburgh, on the 2nd, 3rd and 4th Wednesday of the month, produces bi-monthly newsletter. Contact I. Robertson, 031-441 2361.

**Scottish** Amateur Computer Society, contact Mike Anthony, 46 Moredun Park Gardens, Edinburgh EH17 7JR.

**Central Scotland** Computer Club meets at Falkirk College of Technology, Grangemouth Road, Falkirk, on the first and third Thursday every month.

Contact James Lyon, 78 Slamannan Road, Falkirk FK1 5NF.

**Fife** Computer Users Club meets fortnightly. Annual subs: adults, £5; under 18s, £3. Contact Murray Simpson, 31 Tom Steward Lane, St Andrews, Fife, Scotland KY16 8YB.

**Grampian** Amateur Computer Society meets at 35 Thistle Lane, Aberdeen, on the second and fourth Monday every month at 7.30pm. Annual subs: £12, £5 student, £2.50 junior. Contact Alan Morrison, 21 Beech Road, Westhill, Skene, Aberdeenshire AB36 6WR.

**Kemnay** Computer Club meets weekly. Contact S Stubbs, 15 The Glebe, Kemnay, Inverurie, Aberdeenshire.

**Inverness** Personal Computing Club meets every second Tuesday at 7.30pm. Subs: adults £5, juniors £2.50. Contact Gyl Mackenzie, 38 Ardconnell Street, Inverness IV2 3EX. tel: 0463-220922.

**Perth & District** Amateur Computer Society meets at Hunters Lodge Motel, Bankfoot, on the third Tuesday of every month at 7.30pm. Annual subs £5.

Contact Alastair McPherson, 154 Oakbank Road, Perth PH1 1HA.

**Skye and Lockalsh** Computer Society, proposed new club. Contact C Manvell, 25 Breacais Isol, Isle of Skye IV42 8QA.

**Strathclyde** Computer Club meets at Wolfson Centre, 106 Rottenrow, Glasgow, on the third Wednesday of every month. Contact B Duffy, 24 Lomand Drive, Condorrat, Cumbernauld G4 8NW.

**Wales**

**Abergele** Computer Club meets at Abergele CI Offices every Thursday at 7.30-10pm. Annual subs: £5 adults, £2.50 juniors. Contact W Jones, 77 Millbank Road, Rhyl, Clwyd, North Wales.

**Colwyn** Computer club meets at the Greens Hotel, Colwyn Bay, at 7pm. Contact D Bevan, c/o Abergele Road, Colwyn Bay, Clwyd LL29 7PA.

**81 Club** annual subs: £30 + vat. Contact Mike Hayes, tel: 0222-371732.

**Gwent** Amateur Computer Club meets at St Mary's Institute, Stow Hill, every Thursday at 7.30pm. Annual subs: £3.50. Contact Rothery Harris, 16 Alanbrook Avenue, Newport, Gwent, Wales NP23 6QJ.

**Pencoed** Amateur Computer Club meets fortnightly on Saturdays at Pencoed Library. Subs: adults, £5; OAP's and students, £3.50. Contact Philip Williams, 38 Bryn Rhedyn, Pencoed, Bridgend, Mid-Glamorgan CF35 6TL. tel: 05473 287.

**Pontypool** Computer Club meets at The Settlement, Roackhill Road, Pontypool, Gwent, on every Friday. Contact Graham Loveridge, on Pontypool 2827.

**Swansea & Southwest Wales** Amateur Computer Club meets on the last Friday every month. Contact Paul Griffiths, 1 Prescelli Road, Penlan, Swansea SA5 8AF.

**NORTHERN IRELAND**

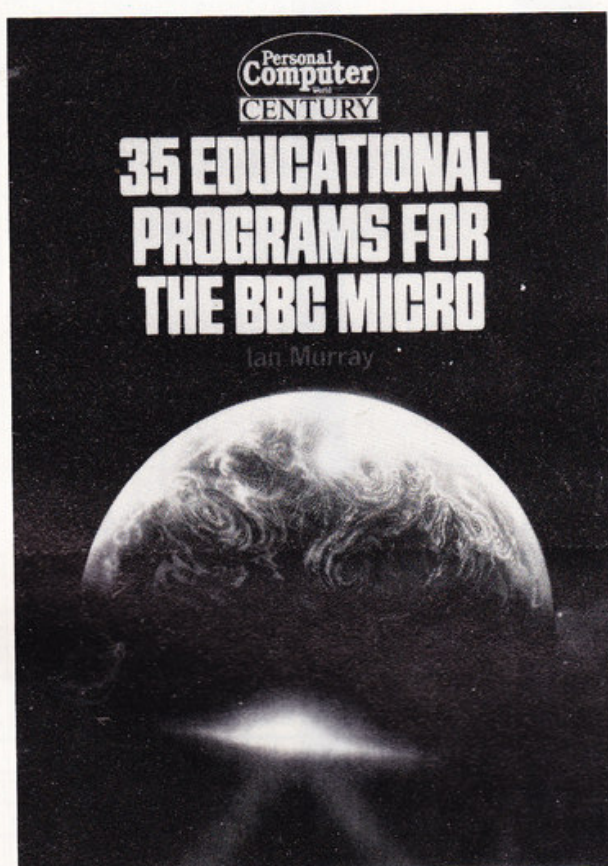
**Bangor** Computer Club (N Ireland). New club. Contact Derek Blanc, c/o Queen's University, Belfast, Northern Ireland.

**EIRE**

**Cork** Amateur Computer Club. Talks and demonstrations. Hardware, programming and games. Contact T Moriarty, Tiger Bay, Rochestown, Douglas, Cork, Eire.



# YOUR SEARCH FOR FULLY TESTED EDUCATIONAL PROGRAMS FOR THE BBC MICRO IS OVER



## 35 EDUCATIONAL PROGRAMS FOR THE BBC MICRO

Ian Murray

Here is a selection of fully documented programs ranging from mathematics to geography, history and general science to spelling.

Designed for use in schools, colleges – all programs have been checked in a classroom environment – and at home, this book will allow you to put your BBC to work as soon as it is unpacked. Each program makes full use of the BBC micro's remarkable graphics capabilities and together they provide a useful insight into programming techniques.

£6.95 (paperback)

240 pp

*Available through all good bookshops but if you experience any difficulty please fill in the form below.*

### ORDER FORM

To: Department EP 2  
George Philip Services Ltd  
Arndale Road,  
Wick, Littlehampton,  
West Sussex BN17 7EN

Please send me \_\_\_\_\_ copy/copies  
of 35 EDUCATIONAL PROGRAMS FOR THE BBC  
MICRO by IAN MURRAY at £7.55 per copy (post paid)

I enclose my cheque/postal order for £ \_\_\_\_\_  
(Please make cheques/postal orders  
payable to George Philip)

Name \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*Please allow 28 days for delivery*

## CENTURY

# DATABASES

This week PCN Databases lists a selection of add-ons for your micro. PCN keeps you up to date in three-week cycles, listing peripherals, then software, followed by micros.

Printers are best categorised by print-head type. The two most common methods of transferring type to paper are the **Dot matrix** and **Daisywheel** techniques.

A dot matrix printer uses a row of pins which are programmed to strike the paper through a ribbon and form the character as a pattern of dots.

The daisywheel acts more like a conventional typewriter, the character set being pre-formed on a wheel with each character on a separate spoke. As the interchangeable wheel rotates it is struck by a hammer to form the character impression.

Dot matrix printers tend to be faster than daisywheel but offer lower print quality.

In selecting a printer make sure the **interface** on your computer is compatible with those available as standard or at extra cost on the printer.

The ● sign means the interface is included in the price; ○ means you have a choice of interfaces included in the price; + means the interface will cost extra.

**Max Baud rate** indicates the approximate characters-per-second rate as they are fed into the printer.

The **buffer** stores characters sent by the computer. The printer can take characters in chunks, at a rate quicker than they are able to be printed, sometimes allowing the computer to be freed for further use.

**Lines per inch** indicates the maximum number of lines printed in a vertical inch. **Characters per inch** can be varied on some printers as the typesizes themselves can be adjusted.

**Maximum print speed** as indicated by the manufacturer tends to be a little optimistic. **Maximum print positions** tells you the optimum number of characters that can be printed in one line by the smallest character size on the printer. **Maximum paper width** is the widest paper the printer can take.

**Size** represents the space the printer takes up on a desk top. **The weight** of the printer is given in kilograms.

**Maximum copies** indicates the number of carbon copies that can realistically be produced at one time.

**Underlining** puts a line under characters while **bold type** thickens the characters to make them stand out. **True descenders** indicates that the print method allows for fully formed tails on letters such as p, g or q.

**Proportional spacing** puts the same space between characters whether they are a long 'm' or a short 'i'. **Block graphics** builds up pictures using rectangular blocks, while **High Resolution Graphics** uses smaller dots. **Bidirectional** means the printer can save time by printing left to right and then doing the next line backwards right to left. Similarly, **Logic Seeking** enables the machine to save more time by printing the short lines without sweeping over the whole width of the page.

**Feed methods** comprise **fanfold** which uses continuous stationery sheets folded road-map style drawn into the printer by a tractor mechanism. The tractor cog fits into holes in the fanfold paper and takes the paper past the printer mechanism. **Roll** is a roll of paper that feeds into the printer, usually using **friction feed** where the paper is gripped between two rollers, typewriter-style. **Cut sheet** indicates the printer uses single sheets like a typewriter.

**Distributor:** to find which company distributes a particular add-on, use the code listed in this column to refer to the distributor table.

The table is at the end of the listings, and gives the distributor's name and telephone number.

## PERIPHERALS

Make & Model	Price inc VAT	Printhead type (M = matrix)	INTERFACES ● inc in price. ○ = options at extra cost (+)					Max baud rate	Buffer Memory Size (in characters)	Lines per inch	Characters per inch	Max print Speed (CPS)	Max print positions	Max paper width in inches	Size (base area in cms)	Weight (in kilos)	Max Copies	Underlining	Bold Type	True Descenders	Proportional Spacing	Block Graphics	High Resolution Graphics	Bi-Directional	Logic Seeking	Feed Method					Distributor
			I-EEE	Centronics	20ma	RS232	Others (+)																								
							Others ●																			Others (+)					
Adler TRD 170	£833	Daisywheel	●	●	●	●	●	9600	256	6,8	10,12,15	17	198	15,5	56×37	13	6	●	●	●	●	●	●	●	●	●	●	●	T2		
Anadex DP 9000A	£1,397	M 7×9, 9×9	●	●	●	●	●	9600	2700	6,8	10,12,5,15,16,7	200	106	9,5	40,9×57	13,6	6	●	●	●	●	●	●	●	●	●	●	●	I1		
Anadex DP 9001A	£1,397	M 7×9, 11×9	●	●	●	●	●	9600	2700	6,8	10,12,5,15,16,7	200	132	9,5	40,9×57	13,6	6	●	●	●	●	●	●	●	●	●	●	●	I1		
Anadex DP 9500	£1,397	M 9×9	●	●	●	●	●	9600	700	6,8	10,12,13,3	200	176	15,5	39×59,9	16	6	●	●	●	●	●	●	●	●	●	●	●	I1		
Anadex DP 9500A	£1,397	M 7×9, 9×9, 13×9	●	●	●	●	●	9600	2700	6,8	10,12,13,3	200	176	15,5	40,9×70,3	16	6	●	●	●	●	●	●	●	●	●	●	●	I1		
Anadex DP 9500L	£1,295	M 7×9, 9×9	●	●	●	●	●	9600	700	6,8	10	150	132	15,5	39×59,9	16	6	●	●	●	●	●	●	●	●	●	●	●	I1		
Anadex DP 9501	£1,397	M 7×9, 11×9	●	●	●	●	●	9600	700	6,8	10,12,5,15,16,7	200	220	15,5	39×59,9	16	6	●	●	●	●	●	●	●	●	●	●	●	I1		
Anadex DP 9501A	£1,397	M 7×9, 11×9	●	●	●	●	●	9600	2700	6,8	10,12,5,15,16,7	200	220	15,5	40,9×70,3	16	6	●	●	●	●	●	●	●	●	●	●	●	I1		
Anadex DP 9620A	£1,489	M 7×9, 9×9, 13×9	●	●	●	●	●	9600	1500	6,8	10,12,15,16,4	200	216	15,5	40,9×70,3	16	6	●	●	●	●	●	●	●	●	●	●	●	I1		
Anadex WP 6000	£2,616	M up to 18×20	●	●	●	●	●	19200	4500	6,8,12,16	10,12,16,7	285	220	15,5	46,7×74,9	25	6	●	●	●	●	●	●	●	●	●	●	●	I1		
ASP 3500	£977	M 9×7, 9×9	○	○	○	○	○	9600	80	6,8	10,12,16,5	180	217	14	61,5×40,5	19	6	●	●	●	●	●	●	●	●	●	●	●	M1		
Brother HRI	£747	Daisywheel	○	○	○	○	○	9600	2000	4,5,6	10,12,15	35	198	16,5	38,1×71,2	16	8	●	●	●	●	●	●	●	●	●	●	●	J1		
Canon AP400	£1,140	Daisywheel	●	●	●	●	1	19200	4000	4,6,8	10,12,15	25	197	15,5	50,8×48,2	18,5	6	●	●	●	●	●	●	●	●	●	●	●	D1		
Centronics 159/4	£962	M 9×7	●	●	●	●	●	9600	768	6	5,8,18,10,16,36	150	80	10	38×35,6	10	5	●	●	●	●	●	●	●	●	●	●	●	B1		
Centronics 150/4	£682	M 9×7	●	●	●	●	1	9600	768	6,8	10,12,16,36	150	132	9,5	38,1×35,5	9,1	3	●	●	●	●	●	●	●	●	●	●	●	R1		
Centronics 152/4	£788	M 9×7	●	●	●	●	1	9600	708	6,8	10,12,16,5	150	217	9,5	38,1×35,5	9,1	3	●	●	●	●	●	●	●	●	●	●	●	R1		

PRINTERS

## PRINTERS

Centronics 154	£869	M 11x8	●	●	●	●	6,9,12,18	5,10,16,5	120	132	15	52,6x37.1	13	5	C1
Centronics 159/2	£881	M 9x7	●	●	●	●	6	5,8,18,10,16,36	150	132	10	38.1x35.6	10	5	B1
Centronics 351	£1,891	M 7x9	●	●	●	●	6,8	5,6,8,25,10,12,16,5	200	192	15	45.7x55.9	18	6	B1
Centronics 352	£1,966	M 7x8	●	●	●	●	6,8	5,6,7,5,8,25,13,2,15,16,5	200	218	14.5	55.9x45.7	18.1	6	C1
Centronics 353	£2,420	M 7x8	●	●	●	●	3,4,6,8,12	10,12,13,2,15,16,5	200	218	15	55.9x45.7	18.1	6	C1
Centronics 739/2	£710	M 11x9	●	●	●	●	6	5,8,3,10,16,7	100	132	9	36.8x27.9	5.4	5	C1
Centronics 739/4	£786	M 11x9	●	●	●	●	6	5,8,3,10,16,7	100	132	9	36.8x27.9	5.4	5	C1
Commodore 4022P	£454	M 6x7	●	●	●	●	2	5,10	40	80	10	36.8x33	9.9	3	C2
Commodore 8023	£1,029	M 5x8	●	●	●	●	2	5,10	150	250	15	51.4x36.8	11.6	3	C2
Data Products DP55	£1,687	Daisywheel	●	●	●	●	6,8	10,12,15	55	198	15	44.4x60.4	24	6	S1
Data Products M100	£1,790	M 9x9	●	●	●	●	6,8	5,8,10,16,5	140	218	16	67.5x59.4	27	6	S1
Data Products M120	£1,741	M 7x7	●	●	●	●	6,8	5,10,16,7	180	220	16	67.5x59.4	27	6	S1
Data Products M200	£1,979	M 7x7	●	●	●	●	6,8	5,10,16,7	340	340	16	67.5x59.4	27	6	S1
Data South DS180	£1,604	M 9x7	●	●	●	●	6,8	5,10,16,7	180	217	15.5	60.9x40.6	16	6	D2
Diablo SP1/P11	£2,127	Daisywheel	●	●	●	●	6,8	10,12,15	40	198	16	56.9x46.3	27.2	6	M2
Diablo 630	£2,127	Daisywheel	●	●	●	●	6,8	10,12,15	40	198	16.5	56.9x46.3	27	6	M2
DMP 100	£249	M 5x7	●	●	●	●	6,8	10,5	50	80	9.5	40.6x20.9	3.9	1	T1
DMP 200	£499	M 9x23	●	●	●	●	6,8	10	120	120	9.5	41.9x34.3	7.5	3	T1
DMP 400	£699	M 7x9, 9x9	●	●	●	●	6,8	10,12,16,7	140	220	15	61.9x40.4	19	5	T1
DMP 500	£1,099	M 23x9	●	●	●	●	6,8	10,12,16,7	220	220	15	58.4x33	12.7	5	T1
DMP 2100	£1,399	M	●	●	●	●	6,8,12	10,12,16,6	160	232	15	55.2x38.1	20	8	T1
DRE 8820	£895	M 9x7	●	●	●	●	6,8	10,12,5,15,16,7	150	266	15.5	64.7x47.6	23	5	G1
DRE 8830	£1,300	M 9x7	●	●	●	●	6,8	10,12,13,3,15,17	180	226	15.5	64.7x47.6	23	5	G1
DRE 8840	£1,370	M 9x7	●	●	●	●	6,8	10,12,13,3,15,17	240	226	15.5	64.7x47.6	23	5	G1
DRE 8910	£1,585	M 9x7, 9x11	●	●	●	●	6,8	10,12,13,3,15,17	160	226	15.5	64.7x47.6	23	5	G1
DRE 8925	£1,660	M 12x8, 12x20	●	●	●	●	6,8	10,12,15,16,7	120	226	15.5	64.7x47.6	23	5	G1
DRH 80	£621	M 7x9	●	●	●	●	6,8	10,12,5,15,17,5	80	140	8	41.5x30	7.5	4	T1
DRH 136	£776	M 7x9	●	●	●	●	6,8	10,12,15,16,5	120	224	15.5	48.6x30.3	10.5	3	T1
DRS 250	£1,431	M 7x9	●	●	●	●	6,8	10,12,15	250	198	6	61x45	25	5	T1
DWP 410	£995	Daisywheel	●	●	●	●	6,8	10,12	25	160	16	60.3x19.6	16	5	T1
Epson MX80	£401	M 9x9	●	●	●	●	6,8	5,8,25,10,16,5	80	132	10	40.6x38.1	5.5	3	E1
Epson MX80 FTT/3	£447	M 9x9	●	●	●	●	6,8	5,8,25,10,16,5	80	132	10	40.6x38.1	7.7	3	E1
Epson MX82	£470	M 9x9	●	●	●	●	8	17,2	80	159	10	40.6x38.1	7.7	3	E1
Epson MX100FT/3	£574	M	●	●	●	●	8	16,5	100	233	15.5	59.7x40	10	3	E1
Facit 4510	£672	M 9x7	●	●	●	●	6,8	6,12,16,17,5	100	132	11.5	42.5x34.8	9	5	A2
Facit 4525	£1,150	M 9x9	●	●	●	●	6,8	5,8,5,10,17	280	132	11.5	46.5x35.6	13.5	5	A2
Facit 4542	£2,300	M 9x14	●	●	●	●	6,8	10,12,15	250	132	18	64x45.7	40	5	A2
Fujitsu 830	£2,179	Daisywheel	●	●	●	●	3,6,8	10,12,15	80	204	15	59.7x44.9	18	6	Z1
General Electric 2030	£961	M 9x7	●	●	●	●	2,4,6,8,12	10,13,16,5	60	218	15.5	54.6x47.6	9.9	2	Z1
General Electric 2120	£1,751	M 9x7	●	●	●	●	2,4,6,8,12	10,13,16,5	150	218	15.5	54.6x47.6	9.9	2	Z1
General Printer GP300	£2,287	M 9x9, 18x25	●	●	●	●	6,8	10,12,15	300	120	13.5	52x44.5	20	5	12
General Printer GP300L	£2,490	M 9x9, 18x25	●	●	●	●	6,8	10,12,15	300	132	13.5	63.5x51.5	24	5	12
Integrex	£914	M 7x5, 9x6	●	●	●	●	6,8	10	125	80	10	38.7x32.5	9.6	1	D3
ITT Swift 3342	£1,719	M 9x7	●	●	●	●	2,3,4,6,8,12	10,13,16,5	150	240	15.5	56x47	10.4	6	13
ITT Swallow	£914	M 9x7	●	●	●	●	2,4,6,8,12	10,13,16,5	60	240	15.5	56x47	10	6	13
Lear Siegler	£1,667	M 9x9	●	●	●	●	6,8	10,12	180	218	16	68.6x50.2	22.7	5	14
Logabax LX213	£1,840	M 9x9	●	●	●	●	6,8	10,12,16,5	180	218	15	57.1x43.2	17	5	T3
Logabax LX217	£2,242	M 9x9	●	●	●	●	6,8	10,12,16,5	180	218	15	57.1x43.2	17	5	T3
Micro Peripherals 99G	£517	M 9x7, 11x9	●	●	●	●	6,8	10,12,16,5	100	136	9.5	41.1x27.3	6.7	2	T3
Micro Peripherals 150G	£918	M 9x7, 11x9	●	●	●	●	6,8	10,12,16,5	150	226	15	58.4x39.9	11.2	2	T3
MT120 I	£600	M 9x7	●	●	●	●	6,8	10,12,5,16,6,20	160	132	10	34.3x24.1	7.5	4	M3
MT120 L	£765	M 9x7	●	●	●	●	6,8	10,12,5,16,6,20	160	132	10	34.3x24.1	7.5	4	M3
MT1802 I	£1,845	M 7x9	●	●	●	●	6,8	10,16,6	200	218	16	55.9x76.2	8.6	5	M3
MT1802 L	£2,205	M 7x9	●	●	●	●	6,8	10,16,6	200	218	16	55.9x76.2	8.6	5	M3
MT440 I	£1,966	M 9x7	●	●	●	●	3,4,6,8,12	10,12,5,16,6	400	220	16	66x45.7	36	5	M3
MT440 L	£2,185	M 9x7	●	●	●	●	3,4,6,8,12	10,12,5,16,6	400	220	16	66x45.7	36	5	M3

# PRINTERS

[illegible]

Make & Model	Price inc VAT	Printhead type (M = matrix)	INTERFACES ● inc in price, ○ = options at extra cost (+)					Max baud rate	Buffer Memory Size (in characters)	Lines per inch	Characters per inch	Max print Speed (CPS)	Max print positions	Max paper width in inches	Size (base area in cms)	Weight (in kilos)	Max Copies	Underlining	Bold Type	True Descenders	Proportional Spacing	Block Graphics	Bi Directional	Logic Seeking	Feed Method					Distributor
			I-EEE	Centronics	20ma	RS232	Others ●																		Others (+)					
Texas Instruments 781	£1,259	Thermal 7x5	●			●	9600	256	6	10,17	120	80	8.5	40.6x15.24	8.5	1						●			●				D5	
Texas Instruments 810	£1,369	M 9x7	+	●		●	9600	256	6.8	5.8,10,16.5	150	132	15.5	65.4x50.8	25	9							●		●				D5	
Texas Instruments 820	£1,438	M 9x7		○		○	9600	2000	6.8	5.8,10,16.5	150	218	15.5	64x45.7	40	5							●		●				D5	
Texas Instruments 840	£847	M 9x9		+		●	9600	256	6.8	10,16.5	75	220	15	57.6x43.2	11.3	3							●		●				R1	
TRD 170S	£834	Daisywheel			○	○	19200	256	6	10,12,15	17	132	15.5	50.8x33	13	6	●	●	●	●	●		●		●				T2	
Toshiba T1350	£1,898	M			○	○	9600	256	6	10,12	192	192	15	55x38	19.9	3	●	●	●	●	●	●	●	●	●	●	●	●	T4	
Walters WM2000	£477	M 9x9	+	●	+	+	19200	750	6.8,12	5,6,6.8,3,10,13,3,16.6	128	132	10	43.9x33.5	12	4	●	●	●	●	●	●	●	●	●	●	●	●	W1	
Walters WM4000	£713	M 9x9	+	●	+	+	19200	1500	6.8,12	5,6,6.8,3,10,13,3,16.6	150	220	15	63x39	13	5	●	●	●	●	●	●	●	●	●	●	●	●	W1	
ZX Printer	£40	Electrical					1	N/A	9	32	50	32	4	14x4.6	N/A	1	●	●	●	●	●	●	●		●				S5	

PRINTERS

## PRINTERS

## MONITORS

These have been split into **colour** and **monochrome**. **Screen size** is a diagonal measurement in inches. Nearly all monochrome monitors accept a **composite video** signal from the computer and most computers are equipped with composite video output. Colour monitors feature a wider range of **signal** systems than mono and it is important to match the output of your computer to the input of the monitor. An **audio channel** will enable sound to be output from a speaker inside the monitor. **Mono tint** refers to the colour of the text on a mono monitor. Some monitors come with an **anti-glare filter** to relieve operator discomfort. **Band width** refers to the frequency range of signals to which the monitor can respond in Megahertz. **Dot resolution** indicates the number of dots which can be displayed across the screen: the more dots, the sharper the picture. **Dimensions** indicates the area the unit occupies on the desktop.

Make & Model	Price inc VAT	Screen size (in inches)	Signal				Audio channel	Anti-glare filter	Band width (in Mhz)	Dot resolution	Dimensions (cms)	Weight (kilos)	Distributor
			Modulated PAL	Unmodulated PAL	TTL RGB	75 Ohm linear	32 bit 4 bit TTL						
Crofton C1401	£300	14			●				10	600	37x42	10	C4
HM 2713	£3,120	13	●	●	●				25	720	54x40	36	B1
HM 2719B	£2,553	19	●	●	●				25	960	50x49	46	B1
HM 2719C	£3,042	19	●	●	●				25	960	50x49	46	B1
HM 3619	£3,548	19	●	●	●				45	1280	50x44	48	B1
Lion Cub 1431-TTL	£286	14	●		●				7	585	65x57.5	11.5	S6
Lion Cub 1436	£316	14	●		●				7	585	65x57.5	11.5	S6
Lion Cub 1439	£339	14	●		●				7	585	65x57.5	11.5	S6
Lion Cub 1441-TTL	£546	14	●		●				15	585	65x57.5	11.5	S6
Lion Cub 1445	£633	14	●		●				15	895	65x57.5	11.5	S6
Lion Cub 1449	£604	14	●		●				15	895	65x57.5	11.5	S6
Lion Cub 1451-TTL	£430	14	●		●				10	653	65x57.5	11.5	S6
Lion Cub 1455	£483	14	●		●				10	653	65x57.5	11.5	S6
Lion Cub 1459	£459	14	●		●				10	653	65x57.5	11.5	S6
Lion Cub 2031-TTL	£344	20	●		●				7	585	65x57.5	11.5	S6
Lion Cub 2035	£431	20	●		●				7	585	65x57.5	11.5	S6
Lion Cub 2036	£390	20	●		●				7	585	65x57.5	11.5	S6
Lion Cub 2039	£371	20	●		●				7	585	65x57.5	11.5	S6

## COLOUR MONITORS

Make & Model	Price inc. VAT	Screen size	Composite video	Audio channel	Mono tint	Anti-glare filter	Band width (Mhz)	Dot resolution	Dimensions (cms)	Weight (kilos)	Distributor
AVT DM 210G	£138	12	●		Green	●	12	750	30.8x29.6	9.5	L1
EG 100	£77	12	●		Green		8	700	37.5x29	8	L1
EG 101	£91	12	●		Green		12	700	37.5x29	8	L1
LEDM 091D	£99	9	●		B&W	●	12	750	22x24	5.4	L1
LEDM 0910	£121	9	●		Green	●	12	750	22x24	5.4	L1
Luxor 10	£212	10	●		Orange	●	22	625	N/A	8	P1
Luxor 15	£283	15	●		Orange	●	22	625	N/A	13	P1
M9	£131	9	●		Green		15-22	650	22.4x25.7	5.7	P1
M12	£144	12	●		Green		15-22	800	29.3x30	9.3	P1
Novex	£114	12	●		Green		12	750	N/A	N/A	P1
N12 1003	£112	12	●		Green		24	800	23x26.5	7	P1
Prince	£126	12	●		Green		24	800	33x50	7	C4
PM 102	£126	9	●		Green	●	24	800	22x28	7	C4
PM 1201	£138	12	●		Green		24	800	33x50	7	C4
Zenith ZVM121	£99	12	●		Green	●	15	N/A	29x29	6.5	P2

## MONOCHROME MONITORS

AVT DM 210G	£138	12	●	Green	●	12	750	30.8×29.6	9.5	L1
EG 100	£77	12	●	Green		8	700	37.5×29	8	L1
EG 101	£91	12	●	Green			700	37.5×29	8	L1
LEDM 091D	£99	9	●	B&W		●	12 750	22×24	5.4	L1
LEDM 0910	£121	9	●	Green		●	12 750	22×24	5.4	L1
Luxor 10	£212	10	●	Orange		●	22 625	N/A	8	P1
Luxor 15	£283	15	●	Orange		●	22 625	N/A	13	P1
M9	£131	9	●	Green		15-22	650	22.4×25.7	5.7	P1
M12	£144	12	●	Green		15-22	800	29.3×30	9.3	P1
Novex	£114	12	●	Green		12	750	N/A	N/A	P1
N12 1003	£112	12	●	Green		24	800	23×26.5	7	P1
Prince	£126	12	●	Green		24	800	33×50	7	C4
PM 102	£126	9	●	Green	●	24	800	22×28	7	C4
PM 1201	£138	12	●	Green		24	800	33×50	7	C4
Zenith ZVM121	£99	12	●	Green	●	15	N/A	29×29	6.5	P2

# DISK DRIVES

This section is divided into categories covering 5 1/4-in and 8-in floppy disks.

Disk data **capacity** is measured in kilobytes (K): one kilobyte = 1,024 characters. A **no of disks** column is included because some disk units contain two disk drives.

Manufacturers can vary the number of disk data **tracks** and these are divided into sectors. This **sectoring** system allows the information to be stored and retrieved by reference to a timing mark on the disk so the computer can keep track of its rotation. The system can be hard, where reference is kept by a hole in the disk, or soft, where the disk position is monitored by magnetic signals.

Some drives have one read/write head for each side of the disk so the buyer has a choice between **single or double-sided** drives. **BS** means that the drives are both single and double-sided.

As disk technology advanced it became possible to cram more data onto the floppy so drives will feature either **single or double** (data) **density**. **BD** means that the drives are both single and double density.

The interface acts as an interpreter so the computer and disk can exchange information. Each device must have the same interpreter before a useful cable connection can be made. The **connect** to column allows you to match the disk interfaces to those included in the disk drives or available at extra cost.

Make and Model	Price Inc VAT	Capacity	No. of disks	Tracks	Sectoring	Sides and density	Connects to	Distributor
							I-EEE RS232 BBC Apple II St. Shugart Nasbus Gemini 20ma Others	
Apple II	£399	143K	1	35	16	SS,SD		P2
Atari	£299	90K	1	40	Soft	SS,SD		A4
BASF 6106	£195	500K	1	48	Both	SS,SD		B6
BASF 6108	£240	500K	1	48	Both	DS,BD		B6
BASF 6118	£279	1Mb	1	96	Both	DS,BD		B6
Canon X8300	£600	640K	2	80	Soft	DS,DD		C5
CD 40	£679	400K	2	40	Both	SS,BD		C6
CD 50A	£424	500K	2	40	Both	SS,BD		C6
CD 50E	£569	1Mb	2	80	Both	SS,BD		C6
CD 50F	£712	2Mb	2	80	Both	DS,BD		C6
CD 80	£765	800K	2	80	Both	SS,BD		C6
CD 80D	£949	1.6Mb	2	80	Both	DS,BD		C6
Commodore 2031	£454	171K	1	35	Soft	SS,SD		C2
Commodore 4040	£799	343K	1	35	Soft	SS,SD		C2
Commodore 8050	£1,029	1Mb	2	77	Soft	SS,SD		C2
Commodore 8250	£1,489	2Mb	2	154	Soft	DS,DD		C2
Commodore VIC 1541	£345	171K	1	35	Soft	SS,DD		C2
Control Data 9408	£221	250K	1	40	Both	SS,BD		C7
Control Data 9409	£272	500K	1	40	Both	DS,BD		C7
Control Data 9409T	£420	1Mb	1	80	Both	DS,BD		C7
Control Data ZL141	£225	250K	1	40	Both	SS,DD		M5
Control Data ZL141B	£175	250K	1	40	Both	SS,DD		M5
Control Data ZL142	£360	500K	2	40	Both	SS,DD		M5
Control Data ZL241B	£240	500K	1	40	Both	DS,DD		M5
Control Data ZL291	£380	1Mb	1	80	Both	DS,DD		M5
Control Data ZL291*	£405	500.1Mb	1	40/80	Both	DS,DD		M5
Control Data ZL291B	£320	1Mb	1	80	Both	DS,DD		M5
Control Data ZL292	£640	2Mb	2	80	Both	DS,DD		M5
CS 40	£482	200K	1	40	Both	SS,BD		C6
CS 50A	£229	250K	1	40	Both	SS,BD		C6
CS 50E	£305	500K	1	80	Both	SS,BD		C6
CS 50F	£397	1Mb	1	80	Both	DS,BD		C6
CS 80	£523	400K	1	80	Both	SS,BD		C6
CS 80D	£627	800K	1	80	Both	DS,BD		C6
Cumana AS100	£252	200K	1	35	Soft	SS,BD		C6
Cumana DA8035	£857	655K	2	80	Soft	SS,BD		C6

## 5 1/4" DISK DRIVES

Make and Model	Price Inc VAT	Capacity	No. of disks	Tracks	Sectoring	Sides and density	Connects to	Distributor
							I-EEE RS232 BBC Apple II St. Shugart Nasbus Gemini 20ma Others	
EG 401AT	£370	102K	2	40	Soft	SS,BD		L1
Gemini 825	£403	400K	1	80	Soft	SS,DD		G2
Gemini 825	£518	800K	1	160	Soft	DS,DD		G2
Gemini 825	£661	800K	2	80	Soft	SS,DD		G2
Gemini 825	£776	1.6Mb	2	160	Soft	DS,DD		G2
Lowe EG 400AT	£426	200K	2	40	Soft	SS,BD		L1
Lowe EG 400T	£253	102K	1	40	Soft	SS,BD		L1
M 4853	£311	1Mb	1	80	Soft	SS,DD		A3
M 4854	£368	1.6Mb	1	77	Soft	DS,DD		A3
Megastore MIOS	£1,034	1.2Mb	2	80	Soft	DS,DD		V1
Multi Floppy Drive	£592	8Mb	5	770	Soft	SS,DD		H1
RM MDS-1	£1,950	144K	1	40	Soft	DS,SD		R3
RM MDS-2	£2,147	288K	2	40	Soft	DS,SD		R3
Scorpio 8	£863	8Mb	5	770	Soft	SS,DD		H1
Sharp MZ80 FB	£856	560K	2	70	Soft	DS,DD		S7
Tandy Colour	£449	175K	1	40	Soft	SS,DD		T1
Tandy 26-1160	£299	75K	4	40	Soft	SS,SD		T1
Tandy 26-3023	£299	156K	4	35	Soft	SS,SD		T1
Tandy Model 1	£389	90K	1	35	Soft	SS,SD		T1
Tandy Model 111	£369	175K	2	40	Soft	SS,DD		T1
TM 101-4	£282	1Mb	1	160	Soft	SS,DD		H1
TM 102-2	£393	2Mb	1	160	Soft	SS,DD		H1
TM 848-1	£389	800K	1	77	Soft	SS,DD		H1
TM 50-1	£147	250K	1	40	Soft	SS,DD		H1
TM 100-1	£158	250K	1	40	Soft	SS,DD		H1
TM 100-2	£221	500K	1	80	Soft	DS,DD		H1
TM 100-4/4M	£247	1Mb	1	160	Soft	DS,DD		H1
Tracker 1	£373	1Mb	2	80	Soft	SS,DD		D7
Tracker 2	£497	2Mb	2	80	Soft	DS,DD		D7

Make and Model

## 8" DISK DRIVES

Make and Model	Price Inc VAT	Capacity	No. of disks	Tracks	Sectoring	Sides and density	Connects to	Distributor
							I-EEE RS232 BBC Apple II St. Shugart Nasbus Gemini 20ma Others	
ACP 700 (AC)	£293	1Mb	1	77	Soft	DS,DD		E2
ACP 750 (DC)	£316	1Mb	1	77	Soft	DS,DD		E2
ACP 1500 (DC)	£403	2Mb	1	77	Soft	DS,DD		E2
Caldisk 142M	£465	500K	1	77	Both	SS,BD		E2
Caldisk 143M	£522	1.2Mb	1	77	Both	DS,BD		F1
Caldisk 143M-1	£465	500K	1	77	Both	SS,BD		F3
Commodore 8280	£2,760	987K	2	77	Soft	DS,DD		C2
Canon X 8330	£1,200	2Mb	2	153	Soft	DS,DD		C5
Control Data 9404B	£684	800K	1	77	Both	SS,BD		M5
Control Data 9406-4	£1,144	1.6Mb	1	77	Both	DS,BD		M5
Eicon F88/1D/DD	£1,438	1Mb	1	77	Soft	SS,DD		E3
Eicon F88/1D/SD	£1,397	500K	1	77	Soft	BS,SD		E3
Eicon F88/2D/FBR	£1,740	1Mb	2	77	Soft	DS,SD		E3
Eicon F88/2D/DD	£2,013	2Mb	2	77	Soft	SS,DD		E3
Eicon F88/2D/SD	£1,972	1Mb	2	77	Soft	SS,SD		E3
Eicon F88/1D/FBR	£1,240	500K	1	77	Soft	DS,SD		E3
F 311	£1,725	1.2Mb	2	76	Soft	DS,SD		B5

[illegible]

A modem interfaces a computer and the telephone system so computers can communicate over long distances. It converts data into electrical pulses or sounds that can be sent down the line. A modem can be connected to the line directly or acoustically. **A**D in the connection column represents direct link, while **A** indicates acoustic. The acoustic coupler is like a female telephone handset with a speaker in the coupler opposing the phone's mouthpiece and a microphone opposing the earpiece. **A**B in this column indicates that both methods of attachment are available. **Baud** rate shows the speed with which the data is transmitted.

The modem must be connected to the computer through an interface. The **interface** column lists the main interfaces featured on each modem. **Asynchronous** means that data may be transferred at intervals as available or as needed. **Synchronous** data is transmitted at regular intervals. **Simplex** transfers data in one direction, while **Half duplex** can transmit/receive in either direction, but not simultaneously. **Full duplex** transmits and receives information in both directions at once.

Some modems can **originate** a call or start a two-way conversation. **Answer** means they can respond to a call from another computer.

Make and Model	Price inc VAT	Connection	Data Rates (baud)	Interface	Others	Capabilities							Distributor Code
						Asynchronous	Simplex	Half Duplex	Full Duplex	Originate	Answer		
AJ 311	£320	B	300	RS232		●		●	●	●	●	●	A5
AJ 1222	£736	D	1200	RS232				●				●	A5
AJ A211	£263	A	300	RS232		●			●		●	●	A5
AJ 1234	£684	A	1200	RS232		●						●	A5
AJ 1256	£684	B	1200	RS232		●						●	A5

**A1** Appropriate Technology, 01-625 5575 **A2** Advent Data Products, Melksham 706289 **A3** Altex Microcomputers Ltd, Reading RG1 1BY **A4** Atari International (UK), Slough 33344 **A5** Anderson Jacobson Ltd, Slough 25172  
**B1** British Telecommunications, London 191 **B2** British Olivetti, 01-785 6666 **B3** Barron McCann, Biggleswade 316286 **B4** Bencom Sendata (UK), 01-911-940 **B5** Bayvel Ltd, Leatherhead 378811 **B6** BASF, 01-388 4200  
**C1** Centronics, 01-581 1011 **C2** Commodore Business Machines, Slough 79292 **C3** Calcomp Ltd, Bracknell 50211 **C4** Crofton Electronics, 01-891 1923 **C5** Canon (UK) Ltd, 01-680 7700 **C6** Cumana, Guildford 503121 **C7** CBL, Reading 792097  
**D1** Discum, Evesham 3591 **D2** Datatrade Ltd, 02244 **D3** DNCs Ltd, 061-643 0016 **D4** DRG, Weston-super-Mare 0141 5398 **D5** Data Systems Division, Bedford 223989 **D6** Data Efficiency, Hemel Hempstead 63561 **D7** Data Track Technology, New Milton 619650 **D8** Dacom Systems, Milton Keynes 676797  
**E1** Epson (UK), 01-900 0466 **E2** Elecomatic, 041-881 5825 **E3** Eicon, Barnhill 81825 **E4** Environmental Equipments Northern Ltd, Nantwich 625115  
**F1** Fastcol, Reading 791557  
**G1** Geveke Electronics, Woking 791557  
**H1** HAL Computers Ltd, Farnborough 517175 **H2** Haywood Electronic Assoc. Ltd, 01-428 0111  
**I1** Informer Ltd, 01-318 42132 **I2** Intac Data Systems, Rotherham 547170 **I3** ITT Business Systems, Brighton 507111 **I4** ITT Consumer Products, Basildon 3040 **I5** Intelligent Interfaces, Stratford-upon-Avon 296879

Plotters use a pen to put graphics or characters on paper under the command of a computer. They are usually one of two types—**flatbed** or **drum**. A **flatbed** holds the paper flat while the pen draws on it in two dimensions. A **drum** plotter turns the paper vertically on a cylinder while the pen moves horizontally. Most plotters can change pens during operation so a variety of colours and line thicknesses are available. **Max pens** indicates the number of pens in operation or on standby. Dimensions of the paper to be used are listed under **paper size**. **Maximum plotting speed** measures the distance in millimetres per sec covered by the pen. **Interfaces** are included in the basic price or come at extra cost.

Make and Model	Price inc VAT	Type	Max Pens	Paper Size	Maximum Plotting Speed in secs.	Interface (+ at extra cost)	Distribution
Calcomp 81	£3,392	Flat	8	A3	30cm	RS232 or IEEE	C3
HP 7470A	£1,317	Drum	2	A4	38.1cm	RS232 (IEEE+)	H2
PD4	£585	Flat	1	A4	700mm	(IEEE+)	J2
Stroke 100	£662	Drum	1	A4	7.6cm	(RS232, Parallel+)	D6
TRS-80 Pen Plotter	£1,399	Flat	6	A4	6.8cm	RS232	T1
Watanabe WX 4633	£2,772	Flat	10	A3	250mm	(Centronics, RS232, IEEE+)	E4
Watanabe WX 4634	£2,515	Flat	2	A3	250mm	(Centronics, RS232, IEEE+)	E4
Watanabe WX 4635	£2,301	Flat	1	A3	250mm	(Centronics, RS232, IEEE+)	E4
Watanabe 4636	£3,074	Flat	10	A3	400mm	(Centronics, RS232, IEEE+)	E4
Watanabe 4637	£2,862	Flat	2	A3	400mm	(Centronics, RS232, IEEE+)	E4
Watanabe 4638	£2,635	Flat	1	A3	400mm	(Centronics, RS232, IEEE+)	E4
Watanabe WX 4671	£1,129	Flat	1	A3	50mm	Parallel (RS232, IEEE+)	E4
Watanabe 4675	£1,638	Flat	6	A3	50mm	Parallel (RS232, IEEE+)	E4
Watanabe 4731	£1,761	Drum	4	A3	200mm	(Centronics, RS232, IEEE+)	E4

Jones & Brother, 061-330 6531; **J2** J J Lloyd Instruments, Locks Heath 4221 **J3** JVC, 01-450 2621  
**K** Kisu Electronics, Malcock 4995  
**L** Lfai & Co Ltd, 01-600 1777 **M2** Modata, Tunbridge Wells 41555 **M3** Mannesmann Tally Ltd, Reading 788711 **M4** Micropute,  
 acclesfield 615384 **M5** Microwave, 01-272 6237 **M6** Microtech Leeds, Leeds 679964  
 Newbury Data Recording, Newbury 48864  
 Phoenix Technology, 01-737 3333 **P2** Pete & Pam Computers, Rossendale 227011  
**Q** Qume (UK) Ltd, Reading 584646  
**R2** Rair Ltd, 01-836 6921 **R3** Riva Terminals, Woking 71001 **R3** Research Machines Ltd, Oxford 249886  
 Sintron Electronics, Reading 875464 **S2** Sord, 01-930 4214 **S3** Storton, Coventry 613521 **S4** Systime, Leeds 702211  
 Sinclair Research, Camberley 681666 **S6** Silicon Express, Leicester 374917 **S7** Sharp Electronics, 061-205 2333  
 Tandy Company, Walsail 648181 **T2** Triumph Adler, 01-250 1717 **T3** Technology For Business, 01-837 1271 **T4** Toshiba  
 ace International, Sunbury-on-Thames 85666  
 Viasak, High Wycombe 448633  
**W** Walters Microsystems Int Ltd, High Wycombe 445175  
**X**-Data Ltd, Slough 723331  
 Zyal Dynamics, Bicester 3361

**EG2000** Colour Genie plus GP-100A printer and Sanyo cassette recorder, all as new, in boxes, £325. 513 Southchurch Rd., Southend-on-Sea, 67793.

**Lynx** 48K for sale, mint condition, also magazines and home-written software (Turtle graphics, puzzle etc), £190 o.n.o. Dave Holes, Luton (0582) 53072.

**Intellivision** and voice module, one voice cartridge and 14 other cartridges, worth £550, will sell for £350. Also free gift worth £60. (0324) 562051.

**Dragon** plus two cartridges plus graphic cassette and joysticks in original box and as new. Tel. 0638 77705 evenings, price about £160.

**Ohio** Challenger, 16K, 2MHz, RS232, I/O, 8K Basic, Cegmon monitor, steel case, leads, manuals, tapes, £65, delivered free. 0865 512251 Ext:-430, Office Hours.

**Atari** 450 16K, cassette player, Basic, manuals, joysticks, some games, all in brand new condition, £185. 01-368 1034

**Atari** 800 48K, with Basic Programmer Kit, Atari 410 program recorder, dust covers, joystick, and 19 games, including Zaxxon, as new, £250 o.n.o. Aylesbury 24100.

**Atari** 400, 48K + recorder, Basic + manuals and joystick with 16 quality games, cost over £700, will sell for £300. Telephone 0732 863815.

**Vic 20** limited edition with cassette Basic part one etc, two year guarantee, £100. Also Point master, Basic II & Users Guide. Anytime, call 32 Saffron Piece, Sutton, Ely, Cambs.

**JVC** stereo cassette deck model DD-99, built with a computer and all the new innovation. Seven months old, sell for £400 o.n.o. Quick sell, call Ezra. (01) 458-6440.

**MX80FT3** Epson printer (centronics) four months old £220. Parish, 2 Colliers Close, Hurworth, Darlington, County Durham DL2 2ES. Letters only please.

**Acorn** Atom 12K+12K, PSU, Floating Point, manual and software, excellent condition, accept £120 o.n.o. or swap for 48K Spectrum. Brighton (0273) 500216.

**Acorn** Atom FP extra RAM Calc ROM, manuals, hardly used, £150. Ward 01-486 9893 day and night.

**Commodore** 64, brand new, boxed, cassette unit, Beginners Course and chess game. Cost over £400. Accept £330 o.n.o. 01-207 1604 after 6pm.

**Vic 20** + cassette, Super Expander, joystick, £60 of software includes centipede, Pacman, Introduction to Basic (part 1), Skramble + many more. Worth £240 accept £190 (o.n.o.) Gorington-on-Thames 0491 872825.

**BBC** Model B, absolute bargain at £295, hardly used, perfect condition, complete with original packing, manual and leads. Call Saeed on 01-741 1746 NOW!

**BBC** Model B, absolute bargain at £295, hardly used, perfect condition, complete with original packing, manual and leads. Call Saeed 01-741 1746 NOW!

**Atari** VCS, Space Invaders, Asteroids, Defenders, Pitfall, Missile Command, Vanguard, Star Raiders, Berserk, Adventure, Superman, Haunted House, Super Breakout, Outlaw, Combat, cover, £140. 0703 86977.

**Redundancy** forces sale, BBC model B + recorder, etc., £340. 125 computer magazines £25. Atom, damaged keyboard, otherwise O.K. £25. Atom games £8. Swanage 424423.

**ZX81** games for sale, each £2: Defender, Asteroids, Scramble, Tomb or Dracula, plus 16K RAM pack £10 and printer £25 o.n.o. Phone 01-446 5154 evenings.

**Apple** 11e, mint condition, disk drive, controller, television modulator, joystick, apple plot, circuit analyst, game, manuals, guarantee. £1,100 o.n.o. Oxford 58831.

**TRS80** Model 1, Level II 16K, black/white monitor, cassette, dust covers, leads, good condition £170 cash. Buyer collects. 01-648 9970 evenings/weekends.

# PCN Billboard

**Acorn** Atom 12K ROM, 16K RAM, 4K ROM utilities and software plus P.S.U. and books, £165 o.n.o. Rugby 812940 (evenings).

**Atari** 400/800 software, 16 games ie, Airstrike, Defender, Astro Chase, Darts, Miner 2049er, Pool, some are cassette some ROM, £12 each. 0732 863815.

**Atari** 400 48K with Program Recorder, Basic and joystick, six months old, £175. 0732 863815.

**Vic 20** computer, C2N cassette unit, Star Wars cartridge, Basic book, complete £95. Poynton 877089.

**Vic 20** C2N cassette, monitor, Super Expander + two other cartridges, Prog Ref Guide, Vic Revealed & two other books, nearly new, accept £235 o.n.o. (0634) 364929.

**16KZX81** and 35 game tapes, cost £245 bargain at £100 or will swap for Dragon joysticks + software, contact A. R. Tankard, 3 Carlisle Close, Colchester, Essex CO1 2YT.

Spectrum or similar. Salford (061) 792 3968, ask for Stefan.

**Wanted** Commodore cassette recorder in good order. Tel: Hayling 2082 evening or 01-549 0151 ext. 265 day, C. J. Turpin.

**Mattel** Intellivision TV game plus six cartridges (Soccer, Space Battle, Sea Battle, Skiing, Poker/Blackjack, Armour Battle). Everything in excellent condition, in original boxes. Bargain £130. Tel: (0443) 435444.

**12 + 12K** Acorn Atom, new keyboard, floating point, printer interface, leads—manuals PSV, worth £300+, accept £150, also cassette drive, matched to Atom, counter pause, worth £20+, accept £10. Tel: (0472) 48531 after 6pm.

**Seikosha** GP80A 80 column graphics printer, manual and paper, boxed, as new, suit Atom, BBC 'B', Apple II. Vic 20, Commodore 64, Oric 1, Lynx 48K, Spectrum, Dragon 32, Colour Genie, Newbrain, PC1500, HX20 etc. Worth £250+ accept £140. Tel: (0472) 48531 after 6pm.

**The overwhelming response to PCN's Billboard service is causing delay in publication of some advertisements. To solve this growing backlog and to cover some of the publication costs we are now charging £1.50 for each ad. Every form received at PCN's offices, 62 Oxford Street, London W1A 2HG, must be accompanied by a postal order or cheque for £1.50 made payable to VNU Business Publications.**

I have 64, 2102 RAM chips for sale, 30p each or £16 the lot. D Viner, 30 Thor Close, Thorpe, Norwich, Norfolk.

**Acorn** Atom, 12K ROM, 12K RAM, PSU, manual, Atom Magic book plus other literature. Plenty of quality software, £100. Tel: Hull (0482) 701013.

**For Sale** ZX Spectrum 16K as new, plus book of 21 games and magazines, £100 ono. Tel: Darlington 56580.

**Video** Genie 48K C/W Expander, 9in B/W monitor, software inc. some games, programming aids and assembler, £350. Tel: Alan 01-985 5555 ext 62 (work), Epping 73586 (home).

**Micro** wanted exchange for Murphy 40 channel home base and Fidelity 40 channel mobile, only months old, cash adjustment either way, could travel. Ashburton, Devon, 0364 53183.

**Spectrum** software for sale, Black Crystal £4, Krazy Kong £3, Planetoids £3, Golf £3, all four for £12. Tel: Sheffield 666867, Steve Gold, 9 Watt Lane, Sheffield S10 5RA.

**Atari** VCS, as new, with Invaders, Pinball, Asteroids, Missile Command, Dodge'em, Adventure, Night Driver, Spacewar, Street Racer and more, £345 new, giveaway at £160 ono: Mr M Woodley, 57 Northway, London, NW11. Tel: 01-455 5478 (evenings).

**Acorn** AP100A printer, mint condition, BBC cable, spare ribbon, 1,000 double sheets paper, boxed, any trial, £175. Tel: Ascot 25030.

**Texas** PC100B, hardly used, including leads and manual, £70 ono. A. Dewar, 27 Lorne Court, Glenrothes, Fife. Tel: (0592) 757914 anytime.

**Atari** VCS joysticks, paddles. Cartridges: StarMaster, Missile Command, Combat, Defender, Raiders of the Lost Ark. Still under warranty, £130 ono. Tel: 01-731 0435 after 6pm.

**Sharp** PC-1500, powerful pocket computer, perfect condition, expandable, cost £170, selling for £125 or swap for

**Acornsoft** Atom games packs, 1, 8, 9 + Bugbyte Invaders, Hyperfire and others, Magic Book, worth £55+, accept £25. 50+ recent magazines, programs for popular micros, worth £30+, accept £15. Tel: (0472) 48531 after 6pm.

**Acorn** Atom 12K + 12K + program power toolkit, ROM, PSU, books, software, FP ROM, £150. Tel: 01-399 3203.

**Vic 20**, C2N cassette, 16K RAM cartridge, three game cartridges, five game tapes, book Innovative Computing, still under guarantee, £250 ono. Tel: 01-808 0096.

**Sinclair** ZX81, 32K memory plus four 16K games cassettes, with manual, leads and box. Bargain £59. Tel: 01-684 9571 (Croydon).

**Wanted:** under 15-years-old ZX81 pen-friend wanted. If you would like to exchange programs and news, write to Sara Hill, 26 Hamilton Road, Wimbledon SW19. Tel: 01-542 5767.

**MZ80A** as new, plus software, books etc, £390. Tel: 01-908 1460.

**Spectrum** software. I want Galaxians, will swap for Scramble, Flight Simulation etc. Also Atari VCS Asteroids, £7. Any swap considered. Tel: 021 444 7043 after 4.30 (Adam).

**Vic 20** with cassette deck, four blank tapes, Rat Race cartridge and joystick, two months old, hardly used, still in box. £180 or offers. Tel: 01-445 7391 after 4.30pm and ask for Neville Leslie.

**Atari** 400/800, dumb prices wanted for collection of tapes and cartridges. Your purchases can help me buy a disk drive. Jervis, 19 Portree Drive, Rise Park, Nottingham NG5 5DT.

**Intellivision** plus eight cartridges, £150 or will sell separately. Phone for prices. Tel: Northampton (0604) 42456. Excellent condition.

**Spectrum** 48K, will swap Time Gate and Black Crystal for Pimania or The Valley or Hitch Hikers Guide to the Galaxy or

any other adventure. Tel: Paul 021-744 3026.

**Exchange** Ace Telcom Viewdata adaptor (Prestel) for a TRS80 expansion interface and one disk drive. Tel: Fen Gales 0670 824665.

**Hi-res** board 256x256 + 64 program characters complete with Toolkit and hi-res game Mercy Dash. For Microtan 65 computer, £80 ono. Tel: 021-384 1297.

**ZX81** 16K RAM plus three software cassettes, selling for £50. Tel: Manchester 794 2398.

**Sharp** MZ80K 48K as new, Basic, Forth, user notes, some games, £250. Tel: Egham (0784) 35378.

**Fortran** Reference Manual for the 2900 series of ICL computers, offers accepted. Tel: (0202) 483807.

**ZX81** 16K Memotech 3D Defender, Monster Maze, Dark Crystal plus other adventure games and mags. Worth £130+, yours for £80. B/W TV, £30. Tel: 01-841 3119.

**ZX81** +16K RAM plus leads, manual, etc, also books plus games, Chess, and household programs, all for £50 ono. Tel: 01-541 3092 evenings.

**Apple II** software, Visicalc, Applewriter, many games, wanted Apple 2 (new keyboard). Tel: John, (0626) 862455.

**Vic** Scott Adams cartridge adventures, Adventureland, Pirate Cove and Mission Impossible, £15 each or £40 the lot. Tel: Lamberhurst 890861.

**Atari** CX2600 cartridges, Space Invaders and Night Driver. Wanting £14 each or £25 for both. Tel: Havant (0705) 455311 any time after 5.30pm.

**Vic20** plus cassette, Super Expander, five cartridge games, £25, joystick, cassette software, five books and magazines etc, cost £470, bargain at £200. Tel: Morris Thomson, Edinburgh 031-343 3123.

**8085/A** micro, Assembly language, full keyboard, 8K ROM, 4K RAM, £200. Atari console, 16 cartridges, table and rack, paddles etc, £150. Tel: Littlewick Green (062 882) 3596 after 6pm.

**BBC** games, large selection of Acornsoft (£8 each), Superior Software (£6 each), LJK, A&F etc, all hardly used, in mint condition, original packing. Tel: Bleaden 813879 after 7pm.

**16K ZX81**, new and unlimited stock of genuine ICL software, English Literature 1 and 2, £1.95 each. A level maths, general statistics, £4.50. Ahmad, 51 Elmwood Rd, Croydon.

**Atari** VCS and five cartridges, Combat, Bridge, Space Invaders, Fishing, Derby and Asteroids, £110 for quick sale. Tel: Falkirk 34562.

**Vic20** software half price in original packaging, mint condition, on cassette and cartridge, see for list. Sales due to shortage of space. Mr K Hulston, 14 Bishop Avenue, North Reddish, Stockport, Cheshire SK5 6NT.

**Urgently** require a printer and disk drive, must be compatible with Acorn Atom or Spectrum, call me on 01-472 3507 now. Jason, consider buying Spectrum with printer.

**Wanted** BBC B, offering Honda 250 Superdream, immaculate condition, hardly used, new K181 tyres, top box, fairing, leather boots, does 77mpg, bargain. Tel: Vic, 061-366 5645.

**Spectrum** Book of Games plus Over The Spectrum, £8 pair, both perfect, Mcode — machine code for 16K Spectrum, unused, £5, all three for £10. Tel: Tayler, (0255) 429984 (Clacton).

**Lynx** for sale — books, leads, PSU, manuals, cassettes, all perfect, only weeks old, £225, no offers. Will swap for BBC A. Tel: Waltham Cross 28173 after 5pm.

**TRS80** Mod. 1 L2 plus software, books, sound, 10 spare cassettes. Reason for selling — unwanted present. Worth over £270, four months only. A bargain at £165 ono. Tel: Paul, Scunthorpe (0724) 782548 any time.

**NewBrain** AD boxed. Immaculate £190.

81

# BACK ISSUES SERVICE

FILL THE GAPS IN YOUR PCN COLLECTION

## Issue 1, March 11-18.

**Pro-Tests:** Apple's Lisa, Textet TX8000; Spectrum speech synthesiser, Apple printer, Commodore network; 3D on Spectrum, graphs package for Apple and IBM, BBC graphics system.

**Features:** computer chess, Occam parallel processing language, Victor/Sirius function keys.

**ProgramCards:** Towers of Bramah (Pascal), Biorhythm (Apple II), Roman Year (Apple II), Shape Utility (Apple II).

**Gameplay:** Darts, Soccer (Atari); Castle of Riddles (BBC Model B); Pimania (Spectrum); Flight Simulator (IBM PC).

**Databasics:** micros and peripherals.

## Issue 2, March 18-25.

**Pro-Tests:** Toshiba T100, Casio PB100, ZX81/Basicare, Vic speech synthesiser, Spectrum spreadsheet, IBM graphics, BBC word processing.

**Features:** Colecovision, micro backgammon, nursery computing, **Gameplay:** Ultima II (Apple), Trader (ZX81), Starquest (Vic 20), Hungry Horace (Spectrum).

**ProgramCards:** String editor (Spectrum), Analogue Clock (BBC Model B), Chart generator (Spectrum), String extract/replace.

**Databasics:** full software listings.

## Issue 3, March 25-April 1.

**Pro-Tests:** TI Professional, Apple speech synthesiser, Facit 410 printer, IBM keyboards, Petspeed compiler, Sirius toolkit, Dragoncalc.

**Features:** Atom upgrade, Lynx programming, Apple music, **Gameplay:** Mangrove (Vic 20), Mutant Herd (Vic 20), Compendium (Dragon), Patience (Spectrum), Noughts and Crosses (Dragon), Great Britain Ltd (Spectrum), Ulysses (IBM PC).

**ProgramCards:** Magnify (Spectrum), Spider (Vic 20), Firing Range (BBC).

**Databasics:** micros.

**Micropaedia:** Anatomy of the BBC, part 3.



## Issue 4, April 1-8.

**Pro-Tests:** Pied Piper Communicator, Olympia ESW3000 printer, Namal Supertalker, Commodore Calcsult, Spectrum Pascal, Cashbook (BBC).

**Gameplay:** Dark Crystal (Apple II), St George (Dragon), Wizard War (Dragon).

**ProgramCards:** Fruit Machine (C64), Tunesmith (Oric), Array Editor.

**Databasics:** peripherals.

**Clubnet:** Clubs and user groups.

**Micropaedia:** Go Forth, part 1.

## Issue 5, April 8-15.

**Pro-Tests:** Commodore 700, Ikon Hobbit, 1-2-3 (IBM), ZX81 machine code.

**Features:** speech packs, monitors, **Gameplay:** Grand Prix (Dragon), Derby Day (Spectrum), Deadline (Apple).

**ProgramCards:** Wacky Racers (Oric), Fruit Machine (C64), Parse Integer.

**Databasics:** Software.

**Clubnet:** full list of user groups.

**Micropaedia:** Go Forth, part 2.

## Issue 6, April 15-22.

**Pro-Tests:** Tycorn Microframe, IBM PC, Scorpio Disks, Dragon sound module, ZX81 graphics, Bottom Line Strategist (CP/M), PaperClip word processor.

**Features:** IBMPC DOS, BBC word processing, PC-1251.

**Gameplay:** Mined Out (Spectrum), Transylvanian Tower (Spectrum), Lunar Lopper (Apple II), Evolution (Apple II).

**ProgramCards:** Wacky Racers (Oric), Mortgage Comparison (Sharp MZ80K), Computer Set Up (BBC), Day of Week.

**Databasics:** micros.

**Micropaedia:** Graphics, part 1.

## Issue 7, April 22-29.

**Pro-Tests:** Mattel Aquarius, Epson FX80, Olivetti JP101, Lisp on Spectrum, Vic 20 assembler, Supergraf on Victor/Sirius.

**Features:** Dealer support, Atari graphics.

**Gameplay:** Krakit (ZX81), Cruising On Broadway (Spectrum), Kaktus (Vic 20), Fantastic Voyage (ZX81).

**ProgramCards:** CBM controls, Computer Set Up (BBC), Wacky Racers (Oric), Julian Dates.

**Databasics:** Peripherals.

**Micropaedia:** Graphics part 2.

## Issue 8, April 29-May 6.

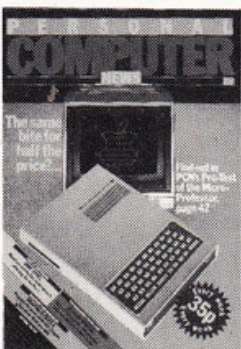
**Pro-Tests:** Atari Home Files Manager, Kobra's Vic Stat for the Vic 20, Hestacrest's Accounts for the Spectrum; Epson RX80 printer, NCR's Decision Mate V, Future Computer's FX20.

**Features:** Micronet, Compact programming on the TI99/4A.

**Gameplay:** Harvester (Vic 20), Strategic Command (Dragon 32), A first Book of Micro Rhymes (BBC), Telling the Time/Money (Spectrum).

**ProgramCards:** Program Indexer (BBC B), CBM Database cards 1-4, Sort/Extract.

**Databasics:** software.



## Issue 9, May 6-13.

**Pro-Tests:** Structured Basic on the Apple, Pixel Power on the Vic 20; Star DP510 printer, Dams and Interpod interfaces for Commodore 64; Micro-Professor.

**Features:** BBC function keys, Atari word-processing part 1.

**Gameplay:** Dungeons of Intrigue (Oric), The Castle (Oric), Starship Command (BBC B), Dragon Trek, Nowotnik Puzzle (Spectrum).

**ProgramCards:** Lower case (Dragon 32), CBM database cards 5-6, Monster (Spectrum), Wildcard Search (MBasic).

**Databasics:** hardware.

**Micropaedia:** Graphics, part 4.

## Issue 10, May 13-20.

**Pro-Tests:** Infomast on Commodore 64, Dragon Maze; MC202 and CMU800 music synthesisers (Apple), Prism directly coupled modem; Epson QX10.

**Features:** ZX81 graphics part 1; Atari word-processing part 2.

**Gameplay:** Rescue (Spectrum), Dictator (Spectrum), Roman Empire (Spectrum), Choplifter (Vic 20), Skyhawk (Vic 20).

**ProgramCards:** Union Jack (Lynx), Escape (Spectrum), CBM Database cards 7-9, Evaluate (MBasic), Formula (BBC B).

**Databasics:** peripherals.

**Micropaedia:** Graphics, part 5.

## Issue 11, May 20-26.

**Pro-Tests:** BBC Vufile, PFS:File for IBM, Apple Pascal; printer comparison, Pickard Joystick Controller for ZX81 and Spectrum; C9E Computer Board.

**Features:** ZX81 graphics part 2, Basic on the Sharp MZ80K.

**Gameplay:** Motor Mania (Commodore 64), Oric Flight, BBC Music Synthesiser, Music Maker (Spectrum), Embassy Assault (Spectrum), Tobor (Spectrum).

**ProgramCards:** Homeward Bound (ZX81), Connect Four (Dragon 32), CBM Database, cards 10 — end.

**Micropaedia:** Keyboards.

## Issue 12, May 27-June 2.

**Pro-Tests:** Spectrum word processor, PFS:Report on IBM, File Handling for Colour Genie; CTI CP80 type I printer, TG Trackball; Sord M5.

**Features:** Epson Basic, Oric sound part 1, Tandy Colour graphics.

**Gameplay:** Mad Martha (Spectrum), Frenzy (Spectrum), Headbanger (Spectrum), Oric roundup.

**ProgramCards:** Election Barchart (Commodore 64), Memory Utility (BBC B), Munch (Spectrum).

**Databasics:** Hardware.

**Clubnet:** clubs (Cambridge Micro-computer Club special).

**Micropaedia:** Disk Drives, part 1.

## Issue 13, June 3-9.

**Pro-Tests:** Telewriter for Dragon 32, Abersoft Forth for Spectrum, GPS graphics processing system for Apple II+; joysticks, rulers; Ajile.

**Features:** Dragon meets Tandy, Oric music part 2, transferring Basic for Colour Genie and Genie 1.

**Gameplay:** Everest Ascent (Spectrum), Colour Genie roundup, Micro Maze (Jupiter Ace), Oix (Atari).

**ProgramCards:** Cupid (Oric), Alien (Dragon 32), Time Bomb (Atari).

**Databasics:** peripherals.

**Micropaedia:** Disk Drives, part 2.

## ORDER FORM

Any one issue is 75p, additional copies 55p, post & packing inclusive. Overseas readers please add £1 per copy airmail postage. Please allow up to 21 days delivery.

Name ..... Telephone (day) .....

Street .....

Town ..... Post Code .....

Please send me ..... issues of PCN, issue nos .....

I enclose my cheque/PO .....

made payable to Personal Computer News or please debit my credit card:

Visa/Access/Amex/Diners

Card no ..... Signature .....

## HOW TO GET THEM

All available back copies of PCN can be ordered from our new Back Issues Service, using the coupon printed here.

For a guide to the subjects covered by Micropaedia every week, see our Micropaedia list above.

Send your orders to: Personal Computer News Back Issues Service, 53-55 Frith Street, London W1A 2HG.

To make sure of getting all your copies in future, why not fill in the tear-out subscription card in this issue.

# MICROSHOP

Rates: £10 per single column cm. Minimum size 3 cm. Series discount available. **Mechanical Data:** Column width, 1 column 57mm, 2 columns 118mm, 3 columns 179mm. **Copy Dates:** 10 days prior to publication.

Contact: Ian Whorley on 01-323 3211.

## Software

### CAN YOU MISS OUT ON A GOOD GAME?

We couldn't which is how we can offer you more quality programs.

For the Dragon 32:  
Scanner 13 £8.45. Odyssey parts 1 and 2 £9.95.  
For the Spectrum 48K:  
Mystery Manner £6.50. Master code £6.50.

For catalogue and full details to order any of the above, please write to

### Bamby Software

Leverburgh  
Isle of Harris  
PA83 3TX.

or phone 085 982 313 or 239.

Please phone between 9am and 9pm.

### HORSE RACING

Professor Frank George's H5 HORSE RACE FORECAST program is a serious punter's aid to sensible betting. Data is entered from a sporting newspaper and the program produces betting recommendations.

Versions available for:

Apple II, Pet, Video Genie, TRS-80, Spectrum, ZX81, BBC 'B', NewBrain, Sharp MZ80A, Sharp MZ80K.  
From: Bureau of Information Science, Commerce House, High Street, Chalfont St. Giles, Buckinghamshire. Football Pools Forecast available.

### RAINBOW SOFTWARE

28  
GUILDHALL  
ARCADE  
PRESTON, LANCASHIRE

Rainbow are looking for high quality and imaginative programs for the BBC micro. If you have a program which you believe to have commercial potential, please send a cassette and details of your name and address to Rainbow Software and you could find your pot of gold!

### VIC-20 Software

All the Imagine software cassettes including:

Arcadia (SK) .....  
Wacky Waiters (SK) .....  
Cacha Snatcha (SK) .....  
Frantic (SK) .....

### ZX Spectrum

Jumping Jack .....  
All cassettes at only £5.50 each including post and packing.

Send cheques/POs to:

RULE COMPUTERS,  
30 Tyers Acre Road, Corstorphine, Edinburgh EH12 7HZ  
TEL: 031-334 7261

### SERIOUS 64 PROGRAMS

We don't believe that the 64 is just a games machine, and here's the software to prove it!

**BUSICALC** — another spreadsheet. At last there's a spreadsheet program that's so simple, you won't need a degree in Computing to understand it. BUSICALC will allow you to juggle figures to your heart's content — and won't confuse with clever functions that you don't need. BUSICALC costs £39 on tape, £41 on disk, and is also available for PET and VIC (with 16k expansion).

**BUSIWRITER** — word processing. If you don't need the ultimate sophistication of VIZAWRITE (£69 — disk only), you ought to take a look at BUSIWRITER. It allows you to write, edit, format and print your text — and will even perform simple calculations! You can buy BUSIWRITER on disk for just £39, or in a cartridge for £49. Both versions will save text to disk or to tape.

**VICTREE** — programming aid. Add over 40 commands to Basic including advanced toolkit functions and Basic 4 style disk commands. The VICTREE module costs £65 including a comprehensive 100 page manual.

**MIKRO** — 6502 assembler & monitor. Why buy an assembler rather than a monitor? Because you probably don't write perfect machine code programs. With MIKRO you can make corrections to your source code and reassemble it at lightning speed (about 20 seconds for 2k of machine code!) The MIKRO cartridge costs £50.

**P.S. WE ALSO SELL GAMES.** We put the colour and excitement into our games, not our adverts. All our arcade games are in machine code with full colour and sound: already available are TANKATAK, MANGROVE, and KAKTUS, and by the time you read this we should have STIX (similar to QIX) and CRAZY KONG ready. All cost just £8 each on cassette. We specialise in adventure and fantasy games: COSMIC CAPERS, GOBLIN TOWERS, and THE CRACKS OF FIRE are £12 each.

Add VAT to prices — postage free — write or phone for a free list

**SUPERSOFT** Winchester House, Canning Road, Wealdstone, Harrow, Middlesex, HA3 7SJ, England Telephone: 01-861 1166



### DRAGON 32

## EDITOR

The most powerful text and program editor available. Handles up to 6 A4 pages (22K). Program includes Merge capability for basic programs.

Editor adds the following functions:

1. Find, Get, Replace — String commands.
2. Organise, Value — Sort records.
3. Insert, Delete, Move — Blocks of text.
4. Add (join), Hack (left), Kill (right) — Lines of text.
5. Tab (plus or minus 8), Centre — Text/Heading, Page numbers.
6. Toggle (on/off), Right justification of text.
7. Specified record output to cassette and printer.
8. Auto-line number, cursor pos., record length, eof — display.
9. Cursor controlled change, insert and delete characters.
10. Single key text scroll.

Complete with instruction manual — £9.95

## MICROPLOT

19 THE EARLS CROFT, CHEYLESMORE, COVENTRY CV3 5ES. Tel: 0203 503038



### BBC CHARACTER GENERATOR

Menu driven facilities include reflect, invert and 3 rotates. Display is on grid for multi-character pictures. Full load and save etc.

£9.95 P&P FREE  
CHEQUES TO

**VISCOUNT SERVICES LTD**  
2A Boulton Road, Southsea, Hants.  
NOFUSS GUARANTEE 0705-833633

Epson HX20 £225, TI99/4a £95, Pet 2001 £175, Vic 20 outfit inc. CN 2N, joystick, intro. to prog. and game £105, Vic 20 £75, CN 2N £25, Vic disk drive forgets official number £195, Atari 400 inc. Basic £110, Atari 800 16K inc. Basic £160, 410 Ded. Rec. £35, joysticks £7 the pair, Atari thermal printer £100, Pet 3032 £325, 3040 double disk drive £350, printer for same 3022 £274, TRS80 mod one L11 £125, Jupiter Ace £65, 16K RAM pack £25, ZX81 £25, 16K for the same £15, Spectrum 48K choice £85-£95, one has reputedly been bitten by a dog or the seller's cousin, HP41C £89, uncased disk drive £100, Video Genie eg 3003 £99, ditto with license £110, Genie I £125, Hitachi monitor £75, Sharp MZ80K £249, TI99/4a expansion unit (the big square box not the earlier long, thin one) £100, TI extended Basic £40, speech synthesiser £35, TI software inc. Parsec £15, thermal modulator £35, personal accs £20, few others please ring. All prices inc. VAT and some sort of warranty. Please ring for further details. Morgan Camera Company, 160 Tottenham Court Road, London W1. Tel. 01-388 2562.



### Software for PET SHARP TEXAS

All programs listed can be written in German or Danish text (except for Pet).

**TEXAS**  
Martian Lander  
Alien War  
Lunar Lander

Special Noughts and Crosses  
Basic Tutorial: Electronics Digital Techniques  
Musical Composition, Morse Code Test  
Speech (if required) on most programs using Speech Editor

#### EDUCATIONAL

Basic Tutorial (5 parts total approx 70k)

Electronics Tutorial (as above) Morse Code Test, Typing Test

#### GAMES

Pet Sharp Jigsaw Puzzle  
Variety of Space Games ie Noughts & Crosses (in large graphics) 4 games being played simultaneously

Three-Card Brag, Code Breaker, Viking Castle

#### UTILITIES

BioRhythms  
6502 Dis-Assembler in Basic, Dis-Assembler to Screen or Printer (Pet only)

We are on Prestel Mailbox (Enterprise 268559565)

Tele ordering details in catalogue.  
All programs £4.00 post paid.

## AQUARIUS SOFTWARE

10 Kenneth Road, Basildon, Essex SS13 2AT.  
Telephone (0268) 559565 (24 hours)  
Prestel mailbox. 0268559565

### ASTROTUTOR

A new series of programs from

#### ASTROCALC

for your 48K Spectrum and Commodore PET computers.

A unique new self-teaching system using computers

For students, or for teachers who want to save time by letting the computer help out.

Learn the astrological interpretations at your own pace. Simple-to-operate programs show meanings of signs, aspects, etc., and then test the user on his knowledge. Use as many times as you wish. Each program has a choice of two difficulty levels. You can practise daily or whenever convenient till you have 100% knowledge. All standard meanings covered.

Five separate programs as follows:-

Planets £4, Zodiac £3, Signs £4, Houses £3, Aspects £10

Special price for all 5: £20

All programs include full instructions on use.

Genie/Tandy TRS80 versions available July.

Please send cash with order, or a large sae for further details to:-

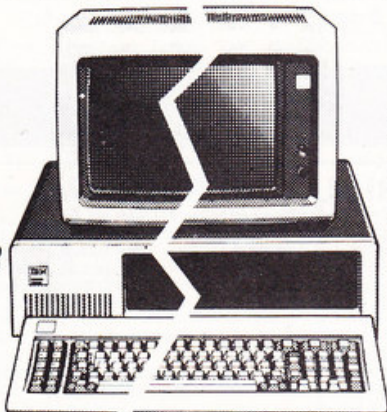
Terry Dwyer, MA DMS Astrol,  
53 Loughborough Road,  
Quorn, Loughborough, LE12 8DU.  
Tel: 0509 412076

# MICROSHOP

## Maintenance

### MICRO-COMPUTER MAINTENANCE

APPLE  
IBM  
SIRIUS  
VICTOR



NATIONAL  
ON-SITE  
24 hr  
CONTRACTS

**COMMERCIAL DATA SYSTEMS LTD.**

Telephone: 0268-710292 (ask for sales)

## Hardware

### OSBORNE 1

Purchased  
for 3 month  
project:

**DOUBLE DENSITY — £810**  
**SINGLE DENSITY — £660**

- ★ Original packaging with manual
- ★ 3 month warranty
- ★ Free software (worth £700) CP/M, C Basic, M Basic, Super Calc + Wordstar with mailmerge.

**NEW PRINTERS to go with your Osborne 1:**

**DAISY WHEEL:** Praxis 35 Bytewriter, with internal interface.  
(offline it's an electronic typewriter) ..... from £395

**EPSON FX 80:** 160 C.P.S. Tractor and friction feed ..... from £395

**EPSON RX 80:** 100 C.P.S. Tractor feed only ..... from £265

For any other printers: Please phone for quotation.

Prices exclusive of V.A.T. And delivery.

CONTACT: TRICIA CARROLL 0252 516766

**DLA COMPUTER SERVICES LTD**

105 Mytchett Road, Mytchett,  
Camberley, Surrey.  
Tel: (Farnborough) 0252 516766.

DLA are official dealers and  
authorised service agents for  
Osborne Computer Corp. (U.K.) Ltd.

BEST PRICES FOR NEW  
LATEST OSBORNE —  
PHONE US!

### SPECIAL INTRODUCTORY OFFER FOR THE LATEST + BEST OSBORNE YET!

- ★ 80 Column screen
  - ★ Double Density
  - ★ Green phosphor screen
- SPECIAL PRICE £1,195**

Quantity discount on application. Normal retail price  
£1,495. MONITORS: 12 inch monitors for the Osborne,  
details supplied on request.

CONTACT TRICIA CARROLL. Tel. 0252 516766

**DLA COMPUTER SERVICES LTD**  
105 Mytchett Road, Mytchett,  
Camberley, Surrey.

Tel. (Farnborough) 0252 516766.

DLA are official dealers and authorised service agents for  
Osborne Computer Corp (UK) Ltd.

## Services

My name is Simon Stable. I specialise in direct data duplicating  
for the following cassette-based micros: BBC AB, ZX Spectrum,  
Oric and Dragon. Disc copying for BBC.

My prices are very competitive with a fast turnaround.  
Dot matrix printed labels to order or blanks (tractor).

"BLANK  
CASSETTES"

**08692 2831**

"COMPETITIVE  
RATES"

For further information about real-time cassette copying

write or phone

46 WEST END, LAUNTON, OXON. OX6 0DG.

### HOBBYIST LIMITED

Open 6 days 10am-7pm. Wednesday and Saturdays  
5.30pm.

Authorised Apple Service Centre.

Apple IIe, Epson HX20 Portable Computer and Epson  
RX80, FX80 Printers all now in stock. Also wide range of  
supporting peripherals and books.

3 The Broadway, Manor Hall Road,  
Southwick, Brighton BN4 4ND

Tel: 0273 593345

## Software

### COMMODORE 64 UP TO 40% OFF

Best sellers latest — tape £6.99 including VAT + P+P.  
Gridrunner 1. Gridrunner 2. Attack of the Mutant Camel.  
Motor Mania, Renaissance, Frogger, Panic, Scramble,  
SpriteMan, Crazy King, Barakuda, Cyclons, Monopole.

Send cheques, postal orders to

CRESTMATT  
42-45 New Broad St.  
London E.C.2.  
Tel: 01-740 0447

DEALER ENQUIRIES WELCOME

### LYNX OWNERS

NILUG, The National Independent Lynx User  
Group has now been formed.

Subscriptions £9 per year. Send cheque payable  
to Nilug, to:

**NILUG**

53, Kingswood Avenue, Sanderstead,  
South Croydon, CR2 9DQ.

The first newsletter is now available.

### HI-FI ZX81 16K

You have £100,000 to invest on the stockmarket in  
five metal commodities.

Can you invest at the right price and beat the  
computer at the investment game to reach £4m  
first?

£4 on cassette, £3 listing

**Peter Christopher**

48 Herbert Road, Chatham, Kent  
Tel: 0634 826855

### UK 101

SOFTWARE

FOR STANDARD MODEL — (8K)

ANDY ANGLER £4.50 inc p&p

BANK JOB £4.50 inc p&p

**DEEWOOD**

Horest Cottage, Horest Lane  
Denshaw, Oldham, Lancs OL3 5SU.

### BANNED . . .

**QUALITY PROGRAMS WANTED**

... all 'Arcade Action' Games from our lists.  
We specialise solely in adventure, simulation  
and business games from many indepen-  
dent suppliers. Full lists: (state computer).



**SAGASOFT,**

148 Barrack Road,  
Christchurch,  
Dorset,  
(0202) 486 207

### ORIC GAMES ARE HERE! (48K)

1. **THE PITS** — The deepest fantasy game you have  
ever played. 500 + rooms and many, many hazards!
2. **S.A.S.** — A multi-part action game.
3. **ACTION 6** — Starshoot, Amaze, Tron, Bomber,  
Starchaser, Headbang.
4. **MIND 6** — Swappers, Squares, Hexpaw, 4 in a Row,  
Bite, Slide.
5. **GRAPHICS** — Includes the most flexible character  
generator on the market.
6. **CONTRACT BRIDGE.**  
£5 each from

**Touchstone**  
61 Highfield Road,  
Saxilby, Lincoln LN1 2QJ.



## Courses

### MENTOR COMPUTING

**BBC Basic 1 day tutorials in East Anglia**

Structured programming: an introduction.  
Saving memory.  
Syntax error. What to do next.  
Teletext mode: avoid the problems.  
Fee including lunch and refreshments £25.

Write for dates and details to

**Mentor Computing**

121 Newland Street Witham, Essex.

# MICROSHOP

## Accessories

### NO HIDDEN EXTRAS — YOU PAY THE PRICE YOU SEE

#### VERBATIM DATALIFE FLOPPIES

MD 525-01 SSSD-SSDD TWIN PACK .....	£5.36
10 PACK .....	£21.25
MD 577-01 SSDD 77/80 TRACK TWIN PACK .....	£7.28
10 PACK .....	£30.41
MD 550-01 DSDD TWIN PACK .....	£7.32
10 PACK .....	£30.61
PAPER-PACK (250 sheets 9.5x11) .....	£4.02
LABEL PACK (250 labels fits 9.5 tractor) .....	£5.32
DISC-BOX (Stores 50 floppies) .....	£21.21
MX80 RIBBON .....	£4.23
VERBATIM 5.25 Cleaning kit .....	£8.23

**REMEMBER VAT AND CARRIAGE ARE INCLUDED  
YOU PAY THE PRICE YOU SEE!**

### COMPAC LTD

COMMERCE HOUSE, STUART STREET,  
LUTON, BEDFORDSHIRE LU1 5AU  
Tel. 0582 452580



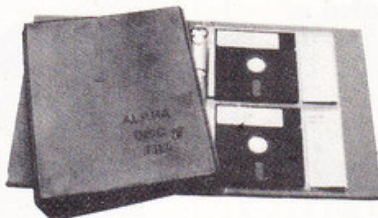
## NEW FLOPPY DISC STORAGE SYSTEM.

### ALPHA DISC FILE STORE

A RIGID plastic binder with 10 double dust free leaves, each will hold 2 standard disc's (10 leaves 20 pockets) each disc has its own file card, available for both 5 1/4" and 8" disc's.

Binder Colours: Red and Blue for 5 1/4":  
Ref 5/20R £6.95 Ref. 5/20R or 5/20B  
5/20B £6.95 Green for 8": Ref. 8/20  
Ref 8/20 £10.75 P&P £1.25 per binder

Alpha, PO Box 125, Cheltenham, Glos GL51 6TP



### To Let

#### SURPLUS PREMISES TO LET ANGEL ISLINGTON N.1

IDEAL FOR STUDIO, COMPUTER/SOFTWARE OR  
OFFICES. ATTRACTIVE RENT/LEASE.

**01-359 2465**

### Clubs

#### ORIC-1 OWNERS.

Tangerine created Oric-1 now TUG creates the rest. An independent users group with a solid reputation for progressive system support. Monthly newsletters, meetings, software, hardware, reviews, advice and lots more. We have a proven record of performance on our system. Join TUG. You'll like us, we do! Send £1.00 + S.A.E. (A4) for sample newsletter and details. Tangerine Users Group, 1 Marlborough Drive, Worle, Avon BS22 0DQ.

### Second User

NEW EQUIPMENT	
EPSON FX 80 Printer .....	£385.00
ZVM 134 Colour Monitor, 13 inch, Resolution 684 x 480 .....	£400.00
TTL levels RGB SUIT BBC Micro .....	£195.00
ZENTHINI 4 Matrix Printers, Serial .....	£950.00
DUAL 8 inch drives, case, psu DSDD .....	£75.00
ZVM 121 Green Screen Monitor, 12 inch .....	£22.50
EX-DEMONSTRATION EQUIPMENT	
2478 inch Drives plus Controller for Z89 Comp. ....	£800.00

**IPMS Developments**  
22 Trenchard Court, Rotherwas, Hereford  
Tel: 0432 265768, 50848 (STD 0432)

+ VAT  
+ CARRIAGE

### Microshop Classified

● **Guide to the BBC DFS** £4.95, A B upgrade notes £2.25, DFS upgrade notes £2.25, DFS in assembler notes £2.25. SAE for details: Data Research Limited, P.O. Box 13, Birkenhead, L42 4RL.

● **TRS-80 model II** with expansion drive and software-accounts, word processing, CP/M and TRS-DOS operating systems — plus manuals. Hardly used. £4,500, as new £2,000 plus carriage. Ring: Colin Gould 01-903 4372.

● **BBC/Spectrum/ZX81.** Programs. Printing service. Any length of program printed for £1.25. Send cheques/P.O. and cassette to Loophole, Software Arkwright House, Alexandra Road, Llandrindod Wells, Powys LD1 5NS.

● **Manufacture Capacity.** Quality, low cost, comprehensive service for assembling computer and like products, especially PCB's, cables coils etc. Let us solve your problems. For enthusiastic confidential help. Ring: Chesterfield 209009.

● **Lynx 48K Software.** LABYRINTH — 3D Maze. CHANCELLOR — UK Economy simulator. OTHELLO — Traditional board game. SPACE TREK Zap the Klingons. £4.75 each including P&P. QUAZAR COMPUTING, 17 Teg Close, PORTSLADE, Sussex.

● **Missile.** Defend your cities from the deadly onslaught. Graphics Game for the BBC microcomputer (32K) only £5 inc. To Paul Stevens, 11 Woodhurst Close, Cuxton, Rochester, Kent ME2 1LU.

● **TI 99/4A Programs for sale.** Pontoon, Airport, Golf, Space games and many more. Send SAE envelope. For full list to Lion Software, 56 Winchester Road, Kenton, Harrow, Middlesex HA3 9PE.

● **Newbrain Software.** Business and serious application. Fully descriptive price list available on request. CORNIX-MICRO, 16 Kneesworth Street, Royston, Herts.

## SHORT-LENGTH COMPUTER/AUDIO TAPES

If you have searched without success for high quality low cost short-length tapes then sit back and relax.

Premium Grade Agfa R.F.W. Cassettes. Manufacturers of high quality blank cassettes suitable for programming. For example, with a minimum order of 25, you can purchase 25 cassettes of 2 1/2 minutes each side for only £10.00 plus postage & packing of £1.95p. Fill in the coupon and post with your remittance to: **R.F.W. Recording Supplies, Green Acres, Northlands, Sibsey Nr. Boston, Lincolnshire PE22 0UA.** Tel: 0205 750 595

All prices are inclusive of VAT at 15%

Please send me high-quality audio tapes in the quantity indicated (tick where applicable)

#### 25 cassettes (including £1.95 p&p)

<input type="checkbox"/> 2 1/2 mins .....	£11.95
<input type="checkbox"/> 5 mins .....	£12.20
<input type="checkbox"/> 6 mins .....	£12.45
<input type="checkbox"/> 7 1/2 mins .....	£12.60
<input type="checkbox"/> 10 mins .....	£13.20
<input type="checkbox"/> 12 1/2 mins .....	£13.95

#### 50 cassettes (including £2.49 p&p)

<input type="checkbox"/> 2 1/2 mins .....	£22.75
<input type="checkbox"/> 5 mins .....	£22.95
<input type="checkbox"/> 6 mins .....	£23.49
<input type="checkbox"/> 7 1/2 mins .....	£23.99
<input type="checkbox"/> 10 mins .....	£24.99
<input type="checkbox"/> 12 1/2 mins .....	£26.49

#### 100 cassettes (including £3.50 p&p)

<input type="checkbox"/> 2 1/2 mins .....	£43.50
<input type="checkbox"/> 5 mins .....	£44.50
<input type="checkbox"/> 6 mins .....	£45.50
<input type="checkbox"/> 7 1/2 mins .....	£46.50
<input type="checkbox"/> 10 mins .....	£48.50
<input type="checkbox"/> 12 1/2 mins .....	£53.50

Including inlay card & side-labels.

Total Remittance £ .....

NAME .....

ADDRESS .....

I enclose my cheque/PO .....

Please make cheque/PO payable R.F.W.

## EPROM SERVICES "permanent software"

### ZX Hardware Specialists

<b>ZX81</b>	
8K Eprom Board inc Eprom 1 or 11 .....	£19.95
Eprom 140 routine tool kit .....	£9.95
Eprom II Rapid Save/Load .....	£9.95
Eprom ZX Monitor .....	£9.95
Eprom K advance & tool kit .....	£9.95
Romulus Z80 Disassembler .....	£9.95
Graphics Board inc 4K of Eprom .....	£24.50
Motherboard — 3 slot .....	£15.95

### ZX SPECTRUM

Rampack Adaptor .....	£6.95
Eprom Board .....	£19.00
23 or 28 way Edge Cards .....	£0.75
23 or 28 way Edge Connectors .....	£2.50
I/O ports from £14.50 .....	
A/D cards from £22.95 .....	
D/A converter £27.00 .....	

All prices inclusive of p&p. Please send sae for details.

## EPROM SERVICES

3 Wedgewood Drive,  
Leeds LS8 1EF (0532) 667183

"Apology for incorrect address in previous ad."

### WANTED PERSONAL COMPUTERS

all models bought for cash  
**Morgan Camera Company**  
160 Tottenham Court Road,  
London W1 Tel: 01-388 2562

## MICROSHOP

### Accessories

OUT NOW



#### THE NEW DELTA 14 HANDSET FOR THE BBC

Used for years by DATABASE owners these high Specification handsets have 14 pushbuttons to take the strain off of your keyboard. The DELTA 14 comes in two parts. One handset will plug into the A/d to give analogue spring return joystick plus three button functions. The second part is the DELTA 14B/1 adaptor box which connects the 15 way "D" to the user port. This gives 12 buttons on a 4x3 matrix. The eighth line selects a second joystick which can be plugged into the adaptor box.

DELTA 14B JOYSTICK HANDSET FOR BBC £10.95  
DELTA 14B/1 ADAPTOR BOX AND CABLE £13.95

#### Still Available JOYSTICKS from £4.50 each DIRECT FROM OUR FACTORY

IN KIT FORM: kit contains 1 switched joystick assembly, 2 moulded case halves, fire button, 1.5 metres 5 core + screen cable, fixing screws

READY BUILT with 9 way "D" socket — suit Atari or Vic 20 ..... £4.50 per KIT  
READY BUILT with potentiometers and 5 way din socket to suit Dragon ..... £5.95 each  
FEW ONLY with potentiometers and 5 way din socket to suit Dragon ..... £5.00 each

#### CONNECTORS

"D" connectors 9 way female plug or 15 way male plug complete with hoods

Din plug 5 way 240 deg. .... £1.75

9 way female plug moulded to 1 metre of 9 core lead ..... 50p

AERIAL SPLITTER SWITCHES ..... £2.50

(Saves unplugging T.V. Aerial to connect computer)

Cheque or PO with order. Prices quoted INCLUDE VAT, 1st Class Post, immediate despatch — 7 day money back guarantee.

**VOLTMACE LTD., PARK DRIVE, BALDOCK, HERTS.**

Callers welcome Monday to Friday.

Telephone: (0462) 894410



### Appointments

# SOFT

## WHY DO YOU USE YOUR COMPUTER, TO PLAY GAMES OR WRITE YOUR OWN SOFTWARE?

Would you like a chance to make a name for yourself in the software market and use that computer knowledge?

SOFT is new! Launched in June '83. It is the only magazine for the microcomputer user, who wants to know more about the software available throughout the UK. Published by Sportscene Specialist Press. Due to expansion we are now looking for another young Sales Person or Trainee to sell advertising space to Software Houses and Computer Companies. We are looking for someone bright, intelligent and with a certain amount of computer experience, preferably with "A" Levels.

The successful applicant will receive an excellent salary plus commission and a chance for advancement in this rapidly expanding publishing company.

For further details contact the Advertising Manager Jeff Raggett on 01-631 1433 or 01-580 0504 between 9.30 and 5.30.



## MICROCOMPUTER PROGRAMMING OPPORTUNITY WANTED

Experienced freelance assembler programmers/organisation to convert best selling arcade games for a variety of home computers.

## INTERESTED?

Send samples of your work and details of your development equipment.

To: Mrs Karen Tarrin  
(Dept PCN)  
Atari International (U.K.) Inc.  
Atari House  
Railway Terrace  
Slough  
Berkshire SL2 5BZ

## TO ADVERTISE IN THE APPOINTMENTS SECTION OF

**PERSONAL  
COMPUTER  
NEWS**

CALL IAN WHORLEY  
ON  
01-323 3211

## MICROCOMPUTERS £250 COMMISSION

YES, We will pay up to £250 or 5% of Sale to Agents, Reps or Persons who supply to us a business lead which we convert into a sale.

For details:  
Computer Incentives,  
500 Chesham House,  
150 Regent Steet,  
London W1R 5FA

Tel: 01-439 6288

# NOTE TO EXHIBITORS

**1982: 47,543 reasons to be at  
the 5th PCW Show**



**1983: 20 chances to be at the 6th**

Six months before the doors open on the 6th *PCW* Show, Britain's number one micro event, only 20 stands\* are available for allocation. Need we say more...?

To discuss stand availability today, phone Timothy Collins on 01-486 1951.  
For exhibitor list and further information write to Montbuild Ltd, 11  
Manchester Square, W1M 5Ab, Telex 24591.

\* correct at 20.4.83

**BARBICAN CENTRE, CITY OF LONDON**  
**28 September — 2 October 1983**

## NEXT WEEK

### Look out for:

**Sound Systems** — Part 1 of a five-part Micropaedia exploring speech, music and sound effects on micros.

**Games** — for the Oric, Commodore 64, BBC Micro, Spectrum and Dragon.

**CP/Morganised** — PCN looks at a front-end package that makes CP/M easier to use.

**Duet for One** — Fujitsu's new Duet brings colour into business.

**Juki Box** — A Pro-Test of the economical Juki daisywheel printer.

**64 Graphics** — Close-up on the graphics capabilities of the Commodore 64.

Plus all the regular news and features

# Virgin at play

Wine flowed at the Roof Garden in Kensington High Street last week for the launch of the long-awaited Virgin Games. But that was about all that was normal at this press launch.

Virgin did it in style — well, its own style at least. The lights flashed disco-fashion, the 45s pounded not quite in the background and the waitresses were designed to appeal to someone as they tottered about wearing schoolgirls' garb, space outfits and some dressed in very little at all. Indoor fireworks and a Margaret Thatcher imitator kept the atmosphere crackling.

But why all this to sell games? It leaves the most sceptical

among us listening with more than half an ear to the rumours that despite the hullabaloo, the games are a letdown. We'll be looking at some and will let you know what we think. But isn't there some saying about he who makes most noise ...

## Why the L?

Japanese firm Taxan's owner's guide for its RGB monitor came our way this week. Seems the company uses voice-input type-setting — or at least that's what we assume from the reference on page two to that well-known machine the Franklin Ace. Ah so, technology moves on ...

## SLANTAX ERRORS

### Hopped off

In Playing the Ace, Gameplay issue 15, details of Hopper slipped from the page. So, for all potential enthusiasts, the program is available from Discount Software, 25 Plymouth Road, Springfield, Chelmsford, Essex CM1 5JG, and it costs £5. Alas, in the same issue Ted Ball's software Pro-Test of the Address Manager for the Spectrum lost its rating, which should have shown: Features 4; Documentation 3; Performance 4; Usability 3; Reliability 5; Overall value 4.

### Wrong Tally

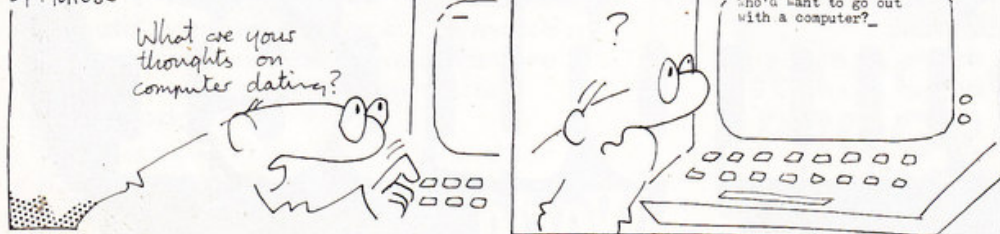
In PCN Monitor, Issue 14, a 2 materialised in the middle of Manesmann Tally's telephone number. MT's real number is (0734) 788711.

### Chess cheque

There's more than meets the eye to the chess challenge we reported in Issue 10. The £5,000 mentioned was not so much of a prize as a stake, and if you want to take on Intelligent Software's chess program with your own you'll have to put up £5,000 of your own, which may be sport but it isn't exactly cricket.

PAL2000

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
Compec North '83	June 21-23	Belle Vue, Manchester	Roy Bratt, Reed Exhibitions, 01-643 8040
Leeds Software Fair	June 21	John Taylor Teacher's Centre, Leeds	Graham Creighton 0532 782181
BBC Micro User Show	June 24-26	Renold Building, UMIST Manchester	Database Publications, 061-456 8500
Music Micro Show	June 28	Holiday Inn Hotel, Liverpool	Peter Hepworth, Hussy's Music Centre, 051-236 1418
Dexpo Europe '83	June 29-July 1	West Centre Hotel, London	Expo Consul Inc, 01-948 3111
Malvern Microcomputer Fair	July 2	Winter Gardens, Malvern, Worcestershire	Personal Computer Fairs, Worcester 22659
Micro Trade '83	July 6-8	Barbican Centre, London	Timothy Collins, Montbuild Ltd, 01-486 1951
IBM Users Conference & Exhibition	July 12-14	Wembley Conference Centre	Online Conferences Ltd, 09274 28211
8th ZX Microfair	August 20	Alexandra Palace, London	Mike Johnstone, 01-801 9172
Acorn User Exhibition	August 25-18	Cunard International Hotel, London	Computer Marketplace Ltd, 01-930 1612
Computer Open Day	September 1	Draganora Hotel, Leeds	Tony Kaminiski, Couchmead Communications Ltd, 01-778 1102

## OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Mini Computer Show for Office, Home, Hobby	June 23-26	Exhibition Hall, Cologne	German Chamber of Industry and Commerce, 01-930 7251
International Micro Computer Exhibition	Aug 2-5	Kuala Lumpur, Malaysia	Conference & Exhibition Management Services SDN BHD, 9-A Jalan SS24/8 Taman Megah, Petaling Jaya, Selangor
National Computer Business & Office Systems	Aug 16-19	Auckland, New Zealand	Trade & Industrial Exhibitions, 12 Heather Street, Parnell, PO Box 9682, Auckland
Australian Computer Exhibition	Sep 13-16	Melbourne, Australia	Riddell Exhibition Promotions PTY Ltd, 166 Albert Road, South Melbourne, Vic 3205
International Peripheral Equipment & Software Exposition	Sep 13-15	Moscone Centre, Anaheim, USA	Cahners Exposition Group SA, 0483 38085

# The printer that thinks it's a computer!

**FACT** With internal microprocessor, 8K buffer store and total compatibility, the Ricoh Flowriter range has proved itself the most intelligent and reliable range of printers on the world market.

**FACT** Ricoh Flowriters can assume the characteristics of any popular 'intelligent' printer and plug into any hardware configuration.

**FACT** Ricoh Flowriters perform all your processing and printing needs while leaving the host computer free for other work.

**FACT** Ricoh Flowriters do all this, give you exceptional print quality, yet **cost the same as ordinary daisy wheel printers!**

- FEATURES**
- Internal microprocessor
  - 8K buffer under full program control
  - Includes RS232, Centronics and IEEE 488 interfaces
  - 60cps print on the RP1600, 37cps on the RP1300
  - Qume, Diablo and NEC Spinwriter wp commands-compatible
  - Auto-bidirectional and logic seeking high-speed printing
  - Graphics capability down to 1/120"

- Built-in proportional spacing tables
- Automatic margin justification, even on proportional spacing
- 128-character printwheels, wide choice of fonts
- Wide range of accessories – sheetfeeds, tractor feeds, ribbons, printwheels
- Detachable keyboard option for using Flowriter as an intelligent typewriter or KSR terminal

For intelligent printing that frees the host computer and gives you exceptional print quality and speed, find out more about the Ricoh Flowriter – the printer that **knows** it's a computer, yet costs the same as those that aren't!



The RP1600 Flowriter



Dealer Enquiries welcome.  
The Ricoh/Flowriter range is only available from APTEC and their authorised dealers, backed by a nationwide service network.



**APPROPRIATE  
TECHNOLOGY LTD.**  
2-4 Canfield Place  
London NW6 3BT  
Tel: 01-328 7272  
Telex 264538 SSE G

The Ricoh

# FLOWRITER

# spectrum gaming

An amazing  
collection of  
exciting  
games for  
VIC 20 and  
ZX Spectrum

Featuring—

- Hi-Resolution Graphics
- Solid Machine Code Thrills
- Authentic Arcade Action
- Sensational Sound Effects

Titles for Oric,  
Dragon and  
Commodore 64  
*Ring for details:*

**061-832 9143**

(24 HOURS)

Dealer enquiries invited

**FREEPOST  
MANCHESTER  
M3 8BB.**

**KONG/MANIC/MISSILE ATTACK/  
STRIKE FORCE/ROAD FROG/  
MONSTER MANCHER/ROCKET COMMAND/  
FRENZ/COSMIC INTRUDERS**

Available from all good  
software dealers and major  
department stores

remember to ask for

**spectrum  
gaming**

by name