

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**

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which one's
for you?**

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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

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Latest news from home and abroad

PCN PROGRAMCARDS
Popular programs to cut out and keep



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VIC20 GAMES FROM QUICKSILVA

TORNADO VIC20 GAMES FROM QUICKSILVA



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+ JOYSTICK

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PIXEL

PIXEL POWER

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. . . and wonders whether, in marketing the Z80 Disk Pack for the BBC micro,

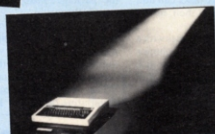
Torch is undercutting its own main product.

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.

**Prof in print****35**

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

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Cover photograph by Naru

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Torch flares

By Geoff 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.

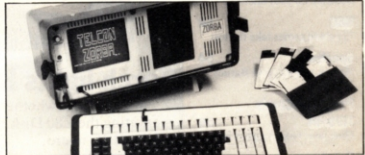
At £1,834 the Zorba comes with a 7in green screen giving 80 columns by 25 lines, two 5¼in floppy disk drives holding 400K each, full qwerty keyboard and a Z80.

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 Seales

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 Winchesters 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 Microdrive 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 Computers.

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 modems.

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

stand. One is a joystick interface that costs £15 and allows you to hook up two Atari-type joysticks. Pasé 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, MicroMyte 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 Prentel 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 splines.

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 Fort. 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 Text, 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 touring 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 the 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-

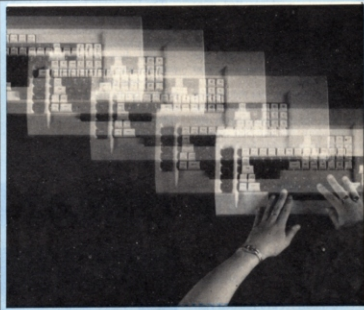
siderably different capabilities. The VX128 has a fairly ordinary eight-colour palette (usual RGB colours), but the VX384 can display any 512 colours from a total palette of 16.8 million!

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 280 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 juggling 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.

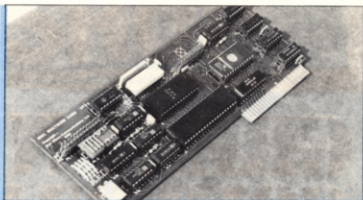
This is bad news for BBC owners with their hearts set on buying disk drives — without the interface, of course, there is no way of getting them to work with the micro.

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

and school 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	Pison	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
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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 grinning markedly.

But the system gives you what by current standards is a vast capacity, and even if its Z80 CPM 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.

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.



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 year's 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 out them. The terminals will cost £350 from Newbury Data on Staines (0784 61141).

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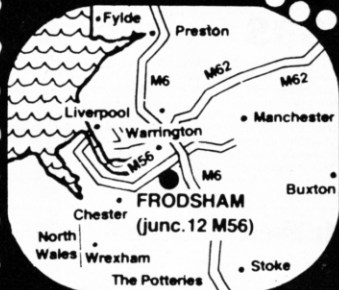
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Setting a cat . . .

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 delivered 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.

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.

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.

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.

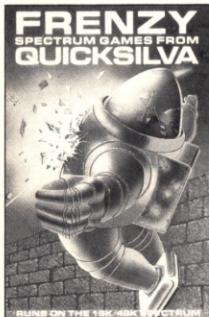
For further information contact The Secretary, VGES, 25 Rona Road, London NW3 2HY.

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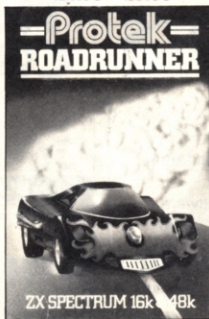
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WRITE TO: Random Access, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

Ballad of the BBC blues

Ode to an Impatient Games and General Use Computer Looney

Mé, 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 McGillinary
Aberdeen

*Wielding of a copy cutting knife,
well honed to trimming over-
long articles to the space avail-
able 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 trans-
mitting large amounts of data
very quickly without airwave
'noise' and the inherent limita-
tions 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/1 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 Intermation: produces a machine-code program by translating Basic.

Lisp: a sophisticated Artificial Intelligence language, which comes complete with an editor, preprocessor 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 AS
20 PRINT AS

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, GETS, INKEY or INKEYS, 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$: REM print if not <CR> or <BS>
1080 THEN I$ = I$ + P$: L = L + 1: REM then add it to the end
1090 ENDIF
1100 ENDIF
1110 UNTIL (P$ = CR$ AND L >= MIN) OR L = MAX: REM until we have enough
1120 = I$: REM return what we got
1130 ENDPROC
    
```

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, Camssoft 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 x 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'.

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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: POK#650.128

By messing around with POKing location 651 you can adjust the amount of time your Vic waits before it starts repeating. To return to normal type, POK#650.0. 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 OSI.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.

#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: POK#410,236

To enable the Break key use: POK#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 POKing 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:

■ POK# 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.

■ POK# 23692.255. Scroll counter. POKing this to 255 during a program stops the computer asking 'scroll?' when the screen is full.

■ POK# 23609.n. This varies the keyboard click length. Increasing its value to about 35 will give a more audible beep.

■ 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 POK#. 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 POK# 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

Iterations, 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

```

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.

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 $x \rightarrow L^4 X^3 (1-X)$ 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:

0.10011001100110011001100110011010

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:

0.10011001100110011001100110011001

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:

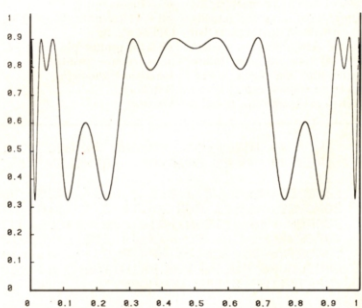
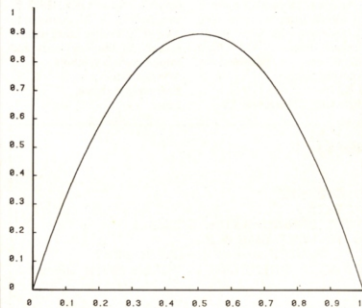
1.00110011001100110011001100110100

Then it subtracts 1 to obtain:

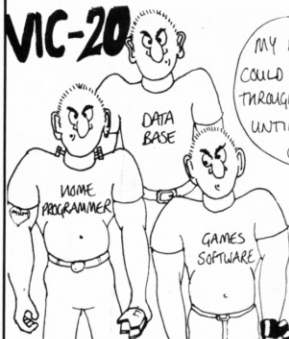
0.00110011001100110011001100110100

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



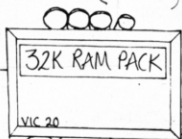
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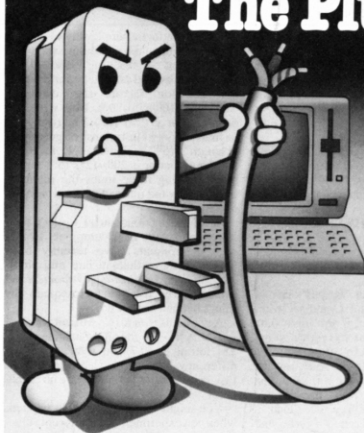
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Barry Miles offers some Sterling advice on buying micro-wares from the United States.

We 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 obsolete 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's 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...



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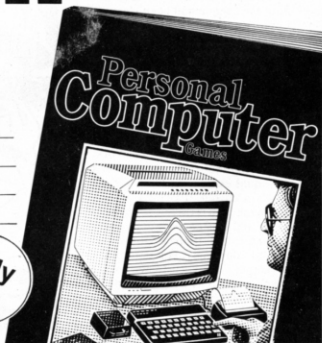
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Bob Maunder is co-author of 'The ZX80 Companion' and author of 'The ZX81 Companion'. He is a Senior Lecturer in Computer Science at Teesside Polytechnic, holds an MSc degree in Computer Science, and is a Member of the British Computer Society.

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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 25

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.

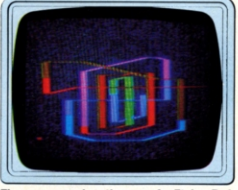
Amendments — delete lines 30 and 32 to select single pen widths if you have no paddles.

Variables in the program

- R** Graphics mode
- PA** Paddle
- BA** Colour update
- YA** Max. Y. Axis
- YS** Stick (0)
- B** Present Colour
- XA** Max. X. Axis

```

1 REM *****ETCH/A/PAD*****
2 REM *****BY*****
3 REM *****EDMUND+BAMBER*****
4 DIM A$(1)
5 GOSUB 250:GOSUB 54:GOSUB 90
6 GRAPHICS R=16:B=0:I=INT (X/2):Y=INT (Y/2)
7 IF STR$(0)=0 THEN GOTO 40
8 IF PADDLE(2)<228 THEN GOSUB 300
9 IF PA<228 THEN PA=15
16 FOR E=712,PA:COLOR V
20 GOSUB 150
25 PLOT X,Y
30 IF PADDLE(1)>170 THEN DRAWTO X+2,Y
32 IF PADDLE(1)<85 THEN DRAWTO X-1,Y
34 IF (X=X-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=8 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,B
50 IF FEEL(53279)=6 THEN GOTO 10
52 IF S=7 THEN GOSUB 90:NEXT B
53 GOTO 40
54 GRAPHICS 2=16: ? E$(ARTIST'S ETCH/A/PAD"? E$(1)
56 ? E$(PRESS TRIGGER / PUSH UP TO CHOOSE COLOR"? E$(1)
58 ? E$(PUSH RIGHT TO REDRAW"
60 ? E$(PRESS START TO DRAW"
62 FOR D=1 TO 5
64 FOR I=0 TO 255
66 FOR E=710,I
70 SOUND 0,I,4,14
72 NEXT I
74 FOR D=1 TO 1000:NEXT D
76 ? GRN(125):GRAPHICS 2=16: ? E$(1)
80 ? E$(PRESS START TO BEGIN"
82 FOR I=0 TO 255:FOR E=710,I
84 IF FEEL(53279)=6 THEN RETURN
86 NEXT I:GOTO 82
90 SOUND 0,0,0,0:GRAPHICS 2=? E$(1)choose RESOLUTION"? E$(1)
92 ? E$(1)LOW RES 4 COLOR"? E$(1)
94 ? E$(1)MED RES 4 COLOR"? E$(1)
96 ? E$(1)HI RES 4 COLOR"? E$(1)
98 ? E$(1)HI RES 16 COLOR"
100 ? "PLEASE ENTER YOUR CHOSEN RESOLUTION"? (A)(B)(C)(D) or (E) FOR
SUPER-RESOLUTION 1 COLOR"
102 INPUT A$
107 IF A$="E" THEN I=1
108 IF A$="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=2: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=9:XA=317:YA=191:BA=16:RETURN
120 RETURN
130 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
180 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,B
175 IF X=XA THEN X=XA
180 IF Y=Y1 THEN Y=Y1
185 IF Y=YA THEN Y=YA
190 IF Y=1 THEN Y=1
195 IF D=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: ? E$(ARTIST'S ETCH/A/PAD"? E$(1)
255 ? E$(1) YOU WILL NEED A JOY STICK:plyr (1) JACK TO DRAW WITH AND
265 ? E$(1) (optional)A PADDLE plyr (2) JACK TO CHANGE THE COLOR OF THE BA
D:GROUND (3)TO CHANGE PEN:SIZE"
270 ? E$(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.



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

Pro processing on the Commodore 64

Word 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 full-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 your 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.

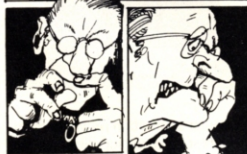
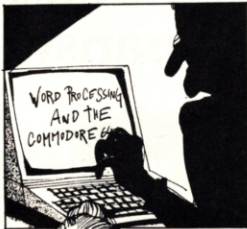
These quibbles aside, the manual is very good for the newcomer, being instructive without condensation.

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-stroke 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: spaced 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

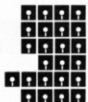
Features
Documentation
Performance
Usability
Reliability
Value



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

CP/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 will 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 be very much for you.

RATING

Features

Documentation

Performance

Usability

Reliability

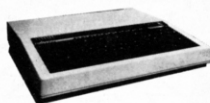
Overall value

Name Simplifile Application Simplified extension to CP/M Operating System System CP/M, with 8in discs Price £75 Publisher Selven Systems, 3/5 Gouthavon 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	Help	<< Disk Message >>		
Cmd	Name	Type	Size	ChgDat	Description
--DISTRI	DD	2K	073082		Simplifile's private file
File1	COM	2K			
File2	COM	1K	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.



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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.

The 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 MicroProcessor. 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 MicroProcessor 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 straightforward 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.

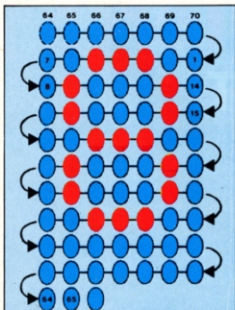
Printing speed is just over 100cps which seems pretty reasonable. The paper is the standard 2.5in-diameter thermographic.

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.

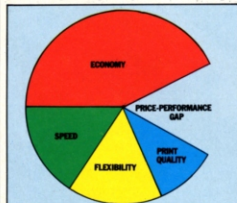
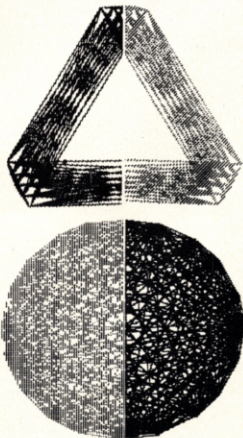
Item MPF-II Printer **Interfaces** MPF-II, Apple II, Centronics **Manufacturer** Multitech **Price** £185 inc VAT **Distributor** Sirtel (0733) 313 444



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

The 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, CPM.

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 CPM. Torch claims it's much more flexible than CPM and has more built-in commands, making it easier to use. The original CPM stands for Control Program for Microprocessors and acts as a



disk operating system for Z80-based microcomputers. CPM 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 CPM 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 CPM, 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 CPM library of programs is vast and Torch's offshoot already has a host of CPM 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 CPM chestnuts as Mail Merge, Spellstar, Calendar and Supersort. More prosaic applications like integrated accounting suites are also catered for.

The economics 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 R I W, 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. CPM 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**

38 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↑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 letter 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 autorepeat 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

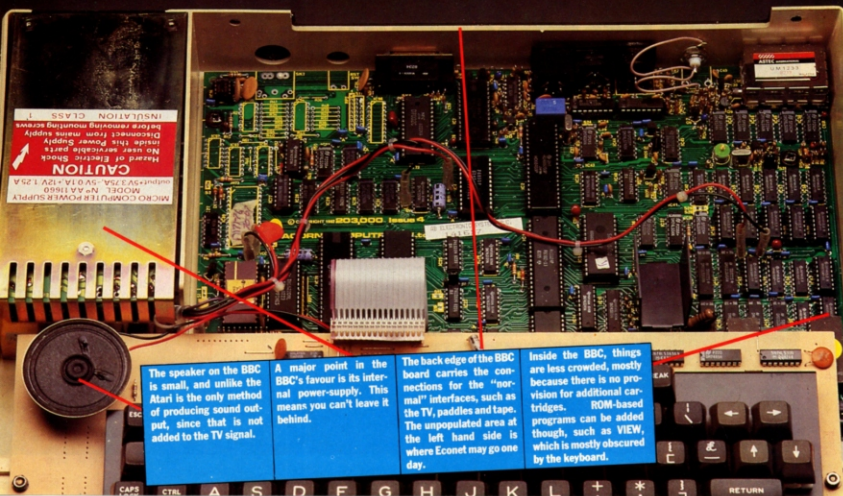
The internal construction of the Atari is very solid with a cast metal frame for the cartridges. This makes it tough enough for children.

This pizzycab 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.

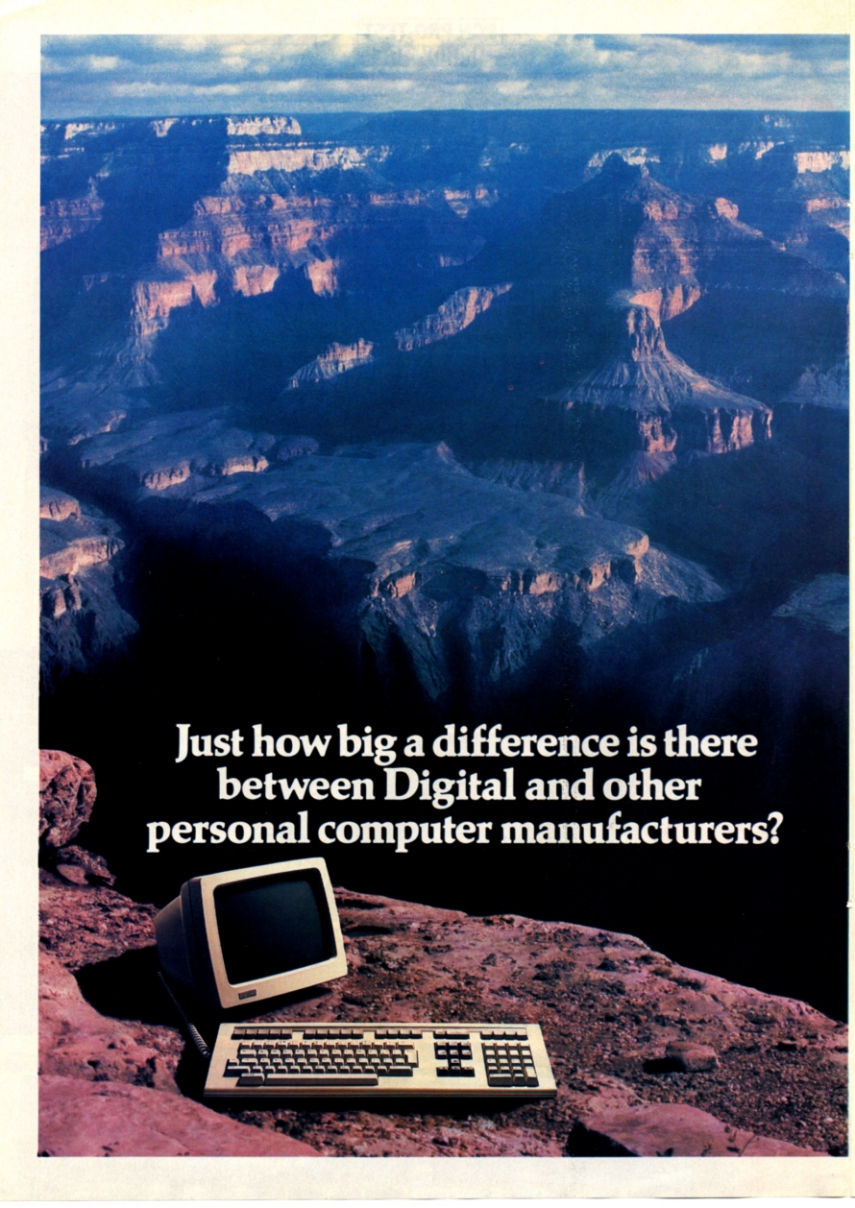


The speaker on the BBC is small, and unlike the Atari is the only method of producing sound output, since that is not added to the TV signal.

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.



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Software Sciences, Thorn (EMI) House,
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4B Microcentres Ltd, 13/14 North Bar, Banbury,
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MMS Ltd, Ketwell House,
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Tel: 0234 40601.

Zygal Dynamics PLC, Zygal House,
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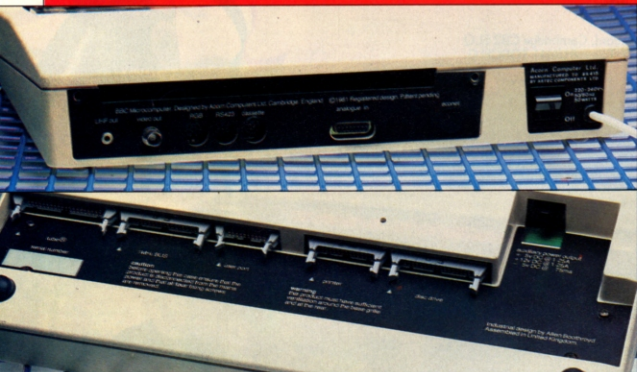
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Above left, the Atari's cartridge slots. At the front are two slots which take the Basic or other language cartridges, plus games or utilities. At the rear are four slots for the 10K operating system pack, and additional memory. On the right, the interfaces 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, and 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, 64 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.

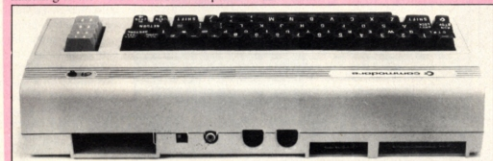
However, Commodore has vowed to repeat its pre-Christmas sales blitz with the Vic last year, and the talk is (PCN, issue 14) that the price will plunge to around the £200 mark.

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,DB	SS,DB
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.

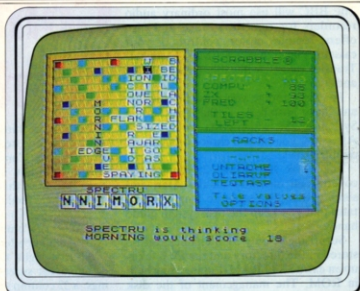
Just a couple of barrel-scrappers. You can't fit either 'Spectrum' or 'Computer' in as the name of the Computer's player. And you've no way of interrupting an all-computer game. Believe me, you'd think twice about pulling the plug and reloading this one.

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 W H 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



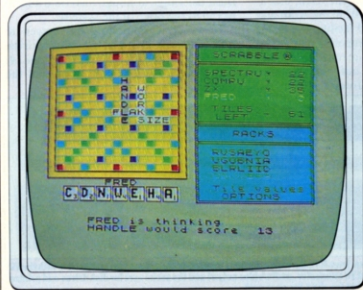
Playability



Use of the machine



Value for money



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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 pop) 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 surpris-

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 of 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

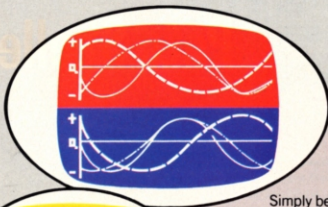
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$$\frac{dy}{dx} - y = f(x) \quad \frac{dy}{dx} = f(x)$$



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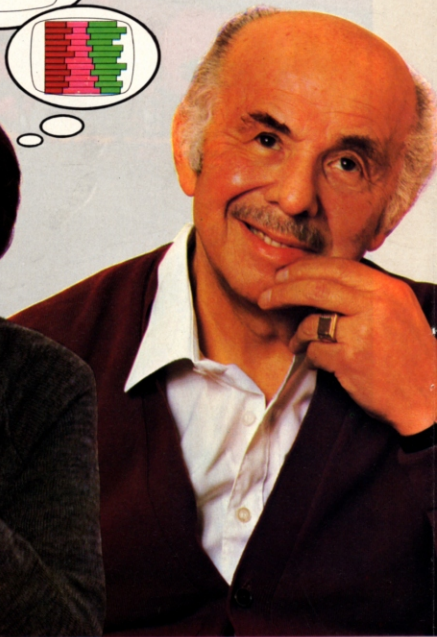
For those family members that do revel in creating their own personal computer programmes the M5 will test all their abilities. And teach them many more.

Alternatively for those that don't want to become so involved in programming the M5 couldn't be more fun.

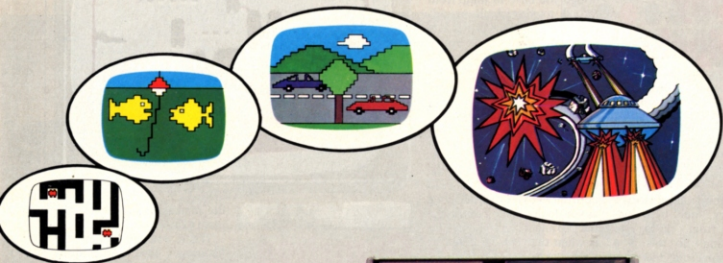
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PCN/20/6/83

HEROES AND VILLAINS

SPECTRUM

Wholly webblocked

Name Horace & The Spiders System
Spectrum 16K or 48K. **Price** £5.95
Publisher Prison 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 skiing to spider-hunting. So this is a game to bring out the very worst in all haters of creepy-crawlies.

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.

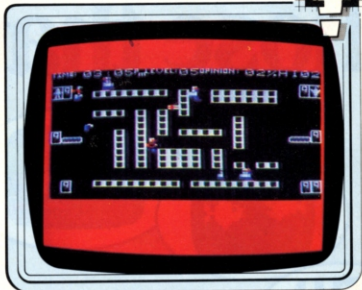
But by using the left and right keys in quick succession, trigger-finger style, you can keep control over him.

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.

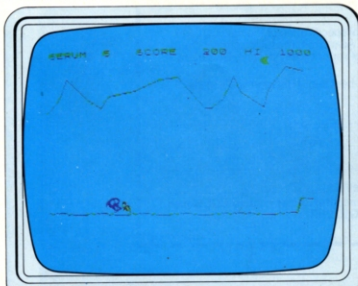
Verdict

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



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PCN ProgramCards

Nine annotated ProgramCards this week will keep owners of T199/4A, 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 T199/4A 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.

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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):"VIDED TITLE
$"
160 C$="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
```

T199/4A TI Extended Basic

Application: general interest
Author: John Waters

```
RUCTIONS *****
210 DISPLAY AT(2,3):" THIS PROG
RAMME ENABLES YUOTO CREATE TITLE
$ 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

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8316VT2/6

```
250 INPUT " PRESS ENTER TO CONTINUE:";A$
260 REM RECORDING INSTRUCTIONS
270 CALL CLEAR
280 DISPLAY AT(1,2):"* RECORDING INSTRUCTIONS *"
290 DISPLAY AT(2,2):" CONNECT THE OUTPUT LEAD FROM THE PAL MODULATOR 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 TELEVISION SCREEN -FROMYOUR TI-99/4A VIA
```

```
THE VIDEO-CAN BE RECORDED."
330 DISPLAY AT(19,2):" A TIME LAG OCCURS BEFORE TITLE DISPLAY FOR SWITCHING VIDEO TO RECORD MODE."
340 INPUT " PRESS ENTER TO CONTINUE:";A$
350 REM TITLE INFORMATION
360 CALL CLEAR :: F=0 :: GOSUB 1050
370 DISPLAY AT(1,2):"*** TITLE COMPOSITION ***" :: DISPLAY AT(3,2):"PLEASE INPUT THE FOLLOWING INFORMATION:"
380 DISPLAY AT(7,2):"HOW MANY TITLE LINES" :: DISPLAY AT(8,2):"(1-24) ?" :: ACCEPT 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 COLOUR (1-16) ?" :: ACCEPT AT(10,26)VALIDATE(DIGIT)BEEP:S
400 DISPLAY AT(12,2):"TYPE COLOUR (1-16) ?" :: ACCEPT AT(12,26)VALIDATE(DIGIT)BEEP:TC
410 DISPLAY AT(14,2):"TYPE BACKGROUND COLOUR?" :: ACCEPT AT(14,26)VALIDATE(DIGIT)BEEP:TB
420 DISPLAY AT(16,2):"STATIC OR ROLLING" :: DISPLAY AT(17,2):"TITLES (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) ?" :: ACCEPT AT(20,26)VALIDATE("HD")BEE
```

```
P:F$
460 F=ASC(F$)
470 DISPLAY AT(22,2):"ARE THE ABOVE ENTRIES" :: DISPLAY AT(23,2):"CORRECT (Y/N) ?"
480 ACCEPT AT(23,26)VALIDATE("YN")BEEP:D$
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 ELSE 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, set up arrays

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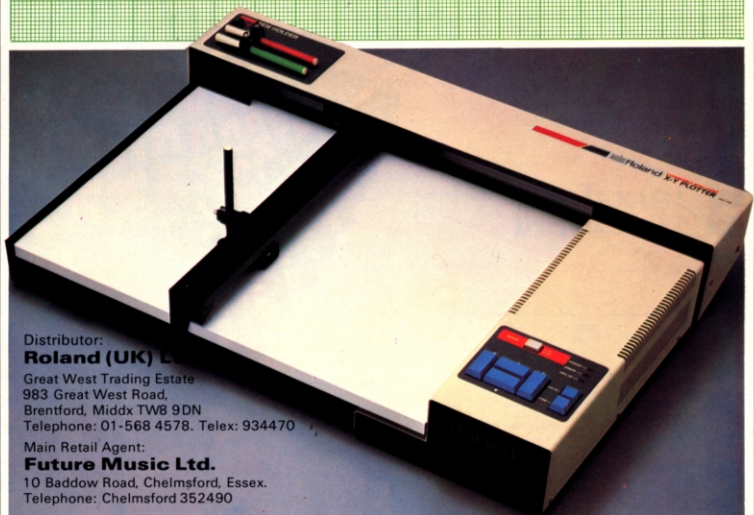
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Bowling Card 1 of 2

8316B1/2

A short simulation of ten-pin bowling

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.

```

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 s=20: LET k=19
20 GO SUB 7500
25 FOR q=1 TO 10
30 FOR p=1 TO p1

32 RESTORE 9019:p1 READ b, c: BORDER b: PAPER c: CLS

35 GO SUB 8010

40 FOR t=1 TO 2
50 FOR k=19 TO 20: 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=0 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 RAND<.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
1: NEXT d: PRINT AT 1, 10: "END OF GAME"
170 INPUT "Another Game "a$:
180 IF a$="y" THEN RUN
190 STOP

```

Bowling Card 2 of 2

8314B2/2

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.

```

200 FOR f=5 TO 0 STEP -1: PRINT AT f, 19: " " : "1" " " "1" " " "1" 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
of 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 50: 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 15, 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 !: AT a, b: "a": NEXT f
8030 PRINT AT 1, 0: "k" "b"
8040 PRINT AT 1, 0: "FRAME "f: " : FOR f=2 TO p1*2 STEP 2: PRINT AT f+5, 0: "Player "f
/2": " " : (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 00111100, BIN 01111110, BIN 01111110, BIN 01111110, BIN 01
11110, 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

```


PCNProgramCards

Pirate Island Card 4 of 9

8316P14/9

```

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	What a choice!
760-807	New location, details and response
810-840	Actions
850	Yohoho!
855-877	Details, prompt and response
880-890	Response action
910-920	Action
930-945	Nosey
947-950	Prompt and response
960-970	Action

PCNProgramCards

Pirate Island Card 5 of 9

8316P15/9

```

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.GG 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.GG 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.GG TREE"
1190 PRINT "2.GG 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	Well done
1120-1175	Recognise this code?
1180-1190	And this?
1200-1220	What to do?
1230-1250	Action, prompt and response
1260-1270	Belogical!

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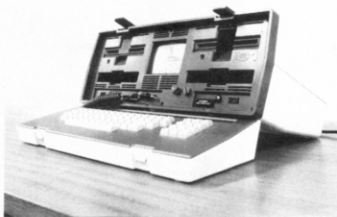
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PCN16

Pirate Island Card 6 of 9

8316P16/9

```

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"
1455 ?
1465 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...

Pirate Island Card 7 of 9

8316P17/9

```

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 S
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: ? "3"
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 YOUR OWN SWORD"
1755 PRINT
1760 ? "HIT Y FOR ANOTHER TURN": INPUT Y#
1770 IF Y#="Y" THEN S
1775 GOTO 1760
1780 ? "YOU ARE NOW SAILING FOR THE ISLAND OF UNKNOWN"
1790 FOR I=1 TO 1000: NEXT I: ? "3"
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 S
1850 GOTO 1830

```

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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 ZJ 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

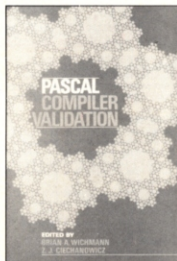
from a wide variety of well informed sources, is it?

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 585311) 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 Gryndon

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 729582.

Multi-User Club produces bi-monthly magazine, subs: £7.50. Contact Valerie Boyle-Shaw, Naibea 851337.

Worce Computer Club. Meets at Woodsprings Inn Functions Rooms on alternate Mondays at 7.10.30pm (annual subs: £12). Contact S W Rabone, 18 Castle Road, Worle, Weston-super-Mare, Avon, tel: 0953-513068.

BEDFORDSHIRE

Bedford Amateur Computer Club. Meets at Star Kissing Club, Bedford, on the first and third Tuesday of each month at 8pm (annual subs: £3). Contact Rowan Ryan, 74 High Street, Great Barford, Beds MK44 3LJ, tel: 0234-870763.

Children's 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 OLU6 2DF, tel: 0525-229922.

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: 0582-458687.

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 3UJ, 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 Mansfield County Secondary School the first Thursday of each month at 7pm. Contact Ken Knight, 22 Mount Street, Aylesbury, tel: 0296-5181.

Chalfont 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 Elwood, Dearway, Chalfont St Giles, Buckinghamshire, tel: 024-07 4906.

Iver Computer Club. Contact P A Seal at 1 Ormeau Drive, Church Road, Iver Heath, tel: 0753-652792.

Iver Computer Society meets at Hunsdon room, Iver Village Hall on the second and fourth Thursdays every month at 7.30. Contact John Haigh, 141 Leas Drive, Iver Bucks, SL09RP.

CAMBRIDGE

Cambridge Microcomputer Club. Meets on the third Wednesday of each month. Contact Derek Tripp at 3 Spurgeons Avenue, Waterbeach, tel: 0223-35662.

Peterborough Personal Computer Club meets at Crossfield 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.

Brum Computer Club. Meets at St Werburgh Community Centre on alternate Wednesdays at 7 to 10pm. Contact Mr R Simpson at The Coats, Stockwood, Cheshire, fortnightly.

Cheshire Computer Club. Contact W Collins at 37 Garden Lane, Chester, Cheshire.

Crew Computer Users Club meets at Bullaloes Club, Earl Street, Crew, Cheshire, on the third Thursday of each month at 8pm. Contact Brian Knight on 0270-623375.

Holmes Chapel Micro Club meets at Lisure 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, subs: £2 per quarter, £1 members subs: £5 adults. Contact John Eary, New Mills 43870.

New Mills & District PCC meets at New Mills School, fortnightly on Fridays at 7 to 9.30pm, meetings 5p. Contact Mr G M Flanagan at 11 Sunnyside Close, New Mills, Stockport, Cheshire SK12 3DH, tel: 0663-44051.

Northwell Computer Club meets fortnightly, meetings 25p. Contact John Lightfoot at 13 Aston Drive, Frodsham, Warrington, Cheshire WA6 7PU, tel: 0728 31519.

Northwell 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 77548.

Mid-Cheshire Computer Club meets at Winsford Library on the second Friday of each 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 21 on third Tuesday of the month. Contact J Telford at 13 Weston Crescent, Norton.

Stockton Amateur Computer Clubs 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 Chester, 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 C-IPJ Labs, Penzance Road, St Austell, fortnightly on Mondays at 7.30pm. Contact N G Day at 24 Clunk Road, St Austell, Cornwall PL25 3DD.

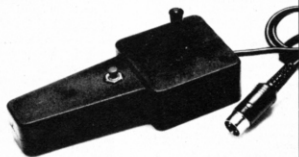
DERBYSHIRE

Derby Micro Society meets at Littleover Church Hall, Shepherds Street, on every other Thursday at 7.00pm. Annual subs: £5, £2.50 children, £2.50 for families, 50p entrance non-members. Contact Mike Riordan, tel: 0332-769440.

Glossop Computer Club. Contact John Dean, 2 Spinney Close, Glossop, Derbyshire.

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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 TG Holden, 14 Greenville Avenue, Teignmouth, Devon TQ14 9NT.
Exeter & District Amateur Computer Club meets twice Tuesday every month. Annual subs: £7.50. Contact Doug Bates, Fortescue House, Stoke Cannon, Exeter. Specialist meetings on third and fourth Tuesdays.
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 subs: £5 adults; £2.50 juniors. Contact Peter Hibbs, 54 Runnymede Avenue, Bournemouth, Dorset BH1 19SE. tel: 01202 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.
Parbeck Computer Club, contact 31 North Street, Wareham, Dorset BH21 0AD.

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
Goniton Computer Club, subs: £1 ZX81 members, £1.50 Spectrum members. Contact 30 Webber House, North Street,arking, Essex.
Brentwood Amateur Computer Club, proposed new club. Contact R Sadler, 18 Manswold Road, Brentwood, Essex CM1 59DF.
Spartan Computer Club meets on the first Friday of every month. Contact Stephen Cousines, 1 Aldeburgh Way, Springfield, Chelmsford, Essex CM1 1TB. tel: 0245 501155.

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 present. Contact G Flitt, 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, Neveon 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 Wakering Road, Little Wakering, Southend-on-Sea, Essex. tel: 0702-218456.

GLOUCESTERSHIRE
British Amateur Electronics Club. Independent club with newsletter, an exhibition'section, library, annual beginner's catering for all ages. Contact Mr Margreth, 3 Bishopscote Close, Golden Valley, Cheltenham.
Cheltenham Amateur Computer Club meets on the third Tuesday of every month at 7.30pm. Contact Mike P Pullin on 0242-25617 or Robin Phelps on 0242-58433.

GLoucester 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 Riverside 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, Farnham 280530.
Fareham and Portsmouth Amateur Computer Club. Contact Alan Smith, c/o Hamlets Close, Lee-on-the-Solent, Gosport, Hants PO13 8HB, tel: 0705-55007.

RAF Oldham Computer Club. Contact c/o instructor, Royal Air Force, Oldham, Nr Basildon, 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, Bobbolskote, Hereford HR4 9TG, tel: 0472-269700.

HERTFORDSHIRE
Harpden Microcomputer Club meets at Silver Cap, Harpenden on alternate Mondays. Annual subs £2.50. Contact David James, 50 La Lane, Harpenden, Hertfordshire AL5 4HH.

HUMBERSIDE
Grimby Computer Club meets at Grimston 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 Finch, 21 Old Crosby, Scunthorpe, South Humberside DN15 8PU.

KENT
Canterbury ACC proposed new club. Contact Fisher, 21 Manorwood Avenue, St Stephens, Canterbury, Kent CT1 2JA.
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: 0834-40336.

North Kent Amateur Computer Club meets at Lecture Theatre, Charles Darwin School, Jai Lane, Biggin Hill, Kent, on the first Thursday of every month at 7.30pm. Annual subs £3, £1 students. Contact Ian H House, 28 Canadian Avenue, Catford SE6 3AS, tel: 01-490 5441.

Orrington Computer Club meets at The Large Hall, Christ Church, Chatterhouse Road, Orrington, Kent, every Friday at 8pm-10.30pm. Insurance cover for all members' equipment while on club premises. Contact Mr R Pratt, 23 Arundel Drive, Orrington, Kent BR6 9JF, tel: Orrington 20281.

Amateur Computer Club, annual subs: £4.50 (for under 18s, OAPs). Contact Rupert Steer, St John's College, Oxford OX1 3JP.
National Personal Computer User Association, annual subs £12. Contact

Eric Keeley, 11 Spralling Street, Manston, Ramsgate, Kent.
Sevenoaks Micro Computer Club. Contact G Sommerhoff, Technical Centre, Sevenoaks School, Sevenoaks, Kent, tel: 0732-456340.
Tonbridge & Tzintz 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.

Buryley Computer Club meets at Carleton Hotel, Standish Street, on Tuesdays 7.30-11pm. Contact Clive Talton, 27 Bassett Street, Burnley, Lancs BB10 3EO.
Chorley Computer Club meets at Tinsley Arms, Chorley, every other Tuesday at 8pm. Contact Chris Hicks, 131 Market Street, Chorley, Lancashire.
Ribble Valley Computer Clubs meets at Staff Canteen, Pendle Carpets Ltd, West Bradford, on the second and fourth Monday of every month at 7.30pm. Contact Ian Thornton-Bryar, 25 Southfield Drive, West Bradford, Clitheroe, Lancs BB5 7TU.

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 7.30pm. 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.

Levensham Computer Club, meets at County Hotel every other Monday, 7.9-9.30pm. Contact Reg Porter, 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 L46 5HJ.
LONDON
Croydon Micro Computer Club meets on the first and fourth Tuesday of every month. Contact Vernon Gifford, 111 Sellars Road, Selhurst SE15 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 Lingron 01-554 3282.

FORUM-80 LONDON, contact Leon Jay on 01-286 6207.
Forum-80 Wembley, contact Victor Saleh on 01-902 2546.
Harrow Computer Groups meets at Harrow College of Higher Education, Room W24, Northwick Park, on alternate Wednesday at 7pm. Contact Stacey Bluscher on 01-992 6666.
Imperial College Microcomputer Club meets at room 145, level 1, on Tuesdays at 7.30pm. Contact Tim Parson, c/o L Union Office, Prince Consort Road, London SW7 2BB.
London School Computer Club. Contact Burlington Dunes School, Dane Building, Du'Cane Road, Hammersmith, London W6 8DB, on every Monday, Tuesday, Wednesday and Thursday during term time and one evening a week during holidays. Annual subs: £5. Contact Peter H NDRB, on 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 London Enterprises, 1 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 Kavari, Berridge House, Hillfield Road, London NW6.
South East London Microcomputer Club meets at Thames Polytechnic, Greens Link, Woodside SE16, on alternate Wednesdays at 7pm. Annual subs: £5. Contact Peter Phillips, 61 Grainger Road, SE3, tel: 01-853 8829.
Southgate Microcomputer Club meets at Room B105 Southgate Tech, fortnightly on Thursdays at 7.30pm. Annual subs: £5. Contact Kevin Pretorius on 01-882 2282. See Prestel page 258/264/5 for details.

West London Personal Computer Club meets at Back room, Fox & Goose pub, Hanger Lane, Alberton, 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 Groups meets at Merchant Taylor 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 Wld Road, Southport, Merseyside PR8 2DL, tel: 0704-2524.
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.

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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 Walling Street, Twocaster, 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 of every month. Annual subs £3. Contact Derrick Daines, c/o Cuttings Avenue, Sutton in Ashfield, Notts.

Eastwood Tom Micro Computer Club meets at Devedish 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 NG16 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, 66 Roseleigh Avenue, Nottingham NG3 6HF, tel: Nottingham (0649) 417.

Workshop Computer Group, new club, first meeting June 14 in Workshop library lecture room. Contact Mr Andrews, Workshop 483727.

NORFOLK

Anglia Computer User Group, Contact Jan Reizl, 128 Templemead, Sprowton Road, Norwich, tel: 0603-29652.

East Anglian Computer User's Group meets at Cromie Community Centre, Telegraph Lane, Norwich. Contact Gill Rizi, 88 St Benedicts, Norwich.

South Norfolk Computer Group meets at Anchor House, Moat Lane, Twocaster, on Wednesdays at 7.30pm.

OXFORDSHIRE

Association of Computer Clubs, Annual subs: £5. £2.50 under 18s and OAPs. Contact Rupert Steele, 30 John's Church, Oxford OX1 3JP.

Microcosm meets at Clarendon Lab, Parks Road, Oxford, every week during term. Contact Rupert Steele, 30 John's Church, Oxford OX1 3JP.

Oxford Personal Computer Club, Annual subs £8. Contact Len Phelps, Southport Cottage, Sutton Courtenay, Nr Abingdon, Oxon OX14 4AJ.

Ridgeway Computing Club meets at Swan Hotel, East Isley, on the second Tuesday of every month. Contact Mike Magney, Beavers, South Street, Blunbury, Didcot, Oxon OX11 0JU.

OXSHIRE

Ludlow & District Microcomputer Club meets at Diocesan Education Centre, Lower Galdedford, 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 School once a month. Beginners Basic course and many machines on display. Contact Mr Vives, 6 Bramley Close, Severn Meadows, Shrewsbury SY1 1ZF.

Telford Computer Club meets at Telford ITE Centre, 50 Unionway, 6-9pm. Annual subs: £3.50. £1.50 unemployed. Contact John Murphy, 10 Brichmore, Brooksfield, Telford TF3 1TF, tel: 0952-595959.

SOMERSET

Sharp M280 Club, contact Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset.

Yeovil Computer Club, contact DG 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 0963-7720.

The Amateur Computer Club of North Staffs meets on the third Wednesday of every month. Annual subs £3. Contact J. Rod, 16 Hill Street, Hedgesford, Staffordshire WS12 5DS.

ICI Birmingham Branch Micro Club, c/o W.B.A. Eccleston, 26 Browns Lane, Tamworth, Staffs.

Tame Valley Computer Club, contact Tim Marshall, 32 Elmfield Avenue, Leyfields, Tamworth, Staffordshire B79 8JG.

SUFFOLK

Suffolk Microcomputer Club meets fortnightly. Annual subs £5. Contact Mr S Pratt, c/o Microtek, 15 Lower Brook Street, Ipswich, Suffolk.

SURREY

Ashlead Computer Club meets on the last Thursday of every month. Contact P Palmer, 8 Corfe Close, Ashlead, Surrey.

Thames Valley Computer Club meets in the afternoon. Annual subs £5. Contact Eric J. Slip, meeting, Contact Phil Ward, Reading 954874.

Thames Valley Amateur Computer Club meets at Griffons, Caversham, on the first Tuesday of every month. Contact Brian Quarm, 25 Roundway, Camberley, Surrey GU15 1NR, tel: Camberley 22386.

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, Roundstone, Farnham, Surrey.

West Surrey Computer Club meets at Paddock Room, Green Man Public House, Burgham, Guildford, the first Thursday of every month. Annual subs £5. Contact Chris Karney on 0483-68121.

ITV Computer Club meets on Fridays. Contact A Bond, 248 Farnham Road, Guildford, Surrey GU2 5PE, tel: 0485 62035.

TI Home Group, annual subs: £12. Contact P Dicks, 157 Bishopsford Road, Morden, Surrey.

CBSS London meets on Sundays 4-10pm. Contact P Goldman, PO Box 100a, Garbury, Surrey GU1 9HY.

Sutton Library Computer Club meets at Central Library, St Nicholas Way, Sutton, Surrey, on the first Friday of every month at 9pm and second and third Tuesday of every month. Annual subs: £6. £4 OAPs, £2 family. Contact Dave Wilkins on 01-642 3102.

Wokingham Computer Club meets on 8 Coslaw Avenue, Wokingham, Surrey SM6 9RA, subs: £20. Contact Adrian Miles, tel: 01-647 1731.

Worthing & District Microcomputer Club, contact Len Stuart, 89 Mayfair Avenue, Worthing Park, Surrey KT14 7SJ.

Worthing & District Microcomputer Club meets at Rose Wilmet 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 Clubs meets at Richmond Community Centre, Sheen Road, on the second Monday of every month at 8pm. Contact Bob Foster, 18a The Barons St Margarets, Twickenham, Middlesex, tel: 01-892 1873.

SUSSEX

West Sussex Microcomputer Club meets at Rom R60, Robinson Road Annex, Crawley, Sussex first and third Mondays, £3 students. Contact J Clarke, 31 Hyde Heath Court, Pound Hill, Crawley, W Sussex, tel: 0273-884237.

Mid-Sussex Computing Club, Contact Jeff Hayden, 2 Hillary Close, East Grinstead, W Sussex RH19 3XQ.

Microanalysis, contact Peter G. Diannage, 16 Malvern Street, Hove, Sussex BN3 3YR.

Aron Microcomputer Club meet at Wick School 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: £700. 6 months, £1 joining fee. Contact P. G. Diannage, 16 Malvern Street, Littlehampton, West Sussex DN17 7BL.

TYNE & WEAR

Newcastle upon Tyne Personal Computer Society meets at Room D103, Newcastle Polytechnic on the first Tuesdays of every month. Annual subs: £6. Contact Pete Ruggill, 21 Percy Park, Tyne mouth, tel: 0632-572905.

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. Annual subscription £12. Contact Alan Hunt, 58 Princes Avenue, Walsall, W Midlands, WS1 2DH, tel: 0922-23875.

National Westminster Personal Computer Society, Contact P Moore 021-236 6176, c/s 382.

Central Program Exchange, annual subs: full membership £25 Europe, small users service £10 Europe. Contact Mrs Judith, 11 Wolverhampton 28231.

West Midlands Amateur Computer Club meets at Enfield School, Love Lane, Stourbridge, on the second and fourth Tuesday of every month. Annual subs £4, £3 full-time students. Contact John Tracey, 100 Booth Close, Brierley Hill, Kingwinford, W Midlands, tel: 0384-70097.

WILTSHIRE

Chipmunk and Calne, proposed new club. Contact Matthew Jones, Pinhills, Calne SN11 0LY.

WORCESTER

Worcester & District Computer Club meets at 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, c/o Co-Op Social Club, Pogmore, Barnsley, on the last Tuesday every month at 7.30pm. Annual subs £1. Contact James Brindson, c/o 39 Keretford Lane, Barnsley, South Yorkshire S70 6NF, tel: 0226-41753.

Doncaster Amateur Computer Society meets in YMC A, Wood Street, on the first Wednesday of 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: 0535-62628.

Leeds Microcomputer Users Group meets every Monday. Contact Chris Townsend, 760 4 Manchester Road, Linthwaite, Huddersfield, tel: 0484-657299.

Leeds Microcomputer Users Group meets at 8 Regent Street, Clarendon Allerton, fortnightly on Thursday at 6pm. Contact David Parsons, 22 Victoria Walk, Horsforth S18 4PL.

Program Power, contact R Simpson, 5 Wensley Road, Leeds LS2 2BX, tel: 0532-683186.

Pennington District Computer Club meets at 26 Mill Hill, Haworth, W Yorks, on Saturday and Sunday. Contact Douglas Bryant, 26 Mill Hill, Haworth, W Yorkshire, tel: 0535-43007.

Snaydon Green 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 Anderson, 3 Verdon Road, Tetley, Sheffield S17 3QE.

Thurso & District Micro Users Club meets at Thurso C Comprehensive School, Physics Lab, Clayton Lane, Thurso, every Wednesday at 7.30pm during school term. Contact Mr James Davis, 62 Tudor Street, Thurso, East. Tel: 0847-2942.

West Yorkshire Microcomputer Group meets on Tuesdays. Contact Phillip Clark, c/o Suite 204, Crown House, Armley Road, Leeds LS12 2ES, tel: 0532-63253.

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

Bishopstoun Computer Club meets at 'Cwa Ben' (Sackelcourt Avenue, Bishopstoun, Renfrewshire, on Saturdays on a month only meeting on May 22 at 10pm.

Contact Alasdair Law, 10 Dundglas Road, Bishopstoun, Renfrewshire PA7 5B.

Edinburgh Home Computing Club meets at Clarendon Hotel, Edinburgh, on the 2nd, 3rd and 4th Wednesday of the month, produces bi-monthly newsletter. Contact Mr J. Beckett, 110 St Andrew's, Edinburgh EH1 1JG.

Scottish Amateur Computer Society, contact Mike Anthony, 46 Moreland Park Gardens, Edinburgh EH11 7TR.

South East Scotland Computer Club meets at Falkirk College of Technology, Grangemount Road, Falkirk, on the first and third Thursday every month. Contact James Lynda, 78 St Mannan Road, Falkirk FK1 5NF.

File Computer Users Clubs meets fortnightly. Annual subs: adults, £5; under 18s, £3. Contact Murray Simpson, 31 Tom Steward Lane, St Andrews, Fife, Scotland KY16 8Y.

Grampian Amateur Computer Society meets at 13 Thistle Lane, Aberdeen, on the second and fourth Monday every month at 7.30pm. Annual subs: £12, £5 student. £2 junior. Contact Alan Macintosh, 11 Beckett Avenue, Westhill, Skene, Aberdeenshire AB36 3WR.

Kennay Computer Clubs weekly. Contact S Stubbs, 15 The Glebe, Kennay, Inverurie, Aberdeenshire.

Inverness Personal Computer Club meets every second Tuesday at 7.30pm. Subs: adults £5, juniors £2.50. Contact GJ Mackenzie, 8 Ardconnell Street, Inverness IV2 3EX, tel: 0463-22062.

Perth & District 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 Lochalsh Computer Society, proposed new club. Contact J Marshall, 25 Breacas Isle, Isle of Skye IV4 2QA.

Strathclyde Computer Clubs meets at Wolfson Centre, 106 Rottenrow, Glasgow, on the third Wednesday of every month. Contact B Duffy, 24 Lomand Drive, Condorart, Cumbernauld G48 8NW.

WALES

Abergele Computer Club meets at Abergele Offices every Thursday at 7.30-10pm. Annual subs: £5 adults, £2.50 juniors. Contact J. Jones, 77 Millbank Road, Rhyll, Cwyd, North Wales.

Colwyn Computer Club meets at the Greens Hotel, Colwyn Bay, 7pm. Contact Gwyneth Jones, 10 Abergele Road, Colwyn Bay, Cwyd LL29 7PA.

St Ith 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: £5.50. Contact Rothery Harris, 16 Alarbrook Avenue, Newport, Gwent, Wales NP17 6QJ.

Pencoed Amateur Computer Club meets fortnightly on Saturdays at Pencoed Library, Subs: adults £5, OAPs & students, £3.50. Contact Philip Williams, 38 Bryn Rhedyn, Pencoed, Bridgend, Mid-Glamorgan CF35 6TL, tel: 047-2877.

Pontypool Computer Club meets at The Settlement, Rockhill Road, Pontypool, Gwent, on every Friday. Contact J. Jones, Coveridge, on Pontypool 2827.

Swansea & South West Wales Amateur Computer Club meets on the last Friday of every month. Contact J. Prescell Row, Penlan, Swansea SA5 8AF.

NORTHERN IRELAND

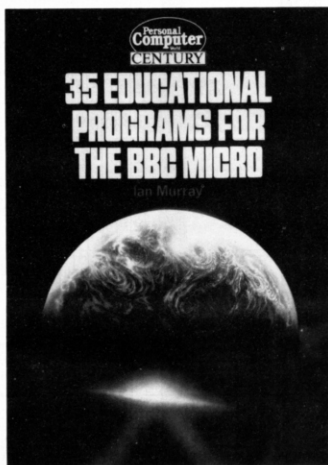
Bangor Computer Club (N Ireland), New Ship, Contact Derek Breen, c/o Queen's University, Belfast, Northern Ireland.

EIRE

Caric Amateur Computer Club, Talks and demonstrations. Hardware, programming & games. Contact T Moriarty, Tiger Bay, Rockstown, Douglas, Caric, Eire.



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CENTURY

Make & Model	Price inc VAT	Printhead type (H = matrix)	INTERFACES				Min baud rate	Buffer Memory Size (in characters)	Lines per inch	Characters per inch	Min print Speed (CPS)	Max print positions	Max paper width in inches	Size (base area in cms)	Weight (in kilos)	Max Copies	Unloading	Bold Type	Trim Descenders	Proportional Spacing	High Resolution Graphics	B Directional	Logic Sinking	Feed Method		
			IEEE	Centronics	Zebra	RS232																		Options at extra cost (+)	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	
ZY Printer	£40	Electrical					1	N/A	N/A	9				14x4.6	N/A	1					●	●	●	●	S5	

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				Dot resolution	Dimensions (cms)	Weight (kilos)	Distributor
			Modulated PAL	TTL RGB	75 Ohm linear 32 bit 4 bit TTL	Audio channel				
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 (in inches)	Signal			Band width (in MHz)	Dot resolution	Dimensions (cms)	Weight (kilos)	Distributor
			Modulated PAL	TTL RGB	75 Ohm linear 32 bit 4 bit TTL					
Lion Cub 2051-TTL	£646	20				10	940	65x57.5	11.5	S6
Luxor Digital	£574	14	●			25	800	N/A	15.7	P1
Luxor Linear I	£597	14		●	●	25	800	N/A	15.7	P1
Luxor Linear II	£643	14		●	●	25	800	N/A	15.7	P1
Microtech 14	£402	14	●	●		18	585	33.7x40.8	12.6	M6
TM 22	£329	6		●	●	5.5	N/A	22x34.5	4.1	J3
VM 14 PSN	£378	14			●	5.5	300	47x40	13.6	J3
Wolf Cub 1435-TTL	£358	14		●	●	7	653	65x57.5	11.5	S6
Wolf Cub 1446-TTL	£587	14		●	●	15	895	65x57.5	11.5	S6
Wolf Cub 1456	£454	14		●	●	10	653	65x57.5	11.5	S6

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	
											MONOCHROME MONITORS
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

8" DISK DRIVES

Make and Model	File Size	Capacity	No. of disks	Tracks	Sectoring	Sides and density	Connects to				Distributor
							IEEE	RS232	Apple II	Si Sangfat	
F 300	E2,300	2.4Mb	2	76	Soft	DS DD	•	•	•	•	BS
M 2894	E490	1.6Mb	1	77	Soft	DS DD	•	•	•	•	AS
M 2896	E493	1.6Mb	1	77	Soft	DS DD	•	•	•	•	AS
Megasort 11	E1,133	2Mb	2	77	Soft	DS DD	•	•	•	•	V1
Megasort 11SD	E1,018	1Mb	2	77	Soft	DS DD	•	•	•	•	V1
Megasort 11.1	E1,121	2Mb	2	77	Soft	DS DD	•	•	•	•	V1
R/M FDS-2	E3,789	1Mb	2	77	Soft	DS DD	•	•	•	•	R3
Timex Model 11	E3,969	466K	1	77	Soft	DS DD	•	•	•	•	T1
Timex Model 16	E3,949	1.2Mb	1	77	Soft	DS DD	•	•	•	•	T1
Timex Model 16	E1,549	2.5Mb	2	77	Soft	DS DD	•	•	•	•	T1

MODEMS

A modern interface a computer and the telephone system so computers can communicate over long distances. It converts data to electrical pulses or sounds that can 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 means acoustic. The acoustic coupler is like a female telephone handset with a speaker in the coupler opposing the phone's microphone and a microphone opposing the earpiece. A B in this column indicates that both methods of attachment are available. The main item shows the speed with which the data is transmitted on each modem. **Asynchronous** means that data may be transferred at any rate. The interface column lists the main interfaces featured at regular intervals. **Simplex** transfers data in one direction, while **duplex** means that data can be transmitted 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	File Size	Capacity	No. of disks	Tracks	Sectoring	Sides and density	Connects to				Distributor
							IEEE	RS232	Apple II	Si Sangfat	
AJ 311	E3,320	B	300	RS232	•	•	•	•	•	•	AS
AJ 1222	E7,736	B	1200	RS232	•	•	•	•	•	•	AS
AJ 4211	E2,893	A	300	RS232	•	•	•	•	•	•	AS
AJ 1254	E6,984	A	1200	RS232	•	•	•	•	•	•	AS
AJ 1256	E6,984	B	1200	RS232	•	•	•	•	•	•	AS

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**V7** Viasak, High Wycombe 446633 **V8** Viasak, High Wycombe 446633 **V9** Viasak, High Wycombe 446633 **W1** Waiters Microsystems Int Ltd, High Wycombe 445175 **W2** Waiters Microsystems Int Ltd, High Wycombe 445175 **W3** Waiters Microsystems Int Ltd, High Wycombe 445175 **W4** Waiters Microsystems Int Ltd, High Wycombe 445175 **W5** Waiters Microsystems Int Ltd, High Wycombe 445175 **W6** Waiters Microsystems Int Ltd, High Wycombe 445175 **W7** Waiters Microsystems Int Ltd, High Wycombe 445175 **W8** Waiters Microsystems Int Ltd, High Wycombe 445175 **W9** Waiters Microsystems Int Ltd, High Wycombe 445175 **X1** X-Data Ltd, Slough 723331 **X2** X-Data Ltd, Slough 723331 **X3** X-Data Ltd, Slough 723331 **X4** X-Data Ltd, Slough 723331 **X5** X-Data Ltd, Slough 723331 **X6** X-Data Ltd, Slough 723331 **X7** X-Data Ltd, Slough 723331 **X8** X-Data Ltd, Slough 723331 **X9** X-Data Ltd, Slough 723331 **Y1** Zygal Dynamics, Bicester 3361

PLOTTERS

Plotters use a pen to put graphics or characters on paper under the command of a computer. They are usually one of two types—**drum** or **matrix**. A **drum** holds the paper flat while the pen draws it on in two dimensions. A **matrix** plots by turning the paper 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. **Matrix** pens indicates the number of pens in operation or on standby. Dimensions of the paper to be used are listed under **paper**. **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	File Size	Capacity	No. of disks	Tracks	Sectoring	Sides and density	Connects to	Distributor			
							IEEE	RS232	Apple II	Si Sangfat	
Calcomp 81	E3,392	Flat	6	A3	30cm	•	•	•	•	•	AS
HP 7470A	E1,317	Drum	2	A4	38.1cm	•	•	•	•	•	C3
PD4	E5,86	Flat	1	A4	700mm	•	•	•	•	•	H2
Shibo 100	E6,62	Drum	1	A4	76cm	•	•	•	•	•	J2
TRS-80 Pen Plotter	E1,399	Flat	6	A4	6.8cm	•	•	•	•	•	D6
Watanabe WX-4633	E2,772	Flat	10	A3	250mm	•	•	•	•	•	T1
Watanabe WX-4634	E2,515	Flat	2	A3	250mm	•	•	•	•	•	E4
Watanabe WX-4635	E2,301	Flat	2	A3	250mm	•	•	•	•	•	E4
Watanabe 4636	E3,074	Flat	10	A3	400mm	•	•	•	•	•	E4
Watanabe 4637	E2,862	Flat	2	A3	400mm	•	•	•	•	•	E4
Watanabe 4638	E2,635	Flat	1	A3	400mm	•	•	•	•	•	E4
Watanabe WX 4671	E1,129	Flat	1	A3	50mm	•	•	•	•	•	E4
Watanabe 4675	E1,636	Flat	6	A3	50mm	•	•	•	•	•	E4
Watanabe 4731	E1,761	Drum	4	A3	200mm	•	•	•	•	•	E4

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Sinclair ZX81, 32K memory plus four 16K game cartridges, 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.

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Exchange Ace Telecom Viewdata interface (Prestel) for a TR580 expansion extender and one disk drive. Tel: Fen Gales 0670 824665.

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Sharp MZ80K 48K as new, Basic, Forth, user notes, some games, £250. Tel: Egham (0784) 35378.

Fortran Reference manual for the 2900 computer, 480.00. Tel: ICI computers, offers accepted. Tel: (0202) 483807.

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Issue 1, March 11-18.

Pro-Tests: Apple's Lisa, Text 7000; 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.
Program/Cards: Towers of Baramah (Pascal), Biohythm (Apple II), Roman Year (Apple II), Shape Utility (Apple II).
Gameplay: Darts, Soccer (Atari); Castle of Riddles (BBC Model B); Pamina (Spectrum); Flight Simulator (IBM PC).
Databases: micros and peripherals.

Issue 4, April 1-8.

Pro-Tests: Fied Piper Communicator, Olympia ES7000 printer, Namal SuperTalker, Commodore Calcsort, Spectrum Pascal, Cashbook (BBC).
Gameplay: Dark Crystal (Apple II), St George (Dragon), Wizard War (Dragon).
Program/Cards: Fruit Machine (C64), Tunemith (Oric), Atari Editor.
Databases: peripherals.
Clubsnet: Clubs and user groups.
Micropedia: Go Forth, part 1.



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, Nowonika Puzzle (Spectrum).
Program/Cards: Lower case (Dragon 32), CBM database cards 5-8, Monster (Spectrum), Wildcard Search (MBasic).
Databases: hardware.
Micropedia: Graphics, part 4.

Issue 2, March 18-25.

Pro-Tests: Toshiba T100, Casio FX100, ZX81/Banana; Vic speech synthesiser, Spectrum spreadsheet, IBM graphics, BBC word processing.
Features: Colocoision, micro background, nursery computing.
Gameplay: Ultima II (Apple), Trader (ZX81), Starquest (Vic 20), Hungry Horace (Spectrum).
Program/Cards: String editor (Spectrum), Analogue Clock (BBC Model B), Chart generator (Spectrum), String extract/replace.
Databases: full software listings.

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).
Program/Cards: Wacky Racers (Oric), Fruit Machine (C64), Parse Intergr.
Databases: Software.
Clubsnet: full list of user groups.
Micropedia: Go Forth, part 2.



Issue 10, May 13-20.

Pro-Tests: Infomart on Commodore 64, Dragon Maze; MC200 and CML500 music synthesisers (Apple), Prism directly coupled mod-com, Epon QX10.
Features: ZX81 graphics part 1; Atari word-processing part 2.
Gameplay: Rescue (Spectrum), Dictator (Spectrum), Roman Empire (Spectrum), Choptieper (Vic 20), Skyhawk (Vic 20).
Program/Cards: Union Jack (Lynx), Escape (Spectrum), CBM Database cards 7-9, Evaluate (MBasic), Formula (BBC B).
Databases: peripherals.
Micropedia: Graphics, part 5.

Issue 3, March 25-April 1.

Pro-Tests: TI Professional, Apple Z8016, IBM PC, Sanyo 1000 printer, IBM Keyboards, Petscod compiler, Sirius toolkit, Dragoncalc.
Features: Atom upgrade, Linx programming, Apple music.
Gameplay: Mangrove (Vic 20), Mutant Haze (Vic 20), Compendium (Dragon), Patience (Spectrum), Noughts and Crosses (Dragon), Great Britain Ltd (Spectrum), Ulysses (IBM PC).
Program/Cards: Magnify (Spectrum), Sender (Vic 20), Fong Range (BBC).
Databases: micros.
Micropedia: Anatomy of the BBC, part 3.

Issue 6, April 15-22.

Pro-Tests: Tycom Microframe, IBM PC, Scorpia Disk, Dragon sound module, ZX81 graphics, Bottom Line Strategist (CP/M), PaperClip word processor.
Features: IBM PC DOS, BBC word processing, PC 1251.
Gameplay: Mined Out (Spectrum), Transylvanian Tower (Spectrum), Lunar Leeper (Apple II), Evolution (Apple II).
Program/Cards: Wacky Racers (Oric), Mortgage Comparison (Sharp MZ80K), Computer Set Up (BBC), Day of Week.
Databases: micros.
Micropedia: Graphics, part 1.



Issue 11, May 20-26.

Pro-Tests: BBC Vofile, PPS File, for IBM, Apple Pascal, printer comparison, Packard Joystick Controller for ZX81 and Spectrum, CVC 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).
Program/Cards: Home-ward Bound (Z8016), Converter Four (Dragon 32), CBM Database, cards 10 - end.
Micropedia: Keyboards.



Issue 7, April 22-29.

Pro-Tests: Mattel Aquarius, Epon FX80, Olivetti PPI10, Lugi on Spectrum, Vic 20 assembler Supergraf on Victor/Sirius.
Features: Dealer support Atari graphics.
Gameplay: Krakri (ZX81) Cruising On Broadway (Spectrum) Kaktus (Vic 20), Fantastie Voyage (ZX81).
Program/Cards: CBM controls Computer Set Up (BBC) Wacky Racers (Oric), Julian Dates.
Databases: Peripherals.
Micropedia: Graphics part 2.



Issue 12, May 27-June 2.

Pro-Tests: Spectrum word processor, PPS Report on IBM File Handling for Colour Genie, CTE C780 type 1 printer, TG Trackball, Sord M5.
Features: Epon Basic, Oric sound part 1, Tandy colour graphics.
Gameplay: Mad Martha (Spectrum), Frezzy (Spectrum), Headbanger (Spectrum), Oric roundup (Spectrum), Election BarChart (Commodore 64), Memory Utility (BBC B), Munch (Spectrum).
Databases: Hardware.
Clubsnet: clubs (Cambridge Microcomputer Club special).
Micropedia: Disk Drives, part 1.



Issue 8, April 29-May 6.

Pro-Tests: Atari Home Files Manager, Kobay's Via Star for the Vic 20, Hestecost's Accounts for the Spectrum, Epon RX80 printer, NCR's Decision Mate V, Future Computer's FX20.
Features: Micromet, Compact programming on the T1904-A.
Gameplay: Harvester (Vic 20), Strategic Command (Dragon 32), A First Book of Micro Rhythms (BBC) Telling the Time-Money (Spectrum).
Program/Cards: Program Indexer (BBC B), CBM Database cards 1-4, Sort Extract.
Databases: software.



Issue 13, June 3-9.

Pro-Tests: Teletwriter for Dragon 32, Abersoft Forth for Spectrum, GFS graphics processing system for Apple II - joystick rulers, Ajile.
Features: Dragon meets Tandy; One music part 2; transferring Basic for Colour Genie and Genie 1.
Gameplay: Everest Ascent (Spectrum) Colour Genie roundup Micro Maze (Jupiter Ace), Ois (Atari).
Program/Cards: Cupid (Oric), Alien (Dragon 32) Time Bomb (Atari).
Databases: peripherals.
Micropedia: Disk Drives, part 2.

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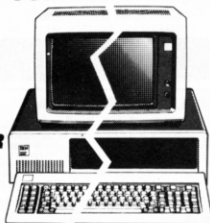
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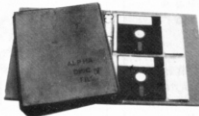


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NEXT WEEK

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/M organised — 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 Manesman 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 besport but it isn't exactly cricket.

PAL 2000

by Mollusc



PCN DATELINES

PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in

PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

UK EVENTS

Event	Dates	Venue	Organisers
Compee 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, UMIIST 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, Montbuid 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	Conard International Hotel, London	Computer Marketplace Ltd, 01-930 1612
Computer Open Day	September 1	Draganora Hotel, Leeds	Tony Kaminski, 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

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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.

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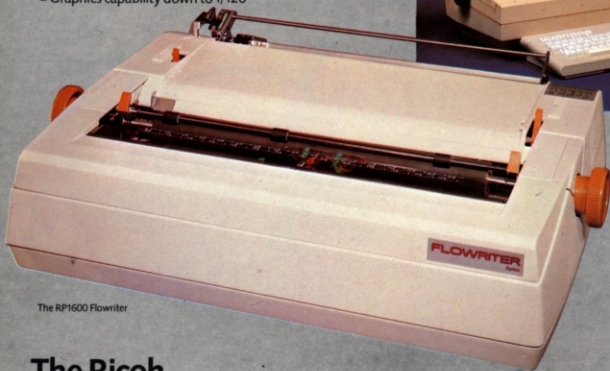
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The RP1600 Flowriter



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