

# PERSONAL

# COMPUTER

EVERY THURSDAY

50p Oct 20 - 26, 1983 Vol II No 33

NEWS

THE COMPLETE COMPUTING WEEKLY

THIS WEEK

**CREATIVE CORTEX**  
Pro-Test of C/WP's  
bright business micro

**FAITHFUL FRIDAY!**  
dBase II tamed for  
easy office use

**BBC BONUS**  
Make more of your disks  
with the Watford DFS

**3D GAMES**  
Gameplay's perspective on the  
new-look cassettes

EVERY WEEK

**MICROPAEDIA SPECIAL**  
Improve your technique with this  
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ZX Spectrum  
BACKGAMMON

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SINCLAIR'S SLOT-IN SOLUTION**

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PCN 20/10



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Cover illustration by Richard Dunn

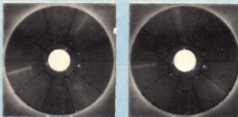
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# Newbrain is saved

By David Guest

The Newbrain lives again. But the machine that almost became the BBC micro two years ago has had to go Dutch to survive.

The liquidator of former Newbrain maker Grundy Business Systems said this week that initial agreements have been signed by Tradecom International to take on the system. Tradecom, which distributed the machine in the Low Countries, Scandinavia, Spain and South Africa, expects to have the i's dotted and the t's crossed later this week.

The handover should be barely noticeable to most users and buyers — Tradecom intends to keep the existing distribution and service arrangements as far as possible.

But the way that the system is presented is due to change. Jack

Van Der Schrier, a director of Tradecom, said that confidence in the system would have to be restored: 'Certainly in England and a little on the Continent, but that can be overcome.'

He added: 'I think the future looks good.' Tradecom will aim the system at educational users and towards vertical business applications, and the Newbrain's identity crisis could soon be over.

The company may transfer production of the system lock, stock and barrel to Holland, but Mr Van Der Schrier said that its immediate plans concern only ancillary devices. 'The machine has a lot of peripherals — expansion modules, controllers and the like — which we think it appropriate to make in Holland.'

The company has some produc-

tive capacity and has been working on Newbrain enhancements such as networking in its own right. Tradecom will be an unknown quantity to most UK users but it could hold the promise of a rosy future for the system.

It will certainly brighten the outlook for some of Grundy Business Systems' creditors. A spokesman for the liquidator said: 'The major benefit of the deal as far as creditors are concerned is that the stocks the company (Grundy) owned we can now sell to Tradecom.' These stocks — completed machines and components — could be worth as much as £1¼ million.

Prior to Grundy Business Systems' collapse Tradecom was on the verge of closing a £1 million contract with education authorities throughout its region.

# Dragon's DOS in the doldrums

Dragon is working to correct faults with its Disk Operating System but the corrections are more likely to find their way to you on paper than in a new version.

People who have bought Dragon disk drives will have come across problems with the Disk Operating System (DOS). They have occurred with two of the DOS commands, RUN and CHAIN. The syntax for the RUN command is: RUN'DRIVE, FILE NAME, BAS' for a Basic program. The drawback is that the command cannot be used with a string variable.

This is not a bug, according to Dragon — it should have been documented in the manual, but unfortunately wasn't. It will be in the next DOS manual, the company says.

The CHAIN command problem is actually a bug. When a program is chained from other programs, it can, if it is too long, be pushed into the DOS's buffer, thereby causing the system to crash.

The solution to this bug is to use the FRES command before CHAIN. This will reliably chain programs up to 11K in length but over this size the system stands a good chance of crashing.

Dragon says that it is looking for a solution to this. If and when Dragon finds it, it will document it in the manual. But it does not plan to rewrite the DOS at this stage as this would mean recalling all the existing systems.

The disk system is a very recent addition but Dragon claims it has been selling well. It declined to say exactly how many disk systems have been sold but the number could be substantial.

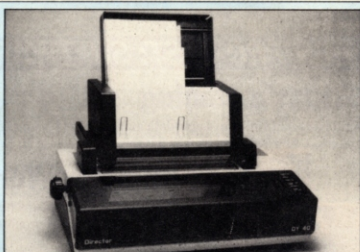
# IBM meets Taiwanese imitators

Imitation being the sincerest form of flattery, IBM has welcomed with open arms moves by Taiwanese manufacturers to make IBM look-alike micros.

Big Blue's attitude is in stark contrast to that of Apple which has spent large sums of money across five continents fighting 'rotten Apples' through the courts.

IBM has even gone as far as organising a seminar for the manufacturers to spell out the legal position and invite them on tours of its US plants. In return for this generosity, the manufacturers are going legitimate and are buying licences to use Microsoft's MSDOS that will give their machines the vital IBM compatibility.

Ironically, one of the companies involved is Multitech, manufacturer of the ill-fated Microprofessor that fell foul of litigious Apple Corp in the UK courts in August.



**PRINT DIRECTOR** — A new 40 cps daisywheel printer has been launched by Samleo Computer Services. Called the Director DY-40 it offers Qume and Diablo compatibility, bi-directional printing, software selectable print pitch, built-in buffer, choice of serial or parallel interfaces and programmable colour selection. Paper handling provides a bi-directional feed system with automatic left and right margin alignment regardless of paper width. Samleo also claims that special noise absorption has been built in to reduce sound levels.

# Japanese lead the way at Birmingham

By Geoff Wheelwright

New business micros from Sharp and Sanyo are expected to lead the wave of machines to be launched at the International Business Show this week in Birmingham.

Sharp's long-awaited PC-5000 portable computer — previewed at the PCW show in September — will be officially launched at the IBS, while Sanyo is expected to officially unveil its £1,400 but definitely unportable IBM beater, the MBC-555 (first shown in Paris in September).

Both new machines use the 8088 16-bit processors and will run the MSDOS operating system — and the Sanyo machine claims IBM

compatibility. The PC-5000 has a built-in 80 column liquid crystal display screen and includes 192K ROM, 128K CMOS RAM (expandable to 256K) and will sell for £1,295. At £100 more, the Sanyo machine comes with 128K and dual, double-sided disk drives.

Although the two Japanese machines look to have the spotlight to themselves, they were almost upstaged by a little Peanut: IBM's long-anticipated, low-cost micro. The Peanut is included in the list of new products to be shown at the IBS, but an IBM spokesman at the show said it was a mistake in the press release and that IBM would not be shelling peanuts this week.

Commodore is expected to show again its portable Commodore 64 with built-in colour monitor and single disk drive, although the machine isn't yet on sale. A Commodore spokesman promised the machine will be released before Christmas. It is expected to sell for about £795.

Aside from new machines, there seems to be a much greater interest in viewdata terminals, electronic mailing and networking systems. Large companies such as Sony and even the Post Office itself were displaying systems for electronic mail and viewdata, while Triumph Adler was demonstrating its new networking.



IBM, smiling indulgently on Far Eastern PC imitators.

# Prices slashed

After a lull in the price wars a new spate of cuts is taking place, with companies at all levels of the micro business drawn in.

Oric Products made the first move, bringing its 16K model down to £79.95 two weeks ago. This was followed by yet another cut in the price of the Aquarius from Mattel (*PCN*, issue 32). Now Tandy has followed suit, preparing to slash the price of the Colour Computer which until recently stood at £240. The new price is £180.

At the business end of the market UK manufacturer Comart has taken the pruning shears to its prices, cutting two of the models in its Communicator range by almost 20 per cent.

The CP-100, an 8-bit system with 64K and two floppy drives, comes down to £1,595 from £1,895. The 1202, a 16-bit machine, comes down to £2,295 from £2,745, again in a configuration that includes two floppy disk drives, but with 256K.

Torch, bouncing back from its brief flirtation with GEC, claims to be selling 1,000 disk packs a month. It could stimulate yet more sales after cutting the price to £730 — it was previously £825, both prices



Back in the limelight — Torchpack down to £730.

being exclusive of VAT. The Torchpack now also includes the range of Perfect software and a company business management exercise approved by the British Institute of Management.

The original Torch system, the CF-500, now also comes with the Perfect software plus networking software and firmware, TorchMail Plus, and Torch Mars.

These could prove to be straws in the wind. With Christmas approaching and the micro makers gearing up for a bumper season (not to mention the retailers setting out their stalls) there could be rich pickings in the next couple of months. The Tandy Colour Computer, for example, is down in price specifically for November and December.

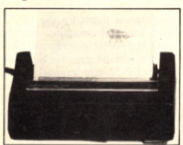
## Enterprint Enterprises

Those of you owning micros with RS232 or RS423 interfaces may be interested to hear of the Enterprint 1200 adaptor, which plugs between the interface and the Sinclair ZX printer, giving you low cost, if narrow, printouts.

Priced at £25, its maker Enterprint Technology also builds a £45 EPROM programmer which can be used to alter the 2K EPROM contents so as to create any special character set.

Enterprint 1200 has a special overflow buffer so that the micro doesn't send over too many characters, and has a double-sided PCB connector to fit the ZX Printer. Living up to its name, it operates at 1200 baud and measures 134mm x 83mm, giving you a mini 'black box'.

For more details contact Enterprint Technology Ltd., PO Box 1240, Wigan, Lancs.



The ZX printer — plug in with Enterprint.

## Games galore by Mogul

Mogul Software has 13 new games coming out in early November for owners of the Spectrum, Commodore 64, Vic 20, Tandy TRS-80, Oric and TI-99/4A machines.

This batch includes several US designed programs. Others are adapted for different machines: four will be for the Spectrum, eight for the Commodore 64, three for the TRS-80, one for the Oric, and nine for the Vic 20.

Metamorphosis, Kongo Kong, Zeus, Creator's Revenge and Pollywood need joysticks, while those that don't are Earthquake, Super Trk,

Pyramid, The Great Adventure Pack (featuring three different games for the price of one), Vipers, Potty Planter, Crash and Fruit Machine. The last four are for the Spectrum, while the adventure pack runs on the Commodore 64 and Vic 20.

Earthquake, for the 64, Vic 20 and TRS-80 is described by the company as a 'first' children's game, while titles such as Zeus have numerous levels of difficulty.

Anyone wishing to have a go should look in the retail stores, as the company won't be selling direct.

## Pocket-size Xerox

The book-size portable computer war is hotting up. Following the release of the NEC PC-8201A in the UK, Xerox has a micro on the threshold.

Called the 1810, it has just been released in the US where it sells for \$2,195. It comes with 64K of memory, three line 80 character liquid crystal display, integral tape recorder and built-in modem. But it won't be launched in the UK until next year in the earliest.

The software in ROM includes a text editor, diary, electronic mail and Microsoft Basic. Up to 30 telephone numbers can be stored in memory and calls made via the modem by a single keystroke.

A novel feature is that, in

addition to storing data and programs, the 1810's tape recorder can be used to record normal telephone conversations.

The micro weighs 5lbs and comes with RS-232 serial and Centronics parallel interfaces as well as monitor and TV outputs and a microphone input for when the micro is used with the telephone. There is also a slot to take ROM packs.

A single charge of the rechargeable batteries will last for about ten hours when the machine is in use.

Also launched with the 1810 is a big brother model called the 1850. It is a dual 8-bit and 16-bit processor machine designed for the desk-top. But weighing only 15lbs it can be easily moved around.

## Tandy's portly portable

Just when you might have thought that Tandy had taken a rest from launching new machines, the busy Californian company has come up with a portable TRS-80 Model 4.

The Model 4P must make the title 'Most Prolific Product Launcher of 1983' indisputably Tandy's. It follows the Models 4, 16 and 100, the MC-10, a clutch of peripherals, and software — and there are still two months to go before 1984.

The 4P has only been launched in the US so far, but according to Tandy in this country it should be here in the new year. It is selling for \$1,800, but Tandy UK has its own pricing policy and the US figure may not bear much relation to what the machine will cost here.

It weighs 26lbs and so falls heavily into the 'transportable' category. The basic model has 64K of RAM, which can be expanded to 128K, and twin 184K 5 1/4 in floppies. The screen is 9in across with an 80 by 24 display, or 640 by 240 graphics. The keyboard is a typewriter-style unit with a numeric keypad and an unspecified number of function keys.

Tandy promises that the 4P is software compatible with the Model 4, but it adds that in what it calls Model III mode it can run TRSDOS and LDOS disk programs written for the Model III. It also anticipates Tandy's implementation of CP/M by offering compatibility with that operating system.

The system has a Centronics and an RS-232C port, but perhaps its most interesting peripheral is built in when you expand the memory to 128K. The operating system, TRSDOS 6.0, treats the extra memory as a particularly fast disk.

The 4P is delivered with a copy of Microsoft Disk Basic, manuals, and an instructions guide. Call Tandy on Walsall (0922) for more details.

It has 128K of RAM, dual double-sided/double-density disks and is CP/M and MSDOS compatible.

Like the 1810, the 1850 has a built-in auto-dial/auto-answer modem and can act as a base station for the peripatetic baby micro.

Compared to the Tandy Model 100 and the other Japanese offerings the Xerox 1810 looks decidedly overpriced. But like the IBM PC it should sell on the name alone.

As to when it is likely to appear in the UK, we can only speculate. AIIA spokesman for Brother Xerox would say that the company 'won't be making an announcement of a UK launch' until next year at the earliest.

# Another 3in contender

Far from settling down to one or even two standard physical formats, the new 'down-sized' generation of circa 3in floppy disk systems has been added to by yet another competing variation.

The Hitachi and Sony standards seemed to be the front-runners, but now Dysan has entered the fray with its Flex Diskette which, it hopes, will set the standard in miniaturised flexible recording media for the new portable generation of micros.

The Dysan version, unlike its competitors, is housed in a 3/4in soft-jacket (Hitachi and Sony have gone for a rigid plastic casing) so it's a small version of the 5 1/4in floppy. Things have apparently been

changed slightly at the centre. Instead of a naked disk surface the company has developed what's described as an innovative metal hub to improve stability and performance. Dysan claims a data capacity of up to 1Mb due to a patented coating and burnishing process.

The Dysan format also needs its own special drives.

The point for the user is that it is still too early to know which standard will reign supreme. Even micro manufacturers can't be sure at this stage, so it's likely to be some time before 3in-or-thereabouts drives can be purchased with any assurance of lasting industry support.



Dysan's handy-sized diskette with patented coating and burnishing.



**TURN IT ON AGAIN** — Radio West's Datarama program, which earlier this year started broadcasting software in the Bristol area, has won the public's seal of approval and will open a new series this autumn. Produced and presented by Tim Lyons and Martin Schimmer, it will go out on Sunday afternoons at 5pm from October 30 — data transmissions will be made after the station's close-down at 1am. If you live in the Bristol, Bath or Avon areas you can pick the broadcasts up on 96.3MHz or 238m medium wave.

## Texas range

Texas Instruments has knocked on the head speculation that it might be near to launching a new personal computer, the TI99/8.

A system code-named Armadillo was shown to selected customers at a show earlier this year but now TI has said that it will concentrate its efforts on the 99/4A for the rest of the year. Sales of this machine are said to have been sluggish.

## A rival for dBase II

Sensible Solution, an applications generator that aims to take over from Ashton Tate's dBase II, was launched last week. It will be on sale from mid-November for any micro running CP/M, MP/M or MSDOS.

The system will be £764.50 for either single or multi-user configurations including 12 months' technical support.

Offshore Computing is the sole UK distributor of the product, written by O'Hanlon Computing Systems of Seattle, and offices will be set up over the next few weeks in Bristol, Edinburgh and Manches-

ter, in addition to its office in Potters Bar, Herts.

Sensible Solution's features include multiple screens built into a single program, automatic screen and data file creation, and multi-user record and file locking. Anyone developing an application on one operating system can run it on any other operating system that supports Sensible Solution.

Offshore Computing is also setting up a Sensible Software Club for registered users of the system, offering facilities such as electronic mail, general help, and club news.

For the cautious there's a 30-day free trial period, and the system will be demonstrated at Compec, in November. Offshore Computing can be contacted on 0707 44447.

## Small office systematised

A newly formed Glasgow company claims to have developed an integrated software package that will bring the automated office within the reach of small businesses.

Oracle Systems has linked up with Computer Automation's Irish subsidiary to produce a computer and software package, selling for £7,500, which it says will bring minicomputer power to the micro market.

The basic system consists of Oracle's package, together with Computer Automation's Omnix MN404, a desktop machine that inhabits the disputed territory between mini and micro. For your money you also get 5Mb of hard

disk storage plus 1.2Mb of floppy back-up, a VDU and a modem, which gives you on-line software support via Oracle's own computer.

The system can be expanded up to 12 terminals.

Oracle's David Buchan says the software, which combines word processor, financial planning and spreadsheet, is ahead of its rivals because of the features of the Opus 1 operating system. It allows full concurrency.

The system itself is ready for installation now, but Oracle is currently looking for dealers in preparation for a full-blown launch in February.

Oracle is on 041-429 2144.

## Brotherly type



Fraternal greetings from Japan — Brother brings portable printing.

The cost of portable printing has been cut with the launch in this country of the Brother EP-22 printer/typewriter. For £169.95 including VAT you get a briefcase-sized battery-mains typewriter with built-in RS232 interface.

The EP-22 is a dot matrix thermal or ribbon printer, with qwerty keyboard and 12-digit calculator. It has a 2K internal memory, which will store about a page of text.

Although the machine can be used as a battery-powered typewriter, the main purpose of the batteries (four US-type) is to power the memory while the machine is

switched off, allowing you to leave tasks and return to them later.

Lowie Computers (Matlock 4995), which has signed a deal with Brother giving it the bulk of the UK distribution rights for the EP-22, says that the machine can be operated over at least two and a half months without recharging batteries.

The EP-22 includes an adjustable 16-character LCD display, can take thermal or ordinary typing paper and sports a slide-out carrying handle. It weighs just under three kilos.

An 8K model with a disk is also on the way.

# BBC radio times

By Sandra Grandison

As Christmas approaches and the number of you with home computers is likely to leap upwards the BBC is putting the finishing touches to a range of micro programmes for television and radio.

The first on the air will be an Introducing Science Extra called Using Your Computer.

Primary schools who've got a BBC Spectrum or RML 480Z and are still fumbling at the keyboard—this series could put you on the right track.

Starting on November 1 the broadcasts are accompanied by four computer programs on cassette produced by the Microelectronics Education Program and available from BBC Publications.

Working in groups of three or four, the children cue the computer at the direction of the radio presenter and follow the programme. Each cassette ends with computer games and simulations designed to extend the imagination.

With five weekly broadcasts one advantage of this series is that it leaves the teacher free to look after the rest of the class while each group of children works with the computer.

Television programmes include real-time applications and a look at office automation.

## BBC Radio and TV Programmes From Autumn '83 to Summer '84

RADIO	Programme Title	Age Group	Date & Time
	Introducing Science		From Nov 1.
	Extra: Using Your Computer	9-12	Tue 2.20-2.40 Radio 4 VHF
	Computers in the Real World	14-16	From Nov 4, Fri 10.45-11.05 Radio 4 VHF
	Secondary Science: Microtechnology	14-16	Spr, Fri 10.45-11.05 Radio 4 VHF
TELEVISION			
	The Computer Programme Series 1	16 and upwards	Aut, Fri 12.05-12.30 BBC-2
	Computers for Control	16 and upwards	Spr, Fri 12.30-12.55 BBC-2
	The Electronic Office	16 and upwards	Spr, Fri 12.30-12.55 BBC-2
	The Computer Programme Series 2: Making the Most of the Micro	16 and upwards	Spr, Fri 12.05-12.30 BBC-2
	Computer Town	16 and upwards	Sum, Evening BBC-2
	Computer Club	16 and upwards	Sum, Tue 11.17-11.37 BBC-2

## Sinclair peripherals on stream

It looks as though demand for Sinclair's ZX Microdrives and Interface 1 for the Spectrum has ruled out the products' appearance in the shops until early next year.

To avoid the catastrophic delays experienced with the Spectrum when it was released on a mail-order basis, Sinclair opted to make the Interface 1 and Microdrives available on a 'those who bought the Spectrum first will receive order forms for the products first' basis.

Demand for the products has been very heavy and at this stage Sinclair is still ploughing through the 'hump' in the Spectrum sales graph (a huge number of people bought the Spectrum in its first month of release), but expects the rate of demand to decline as time goes on.

Presumably the Spectrum users most likely to want Microdrives are the ones who were keen enough to order the Spectrum upon its release. Sales for the Interface 2 with its joystick interface and games port are also reported to be encouraging and Sinclair claims there are no difficulties in meeting mail order demand.

There is no indication yet how the cartridge software is affecting sales of cassette-based programs but the number of cartridges is small.

# Standard advance from DR...

Digital Research has enhanced its GSX graphics operating system so that it can work with IBM's PC DOS and Microsoft's MSDOS.

GSX is designed as an extension to operating systems to provide graphics software with the same degree of portability that made CP/M a widely used operating system for non-graphics applications.

The main limitation on the portability of graphics packages in the past has been the hardware differences between different machines.

Digital Research has overcome the difficulties by constructing GSX in two parts. The Graphics Device Operating System (GDOS) is the machine independent part of GSX and acts as the front end of the software/device interface.

All instructions from GDOS are interpreted by GIOS into instructions that can be understood by the specific machine on which it is implemented.

Digital Research has high hopes that GSX will become the universal standard for graphics systems on micros. It is a view re-inforced by GSX's conformity to the emerging American ANSI standard known as

Virtual Device Interface.

'A lack of standards has significantly slowed both the entry and the quality of graphics applications,' said Paul Bailey, DR's vice-president for European Operations. 'GSX fills that gap and frees software developers to concentrate on the quality and sophistication of graphic applications rather than worry about specific hardware implementations.'

Pricing of GSX is being set at a competitive level with costs to micro manufacturers working out at around £2 a machine.



Paul Bailey — GSX fills the gap.

Digital Research has upped the stakes in its 16-bit battle with Microsoft.

It has signed a deal with Birmingham-based ACT Pulsar to provide its full range of computer languages and software development tools for the ACT Apricot and the Sirius.

## ... and rivals

Microsoft has hit back at arch-rival Digital Research by revealing further progress with its MSX home computer standard.

It launched the MSX-DOS operating system last week (*PCN*, issue 32) and is gradually presenting the complete MSX specification. The new 8-bit OS was developed in response to the demands of the Japanese manufacturers behind MSX, who wanted further capabilities in the form of add-on disk drives to their MSX micros.

But if you think MSX will hold promise for the future, revealing some new innovation, it won't. MSX conforms closely to the actual state of affairs in the home computer market.

Microsoft says MSX looks and acts like MSDOS. The command syntax and user interface are iden-

tical, though the OS code itself is a compact 8K. The DOS fully supports the 32K ROM graphics and includes Microsoft's M-80 assembler.

MSX-DOS is CP/M-80 2.2 compatible and runs all Microsoft's 8-bit software including MBasic, Cobol-80 and Fortran-80. Based around the Z80 processor, MSX also specifies the 9918 graphics chip and the AY-3-8910 sound chip.

The first MSX machines have started to appear from Yamaha, Spectravideo and NEC amongst others.

The prime motive for these companies endorsing MSX as a common standard was that if the market standardised on one type of machine and operating system, it would stimulate development of software.

# Oric oo-là-là!

## From Ian Scales in Cannes

The French are just beginning to experience the home computer boom that has gripped the UK over the past couple of years.

Cannes, the venue for the famous film festival, recently used the same facilities to play host to a video and telecommunications exhibition called Vidcom and an associated microcomputer event called Mijid, dedicated to games computer hardware and software.

Conspicuous by its presence was Oric International and its French distributor Oric France. Oric was the only major British home/hobby micro manufacturer at the show, sharing the event with Mattel, Atari and the other multinational heavyweights.

Oric has achieved notable sales in France and the Oric 1 was named

French home computer of the year at the show.

According to Oric International's marketing manager Peter Harding, the Oric 1's success in France is not just attributable to the ease with which it can be converted to output to French television sets (which use a different signal system from the UK). It is a testament, he says, to Oric's even-handed treatment in the French press. In Britain, on the other hand, he feels that the Oric 1 has been treated to a non-stop torrent of abuse from microcomputer publications with a depressing effect on sales. Oric would like to view the Oric 1's cross-Channel success as a vindication of the product and an indictment of UK specialist magazines.

Harding says that Oric has three computer products on the drawing

board and hints darkly that future Orics will include a small business system.

French micro prices seem high in comparison to those in the UK. For instance, a 690 Vic 20 costs the equivalent of £192 in France. In games consoles, though, the difference is less marked.

With the small market prepared to support prices like these it is not surprising that the French are producing their own products. Hector is an upgradable micro with a full moving keyboard and a built-in cassette tape recorder. It comes with a Z80 supporting 48K of RAM, with Fort and Basic available and various upgrades such as disk drives and CP/M. Its big selling point is obviously its Frenchness — the documentation is written in French for the home country.

## Rabbit finds a musical outlet

Rabbit Software has closed a deal that will put its software into record shops around the country.

In what could be the forerunner of many similar arrangements between software producers and record companies, Rabbit has agreed with CBS to deliver its programs to all stockists of CBS records and videos. The day may not be far away when record shops will be split down the middle, with music on one side and software on the other.

Rabbit concentrates on Commodore software, principally for the Vic 20, but you should find an increasing number of Spectrum titles from it on the local record shop's shelves. It is in the process of branching out at the moment and the Sinclair machine is one of its targets.

## Techno Tiswas

Wednesday November 9 is blast-off day for *The Magic Micro Mission*, a new series from Central Television that aims to take you 5,000 light years from earth in your microcomputing.

The scenario of the programme will have a star ship supposedly broadcasting from the farthest outposts of the universe, probably somewhere in Birmingham. Central plans six programmes and each one will feature home computing celebrities like Dave Lee Travis and David Gower, a futuristic film clip, and a section dedicated to un-

scrambling impenetrable jargon.

Central is calling it 'the technological Tiswas' and promises fun, jokes, costumes and colour as the ship makes its imaginary progress around the galaxy.

The first programme goes out at 5.15 on November 9 and the others will follow, one a week, until just before Christmas. The stars are Adrian Hedley, who you might recognise from the BBC programme *Jigsaw*, and Jo Wheeler, who you probably won't recognise because she hasn't been on television before.



Adrian Hedley and Jo Wheeler on a magic micro mission.

## New software for the Beeb

Seven new programs and a book, *Beyond Basic*, are out from BBC Publications for the BBC micro and will sell through bookshops and micro dealers.

The book sells for £7.25 while Dr

Who, a graphics game, and Canyon, in which you fly a plane defending a tiny mountain kingdom, are £10.

Taxcalc, for dealing with your income tax, is £17.25 and Record Keeper is £13.80. Toolbox, a programming aid, is £21. VU Type has been developed by Pitmans to help you learn to type and costs £16.10, and White Knight MKII, the BBC Chess Master game, is £11.50.



**TILT AND SWIVEL** — Display terminals that check in at more than £500 are usually going to data processing departments that don't have to worry about a ha'porth of tar, but the Televideo TV1 924 at £792 looks as though it could have something to offer outside those hallowed grounds. Besides various ergonomic features there is a numeric keypad, 32 programmable function keys, 14 editing keys and 31 graphics characters at your fingertips. It also has two scrolling speeds and a non-volatile store. The distributor is Midicron in Belper.

## Keys to VCS

The device that will turn your Atari VCS into a computer has come out of the forge at Vulcan Electronics.

The Spectravideo Compumate fits on to the top of the Atari system and plugs into the cartridge port on the main console. To coincide with its launch of the keyboard device Vulcan is releasing six software packages with an educational theme.

According to Vulcan's managing director Robert Stein there are almost 750,000 VCS owners in the UK. 'Many of them have already bought a home computer,' he says, 'but many more now have the opportunity to give their VCS Consuls a new lease of life.' He sees the Compumate as being more suitable for beginners than for ambitious machine code programmers.

The Compumate device costs £49.95 and the software cassettes £4.99 each.

The worthy aim of turning a games machine into a computer and equipping it with educational software hasn't turned Vulcan's head entirely from the serious business of arcade games. The company has also launched seven game cartridges for the VCS at £9.95 each.

Also due out this month are four cartridges for the Colecovision games machine; at £19.95 each these have titles that speak for themselves — such as Super Cross Force and Armour Battle.

Its final contribution in a busy month is a range of interfaces to let the Spectravideo Quicksort joystick run with Spectrum, Oric and Dragon machines.

Vulcan is on (01) 203 6366.



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# LSI Octopus launches out

Upgradability and communications are the key features of a new dual micro from London Computer Marathon entrant LSI Computers.

Like the company's M-Four machine, the Octopus uses the 8088 and Z80 as its CPUs. The M-Four was the runner-up in the amount of work it completed in the computer marathon to the Wang Professional — the Octopus might well have won as both CPUs run faster than in the M-Four.

By including both an 8-bit and a 16-bit processor in its new machine LSI is offering the best of both worlds — the wealth of software available under CP/M and the power and potential of a 16-bit machine.

The Octopus starts at £1,760 for a micro with a single floppy, 128K of RAM and CP/M86. A monitor would cost extra.

A complete system with second drive, monitor and free Axis accounting and stock control software package costs £2,400.

The Octopus uses a novel piggy-back arrangement in the main processor box to allow the addition of up to four expansion boards.

Memory can be expanded to 256K on the main circuit board or by

the use of memory expansion boards holding 512K.

The basic machine has two RS232 serial ports and a bi-directional parallel port. Extra ports can be added using the communications expansion board that has four RS232 interfaces, two of which can operate synchronously or asynchronously, and an RS422 interface.

The graphics capability can be similarly enhanced from eight to 16 colours on a 720 by 325 pixel screen.

Communications options include an ARCnet network interface and an autodial/autoanswer modem.

LSI is offering a choice of operating systems including MSDOS, CP/M86 and Concurrent CP/M. The operating systems have been implemented in such a way that they automatically switch between processors depending on the application that is being used.

LSI is also offering a choice between its standard keyboard (with 32 function keys) and an IBM-style keyboard.

Optional extras include a carrying case and UHF modulator for the overworked executive who wants to take the micro home and use it with his television set.



Octopus: LSI extends its tentacles with another dual processor.

## Execs shrug off keyboard phobia

The end of the mouse is nigh. Contrary to popular belief business executives do not suffer from keyboard phobia — the main argument used to justify systems using a mouse.

According to a survey carried out for Philips Business Systems, 79 per cent of Britain's business people thought it was a good idea for them to use a keyboard. Only seven per cent said they couldn't see themselves using one.

Not surprisingly, four of the people saying that senior executives would find using a keyboard too difficult were computer managers. Could it be they jealously want to guard their access to the technology?

Advocates of the mouse will clearly face an uphill task in winning over Britain's keyboard enthusiasts. And even if they can persuade executives that a mouse is easy to use they will still have the problem that many (perhaps most) executives have desks so cluttered and full of paper that they don't have the clear space to use a mouse.

Anyone interested in joining the campaign to prevent the mouse from becoming an endangered species?



**TAKE A SHOT** — Light pen manufacturer Stack (051-933 5511) has taken its technology a step further to produce the Stack Light Rifle (SLR). Now you can take fun fair shooting into your home with titles like Rats and Cats, Escape from Alcatraz, Big Game Safari and Blue Mountain at £5.75 each. The SLR will be launched at the Northern Computer Fair, November 24, and will be sold with three games for the Spectrum, Vic 20 or Commodore 64 at £29.95.

## Limrose promises program skills in ten minutes

Programming in ten minutes? That's what Limrose Electronics is promising users of its Progen program generators.

Limrose (097883-5555) has Progen running under CP/M at the moment and it plans to have it implemented on Apple, Sharp, IBM, DEC and other micros before the end of the year. The software has taken two years to develop, and a spokesman said that an 'intelligent' version that will tolerate spelling mistakes is also in the

Limrose Electronics pipeline.

Progen 1 is aimed at people who need to produce ad hoc programs for business or other uses at short notice. It needs a micro with at least 64K, and it will cost £95.

A more sophisticated version, Progen Plus, is likely to go out to dealers and professional software producers, the spokesman said.

The software includes a file handler and operates on the now familiar question and answer principle of automatic program design.

## Wang baby born

The US office hardware specialist Wang has added two more computers to its range of Office Information Systems (OIS) called the OIS 40 and OIS 50.

Selling at £5,748, the OIS 40 is a single user system which runs Wang's well-established Word Processing. At this price the system consists of a 10Mb hard disk, 320K diskette and a 20 cps printer. In addition, it comes with a low-profile keyboard and a tilt-and-swivel display.

The OIS 40 can be upgraded to the OIS 50, supporting up to four users. The OIS 50 costs £14,237 with 10 Mb of hard disk, four workstations and one printer.

Software that comes with the

machines includes Wang Word Processing, Glossary, Decision Processing, Sort, System Security, Mathematics Support Package, Message Control and System Utilities.

Still on the software front, Wang has released a new package called Notebook for £166.75. This runs on the company's range of Professional computers and is used for the storage and retrieval of unstructured text.

For an additional £86 Wang users can now put the UCSD p-System on their machines. Because the p-System is transportable, users can transfer applications from non-8086 environments to the Wang Professional Computer.



Wang OIS systems in a not-quite-paperless office.

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# PCN Charts

This top 30 games list is compiled from both independent and multiple sources across the nation. It reflects what's happening in high streets in the two weeks up to October 13 and, like the micro charts, does not take account of mail order sales. The micro charts this week show the number of machines sold in the same two-week period so they tell the story in the high street between September 30 and October 13.

## GAMES

### Top Thirty

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

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# PCN Charts

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

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

## HARDWARE

### Top Twenty up to £1,000

MODEL	PRICE	DISTRIBUTOR
▶ 1 (1) Spectrum	£99	(SI)
▶ 2 (2) Vic 20	£140	(CO)
▶ 3 (3) CBM 64	£229	(CO)
▶ 4 (4) BBC B	£399	(AC)
▲ 5 (7) Oric 1	£130	(OR)
▶ 6 (6) Texas 99/4A	£99	(TI)
▶ 7 (9) Dragon 32	£174	(DR)
▶ 8 (8) Atari 800	£300	(AT)
▼ 9 (5) ZX 81	£40	(SI)
▲ 10 (12) Sharp MZ80A	£349	(SH)
▶ 11 (11) Colour Genie	£168	(LO)
▼ 12 (10) Atari 400	£150	(AT)
▲ 13 (14) Tandy colour	£240	(TA)
▲ 14 (15) Aquarius	£80	(MA)
▼ 15 (13) Lynx 48/96	£225	(CA)
▲ 16 (18) CGLM 5	£150	(SO)
▲ 17 (—) Sharp MZ700	£240	(SH)
▼ 18 (17) Epson HX20	£472	(EP)
▲ 19 (20) Nascom 3	£500	(LL)
▼ 20 (16) Apple IIe	£969	(AP)

### Top Ten over £1,000

▶ 1 (1) IBM PC	£2,390	(IBM)
▶ 2 (2) Act Sirius	£2,525	(ACT)
▲ 3 (8) DEC Rainbow	£2,714	(DEC)
▲ 4 (5) Commodore 8000 series	£1,200	(CO)
▼ 5 (3) HP86A	£1,438	(HP)
▲ 6 (7) Olivetti M20	£2,400	(OL)
▼ 7 (6) Epson OX10	£1,995	(EP)
▲ 8 (—) British Micro	£1,495	(BM)
▶ 9 (9) Ajile	£2,995	(AJ)
▲ 10 (5) Apple III	£2,780	(AP)

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



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## The sad voice of experience

We have all heard of people being given good advice and then blatantly ignoring it. I had not put myself in such a category until recent events unambiguously demonstrated that I too have become a member of this group.

The micro mags advised me to spend my hard earned cash on a computer which was not a promotion manager's dream, but was real and obtainable over the counter.

However, the gloss pages called like a siren, and there I found the Oric 1, hailed as 'tomorrow's micro-today!' Not being totally green I obtained a specification and was convinced that it offered most of the features I wanted. So I took the plunge and ordered a 16K machine by phone in early November (82).

Delivery was not the specified 28 days, nor was it before Christmas. It arrived in late January in the guise of a 48K machine, and was two weeks later than my Barclaycard bill for payment of two machines. The latter problem needed several letters and phone calls before I was credited with the cost of the mythical second machine.

The machine itself was tagged with apologies: '16K machine unavailable, please accept this 48K machine on loan', and 'this manual is only

### PCN £10 Star Letter



temporary.'

I therefore struggled with a totally inadequate manual for several months only to find that the ROM had the inevitable bugs, the screen shimmered, sounds caused the display to judder and some of the specified features were missing (eg VERIFY). The real manual then arrived, and because it was just about adequate I thought my problems were over.

Not so! In June Oric told me I could keep the 48K machine for a further £27.50 or exchange it for the 16K version.

I therefore returned the



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

machine and asked for the faults to be fixed and I would send the extra money for the larger machine. Four weeks later my machine was again AWOL with both the GPO and Oric denying its existence.

Ten weeks after postage, and after taking out a compensation claim for loss with the GPO, it appeared on the doorstep. Only one problem was attended to: the screen judder was cured, but there was a reduction in sound level.

The purpose of this letter is to urge other contributors to PCN's lively columns to listen to your good advice. For example, Mark Paton had shortlisted two mythical machines and Craig Rollason wondered if he should await developments at Acorn.

Both were well advised by you and my sad and frustrating experiences would underline the need to buy, through the established retail outlets, an available machine which has overcome any initial launch defects. In this way we may all yet benefit: manufacturers would be encouraged to get it right, and we users would be free to enjoy our computing as we wish to.

N T Jewell,  
Fullwood, Preston

*You win the tennor. (Flattery had nothing to do with your success, but don't stop...)*  
Ed.

## Communicating with the consumer

I was amused to read in PCN, issue 24 the criticism of the

CBM 1541 Drive Handbook because at that time I was in the UK and actually bought one of these machines. In true computer industry style the handbook is a complete mess. Even a 50-year-old accountant who knows little about computers could see some of the more obvious misprints and I do not mean in the appalling English but in the programs and instructions (scratch is wrong for starters). The UK 20 incidentally has two pages of its handbook transposed but the average juvenile learner or bemused parent would not find it.

I feel it is time someone took action to stop computer manufacturers selling these ill-printed, badly written 'User Handbooks'. Can you imagine what it is like for me sitting 6,000 miles away with little knowledge and few local users trying to decode one of these bits of computer 'garbage'.

I am not only referring to CBM whose products I like and whose Programmers Reference Manual is almost correct. All are as bad as each other. One of my Sharp computers (I have two) has a handbook which would have been almost as much use written in the original Japanese (in fact some few pieces escaped translation).

Could I suggest that manufacturers take the products of their machine handbooks to an accountant of between 30 and 60 with a little computer experience (there are about 25,000 in the UK) and ask them to run through it.

If someone with such a background finds one word difficult then it is simply wrong and must

be rewritten until it can be understood. Do these electronic wizards not know that in their chosen industry they are in communications! If they cannot communicate with their customers heaven help them as the customers will not.

David Walton, F.C.M.A.  
Saudi Arabia

*A pat on the back for PCN here for we've been prompting Commodore to correct the 1541 handbook. An errata sheet is now available and reprints of the book should be the corrected version. Ed.*

## Waiting for service

As computer shops spring up on every corner, am I alone in wishing that these shops did more than just display shrink-wrapped micros on every spare inch of shelf-space? Why do these shops offer some real peripherals? Why don't they demonstrate micros operating printers, instead of arcade-style games? In short, why don't these shops offer some real service?

I would like to suggest that your magazine incorporates a regular feature entitled 'Why are we waiting?' As a Lynx-owner, I have given up hope of ever equipping my machine fully. When I first enquired about the Lynx, the friendly blurb I received told me that the Lynx wouldn't take hostages but would allow other manufacturers' equipment to be used. Now I find that would-be disk drive users must either purchase Lynx drives or go without. Why don't Computers provide a disk controller and operating system so that purchasers could then link up the drives available now? As for the Lynx RS232 serial port...  
Adrian Martin  
Worthing, West Sussex

*We do have a fake-out list in Monitor from time to time, so do keep us in touch — Ed.*

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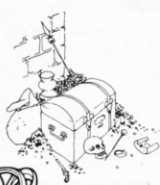
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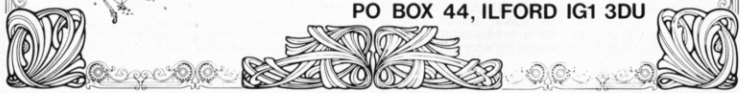
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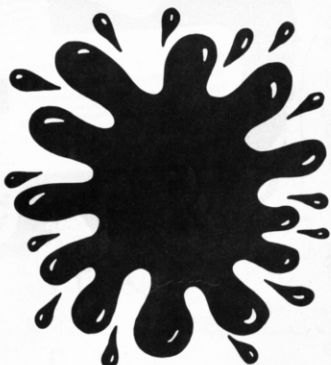
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### An 800 by any other name . . .

**Q** I recently bought an Atari 800 48K and I was wondering if it's possible to upgrade to the new Atari 800XL. Will my existing Atari take the range of add-ons for the new XL computers?

*Matthew May,  
Dublin, Ireland.*

**A** No and Yes, respectively. The Atari 800 and the new 800XL are two different machines which have different shapes and different innards. It would be just as hard for you to upgrade from your existing Atari 800 to the new 800XL as it would be for you to turn your 800 into an Apple (ie, impossible).

But the good news is that all peripherals in the new Atari XL range will run on your good old 800. In fact, the only great advantage you'd have in trading up to the new 800XL would be more memory (the 800XL will have 64K) and perhaps some extensions of the sound and colour capabilities. All the software for the XL series of machines will be compatible with yours, so you won't lose out there either.

Stick with your 800 for a while. It's a good machine and being improved all the time by the increasing number of expansion options open to it.

### Micro and recorder in harmony

**Q** I have a stereo radio-cassette recorder with a headphone socket and a microphone socket, and I would like to know whether I can use it with a home computer.

*Michael Bowles,  
Retford, Notts*

**A** The answer is a qualified yes. Micros can be a bit fussy about the tape machines they'll work with, the rule being that the cheaper that tape machine, the more likely is to work properly.

This is because the better tape machines will tend to mellow down the sound input

— fine for music, not so clever for data.

That said, many excellent hi-fi systems will work well with micros. Try to check it at the shop where you buy your micro — you may need a special lead if your tape machine has DIN rather than jack sockets, but a good micro store will sell you this.

There is a second proviso and that is that some micros, notably the Commodore and Atari machines, require a dedicated cassette unit to work with them. This may influence your choice.

### Dangers of a DIY Vic motherboard

**Q** I am in the process of building an expansion motherboard for a Vic 20. Is it possible to disable the cartridge slots by switching the positive supply to each individual slot? Will this damage the cartridge when the Vic 20 is switched on?

**A** Also, can a ribbon cable be used to mount the motherboard away from the computer, and if so, what would the maximum length of the ribbon cable?

*L.A. Crowe,  
Newport, Gwent.*

**A** Easy bit first: yes, you can use a ribbon cable to allow the board away from your Vic. In fact, this is an eminently sensible solution as it makes unplugging the contraption from the Vic both easier and less fraught with the danger of breaking something. In practice there's no limit on the length of your cable although, given the spaghetti that accompanies any expanded Vic, you won't want to add to the chaos.

Now the hard part. Forgive the doubts, but if you need to ask about this, are you competent enough to build the board anyway? There is a deal more involved in making a motherboard that adding a few extra edge-connectors.

Because the set-up requires power going in and out of the expansion port, your motherboard ought to be both buffered and fused. A mistake in this department could do your Vic a serious bit of GBH.

Your best bet for disabling individual slots is a physical switch. Have a look at some of the commercially available

boards and see how they do it. If you can't follow what they've done you're in no position to do it yourself.

### Tuning in to colour TV

**Q** Can you tell me if using a colour TV, for example, for a Vic 20, affects the television in any way, since I have been banned from using the living room colour one.

*Ralph Rapley,  
Ipswich, Suffolk.*

**A** Yes, if you're using a micro it means you can't watch Crossroads at the same time — Vic 20s are particularly prone to this . . .

But seriously, there's no way your Vic can damage your TV, apart from the standard wear and tear you'd actually get watching the thing.

It is theoretically possible to 'burn in' an image on the screen but in practice you would need to leave a completely stable image for an unrealistic time to achieve this.

Some micros, such as the Atari have a built-in facility to dim the image and prevent this happening if you haven't touched the keyboard for a while.

If it's an old four-channel setting only model, constantly retuning would probably damage the tuner, but if it has enough spare settings for you to leave it tuned for your Vic, then there's no problem.

### Rules for starting a club

**Q** I own a ZX Spectrum and a ZX Printer and have many friends who also own Sinclair computers. We are thinking of starting a computer club — can you give us some advice?

*R Page-Brown,  
Allesley, Coventry.*

**A** It's very important that you get straight in your mind the kind of club you want to start before you do anything. Many clubs are just a group of friends meeting in someone's front room — no money changes hands, and membership's limited to a fairly small group, so you've got no problems.

But if you want to start something bigger, it's best to

get yourself organised. First you'll need premises for your meetings. Try your local schools, community centres and church halls — you might get premises free if the vicar or caretaker is soft-hearted, but if not, it should still be quite cheap.

Next you'll need a constitution. This needn't be more than a couple of paragraphs, but should set down who is eligible for membership, how much it costs, what office-bearers you'll have — chair person, secretary and treasurer should do you — and how and when they'll be elected. You should also say how decisions will be made.

Once you've got that sorted out, form an interim committee and advertise your inaugural meeting, which will elect your office-bearers and get the ball rolling. If you do it this way you should be able to grow to some considerable size without risking falling out with all your friends!

### Fair copy of a cassette?

**Q** I have bought a Screen Graphics 64 cassette. It works really well and I would like to make a spare copy but cannot list or save it into another cassette.

**A** When I type LIST, the ready message appears on screen. If I type RUN . . . RETURN, the program is executed. How can I make a copy of it?

*M Sfeir  
Hertogenlaan 25,  
Ekeren, Belgium*

**A** With any program in memory that will not list, you can bet you are dealing with machine code. In any event, your can be equally certain that the publisher of the program doesn't want to make a copy.

In this case, my sympathies tend to be with the publisher. Unless you go out of your way to damage the cassette (spilling coffee on it, or standing it near a strong magnetic source), the chances are that you will never need a back-up copy. Unlike disks, cassettes are a remarkably sturdy and reliable storage media.

However, in the firm faith that no reader of PCN would indulge in piracy, a machine code monitor might give you a few ideas.

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

## Cassette control on the Newbrain

On the Newbrain it is possible to obtain more than 80 characters per line by using the Comms port and not the printer port. For this use stream #9 instead of #8. PRINT#9... will then achieve a line printed without the CRLF after the 80th character. PUT#9... will set the printer with control codes as necessary.

On the subject of cassette motor control, I use a small subroutine to control the cassette.

```
5000 PRINT "Press rewind key on cassette then hit any key to continue"
```

```
5010 PRINTTAB(10); "Hit * key at the end of rewind to continue the program"
```

```
5020 GET #5, CH: ON BREAK GOTO 5030: VERIFY: 5030 ON BREAK GOTO 0: RETURN
```

This assumes that stream 5 has been opened previously with OPEN #5.5.

*Ray Clarke  
Hove, East Sussex*

## EOR on the BBC put to good use

In this age and time of structured programming, computer programs often consist of little more than a loop giving access to a battery of procedures. One favourite trick on the BBC micro is to loop continuously through a number of negative INKEY statement serves to toggle a variable between two values (eg. 1 and 0) — in addition to passing control to the appropriate procedure. In most cases the toggling and procedure calling have to be done on the same line, both

actions being implemented on the INKEY condition being true.

An elegant (and rarely used) way of doing this is to use the EOR operator. Thus, 1 EOR 1 is 0 and 0 EOR 1 is 1. A short program that demonstrates this is shown below. It uses the spacebar (~99) to toggle Tog% between 0 and 1 and hence the foreground colour between red and black.

In general, X EOR X is 0 and X EOR X IS X; so it is possible to toggle between any value and zero. A little experimenting will reveal other toggle values, such as >LEOR 3 is 4 and 4 EOR 3 is 7.

```
10 Tog%=1
20 REPEAT
30 IF INKEY=99 THEN
   Tog%=Tog% EOR 1
   PROCSCREEN (Tog%)
40 UNTIL FALSE
50 END
60 DEFPROCSCREEN (V%)
70 VDU 19, 1, V%, 0, 0, 0
90 AS=GET$
100 ENDPROC
Mario Camilleri  
B'Kara, Malta
```

## Put the Dragon back into synch

The MOTORON and MOTOROFF commands on the Dragon 32 have a built in time delay, which can be quite irritating when trying to synchronise music or sound effects from tape. This can be overcome by POKE#H94,255 and POKE#H95,X where X is a number between 0 and 128. The lower the number, the less time delay. Reset to default values by SAVE or LOAD programs ie POKE#H94,18 and POKE#H95,218. An ideal setting would be POKE#H94,255 and POKE#H95,20.

*Hywel Francis  
Cyncoed, Cardiff*

## POKEing the Newbrain screen

A tip to settle the argument about difficulty in POKEing the Newbrain screen: if the following line is used to poke a space into the first location of each line, one can happily poke anywhere on the screen without problem.

```
X=642: FOR I=1 TO 24: POKE X, 32: X=X + 64: NEXT I
```

There is a gap between the end of one line and the start of the next, but if one adds 64 to the start number of the previous line this will give the current line location, top left being 642.

*Jim Moon  
Preston, Lancs*

## Useful tips for Oric POKES

On the Oric-1 the Basic keywords of the users program are held. POKEing this location with any number between 128 and 255 will produce a keyword as the first command of the first line, providing there is a line there in the first place, while POKEing with a number below 128 will produce an ASCII code in the line. For example try:

```
REM.....
Now type PRINT PEEK (1285), and the computer will return with a value of 157, and LIST the line. You'll see that REM has changed to CLS, as 148 is the code for CLS.
```

Now for something more useful, change the line back to normal with POKE 1285, 157 and LIST it. Now type DOKE 1283, any number between 1 and 65535, and LIST the program. The line number has changed to the number you DOKEd into 1283, so to write a copyright message that cannot be run edited or deleted type:

```
Ø REM COPYRIGHT MESSAGE
```

the DOKE 1283, 65535, and LIST it. The line is now immovable, as it is above the standard line number limit of 63999.

*James Eibisch  
Cheltenham, Glos.*

## The repetitive Dragon

Contrary to popular belief, it is possible to obtain auto repeat of keys by using the INKEYS command on the Dragon 32.

This can be seen in the example given below. The program converts the value of the key being pressed, into ASCII code. This value is stored in memory, and if it equals the value of an arrow key then the black square is moved in the appropriate direction. The character will continue to move as long as the value remains, it is countermanded if another key is depressed.

Dragon users now have two

methods of auto repeat, PEEKing the keyboard and using a manipulated form of the INKEYS command.

DEMONSTRATION PROGRAM OF INKEYS AUTO REPEAT:

```
10 CLS:QQ=238
20 PRINT@QQ, CHR$(128)
30 INKEYS: IF AS="" THEN 4Ø ELSE A=ASC(AS)
4Ø A=8 THEN QQ=QQ-1: WW=QQ+1
5Ø A=9 THEN QQ=QQ-1: WW=QQ-1
6Ø A=1Ø THEN QQ=QQ+32: WW=QQ-32
7Ø A=94 THEN QQ=QQ-32: WW=QQ+32
8Ø PRINT@WW,"
9Ø GOTO 2Ø
E Robson  
Wallsend, Tyne and Wear
```

## PRINT AT in machine code

In a recent *Microwaves* (PCN, Issue 30), there was a Basic subroutine for a 'PRINT AT' function. The following is a machine code version for the Commodore 64 which is faster and a bit more flexible, allowing PRINT AT and INPUT AT.

```
1Ø REM AT IN FUNCTION
2Ø FOR T=828 TO 856: READ D: POKE T,D: NEXT T
3Ø DATA 32, 253, 174, 32, 138, 173, 32, 138, 32, 247, 183, 152, 72, 32, 253, 174, 32, 138, 173
4Ø DATA 32, 247, 183, 166, 2Ø, 1Ø4, 168, 24, 32, 24Ø, 255, 96
5Ø REM DEMO
6Ø X=18:"y=5: PRINT CHR$(147):AT=828
7Ø SYS AT,X,Y: PRINT "DEMO"
8Ø SYS AT,X,Y+2: INPUT "YOUR NAME":NS
```

*David Gristwood  
Sunderland, Tyne and Wear*

## Missing correspondents

The following people have sent in their ideas to be published on the microwaves page. Unfortunately we have lost their addresses. So if they send them in ASAP.....

*I Wrigley F Ellahi  
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Ian Scales reports on another major peripheral for the Spectrum — the cartridge interface

# Plug in and go . . .

Instantaneous loading is now a reality for Spectrum owners, with the release of Interface 2, which provides a joystick interface and ROM cartridge port for the machine.

Its arrival comes as something of a surprise — it was launched quietly in late September, bang on schedule, and users waiting for the Microdrives, courtesy of Interface 1, are currently being invited to buy Interface 2 before they've even had so much as a sniff of Interface 1!

Stocks of the new interface are apparently large enough for it to be readily available, although Microdrives are still in very short supply.

Interface 2 plugs neatly into the back of the Spectrum — or, for the lucky few, into the back of Interface 1 — and provides two major advantages for the machine. First, ROM cartridges can be used, so all you need do is power up for your program to be ready and loaded, and second, it will accept two standard Atari-type D-plug joysticks.

Sinclair Research emphasises that these can be any type of joystick with a 9-way D-plug, and that, as the necessary software is built into Interface 2, the joysticks will work with cassette-loaded programs as well as ROM cartridges. Ten of the most popular Spectrum games, are already available on cartridge.

Interface 2 is currently being sold by mail order for £19.95, and the ROM cartridges are selling for £14.95 — cheap for what they are, but still something of a blow for those used to cheap games tapes.

The Spectrum was initially conceived by Sinclair as a low-cost hobbyists' micro — it did the job it set out to do well, at a very competitive price. But it was still something of a 'bare bones' machine — many of the facilities needed to communicate adequately with the outside world were left out of the design. Users were therefore left with just the cassette interface, and with a cheap, but poor quality, printer.

Bit by bit, companies like Kempston filled the gap — it became possible to use joysticks and decent printers, although there were still compatibility problems. Not all games would operate with a given joystick, and vice versa. Therefore, although some excellent games have been produced for the Spectrum, it hasn't always been possible to play them the way they should be played. And if you were reduced to playing through the keyboard alone, you'd have even more problems because of the poor response from the cut-price keys.

## Construction

With Interface 2, these problems are starting to fade. The device itself is finished

in the standard Sinclair Model T black, is slightly wider than the Spectrum's edge connector, and slots tidily into said connector. The ROM cartridge itself slots into a slightly oval socket, which is protected by a sort of hatch affair, and the joystick ports are situated to the left of this.

It is a prime example of the growing petite-ness of Sinclair Research products.

But in operation, it's more than just a pretty case. Setting aside for the moment the ROM cartridge facility, which will allow you to load programs which would otherwise be simply too big for the Spectrum, the joystick interface alone promises to give the market a thorough shaking up, for a number of reasons.

First, there is the advantage of standardisation. The Kempston set-up had already gone some way to achieving this. Like Interface 2, the Kempston interface plugs into the edge connector, and uses standard D-plug joysticks, and the company has been having some considerable success in persuading software producers to include joystick code routines in their games programs.

But this has in no way been a universal solution to the problem. Many of the Spectrum owners most willing to spend money on a joystick interface must already be confirmed games addicts, and so will have at least a handful of games which were, until now, incompatible with joysticks of any description.

You could use the Pickard Joystick Controller, which is wired up in such a way that it fools the computer into thinking that you are sending it the key codes it expects, but it is a fiddly operation to fit, and is not particularly warranty-friendly.

Interface 2 gets round this rather stylishly, and simply because it comes from the machine's manufacturer, it is assured of the position of the industry standard.

Sinclair hasn't made the support bracket,

featured on the Interface 1 part of the package. This bracket screws onto both the Spectrum case and Interface 1 to form a solid connection with the Spectrum board and reduces the dreaded RAM-wobble problem prevalent on the ZX81.

The connection has a tendency to wear down leading to frequent crashes and the omission here is particularly unfortunate considering the unavoidable amount of stress and strain likely to be placed on the Interface 2 as cartridges and joysticks are plugged in and out.

Visually, the nicest thing about the product is the cartridge itself. True to form, Sinclair has done a marvellous miniaturisation job, producing cartridges about 1.5 × 2 × 0.3 inches.

At £14.95 Sinclair is producing some of the cheapest games cartridges on the market although they now look decidedly overpriced following Commodore's recent decision to cut its games cartridges for the Vic 20 to around the £10 mark. There was some talk from Sinclair before the launch to the effect that £10 would be the price for its cartridges although it may be that the price will come down after a few months.

Another nifty feature is the red rubber skirt which envelops and protects the cartridge connector when it is not plugged into the games port. When the cartridge is plugged in, the skirt is pulled up out of the way.

There's a hinged lid over the games port and a pair of plastic plugs to protect the joystick sockets. These are easily removable — and also easy to lose, although Sinclair says they can be dispensed with anyway.

## In use

As with all cartridge systems the power must be off when the cartridge is inserted or removed from the port. On the Atari this restriction is made idiot-proof by the access





lid to the cartridge cavity switching off the power to the computer when it is opened.

Unfortunately, no such safeguards are featured with Interface 2, though the law of probability says you will commit this crime at least once during the lifetime of the system.

The accompanying literature is sketchy but adequate, telling you how to program the joysticks for you own games in Basic or machine code.

The codes follow the top row of the keyboard: ten keys equal up, down, left, right and fire for each of the joysticks and these can be read from Basic using the IN function.

All the cartridges can be used with either a 16K or 48K Spectrum because you're not using much of the RAM memory in any case. You can use the interface and joysticks with cassette games as well, and

according to Sinclair the number of games cartridges will increase quickly. It's likely that the introduction of the Interface 2 will split the Spectrum market up into two distinct segments — serious applications for Interface 1 and Microdrive owners and games for the Interface 2 users. In the mean time it's likely that cassette games will

serve as a test market for the cartridges — the best-selling games will obviously be "moved across" first.

At the moment there are ten games available on cartridge. These are Space Raiders, Planetoids, Hungry Horace, Horace and the Spiders, Chess, Backgammon, Psst, Jet Pac, Cookie and Tranz Am.

priced about right, and Sinclair obviously hopes to make a big killing in the run-up to Christmas. It would be a much better product if the cartridges were priced at £10 instead of £15.

**Item Sinclair ZX Interface 2 Machine ZX Spectrum Price** £19.95, Cartridges £14.95  
**Manufacturer** Sinclair Research **Available** mail order, Sinclair Research, Stanhope Road, Camberley, Surrey GU15 3PS, tel (0276) 685 311.

### Verdict

The Interface 2 is a neat little product. It's

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



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

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

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



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The Acorn and Watford Disk Filing Systems for the BBC micro are compared by Bill Davies.

# BBC DFS options

In order to interface a disk drive to the BBC micro you need to install an interface kit which comes with a Disk Filing System (DFS). The DFS consists of software contained in a ROM and plugs into the sideways expansion sockets inside the machine.

The DFS contains all the extra commands necessary to operate the disk system. Because Acorn was a little tardy in supplying the necessary hardware other firms jumped in and provided the bits. Probably the best known of these is the Watford Electronics DFS and we've placed it alongside the Acorn DFS to see how they compare.

## Acorn DFS

The first thing any new user should do is to look at their manual. Acorn's manual for the disk operating system is not the easiest in the world to understand. The first section does make sense, and tells you what a disk system is. But it is when you get into the manual proper that problems might arise. Having said that, it is child's play in comparison with some other manuals.

The Acorn DFS has a utilities disk with the same program on it as the welcome cassette that comes with the machine.

It's when you run the disk that you realise just what a blessing a disk drive really can be. The original welcome cassette would take anything up to a minute to load. The disk does it in seconds. What a pity there's no description of how those programs are constructed. But the enthusiast can always make a listing and work it out.

Also on the utilities disk is a formatting routine so that you format your disks to 40 or 80 tracks. You're well advised to make a backup copy of the disk just as soon as you've worked out how to operate the disk system. Without the disk you can't use any new disks... so beware.

## The commands

The first listed command may be one of the most useful: 'ACCESS' (no, not a free credit card), gives you access to the program on disk. It means that if you wish to protect the program from accidental erasure by placing the letter 'L' after the file name it'll protect against some of the more destructive commands on the system.

'BACKUP' lets you make copies of the disk. With this command you copy the entire disk, track by track, sector by sector. If you have only one disk drive there are screen prompts to make sure that you change over the disks when making the backup.

The COPY command is for copying specific programs, and again you are given prompts to make sure that you remember

to take out one disk and replace it with another.

There are certain commands on the DFS which are somewhat destructive, to say the least. What could be worse than spending hours poring over your hot computer entering data, saving it and then in a moment of sheer thoughtlessness erasing it all with a 'DESTROY' command? But Acorn have thought about that one too, and the 'ENABLE' command is there to make you think again before you take the final step.

Calling up 'INFO' is helpful as it will tell you all you may need to know about the file on disk, ie the load address, the execution address, the length in bytes and where it is on the disk.

Any file can be 'RENAMED', providing the new name doesn't already exist on the disk. A useful function of this could be when you save a file to disk, then come back to it again later and add to it. If you try and resave it under its old name the chances are that you will find that there is not enough room on the disk in the space reserved for that filename. Saving it with a new filename, ie 'File 1' means that you can then erase the old file (and its name) and then rename with the old name in its new location.

## The Watford DFS

The Watford Electronics DFS has the same commands built into it plus some other hidden little 'goodies'. The first thing you'll notice is you can throw away the disk that you use for formatting (not literally, I hasten to add). The DFS has a disk formatting command built into it, with the useful addition that you can select 31 or 62 files on the disk.

This means that if you are planning to use the disk for relatively short files, ie a large number of letters, you can store up to 62 of them on one disk without the 'Catalogue Full' error message coming up.

On a 40 track disk you may find that you run out of space before you get to 62 files, but if your drive is double density and you're working with 80 tracks, the increased number of files is a godsend.

When you call up the CAT command the Watford DFS shows you the catalogue of files, and tells you how many you have at the bottom eg 40 files of 62 on 80 tracks. Handy, if you have so many files on disk that it starts to spool off the screen.

MLOAD and MRUN are two other unique commands. Typing in MLOAD permits a file to be loaded over the disk workspace. This works by loading the file to &1200, switching off the disk system, then moving the program to its correct load location.

Programs can be used from tape as they can be automatically moved to their correct position.

The MRUN command does the same thing, except that the program is automatically run when loaded.

A further unique command is VERIFY. This scans the disk checking each individual sector to see if the sector's internal checksums match the actual contents.

Question marks that appear on screen after the track number indicate a fault on that particular track and here the EDIT command described later comes in useful. Having the verify in the ROM and not on disk (as it is with Acorn) means that memory is not corrupted when the disk loads the verifier.

## The utilities

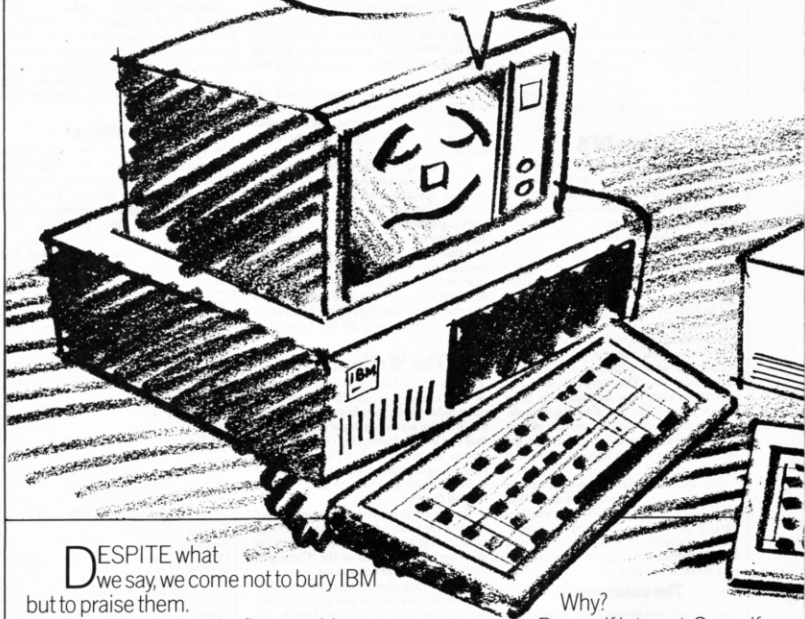
The Watford DFS provides an important extra utility called EDIT. It's a disk sector editor. The point is to allow the sectors of a disk to be modified directly. This allows corrupted programs to be repaired without actually loading the programs into memory.

The editor is treated as a language. On entering you can call up any OS command. Using the Tab key you can find and call up

27 ▶

List of Watford and Acorn DFS commands and utilities	
Acorn DFS 0.90	
ACCESS <afsp> (L)	
BACKUP <src drv> <dest drv>	
COMPACT (<drv>)	
COPY <src drv> <dest drv> <afsp>	
DELETE <fsp>	
DESTROY <afsp>	
DIR (<drv>)	
DRIVE (<drv>)	
ENABLE	
INFO <afsp>	
LIB (<dir>)	
RENAME <old fsp> <new fsp>	
TITLE <title>	
WIPE <afsp>	
Watford Electronics DFS 1.20	
ACCESS <afsp> (L)	
BACKUP <src drv> <dest drv>	
COMPACT <drv>	
COPY <src drv> <dest drv> <afsp>	
DELETE <fsp>	
DESTROY <afsp>	
DIR (<drive>.) <dir>	
DRIVE <drv>	
ENABLE	
FORMnn <drv>	
INFO <afsp>	
LIB (<drive>.) <dir>	
MLOAD <afsp>	
MOVE <src drv> <dest drv> <afsp>	
MRUN <afsp>	
RENAME <old afsp> <new afsp>	
TITLE <title>	
VERIFY <drv>	
WIPE <afsp>	
WORK <fsp>	
UTILS:	UTILS:
Acorn DFS 0.90	Watford
BUILD <fsp>	Electronics
DISC	DFS 1.20
DUMP <fsp>	BUILD <fsp>
LIST <fsp>	DISC
TYPE <fsp>	DUMP <fsp>
	EDIT
	LIST <fsp>
	TIDY
	TYPE <fsp>

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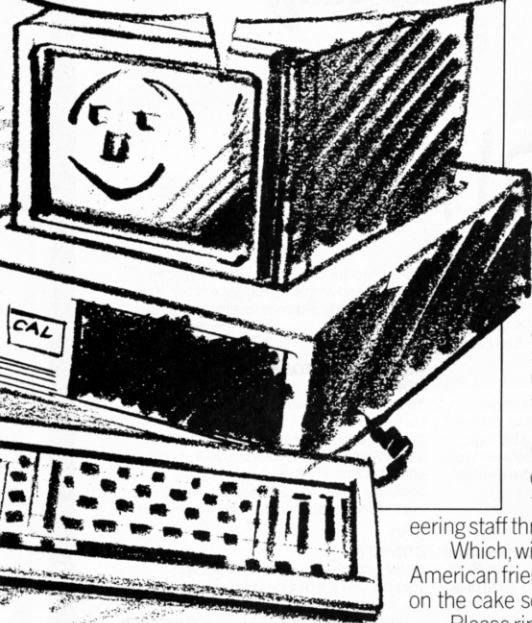
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any specified track and sector number, which is then displayed on the screen in Hexadecimal and ASCII representation. You can overwrite any byte, in either format, and then pressing copy will automatically replace that sector back to the disk in its corrected state.

You can put this to the test with an Acorn Atom disk if it refuses to load into the machine. You find the offending sector, correct the error, and the disk should be working perfectly.

A further use of the sector editor is to patch back a deleted program. This means that if you have deleted a program from the directory, but retained the program on disk you can find the program through the editor and resave it onto another part of the disk, thereby placing it back into the CAT.

The handbook strongly recommends that you make a backup copy of the disk before using the EDIT facility. If you get your sums wrong on the editor you may

find that you have corrupted the entire disk. So be warned.

A couple of extra 'help' facilities offered by Watford make your housekeeping easier. Calling up 'HELP FILES' will produce a list of all the text files that are currently open. This is extremely useful for de-bugging Basic file-handling programs.

The other one is 'HELP SPACE'. This allows you to scan through the disk seeking out gaps that may have been left on the disk when programs have been deleted. It's particularly useful if you've attempted to save a long program and the computer returns with a 'disk full' error, and you know that there should be space. HELP SPACE will show you how many gaps there are and (in hex) how big they are.

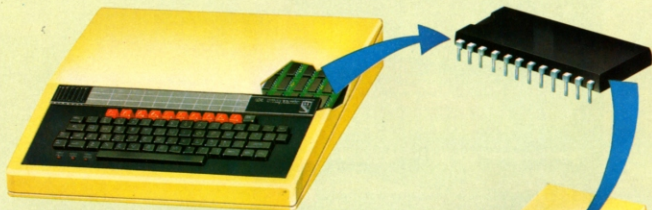
COMPACTING the disk will then move all the files up together and leave room at the end of the disk for your new program.

The manual (£7.50) is concise and easy to read. The author assumes the user

has some knowledge, but not too much. A new manual is in the offing and apparently an explanation of error codes will be included. Unlike the Acorn, the Watford DFS gives details of errors when they appear ie not just a number, and the new manual will enlarge on what the error means. "ID CRC error" doesn't mean much to most of us, let's face it.

The Watford DFS appears to be a better buy. In their adverts they cheekily offer to replace your Acorn DFS on payment of £35. If you're tempted you'll be buying a very powerful package. But there is a danger that it won't be able to handle such subsequent upgrades of the Acorn DFS as Econet.

**Item Watford DFS Machine BBC Model B**  
**Manufacturer** Watford Electronics **Price** £42 plus VAT (or £35 plus VAT if you trade in another DFS) **Contact** Watford Electronics, 33/35 Cardiff Road, Watford, Herts. WD1 8ED, 0923-40588.

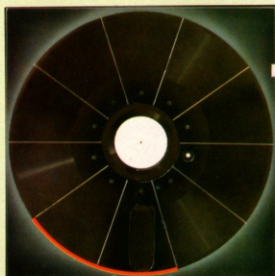


Floppy disks are organised into tracks and sectors. The Acorn disk filing system comprises 40 or 80 tracks per disk side and each track is divided into 10 sectors, with 255 bytes per sector.

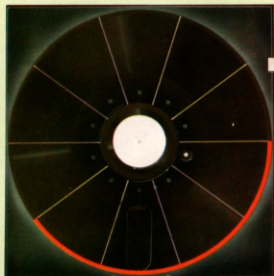
The Acorn DFS allocates sectors 0 and 1 on track 0 as a directory so the system can find its way about the disk to find files. The problem with the Acorn version was that only 2 sectors were allocated as directory space and this gave the user 31 files per disk side to play with - a rather small number, especially if the reason you're using the disk system is to save small Basic programs or short text files.

The Watford DFS arranges the setting up of a second catalogue file, using another two sectors of track 0. The Watford DFS recognizes that the extra catalogue space exists through the use of a series of SAA recognition bytes in the area normally used for the title in the second catalogue.

This puts you in touch with 62 instead of 31 files, so you're more likely to use up the available disk space before the files run out.



The Acorn DFS allocates two sectors on track 0 of the floppy disk for the directory, giving you 31 files.



The Watford DFS allocates four sectors on track 0 of the floppy disk for the directory, giving you 62 files.





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**commodore**



Gary Williams delves into the Oric-1 in a fit of PEEK and hauls up a few gems.

The Oric-1 user's handbook has been criticised for its lack of information with regard to system variables and reference charts for codes and instructions. This article brings together some of the hidden but useful memory locations, and undocumented facilities.

The designers of the Oric-1 have declined requests for listings of the system variables due to possible changes in future models. There are some well known bugs in the Basic interpreter, TAB(X) and STR\$(X) for instance, which may involve alterations to some of the existing variables when the new version ROM is released.

The current ROM, or EPROM, has now been available for some months and there are no definite plans of a new ROM being made available in the near future. The data in this article, therefore, will not become obsolete for some time.

First, those interpreter bugs. The tabulate instruction, TAB(X), appears to do nothing until X is greater than 10. There is still no guarantee that if you TAB(10+4), the statement will start at the 4th column. Location 617 (hex 0269) in RAM is the system variable that stores the current horizontal location of the cursor. Changing the value of this location will move the cursor to the desired position.

10 POKE617,10:PRINT"HELLO"

This simple instruction will print HELLO, ten spaces from the left of the screen, on the current line.

The instruction to convert numeric variables into string variables is STR\$(X). Unfortunately, the conversion puts a redundant character in front of the string variable. This is not always immediately obvious, until you try to manipulate the string with LENS(X\$), LEFT\$, MIDS\$, RIGHTS\$ etc. This will give some unexpected results. You may spend hours trying to find a non-existent error or incorrect formulae in your manipulation routine. The trick is to remove the first character of the variable, immediately after the STR\$(X) instruction.

10 X\$=STR\$(X):IF LEFT\$(X\$,1)=CHR\$(2)THEN X\$=MIDS\$(X\$,2)

This simple instruction should work, even if Oric decides to change the ROM. The redundant character is normally CHR\$(2). The line first checks that the character is present (on current versions of the machine it will always be present) then changes X\$ to be equal only to those characters from position 2 onwards.

Table 1 shows the purpose of some of other system variable locations. The decimal and hex equivalent is given for convenience.

**Location 27 & 28 (hex 1B & 1C)** — This is the location that the system keeps referring to when in direct mode, i.e. when not running a program. The location is normally set to 52205 (hex CBED) and allows the computer to continue operation in the normal manner. Other numbers can be DOKED into this location to cause the computer to react differently when completing a program, attempting to stop a program with CTRL'C' or system crash due to error.

# Uncharted waters

This facility can be used in the first line of every new program developed. If the program is AUTO saved, the first instruction received upon CLOAD will prevent the program from being listed or copied. Any attempt to interrupt the program will cause the computer to initialise a hard re-set, i.e. equivalent to switching the main power unit 'off' then 'on'.

**Location 174 & 175 (hex AE & AF)** — When READING DATA statements, there must be some method of identifying which is the next statement to be transferred into a variable. This location stores the line number of the current DATA statement.

**Locations 520, 783 & 784** — PEEKing 520 and DEEKing 783 give various decimal numbers depending upon which key is pressed. Table 2 gives the breakdown for each key on the keyboard. The location identifies the key and not the character, therefore no matter whether you are in upper or lower case, the memory location

will return the same decimal number for a given key. The following small routine will display the numbers corresponding to each key pressed:

```
10 CLS:PRINT" KEY PEEK(520)
DEEK(783)":PRINT
20 GETXS:P=PEEK(520):IFP=560RA
=PTHEN20
30 IF XS+"X"THEN END
40 A=P:PRINTXS,.,P,DEEK(783)
50 GOTO20
```

**Note:** — Pressing CTRL'C' will return decimal numbers to the screen and you may not be able to stop the program. Line 30 looks for the X key in CAPS mode, which will stop the program.

PEEKing or DEEKing these locations, instead of using KS=KEY\$ in games software, will avoid delays in waiting for the REPEAT facility to become operative, i.e. a delay of one second.

**Location 524 (hex 020C)** — One of the bits in

### System Variables — Table 1

HEX	DEC.	Purpose
001B	27	Direct mode reference Normally = 52205
001C	28	
00AE	174	Pointer to current DATA statement
00AF	175	Stores the current line number
0208	520	Key pressed. 56 = No key. See table 2
020C	524	Lower case = 127. CAPS mode = 255
0268	616	Vertical position of the cursor
0269	617	Horizontal position of the cursor
026A	618	Screen control. See table 3
026B	619	Paper colour
026C	620	Ink colour
026D	621	Base address for screen — DEEK(621) Normally 48000 (hex BB80)
026E	622	
026F	623	Lines of text on screen. Normally = 27
0276	630	Down counter. 100 counts = 1 second
0277	631	Max. figure set = DOKE630.65353
0307	775	Low = fast repeat. High = fast Basic
030F	783	Which key pressed. See table 2
0310	784	Normally = 45310 (No key)

### Key identity locations — Table 2

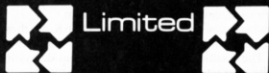
Key	PEEK (520)	DEEK (783)	Key	PEEK (520)	DEEK (783)	Key	PEEK (520)	DEEK (783)
1	168	47327	A	174	48863	T	137	47613
2	178	47807	B	146	47867	U	133	48638
3	184	47231	C	186	47743	V	152	47351
4	154	47863	D	185	47487	W	190	48767
5	144	47355	E	158	48887	X	176	47295
6	138	47869	F	153	47607	Y	134	48894
7	128	47358	G	150	48891	Z	170	47839
8	135	49150	H	142	48893	[	189	48511
9	139	48125	I	141	48637	]	181	48575
0	151	49147	J	129	47614	;	147	48123
—	155	48199	K	131	48126	,	187	47999
—	191	49023	L	143	49149	'	140	48381
/	179	48063	M	130	47870	~	148	48379
ESC	169	47583	N	136	47357	/	159	49143
CTRL	—	—	O	149	48635	←	172	48351
SHIFT	—	—	P	157	48631	→	180	48319
DEL	173	48607	Q	177	47551	↑	156	48375
RET	175	49119	R	145	47611	→	188	48255
SPACE	132	38382	S	182	48831			

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31 this location determines whether the computer is in upper or lower case. A decimal value of 127 puts the computer into the lower case mode. Decimal 255 gives upper case or CAPS mode. All this means is that if bit 8 is set to 0 the computer will type in lower case mode, if bit 8 is set to 1 then it will be in CAPS mode.

01111111 = 127  
11111111 = 255

POKEing the required decimal number into this location overcomes the problem with using CTRL 'T' or PRINTCHR\$(20), i.e. it is toggle action, and depending on the previous state of the toggle.

**Location 616 (hex 0268)** — Sometimes it is handy to know which is the current line for printing on the screen. Location 616 monitors the cursor and stores the screen line number in decimal format. This may also be changed with a POKE.

10POKE616,10:PRINT:PRINT

"HELLO"

This instruction line will print HELLO on line 10 of the screen. Notice the null print statement immediately after the POKE instruction. For some reason, this must always be included and treated as part of the total instruction. If it were omitted, then the HELLO statement would appear on the screen line previously stored in location 616, prior to the POKE. The following PRINT statement, in say program line 20, would appear on screen line 10.

The location may be used as a dependant PRINT instruction.

10 POKE616,PEEK(616)+X:PRINT:PRINT"HELLO"

where X = the desired line spacing.

**Location 617 (hex 0269)** — Horizontal position of the cursor. (See TAB(X) interpreter bug routine.)

**Location 618 (hex 026A)** — Depending on which bit is set, the screen will perform in various ways. Reference to table 3 will detail the differences. Normally set to decimal 11, eg:

POKE618,2 = VDU 'on' with cursor and keyclick 'off'

POKE618,10 = VDU and keyclick 'on'

The control codes listed on page 146 of the manual are helpful but unfortunately they work in a toggle form. In other words, if the condition is 'off', entering the control code switches it 'on'. Similarly if the condition is 'on', the control code switches it 'off'. This can be a bit disconcerting if you are attempting to switch the keyclick 'off' with the first line of your program by using PRINTCHR\$(6), only to find that the keyclick was already 'off' and your instruction has switched it 'on' again. Also, if

## ORIC OPERATING SYSTEM

For those unfamiliar with the method of storage in a computer, the Oric-1 is an 8-bit computer. This means that the microprocessor used in the machine has a byte capacity of 0 to 255 decimal.

How does 8-bits = 1 byte = 255 decimal? Logic circuitry works on the principal of ones and offs. If a

signal is on, then the receiving circuit will do one thing. If the signal is off then the circuit will do something else. Rather than calling it on and off, we call them 1's and 0's. If we have more than one wire, each capable of passing 1's or 0's, then the following truth table can be applied.

Count	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Wire 1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
Wire 2	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
No.	3	0	0	0	0	1	1	1	0	0	0	0	1	1	1	1
	4	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

This demonstrates that with only four wires, each capable of being on or off (1's or 0's), we can achieve 15 different conditions or patterns.

Wire 1 changes every 1 count

Wire 2 changes every 2 counts

Wire 3 changes every 4 counts

Wire 4 changes every 8 counts

Notice the common factor between the number of counts. Each succeeding wire is a multiple of 2' the

counts on the previous wire.

1 × 2 = 2 This is where the terminology  
2 × 2 = 4 'Binary' comes from. Each is a  
4 × 2 = 8 multiple of 2.

Now, getting back to 8-bits — If we have eight wires it will give the following count sequence. The bit numbers are always shown with the lowest value (least significant bit) on the right and the highest value (most significant bit) on the left.

Bit No.	8	7	6	5	4	3	2	1
Binary	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
Decimal	128+	64+	32+	16+	8+	4+	2+	1

Therefore, each 8-bit word, known as a byte, is capable of being the equivalent of any decimal number between 0 and 255.

When the computer is searching through memory,

it is not looking for decimal values but bit patterns within each byte, i.e. a particular pattern of 1's and 0's.

Bit No.	8	7	6	5	4	3	2	1
Example 1	0	1	1	0	0	1	0	1
Example 2	1	0	1	1	0	0	0	0
Example 3	0	0	0	0	1	0	1	1

The Oric is capable of storing numbers larger than 255, in fact, up to decimal 65533. This is achieved by using two bytes per number. The first byte stores the value 0 to 255 while the second byte, also any value between 0 and 225, is used as multiplier for 256.

This is then added to the value in the first byte.

1st byte 11111111 = 255 = 255  
2nd byte 11111111 = 255 × 256 = 65280 +  
65353

there are dependant sub-routines in your program, i.e. sub-routines which may or may not be called depending on the condition of certain variables, then you can't use the control codes as stated on page 146 of your manual. It doesn't check the condition of the toggle before applying the PRINT CHR\$(X) instruction.

**Location 619 & 620 (hex 026B & 026C)** — Paper colour and ink colour respectively.

**Location 621 & 622 (hex 026D & 026E)** — Stores the start location of the screen memory. As this is normally 48000 decimal it requires two bytes to store the information, therefore DEEK(621) will look at both locations 621 and 622. The location can be changed with a DOKE instruction.

DOKE621,48160 will set the screen start memory to the fourth line down on a normal TV. If a program is in memory and you type LIST, you will find that only the

lower 23 lines of the screen scroll upwards. Whatever was previously in the top three lines, remains on screen. The 27 line area reserved for screen display has been shifted down by three lines. Now limit the bottom of the screen. Any changes to location 621 must be supported by changes to the following RAM location.

**Location 623 (hex 026F)** — Stores the number of lines for screen display. Can be POKED in conjunction with a DOKE into location 621 to give a scrolling window.

**Location 630 & 631 (hex 0276 & 0277)** — Together form a counter which equals 100 counts every second. The counter counts down from 65535 to zero, then re-sets itself to 65535 and repeats. It can be used as a time out display in games software.

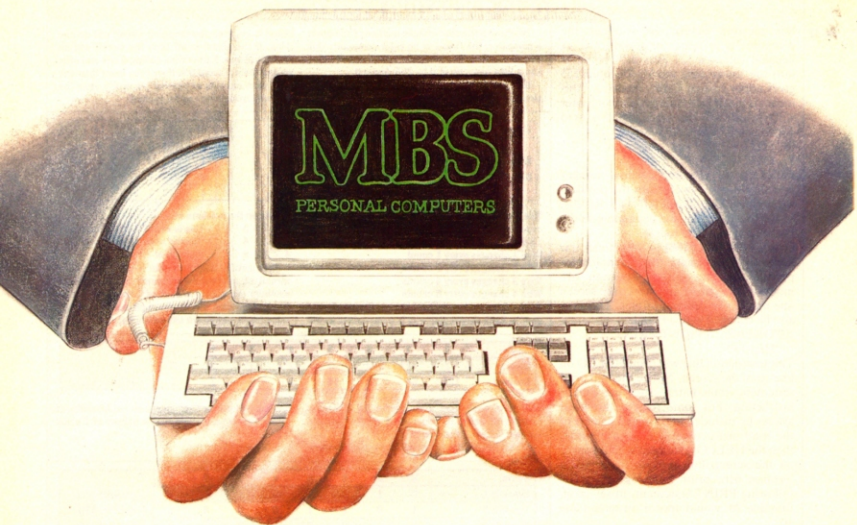
10 CLS:DOKE630,1100  
20 TINT(DEEK(630)/100)  
30 TS=STR\$(T)+" seconds":IFLEFT\$(TS,1)=CHR\$(2) THEN TS=MID\$(TS,2)  
40 PLOT10,10,TS  
50 IF T=0 THEN END ELSE GOTO 20

**Location 775 (hex 0307)** — Controls the speed of the Basic interpreter and repeat facility of the keyboard.

Low numbers in location 775 give a fast repeat on the keys but will slow down the Basic interpreter. Conversely high numbers give a slow repeat but effectively increase the speed of the interpreter. Normally set to decimal 39.

Location 618 (HEX 026A) — Table 3

Bit	Binary	Decimal	Purpose
1	2 <sup>0</sup>	1	Cursor 'on'
2	2 <sup>1</sup>	2	VDU 'on'
3	2 <sup>2</sup>	4	Printer 'on'
4	2 <sup>3</sup>	8	Keyclick 'on'
5	2 <sup>4</sup>	16	Escape 'on'
6	2 <sup>5</sup>	32	40 column display 'on'
7	2 <sup>6</sup>	64	Double height 'on'
8	2 <sup>7</sup>	128	



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Max Phillips dissects a new business heavyweight — the graphical Cortex from C/WP.

# Capable Cortex

The perfect CP/M machine shouldn't be an impossible dream. CP/M has been around long enough for designers to have massive experience and expertise to work with. The Cortex is a superb modern piece of hardware, combining a capable CP/M with hires graphics, a neat design and a good price. But as with all impossible dream machines, it is far from faultless.

The Cortex is aimed at the serious user — either a professional working from home or an office worker. Its main lot in life is running the Wordstar word processor though being a CP/M machine it is, of course, capable of most jobs. A choice of disk storage up to 1.6Mb of floppy and 10Mb Winchester also make it more suitable to bigger business jobs than Apples and Osbornes.

Essential background reading is the name saga. The Cortex is actually an Ontel Amigo — same machine, different software. It's designed by Microworld and built by Ontel. C/WP's OEM version used to be called the Context — until its namesake objected. It is strange that the new name seems to have gone unnoticed by Powertran whose Cortex kit home computer has been around for a long time.

## Presentation

The Cortex itself comes in a carryable cubic box. However, C/WP adds in its own drives. These arrived separately in plastic bubble wrapping — attempts to ship the machine may result in them getting dropped or lost.

Besides the machine and drives, you get a box of master disks, three tatty C/WP manuals and the new 3.3 version of Micropro's Wordstar and manual. This official release even has its 8-inch distribution disk — purely decorative on 5¼ inch drives.

## Documentation

It wouldn't really be fair to criticise the documentation. It gives the impression of being unfinished. Still, if you bought one tomorrow, you'd get an installation manual, a C/WP Wordstar manual (as well as the Micropro real thing) and a standard CP/M text book. And, with due nostalgia for days gone by, you get some of the documentation in a file called READ.ME on the masters.

The installation manual will explain how to plug it in and switch it on, though it's a shame that it seems unaware of the configurations C/WP supply. It even seems convinced that you get an Epson MX100 as standard kit.

The C/WP Wordstar manual is a giggle only because of the comical examples it uses. I have my doubts about its success as a tutorial — it omits many simple things and



'The Cortex is a superb modern piece of hardware combining a capable CP/M with hires graphics'. Left: The documentation appears rushed or unfinished, with the exception of the Micropro manual.

dwells on trivia. And it's a non-starter as a reference guide. None of this is a serious problem as you get the brilliant Micropro manual. But remember that if you stay away from the standard 3.3 Wordstar and use C/WP's custom version, you will need to fit between the two manuals.

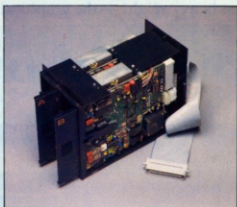
There is a superb though scruffy optional reference guide, price £30. It is a technical manual — it gives manufacturer's documentation for most of the major chips in the Cortex as well as listing useful info such as Escape sequences. It makes the Cortex an exciting adventure for the skilled hobbyist but it's almost no use for the business user.

The free CP/M text book is the only documentation about CP/M. You'll need it

for minor things like TYPE, STAT and PIP let alone the programmer's stuff like ASM and DDT. C/WP sells the machine almost as a dedicated Wordstar station. CP/M and buying and running programs don't seem to be possibilities. The point should be that the Cortex is a capable computer and the documentation should let you use it to the full.

## Construction

As desktops go the Cortex is a neat design. The computer is housed in the bottom of the monitor, itself tiny enough to sit in a corner of your desk. The drives are separate and can more or less be positioned where you like. Finally, the keyboard is a standard copy of the PC keyboard on a



435 suitably long lead. C/WP can supply the Cortex in the usual drab cream or a more tasteful range of colours — black, white, orange, green and blue.

It's well-built though not beautifully so. The drives are a bit 'heavy metal' and crudely finished. But the worst feature is that there appears to be a missing back panel on this and many other Cortexes. Not only does this leave the interfaces unlabelled but there's bare PCB exposed to the outside world.

I don't think it would take a very serious accident to do very serious damage to the machine. If you buy one make sure you get a cover!

The computer itself is a fun design. There's the standard Z80, 4MHz processor, plus 64K RAM for processing. This is coupled to a 6502 with 32K RAM driving a 6845 to provide the capable display.

### Keyboard

The Cortex sports an IBM PC copy keyboard. You love'em or hate'em. In its favour, it is copiously equipped — ten function keys, numeric cum cursor pad, Caps and Num locks with LEDs and sundry others such as ALT and so on. Some of the more well known layout quirks are a tiny return key and a / key between Z and Shift. But even if you get used to that, the Cortex has some other oddities.

There's no pound sign on the keyboard — I thought this was a UK machine. C/WP will be fitting £ keys to machines soon. The Alt key is hardly ever used in a constructive way.

The other problem is that you can't program the function keys without direct mods to the BIOS. You should be given software to do two jobs — assign useful strings to individual keys and download a whole keyboard definition to go with a particular package. Programming the keys by modifying the BIOS is neither elegant nor simple. Again, software to do this is 'on the way'.

Finally, the Cortex has a beautifully implemented Print Screen key (PrtSc). Hit this at any time and the BIOS produces a sideways copy of the screen on the printer using its bit image mode. So even the Cortex graphics are faithfully reproduced. PrtSc works for Epsoms or Epson-compatible printers — if you are not going to use a high quality daisy-wheel printer, make sure you buy a compatible dot matrix. PrtSc is, of course, a little slow but it is definitely worth having.

### Screen

The Cortex's screen is definitely one of its more glamorous features. It's a high quality green phosphor monitor. The only external control is brightness but contrast can be software-controlled and the image is all but perfect except at the highest brightness levels. Spec-wise, it has amazing abilities courtesy of its 6502 plus 32K RAM video control.

Text is a standard 80 columns by 25 lines but there's a full 256 characters available. Besides the usual set, there's a handful of special symbols — arrows, ticks and so on. 128 characters are undefined on power up and the whole 256 can be simply reprogrammed at will.

Reprogramming can be done with Escape sequences from within programs or by the end user with a program called FONT.COM. This is a curious character definer.

## 'It's well-built though not beautifully so'

All your definitions are first preloaded into a text file (using Wordstar of course) as a mixture of \*s and .s. Then you just FONT FileName to load the definitions. This method isn't as entertaining as most interactive definers but provided you're good with a text editor, it provides some powerful facilities.

C/WP has an additional menu-driven, on-screen editor which will become a standard part of new systems.

Screen attributes allow for the whole range of inverse, blinking, underline and bright characters. There's even an over-strike ability. Scrolling is switchable between a normal fast scroll and a software smooth scroll. The scrolling appears to be the only major flaw in the system. There's an infrequent but annoying flash which appears to be a slight timing problem at the 6502/6845 end of things.

Hires graphics (640x300) can be freely mixed with text. The Cortex emulates an ANSI standard graphics terminal. Long Escape sequences (for example PRINT CHR\$(27);CHR\$... from Basic) trotted out to the BIOS are interpreted and sent to the 6502.

Facilities provided include dotted and dashed lines, arcs and circles. Characters can be written at any X,Y position and screen memory can be PEEKed or POKEd.

It is worth noting that the screen format does produce elongated circles. Visually correct circles are easily possible using the arc drawing commands. However, be warned that some business graphics packages may produce strange pie charts.

The Cortex also supports Digital Research's GSX graphics interface. This is a graphics BIOS that allows graphics packages to be portable between a number of different micros. GSX should ensure that the Cortex isn't short of graphics software. But remember it's a new system and it will take time for a big catalogue to build up.

For the review, C/WP lent a copy of DR Graph, Digital Research's business graphics package. DR Graph will be adequate for some jobs but is probably better off as a demo of the GSX system.

Having a standard package talking to specific hardware through GSX produces interesting results. DR Graph draws odd circles and offers colours it can't display. And it is very slow. It's a bit like the old court scene. Call Circles, says DR Graph.

Call Circles, says GSX. Call Circles, says the BIOS. And the 6502 driver program says 'alf a mo, one circle coming up. You might think that having a 6502 dedicated to the display would produce lightning graphics. It helps, but it is still isn't a fast process.

### Storage

C/WP is known for its disk drives and the Cortex reaps the benefits. The Cortex can be supplied with twin 200K or 800K floppy disk drives and 5 to 20Mb hard disks. PCN tested a top floppy system — a luxurious total of 1.6Mb.

Obviously such abilities make the system a good choice for large database applications such as subscription lists and ledgers for starters. If you are buying it primarily as a low cost word processor then you could penny pinch and go for the smaller drives. The nice thing is the upgrade path... if you need bigger drives, you buy them and plug them in.

Most of the time the drives work beautifully and quickly. There were no reliability problems. However, the Cortex's BIOS has a number of very jagged, rough edges. Most systems that are happy with different disk formats can sense the

# AT LAST, A HOME COMPUTER THAT IMPROVES WITH AGE.



## It's surprising how many first-time relationships with a home computer go sour with age.

You buy an attractive, discounted little machine so that you and the children can learn about computers.

Instead, you learn about its limitations: the dull graphics. The plugs that fall out. The cheap power supply. The unalterable "beginners" language. The stiff, fragile keys. No provision for future developments. If only you'd looked around a bit in the beginning... *"Quality costs a little more, but it's usually worth paying for"* (Personal Computer News - CGL M5 Review, June 83.)

The CGL M5 is designed and built by Sorl, one of Japan's leading computer specialists, with three main ideas in mind.

First, to be easy and fun to learn and operate.

Second, to be rugged enough to last through hours and hours of operation.

And third, to form the basis of a powerful, versatile home computer system that won't need replacing until you're ready for a dedicated business system.

### Built to learn

The CGL M5 is designed to be easy for non-geniuses to use.

*"On the M5, most of the work is done for you, and all that is left is the need to work out what to do next, rather than how to do it."* (Personal Computer News, June 83.)

If you make a mistake, you can correct it with a simple movement of the cursor. So you only correct that mistake, not a whole line, nor do you have to indulge in complex edit commands.

Budding video game designers and computer artists will love to get their hands on the 16 colour graphics and 32 moveable images called "sprites".

*"The M5 makes professional graphic*

*effects very simple for even the beginner to achieve."* (Personal Computer World, Aug. 83.)

### Built to last

*"It works first time, doesn't need a lot of mollycoddling and figgery-pokery to persuade it to continue to do so, and what's even better, it continues to work well. You don't have to balance cold cartons of milk on the top, shove matches in the back to keep the plugs in, or press the keys with several pounds force to make them respond."* (Personal Computer News, June 83.)

Being able to build things that work and carry on working without endless maintenance is something at which the Japanese seem to excel.

### Built to grow

To be truly versatile, a home computer has to understand very different things.

So you need different "languages," which the M5 provides by supplying part of its memory in plug-in cartridges.

*"The M5 eliminates the worst limitations of computers at this level, which is that they tend to be stuck with whatever language is provided by the management."* (Personal Computer News, June 83.)

The computer is supplied complete with a Basic-I cartridge, a standard integer BASIC language and a simple learning text.

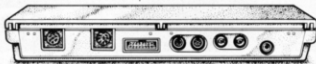
Plug in the Basic-G cartridge, and you can access the M5's incredibly sophisticated graphic and sound capabilities which are far in advance of similarly-priced computers.

Move on to the Basic-F cartridge, and you have scientific, technological and statistical computing power usually available only

on big computers with equally big price tags.

The FALC cartridge provides a tailor-made language for data management, spreadsheet accounts and business problems. Combine FALC with a disc and you could "turn the M5 into a small business machine" (Personal Computer Magazine, August 83.)

Now, take a look at the back of the M5.



Notice the sockets (usually an extra for a standard

Centronics-type printer, the separate video monitor and hi-fi sound output.

Even the language cartridge socket has hidden potential:

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format of a newly inserted disk and automatically adjust to it.

The Cortex BIOS tries but fails. If you try to copy from a 200K disk to an 800K disk without prior warning, the system fails to switch formats. It reports a bad read — the actual message suggesting that your disk drive door is probably open. You hit Control-C to restart the Cortex. It tries to log on to the disks and this time spots the different format and adapts to it!

And you really can't swap disks without Control-C. None of this is very serious. After all, most users who have bought 800K drives will use them at 800K all the time. When they buy software on a smaller format, they can go through the laborious copy procedure. Because everything needs to be warm started before use, you need the extra step of copying a copy program onto the disk onto which you want to copy the new software.

So it's a small and insignificant hassle. Or at least it would be if it were documented with any clarity. The worry is that if this doesn't work there may be other things that don't work as well. There are certainly a number of points that could do with a little attention.

On power up, the Cortex goes for the disk in drive A without a sensible 'Insert disk in drive A and press Return' pause. Again, the inelegance doesn't matter but you may lose the whole system if drive A goes down and you can't boot from drive B.

Control-C to warm start the system fails to clear the keyboard buffer. Type lots of them, or accidentally let it auto repeat, and the Cortex sits there warm starting over and over again.

A couple of last points about the drives. The boot message asks you to put your disk in the lower drive. On a 1.6Mb system, the drives are vertical. Strange how the standard A and B labels on the drives remove this sort of ambiguity!

The Canon drives also have an In-Use LED, capable of being red or green. The colour change depends on the head tracking — red for 80 tracks and green for 40 tracks. It's could just be useful — red is 800K format and green is 400K or 200K.

## Interfaces

The Cortex isn't really into expansion other than with bigger drives. It has a standard set of interfaces — RS232, Centronics, floppy disks and hard disk controller. Perfectly adequate for most business uses.

## Software

Being standard CP/M lets you buy all the old favourites — Dbase II, Multiplan, Supercalc, MBasic, Cardbox and so on and so on. Wordstar becomes a bit of a special case because it is bundled with all but the cheapest version of the Cortex. C/WP is always a keen pricer — keep an eye open for other offers.

And, as I've said, GSX graphics should help to ensure graphics software is available though it's packages written specifically for the Cortex that count. However, remember that the Cortex is primarily

being sold as a Wordstar box. To this end, C/WP has produced its own cannibalised version of the program — C/WP Wordstar.

The basic idea is very sensible — to use the keyboard as much as possible. Wordstar will work on the barest of keyboards using Control sequences for almost all functions. Along comes the Cortex with a PC keyboard with a lot of extra keys that are ignored. So you redefine the extra keys to generate sensible control codes and make the whole thing easier to use.

C/WP has done this for its Cortex Wordstar. The cursor pad works, including Home, End, Page up and down, Insert and Delete. And some function keys do neat jobs. F9 saves your text and then puts you back where you were. Normally this is Control-K, S followed by Control-Q, P.

But there are no variable help levels. The 'J' help menu is now a 'H' menu. Bits of the 'K' disk and 'O' formatting menus have been moved onto a new 'J' menu. And so on. Experienced Wordstar users will be horrified. Even if you don't understand the changes above, you should realise that Wordstar is a big seller and has a superb

## 'A serious hobbyist will find lots to do with a Cortex'

user interface. It takes a while to learn but soon becomes a very fast second nature. I doubt C/WP's version is anywhere near as good.

So you've got a different program and you can learn its idiosyncrasies. Don't expect to learn Wordstar with this version or expect Wordstar typist to be able to work it. Unfortunately, there are some nasties in the mods.

When you boot C/WP Wordstar, it always logs onto drive B. 'Insert your disk into drive B', it invites. And, like the bootstrap, it then goes for Drive B without giving you half a chance to put a disk in.

Of course, in its defence, you do get a normal version of Wordstar 3.3 with its excellent manual. And guess what? You've no way to figure it out to work with the Cortex's copious keyboard. In short, C/WP's would have been better spent on developing a full set of utilities than messing about with established packages.

So what utilities do you get? A complete CP/M package PIP, STAT, ED, ASM, DDT, SYSGEN and friends. There's also a C/WP menu system — a simple device for either booting Wordstar or running utilities. It's a very pretty little program though remember that the Num Lock key should be off for the snazzy bits to work!

The utilities are reasonably easy to work. There's a FORMAT program that always formats the disk in Drive B. Oh, and an apparently last minute addition, an AFORMAT program that always formats Drive A. There's a disk copy but it can't cope with different disk formats. The result being that you need to know how to use PIP and SYGGEN anyway.

## Verdict

The Cortex produces mixed reactions. The hardware is excellent — big, fast disks, a high quality and speedy monitor, neat footprint and so on. Being CP/M puts lots of software within easy reach, including all the classics.

The only thing that detracts from the machine seems to be the supplied software and documentation. Both seem to be either rushed or unfinished. Hopefully, C/WP is working very hard to tidy up the loose ends.

A serious hobbyist will find lots to do with a Cortex. It would also be ideal for an office worker or perhaps as a standard machine throughout a large office. Provided you can put up with some of the rough edges while you learn the system.

Rivals are easy to list although few compare with the Cortex on price/performance. An expanded Apple, a Cromemco C10 or British Micro are good examples. However, new 16-bit systems will offer strong alternatives — the ACT Apricot and the Advance being the most obvious.

So the Cortex is definitely a system to consider. It's a very nice CP/M system but it needs a bit more work. It's really up to C/WP to finish what it has started. The Cortex could do very well...

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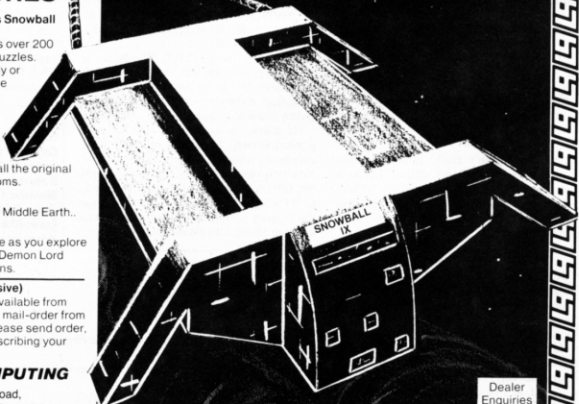
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Welcome



Chris Bidmead tracks down Ashton-Tate's new database for the IBM PC and CP/M micros.

# All done by Friday?

Friday! springs from the loins of dBase II, Ashton-Tate's widely promoted (and rather good!) multi-file database system for micros.

At its lowest level dBase II works as a very simple flat file handler, but you can write code to extend it to a reasonably good likeness of a relational database system.

The problem is that many users find its direct mode too elementary for their needs, but aren't quite up to writing all the code needed to implement a fully-fledged system: Ashton-Tate has aimed its new product Friday! directly at this gap in the market. The result is a comprehensive flat file handling system with built in utilities like form design, mail label printing and selective searching; all driven by a set of free menus that makes its use virtually self-explanatory.

In fact Friday! is written in dBase II, processed by Ashton-Tate's new Runtime, a pseudo-compilation system designed to turn dBase II applications into commercially viable packages as impenetrable to the piratical eye and (almost) as speedy as object code files.

## Features

Friday! is called a 'flat' filing system because the records it creates can't be processed in conjunction with other records in other files. More sophisticated database management packages (like dBase II itself) can connect together details from a number of files, building up multi-dimensional pictures of the data.

But a flat file system is usually more than adequate for applications like name and address storage or archive indexing and; if like Friday!, it can do maths on the stored numbers simple book-keeping also falls within its scope. Compared with the fuller database management systems, flat files have the advantage of being quick to build and query, and are easy to maintain.

The 'front end' that drives Friday! manages to avoid most of the stodgy handling usually associated with the menu approach.

## Presentation

Marketing has become Ashton-Tate's strong point, and as you might expect, Friday! is splendidly packaged. With the two IBM PC disks comes a handsome red manual in the now familiar dwarf ring-binder format. The cover is hinged, so that the book can be set up on the desk like an easel, although IBM PC users will already have discovered that the ledge on the keyboard makes an excellent prop for documentation.

The manual is indexed and well-endowed with illustrative examples picked

out in light green, which certainly improves the legibility and general appearance of the properly typeset 200-plus printed pages.

As with the dBase II manual, the first half is a series of graduated lessons which takes you right the way through the facilities, beginning with learning how to handle the test database provided on the distribution disks, and ending with creating printed report sheets to your own design from your own data.

The second half of the manual is detailed reference material, keyed into the activity of the program by way of a three-digit code known as the 'prompt number'. The prompt number is found in the top right hand corner of the screen, and there's a different one for each different stage of the program. If you get stuck somewhere in Friday!, or need the full background story on some particular feature, all you have to do is look up the current prompt number in the manual.

The one criticism you might make as you get to know the package better is that because of its size and the sheer quantity of text the manual gives a false impression of the complexity of the package. If you've used a micro before you should be able to get well under way with Friday! without even having to dip into the documentation.

And if you haven't used a micro before, Friday! turns out to be a very good place to start. With the package comes a 63-page booklet called 'Through the MicroMaze'. It's designed to introduce newcomers to the wonders of working with a micro, and there's a lot of sensible advice dotted among the welter of lavish full-colour illustrations. No obtrusive plugs for Ashton-Tate products either.

## Getting started

Friday! has a separate a setup program to configure it for 26 different hardware environments. The IBM PC version comes pre-configured, albeit somewhat oddly, with rather illegible inverted video being used to highlight the data fields. If you prefer the screen to show field names in low intensity and field contents in normal intensity — a far more readable arrangement — make sure that the SETUP.COM program is included. The manual says that SETUP.COM doesn't come with the IBM version, but it was certainly there on the distribution disk I received.

On entry the program shows you the current data and program drives, inviting you to change them. These always default to program in A: and data in B: — tedious if you're running Friday! on the XT hard disk version of the IBM PC, because the fast and capacious hard disk on which you want to do all your processing is called C:. There seems to be no way of getting Friday!

to default to this drive on entry, so you have to resort to the nonsense of telling Friday! every time it powers up where to look for its files.

## In use

Newcomers can begin by working through the example in the manual, a database of very American real estate properties. The UK market isn't going to identify much with this Raymond Chandler world of people who live in condos and have tennis courts and stables, but it does give you a chance to get to know the various ways of accessing data.

Record by record browsing is done with the arrow keys, not the dedicated cursor keys of the IBM keyboard — Friday seems to know nothing about them. Browsing lets you move forwards and backwards through the file, but as it's in the order defined by the current indexed field rather than truly sequential, access can appear a little sluggish.

In this mode you can also edit records and delete them, with the option of restoring deleted records. To go directly to a record you use the Quick Find option, which needs to know only the value of the index field. You don't have to put in the whole field — as in dBase II, all the system needs are the first few characters.

Setting up your own flat file is the next step. In full-blown dBase II this is hardly complicated, as long as you're happy to accept the default screen formatting that the system provides automatically. Friday! works equally simply at this level, with some added facilities:

- Data files are stored and retrieved through an internal directory that records file names against an identifying description so you can remind yourself or other users what the file is about. A similar directory stores format files.

- At the time of creation of a new file you can set up a password to keep the contents of the file away from unauthorised eyes.

- Prompts talk you through the creation of the individual fields, reminding you of the rules for forming field names and the data types allowable. Types are the same as in dBase II (alphanumeric, numeric and logical) except that their names have been translated into good old Anglo-Saxon as Anything, Math and Yes/No.

The screen display allows you to edit any field descriptions that have been entered inaccurately, and when you're happy with this stage you can save the file description. The first field you have created automatically becomes the index field, but you have a chance to change this later.

The system also builds a default format file for displaying the fields on the screen and uses this to run straight on into the data

entry section of the program. The field names you choose will be displayed on the screen with one per line starting at the top left hand corner, and their fields delineated by pairs of square brackets. If this utilitarian layout isn't to your taste Friday! offers the opportunity to customise the layout, arranging the fields in any order you choose, even excluding fields you don't want to show. Explanatory text can also be added.

The new layout file is created in much the same way as the data description. The menu directs you to an internal directory of format files relating to the current data file (the name of which appears in the top left hand corner throughout the run of Friday!). Deciding to add a new file to the list automatically takes you into an editing routine that lets you draw up the layout, positioning each field on a grid.

At the same time you can create what the manual calls a 'typing guide' for each field. This handy check against operator error defines what sort of characters are allowed in each field, further refining on the data type-checking carried out by the dBase kernel of Friday!

Reports for printing can be sculptured in much the same way, and again it's a two-tier system offering simple and quick report formatting or, if you want to spend a little more time setting it up, a customised report. One very nice feature here is the provision to include a sort of translation table, so that details kept as abbreviations in the data file can be written out in full in the printed report.

### Verdict

People who use computers a lot usually agree that menus aren't the ideal way to drive a program, but they're certainly very useful for beginners, or to help you remember how to work a program that you only use occasionally. One of the worst aspects of menus is having to weave your way through acres of screenage to get from one part of the program to the other.

Friday! cuts through all this with the rule that in addition to being able to access the previous menu that brought you to where you are, you can always jump straight to the main menu. This helps quite a lot,

although the system is still noticeably slower than, for example, raw dBase II used as a flat file system.

It seems a pity that the files created by Friday! aren't compatible with dBase II. There is a mechanism for translating data files to the dBase format, but the screen definitions have to be left behind and recreated.

I mentioned that highlighting with inverted video is a curiously handled option on the IBM PC as the program comes configured. Stranger still, enhanced video doesn't appear automatically — you have to switch it on explicitly every time you call up a new screen. Even then it will only appear when you change the record. Inverted video is a great help in improving readability by distinguishing field identifiers from field content, but Friday! handles this useful facility rather clumsily.

An important part of Ashton-Tate's marketing strategy for Friday!, as with dBase II, is the provision of a demonstration subset of the system along with a sealed disk containing the full version of the software. You are allowed to try out the demo for 30 days, and if you don't like it you can return it for a full refund.

Unfortunately the demo system has a spectacular bug in the section of the 'temporary sort' routine where you choose the fields on which a file should be indexed. You select a field by entering a one or two digit number, but the entry requires no carriage return. The bug is a classic — the moment you put in the first digit the routine runs off with it, so you've no chance of entering any field number higher than nine.

The temptation to open the sealed disk to check whether the same bug is in the full system is overwhelming (a deliberate marketing ploy?). For a reviewer this move costs nothing, but paying customers may feel differently and simply send the software back. Rest assured, though: the bug turns out to be cured in the full version.

I've already mentioned Friday!'s obstinate preference for drives A: and B: and the inappropriateness of this on the XT

running MSDOS 2. You can legitimately push this criticism further. Programs written to run under MSDOS 2 ought not to be thinking in terms of drives at all, but rather of *directories* — named collections of files arranged in a tree structure.

In this respect Friday! is less than ideally adapted to the operating system. With an awkward profusion of MODULE?? PRG and associated driver files required to run the program (35 in all, would you believe!) you might think nothing could be better to bundle this all into a manageable unit for MSDOS2's new tree directory system. The sensible thing would be to keep all your Friday! files together in a directory called FRIDAY and create a second, inner directory called, say, FRIDATA to store the data files. This is how, MSDOS 2 is intended to work — but unfortunately Friday! has no way of addressing the directory FRIDATA.

These criticisms detract very little from the fact that Friday! is a well thought out, very professionally presented piece of software that is quick to learn and easy to use. At £190 this handsome little bargain from Ashton-Tate should cause quite a stir in the database market.

### RATING

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



**Name** Friday! **Application** database file handling and report-writing **System** IBM PC and all CPM-80 machines **Price** £190 **Publisher** Ashton-Tate, Culver City, California, USA **Distributor** Ashton-Tate (UK), Stony Stratford, Milton Keynes MK11 1BY, tel 0908 568866



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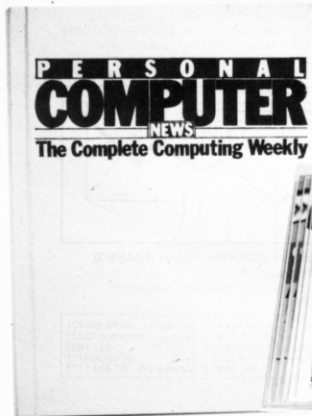
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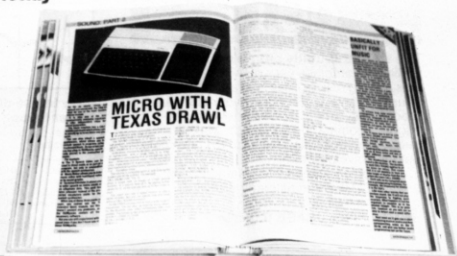
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PCW



Susan Curran checks the writing skills of Wordsworth.

# BBC writer

The ROM-based word processors for the BBC have received so much attention that it's easy to overlook the cassette and disk based versions. Wordsworth, which comes in both formats, is less than half as expensive as View or Wordwise, though, and could appeal to writers on a tight budget. It also works with the earlier versions of the operating system.

I tested the 80-track disk version, on a Torch rather than a BBC proper. There are few differences when the Torch is used as a mock-BBC computer, but Torch users might like to note that it works fine.

## Features

Most of the basic word processing features are there, and a few useful and less common ones. You can save files on disk or cassette, and utility lets you swap them from one to the other, which would be handy if you plan to upgrade your system, or resent the poor use of disk space (I'll be back to that) for long-term document storage. It's possible to insert text, and (within limitations) to reformat existing documents. It's also possible to merge files to produce simple form letters, though this feature won't be flexible enough for

Users are invited to contact Ian Copestake, the originator, for help with printer or other problems.

## Getting started

The disk version is protected, a system I don't like. You can't patch or amend it, or even list the directory outside the program. You can't make your own backups, and you can't make multiple copies to simplify your document filing. Understandable but frustrating.

To start the program you press Shift/Break, a procedure that proved quite tricky on the Torch (which doesn't have a Break key as such), but may be easier on a real Beeb. There's a clearly laid-out menu structure, which you can't avoid or cut down.

There's no attempt at training in the manual, and the contents are laid out in an awkward order for beginners. As an experienced WP user I had no trouble making sense of it all, but newcomers might fumble at first.

## In use

Like most Beeb word processors, Wordsworth works on the 40-column teletext screen, to leave a reasonable amount of memory free for the text. There's no horizontal scroll; instead each printed line takes up two screen lines, with a maximum line length of 80 characters. If this doesn't bother you (it's hardly generous), then the arrangement is clear and tidy.

The text is white on black, with colour used for screen prompts and system information. If your display is black and white, or green and black, you may curse the liberal use of red and green. It's possible on the disk version only to view your text in 80-column format (black on yellow, this time), but to edit it you have to switch back (through the main menu) to 40 columns.

Cursor movement and scrolling is all through the cursor keys with shift, control or both: logical and easy to use. Menu choices are made with number keys, editing mode choices with function keys. I kept pressing number 1 when I meant function 1, though no harm was done. On the whole, the system seemed reasonably logical and easy to remember.

There is automatic word wrap, but curiously you press shift-return (not return

alone, as is usual) to end a paragraph. If you forget, the paragraphs all run together when the program reformats after an alteration. There's no screen indication and I did often forget.

In general, the program's response is fast although reformatting (after every amendment) was painfully slow. I noticed a delay only when deleting text backwards.

There are no pagination commands at all, and the manual suggests that you make each page of a document into a separate file for printing. This would be passable on



cassette, but it is maddening on disk. Allowing for the DFS's limitation to 31 disk files, it would take an entire disk to store a 31-page document. It's possible to get around this by using 'multiple record files' and doing a mock-merge when printing, but this is pretty clumsy. In general, a tedious omission. Incidentally, disk files, like cassette files, are limited to RAM size, about 4,000 words.

## Reliability

I found the program very reliable. It did crash once on me, but when I reset the system my text was still intact. Idiotic user responses are generally anticipated and dealt with sensibly.

## Verdict

A neat and cheap program, if you can tolerate its limitations. Not for you if you want to produce wide copy, store long documents on disk or to double-space on a printer that does not have software switchable line spacing.

### RATING

Features  
Presentation  
Performance  
User interface  
Reliability  
Overall value



**Name** Wordsworth **Application** word processing  
**System** BBC Model B with or without disk drive (or Torch) **Price** £17.25; disk £19.50  
**Publisher** Ian Copestake, 23 Connaught Crescent, Brookwood, Woking GU24 0AN, tel 04867 4755 **Format** Cassette, 40 or 80 track disk **Language** apparently Basic **Other versions** No **Outlets** Mail order



serious business use.

Among the interesting extras are a search and replace, a keyboard lock with password (useful if you work at home with kids around), a swap-cases command, and a (slow) word count feature. Background printing is possible if you wish to edit a later section of the document being printed. There's an automatic totaling feature using the decimal tab register.

Wordsworth has a flexible printer driver routine, with special support for Epson printers. I use a Tandy daisywheel which has given me hours of trouble with Wordstar, and I had no problem getting it to function adequately.

## Presentation

My review disk came in a cardboard folder, but the retail version should boast a 'rigid A5 wallet'. There's a small-format 22-page manual, photo-reduced presumably from the Epson printer that is so well supported. It's legible and clearly written, and has a summary of commands on the back, but no index. There is a good Help facility on disk too (not on cassette), though frustratingly you have to abandon your document to get to it.




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Despite its gaming image, the Atari has several word processors. Geoff Wheelwright has the latest.

The Atari range of computers have never been known for their great prowess in word processing, but Atari has just released a new cartridge W/P package it hopes will change that image.

Atariwriter will run on the 400, 800, 600XL and 800XL computers (yes, the 16K Atari 400). The program can be used with any Atari micro with a memory capacity of 16K or more, so it theoretically means you can run the little Atari 400 with a W/P and disk drive — although the reality of the situation is that the 400's 16K memory won't be able to do much in the way of world processing once you've loaded the Atari DOS into memory.

But you can still use the 4000 quite effectively as a word processor if you have the Atari tape recorder as a storage unit and Atariwriter plugged into the 400's cartridge software slot.

In *PCN, Issues 9 and 10*, we looked at three word processors for the Atari range of computers. They were produced by Datasoft, LJJK and Atari respectively, with Atari and Datasoft producing the two cheapest of the packages (£68.95 for Datasoft's Text Wizard and £99.95 for Atari's Word Processor).

Ironically, it is Atari and Datasoft that have together produced Atariwriter, selling for £65. Although Atariwriter has Atari's name and logo slapped all over it, the fine print at the back of the documentation acknowledges Datasoft's role.

## Features

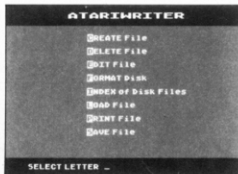
There is a good deal to Atari's chip-based word processor, starting with a simple, easy-to-understand menu system. When you "boot" your Atari with an Atariwriter cartridge in the left cartridge slot, the machine will immediately enter Atariwriter, presenting you with eight options — each selectable with a single letter and Return.

The options are: Create file, Delete file, Edit file, Format disk, Index of Disk files, Load, Print and Save files.

Most of the options are self-explanatory, although a few of them have some nice touches that make Atariwriter that much easier to use.

For example, the Edit file command will edit whatever file is in memory — instead of making you specify a file name first. File names are required only when you want to save the file after typing it in.

And if you want to edit an existing file,



What's on the menu.

# A word on Atari

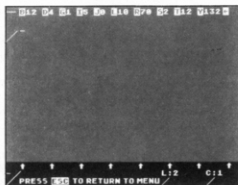
## In use

you load it into memory first, then go into Edit mode. When you're finished editing, you can either save the file under the same name or change the name and create an updated copy of the file.

Similarly, the file printing process also has some nice options, including the ability to preview files on-screen as they will be printed out — including the page breaks, paragraph marks and line spacing. Because the Atari doesn't come with an 80-column screen, the preview mode operates as a "scroll-across" imitation 80-column mode that lets you see where things are going to be on the page without requiring 80 columns.

## Presentation

Atariwriter comes in a large silver cardboard box and features a picture of a typewriter poetically dumped in a rubbish



On screen — formatting information on the top line, tab stops, line and cursor positions at bottom.

bin, with the clear implication that you'll feel so confident about your new-found word-processor that the typewriter will become redundant. (I wouldn't go that far — what about the long winter evenings when the power goes down.

Atari has benefited from its collaboration with Datasoft in that it's documentation is far simpler than the cumbersome Word Processor manual that preceded it. The Atariwriter documentation is more reminiscent of Datasoft's Text Wizard — simple, but perhaps sparse, documenta-

tion. Atariwriter is easy to use, with its upper and lower case 40-column display and capability to embed commands for line spacing, paragraph breaks and justification. Anyone particularly fond of the TAB key on the Atari, however, is advised to resist the temptation to use it with Atariwriter. The program prefers a CTRL-P to a TAB, although the TAB can be used to move across the screen.

The preview mode is available from the program's Edit mode, so that you can see exactly what your text will look like when it's printed out. It takes the control codes (like the ones used for line spacing and paragraphs) and uses them to display your fully-formatted text.

## Verdict

Atariwriter is an easy-to-use word processor for the Atari that is well worth the £65 price.

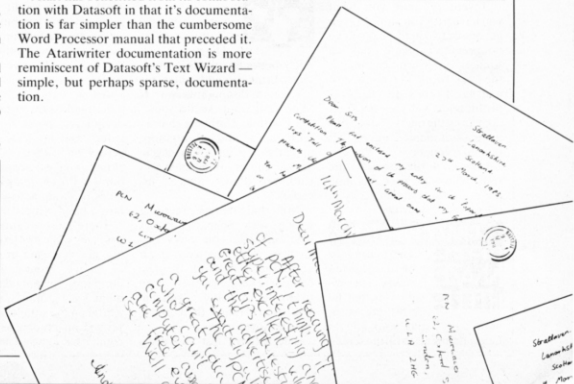
After numerous attempts by Atari, Datasoft and others in the past to produce a good word processor for the Atari, it took a collaboration between Atari and Datasoft to finally get it right.

### RATING

- Features
- Documentation
- Performance
- Usability
- Reliability
- Overall Value



**Name** Atariwriter **Application** Word processing  
**System** Atari 400, 600XL, 800 or 800XL with minimum of 16K plus cassette storage **Price** £65 including VAT **Publisher** Atari International, Slough 33344 **Format** Cartridge **Outlet** All Atari dealers.



Follow Bryan Skinner and Mike Gerrard as they travel with Cuthbert and explore castles.

# Dragon wagonload

For this round-up we've selected three October releases from Microdeal (with Cuthbert at large again) and two recent releases from other companies, including an interactive adventure from Virgin and another adventure with educational overtones.

## CASTLE ADVENTURE



Success in Castle Adventure, from Virgin Games, requires that you rescue the Staff of Gamroth from within the Castle and return with it safely to the drawbridge through which you entered. As you stand there, wondering how to get in the fortress, you might be tempted to read the sign: 'Abandon Hope All Ye Who Enter Here'. Ignoring a bystander's suggestion that I type 'Leave Bob Behind', I tried Go East — only to fall in the moat and drown — not an auspicious start.

This is a text-only game and even the text formatting leaves a lot to be desired. Perhaps I've been spoiled by adventure games of increasingly high quality recently and this is certainly not in the same class. In fact, it's a bit of a let-down. The screen display is limited to a brief description of where you are, what you can see, and where you can go — North, South, East, West, Up, Down.

'Inventory' tells you what you have with you and you even get one or two items that you've not previously taken. Look is a similar one-word command, the rest being the noun-verb pairing. There's no character profile and it's all too easy to get done in by the many and various unpleasant manifestations that pop up frequently.

I felt no desire to rescue the staff, who were probably having more fun watching telly in the servants' quarters.

## CRAZY PAINTER



There used to be a magician whose speciality was that he 'fills the stage with flags', and your job in Crazy Painter is to fill the screen

with paint, moving your brush around with either joystick or the arrow keys, and for once this is a game where keyboard control seems preferable.

There are eight levels of difficulty, from A to H, the latter presumably standing for Hilariously Suicidal, and you can start a game on any level.

The usual choice of three background colours applies, and you have four pots and five brushes, or lives. One pot should just fill the screen, if carefully applied, and you're given an extra pot for each completed screen.

To prevent you from giving your paintwork a lovely finish there are more hazards than I've encountered in a day's do-it-yourself, starting with dogs who tramp muddy paw-marks across the screen, moths who zig-zag down, balloons that rise up, caterpillars that drift wardwardly across, and boys who have the helpful habit of dropping turpentine just where you've painted.

An amusing and frenetic game which has you dashing frantically about to a jaunty background medley which includes *Whistle While You Work* and *Whistle A Happy Tune*. Good graphics too.

## CUTHBERT GOES DIGGING



If you've any energy left you can then try Cuthbert Goes Digging, which might better be called Cuthbert Goes Bonkers, and which for me was a disappointment. If Microdeal wants to do something with its Cuthbert character then it should be a bit more inventive than merely to recycle arcade games. What next? — Cuthbert Plays Space Invaders?

Not that there's anything wrong with Space Panic or whatever else you know this game as, where meanees chase you along a network of platforms and ladders while you try to lure them into holes to enable you to rearrange their heads with a shovel.

The action's fast and it's a

reasonable arcade clone.

There was, though, either a bug in the program or a bug in me because after half an hour's playing I hadn't scored a single point, being unable to put Cuthbert in just the right position for bashing meanees. They simply wouldn't plunge through the holes, though if there's a problem in the program it's presumably just on this pre-production review copy.

For those who can manage it, the game offers eight skill levels, ranging from six pursuing meanees to 13, and either keyboard or joystick control. There's the usual disappearing oxygen and a chance to enter your name in the Hall of Fame — or in my case the Hall of Shame.

## CUTHBERT IN THE JUNGLE



Preferable is Cuthbert in the Jungle, even if your hero has managed to change his appearance slightly in the meantime in infiltrating himself into yet another arcade variation. Here it's joysticks only as you manoeuvre Cuthbert along a jungle landscape offering more hazards than Tarzan ever had to face.

You begin with three lives and a timer ticking down from 20 minutes. You have 2,000 points to your credit, decreasing every time you bump into a rolling log or fall into a pit or experience some other minor disaster, and increasing for each piece of treasure you find.

Among the hazards are quicksand that appears and disappears, pools full of alligators that must be bounded across when their mouths are closed, snakes, scorpions and burning fires to jump over, and lakes to swing across by grabbing a handy vine.

There's also an underground passage, safer but less rewarding, and you can run along this or above ground in either direction. The only disappointment is the graphics, which are a little on the simple side, but it proved an enjoyable game to come back to again and again.

## GIANT'S CASTLE



Giant's Castle from Dungeon Software is billed as an adventure game for the younger player. Your aim is to rescue a beautiful princess from the giant's domain — what would a seven-year-old girl make of that, I wonder? To do this you have to answer a number of questions put to you by various characters you meet, such as a 'deformed witch'.

The locations are poorly described, being mostly of the form 'You are in a dank, dark, slimy cavern/cave/pit' and there's a lot of repetition of rather unimaginative screen displays.

Questions range from vocabulary — 'What do you call someone who flies an aeroplane'; anagrams — 'What is the vegetable — RPIAPNS'; to maths — 'What are 6+4'. If you enter TEN to this you get 'ERROR-REDO' — so the error trapping is almost nonexistent.

I found the direct encouragement of aggression rather hard to swallow; if you get caught by the skull-crushers you're told to 'Go on, give them a good punch'.

Quite frankly I wouldn't let children anywhere near this program. It's not particularly good, but also its outlook is limited and its purpose obscure. There's a lot of poor 'educational' software on the market and we're just beginning to see some very good pieces appearing. There's no excuse for poor programming or lack of design just because you're producing a program for younger children. Quite the reverse, I have to report '2/10, could do much better with a little thought and effort'.

**Castle Adventure** (£6.95), Virgin Games, 61-62, Portobello Road, London W11  
**Giant's Castle** (£5.95), Dungeon Software, PO Box 4, Ashbourne, Derbyshire  
**Crazy Painter, Cuthbert Goes Digging, Cuthbert in the Jungle** (£8 each), Microdeal, 41, Truro Road, St Austell, Cornwall.

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"LEE, YOU GO WITH FRED BACK TO BASE CAMP AND GET MORE SUPPLIES. CARL AND I WILL SEARCH FOR THE OTHERS."

"SURE THING, HANK! WE'LL SEE 'Y'ALL BACK HERE LATER!"

"GUT, DIS MAY VELL BE MY CHANCE TO DISPOSE OF ZIE SCHWEINHUND AMERIKANER!"

NOT FAR AWAY, MONTY, TOM AND IAN ARE TRAPPED AT THE BOTTOM OF A CREVASS.

"DASHED LUCKY REALLY THAT THIS FIGSURE HAS SHELTERED US FROM THE WEATHER. YOU SHARE THE LAST GINGER NUT, CHAPS. I AM SURE THAT AID IS IMMINENT."

"HAVE THE GINGER, TOM, I'LL TAKE THE NUT!"



MEANWHILE, AT THE TOP...

"LOOKY HERE WHAT I'VE FOUND, CARL. MONTY'S HAT. THEY MUST BE TRAPPED BELOW."

"AND IN A MINUTE, SCHWEIN, YOU WILL JOIN ZEM IN OBLIVION."

SUDDENLY, THE TWO CLIMBERS HEAR A NOISE ABOVE THEM.

RUMBLE

"GOTT IM HIMMEL!"

"WATCH OUT, AVALANCHE!"



WILL HANK AND CARL SURVIVE THE AVALANCHE? WILL MONTY BE RESCUED? WILL CARL'S EVIL PLANS COME TO FRUITION? WILL THE BARBARIAN REACH THE SUMMIT OF MOUNT FALOMAR BEFORE PETERKINS THE FERRET-STRANGLER? DON'T MISS NEXT WEEK'S EXCITING EPISODE!

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## SPORTY TYPES

### COMMODORE 64

# Pot the black

**Name** Hustler System Commodore 64 **Price** £5.99 **Publisher** Bubble Bus, 87 High Street, Tonbridge, Kent TN9 1RX **Format** Cassette **Language** Machine code **Other versions** None **Outlet** Mail order.

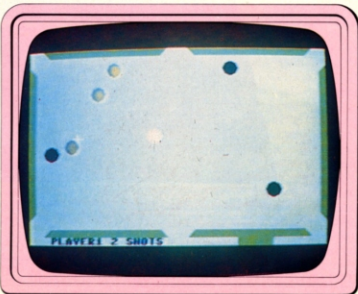
A hush descends as Typhoon steps up to the green-baized screen, the pearl buttons on his purple waistcoat twinkling in the light from the VDU. He has to pot this one if he's to win the championship for the tenth successive year. Carefully moving his joystick, he lines up the black for the centre pocket and fires it in.

Now you too can live out your favourite pool daydream in the privacy of your own home with Hustler, a splendid game from newcomers Bubble Bus.

### Objectives

There are three one-player and three two-player games, though you can play all six by yourself. The one-player choices are potting any ball in any pocket, potting the numbered balls in order, and potting each numbered ball in its numbered pocket.

The two-player games are potting the balls in their numbered pockets, six ball pool, and the players potting the balls in a different order. Each game is refereed by the computer, which gives scores, penalty points and free shots.



### In Play

The game opens with the Pot Black theme followed by the game option menu.

The appropriate balls are set up in place ready for the start. A small white cross acts as your cue sight. You have to move your joystick (or use the function keys) to position the cross on the point where you wish your cue ball to strike. That's the relatively easy part.

Down at the bottom of the screen is a bar which acts as a power indicator. The bar expands to the right and when at its limit, immediately clears and starts again. To activate the cue ball, you must press the fire button (or space key) at the right moment.

Although the edges of the balls are a little bit ragged, they move smoothly and are as true in their behaviour as you could expect. The sound of the balls colliding is more electronic than the satisfying clunk of real balls. Nevertheless, these are small flaws in what is an otherwise splendid program.

One rather good idea is that by pressing the Restore key at any time, you can get back to the menu.

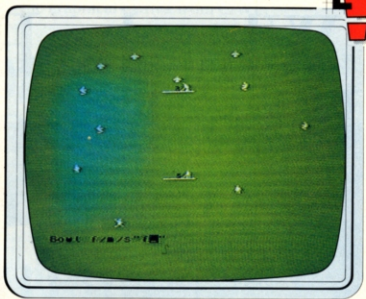
### Verdict

A very good and enjoyable simulation of a mini-pool game. We shall be hearing more of Bubble Bus.

Bob Chappell

#### RATING

Lasting Appeal	★★★★
Playability	★★★★
Use of Machine	★★★★
Overall Value	★★★★



### SPECTRUM

# Fields of green

**Name** Cricket System Spectrum 48K **Price** £4.95 **Publisher** Cambridge Microcomputer Centre (0223 355404) **Format** Cassette **Language** Basic **Other versions** None **Outlets** Mail order.

Presumably aimed at those cricketing junkies who need an alternative to Match of the Day during the winter, here comes an attempt to computerise the game with graphics and sound.

### First impressions

Cricket comes with a free Darts program on the reverse. The cassette cover provides all the information you need to get started, with some further brief instructions at the start of the program.

### In play

You first enter the names of the two teams, then toss by pressing ENTER to see who bats first. The only other instructions you really need are that the fielding side chooses the speed of the bowler's delivery by pressing F, M or S. Once the ball has been bowled and hit, the nearest fielder can be moved in the appropriate direction by using either key 0 or key 1.

The game is limited to ten overs or ten wickets, and there is even a random rain feature to stop play. There are six balls per over with a change of ends in between and a look at the scoreboard, although you can in fact get this at any time by pressing T.

The cassette describes the

game as 'full colour' which is true, the colour being green. This being a Basic game the graphics are limited, the players behind the wickets look more like seagulls than crouching men, and the movements tend towards the jerky rather than the smooth. The main actions are the bowler running up to the wicket and the batsmen running, or walking, when declared out, towards the pavilion.

The cassette also says that the sound effects include a realistic click as the bat strikes the ball, with clapping from the spectators for a boundary or a wicket. While you do get sounds resembling those, I'd hardly say the game explores even the limited capabilities of the Spectrum to the full.

Having said all that, the game itself is quite fun to play, though it is rather hard to pick out the ball once the batsman has hit it, which resulted in lots of boundaries in my first practice game. If the nearest fielder does get to the ball, the result may be a catch, a run-out, or simply a score lower than four for the batsman.

### Verdict

For this reason, and the limited use of sound and graphics, I was disappointed in Cricket, although I can well imagine it appealing to people who prefer the simple nature of this to something more complicated and frantic.

Mike Gerrard

#### RATING

Lasting appeal	★★★★
Playability	★★★★
Use of the machine	★★★★
Overall value	★★★★

# Why the BBC Micro? It might be fairer to let someone else answer that question.

"The BBC Microcomputers are the limousines of home computers. The graphics are probably the best of any machine in this class. You are paying for a smart machine which would not disgrace the home of a professional."  
*Video World, Feb. '83.*

"Its design has given the BBC Micro an unrivalled potential for business, educational and serious home applications. It has been equipped to function as the heart of a system which can be expanded to suit its owner's need."  
*Which Micro & Software Review, Feb. '83.*

"The most attractive and exciting feature of the BBC Microcomputer is its enormous potential for expansion which will allow a highly expansive system to be built-up."  
*Deborah Carruthers, Which Micro, June '82.*

"They (the graphics) are tremendously exciting, and they are one of the features that make this machine stand out head and shoulders above everything else that is available in the market place at this time."  
*Dave Fletcher, Educational Computing, May '82.*

"It is expandable and has a powerful BASIC. It has superb sound and graphics, the software is readily available and the price is right!"  
*Mr. A. D. Alles, a BBC Micro owner from Hampshire.*

"The basics are easy to follow. My wife has developed a program for teaching our daughter French vocabulary. Our daughter uses it mainly for games and simple programming."  
*Dr. A. Yarwood, a BBC Micro owner from Co. Durham.*

"It is a very powerful computer. My husband has written his own data base. I have been writing programs and programming games. Even the children have written small programs."  
*Mrs. A. M. Thomas, a BBC Micro owner from Devon.*

"No other computer can offer such ease of use when dealing with complex sound effects."  
*Which Micro, June '82.*

"It isn't often a journalist can sit down to write about a computer with the certain knowledge that he has never seen a nicer machine."  
*Guy Keiney, Personal Computer World, Dec. '82.*

"It has got huge potential. Besides playing the games, the whole family are learning basic programming."  
*Mr. P. S. Green, a BBC Micro owner from Staffordshire.*

"Everything possible seems to have been done to ensure that this is not a 'dead end' machine..."  
*Paul Beverley, Personal Computer World, July '82.*







Perhaps we could just add that the BBC Micro is the machine which was chosen to be at the heart of the BBC's massive Computer Literacy Project.

It is also the machine which, having won the Department of Industry's blessing, will account for over 80% of the computers bought by British schools this year.

And now for some facts about the machine itself.

The BBC Micro is light, compact and, with a conventional electric typewriter keyboard, easy to get the feel of.



It can be loaded from virtually any cassette recorder. And there is a wealth of ready-made programs available covering games, education and business subjects.

The BBC Micro uses BBC BASIC, a sophisticated version of the most popular computer language.

However, as your confidence and fluency grow, it can be adapted to switch to other languages.

It can also become a word processor, with the facility to link with a second processor for high-powered business use.

A disc drive unit can also be added. And with an adaptor, the BBC Micro is the first micro to be able to pick up programs from the Miconet-Prestel system. Another adaptor converts your TV into a Teletext receiver, with further ability to download programs.

All this for only £399.

The most sophisticated version of the BBC Micro, the Model B, is only £399. The basic Model A is £299. (Both come with a "Welcome cassette" and comprehensive introductory manual.)


Both models are available from local stockists and the BBC Micro B from W.H. Smith Computer Shops.

Alternatively, if you would like to order a BBC Micro B with your credit card, or if you want the address of your nearest stockist, just phone 01-200 0200.

Or, you can buy a Model B by sending off the order form below to: BBC Microcomputers, c/o Vector Marketing, Denington Estate, Wellingborough, Northants.

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## BADDIES IN 3D

BBC

# Deep space hitch

**Name** 3 Deep Space System BBC  
**Price** £7.95 **Publisher** Postern Ltd,  
 PO Box 2, Andoversford,  
 Cheltenham, Glos GL54 5SW.  
**Format** Cassette **Language** Basic/  
 Machine Code **Outlets** Mail order.

The television screen is of course a two-dimension affair, so when someone tries to add a third dimension to a space battle game, we should at least take notice. This is in essence an Arcade type space battle, with you the only thing between Earth and damnation. The difference is that here you can move your interceptor in and out of the plane of the screen, flying in front of or behind the enemy.

### Objectives

Waves of Andromedan spaceships wing towards you on their way to Earth, and it is your task to let as few past as possible. There are five types, of which the Dragon class must on no account pass by, for then the end of the world is assured.

You must place yourself in the correct position both vertically on the screen, and also in depth, for otherwise your laser bolt will miss. If the going gets too tough, your ship is also equipped with a few handy X-bombs, that somehow destroy everything on the screen except you.

### In play

Postern seems to have done everything right with the packaging of this game. It comes in a nice wallet with an excellent set of instructions, and a pair of those red and blue 3D specs.

Despite the lengthy instructions, however, I could not obtain a good 3D effect on my TV. This may be due to the particular room, but does at least demonstrate that difficulties can be met.

Having said that, the game was fun anyway. At least with the early waves of baddies, you can tell at what depth they are by their size. Later waves however, are fitted with image distorters. The controls are easy to use, and the sound adequately noisy.

### Verdict

This is a clever attempt to achieve 3D. Unfortunately it probably won't work too well on most TVs. Wearing the glasses can be uncomfortable and irritating. The game itself is standard enough but without a full 3D effect is frustrating and pointless.

It's possible that the best approach to 3D will not be via two-colour viewing but by perspective graphics such as used in Luna Crabs, Ant Attack and so on.

Sometimes the best ideas don't quite work out in practice.

Andrew Willis

#### RATING

Lasting appeal



Playability



Use of machine



Value for money



## SPECTRUM

# Cute crabs

**Name** Luna Crabs Application  
**Game System** Sinclair 16K or 48K  
**Price** £6.95 **Publisher** Micromega,  
 230 Lavender Hill, London SW11  
 1LE **Format** Cassette **Language**  
 Basic **Other versions** None **Outlet**  
 Retail.

Should we sympathise with our enemies on the moon in a fight to the death? Is there a tinge of remorse as we wipe them out? Thanks to convincing 3D graphics the luna crabs have acquired an attractively crafty personality. It is this which distinguishes the game from a typical space invaders battle.

### Objectives

Playing the game is simple. Your score points if you manage to shoot the furtive luna crabs while attempting to avoid their return fire. They dart forward, open their mouths and spit green acid balls.

Your weapon is a cannon which is restricted in action to rotating to the left or right when firing its photon bolts. The cannon may be controlled only by keyboard as there is no joystick version. It is fairly easy to score, particularly if you pick off the little creatures one by one. When they make a concerted attack you are advised to cut and run.

### First impressions

The cassette comes sealed in cellophane and has an accurate if rather fuzzy colour picture of the graphics on the cover. It is always good to see an honest

representation of the game instead of an artist's wildly idealised impression. The simple operating instructions are couched in florid science fiction twaddle but are easy to follow.

### In play

A clicking sound heralds the appearance of cute red crabs which scuttle from behind purple lunar rocks, over a lemon terrain, against a black sky. Their random approach and withdrawal is displayed in good 3D which creates the clever illusion of skulking, canny opponents trying to avoid your fire.

As you move to the left or the right, the horizon rotates around your gunsight. Your landing craft sits invitingly in the middle distance. It is a disappointment in the game to discover that however many crabs you destroy it seems you are never allowed to reach its safety.

### Verdict

The controls are simple and easy to master. The graphics are clear and colourful and the 3D effect is pleasing. An obvious weakness is that the skill level cannot be altered and the only objective is to obtain a high score by hitting as many crabs as possible. Nevertheless these nervous and unpredictable creatures are a more likeable, amusing and challenging opponent than the stereotyped, geometric, alien with all the character of a match-box.

Eric Salbine

#### RATING

Lasting appeal



Playability



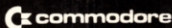
Use of machine



Overall value



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# PCN ProgramCards

This week ProgramCards sees the completion of the PCN game 'Bees Away' and the start of two new programs, one for the Lynx and one for the Apple.

## Key to the Lynx

The Lynx program, from Clive Newtom of Sutton Coldfield, is a useful utility that allows you to redefine the single key commands (esc commands). The keys can be altered to produce any of the Basic reserved words and, after they have been defined, the keys can be saved. The system variables between 25146 and 25171 hold the tokens to be used. These tokens are actually the position minus one of the location of the command in the Basic command syntax table.

The program gets the new command, evaluates it's token and replaces the token in the table. To reset all the commands after the program is finished, use CALL 1. This resets the machine to its power on state and should be easier than switching

the power off then on.

On running, the program displays all the current single key command words as a table. Option 1 allows new commands to be assigned to the keys, but note that only valid Basic commands can be used. The 'save the table' option allows the defined keys to be saved on tape. The program will automatically name the file with the version number that you specify, ie for version 1 the file will be saved as TABLE 1. To reload the table use MLOAD "TABLE1" or whatever version number you want.

Used in this program are a number of machine code routines. Within these routines are a number of locations which are not documented in the Lynx manual. These are 25145 — the state of the keyboard, POKING this location with the value 0 forces upper case; 25172, the horizontal print position; 25173, the vertical print position; 25113/4 address of start of the basic command syntax table and

25084/5, the address of the end of the Basic program.

## French Apple

From Bryan Skinner, of London, comes an educational program for the Apple. The program teaches you, or tries to teach you, some of those nasty irregular French verbs. It does this by feeding the pupil the infinitive of the verb and then a random part *ie* for favor the user may be given 'je'. The reply should be 'sais'. The test then continues for ten goes playing various tunes.

## Indirect address

Anyone who has sent in a program that has been published in ProgramCards, and has been wondering where their money is, should telephone PCN editorial as soon as convenient, as we seem to have lost some addresses.

And keep your programs coming, whatever your machine.

## PCN ProgramCards

### Key Utility Card 1 of 2

8333Ku1/2

```
10 DIM A$(7) (75)
20 CALL LCTN(700)
30 WINDOW 15,110,25,245
40 VDU 1,WHITE,2,BLACK,4
50 POKE 25145,0
60 PROC HEADER
70 PROC TABLE
75 PRINT "Commands: 1. Alter Table",,
"???????? 2. Reset Table",,,"3. Save
New Table",,,"4. Exit"
80 LET K=GETN-47
90 IF K<2 OR K>5 THEN GOTO 80
100 ELSE GOTO K*100
110 CALL LCTN(720)
120 GOTO 75
200 REPEAT
205 CALL LCTN(720)
210 PRINT "Change which letter ";
220 LET L=GETN
230 IF L<ASC("A") AND L>ASC("Z") THEN
RETURN
240 PRINT CHR$(L)
250 INPUT "New Command ";B$
260 CALL LCTN(710)
270 IF HL=75 THEN PRINT CHR$(7),,"Inv
alid Command"
280 ELSE PROC ALTER (L-65,HL)
285 PRINT @ 15,215;"Continue ? <Y/N>"
290 UNTIL NOTGET$="Y"
299 GOTO 110
300 FOR I=0 TO 25
310 PRINT @ 43,195;CHR$(1);CHR$(I+7);
CHR$(123);
320 POKE 25146+I,PEEK(5985+I)
340 PROC ALTER (I,PEEK(5985+I))
350 NEXT I
360 GOTO 80
370 DEFPROC INK(x)
380 LET i=2+4*(PEEK(5985+x))=PEEK(25146+x)
))
390 ENDPROC
400 CALL LCTN(720)
410 PRINT "Version Number <0 TO 9> ?"
420 LET V=GETN
430 IF V<48 OR V>57 THEN GOTO 420
440 POKE LCTN(730)+24,V
```

20	Call a machine code routine to copy 75 commands from Basic syntax table in ROM into AS.	200	Begin 'alter table' loop.	310-340	Get original ROM commands and place them into the table.
50	Force upper case.	205	Clear lower third of the screen.	370-390	Define procedure to select the appropriate colour for the altered, or not altered, commands.
75	Print menu, note that "—" is obtained with shift?	220	Get letter to be changed.	400	Start the save routine and clear the bottom third of screen.
80-100	Get option and if correct, execute appropriate command.	230	Check character is valid.	420	
110	Clear lower third of screen.	260	Call routine to check command validity and return token in HL. If command is valid then alter relevant key.	440	Get number from keyboard.
		290	If yes then continue repeat loop.		

# CHOOSING A HOME MICRO

**WARNING**

Choosing a home micro can be a daunting task to the newcomer, and with an ever increasing number of micros emerging on the market, even up-grading, say, from a ZX81 can be a risky and expensive exercise if the wrong decision is made. It is important to look at the real facts and specifications, and check exactly what you get for your money before choosing your micro-computer system.

## THE PITFALLS

### "DON'T LET THE ADD ONS ADD UP"

A number of large companies are offering packages that seem to be good value and low cost. These offers usually have a hidden sting inasmuch as the essential accessories such as connection leads, peripherals and software often carry very high cost premiums. e.g. software for low cost hardware usually costs between £29 and £49 for a ROM cartridge!!

### CHECK THE QUALITY OF THE PRODUCT.

Raw materials are now an area where corners can be cut, and shoddy workmanship during 'building' can affect the 'up-time' of your unit. Areas to watch out for are unreliable edge connectors, corrosion and poor quality P.C.B.s. Low quality components and bad design will seriously affect the reliability of the end product, and can lead to false economy.

### DON'T BUY A GAMES MACHINE

Unless you want just games and nothing else! With a games computer you are limited. Some computers, however, have the advantage of both games facility plus the whole world of computing to explore, as your interest and skills develop. A real computer system will allow you to expand your knowledge of the Hi-Technology world, and help earn its keep with its added uses in the field of education, communication and home business use.

### SOFTWARE

Make sure the system you choose has a growing library of support software, to enable you to realize the full potential of your machine.

### KEY POINTS TO LOOK FOR

● **High Resolution Colour**  
In general most home computers have a poor graphics resolution (or detail). Check on the vertical and horizontal resolution in graphic mode and multiply the two numbers together. If the result is less than 35,000, then the graphics can hardly be considered high resolution. Without high resolution graphics displays such as those used in games tend to be "Chunky" in appearance.

● **High Quality Sound**

Some computers claim to provide a sound channel when in reality all that can be found inside the computer is a small buzzer controlled by electronic pulses. At the very least a sound facility should provide more than one channel and a raise channel as well (for gun shot effects in games for example). The best systems also provide envelope control of the sound channels to produce very sophisticated effects; very important for generating music. Also look for the ability to connect to external amplifiers.

● **Keyboard**

For accurate entry of programs and data into a computer it is important that the keyboard has a good tactile feel in operation. Coupled with acoustic feedback the user is fully aware when the computer has accepted his/her actions. Also of importance is the keyboard layout. A standard computer keyboard layout will familiarise the user with the vast majority of computers used in the world of business and professional applications; very important if the purpose of purchasing a computer is educational.

● **RAM**

One of the most important features of a computer is the amount of RAM, or memory, included. In general the more powerful and exciting a computer program is the more RAM it requires. But take care, all computers are advertised quoting the total RAM used in the system. Computers use up a great deal of their own RAM for storing essential data and particularly in supporting the graphics display and the CPU. If it is less than 32K think again, is it enough?

● **Computer Language**

It is too difficult to program a computer in its own binary language so high level languages are used, the most popular being BASIC. However, there are a number of BASICs, some being very different from the rest. A de facto standard in the computer industry is Microsoft BASIC. Learn this one and you will be able to program in the majority of computer BASICs; such an important point if a home computer is to be used to educate your children to face the technology of the future.

● **Expansion**

As your interest and knowledge of computing grows, you will need a



*Choosing the right system carefully will save you from throwing your money away. Check full specification, plus peripherals and software prices, before you buy. Preferably choose a Real computer system that can expand to meet your needs.*

computer system that will grow with you: able to accommodate Printers, Disk-drives, Joysticks, Communications Modem, and Colour Monitor, as well as produce Hi-Fi sound effects.

● **Software**

The computer you choose should have a growing selection of utility

software to make the most of its capability. Remember, computing is here to stay. You can learn to compute on a toy, or a device which does not behave like a real computer. In short, look out for a computer which offers all the points above, and you will be sure of getting the best value for money.

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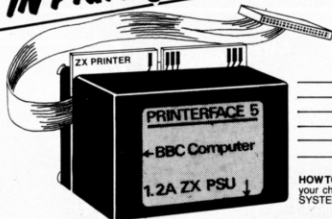
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## PCN Program Cards

### Key Utility Card 2 of 2

8333 KU 22

```

445 DPOKE LCTN(730)+13,LCTN(730)+18
450 PRINT CHR$(10);"Start Tape and Press
any Key","TABLE";CHR$(V)
460 LET V=GETN
470 CALL LCTN(730)
480 GOTO 110
500 PRINT " Are you sure ?? (Y/N) "
501 IF NOTGET#="Y" THEN GOTO 110
505 WINDOW 3,123,5,245
510 CLS
520 NEW
550 DEFPROC ALTER (1,X)
560 POKE 25146+(1),X
570 PROC INK(1)
575 PRINT @ 15+(INT(1/13)*48),39+(1-<
12)*13)*10;CHR$(20);CHR$(1);CHR$(1);CHR$
(65*1),A$(X);
576 VDU 1,WHITE
580 ENDPROC
600 DEFPROC TABLE
610 FOR I=0 TO 12
620 PROC ALTER (I,PEEK(25146+I))
630 PROC ALTER (I+13,PEEK(25159+I))
640 NEXT I
645 DPOKE 25172,&B90F
650 ENDPROC
660 DEFPROC HEADER
670 PRINT CHR$(21);"stuvwxY SINGLE KEY E
NTRY TABLE"
680 VDU 28,28
685 PRINT "?????????????????????????????
?";CHR$(20);
695 ENDPROC
700 CODE ED 5B 19 62 13 2A FC 61 23 06
4B 0E 07 1A 23 CB BF 77 13 23 1A CB 7F 2
0 07 0D 18 F5 3E 20 77 23 0D 20 F9 3E 0D
77 23 10 E2 C9
710 CODE 2A 19 62 06 4B 23 CB 7E 28 FB
ED 5B FC 61 C5 01 AE 02 EB 09 EB C1 E5 1
A FE 0D 28 0B 4E CB B9 23 13 91 28 F3 E1
18 06 4E CB B9 E1 20 02 10 D6 3E 4B 90
26 00 6F C9
720 CODE 3E 14 CF 21 0F B9 22 54 62 06
04 3E 1E CF 3E 1F CF 10 F8 22 54 62 C9
730 CODE 21 3A 62 E5 21 53 62 E5 21 00
00 E5 11 CB 71 C3 03 3F 22 54 41 42 4C 4
5 32 22 C9

```

440	Put version number into the machine code at line 730.	576	Reset colour.				Basic syntax table in ROM into AS.
460	Get key.	600	Procedure to print table.	710			Checks validity of command and returns respective token in HL.
470	Call code to save new commands.	610-640	Print table.				Clears bottom third of screen. Saves modified command set. Reload using MLOAD
505	Reset window to normal.	660	Procedure to print header.	720			"TABLE" of 1,2 etc for version number.
550	Define procedure to change relevant command.	670	Print header, the Lynx logo is obtained using shift (stuvwxYz).	730			
560	Poke token into relevant place.	680	Go up six pixels for underline.				
575	Replace altered command in	685	Do underline using shift ?				
		700	Copies 75 commands from				

## PCN Program Cards

### Bees Away Card 4 of 7

8333BA47

```

1140PROC TOPCOL
1150PROC SLETT
1160VDU24,10;10;1270;1024;
1170ENDPROC
1180DEFPROC END
1190TI%=INT(TIME/100)
1200ENVELOPE 1,131,-2,-2,-2,100,100,100
,127,-1,-1,-127,0,127
1210SOUND&0201,1,255,69
1220SOUND&0202,1,239,69
1230SOUND&0203,1,227,69
1240FORT%=0T0000;NEXT
1250ENDPROC
1260DEFPROC HISCORE
1270LOCAL TX
1280CLS
1290VDU20,4
1300FORT%=1T05
1310IF SC%>HS%(TX) PROC SC(TX):TX%=5
1320NEXT
1330CLS
1340PROC SCREEN
1350VDU4:COLOUR2
1360VDU26
1370FORT%=1T0 5
1380PRINTTAB(2,(TX)*2)+8);TX%;" *** ";HS%
(TX);" "SHT%(TX);" "HS%(TX);" ***"
1390NEXT
1400*FX15,0
1410PRINTTAB(1,30)"PRESS SPACE BAR TO S
TART"
1420A#=#GET#;IFA#<>"GOTO1420
1430ENDPROC
1440DEFPROC SC(X%)
1450LOCAL TX,A#
1460*FX15,0
1470A#=#FNGSC
1480FORT%=5TOX%STEP-1
1490HS%(TX)=HS%(TX-1)
1500HS%(TX)=HS%(TX-1)
1510NEXT
1520HS%(X%)=LEFT$(A#,9)
1530HS%(X%)=SC%
1540HT%(X%)=TI%
1550ENDPROC
1560DEFPROC BITE

```

BBC B/BBC Basic/Garroch/Continued

1140	Colour it in.		colours, write text at text cursor.	1410-1420	Print prompt and get reply.
1150	Print the titles and scoring.	1300-1320	Check if current score is in the top five and if so insert it with PROC SC.	1440	Procedure to reposition the high score table.
1180-1170	Define the graphics window and end the procedure.	1330-1340	Clear the screen and print the playing screen.	1450	Set up local variables.
1180-1250	Define a procedure to make the end of game sound.	1350-1360	Select colour and reset default window.	1470	Get name from player.
1260	Procedure to check the high scores.	1370-1390	Print the high score table.	1480-1510	Redistribute the high score table.
1270	Set up local variable TX%.	1400	Clear the buffers.	1520-1540	Put the current score into the table at the appropriate place.
1290	Set default text and graphic				

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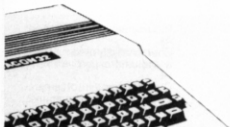
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# PCNProgramCards

## Bees Away

## Card 5 of 7

8333BA5/7

```

1570MOVEXPOSX(T%),YPOSX(T%)
1580GCOL2,1
1590PRINT:BL#:
1600YPOSX(T%)=80
1610SOUND2,2,0,10
1620IFFL#=#BT#SC%=SC%+10ELSESC%=SC%+10
1630MV%=MV%+2
1640IFRND(15)=1FLR#=#BT#:MV%=MV%+3:VDU19
,2,5,0,0,0
1650IFRND(7)=2FLR#=#FL#:VDU19,2,3,0,0,0
1660GCOL0,3
1670MOVE192,930:PRINT:CHR#232:CHR#232:4
HR#232:CHR#232
1680MOVE192,930:GCOL0,0:PRINT:SC%
1690MOVE192,962:GCOL0,3:PRINT:CHR#232:4
HR#232:CHR#232:CHR#232
1700MOVE192,962:GCOL0,0:PRINT:INT(TIME/
100)
1710ENDPROC
1720DEFFPROCSLETT
1730MOVE384,1013
1740GCOL0,0
1750PRINT:"PERSONAL"
1760GCOL0,2
1770MOVE388,1018
1780PRINT:"PERSONAL"
1790GCOL0,2
1800MOVE492,968
1810PRINT:"COMPUTER"
1820MOVE496,972
1830GCOL0,0
1840PRINT:"COMPUTER"
1850MOVE556,928
1860GCOL0,0
1870PRINT:"NEWS"
1880GCOL0,2
1890MOVE560,932
1900PRINT:"NEWS"
1910MOVE12,930
1920GCOL0,0
1930PRINT:"SCORE"
1940MOVE44,962:PRINT:"TIME"
1950MOVE852,930
1960PRINT:"HI-SCORE ";HS%(1)
1970MOVE852,962
1980PRINT:"TOP TIME ";HT%(1)
1990ENDPROC
    
```

1570	Move to the position of the flower.	1640-1650	Randomly select a flower.
1580-1590	Rub out the flower.	1660-1670	Rub out the score.
1600	Move the flower to the ground.	1680	Print the score.
1610	Make the 'bite' sound.	1690	Rub out the time.
1620	Check which heads are around and alter the score accordingly.	1700	Print the time.
1630	Increment the amount by which the flowers move.	1720-1900	Print the PCN logo.
		1910-1990	Print various score titles.

# PCNProgramCards

## Bees Away

## Card 6 of 7

8333BA6/7

```

2000DEFFPROCTOPCOL
2010MOVE10,1014
2020MOVE1270,1014
2030GCOL0,1
2040PLOT85,10,981
2050PLOT85,1270,981
2060GCOL0,3
2070PLOT85,10,904
2080PLOT85,1270,904
2090GCOL0,1
2100MOVE552,940
2110MOVE688,940
2120PLOT85,552,904
2130PLOT85,688,904
2140ENDPROC
2150DEFFPROCScores
2160LOCALTX
2170FORTX=0T05
2180HS%(TX)="PCN TEAM"
2190HS%(TX)=10*(8-TX)
2200HT%(TX)=10*(6-TX)
2210NEXT
2220ENDPROC
2230DEFFNGSC
2240LOCALTX,IN#,A#
2250VDU26
2260PROCWOW
2270VDU28,10,21,31,20
2280PRINTTAB(9,20).....
";VDU13
2290FORTX=0T021
2300A#=#GET#
2310IFA#=#CHR#127TX=TX-1
2320IFA#=#CHR#13TX=22:GOTO2350
2330PRINT:A#
2340IN#=#IN#+A#
2350NEXT
2360VDU7
2370=#IN#
2380DEFFPROCWOW
2390CLS
2400PROCW(240,700)
2410PROCDD(640,800)
2420PROCW(840,700)
2430PRINTTAB(12,12)"You got into the"
2440PRINTTAB(17,14)"TOP 5"
2450PRINTTAB(14,16)"Type in your"
2460PRINTTAB(18,18)"name"
2470PRINT
2480ENDPROC
    
```

2000	Procedure to put the colours on the playing screen.	2250	Restore default windows.
2010-2140	Colour in the screen.	2260	Draw the WOW logo.
2150-2220	Procedure to set up the hi-scores.	2270	Set up text window.
2230	Function that gets and returns the player's name.	2280	Prompt for name.
2240	Set up local variables.	2290-2350	Get the name.
		2360	Beep.
		2370	Return the name.
		2390-2480	Do it.

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## PCN Program Cards

### Bees Away

### Card 7 of 7

8333BA77

```

253ONEXT
254OFORT=OTD200STEP4
255OMOVEX+200,Y
256OPLDT6,X+200-100+T,Y+200
257ONEXT
258OENDPROC
259ODEFFPROCD(X,Y)
260OFORT=OTD2*PI STEP.2
261OMOVESIN(T)*50+X,COS(T)*50+Y
262OPLDT6,SIN(T)*100+X,COS(T)*100+Y
263ONEXT
264OENDPROC
265ODEFFPROCDINST
266OCLS
267OFOR T%=OTD461STEP51
268OMOVETX+128,TX
269OMOVETX+51+128,TX+51
270OPLDT85,1024-TX+128,TX
271OPLDT85,1024-TX-51+128,TX+51
272OPLDT85,1024-TX+128,1024-TX
273OPLDT85,1024-TX-51+128,1024-TX-51
274OPLDT85,TX+128,1024-TX
275OPLDT85,TX+51+128,1024-TX-51
276OPLDT85,TX+128,TX
277OPLDT85,TX+51+128,TX+51
278OGCOL 0,TX/51
279ONEXT
280OCDLDR2
    
```

```

2490DEFPROCW(X,Y)
250OFORT=OTD200STEP4
251OMOVEX,Y
252OPLDT6,X-100+T,Y+200
285OPRINTTAB(7,10);"Eat The Flowers As
They Grow"
286OPRINTTAB(7,12);"Don't Let Them Reac
h The Top"
287OPRINTTAB(14,23)"Z Moves Left "
288OPRINTTAB(14,24)"X Moves Right "
289OPRINTTAB(14,25)"* Moves Up "
290OPRINTTAB(14,26)"? Moves Down "
291OPRINTTAB(6,17);FL$;CHR$9;CHR$11;"
Scores 10 When Eaten By ";BE$
292OPRINTTAB(6,21);BT$;CHR$9;CHR$11;"
Scores 100 When Eaten By ";BE$
293*FX15,0
294OPRINTTAB(6,30);"PRESS THE SPACE BAR
TO BEGIN"
295OFOR T%=3TD0STEP-1
296OVDU19,0,TX,0,0,0
297OVDU19,1,TX+1,0,0,0
298OVDU19,2,TX+2,0,0,0
299OVDU19,3,TX+3,0,0,0
3000A$=INKEY$(10)
301ONEXT
302OIF A$="" THEN 2950
303OENDPROC
    
```

2490-2580 Procedure to draw W.  
2580-2640 Procedure to draw O.  
2650 Procedure to print instructions page.

2670-2790 Plots squares on the screen.  
2800-2940 Print instructions.  
2950-3020 Alternate colours and wait for key (space bar) to be pressed.

## PCN Program Cards

### French Test Card

### 1 of 4

8333FT14

```

1 HOME : UTAB 10: HTAB 5: FLASH : PRINT "IRREGULAR FRENCH VERBS": NORMAL
: UTAB 11: HTAB 5: INVERSE : PRINT "***** *****": NORMAL
2 CLEAR : S = 100 : O = 9C : @ = 0
5 NU = 6
10 DIM INF$(10) : DIM ENK(6,8)
15 DIM RP(11) : DIM RK(11)
20 DIM PF$(9) : DIM PE$(9)
25 GOSUB 5000
50 GOSUB 7000
100 REH **** INFO ****
110 HOME
120 UTAB 5: PRINT " THIS PROGRAM WILL TEST YOU ON SIX"
130 UTAB 7: PRINT "IRREGULAR FRENCH VERBS"
140 UTAB 9: PRINT " THE VERBS ARE:"
145 REH *** VERBS ****
150 UTAB 13: INVERSE : PRINT "SAVOIR, DEVOIR, VOULOIR, POUVOIR,": NORMAL
: PRINT : INVERSE : PRINT "BOIRE, CROIRE": NORMAL
160 UTAB 17: PRINT " IF YOU WANT TO CHECK HOW ": UTAB 19: PRINT "THESE
E VERBS GO, PRESS C"
170 UTAB 23: PRINT "PRESS THE SPACE BAR FOR A TEST"
200 GET H$: IF H$ < > "C" AND H$ < > " " THEN 200
210 IF H$ = "C" THEN GOSUB 8000
1000
1007 HOME : SPEED = 255
1008 FF = FRE (0)
1010 Z = INT ( RAND (1) * 8 ) + 1
1020 U = INT ( RAND (1) * 6 ) + 1
1030 GOSUB 4000: IF T0 = 1 THEN 1000
1035 U$ = INF$(U):PF$ = PF$(Z):O$ = ENK(U,Z)
1038 GO = GO + 1
1039 X = 2
1040 PL = LEN (PF$)
1050 UTAB 3: INVERSE : PRINT "GO": NORMAL : PRINT " ": INVERSE : PRINT
60: NORMAL
1085 UTAB 8: HTAB PL + 2: PRINT "("U$F$)"
1090 UTAB 20: PRINT "TYPE THE CORRECT LETTERS,": PRINT : THEN PRES
S RETURN
1110 UTAB 10: PRINT PF$;" "
1120 INPUT TR$
1122 UTAB 20: CALL - 950
1125 UTAB 19: PRINT "YOUR ANSWER IS ": INVERSE
1130 IF TR$ = O$ THEN GOSUB 3900: GOSUB 3500
1135 IF TR$ < > O$ THEN GOSUB 3850: GOSUB 4200
1210 IF GO < 18 THEN GOTO 1007
1220 HOME : UTAB 10: PRINT "YOU SCORED "JSC;" OUT OF "J60
1225 PRINT : PRINT : PRINT
    
```

## Apple Applesoft Basic

Application: Educational  
Author: Bryan Skinner

1	Print title.
2-5	Clear and initialise variables.
10-20	Dimension arrays.
25	GOSUB and read persons at line 2010, verbs at line 2060 and nouns at 2080-2110.
50	GOSUB and read, POKE the data in line 7000, hence play music.
100-210	Print introduction.
1007	Set the variable speed and home the cursor.
1008	Get amount of free space.
1010	Select random person.
1020	Select random verb.
1030	GOSUB and check whether the verb has been used. If so then select another.
1035	Set up current verb, person and question.
1038	Increment GO.
1040	Get length of person for formatting.
1050	Print GO number.
1085	Print the French verb.
1090	Prompt.
1110	Print person.
1120	Get guess/answer.
1125	Print answer is—
1130	Right.
1135	Wrong.
1210	Continue for tengoes.

**The Lightning Oric Assembler** £9.90\*

There are other assemblers/editors available for the Oric, but none combine the same features and ease of use that we have obtained with this comprehensive utility program for the Oric 48K. The manual which accompanies the assembler gives a brief insight into machine code and the use of assemblers to enable anyone to write in assembly language after just a little study. Full specifications of the assembler cannot be fitted into the small space available here and so they may be obtained from your local dealer or direct from Mr. Micro.

\*Includes comprehensive instruction booklet.

**Crazy Golf**

Crazy Golf is a new program for the 48K Spectrum you are required to clear the course avoiding and circumventing the many strange obstacles. Finally putting your ball in the hole. The pair for each hole is displayed and a novel direction indicator combined with a force indicator enable you to send the golf ball in the direction you feel is the best one to clear the course. Crazy Golf really is crazy but most of all it is fun and will be found to be very enjoyable by all members of the family.

For use with Joystick and keyboard.

**Bengo**

An exciting program for the unexpanded Vic 20 which combines fast moving strategy and reflex skills. You must control Bengo, the super Eskimo against the dreadful snow Yeti. Half blind and half witted the Yeti can smell a good Eskimo lunch - the only protection Bengo has is to huff huge blocks of ice across the frozen waste at the Yeti.

Don't get distracted - or you'll be personally responsible for the demise of an Eskimo!

For use with Joystick.

**Dracula**

A superb adventure for the 48K Oric. This adventure is written in the good old style! No silly graphics, no gratuitous drawings, no distractions from pure mental images of horrendous monsters. This evocative text adventure of the old genre will have Oric owners shivering with anticipation and perhaps fear.

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Vic 20 BR or 16K expansion.

Hey Amigo you gotta run fast ah. The banditos they are a chasing you and they will get you if you do notta escape CR. You must run round the blocks, when you run round de corners off de city the banditos they are frightened to go there and you score de points. Fly you have nola gotta gun but a joystick can be fun.

For use with Joystick.



**Digger** £6.90

Vic 20 BR or 16K expansion

Your remote viewer shows the path of the professors devious digging apparatus. Using your computer linked remote control you must guide the digger beneath the earth to collect the rare microtonic gems. Unfortunately the microtonic is protected by the microtons who will plague your machine in order to attempt to stop its progress. You may be able to kill the microtons by skillfully manoeuvring your digger beneath a subterranean slate tile which will then fall killing any microton in its path. This is a novel implementation of a popular arcade game. For use with Joystick.



**Humphrey** £6.90

Vic 20 BBC Model B

This new game for the BBC Model B or for the Vic 20 (BR or 16K expansion) and also for C.B.M. 64 involves some tricky decision taking. Object of game is to make Humphrey land on all the cubes thus changing their colour. Unfortunately Humphrey is being chased by a bouncing ATORIC (DORP) you will soon learn that this deceptively simple game has tremendous addictive properties and quite a high degree of tactical skill.

For use with keyboard or joystick.



**Mysterious Island** £9.90

Vic 20 16K

Escape from prison in a hot air balloon - try to land it on Mysterious Island, then the fun really begins. • Booby Trapped Fields • Killer Bees • Hostile Halves • Hidden Clues • Force Fields • Capture the Treasure • Full Graphic Display • Several Games lead to Exciting Climax • Separate Practice Program • Includes Blank Data Tape to store the game to play later. All successful adventures can claim a unique personalised award by sending Mr. Micro their final position at the end of the game - By Joystick or keyboard.



**RANDAM** £13.90

Vic 20

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**Punchy** £6.90

Spectrum 48K

Punch has taken Judy for his evil purposes and locked her away. Judy has called upon the forces of goodness to escape, so with the help of our hero Bobby the policeman and you the purchaser of this fine program you must guide brave Bobby across the sludge to rescue poor Judy. Leap the gaps. Jump over the dogs. Leap the alligator pit. Dodge the tomatoes. Flock the crit. Collect the sausages and finally rescue Judy. By Nestphone joystick or keyboard.



**Dragon Tamer** £9.90

Dragon 32

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# PCNProgramCards

## French Test Card 2 of 4

8333FT24

1230 IF SC < = 3 THEN PRINT "THAT'S NOT VERY GOOD"	1230-1260	Rating.
1250 IF SC > = 3 AND SC < 6 THEN PRINT "THAT'S AVERAGE"		
1255 IF SC > = 6 AND SC < 9 THEN PRINT "THAT'S PRETTY GOOD"		
1260 IF SC > = 9 THEN PRINT "THAT'S VERY GOOD"		
1270 CALL - 912: UTAB 23: HTAB 25: PRINT "EYE": END	1270	End.
1998 END		
1999 REM PEOPLE		
2000 REM *** PEOPLE - FR, ENG		
2010 DATA "JE","TU","VOU","ELLE","SHE","IL","HE","NOUS","HE","VOUS" "YOU","ILS","THEY","ELLES","THEY"	2010	Persons' data.
2049 REM *** INFS		
2050 REM *** 6 IRREGS		
2060 DATA SAOIR,DEVOIR,VOULOIR,POUVOIR,BOIRE,CROIRE	2060	Infinitive irregular verb data.
2069 REM *** ENDS		
2080 DATA SAIS,SAIS,SAIT,SAIT,SAVONS,SAVEZ,SAVENT,SAVENT	2080-2110	Endings data.
2082 DATA DOIS,DOIS,DOIT,DOIT,DEVONS,DEVUZ,DOIVENT,DOIVENT		
2085 DATA VEUX,VEUX,VEUT,VEUT,VOULONS,VOULEZ,VEULENT,VEULENT		
2090 DATA PEUX,PEUX,PEUT,PEUT,POUVRONS,POUVEZ,PEUVENT,PEUVENT		
2100 DATA BOIS,BOIS,BOIT,BOIT,BUONS,BUVEZ,BOIVENT,BOIVENT		
2110 DATA CROIS,CROIS,CROIT,CROIT,CROYONS,CROYEZ,CROIENT,CROIENT		
2499 REM SHORT PAUSE	2500	Short pause.
2500 FOR H = 1 TO 1800: NEXT : RETURN	2600	Medium pause.
2599 REM MED PAUSE	2700	Long pause.
2600 FOR H = 1 TO 2000: NEXT : RETURN		
2699 REM LONGISH PAUSE		
2700 FOR H = 1 TO 5000: NEXT : RETURN		
3500 UTAB 19: CALL - 950		
3501 REM *** CORRECT		
3502 SPEED= 50: PRINT "RIGHT": SPEED= 255: CALL - 950: NORMAL	3502	Correct.
3505 SC = SC + 1	3505	Increment score.
3510 UTAB 21: PRINT "SCORE=" ;: FLASH : PRINT SC ;: NORMAL : PRINT " OUT 0 F " ;: GO	3510	Print score.
3515 GOSUB 4217	3515	GOSUB and print solution.
3520 GOSUB 3700	3520	Continue prompt.
3540 RETURN		
3700 UTAB 23: HTAB 5: INVERSE : PRINT "PRESS THE SPACE BAR TO CONTINUE"; NORMAL : GET H\$: IF H\$ < " " THEN 3700	3700	Continue prompt subroutine.
3710 RETURN		
3800 REM ***** RIGHT TUNE	3800-3830	Play correct tune.
3805 F = 736:LN = 737:T = 730		
3810 FOR I = 1 TO 3: FOR T1 = 150 TO 10 STEP - 5		
3820 POKE F,T1: POKE LN,10: CALL T		
3830 NEXT T1: NEXT I: RETURN		
3850 REM ***** WRONG TUNE	3850-3880	Play wrong tune.
3855 F = 736:LN = 737:T = 730		
3860 FOR I = 1 TO 2: FOR T1 = 150 TO 255 STEP 30		
3870 POKE F,T1: POKE LN,100: CALL T		
3880 NEXT T1: NEXT I: RETURN		
4000 REM *** CHECK FOR REPEATS	4000	Check for repeats, routine.

# PCNProgramCards

## French Test Card 3 of 4

8333FT 34

4001 FO = 0	4001	Set flag to zero.
4005 IF GO > 0 THEN FOR I = 1 TO 60:R(I) = 0: NEXT I	4005	If all verbs have been used then reset them.
4007 IF GO > 0 THEN FOR I = 1 TO 8:R(I) = 0: NEXT I	4007	If all persons have been used then reset them.
4010 FOR I = 1 TO 60	4010-4030	Check if verb has been used, if so then set FO and return.
4020 IF R(I) = 2 OR R(I) = U THEN FO = 1: RETURN	4040-4100	If no repeat then assign verb and part then return.
4030 NEXT I	4200-4205	Print answer.
4040 RPK(GO) = 2:RUK(GO) = U	4212	Print score.
4100 RETURN	4213	Print answer.
4200 SPEED= 50: PRINT "ANSWER SHOULD BE.....";: FLASH : PRINT 0\$: NORMAL	4214	Continue prompt.
4210 UTAB 21: PRINT "THE ANSWER SHOULD BE.....";: FLASH : PRINT 0\$: NORMAL	4217-4220	Print headings for all answers.
4212 GOSUB 4217		
4213 UTAB 21: CALL - 060: PRINT "SCORE=" ;: FLASH : PRINT SC ;: NORMAL : PRINT " OUT OF " ;: GO		
4214 GOSUB 3700		
4215 RETURN		
4217 NORMAL		
4218 SPEED= 200:H1 = 25:H2 = 34		
4219 H3 = 16		
4220 UTAB 1: HTAB H1 - 2: INVERSE : PRINT "PEOPLE";: NORMAL : HTAB H2 - 2 : INVERSE : PRINT "ENDINGS";: NORMAL	4230-4240	Print all answers.
4230 FOR I = 1 TO 9		
4233 UT = 2 + I		
4234 UTAB UT: HTAB H1: PRINT PFK(I); TAB H2:ENK(U,I)	4250	Get question length.
4236 IF I = 2 THEN UTAB UT: HTAB H2: FLASH : PRINT ENK(U,I): NORMAL	4260-4280	Print particular answer.
4240 NEXT I		
4250 LO = LEN (08)		
4255 SPEED= 220 - 20 * (LO / 3)		
4260 FOR T = H2 TO H3 STEP - 1		
4265 IF T < H1 THEN HTAB 2 * 2: HTAB H1: INVERSE : PRINT PFK(Z): NORMAL		
4270 UTAB 2 * 2: HTAB T: FLASH : PRINT 0\$: NORMAL : PRINT SPC( LO )		
4280 NEXT T		
4285 UTAB 2 * 2: HTAB H1: INVERSE : PRINT PFK(Z): NORMAL	4285	Stop flash.
4295 UTAB 2 * 2: HTAB H1: INVERSE : PRINT PFK(Z): NORMAL	4300-4320	Select format.
4298 D = ABS ((2 * 2) - 10):UT = 2 + 2		
4300 IF UT < 10 THEN UM = 1		
4310 IF UT > 10 THEN UM = - 1		
4320 IF UT = 10 THEN UM = 1		
4330 FOR T = 0 TO 0		
4340 UTAB UT + (UM * T): HTAB H3: FLASH : PRINT 0\$: NORMAL	4330-4370	Reiterate answer.
4350 UTAB (2 * 2 + (UM * T)) - UM: HTAB H3: NORMAL : PRINT SPC( LO )		
4370 NEXT T		
4375 UTAB 10: HTAB H1: PRINT "NOUS"		
4376 A = LEN (PF8) + 1		
4380 FOR Q = H3 TO A + 1 STEP - 1		
4390 UTAB 10: HTAB 0: FLASH : PRINT 0\$: NORMAL : PRINT SPC( LO ): HTAB H 1: PRINT "NOUS"		
4400 NEXT Q		
4410 UTAB 10: HTAB H1: PRINT "NOUS"		
4420 SPEED= 255		
4490 RETURN		

## To all purchasers of Sinclair Small Business Accounts for ZX Spectrum

It has come to our attention that there is an error in some copies of the above program. We are anxious to minimise the inconvenience to purchasers and are therefore taking prompt action to inform you and offer a replacement free of charge.

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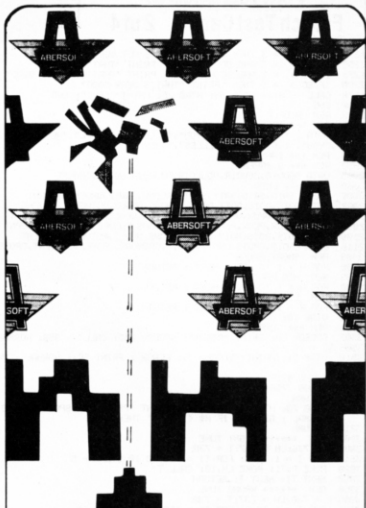
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Which book would your micro want you to buy? PCN's review page helps you choose.



**'How to Program the Apple' by Rohan Cook and Tim Hartnell, published by Interface Publications at £5.95 (paperback, 129 pages).**

The footnote to the title, 'If you've never programmed a computer before', is well chosen, because this is exactly the type of person this book is written for. Not people who have never used a computer, however. The authors assume that the reader owns an Apple with disk drive and colour monitor and knows how to use it with commercial software.

As the book is intended to be used in conjunction with the computer throughout, the first step is to explain the disk operating system (DOS) and how to initialise disks and SAVE programs — which haven't been written yet.

After the usual gentle introduction to Applesoft Basic program commands, the next section deals with sound production. In this case the reader is provided with the means to produce 'music' without any real explanation of how it works.

Further chapters describe mathematical symbols, strings, graphics, colour and arrays, and how to use them. Each section is enlivened with sample programs and games to make the lesson more memorable.

The final chapter lists a number of games, but I again wondered whether the reader had been supplied with enough information to understand their structure.

The glossary is incomplete and doesn't repeat many of the expressions used in the book, but the Appendix on the use and care of disks is very laudable. How many beginners carelessly throw their disks about thinking that they are indestructible?

The book is easy and pleasant to read, and trying out the programs should provide hours of amusement. I don't however, think it constitutes a complete introduction to programming, a claim which, I hasten to add, the authors do not make. A lot of practice and a little more tutoring will still be needed.

**LB**

**'Dragon 32 — Programmer's Reference Guide' by John Vander Reyden, published by Melbourne House at £6.95 (paperback, 144 pages)**

Aimed at the beginner in Basic and also the expert in machine code, this guide follows a straightforward path through the Dragon's capabilities.

For someone moving up from Basic to m/code the book is ideal, but expert programmers probably won't need it. The novice is advised to start with the stamplate to the guide 'Complete Dragon Basic Course' also from Melbourne House. Anyone with time and patience, though, could probably manage just as well with this guide and the machine's manual.

A Basic dictionary is included and mercifully it's far easier to follow than the Dragon manual. Most of the functions in Basic have the time (in seconds) that the machine takes to perform the task — useful for comparisons.

It's the type of book you can read through initially, then refer to individual points when the need arises — a good index and excellent contents pages make this easy.

Several short Basic programs are listed — for genuine demonstration purposes rather than space-filling — including a

program to convert input speech or music into digital format. A good-quality cassette recorder and tapes are needed to get the best results from this program.

The speech program is listed both in Basic and m/code, which is encouraging. A short six-function monitor (ie, a program for loading m/code directly) is in the book for those without one. This is designed only as a 'taster' to machine code, so don't expect too much from it.

Ten appendices cover the basic keywords up to the 6809 chip's instruction set.

The book is value for money. It contains plenty of tips on programming and ideas on how to advance. It would, however, have been easier to use if it was ring-bound.

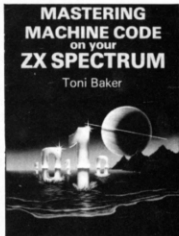
**JB**

**'Mastering Machine Code on your ZX Spectrum' by Toni Baker, published by Interface Publications at £9.95.**

**'Spectrum Machine Code Made Easy', volume 1, by James Walsh, and volume 2 by Paul Holmes, published by Interface Publications at £5.95 each.**

It's common to see competing titles published at about the same time, but even granted the fact that publishers are stampeding into the micro market at the moment, it's unusual for the same publisher to launch two competing books.

But Interface seems to have managed this puzzling feat. Toni Baker's book seems to be based loosely on the series of the same name published in ZX computing, although clearly it provides much more detail. It reads well and manages to make the fine balance



between plunging you into a subject too fast and keeping things too simple.

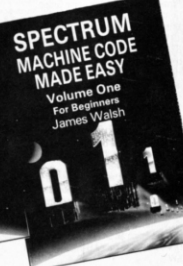
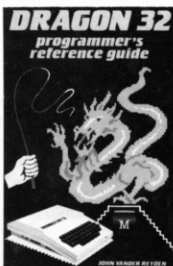
The two-volume *Spectrum Machine Code Made Easy* by Messrs Walsh and Holmes is — of course — longer, but perhaps not as much as might be thought. It does, however, show the odd sign of padding; there is repetition around the end of volume 1 and the beginning of volume 2.

Once you hit volume 2, the information gets more bitey and non-systematic. The tables and appendices are useful, but could have been made more so if they were better related to the text.

The advanced stages of Toni Baker's book, on the other hand, seem to progress more logically from the beginnings, and culminate in a fairly detailed draughts program, along with a few pointers to producing graphics.

Neither of the two 'courses' has an index, which is a pity, but both will nevertheless take you a fair way into machine code. It's difficult to choose between them but *Mastering Machine Code* probably has it by a nose.

**JK**



Clubnet keeps you in touch with enthusiasts throughout the country. It is divided into clubs and user groups and lists of both will be published every four weeks.

John Rack is only one member of the London University Vic 20 User Group with an unusual interest involving computers. A postgraduate student in the Psychology Department at London University, he is researching into dyslexia and hopes to use the Vic 20 in connection with people suffering from the disorder.

The user group itself was set up just over a year ago by Jim Chambers and Ken Michaelson, who also share a common interest. They are both ham radio enthusiasts and use their machines in association with transmitter equipment to communicate with other computer users all over the world. To do this, they have had to pass British Telecom exams and each has a call sign — in Ken's case G3R3DG.

'We try to have a point to each evening,' said Jim, 'although when we tried some serious stuff it was hard going. The only thing we really have in common is the Vic 20.'

Mr Chambers has produced an information sheet which summarises the group's

## Calling all hams



aims. These include exchanging information about technical matters, programs and games and providing circuits and help regarding interfacing for printers, amateur radio and switching of power.

The group also plans to give demonstrations of add-on units. Items covered so far are speech synthesis, user port relays and switch recording.

Meetings are on the third Tuesday of every month in a spacious room at the University of London. There is no sub-

scription, although a small collection is made for coffee and stationery.

Mr Chambers emphasises that although the group occasionally publishes a newsletter, no effort is made to be a postal group and dependence is placed on members supporting the meetings.

There are currently around 20 members and the group can take a few more. It used to meet in people's houses until it was lucky enough to find a friendly professor at the university.

If you live or work in central London and own a Vic 20, this is an invaluable club for exchange of ideas and a friendly and informal atmosphere. **Janice McKenzie**

**Name** The London University Vic20 User Group **Venue** Third Floor Common Room, University College (Department of Psychology), 26 Bedford Way, London WC1 **Meetings** Third Tuesday each month **Contact** Jim Chambers on 01-387 7050 ext 413.

## USER GROUPS

### Acorn

**Coventry Acorn** Atom User Group. Peter Frost, 18 Frankwell Drive, Coventry, 0203 613156.

**Kent Medway Acorn** User Group. Meets at St John Fisher School on last Monday of month at 7pm. Sessions at 9pm Thursday at the Fox and Hound, Chatham. Ciem Rutter, c/o St John's Fishermen's Club, Ordance Street, Chatham, Kent, 0634 42811 (day). 0634 373459 (evenings).

**Manchester Acorn** User Group. Meets at AMC, Crescent Road, Crasall, Manchester 8 on Tuesdays except school holidays. John Ashurst, 192 Vendure Close, Failsforth, Manchester. 061-681 4962.

### Apple

**Ashford** Apple User Group. Meets first Monday of every month. Contact M Lawrence, 15 Pethers Road, Ashford, Surrey.

**British Apple** Systems User Group, PO Box 174, Watford WD2 6NF.

**British Apple** Systems User Group. Meets first Tuesday evening and third Sunday afternoon every month at Old School, Branch Road, Park Street, St Albans. Subs: £12.50 + £2.50 joining. Contact D Bolton, 0727 72917.

**Birmingham & Region** Apple Group. Contact Mel Golder. 021-426 2275.

**Bristol** Apple Users and Dabblers. Meets at 10 Warring House, Redcliffe Hill, Bristol BS1 6TB, once a month. Ewa Dabkowski, c/o Datalink, 10 Warring House, Redcliffe Hill, Bristol BS1 6TB. 0272 213427.

**Buckinghamshire** Apple User Group. Steve Profit, The Granary, Hill Farm Road, Marlow Bottom, Buckinghamshire, 062 84 73074.

**Chesham** Apple Users Club. Proposed new club. Contact D Beckingham, 571 Galleyswood Road, Chesham, Oxon, tel: 0494 669448.

**Croydon** Apple User Group. Meets at Sidha House, 350 Lower Addiscombe Road, Croydon, on second Monday of month. Paul Vernon, 60 Flaxhurst Way, West Wickham, Kent, 01-777 5478.

**London** Apple Music Synthesis Group. Dr Davis Ellis, 22 Lennox Gardens, London SW1.

**South-East London** Apple User Group (Appletree). Contact John Grieve at 106 Maran Way, Erith, Kent or phone 01-311 7681.

**Milton Keynes** Microcomputer User Group. Meets every Tuesday, 7.30pm. Brian Pain, Sir Frank Markham School, Woughton Centre, Chalfon Way, Milton Keynes.

### Atari

**Birmingham** User Group. Meets at the Malaga Grill, Mataoor Public House, Bull Ring shopping centre, Birmingham, on second and fourth Thursday every month at 7.30pm. Mike Aston, 42 Short Street, Wednesbury, West Midlands.

**Carshalton** Atari User Club. Paul Deegan, 01-642 5232.

**Lea Valley** Atari User Group. Meets every month. Details from Matthew Tydemann, 125 Cadmore Lane, Cheshunt, Herts.

**South Cheshire** Atari User Group. Meets at the Earl of Crew, Nantwich Road, Crew, on first Thursday of each month at 7.30pm. Contact A Davies, 48 Blagay Lane, Nantwich, Cheshire, 0270 626969.

**Essex.** Contact John Sarrar, 138 Frederick Road, Rainham, Essex, tel (76) 22077. Meets at Rainham Town Football Club, 7.30pm, second and fourth Friday of each month.

**London** Silica Atari 400-800 User Club. Richard Hawes, 01-301 1111.

**Manchester** Atari Computer Enthusiasts. Meets at the Eilemmer, Worsley Road, Worsley, on the second and last Thursday of month. Contact Martin Davies, Bolton 700757.

**South Middlesex** Atari Club. Meets fortnightly, Tuesdays, at Staines Methodist Church Hall, Kingston Road, Staines. Contact Brian Milligan, 50 Linksford Avenue, Middlesex. Tel: Ashford (69) 45387.

**Norwich** Atari User Group. Ken Ward, Norwich 661149.

**Preston** Atari Computer Enthusiasts. Meets at KSC Club, Merrion House, Beach Grove, Ashton, Preston, on third Thursday of month at 7.30pm. Roger Taylor, 0253 73192.

**UK Atari** Computer Owners Club. Contact PO Box 3, Raleigh, Essex.

### Atom

**Liverpool** BBC and Atom User Group.

**Old Swan** Technical College. Room C33 on third Wednesday of month at 7.30pm and at Birkenhead Technical College on third Thursday of month at 7.30pm. Nick Kelly, 051-525 2934 (evenings).

### BBC

**Inverclyde** BBC Micro User Group. Meets on third Monday of each month at 9 St John's Road, Gourrock, Renfrewshire. Contact Robert Watt on Gourrock 39967.

**Laserbug** is an international user group for the BBC micro. Paul Barbour, 10 Dawley Ride, Colnbrook, Slough, Berks, 02812 30614.

**Sheffield.** Sheridan Williams or David Graham at PO Box 50, St Albans, Hertfordshire AL1 2AR.

**Bournemouth** BBC User Group. Meets at Lansdowne Computer Centre, 5 Holdenhurst Road, Bournemouth on first and third Wednesday of month at 7.30pm. Norman Carey, 0202 749612.

**Brent Barnett** User Group. Meets on last Sunday of month. Joseph Fox, 4 Harman Close, London NW2 2EX.

**Charlton & District** (South Manchester) BBC Micro User Group. Contact Philip Harrison, 34 Holwood Drive, Manchester M16 8WS.

**Chelmsford.** Contact Ian on Chelmsford 69174.

**Cardiff** BBC Microcomputer Club. Meets alternate Wednesdays at Applied Science Lecture Theatre, University College, Newport Road, Cardiff.

**Formal 48-80** Club (BBC Disk User Group). Send SAE to Peter Hughes, Five Marsh Street, Bristol BS1 4AA.

**Liverpool** BBC & Atom Groups. Meets on the first Wednesday of every month at Old Swan Technical College, Room C33, 7.30-9.30pm, and on the third Thursday at Birkenhead Tech. College, 7.30-9.30pm. Contact Nik Kelly, 56 Queens Drive, Walton, Liverpool L4 6SH.

**North London** BBC Micro Users Group. Meets at The Prince of Wales, 37 Fortune Green Road, on Tuesdays at 7pm. Dr Leo McLaughlin, Westfield College, The University of London, Kilderpore Avenue, London NW3 7ST. 01-435 0109.

**Northern North Sea** User Group. Potential members with helicopters welcome. Contact Ian Wilkins on board MSV Stadiw, Brent Field, East Shetland Basin, Northern North Sea (100 miles off Shetland Islands).

**Norwich & District** BBC Microcomputer User Group. Meets at Norwich City College on the first and third Tuesday of every month at 7pm. Subs: £3; students and OAPs £1.50. Contact Paul Beverley, Department of Electronics, Norwich City College, Ipswich Road, Norwich NR2 2LJ.

**Preston** area BBC Micro User Group. Meets at Plough Hotel, Lea, Preston, on last Tuesday of month at 7.30pm. Duncan Coulter, 8 Briar Grove, Ingol, Preston, Lancashire, 0772 725793.

**Tyne and Wear** BBC User Club. Contact Ian Waugh, 13 Briardene Drive, Wardsley, Tyne & Wear NE10 8AN.

**Wakefield** BBC Micro User Group. Meets at Holmfild House, Clarence Park, Wakefield, on first Wednesday of each month at 7.30pm. Contact R Bilton tel: Wakefield 382274.

**Wellington** BBC Owners User Group. Contact R Houghton, 49 Addison Road, Irthingborough.

**Witham** (NAMEBUG) BBC Micro User Group. Meets at comprehensive school, Witham on second Thursday each month at 7.30pm. Dave Watts 0245 358127 after 7pm.

**Brent Field.** East Shetland Basin, Northern North Sea (100 miles off Shetland Islands).

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### Basic

**Widely** Basic User Group meets at Campus West Library, Welsyn Garden City, Herts, on last Friday of each month at 7pm. Contact Debi Colthorpe, 36 Birds Close, Welsyn Garden City, Herts, 96 30082.

### Comal

**London** Comal User Group. Meets at Polytechnic of North London, Holloway, second Wednesday of month, term time. John Collins, 75 74111.

### CUA

**USA User Group.** Adrian Waters, 9 Moss Lane Romford, Essex.

### Commodore ICPUg

**Basildon.** Contact Walter Green, 151 The Highway, Basildon, Essex.

**Bloxham.** Contact John Temple, Kirabanda, Rose Bank, Bloxham, Oxon.

**Barnsley.** Bob Wool, 13 Ward Green, Barnsley, South Yorkshire, 0226 85084.

**Blackpool.** Meets at Arnold School, Blackpool, on third Thursday of month. David Jarrett, 197 Victoria Road, Thornton Clevelings, Blackpool FY5 3ST.

**Birmingham.** Contact J A McKain, PPI Ltd, 177 Lottels Road, Birmingham, tel: 021-544 0202.

**Bournemouth & Poole.** Contact Douglas Shave, 97 Canford Cliffs Road, Poole, Dorset BH13 7FP.

**Bury St Edmunds.** Contact Alan Morris, 30 Kelso Road, Bury St Edmunds, Suffolk.

**Burnley.** Contact John Ingham, 72 Ardwick Street, Burnley, Lancashire.

**Canterbury SE.** Meets at The Physics Lab, Canterbury University, on first Tuesday and Wednesday of month. R Moseley, Rosemont, Romney Hill, Maidstone, 0622 37463.

**Carrickfergus.** David Bolton, 19 Carrickfergus Road, Carrickfergus, Antrim BT38 7ND, 09603 63786.

**Chelmsford.** Contact A C Surridge, 97 Canterbury Road, Chelmsford, Essex.

**Cheltenham.** Meets at the Cheltenham Ladies College on last Thursday of month at 7.30pm. Alison Schofield, 78 Hesters Way Road, Cheltenham, Gloucester. 0242 580789.

**Clywd.** John Poole, 6 Ridgway Close, Cornhill's Quay, Clywd CW5 4LZ.

**Corby.** Peter Ashby, 215 Winchou Way, Corby, Northamptonshire, 05363 4442.

**Coventry.** Meets at Stoke Park School and County College at 7pm on fourth Wednesday of month except July, August, December. Will Light, 22 Ivybridge Road, Styvechale, Coventry, Warwickshire.

**Derby.** Meets at Derby Professional Colour every other Tuesday at 7pm. Robert Watts, 03322 72569.

**Derbyshire & District.** Meets every other Monday 7-9pm at Davidson Richards Ltd, 14 Duffield Road, Derby. Contact Raymond Davies, 105 Normanton Road, Derby D1 2GG.

**Devon.** Contact Matthew Stibbe, The Lawn, Lower Woodfield Road, Torquay, Devon.

**Durham.** North-East Pat and ICPUG. Meets at Lawson School, Burnley at 7pm second and third Mondays. Jim Cocalis, 20 Worcester Road, Newton Hall Estate, Durham, 0385 67045.

**Dyfed.** Simon Kniveton, 097 986 303.

**Gosport.** Meets at Bury House, Bury Road, Gosport. Hants at 7pm. Contact Tony Cox, 10 Staples Reach, Rowmer, Gosport, Hants.

**Hainault.** Meets at Grange Remedial Centre, Woodman Path, Hainault. Carol Taylor, 101 Courtlands Avenue, Dainbrook, Ilford, Essex.

**Glasgow.** Dr Jim MacBrayne, 27 Dalrymple Crescent, Newton Meams, Glasgow, 041-639 5696.

**Gloucester and Bristol Area.** Meets last Friday of each month. Contact Janet Rich, 20 Old Court, Spring Hill, Cam, Gloucester.

**Hampshire.** Meets at 70 Reading Road, Farnborough, on third Wednesday of month. Ron Green, 109 York Road, Farnborough, Hants, 0252 542921.

**Hants.** Contact Tony Cooke, 7 Russell Way, Petersfield, Hampshire GU31 4LD.

**Hertfordshire North.** Meets at Provident Mutual Assurance, Purwell Lane, Hitchin, on last Wednesday of month. B Granger, 73 Minehead Way, Stevenage, Herts SG1 MHS, 0438 727925.

**Kilmarnock.** Meets at Symington Primary School on first and third Thursday of month at 7pm. John Smith, 19 Brawlands Road, Symington, Kilmarnock KA1 5RW, 0563 830407.

**Liverpool.** Meets at The Merchant Taylor School for Boys, Crosby, on second Thursday of month at 7pm. Tony Bond, 27 Ince Road, Liverpool L23 4JF, 051-924 1505.

**Llanidysul.** Contact F Townsend, The Hill, Rhaydon, Llanidysul, 05455 5291.

**London.** Alan Birks, 135 Queen Alexandra Mansions, Judd Street, London WC1, 01-430 8025.

**London North.** Barry Miles, Department of Business Studies, North London Polytechnic, Holloway Road, London N7, 01-607 2789.

**Maidstone.** Meets on the first Wednesday of every month contact Ron Moseley, Lord Romney Hill, Weaving Maidstone, Kent, 0632 7643.

**Mapperyley.** Meets at Arnold & Carlton College, Digby Avenue, Mapperyley every Friday. Contact Mark Graves, 8 Digby Hall Drive, Gunthorpe Road, Gedling, Notts NG4 4JT.

**Mersley.** Meets fortnightly. Contact P Leather, 27 St Luke's Drive, Formby, Merseyside, tel: 36 74894.

**National.** Contact Membership Secretary, 30 Brancates Road, Newbury Park, Ilford, Essex IG23 7EP.

**Norfolk.** Proposed new club. Contact J Blair, 7 Beach Road, Cromer, Norfolk.

**Norfolk.** Peter Potts, Bramley Hill, Wretton, King's Lynn, Norfolk PE33 9QS, 0362 00692.

**Northampton.** Contact Peter Ashby, 215 Lincoln Way, Corby, Northants.

**Northern Ireland.** Meets last Wednesday of each month. Contact David Weddell, 9 Upper Cavehill Road, Belfast BT15 5EZ, 0232-711580.

**Northumberland.** Graham Saunders, 22 Front Street, Guide Post, Northumberland.

**Rhyl.** Contact Frank Jones, 77 Millbank Road, Rhyl, Clywd, 0745 54820.

**Slough.** Meets at Slough College on second Thursday of month at 7.30pm. Brian Jones, 53 Beechwood Avenue, Woodley, Reading RG5 3DP, 0734 661494.

**Somerset.** Contact Paul Montague, 12 Loxton Close, Taunton, Somerset.

**South-East.** Regional Group. Meets at Charles Darwin School, Jall Lane, Biggin Hill, Kent, on third and fourth Thursday of month at 7.30pm. Jack Cohen, 30 Brancaster Road, Newbury Park, Ilford, Essex, 01-597 1229.

**South Midlands.** Meets at 12 York Street, Stourport-on-Severn, on last Thursday of month. M J Merriman at above address.

**Stafordshire.** 57 Clough Hall Road, Kidsgrave, Stoke-on-Trent.

**Stourport-on-Severn.** Meets last Thursday of each month. Contact M Merriman, 12 York Street, Stourport.

**Teddington.** G Squibb, 108 Teddington Park Road, Teddington, Middlesex, 01-877 2346.

**Watford.** Meets on second Monday of month. Stephen Rabagatti, c/o Institute of Grocery Dist. Grace Lane, Letchmore Heath, Watford, Herts, 01-779 7141.

**Wilney.** Contact Ian Byth, 40 Wilmot Close, Wilney 5171.

**Wolverhampton.** Meets on first and third Thursday of each month. Contact J Bowman, 6 The Oval, Albrighton, Wolverhampton, W Midlands.

**Commodore 64**  
**National.** Commodore 64 Independent Users Club. Contact Cive Embury, 175, Santon Ave, Fallowfield, Manchester or Keith Bowden, 47 Park Ave, Barking, Essex.

**Commodore Pet**  
**Blackpool.** West Lancashire Pet Users Club. Meets at Arnold School, Blackpool on the third Thursday of month. D Jewett, 197 Victoria Road, East Thornton, Blackpool FY5 3ST.

**Southern Users of Pets Association.** Howard Pilgrim, 42 Compton Road, Brighton BN1 5AN.

**Pet User Group Crawley.** Richard Dyer, 33 Bury Road, Ifield, Crawley.

**Pet Users Education Group.** Dr Chris Smith, Department of Physiology, Queen Elizabeth College, Camden Hill Road, London W8 7AH.

**UK Pet Users Club.** 360 Euston Road, London NW1 3BL.

**Pet Users Group.** Meets at Polytechnic of North London, Eden Grove, Room 320. On

alternate Tuesdays, 6pm. Barry Miles 01-607 2789.

**Pet User Club.** Margaret Guilford, 818 Leigh Road, Slough Industrial Estate, 0753 74111.

**Independent Pet Users Group.** 57 Clough Hall Road, Kettle Grove, Stoke-on-Trent, Staffordshire.

**Commodore Vic**  
**National Association** of Vic-20 Owners. Contact S Tomananek, 20 Milner Road, Sherwood, Nottingham.

**Burnley.** John Ingham, 72 Ardwick Street, Burnley, Lancashire.

**Clywd.** Contact A Stanners, 192A Willow Park, Queensferry, Deside, Clywd, Wales, 816603.

**Users Group.** Meets on alternate Tuesdays at 6.30pm at Polytechnic of North London, Community Centre, Robin Bradbeer.

**London.** Contact Jim Chambers, Department of Psychology, University College London, Gower Street, London, WC1, 01-387 7504 x413. Meets at University College, 26 Bedford Way, London WC1, third Tuesday of each month at 8pm.

**Norfolk.** J Blair, 7 Beach Road, Cromer, Norfolk, 0263 512849.

**Compucolor**  
**Caversham.** Compucolor Users Group UK. Meets at Community Centre, Caversham Park Village twice a year. Peter Hiner, 11 Pennycroft, Harpenden, Hertfordshire, 05827 64872.

**CPM**  
**Children CPM User Group.** Contact Kenneth Hirst, Welwyn Garden City 28723.

**Irish CPM Users Group.** Meets monthly in Dublin area. Doug Notley, Gardner House, Ballsbridge, Dublin 4, Dublin 686411.

**London.** CPM User Group (UK). Subs 57, 50. Produces newsletter. Contact David Powell-Lybbe, 01-247 8691.

**UK CPM Users Group.** Lesley Spicer, 11 Sun Street, London EC2M 2DD, 01-247 0691.

**COSMAC**  
**COSMAC Users Group.** James Cunningham, 7 Harrowden Court, Harrowden Road, Luton, Bedfordshire, 0582 423934.

**Decus**  
**Decus UK & Ireland.** Contact Tracey Parke, DECUS, PO Box 53, Reading, Berkshire RG2 0TW.

**Digital Equipment**  
**Digital Equipment Users Society.** The Secretary, PO Box 53, Reading, Berkshire, 0734 387725.

**Dragon**  
**Slough.** Contact J Griffin, 1 Garrard Road, Slough, 0753 753526.

**Brixham Dragon Owners Club.** Meets at Computer Systems (Torbay), Pump Street, Brixham, every Saturday at 2.30pm. Ian Chipperfield, 22 Brookdale Court, Brixham, Devon, Brixham 92224.

**Greater Manchester.** Contact Melvin Franklin, 40 Cowlies, Westhoughton, Bolton, Lancs.

**Epson HX20**  
**London.** Contact Terence Norton, 25 Sawyers Lane, Drayton Bridge Road, Ealing, W13, 01-998 1494.

**London.** The Dragon's Den. Contact D Buckingham, 83 Neville Road, Limbury, Luton, Beds.

**Education**  
**Birmingham.** Education ZX801 User Group. Eric Deeson, Highgate School, Balsall Heath Road, Highgate, Birmingham B12 9DS.

**Birmingham.** MUSE. National body for

co-ordinating activity in schools, colleges. Lorraine Boyce, MUSE Information Office, Westhill College, Wuseley Park Road, Birmingham, 021-471 3723.

**Dublin.** Computer Education Society of Ireland. Dairmaid McCarthy, 7 St Kevin's Park, Kilmacud, Blackrock, Co. Dublin.

**Middlesex.** Educational Users Group. Offshoot of National TRS-80 Users Group. Dave Fletcher, Head Teacher, Beaconsfield First and Middle School, Beaconsfield Road, Southall, Middlesex.

**Worcestershire.** Mini and Microcomputer Users in Education. National organisation. R Trigger, 46 Chadote Way, Catshill, Bromsgrove, Worcestershire B61 0JT.

**Forth**  
**Forth Users Group.** David Husband, 2 Gorleston Road, Branksome, Poole, Dorset BH12 1NW, 0202 764724.

**Forth Interest Group UK.** Meets at Room 408, South Bank Polytechnic London SE1 on the first Thursday of the month. Contact K Goldie-Morrison, Bradden Old Rectory, Towcester, Northants.

**Forum**  
**Forum 80 Users Group.** Frederick Brown, 421 Endike Lane, Hull HU6 8AG.

**FX-500P**  
**FX-500-P Users Association.** Max Francis, 38 Grymsdyke, Great Missenden, Buckinghamshire HP16 0LP.

**Genealogists**  
**Society of Genealogists Computer Interest Group.** Anthony Camp, 01-373 7054.

**Genie**  
**Colour Gene Group.** Details of meetings/membership from Pat Doohan, secretary, Nottingham (0602) 278791.

**UK INTL MDS**  
**UK INTL MDS Users Group.** Lewis Hard, c/o S F A C E, The Old Coach House, Cowley, Upton-on-Severn, Worcester WR8 0NS.

**Ithaca Audio S100**  
**Ithaca Audio S100 Users Group.** Dave Weaver, 41 Dore Avenue, North Hykeham, Lincoln LN6 8LN.

**Jupiter Ace**  
**Jupiter Ace Users Group.** John Joyce, Remsolt, 18 George Street, Brighton BN2 1RH.

**Lynx**  
**National Independent User-Group.** Subs 53. Contact Robert Poat, 53 Kingswood Avenue, Sanderstead, South Croydon CR2 9DD.

**Mattel**  
**Mattel Intellivision TV Game Group.** Warrington 62215 at 4pm.

**Medical**  
**Durham.** Primary Health Care Group. Dr Alastair Malcolm, British Computer Society, Chevelay Park Medical Centre, Belmont, Durham, 0385 64282.

**London.** Medical Micro Users Group. Medicom, 1-2 Hanover Street, London W1.

**Middlesex.** TRS-80 Medical and Laboratory Users. Dr Robinson, The Residence, Northwick Park Hospital, Harrow, Middlesex.

**Micronet**  
**Micronet Independent User-Group.** Contact George Foot, Prestel Mailbox No. 892852867.

**Nascom**  
**Berkshire.** Nascom Thames Valley User Group. Meets at Frogmore Hotel, Windsor, on Thursday fortnightly, 8pm. Mike Rothery, 37 Eaton Wick Lane, Eton Wick, Windsor, Berkshire, Windsor SE106.

**Birmingham Nascom User Group.** Meets

at Davenport Social Club, Granville Street, Birmingham on the last Thursday of month, 8pm. Martin Sidebotham, 021-744 3093.

**International Nascom Microcomputer Club.** 80 Oakfield Corner, Sycamore Road, Amersham, Buckinghamshire HP6 5EQ.

**Meresseyde Nascom User Group.** Meets at Mona Hotel, St James Street, Liverpool, on the first Wednesday of month, 7.30pm. Mr T Searle, 051-526 5256.

**Newbrain**

**Wakefield Independent Newbrain User Group.** Anthony Hodge, 15 St John's Court, Wakefield WF1 2RY.

**Weylyn.** Contact Angela Watkiss, 4 Ninnings Lane, Rabley Heath, Weylyn, Herts AL6 9TD.

**Ohio**

**Ohio Scientific User Group.** Tom Graves, 19a West End, Street, Somerset, 0458 45559.

**Oric**

**Avon.** Contact Bob Green, 1 Marlborough Drive, Worle, Avon, tel: 0934 21315.

**Oric Owners Group.** Paul Kaufman, 3 Club Meats, Ely, Cambridgeshire.

**Kent.** Contact Roger Pyatt, 23 Arundel Drive, Orpington, Kent with SAE or call 66 20281.

**Strathclyde Oric 1 User Group.** Contact Colin Falles on 041-776 3654, or SAE to him at 24 Murside Ave, Kirkintilloch, Glasgow G66 3PR.

**Cardiff.** 12 Tregarth Court, Craigiau, Cardiff.

**Osborne**

**British Osborn Owners Group.** J Angles, Flat 19, Rowan House, Milton Road, Handsworth, Birmingham B20 2JR.

**OSI**

**OSI UK User Group.** Richard Elen, 12 Bernerley Road, London SW11 6DS.

**Pascal**

**Pascal User Group.** Nick Hughes, PO Box 52, Pinner, Middlesex HA5 3FE.

**PDP**

**Buckinghamshire.** PDP8 User Group. Nigel Dunn, 21 Campion Road, Widmer End, High Wycombe, Buckinghamshire, 0494 714483.

**Hertfordshire.** PDP11 User Group. Pete Harris, 119 Carpenter Way, Potters Bar, Hertfordshire EN6 50B, 0707 52091.

**Pilot**

**UK Pilot User Group.** Alec Wood, Wirral Grammar School for Boys, Cross Lane, Bebington, Wirral, Merseyside L63 3AQ.

**Prestel**

**Administrational Prestel Committee.** ACC National Club Spot 800 (hobbyists on Prestel). Rupert Steele, St John's College, Oxford OX1 3JP.

**Research Machines**

**Leamington Spa.** West Midland RML User Group. Spencer Instone, c/o 59 Avenue Road, Leamington Spa.

**Newcastle.** NERML 380Z User Group. Meets monthly at Micro-Electronics Education Centre of the Polytechnic, Coach Lane Campus. Mr Hatfield or Mr Reed, Computer Unit, Northumberland Building, Newcastle Polytechnic, 0632 326002.

**Research Machines National User Group.** Contact Jim Cooley, RMNUG, c/o Research Machines Ltd., PO Box 75, Oxford.

**West Midlands RML User Group.** Contact 0926 38751.

**Sharp M280**

**Aberdeen.** International Sharp Users Group. Graham Knight, c/o Knights Computers, 108 Rossmount Place, Aberdeen, 0224 630526.

**Essex.** Sharp M280K User Group. Joe

Street, 66 Elmhurst Drive, Hornchurch, Essex RM11 1PE.

**Leeds.** Sharp PC1211 Users Club. Jonathan Daykene, 281 Lidgett Lane, Leeds LS17 3AQ.

**Somerset.** Sharp M280 Users Club. Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset BA21 4AE.

**Sinclair**

**Aylesbury.** Sinclair ZX Computer Club. Ken Knight, 0296 5181.

**Brighton.** ZX Users Group. J Ireland-Hill, 145 Godwin Road, Hove, Brighton.

**Colchester.** Sinclair User Group. Meets fortnightly. Richard Lawn, 102 Preetygate Road, Colchester, Essex.

**Cardiff.** ZX Club Meets on last Sunday of month, 2pm. Mike Hayes, 54 Oakley Place, Grangeatown, Cardiff, 0222 371732.

**Doncaster & District Sinclair User Group** meets at St Andrews Hall, Morley Road, Wheatley, Doncaster, every Wednesday fortnightly the first in each month. Contact John Woods, Doncaster 29357.

**Essex.** Contact M Burnett, 24 Inverness Drive, Hainault, Ilford, Essex.

**Folkestone.** ZX Spectrum User Group for under 16s. Contact J. Parish, Brookhouse, Etchinghill, Folkestone, Kent. Glasgow, ZX80/81 User Group. Ian Watt, 10 Greenwood Road, Clarkson, Glasgow, 041-638 1241.

**Liverpool.** ZX Computer Club. Meets at ZX Computer Centre, 17 Sweeting Street, Liverpool, on Wednesday, 6.30pm. Keith Archer, 051-260 4950.

**London.** National ZX User Club. Tim Harnell, Interface, 44-48 Earls Court, London W8.

**London.** Sinclair User Group. Meets at Polytechnic of North London, Room 2-5 Tower Block, Monday, 6.30pm. Irving Brand, Polytechnic of North London, Holloway Road, London.

**Manchester.** Sinclair Users Club. Meets at Longsight Library, 519 Stockport Road, Manchester, every Wednesday at 7.00pm. Call 061-225 6997 or 061-445 6316.

**Nottingham.** ZX Spectrum Club. D Beattie, 63 Kingsley Crescent, Sawley, Long Eaton, Nottingham NG10 3DA.

**Scunthorpe.** Grange Farm ZX Computer Club, Scunthorpe, South Humberside. Meets first and third Tuesday of month. Contact Sheila & Fred Wilkinson, 0724 842970.

**Staffordshire.** ZX80 National Software Association. 15 Woodlands Road, Wombourne, Staffordshire WV5 0JZ.

**Suffolk.** ZX Amateur Radio User Group. Paul Newman, 3 Red House Lane, Bradford, Suffolk. SAE essential. No telephone inquiries.

**Surrey.** Guildford ZX80/81 Users Group. Meets Fridays. A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE. 0483 62035.

**Surrey.** ZX80/81 User Club. David Bigden, PO Box 159, Kingston-upon-Thames, Surrey KT2 5UD.

**Wessex.** Hassocks ZX Micro User Club. Paul King, 25 Fir Tree Way, Hassocks, West Sussex.

**Sirius**

**Sirius User Group.** Ray D'Arcy, Sirius User Club, The Microsystems Centre, Enterprise House, 7-71 Gordon Street, Luton, 0582 412215.

**68XX**

**68 User Group.** Meets every fourth Tuesday throughout the year. Contact 41 Pebworth Road, Harrow, Middlesex.

**6809 User Group**

**6809 User Group.** Produce bi-monthly newsletter. Contact Mr Gibbons, Clarence Lodge, Hurdon Road, Launceston, Cornwall PL15 9DB.

**Software**

**London.** Software Group. Meets at

Polytechnic of North London, Room 2-3 Tower block Thursday, 6pm. Mike Duck at Polytechnic of North London, Holloway, London N7.

**Oxford.** Program of the Month Club. Mr Durrant, 55 St Thomas Street, Oxford OX1 1JG, 0855 250333.

**Sorcerer**

**Liverpool European Sorcerer Club.** Monthly meetings. Colin Marie, 32 Watchday Avenue, Formby, near Liverpool L37 3JU, 07048 72137.

**Surrey.** Exidy Sorcerer User Group. Andy Marshall, 44 Arturs Bridge Road, Woking, Surrey GU21 4NT.

**Spreadsheet**

**International Electronic Spreadsheet Users Group.** UK Alpha House, 7th Floor, Rowlandsway, Manchester M22 5RG.

**Tandy**

**Tandy Model 100 User Group.** SAE to Remsoft, 18 George Street, Brighton, tel: 0273 602354.

**Tangerine**

**Avon.** Tangerine Users Group. Bob Green, 1 Marlborough Drive, Worle, Avon, 0934 21315.

**Bristol.** Tangerine Homebrew. A Coales, 35 Mogg Street, St Werburghs, Bristol BS2 9UB.

**Texas Instruments**

**Brighton.** Contact Clive & Audrey Scally, 40 Barnhill, Patcham, Brighton, Sussex.

**Ireland.** Proposed new club. Contact Mrs Ann Flynn, 53 Georgian Close, North Road, Drogheda, Co. Louth, Eire.

**Leeds.** T199/4A User Group. Meets at 30 Gipton Wood Road, Leeds 8, Mondays 7pm. I Youlden, 0532 401408.

**Manchester.** TI User Group. T Grimshaw, 21 Allingham Street, Longsight, Manchester.

**Manchester.** T19900 User Group. Chris Cadogan, Department of Computer Science, University of Manchester M13 9PL.

**Nationwide TI Users Group.** Contact T199/4A Exchange, Independent TI Users, 40 Barnhill, Patcham, Brighton BN1 8UF.

**Triton**

**Triton User Group.** Nigel Stride, Transam Ltd, 12 Chapel Street, London NW1, 01-402 8137.

**TRS-80**

**Birmingham.** National TRS-80 User Group. Meets at Adam & Eve Pub, 1st Floor, Bradford Street, Birmingham on last Friday of month. Michael Gibbons, 1 New Street, Castle Bromwich, Birmingham B38 9AP, 021-747 2260.

**Chelmsford.** TRS-80 User Group. Michael Dean, 22 Roughtons, Gallewood, Chelmsford, Essex.

**Durham.** North East TRS-80 User Group. Meets at Information Technology Centre, Gateshead on the third Wednesday of month, 7pm. J Dunn, 8 Etrich Terrace, North Gateshead, County Durham.

**Edinburgh.** Scottish TRS-80 and Genie User Group. Meets at Mansion House Hotel, Milton Road, second Thursdays of month. Dick Mackie, 72 Morningside Drive, Edinburgh EH8 1DX, 031-447 8651.

**Herts.** Contact Reg Smith, 24 Sempill Road, Hemel Hempstead, Herts, 0442

**60085**

**Hull & District TRS-80 Beeb Users Group.** Meets second Tuesday of month and Thursday 16 days later at Lawrence Dpt, Hull University, Contact J Paynce, 2a Hall Road, Hull HU6 8SA.

**Isle of Wight.** TRS-80 User Club. Meets at London Hotel, Ryde on last Friday of month, 7.30pm. Sean Coulson, 0903 614589.

**Kent.** TRS-80 User Group. Alan Reid, 23 Woodeys Road, Rainham, Kent, 0634 367012.

**Greater Manchester.** Northwest TRS-80 User Group. Meets at Barton Aero Club, Barton Aerodrome, Irlam, near Manchester on last Wednesday of month, 8pm. Melvin Franklin, 40 Cowles, Westthorpe, Bolton, Lancs.

**Lancs.** TRS-80 Colour Computer Group. Subs: C3. Contact Ian Wild, 53 Darnton Road, Ashton-U-Lyne, Lancs OL6 6RL.

**Liverpool.** Merseyside TRS-80 Video Genie User Group. Meets second Thursday of month, 7.15pm. Peter Toothill, 101 Swanside Road, Liverpool L14 7NL, 051-220 9733.

**London.** SW. TRS-80 User Group. Ron Everett on 01-394 2123.

**Meresseyde.** TRS-80 User Group. N Rushton, 123 Roughwood Drive, Northwood, Kirby, Merseyside.

**Milton Keynes.** National TRS-80 and Genie User Group. Brian Pan, 24 Oxford Street, Stony Stratford, Milton Keynes.

**Nottingham.** TRS-80 Genie User Group. Meets at Willford Moderns Rugby Club House on first and third Wednesday every month at 7.30pm. Contact Geoffrey Hillier, 5a Gregory Street, Lenton, Nottingham NG7 2LR, Nottingham 783908.

**Nottingham.** East Midlands TRS-80 User Group. Mike Costello, 15 Langbank Avenue, Rise Park, Nottingham NG5 5BU, 0602 751753.

**London.** TRS-80 Genie Group. Meets at Central Common Room, The Residency, Northwick Park Hospital on first Sunday of month. Dr Nick Robinson, Central Room, The Residency, Northwick Park Hospital.

**Northants.** TRS-80 User Group. Meets at Welwyn Park Community Centre on alternate Thursdays at 7pm. Neil Griffiths, 0858 65718.

**Colour Genie**

**International Colour Genie Users Group.** Write with SAE to The Secretary, NCGUG, 46 Highbury Avenue, Bulwell, Nottingham, 0602 278791.

**National Colour Genie User Group.** Marc Leduc, 46 Highbury Avenue, Nottinghamshire NG6 9DB.

**UCSD**

**Hants.** UCSD System Users Society. John Ash, Dicol Data Systems Ltd, Bond Close, Kingsland Estate, Basingstoke, Hants RG2 0QB.

**Oxford.** UCSD Pascal UK Users Group. Malcolm Harper, Oxford University Computing Laboratory Programming Research Group, 45 Banbury Road, Oxford OX2 6PE.

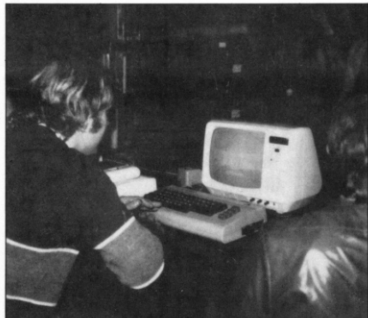
**5502**

**Bedfordshire.** 5502 User Group. Walter Wallenborn, 21 Argyle Avenue, Luton, Bedfordshire LU3 1EG, 0582 26927.

**Hants.** 5502 User Group (Southern Region). Steve Cole, 70 Sydney Road, Gosport, Hants.

**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 Wendie Pearson, Listings Editor, at Personal Computer News, 62 Oxford Street, London W1A 2HG, or give her a call on 01-636 6890.**

# Computer literacy



Club member Danny Day plays 'Falcon Patrol' on a Commodore 64.

Project M, for the mentally handicapped, is the latest venture of Croydon Computer Club, which packs out Croydon's reference library in Katharine Street on the first and fourth Tuesday of each month.

Members are taking micros down to Heaver's Farm, South Norwood, for the benefit of the severely mentally handicapped, who are looked after there by Croydon social services. The club has made them a robust keyboard with six keys the size of 10p bits. 'The aim is to help them recognise signs like bus stops and numbers,' said member Ishaq Khabaza, a former Professor of Computing at Queen Mary College in London's east end.

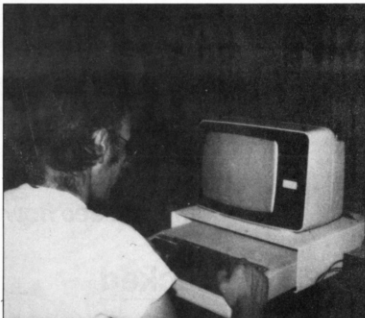
Mr Khabaza is BBC Group Chairman of the club, which has other special interest

groups including one specialising in Sinclair products and one concentrating on robotics. 'We aim for computer literacy—the aim of the club is for people of all types to get the best out of their computers,' he said.

The first Tuesday meeting takes the form of a talk, whereas the fourth Tuesday concentrates on the special interest groups.

Chairman Vernon Gifford says the club is three and half years old—it originated in a pub when six members of the British Computer Society were having a quiet drink.

That day resulted in 200 members aged between 9 and 61. The younger ones attend Computertown each Saturday between



Tony Nana plays 'Missile Base' on the BBC.

10am and 1pm and the most promising children form project groups, doing word processing and games.

A newsletter comes out quarterly and the club likes to make its presence felt at shows—two dozen people attended the club's stand at the PCW show.

The evening PCN attended attracted nearly 80 people as well as a variety of micros including the BBC and Commodore 64. The atmosphere proved very lively and the members helpful and interesting.

**Wendie Pearson**

**Name** Croydon Microcomputer Club **Venue** Reference Library, Katharine Street, Croydon **Meetings** First and fourth Tuesday of each month **Contact** Vernon Gifford on 01-653 3207.

## CLUBS

**AVON**  
Bristol Berkeley Nuclear Laboratories Club. Contact Neil Walker, 53 Wolford Ride, Alveston, Bristol, 0454 41262.

**Bristol** Micro Computer Club. Meets at the Pavilion, Southend Road, Filton, Bristol, every other Tuesday, Darryl Collins, 60 Mackie Rd, Filton, Bristol BS12 7NA, 0272 792962.

**Bristol** Format 40 Disc Club, for BBC disk users. Contact Peter Hughes, Format 40/80 Disc Club, c/o The Lending Library, Five Marshall Street, Bristol BS1 4AA.

**Multi-User Club** Valerie Boyde-Shaw, Nailsea ES1537.

**Worce** Computer Club. Meets at Woodsprings Inn Functions Rooms on alternate Mondays at 7-10.30pm. H Bennett, 0934 514902 or F Feeney, 0934 833122.

**BEDFORDSHIRE**  
**Bedford** Amateur Computer Club. Meets at Star Rowing Club, Bedford, on the first and third Tuesday of month 8pm. Rowan Bird, 74 High Street, Great Barford, MK44 3LB, 0234 870763.

**Chilren** Computer Club. Meets at Five Bells, Eaton Bray, Near Dunstable, Leighton Buzzard on second and fourth Monday of each month. Contact Steve Betts, 42 Wallace Road, Eaton Bray, OU6 2DF, 0625 205922.

**Luton College** Computer Club. John Rodger, 0582 3411.

**Luton** Computer Club. J P Fletcher, 1 Trowbridge Gardens, Luton, LU2 7JY, 0582 450687.

**BERKSHIRE**  
**Easthamstead** Computer Club. Meets at Easthamstead Park School, Bracknell, on the first Wednesday in month at 8pm. Brian Poulton, 0344 84423.

**Crown Wood** Computer Club. Meets at Crown Wood Community Centre, Bracknell, each Thursday at 8pm. Ray Ayrton 0344 59264.

**BIRMINGHAM**  
**Birmingham** Amateur Computer Club. Meets at Free Church Hall, Land Lane, Marston Green, Birmingham on first and third Thursday of each month at 7.30pm. Contact Les Moore, Secretary, Wolverhampton 723540.

**BUCKINGHAMSHIRE**  
**Aylesbury** Computer Club. Meets at Quarendon Youth Club every Friday at 7.30pm and at Mandeville County Secondary School the first Thursday of each month at 7pm. Ken Knight, 22 Mount Street, Aylesbury, 0296 5181.

**Chilren** Microcomputer Club. Meets at the Garden Centre, School Lane, Chalfont St Giles, on the first Wednesday of each month. Mrs W Tibbitts, Elilwood, Deanway, Chalfont St Giles, 024 07 4906.

**Iwer** Computer Club. P A Seal, 1 Ormonde Flats, Church Road, Iwer Heath, 0753 652792.

**Iwer** Computer Society meets at Huntsmoor room, Iwer Village Hall on the second and fourth Thursday every month at 7.30. John

Haigh, 141 Leas Drive, Iwer, SL0 9PR.

**CAMBRIDGESHIRE**  
**Cambridge** Microcomputer Club, meets on the third Wednesday of month. Derek Tripp, 3 Spurgeons Avenue, Waterbeach, 0223 315662.

**Peterborough** Personal Computer Club meets at Crossfield Electronics Social Club, fortnightly on Mondays. Andrew Pike, 0733 44342 after 5pm.

**CHESTER**  
**Altrincham** Computer Club. Meets at N. Cestrian Grammar School, Durham Road, Altrincham, fortnightly. Martin Hicking, 39 Barrington Road, Altrincham, WA14 1H2, 061 941 4547.

**Brusell** Computer Club. Meets at St Werburgh Community Centre on alternate Wednesdays at 7 to 10pm. Mr R Simpson, 4 The Coats, Stockwood.

**Chester** Computer Club. Contact W Collins, 37 Garden Lane, Chester, Cheshire  
**Crews** Computer Users Club meets at Buffaloes Club, Earl Street, Crews, on the third Thursday of each month at 8pm. Bram Knight, 0270 623375.

**Holmes Chapel** Micro Club meets at Leisure Centre, Holmes Chapel at 7.30 to 9.30pm on the first and third Tuesday of month. Margaret Baker, 1 Helton Close, Crews, 0477 34238.

**Kinder Peck** Computer Club meets at Bew Mills School every Monday. John Eary, New Mills 43870.

**Kettleshume** National Computer Buyer's Club. Send SAE to Barry Edwards, Lakeside House, Padstock Lane, Kettleshume, nr

Stockport, Cheshire.

**New Mills & District** PCC meets at New Mills School, fortnightly on Fridays at 7 to 9.30pm. Mr G M Fianagan, 11 Sundown Close, New Mills, Stockport, SK12 3DH, 0663 44051.

**Northwest** Computer Club meets fortnightly. John Lightfoot, 13 Aston Drive, Frodsham, Warrington, WA6 7PU, 0728 31519.

**Northwest** Computer Club, weekly meetings. Tom Wyatt, 29 Summer Lane, Halton, Runcorn Cheshire WA7 5PG, Runcorn 77545.

**Mid-Cheshire** Computer Club meets at Winsford Library on the second Friday every month at 7.30pm. Simon Sadler, Winsford 53339.

**Stockport** Software Exchange Club. Send SAE to P Redford, 53 Cavendish Road, Haze Grove, Stockport, Cheshire.

**CLEVELAND**  
**Cleveland** Micro Club meets on the second and third Tuesday of each month, under 18s on second of month, over 21s on third Tuesday of month. J Telford, 13 Weston Crescent, Norton.

**Stockton** Amateur Computer Club meets at YMCA, Stockton, each alternate week at 7-9pm. Peter Cheshire, 60 Croft Road, Eaglescliffe, Stockton-on-Tees, TS16 0DY.

**CORNWALL**  
**Cornish** Radio Amateur Club—Computing Section. Bob Reason, 24 Mitchell Road, Camborne.

**Cornwall Area** PAICG meets at the Penzance Micro Centre every Friday, S Zenith, Hayle 754845.

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**St Austell** Computer Club and Computer Town meets at ECIP Labs, Penpewen Road, fortnightly on Mondays at 7.30p. N.G. Day, 2 Colindale Close, St Austell.

#### CUMBRIA

**Ambleside** Computer Club Contact Jeremy Western, 8 Hill Top Road, Ambleside, Cumbria. Tel: Ambleside 2452.

#### DERBYSHIRE

**Chesterfield Micro Club**. Meets each Friday at 7pm. John Charter 37555 or Alan Crofts 30262.

**Derby Micro Society** meets at Littleover Church Hall, Shepherd Street, first and third Fridays of each month at 7pm. Frank Taylor, 0332 559334.

**Glossop Computer Club**. John Deam, 2 Spinney Close, Glossop.

#### DEVON

**Devon Computer Users Club**. Meets at Computer Systems (Torbay), Pump Street, Brixham, Saturdays at 2.30pm. Ian Chipperfield, 22 Brookdale Court, Brixham, Devon (Brixham 59224).

**Exeter and District Amateurs Computer Club** contact **the Bank**, Contact Paul Couchman, 29 Clifton Place, North Hill, Plymouth, Devon.

**Exeter & District Computer Club** meets at Exeter School, Madingley Road. Exeter, on the second and fourth Tuesdays every month. T.G. Holden, 14 Greenville Avenue, Teignmouth, TQ14 9NT.

**Exeter & District Amateur Computer Club** meets second Tuesdays every month. Doug Bates, Fortescue House, Stoke Cannon, Exeter. Specialist meetings on third and fourth Tuesdays.

**Okhampton Computer Club**, contact Cheri Graebe, Okhampton 3523, or Okhampton Community College, Okhampton 3800. Meets 7pm each Wednesday during term time.

**South Molton Computer Club**. Meets at South Molton Tool Hire, Dootson House, Cooks Cross Industrial Estate, South Molton, North Devon, each Thursday at 7.30pm. Contact Nick Howe on 07935 3446.

**Torbay Users Computer Club** meets at Devon Computers, 39 Tottens Road, Plymouth on Mondays fortnightly.

#### DORSET

**Bournemouth Area Computer Club** meets at Kinson Community Centre on the third Wednesday every month. Peter Hibbs, 54 Bournemouth Avenue, Bournemouth, BH11 9SE. 0202 576547.

**TOPIC** meets at Canteen English Truck Centre on the second and fourth Wednesday every month at 7pm. David Bradford, 1 Alexander Road, Bournemouth, BH6 5JA.

**Purbeck Computer Club**, contact 31 North Street, Wareham, Dorset BH20 1AD.

#### DURHAM

**Darlington Computer Club**, weekly meetings. L. Boxell, 8 Vane Terrace, Darlington DL3 7AT. 0325 67766.

#### ESSEX

**Genius Computer Club**. 30 Webber House, North Street, Barking.

**Great Dunmow Computer Club**. Contact T Coombs, 4 Oakroy House, Oakroy Avenue, Great Dunmow, Essex CM6 1HQ.

**Brentwood Amateur Microcomputer Club**. Meets once a month. A.R. Holland, 0277 221620.

**Springfield Computer Club** meets on the first Friday of every month. Stephen Crompton, 1 Aislebury Road, Springfield, Chelmsford, CM1 5PB. 0245 50155.

**Canvey Computer Club**. Contact Dean Conway, 17 Mornington Road, Canvey Island, Essex SS8 8AT.

**Colchester Microprocessor Group** meets at University of Essex on the second and fourth Wednesday of every month at 7.30pm. Information Centre, University of Essex, near Colchester.

**Colchester Computer Society**. Meets at Severalls Hospital Social Club, Colchester. Contact A Patten, 14 Formeard, Rivenhall, Waltham, Essex CM8 3HD. 0216 516355.

**National Westminster Personal Computer Society**. 41 Moore Avenue, Gants Hill, Ilford P 4 J. 01-554 9699.

**Stanway School Computer Club**, only school members at present. G. Floyd, c/o Physics Department, Stanway School, Stanway, Colchester.

**Widdowes Computer Link Club**. Meets Wednesday evenings. Contact E Ferrant, 55 South Street, Barming, Kent, 01-622 27865.

**Nalissa Multi-User Club**. Contact Valerie Boyd-Shaw, 0272 851133.

**Reford Club**, a new club. Mr D Norden,

138c Church Road, Romford.  
**Roundcare Micro Computer Users Club**. Meets at the Roundcare Youth House, Laindon Link, Basildon every Wednesday at 7.30pm. Contact Mrs L Daden, Basildon 285119.

**South East Essex Computer Society** meets at Hockey Club at Roots Hall, near southern Footpath, Chelmsford on Wednesday at 7.30pm. Robin Knight, 128 Little Wakering Road, Little Wakering, Southend-on-Sea. 0702 218456.

**GLOUCESTERSHIRE**

**British Amateur Electronics Club**. Mr J. R. Hughes, 3 Bishopstone Close, Golden Valley, Cheltenham.

**Cheltenham Amateur Computer Club** meets on the third Tuesday of each month at 7.30pm. Mike Pullin 042 25617.

**COCHO**, 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. M Hughes, 36 Riverways Way, Cheltenham.

**HAMPSHIRE**

**Commodore Computer Club**. Meets on the first Friday of every month at Bury House, Gosport Community Centre, Bury Road, Gosport at 7pm. Brian Cox, Fareham.

**Fareham and Portsmouth Amateur Computer Club**. Contact G Smith, c/o Francis Close, Lee-on-the-Solent, Gosport, Hants PO13 8BH. 0705 550907.

**RAF Odiham** Computer Club. Contact c/o Officer IC, Royal Air Force, Odiham, Nr Basingstoke.

**Southampton Amateur Computer Club** meets at Crestwood Centre, Shakespear Road, Boyton Wood, Eastleigh, Hants on the second Wednesday of every month at 7.30pm. Paul Blitz, Chandlers Ford 69050.

**HEREFORD**

**Hereford Amateur Computer Club**, proposed new club. Stuart Edinborough, 2 Warwick Walk, Bobbeshote, HR4 9TG. 0432 269700.

**HERTS**

**Eisenham Computer Club**. Meets on second Wednesday of each month at the New Village Hall, Committee Room, Eissenham, Bishop's Stortford. R. Franklin 02719 815088.

**Sawbridgeworth Computer Club**. Meets at Sawbridgeworth Parish Hall, 7pm. Fridays at 8pm. M. Woodward, 38 Sayersbury Road, Sawbridgeworth, Herts, CM21 6EB.

**Stevage** Proposed new club. Contact Robert Timmins, 204, Selton Road, Martins Wood, Stevenage. Tel: Stevenage 722975 (after 6 and weekends).

**HUMBERSIDE**

**Bridlington Microcomputer Club**. Meets 7.30pm alternate Fridays at Old Star Inn, High Street, Bridlington. Contact D Copleman, 0262-801859.

**Grimsby Computer Club** meets at Grimsby Central Library fortnightly on Mondays at 7.30pm. Ian Fell, 0472 424248.

**Scunthorpe & District Microprocessor Society** meets at Community Centre, Lindon Street, Scunthorpe, every Tuesday at 7.30pm. G. Hinds, 211 Old Road, Scunthorpe, South Humberside DN15 8PU.

**KENT**

**Canterbury ACC** proposed new club. Contact J Fisher, 21 Marwood Avenue, St Stephen's Canterbury, CT2 7AK.

**Gravesend Computer Club**. Meets at School Room Extra Tuition Centre, 39 The Terrace, Gravesend. Contact c/o The Extra Tuition Centre, 0474 5067.

**Medway Amateur Computer & Robotics Organisation**. Meets at 7.30pm on first Tuesday and third Wednesday of every month. Annual subs 15s. Contact Paul Amey, c/o 3, Walderslade Centre, Walderslade Road, Chatham, Kent, 0634-63036.

**North Kent Amateur Computer Club** meets at Leathers Theatre, Charles Darwin School, Jai Lane, Bognor Hill, on the first Thursday of every month at 7.30pm. Ian House, 28 Canadian Avenue, Cufford SE6 3AS. 01-690 6900.

**Oprington Computer Club** meets at the Large Hall, Christ Church, Chateauford Road, Oprington, every Friday at 8pm-9pm. Mr R Peatt, 23 Arundel Drive, Oprington, Kent BR14JF. Oprington 20281.

**National Personal Computer User Association**. Eric Keeley, 11 Spratling Street, Manston, Ramsgate, Kent.

**Sevenoaks School Computer Club**. G Sommerhoff, Technical Centre, Sevenoaks School, Sevenoaks, Kent. 0732 456340.

**Tonbridge & Tonbridge Wells** AC. Ray Skowksi, 1 Cromer Street, Tonbridge, 0732 355960.

#### LANCASHIRE

**Blackburn Micro Computer Club**. Roger Longthorn, 12 Sharp Close, Accrington.

**Bolton Computer Club** meets at E424 Bolton Institute of Higher Education, Deane Road, Bolton, on Thursdays. David Atherton, 16 Douglas Street, Asherton, Ranshaw, M29 4RS. 0924 878210.

**Burnley Computer Club**. Meets at Burnley Technical College on Tuesdays, 7.30-11pm. Contact Dave Tallow, 27 Bassnet Street, Burnley, Lancs.

**Chorley Computer Club** meets at Towley Arms, Chorley, every other Tuesday at 8pm. Tony Higson, 23 Brock Road, Chorley, Lancs. Chorley 68429.

**Ribble Valley Computer Club** meets at Staff Centre, Pendle Carpets Ltd, West Bradford, on the second and fourth Monday of each month at 7.30pm. Contact Ian Thornton-Dwyer, 23 Southfield Drive, West Bradford, Lancashire, BB7 4TU.

**Lancaster & Morecambe** Computer Club. Sarah Blackler, 0524 33555.

**South East Lancashire Computer Club** meets at Turf Lane Centre, Turf Lane, Chadderton, on Thursdays at 7-9.30pm. David Sholes, 18 Beech Avenue, Oldham, Lancs.

**LEICESTERSHIRE**

**East Leake Computer Club**. Andrew Jones, 59 Bateman Road, East Leake, Loughborough, LE12 6NN.

**Hawker Sideley Computer Club**. Contact R Wraithall, 6 Naseby Drive, Loughborough LE11 0UN.

**LINCOLNSHIRE**

**Lincoln Computer Club**, meets at the Cardinal's Hall, 238 High Street, Lincoln (entrance on Grantham Street) on first and third Wednesday of each month, except August. Contact Jeffrey Joy, 23 Cross O Cliff Hill, Lincoln, 0522 28252.

**Skewness Computer Club**, meets at County Hall every other Monday, 7.30-8.30pm. Reg Potter, 118 Bertrams Avenue, Skewness, 0754 3594.

**LONDON**

**Association of Computer Clubs**. Contact Rupert Pinescent, 17 Regent Park Crescent, London SE26, 01-778 6824. National Club.

**Croydon Microcomputer Club**. Meets at Croydon Central Reference Library. Contact Vernon Gifford, 01-831 2007.

**East London Amateur Computer Club** meets at Harrow Green Library, Cathall Road, E11, on the second and fourth Tuesday of each month at 7.10pm. Fred Flinger on 01-554 3288.

**Forum-80** London. Leon Jay, 01-286 6207.

**Forum-80 Wembley**. Victor Saleh, 01-902 2546.

**The Foundation**, c/o Princes Street, Tottenham, London N17. Postal club for science fiction/fantasy society. Contact Jason Hodson.

**Harrow Computer Group** meets at Harrow College of Higher Education, Room W24, Northwick Park, on alternate Wednesdays at 7pm. Bayzie Butcher, 01-950 7088.

**Isleworth Computer Club**. Contact Dunning Danes School, Dane Building, DuCane, London, Hammershill.

**Metropolitan Police Amateur Computing Club**. Meets on the first Tuesday of month at 8pm. Contact S Faint, 01-725 2428.

**GB Microgroup** meets at Regents Park Library, Robert Street, NW1, on the third Tuesday of month at 7.30pm. Jim Amey, c/o 11 Peabrook Road, Harrow, Middlesex.

**North London Computer Club** meets at the Polytechnic of North London, Holloway, N7 8RN, on Monday, Tuesday, Wednesday and Thursday during term time and one evening a week during holidays. Robin Bradbeer, 01-607 2789.

**Paddington Computer Club** meets at Paddington Green, 25 Paddington Green, W2 1NB. Peter Hill, 01-723 5762.

**Post Office HQ Microcomputer Club** meets at room 814/6, Riverbank House, 12-13 South Park, off Moorgate, on the second Thursday of month. Vernon Quantance, British Telecom Enterprises, Cheapside House, 138 Cheapside EC2U 6JH. 01-622 4716.

**Queens Crescent Computer Club**. Meets at Queens Crescent Library, 165 Queens Crescent, London NW5, 01-485 4551.

**The SOLOFT Computer Club** meets once a fortnight. M. Kayen, 12 Calderon Road, London E11.

**South East London Microcomputer Club** meets at Thames Polytechnic, Greens Ends, Wooler SE 16, on alternate Wednesdays at 7pm. Peter Phillips, 61 Grainger Road, SE3. 01-853 5829.

**Southgate Microcomputer Club** meets at 81/86 Southgate Tech, fortnightly on Wednesdays at 7.30pm. Kevin Peroutis 01-882 2822. See Prestel page 25820645.

**West London Personal Computer Club** meets at Back room, Fox & Goose pub, Hanger Lane, Acton, on the first Tuesday of month at 7.45pm. Graham Brain, 01-997 8986.

**MANCHESTER**

**Manchester Computer Club** meets at the Department of Computer Science, Manchester University, Oxford Road, on the first and third Thursday of month at 7.30pm. David Wade, 061-941 2486.

**Newall Business Computer Users Club**. Proposed new club to meet the last Tuesday of month. K Wadsworth, 061-740 7320 after 5pm.

**North Trafford Microcomputer Club**. Meets fortnightly. Contact Ian White, 16 Leicester Avenue, Timperley, Altrincham WA15 6HR, 061-969 2080.

**MERSEYSIDE**

**Merseyside Microcomputer Group** meets at Marchant Taylor's School, Crosby, on second Thursday month. Mr F Shaw, 14 Albany Avenue, Eccleston Park, Prescot, 051-426 5536.

**Southport Computer Club** meets weekly. Ian Bristone, 28 Weld Road, Southport, Merseyside PR8 2UD. 0704 64524.

**Wirral Microcomputer Users Group** meets at Birkenhead Technical College every Monday. J Phillips, 14 Helton Close, Birkenhead, Merseyside L43 9HP.

**Wirral Computer Club**. Contact Gary Metcalfe, 24 Marlston Avenue, Itby, Merseyside.

**MIDDLESEX**

**Brigadier Computer Club**. Meets on the first and third Monday of every month at Brigadier Youth Centre, Brigadier Hill, Enfield at 7.30pm. Subs: £2.

**Chalfonts Computer Club**. Contact Michael MKN2 UEU, 01-363 3786.

**Microdealer User Association**. Meets three times a year. Contact Phillip Matthews, 19 Philip Morris House, 21 High Street, Feitham TW13 4AD. 01-751 6388.

**Sunbury Computer Club** meets at St Benedict's Hall, Napier Road, Ashford, on the last Tuesday of month at 8pm. Simon Taylor, 8 Priory Close, Sunbury-on-Thames, Middlesex. Simon Clark, 83 Welling Street, Twickenham, Northants NW12 7AG.

**ZX Micro Club**. Contact Paul Hargreaves, 10 The Ride, Brentford, Middx.

**NORTHAMPTONSHIRE**

**Corby University Micro Club**. Meets at Lodge Park Sports Centre fortnightly on alternate Wednesdays and Thursdays. Contact Peter Wilson, 26 North Cape Walk, Corby, tel: Great Oakley 742622.

**Kettering Microcomputer Club**. Meets every Wednesday at 7pm. Details from Simon Taylor, 26 North Cape Walk, Corby.

**South Northants Computer Group** meets at Anchor House, Moat Lane, Towcester, on Wednesdays at 7.30pm.

**NOTTINGHAMSHIRE**

**Asfield Computer Club** meets at Curtis Junior School, 31 Mrs's Road, Sutton in Ashfield on the first and third Thursday month. Derrick Daines, c/o Cuttings Avenue, Sutton in Ashfield, Notts.

**Eastwood New Computer Club** meets at Devonshire Drive Junior School Wednesday at 5.45pm. Ted Ryan, 15 Queens Square, Eastwood, Nottingham NN16 3BB.

**Nottinghamham Microcomputer Club** meets at Castle Gate Centre, Nottingham, Monday at 7.30pm. Mr E Harvey, 68 Rosehill Avenue, Nottingham NG3 6FF. Nottingham 608491.

**Workshop Computer Group**. Mr Andrews, Workshop 487327.

**NORFOLK**

**Anglia Computer User Group**. Jan Rejzl, 128 Wickemessis, Sprowton Road, Norwich. 0603-29652.

# CLUBNET

**Brecklands** Computer Club. Contact Andrew H 1 Annaloes Close, Telford, Norfolk. Meets each Saturday, 5pm at this address.

**Dereham & District** Computer Club. Meets at Middle School, Westfield Road, Toffwood, East Dereham on every second Wednesday at 7.30pm. Contact Mrs Fran Cook, Dereham 67732.

**East Anglian** Computer User's Group meets at Cromer Community Centre, Telegraph Lane, Norwich. Gill Riji, 88 St Benedicts, Norwich.

**Gloucester** Computer Club meets at Unit 26, Longs Estate, Longs Estate, Great Yarmouth on Fridays at 6.30pm. Tel: 0493-600003.

**Yarmouth Computer Club** meets each Friday at 7pm. Contact the club at Unit 26, Longs Estate, Longs Estate, Great Yarmouth, Norfolk, 0983 662871.

## OXFORDSHIRE

**Association of Computer Clubs**, Rupert Steele, St John's College, Oxford OX1 3JP

**Microcos** meets at Clarendon Lab, Parks Road, Oxford, every week during term. Rupert Steele, St John's College, Oxford OX1 3JP

**OXFORD PERSONAL COMPUTER CLUB**. Len Phelps, Southcourt Cottage, Sutton Courtyour, Nr Abingdon, Oxon OX14 4AU

**Ridgeway** Computer Club meets at Swan Hill, East Isley, on the second Tuesday month. Mike Magney, Beavers, South Street, Blubury, Didcot, Oxon OX11 0JU.

## SHROPSHIRE

**Ludlow & District** Microcomputer Club meets at Diocesan Education Centre, Lower Ludford, Ludlow, on the second Monday of each month at 7.30pm.

**Shrewsbury** Micro Club meets at Shrewsbury Shirhall on each month. Mr V Rose, 5 Bramley Close, Severn Meadows, Shrewsbury SY1 2TP.

**Telford** Computer Club meets at Telford TFC on Monday 6-9pm. John Murphy, 10 Bromore, Brookside, Telford TF3 1TF. 0952 95959.

## SOMERSET

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

**Worcester** Computer Club meets on Tuesdays during term time at Somerset College of Arts and Technology, Contact David Elliott at Fir Tree House, Back Lane, Wedgway-sub-Mendip, Wells, Somerset.

**Yeovil Computer Club**, D de Carrington, 2, Romsey Road, Yeovil, BA21 5XN.

## STAFFORDSHIRE

**Alasager** Computer Club, meets at Alasager Comprehensive School, Stoke-on-Trent, Staffs, fortnightly on Tuesdays. Rex Charlesworth, 09363 77270.

**North Staffs Amateur Computer Club** meets on the third Wednesday of each month. J Rol, 16 Hill Street, Hednesford, Staffordshire WS12 5DS.

**ICL Birmingham Branch** Micro Club, c/o WSA Eccleshall, 26 Browns Lane, Tamworth, Staffs.

**Tame Valley** Computer Club, Tim Marshall, 32 Milon Avenue, Leyfilds, Tamworth, Staffordshire B79 8UG.

## SUFFOLK

**Haverhill** Computer Club, meets at St Mary's Church Hall, Camps Road, Haverhill, on the second, third and fourth Wednesday of each month at 7.30 to 10pm.

**Kendrew Holliman**, 5 Trinity Close, Balm, CB1 6DW. 022 629 583.

**Newmarket Home Computer Group**, Meets at Anchor House, Moat Lane, Twocaster, at 7.30pm. Contact Simon Clark, 83 Walling Street, Twocaster, Northants NN12 7JA, 0327 52191.

**Suffolk** Microcomputer Club meets monthly. Mr S Pratt, c/o Microtek, 15 Lower Brook Street, Ipswich.

## SURREY

**Ashted** Computer Club meets on the last Thursday of month. Contact P Palmer, 8 Corle Close, Ashted.

**Deaf** Microcomputer Users Group. Contact Chris Marsh, 3 Delaporte Close, Epsom, Surrey KT17 4AF.

**Thames Valley Amateur Computer Club** meets at Griffin, Caversham, on the first Tuesday of month. Brian Day, 25 Roundway, Cambridge, GU15 1NR, Camberley 22186.

**Well** Micro Club, Dave De Silva, 316 Kingston Road, Ewell, KT19 0SU.

**West Surrey** Computer Club meets at Paddock Room, Green Man Public House, Burham, Guildford, on the first Thursday of month. Chris Karney, 0483 68121.

**ITN Computer Club** meets on Fridays. A Room, 54 Farnham Road, Guildford, Surrey GU2 5PE. 0485 62005.

**Sutton Library** Computer Club meets at Goldman, PO Boxes 100, Sundays, KT5 8HY.

**Richmond** Computer Club meets at Richmond Community Centre, Sheen Road, Richmond, Monday of month at 8pm. Bob Forster, 18a The Barons St Margarets, Twickenham, Middlesex, 01-982 1873.

**Sutton Library** Computer Club meets at Central Library, St Nicholas Way, Surrey, on the first Friday of month and third Tuesday of month at 8.30pm. Dave Wilkins 01-642 3102.

**Association of London** Computer Clubs, Len Stuart, 89 Mayfair Avenue, Worcester Park, KT4 7SJ.

## SUSSEX

**Amateur Computer Club** meets at Wick Amenity Centre, Wick Farm Road, Littlehampton, on the first Monday of month at 8pm, and third Sunday of month at 6pm. 01323 671030.

**Ridgeway** Computer Club meets at Swan Hill, East Isley, on the second Tuesday month. Mike Magney, Beavers, South Street, Blubury, Didcot, Oxon OX11 0JU.

**Brighton**, West Sussex Computer Club meets 7.30pm every second Wednesday at Southwick Community Centre. Contact J Wood, 30 Leicester Villas, Hove, E Sussex.

**CVCC** Video Games Club. Contact G Bond, 7 Swift Lane, Langley Green, Crawley BN11 3QZ.

**Essex**. **Essex & District** Computer Club meets at 7.30pm on last Wednesday of each month at the WYRS Centre, Hyde Road, Eastbourne. Jim Booth, 0932 51453.

**Horsham** Microcomputer Club, Meets at the Forest Community School, Compton Lane, Horsham on second Wednesday of each month from 7.30pm. Philip Davidson 0403 60965 or Jim Laing 0403 67522.

**Midhurst & District** Computer User Group meets at the Grange Centre, Midhurst, at 7pm on the second and fourth Thursday of every month. Contact Val Weston, tel. Midhurst 3876.

**Mid-Sussex** Microcomputing Club. Contact Jeff Hayden, 2 Hillary Close, East Grinstead, RH19 3SD.

**West Sussex** Microcomputer Club meets at Room R06, Robinson Road Annex. Crawley, on the first and third Monday of month. J Clark, 31 Hyde Heath Court, Pound Hill, Crawley, 0293-884207.

**Worthing & District** Microcomputer Club meets at Rose Wilmot Youth Centre, Littlehampton Road, Worthing, on alternate Sundays 11am-1pm. B. Thomas, 11 Gannon Road, Worthing, W. Sussex, BN11 2DT, 0903 36785.

## TYNE & WEAR

**Newcastle upon Tyne** Personal Computer Society meets at Room D103, Newcastle Polytechnic on the first Tuesday of every month. Pete Skargill, 21 Percy Park, Tynemouth, 0632 573905.

## WEST MIDLANDS

**Cannock** Computer Society meets at Cannock Computer Systems, Old Penkridge Road, Cannock, fortinightly. Terry Sale, 20 Redwood Drive, Chase Terrace, Walsall WS4 3AA.

**Covebury** Computer Circle. Contact Chris Baugh, 9 Hillman House, Smithfay Way, Coventry CV1 1ZJ.

**Coventry** Micro Club meets on Wednesdays at 7.30pm at Walsgrave Junior School. Jack Hewitt, 3a Boswell Drive, Walsgrave-on-Sow, Coventry, Tel: 615543.

**Wednesfield** Computer Club meets at Park Hall Community School on the second and fourth Monday of month 6.45-9.45pm. Alison Hunt, 58 Princes Avenue, Walsall, WS1 2DH, 0922 23875.

**West Midlands** Amateur Computer Club meets at Enfield School, Love Lane, Stourbridge, on the second and fourth Tuesday of month. John Tracey, 100 Booth Close, Brerley Hill, Kingswinford, 0384 70097.

## WILTSHIRE

**Chippenham and Calne**, proposed new club. Matthew Jones, Pinthills, Calne SN11 0LJ.

**Chippenham** Computer Club, Contact Peter Knaggs, 12 Seymours Road, Chippenham or call Chippenham 654940.

## WORCESTER

**Worcester & District** Computer Club meets at Old Phassant Inn, New Street, Worcester, on second Monday of month at 8pm. D Stanton, 55 Vaughal Street, Rainbow Hill, WR1 6PA.

## YORKSHIRE

**Barnsley Co-Operative** Computer User Group meets at Co-Op Social Club, Pogmore, Barnsley, on the last Tuesday of month. 47 Moor James Bridge, c/o 39 Kerreford Hall Road, Barnsley, South Yorks S70 6NF. 0226 41753.

**Greenhead** Grammar School Computer Club. Brian Smith, Greenhead Road, Keighley, West Yorks YO20 6EB, 0535 62828.

**Huddersfield Computer Club** meets every Monday, Chris Townsend, 760/4 Manchester Road, Huddersfield, 0485 652799.

**Keighley** Computer Club. Meets each Wednesday at 7.30pm at Methodist Church Hall, Market Street, Keighley, West Yorks. Contact Simon Midgley on 0535 681463.

**Leeds Microcomputer Users** Group meets at 8 Regent Street, Chapel Allerton, fortinightly. Contact Mrs David Parsons, 22 Victoria Walk, Horsforth LS18 4PL.

**Program Power**, R Simpson, 5 Wemsley Road, Leeds LS7 2BX, 0532 663186.

**Sheffield** Computer Club meets on Tuesdays. Paul Channell, tel: 0274 595731.

**South Yorkshire** Personal Computer Group meets at General Leatons Theatre, St Georges Building, Mappin Street, Sheffield, on second Wednesday of month at 7.30pm. Paul Sanderson, 8 Vernon Road, Tetley, Sheffield S17 3QE.

**Thurso & District** Micro Users' Club meets at Thurmsco Comprehensive School, Physics Lab, Clayton Lane, Thurmsco, Wednesday at 7.30pm during school term. Mr James Davis, 62 Tudor Street, Thurmsco East, 0709 993880.

**West Yorkshire** Microcomputer Club meets on Tuesdays. Phillip Clark, c/o Suite 204, Crown House, Armsley Road, Leeds LS12 2ES. 0532 635232.

**York** Computer Club meets at the Enterprise Club every Monday at 8pm. K Thomas, Green Lee, Ripon Road, Harrogate, HG1 2BY, 0904 38239.

## SCOTLAND

**Bishopston** Computer Club meets at Cwa Ben, Sachelcourt Avenue, Bishopston, Renfrewshire, on Sunday once a month. Alasdair Law, 10 Douglas Road, Bishopston, Renfrewshire PA7 5EF.

**Edinburgh** Home Computing Club meets at Crosswinds Community Centre, Tollcross, Edinburgh, on the 2nd, 3rd and 4th Thursday of month from 7-10pm. I. Robertson, 031 441 2361.

**Scottish Amateur Computer Society**, Mike Anthony, 46 Moredun Park Gardens, Edinburgh EH17 7JZ.

**Central Scotland** Computer Club meets at Falkirk College of Technology, Grangemuir Road, Falkirk, on the first and third Thursday of month. James Lyon, 78 Slamanroad Road, Falkirk FK1 5NF.

**File** Computer Users Club meets fortinightly. Murray Simpson, 31 Tom Steward Lane, St Andrews, Fife, KY16 8YB.

**Grimpan** Amateur Computer Society meets at 35 Thistle Lane, Aberdeen, on the second and fourth Monday of month at 7.30pm. Alan Morrison, 21 Beech Road, Westhill, Skene, Aberdeenshire AB3 6WR.

**Kenny** Computer Club meets weekly. S Kennon, 15 The Glebe, Kenmy, Inverurie, Aberdeenshire.

**Inverness** Personal Computing Club meets every second Tuesday at 7.30pm. Giv Mackenzie, 38 Ardconnel Street, Inverness IV2 3EX, 0463 220922.

**Perth & District** Amateur Computer Society meets at Hunters Lodge Motel, Bankfoot, on the third Tuesday of month at 7.30pm. Alastair McPherson, 154 Oakbank Road, Perth PH1 1HA.

**Skene and Leitham** Computing Society. Contact C Manvell, Tigh na Pairc, 25 Lower Breiskish, Isle of Skye IV42 80A, 04712 317.

**Stirling** Computer Club meets at Wolfson Centre, 106 Rottenrow, Glasgow, on the third Wednesday of month. B Duffy, 24 Lombard Drive, Condorart, Cumbernauld G4 8NW.

## WALES

**Abergele** Computer Club meets at Abergele C Offices every Thursday at 7.30-10pm. J Jones, 77 Millbank Road, Rhyll, Cwyd. **Beddau & District** Computer Club, meets at Beddau Community Centre, 7pm, Mondays. Nigel Butters, Newtown, Llanelw 206305.

**Cwyd 800 Computer Club**, Contact Alan Jones, 10 The Llanes, High Street, Llanwrda Gwyn, Deeside, Cwyd, 0244 816993. Meets at Deeside Community Centre, Queensberry, Deeside on Thursday at 7pm.

**Colwyn Community** Club meets at the Green Hotel, Colwyn Bay, at 7pm. Contact D Bevan, c/o Abergele Road, Colwyn Bay, Cwyd LL29 7PA.

**Gwent** Amateur Computer Club meets at St Mary's Institute, Stow Hill, Thursday at 7.30pm. Rothery Harris, 16 Alanbrook Avenue, Newport, Gwent, Wales NP2 6JL.

**Llantrisant** Home Computer Club, Meets at Adon Education Centre, Llantrisant, every Tuesday. Contact Douglas Lewis, 16 Denbigh Drive, Llantrisant Major, South Glamorgan CF6 9GJ.

**Mold** Computer Club. Meets 7.30pm on first and third Thursday of each month at the Daniel Owen Centre, Earl Street, Mold. Contact G Johnson, 18 Daylona Drive, Northop Hall, Mold, Cwyd, Wales. Tel. Deeside 821945.

**Milford Central** Computer Club. Open to schoolchildren, meets every lunch hour and evening. Contact Peter Jones at Milford Central School, Prioryville, Milford Haven, Dyfed, 043 784 571.

**Pencoe** Amateur Computer Club meets fortinightly on Saturdays at Pencoe. **Mold** Computer Club. Meets 7.30pm on first Friday, Rhedyn, Pencoe, Bridgend, Mid-Glamorgan CF35 611, 0585 860307.

**Pontyool** Computer Club meets on the first and third Thursday of month at the Settlement, Roachy Road, Pontyool, Gwent, on Friday. Graham Loveridge, on Pontyool 2827.

**Swansea & South West** Wales Amateur Computer Club. Meets on the last Friday every month. Paul Griffiths, 1 Prescelli Road, Penlan, Swansea SA5 8AF.

**Swansea** Computer Club. Meets on 10 (pub), Union Street every Tuesday at 7.30pm. Contact Robert Palmer, 044 123 602.

**Wrexham & District** Computer Club. Meets each Thursday. Contact Houghton, 1 Snowe Avenue, Wrexham, Cwyd, Wales.

## NORTHERN IRELAND

**North Down** Micro Users Club. Meets at Bangor Central Library, Hamilton Road, Belfast, every Thursday. Contact A Robson, 0247 67800.

## STOP PRESS

**Texas Instruments** Home Computer User's Club, membership 25 per year. Currently seeking regional organizers. Contact Keith Longman, PO Box 190, Maidenhead, Berks, Tel. 0628-71696.

# Once a month

Your eyes will not be deceiving you next week when your open PCN to find no Clubnet. But before you write this off as gross carelessness on our part, let us assure you that it is deliberate. Clubnet is merely deferred.

Every fourth week, starting with issue 33, you'll get a full list of clubs and user groups nationwide, as well as two reports.

In issue 34, there will be no clubs or user groups but Databasis will be back, starting with hardware. The next week will consist of peripherals and the week after, software.



# FILL THE GAPS IN YOUR PCN COLLECTION

**Issue 1, March 11-18.**  
**Pro-Tests:** Apple's Lisa, Text (ZX80), Spectrum speech synthesiser, Apple printer, Commodore networker, 3D on Spectrum, graphs package for Apple and IBM, BBC graphics system.  
**Features:** computer chess, Occam parallel processing language, Victor/Sirius function keys.  
**Programs/cards:** Towers of Braham (Pascal), Biohistory (Apple II), Roman Year (Apple II), Shape Utility (Apple II).  
**Gameplay:** Darts, Soccer (Atari), Castle of Riddles (BBC Model B); Pimasa (Spectrum), Flight Simulator (IBM PC).  
**Databases:** micros and peripherals.



**Issue 2, March 18-25.**  
**Pro-Tests:** Toshiba T100, Casio PB100, ZX81/Basicare, Vix speech synthesiser, Spectrum spreadsheet, IBM graphics, BBC word processing.  
**Features:** Colocvision, micro backgammon, nursery computing.  
**Gameplay:** Ultima II (Apple), Traker (ZX81), Starquest (ZX20), Hungry Horace (Spectrum).  
**Programs/cards:** String editor (Spectrum), Analogue Clock (BBC Model B), Chart generator (Spectrum), String extract/replace.  
**Databases:** full software listings.

**Issue 3, March 25-April 1.**  
**Pro-Tests:** TI Professional, Apple speech synthesiser, Facit 410 printer, IBM keyboards, Pipedream computer, Sirius toolkit, Dragonica.  
**Features:** Atom upgrade, Lynx programming, Apple music.  
**Gameplay:** Managrove (Vic 20), Mutant Head (Vic 20), Compendium (Dragon), Patience (Spectrum), Noughts and Crosses (Dragon), Great Britain Ltd (Spectrum), Ulysses (IBM PC).  
**Programs/cards:** Magnify (Spectrum), Speller (Vic 20), Firing order (BBC).  
**Databases:** micros.  
**Microcards:** Anatomy of the BBC, part 3.

**Issue 4, April 1-8.**  
**Pro-Tests:** Pied Piper Communicator, Olympia ESW3000 printer, Namal SuperTalker, Commodore 16/64c, Spectrum Pascal, Cash book (BBC).  
**Gameplay:** Dark Crystal (Apple II), George (Dragon), Wizard War (Dragon).  
**Programs/cards:** Fruit Machine (BBC), Timesheet (Oric), Array Editor.  
**Databases:** peripherals.  
**Clubset:** Clubs and user groups.  
**Microcards:** Go Forth, part 1.

**Issue 5, April 8-15.**  
**Pro-Tests:** Commodore 700, Ikon Heblit, 1-2-3 (IBM), ZX81 machine code.  
**Features:** speech packs, monitors, IBM PC, Scorpion Disk, Dragon sound module, ZX81 graphics, Bottom Line Strategist (CPM), Speech Clip word processor.  
**Features:** IBM PC DOS, BBC word processing, CP-1251.  
**Gameplay:** Microsoft Paint (Spectrum), Translunary Tower (Spectrum), Loran Leeper (Apple II), Evolution (Apple II).  
**Programs/cards:** Wacky Racers (Oric), Mortgage Comparison

(Sharp MZ80K), Computer Set Up (BBC), Day of Weck (Dragon).  
**Microcards:** Graphics, part 1.  
**Issue 7, April 22-29.**  
**Pro-Tests:** Mattel Aquarius, Epson FX80, Olivetti JP101, Lip on Spectrum, Vic 20 assembler, Supergraf on Victor/Sirius.  
**Features:** Dealer support, Atari graphics.  
**Gameplay:** Krakit (ZX81), Crusader (Spectrum), The Great Escape (Spectrum), Kaktus (Vic 20), Fantastic Voyage (ZX81).  
**Programs/cards:** CBM controls, Computer Set Up (BBC), Wacky Racers (Oric), Julian Dates.  
**Databases:** Peripherals.  
**Microcards:** Graphics, part 2.

**Issue 8, April 29-May 6.**  
**Pro-Tests:** Atari Home Files Manager, Kobra V, Vix Start for the Vic 20, Hostcard's Accounts for the Spectrum, Epson RX80 printer, NCR's Decision Mate V, Future Computer 2.  
**Features:** Microcot, Compact-prog for the T1994A.  
**Gameplay:** Harvester (Vic 20), Strategic Command (Dragon 32), first book of Mithras (Spectrum), (BBC), Telling the Time-Money (Spectrum).  
**Programs/cards:** Program Indexer (BBC), CEM Database cards 1-4, Sort/Extract.  
**Databases:** software.

**Issue 9, May 6-13.**  
**Pro-Tests:** Structured Basic on the Apple, Pixel Power on the Vic 20, Star DP110 printer, Dams and interlocks for Commodore 64, Micro-Processor.  
**Features:** BBC function keys, Atari database accessing part 1.  
**Gameplay:** Dungeons of Intrigue (Oric), The Castle (Oric), Starship Command (Vic 20), Dragon Trek, Nootnik Puzzle (Spectrum).  
**Programs/cards:** Lower case (Dragon), Oric 2, Monster (Spectrum), Wildcard Scrabble (MHSAC).  
**Databases:** software.  
**Microcards:** Graphics, part 4.

**Issue 10, May 13-20.**  
**Pro-Tests:** Infomul on Commodore 64, Dragon Maze, MC 200 and CMBU80 music synthesizers (Apple), Prism directly coupled module, Atari graphics part 1.  
**Features:** ZX81 graphics part 1; Atari word processing part 2.  
**Gameplay:** Rescue (Spectrum), Dictator (Spectrum), Roman Empire (Spectrum), ChessPilot (Vic 20), Skyhawk (Vic 20).  
**Programs/cards:** Union Jack (Lynx), Escape (Spectrum), CBM Database cards 7-9, Evaluate (MHSAC), Formula (BBC B).  
**Databases:** peripherals.  
**Microcards:** Graphics, part 5.

**Issue 11, May 20-26.**  
**Pro-Tests:** BBC Vaffle, PFS-file for IBM, Apple Pascal, printer for Commodore 64, Microsoft Jet, troffer for ZX81 and Spectrum; CSE Compiling Tools.  
**Features:** ZX81 graphics part 2, Basic on the Sharp MZ80K, Commodore Motor Maria (Oric), Commodore 64, Oric Flight, BBC Music Synthesiser, Music Maker (Spectrum), Tobor (Spectrum).  
**Programs/cards:** Home Ward (Dragon 32), CBM Database, cards 10-11 end.  
**Microcards:** Keywords.

**Issue 12, May 27-June 2.**  
**Pro-Tests:** Spectrum word processor, PFS Report on IBM, File Manager for Colour Graphic, Citi CP80 type 1 printer, To Trackball; Nord MS.  
**Features:** Epson Basic, Oric sound part 1, Tandy Colour graphics.  
**Gameplay:** Mad Martha (Spectrum), The Ring of Fate (Spectrum), Spectrum spectate.  
**Programs/cards:** Vulture Tiler (T1994A card), Pirate Island (Atari) cont.) Word processor (BBC).

**Issue 13, June 3-9.**  
**Pro-Tests:** Teletwriter for Dragon 32, Atari 4th for Spectrum, GFS graphics processing system for Apple II, joystick, rulers, Ajile, Dragon music meets Tandy, Oric music part 2, transferring Basic for Colour Genie and Genie to Spectrum.  
**Gameplay:** Everest Ascent (Spectrum), Colour Gene roundup, Micro Maze (Lupter Area), Qix (Atari).  
**Programs/cards:** Cupid (Oric), Alien (Dragon 32), Time Bomb (Atari).  
**Databases:** peripherals.  
**Issue 14, June 10-June 15.**  
**Pro-Tests:** Apple Accelerator II board, Modula 2 (Apple II), Oric-Basic, Joystick Control Unit, Acipoint Centronics Interface, BBC Speech Synthesiser.  
**Features:** Newbrain Basic part 1, Sirius designing.  
**Gameplay:** AB Diddams (Spectrum), Mongoose (Commodore 64), Autonomously (Spectrum), Dragon dramas.  
**Programs/cards:** Time Bomb (Atari, cont.), Sheep Drive (BBC B).  
**Databases:** Software.  
**Microcards:** Spectrum, Part 1

**Issue 15, June 16-22.**  
**Pro-Test:** Com 35, Address Manager (Spectrum), Spores (Commodore 64), MST Database (Epson IX-20), Voice Input Module (Apple II).  
**Features:** Newbrain Basic part 2, Genie chess.  
**Gameplay:** Cleared for Landing, Playing the Ace (Apple II), Vulture, Star Jammer (Dragon 32).  
**Programs/cards:** Mover (BBC B), Spring Clock (Commodore 64), Prate and Ruler (Atari, 3 of 9), Micro-mind, Colour Genie, Brickbat (Dragon 32).  
**Databases:** Hardware.  
**Microcards:** Spectrum, part 2.

**Issue 16, June 23-June 29.**  
**Pro-Tests:** Atari V Acorn, word processing for the Commodore 64, Gemilife (CPM), MFP-1 Printer, Z80 Pack for BBC.  
**Features:** ZX81 Maths, US mail order, Atari graphics.  
**Gameplay:** Computer Scrabble (Spectrum), Education (BBC), Home and Senders (Spectrum), Catcha Snaith (Vic 20).  
**Programs/cards:** Vulture Tiler (T1994A 3 of 6), Bowling (Spectrum), Pirate Island (Atari) cont.  
**Microcards:** Spectrum, part 3.

**Issue 17, June 30-July 6.**  
**Pro-Tests:** Duet II, The Organizer (CPM), Trace and ZX Test (Spectrum), Jaki II/daywheel, Vix (Lynx Term) (Apple II).  
**Features:** Leaving part 1, Atari screen action.  
**Gameplay:** Oric chess, Grand Master (Commodore 64), Escape from Oric (BBC), Jet Fac (Spectrum), The Ring of Fate (Dragon 32), Spectrum spectate.  
**Programs/cards:** Vulture Tiler (T1994A card), Pirate Island (Atari) cont.) Word processor (BBC).

**Issue 18, July 7-13.**  
**Pro-Tests:** Tandy 100, RS232 interface (ZX81), ROM pager (Commodore), Interface printer buffer, IBM Personal Basic, WP.  
**Programs/cards:** Word Processor (Spectrum), Leaving Part 2, Lynx music.  
**Gameplay:** Spectrum Backgammon, BBC Snooker (Spectrum), 64 round-up, Serpentine (Vic 20), Put (Spectrum), Spectrum Safari.  
**Programs/cards:** Word Processor (BBC), Fruit Machine (Spectrum).  
**Microcards:** Sound Part 2.

**Issue 19, July 14-20.**  
**Pro-Tests:** 16-bit chips, Stock count (Epson HX-20), Malplot (Torch), Smith-Corona daywheel, ZX81 word processing.  
**Features:** Insurance, buying second-hand.  
**Gameplay:** Escape MCP (C64), Escape from Perilus (Atari), Apple round-up, Temple of Aphasi (C64), Airline (Spectrum), Health-rover (Spectrum).  
**Programs/cards:** Colour Code (BBC), Wreck (Dragon 32).  
**Microcards:** Sound Part 3.

**Issue 20, July 21-27.**  
**Pro-Tests:** Rale bareboard, Vic digital type drive, Seikooha colour printer, TouchScreen, Bonus (Pet payroll), Newbrain monitor.  
**Features:** Computer art, Dragon scrolling.  
**Gameplay:** Rabbit Turl (T1994A), Aztec Challenge (Atari, Vic 20), T1994A, BBC round-up, Joust (Spectrum), Molar Mad (Spectrum), Print Shop (Spectrum), Time-Lords (BBC).  
**Programs/cards:** Tumbler (Oric), Wreck (Dragon), Atari Errors, Speed Race (Vic 20).  
**Microcards:** Sound, part 4.

**Issue 21, July 28-August 3.**  
**Pro-Tests:** BBC graphics, Newbrain assembler, BBC turtle, Oric printer, Transiv printer.  
**Gameplay:** Franklin's Tom (Dragon), Hammer House of Horror (Spectrum), Junjunan (64), Junging Jack (Spectrum), Fourth Element (Spectrum), Cylon (64).  
**Programs/cards:** Collection (Vic), Bomber (64), Defuser (BBC).  
**Microcards:** Sound, part 5.

**Issue 22, August 4-August 10.**  
**Pro-Tests:** Spectrum Form, BBC graphics, Music synthesiser, IBM plotter, Brother daywheel, Maltron keyboard, Mapal.  
**Features:** Genie assembler, Dragon machine code.  
**Gameplay:** Rover Rescue, Orc Attack (Atari), Zerk (64), Knot in 3D, 3D Comb Code (Spectrum), Mista (Oric), Vector's Lair (Spectrum).  
**Microcards:** CPM, part 1.

**Issue 23, August 11-August 17.**  
**Pro-Tests:** Nord Basic-G, Tawford, IBM file software, Microdrive, Tandy Model 4.  
**Features:** Dragon machine code.  
**Gameplay:** Bridge Master, Stryx, Mamic Miner (Spectrum), Atari round-up, Genies (Spectrum), Hangar (Oric), Everest (Dragon).  
**Microcards:** CPM, part 2.

**Issue 24, August 18-August 24.**  
**Pro-Tests:** I-Maker III, Spectrum IIB, daywheel surveyed, Spectrum digital tracer, Laser.  
**Features:** Ideotext, Dragon machine code.  
**Gameplay:** Oric roundup, Cookie, Egg Farm, Kachon (Spectrum), Sea I (BBC), Lantastic (Dragon), The Island (64).  
**Microcards:** Commodore 64, part 1.

**Issue 25, August 25-August 31.**  
**Pro-Tests:** Electron, Simos Basic, Oric monitors, Microdrive.  
**Features:** Atari graphics map, Atom Atom, Dragon machine code.  
**Gameplay:** Suspended (64), Terror Days, Kachon (Spectrum), Dragon roundup, Jigger (Oric), Frogger (IBM).  
**Microcards:** Commodore 64.

**Issue 26, September 1-September 7.**  
**Pro-Tests:** IBM 64, BCPL, BBC tracer, 80 column Pet, Oric interfaces.  
**Gameplay:** Magic Mountain, Smugglers Cove (Spectrum), Spectrum roundup, Matrix (64), Ninja Warrior (Dragon), Dallas (Oric), Call to Arms (IBM).  
**Microcards:** Commodore 64.

**Issue 27, September 8-September 14.**  
**Pro-Tests:** Sharp MZ700, BBC Lisp, Apple editor, IBM mic, ZX81 mergery.  
**Gameplay:** Zip-Zap, Zoom (Spectrum), Spectrum roundup, Hover Beaver (Spectrum), Space Rescue (64).  
**Microcards:** Dragon, part 1.

**Issue 28, September 15-September 21.**  
**Pro-Tests:** Zenith Z100, Small Daps, Atari Supergraphics, Newbrain CPM, IBM mic.  
**Gameplay:** The Witness, Super Scramble, Six (64), Harrier Attack (Oric), Morocco Grand Prix (Dragon), Phatwah's Tomb (Spectrum).  
**Microcards:** Dragon, part 2.

**Issue 29, September 22-September 28.**  
**Pro-Tests:** Portico/Miracle, Dragon editor, BBC toolkit, Dragon graphics, Atari graphics.  
**Features:** IHX20 disassembles, TI transformation.  
**Gameplay:** Gridder, Gloopert, California Gold Rush (64), Oric round-up, British Army (BBC), IBM, General Electric (Spectrum).  
**Microcards:** Dragon, part 3.

**Issue 30, September 29-October 5.**  
**Pro-Tests:** IBM 64, BCPL, BBC tracer, 80 column Pet, Oric interfaces.  
**Gameplay:** Magic Mountain, Smugglers Cove (Spectrum), Spectrum roundup, Matrix (64), Ninja Warrior (Dragon), Dallas (Oric), Call to Arms (IBM).  
**Microcards:** Commodore 64.

**Issue 31, October 6-October 12.**  
**Pro-Tests:** Sharp MZ700, BBC Lisp, Apple editor, IBM mic, ZX81 mergery.  
**Gameplay:** Zip-Zap, Zoom (Spectrum), Spectrum roundup, Hover Beaver (Spectrum), Space Rescue (64).  
**Microcards:** Dragon, part 1.

**Issue 32, October 13-October 19.**  
**Pro-Tests:** Zenith Z100, Small Daps, Atari Supergraphics, Newbrain CPM, IBM mic.  
**Gameplay:** The Witness, Super Scramble, Six (64), Harrier Attack (Oric), Morocco Grand Prix (Dragon), Phatwah's Tomb (Spectrum).  
**Microcards:** Dragon, part 2.

**Issue 33, October 20-October 26.**  
**Pro-Tests:** Portico/Miracle, Dragon editor, BBC toolkit, Dragon graphics, Atari graphics.  
**Features:** IHX20 disassembles, TI transformation.  
**Gameplay:** Gridder, Gloopert, California Gold Rush (64), Oric round-up, British Army (BBC), IBM, General Electric (Spectrum).  
**Microcards:** Dragon, part 3.

**Issue 34, October 27-October 31.**  
**Pro-Tests:** IBM 64, BCPL, BBC tracer, 80 column Pet, Oric interfaces.  
**Gameplay:** Magic Mountain, Smugglers Cove (Spectrum), Spectrum roundup, Matrix (64), Ninja Warrior (Dragon), Dallas (Oric), Call to Arms (IBM).  
**Microcards:** Commodore 64.

**Issue 35, November 1-October 7.**  
**Pro-Tests:** IBM 64, BCPL, BBC tracer, 80 column Pet, Oric interfaces.  
**Gameplay:** Magic Mountain, Smugglers Cove (Spectrum), Spectrum roundup, Matrix (64), Ninja Warrior (Dragon), Dallas (Oric), Call to Arms (IBM).  
**Microcards:** Commodore 64.

**Issue 36, November 8-October 14.**  
**Pro-Tests:** Sharp MZ700, BBC Lisp, Apple editor, IBM mic, ZX81 mergery.  
**Gameplay:** Zip-Zap, Zoom (Spectrum), Spectrum roundup, Hover Beaver (Spectrum), Space Rescue (64).  
**Microcards:** Dragon, part 1.

**Issue 37, November 15-October 21.**  
**Pro-Tests:** Zenith Z100, Small Daps, Atari Supergraphics, Newbrain CPM, IBM mic.  
**Gameplay:** The Witness, Super Scramble, Six (64), Harrier Attack (Oric), Morocco Grand Prix (Dragon), Phatwah's Tomb (Spectrum).  
**Microcards:** Dragon, part 2.

**Issue 38, November 22-October 28.**  
**Pro-Tests:** Portico/Miracle, Dragon editor, BBC toolkit, Dragon graphics, Atari graphics.  
**Features:** IHX20 disassembles, TI transformation.  
**Gameplay:** Gridder, Gloopert, California Gold Rush (64), Oric round-up, British Army (BBC), IBM, General Electric (Spectrum).  
**Microcards:** Dragon, part 3.

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# PCN Billboard

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**IBM 3032 32K with tape recorder.** Professional keyboard, three cassettes. Crazy Kong, Acrobat, Chess. Excellent condition plus three manuals, £480.00. Tel: 01-959 5553.

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**Atari 400, 48K plus cassette recorder, two joysticks, books and software.** £200. Tel: 051-356 3865 after 4.30pm.

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**BBC Software** at £1.50 including latest Acornsoft, also Eproms at £6.50 include Wordwise, BCPL, Beebeale, Gremlin. Tel: 0376 511973, ask for Karin after 3.30pm.

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**Sharp MZ20K plus Epson MX80FT3 printer.** Direct interface plus over £400 applications. Languages, utilities, games, £500. Will separate. Tel: (0429) 74085 after 5pm.

**Atari 400 48K Keyboard + a41 recorder, basic cartridge, joystick, numerous software, books and magazines.** £250. Tel: Brentwood (0277) 219444.

**Atari 400/800 software for sale or swap.** Various tapes and cartridges. After 4pm. Tel: 01-525 4440 (0628) 37885 (Alaric).

**BBC Model B 1.2 ROM: character generator £3.00 + various back copies of computer magazines.** Tel: 021 523 6180 after 6pm. Ask for Liam.

**BBC dual disc unit 2 x 100K LVL.** Type guaranteed until December, £295. Casio FX602P plus cassette adapter £50. (All new). Tel: Coggeshall (0376) 61828 (evenings).

**Atari 800 48K plus Basic, program recorder, over £130 worth of software, Pointmaster, Joystick, books/manuals, £375.00.** Tel: Nottingham (0602) 872866 after 5pm.

**Vis-20 + C2N cassette, over £50.** Software, books, many magazines. Original price £200. Bargain at £150.00. Original boxes. Tel: Dorking (Surrey) 887536 evenings.

**16K Colour. Kong, Scramble, Champour, Galactic Attack cassettes, Manuals, Z80 assembly language book, exclusive information.** Cost £280 + 4 years £150. Tel: Sandyford 81649 after 4pm.

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**Dragon 32**—lonely Dragon has ordered owners to contact others in order to change its type diet. Preferably Edinburgh, but anyone's OK. Tel: Jim 031-661 9568.

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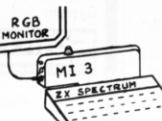
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## Microdeal settles for the best of both worlds

Poor old Microdeal seems to be having a few technical problems. Pictured here is Microdeal receptionist Tracey Mayo, winner of the talent contest to host the State 83 Exhibition being held in Cornwall this month.

'Beauty and the brains', trumpets Microdeal. But further down the page we find that Morgan Skinner, winner of the Kent Award has joined Microdeal as programmer.

One of the two must be the beauty, while the other is the brains. But if Morgan Skinner is so beautiful, why didn't Microdeal send a picture?



Tracey Mayo

## Pecker power Blue chip Inmos

The mystique surrounding computers is something we all know about — people have been trying to unravel it for years. The mystique surrounding stocks and shares is another thing entirely.

Put the two together and what do you get? A company called Zarkon Computer Inc.

Zarkon is a US company run by a 15-year-old called Martin Pecker. It plans to sell peripherals for personal computers but at the moment it has no full-time employees, no sales, and no showroom. This hasn't discouraged US investors and Zarkon's stock has risen 67 per cent in six weeks.

So what else is new?

What could be the world's most expensive chip came on to the scene last week. It cost more than £100 million but it could be yours for as little as £13.34 in quantities of 100.

The chip is a 64K dynamic RAM, arranged in a byte-wide 8K by 8 design. It is the first UK-designed chip from Inmos, the Government-owned semiconductor maker, which absorbs tax-payers' money at a rate of £20 million a year. But Inmos represents the sunrise industries, the job creators of the future. It employs about 700 Americans at its Colorado Springs plant and when it gets going properly here it may provide work for 500.

**PALSOO**  
by Mollusc

this new adventure  
game program will keep  
us occupied for a  
couple of weeks...

That's how  
long it takes  
to play??

that's how long  
it takes to load!

## NEXT WEEK

**Hardware** — Book a date with our review of the book-sized NEC 8201.

**Software** — PCN Pro-Tests a package designed to keep records straight on the Commodore 64.

**Peripherals** — A close-up of the new synthesiser from Currah.

**Microspedia** — The programming guide moves on to concentrate on FortH and string handling.

**Gameplay** — Games for the Atari, Apple, BBC and Spectrum.

## PCN DATELINES

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

Organisers who would like details of coming events included in

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

## UK EVENTS

Event	Dates	Venue	Organisers
Lancaster & Morecambe Computer Club Open Day	October 29	Lower Town Hall, Lancaster	Brian Sheldon, 0524 61831
Brainwave (Home Computing, Video & Electronics Family Show)	November 4-6	NEC, Birmingham	Clapp & Poliak Europe, 01-747 3131
Software Expo	November 8-10	Wembley Conference Centre, London	Interco, 01-948 3111
Home Computer Exhibition	November 9-13	Dublin	SDL Exhibitions, Dublin 763871
Malvern Micro Fair	November 12	Malvern Winter Gardens, Worcestershire	Personal Computer Fairs, Worcester 22659
Manchester Apple Village	November 13-16	Belle Vue, Manchester	Database Publications, 061-456 8383
COMPEC	November 15-18	London Olympia	Reed Exhibitions, 01-643 8040
Humberside Computer Fair	November 20	Winter Gardens, Cleethorpes	Jenson Lee, Grimsby Computer Club, 0472 42559
Northern Computer Fair	November 24-26	Belle Vue, Manchester	Reed Exhibitions, 01-643 8040
BBC Micro User Show	December 9-11	Westminster Exhibition Centre	Database Publications, 061-456 8383
Your Computer Christmas Fair	December 15-18	Wembley Conference Centre	Reed Exhibitions, 01-643 8040

## OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Comdex Europe	October 24-27	Amsterdam	Interface Group, Rivierstaete, Amsteldijk 166, 1079 LH Amsterdam
Computer Malaysia	October 25-28	Kuala Lumpur	Conference & Exhibition Management Services, 9A Jalan SS24/8, Taman Megah, Petaling, Jaya, Selangor
Gulf Computer Exhibition	November 21-24	Dubai	Trade Centre Management, 01-930 3881

# Announcing more exciting programs for the BBC.

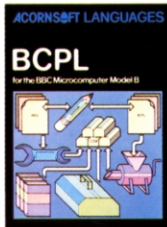
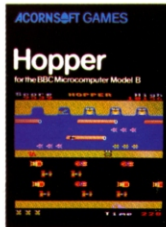
Acornsoft is the software division of Acorn Computers, the company that designed and built the BBC Microcomputer. Here are four more exciting programs, all designed to get the most from your BBC Micro.

**Magic Garden** (£9.95) is a cassette based on Shirley Conran's successful book. It's a problem-solving program which provides the complete beginner with instant answers to the questions of what to plant and where. Simply tell the computer whether you prefer a shrub or a flower, the type of soil, light and shade conditions and required flowering time and the computer will come up with a selection of possible plants.

**Draughts & Reversi** (£9.95) is a cassette containing two traditional board games for you to play against the computer. Both give a graphic display of the board on the screen and you can enter your moves with either keyboard or joystick. The games can be played at varying levels of difficulty and on the higher levels you will find the computer to be a very worthy adversary.

**Hopper** (£9.95) is a game on cassette which can be played with either keyboard or joysticks. Hop the frog across the busy motorway trying to avoid four lanes of fast-moving traffic. To get across the river to the frog's lair you must leap on to the logs and turtles' backs, but beware of the diving turtles, the crocodile and the snake.

**BCPL** (£99.65) is a flexible modern structured language that's very easy to learn. The package consists of a BCPL language ROM, a 40/80 disc and a 450 page User Guide. The disc contains the BCPL Compiler, a Screen Editor and a 6502 Assembler. BCPL is particularly good at handling Input and Output and is ideal for writing utility programs and to develop games and commercial packages.



## How to get Acornsoft programs.

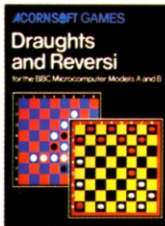
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