

PERSONAL *weekly* COMPUTER

50p March 24, 1984

No 54

NEWS

BRITAIN'S BIGGEST WEEKLY

WORLD EXCLUSIVE

64 STRATEGY

Game listing with great graphics

GAMES TRIO

Trial runs on Atari, BBC, Spectrum

VIC 20 ACTION

Program power with a modular games designer

SPECTRUM KEYBOARDS

We compare three full-travel keyboards

PCN LIFTS THE BLINDS ON THE PORTABLE PC

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REGULARS

Monitor 2

Curbing the copiers — new lines of attack, page 2; add-ons blossom for Acorn, page 3; Jane gives Lisa a spin on Apple, page 4; plus a report from last week's Computer Trade Show, page 5.

PCN Charts 7

All the top selling games and hardware at a glance.

Random Access 9

Get out your pen and state your point of view. The best contributions are rewarded with a tanner.

Routine Inquiries 10

Let us help you with all manner of PC problems, our panel of experts is standing by.

Microwaves 11

This is where you can show off your computing prowess and share your little gems with fellow-readers.

Readout 16

Read any good books lately? We may have reviewed just what you're looking for.

Clubnet 70

Find out what clubs and user groups there are in your area, or start your own and let us know about it. This issue contains the first of our weekly Clubnet reports on page 15.

Billboard 78,82

Buy, sell or swap — there is something for everyone on the second-hand bargain page.

Quit/Datelines 88

We finish off with a look at the lighter side of the micro business, and make a few dates for the future.

SPECIALS

Atari mixed modes 24

Mark Hutchinson continues his series on the Atari's graphics and shows you how to get the results you want.

Starving industry 29

Everybody is feeling the pinch as the microchip shortage becomes global. Tom Sato tries to analyse the strategies being employed by manufacturers to keep their lines of supply open.

**MENU**

March 24, 1984

No 54

**PC on the move** 18

PCN has done it again — specially flown in from America we give you the first review of IBM's newest addition to its micro range, the Portable PC. For all those workaholic executives who want to take work home from a computerised office, Steve Birchall presents what may be the answer.

MICROPAEDIA**Pull out and keep Atmos expansion**

We wrap up our look at Oric's Atmos and Oric computers with an examination of peripherals and Oric Basic.

Competition**Win a Mac** 79

An Apple Macintosh could be yours. There are two going as prizes in our readership survey and competition.



PRO-TEST PERIPHERALS

All keyed up 34

Fuller, DK 'tronics and Transform have produced 'real' keyboards for the Spectrum. John Lettice tried them out.



PRO-TEST SOFTWARE

Dip into Beebfont 51

Garry Marsh achieves some very fancy lettering with his BBC.

D-I-Y games 53

To get around the standard line-up of commercial games, why not design your own. Even with the limited memory of the Vic 20 this isn't as hard as you'd think — as Pete Gerrard discovered.



GAMEPLAY

Atari 55

Whether you want to fly a plane or drive a racing car, anything is possible in Atari's fantasy world.

Spectrum 58

Arcade action on the move as you hurtle through the forest on your motorbike or engage in a dogfight high in the skies.

BBC 59

Take your pick from our selection of text adventures that take you out to sea or into Frankenstein's castle.

PROGRAMS

Commodore 64 60

If you thought Othello was a play by Shakespeare, think again. In this case it's a micro version of the board game Reversi.

Sord 67

The first of our new regular utilities — a handy routine for the CGL-M5.

Pirates under fire

Any colour but black

Software Projects has launched its long-awaited Jet Set Willy with an anti-copying device that could take the colour from the copyright crackers' cheeks.

The Liverpool company has released Jet Set Willy with a colour-coded chart. When you've loaded the program it asks you for the colour sequence of one of the squares on the card — get the sequence wrong and it asks you for another. Get that wrong and the program wipes itself out.

This means that although you could make an illegal copy of the tape, you'd also have to make an illegal copy of the card for anyone else to be able to play the game.

Software Projects believes that since the software copyright issue is so confused it will be better off relying on copyright for the card itself. It has also applied for a patent for the card system.

There's little doubt that piracy is having a large effect on the sales of games programs. Several large distributors claim that games in the top ten charts should not be there according to their sales figures. The

volume of sales must therefore be made up by illegal copies. One company believes its programs are being copied in bulk in Ireland and Spain, then offered to retailers by salesmen posing as authorised distributors.

Software Projects is the company that took over Manic Miner when Matthew Smith left Bug-Byte — he is also the author of Manic Miner. The company plans to use similar card systems with future games releases. In future the chart will be printed on the cassette inlay.

But the method is far from foolproof. PCN has already received letters from readers explaining how to break the coding system.

Moreover, those with colour blindness will almost certainly have difficulty distinguishing between some of the card's colours.

Policy decision

Software pirates are under attack from a Bristol insurance company that aims to make it less painful to take them to court.

Halsey and Partners (0272 503716) has introduced a policy that will pick up some of the legal costs you might incur trying to get a pirate

to walk the plank. 'It isn't a cheap form of insurance, but it's a means of protecting your livelihood,' said a company spokesman.

The level of the premium depends on the type of software you produce, the size of your operation, level of sales and other factors. Under a ten per cent co-insurance clause you also have to pay ten per cent of every claim, but the benefits provided by the policy demonstrate the scale of the problem and the potential value of insurance: payouts might rise to £100,000 for a single claim, or £1 million in a year.

The policy, called Legal Expenses Insurance in Respect of Software Copyright, has defensive as well as attacking features. It looks most obviously attractive to small software producers who might lack the resources to take on a larger firm that it believes is selling its software illegally.

Under these circumstances the smaller software publisher can afford to lose an action, and if he wins the chances are that he won't need to make a claim against the policy.

The scheme was introduced late last year and the spokesman said it

was too early to comment on its acceptance or effect. 'It is a very new and quite high-risk area of insurance.' He added that it had taken a number of months to develop, but Halsey and Partners can draw on experience in the computer field with policies such as Datacover, for general users, and the Professional Indemnity policy for dealers.

Gosh shows lead

The Guild of Software Houses (Gosh) has launched a two-pronged attack on software pirates—but it's having to rely on the Government and the publishing industry to actually take any action.

Rod Cousins, vice-chairman of Gosh, has written to magazine editors urging the press to help stamp out piracy by monitoring what they advertise. Nick Alexander, chairman of Gosh, has added his name to a letter from the newly formed Copyright Reform Group to the Prime Minister. The letter asks for the inclusion of a bill for a reformed Copyright Law in the Government's 1984/5 legislative programme.

Atari contest winners



The waiting's over at last for all of you who entered the Atari competition in PCN's Micropaedia last month.

These are the six names that came out first when we made the ceremonial draw — each of you wins a brand new Atari 600XL: SP Woodward of Benbecula, RE Wilson of Pulborough, J McGhee of Glasgow, KF Cheung of Retford, O Cornelius of Walthamstow, and AC Chamberlain of Tunbridge Wells.

The three winners of Atariwriter word processors are: K Palmer of Worcester, NF Fowler of Wormley, and B Seares of Lewisham.

Finally, the five winners of Donkey Kong games are GM Dinnage of Hove, B Walton of Whitley Bay, K Gaughan of Letchworth, T Whitehead of London NW1, and T Burke of Sheffield.

Out of order

By David Guest

Sinclair Research is calmly insisting that Microdrives are readily available, but in the background a thriving black market in order forms is growing up.

The going rate for an order form ranges from £5 to £15, and some philanthropic marketers are even prepared to give order forms away if they can't trade them for software or cash.

The market is operating openly on the pages of Micronet, and similar ads are being submitted to PCN's Billboard section (but we will not be publishing them). Sinclair, Canute-like, has noticed the waves lapping around its feet and is taking action to stop them: 'There is no need for this,' a spokeswoman said. 'We've put the word around to everyone.'

But putting the word around isn't proving as effective as putting the Microdrives around would. Despite Sinclair's protestations (Issue 52: 'The Microdrives are available in any quantity...') Billboard ads are coming into the PCN office thick and fast with no sign of the flow abating, and the pages of Micronet are decorated with various offers.

Nobody seems intent on making excessive profits; one advertiser was proposing to give his order form away and another, unsure of what he might charge, preferred to look



Sinclair Microdrives — thin on the ground or off the shelf?

for a software exchange. Others said that they thought £5 might be about right but they'd settle for less. 'I'd be prepared to haggle,' said one.

Sinclair insists: 'They can buy as many Microdrives as they like. It is freely available and once an order is confirmed can be delivered within 28 days.'

Seasoned Sinclair-watchers will remember that the QL was subject to a similar delivery schedule once upon a time. But the latest update to this long-running saga is Sinclair's promise to have the first QLs delivered by the end of March, with production being gradually ramped up to 20,000 a month.

Sinclair has also given an assurance that there are no delays to QL

orders going via Freepost. One QL orderer claims to have been told by the company that it was taking 14 days for orders to arrive.

Like something buried in sawdust at the bottom of a brambled gift that Sinclair has promised to people whose cheques have been cashed is still a mystery. The company has wisely not committed itself to a gift delivery schedule.

What should Sinclair settle on as a gift? What would be more appropriate, a Microdrive order form or a compendium of patience games? Send your suggestions to PCN, 62 Oxford St, London W1 and we'll give £10 for the one we think is best.

Seconds out at Acorn

A graphic design package using a high-precision joystick and a new Econet file server were chosen to highlight the power of the 6502 second processor for the BBC micro when it was launched last week.

The 6502 will sell for £199 and come in its own box with 64K of RAM, the inevitable ULA custom-designed chip, and two new ROMs — one holding a new combined disk/Econet filing system, the other holding a version of Basic that works with the second processor.

Acorn has opted for a 3MHz version of the 6502 which connects to the BBC micro through the 'tube' interface to create a system where the 6502 on the main board handles all the input and output functions and the second processor runs the applications software.

Apart from speed, the other main advantage of the second processor is the extra memory it makes available to the user. With the machine code programs there is 60K available and with Basic programs 44K.

The Bitstick graphics system is similar to the version that runs on the Apple and has been designed by the same company, Robocom. It requires a BBC micro equipped with the 6502 second processor and twin 400K disk drives.

The package costs £375 which includes the Bitstick itself. This device is a high-precision joystick with three push button controls and a rotating stem to provide additional functions.

Four colours are available on screen with 12 shading patterns. Lines can be any width and areas can be defined and filled with any selected colour or shade.

Printing is limited to the Acorn Sparkjet printer at the moment, but extensions including a printer driver are planned.

The new Level Two Econet file server will be available in about three weeks at a price of £249. Like the Bitstick it can only be used with the 6502 second processor. It will provide a range of new facilities including unlimited length files (Level One restricts files to a



Latest release from Acorn — second processor arrives at last.

maximum length of 12K), hierarchical directories with up to 256 entries per directory and passwords and protected file access.

Second processors were to be a key feature of the BBC when it was launched two years ago and Acorn

has drawn a lot of fire from users for its failure to deliver the products by the originally announced dates. Tom Hohenberg, Acorn's marketing director, was unapologetic at the 6502 launch. 'We had other priorities,' he said.

Broadway's interfaces outpace Elk

You can now buy a printer interface for the Acorn Electron — but not from Acorn.

A Bedford firm, Broadway Electronics, has produced a printer and user-port plug-in card for the Electron that sells for £39.95 (plus VAT). A spokesman for Broadway said the plug-in card allows you to use the Electron with any printer that has a parallel interface.

And the interface supports all the

standard BBC micro *FX calls which allow you to control the operation of a printer from within a Basic program. Broadway is initially distributing the printer cards from its Bedford warehouse (the company can be reached on 0234 58303) and has plans for distribution through WH Smith and Boots.

Broadway is also planning soon to release an analogue-to-digital joystick port that would run BBC-compatible joysticks — it expects this interface to cost about £25 and to be ready in three weeks. This will again run like the BBC joystick ports — and still be released some four weeks before Acorn's Elk (joystick and printer interface).

Wren undergoing revamp

Following the review in PCN (Issue 52), Wren Computers has announced that it is to make changes to the production version of its £1,000 portable.

The company is commissioning additional communications software to take advantage of the machine's built-in autodial modem.

External design changes include a new lid (one was not supplied with the review machine) to protect the screen and provide storage space for the mains cable, disks and operating manual. The sliding action of the top part of the unit has also been improved.

One of the main complaints in the review was the hot running of the disk drives. 'The disk drives have continuously given us problems,' said Keith Silver, Wren's product manager, 'and we have changed over to a new supplier, with the advantage of not only providing reliable drives but also an improved opening and closing mechanism (they no longer chew your fingernails).'

Other changes include a rewriting of the Perfect software manuals, improved screen legibility and an extension of the Executive Desktop suite of software.

Tandy trove

Tandy will soon be releasing 187K disk drives and a monitor interface for its Model 100 portable computer.

From the beginning of May you will be able to buy an 80-column video interface and disk drive for the Model 100 — at a price of £599. The interface will allow you to run Model 100 software on a proper 'green screen' 80-column monitor and use up to two disk drives for storage.

The interface and disk drive will be launched by Tandy at the May 2 introduction of Tandy's Model 2000 big 16-bit MS-DOS machine and its Osborne-style portable, the 4-P launched in the US last year.

As with all Tandy launches, the machines should be in Tandy shops around the UK from the day of the launch.

All change at Flan

By Ralph Bancroft

Flan Computers, originally Samur-ai and later Elan, has changed its name again — but the new one promises to cause even more confusion.

Flan (Issue 53) has become Enterprise Computers, which is the name of its forthcoming first product. It is also a remarkably popular name in the micro business.

Enterprise was the name given to a desktop microcomputer from Data General. Flan has signed an agreement with Data General that allows it to use the Enterprise name, worldwide, for home computer products. Neither company was prepared to discuss how much money was involved in the deal.

In the UK it will be interesting to

see how many people will confuse Enterprise Computers with Enterprise Technology Ltd, a Wigan company that makes a printer interface board for the Spectrum.

Then, of course, there will be more than a few who will think that Enterprise Software Products Ltd is the main supplier of games software for the new machine. It is, in fact, a software house specialising in CP/M and MP/M software.

If you ring Enterprise Systems Group Ltd in Thames Ditton, a pleasant voice answers with the single word 'Enterprise'. A spokesman for the company, which markets business packages and special applications running on minis and mainframe computers, said that it was the first he had heard of Flan

Computers and its intention to use the name Enterprise.

'I'm surprised that the Registrar of Companies allowed them to register the name,' he said.

In fact, Flan has not yet registered the name Enterprise Computers Ltd. There is a small hitch — a company called Enterprise Computers Ltd already exists.

'The company was registered some years ago,' said Michael Shirley, Flan's marketing director, 'but it has ceased trading and is currently in the hands of the liquidators. We have acquired the name and are legally entitled to use it.' But Flan has yet to change the name at Companies House.

So the company is Flan, trading as Enterprise Computers.

VIEW FROM JAPAN



By Tom Sato

Japan haggles over price-performance

Personal Computer News is the name of the best selling weekly microcomputing magazine in Britain but in Akihabara, Tokyo's centre for consumer electronics, it is the name of the most feared and hated computer journal. Mention this name at any of the multi-storey computer shops around here, and you'll be kicked out for sure. For *PCN* publishes the haggled prices together with advice on how to get the maximum discount — a Bible for computer buyers, a nightmare for the shop keepers.

The Japanese *PCN* is a tabloid newspaper published once in a while. It gives the computer stores a real headache because customers keep on coming in and asking for the prices quoted in the newspaper. In most cases the prices quoted are impossible and some totally fictitious.

But in Akihabara you can haggle for anything. For the latest models the best you can do is about a five per cent discount or a free joystick, but if you are buying an old model with lots of peripherals, say a monitor, a disk drive and some software, then the whole system may be reduced by 30 to 40 per cent.

In one shop in Radio Kaikan, a building which contains more than 50 electronics shops, they were offering a Commodore 64 at 60 per cent off. In another shop the Sharp MZ700 with a full upgrade was offered at 50 per cent of the original price with more discount on demand.

Computer shops are springing up like mushrooms in Akihabara. Or more precisely, like asparagus, since most of the large shops recently built are multi-storey. Land is expensive in Tokyo and the only way to increase the floor space is to build upwards.

One such recent development is the Laox chain stores. They have four shops in Akihabara and all of them are about five storeys high. The shop manager of Laox Central shop, Hiroyuki Kanbara, explained that most of the shops were built during the summer of 1983 in anticipation of a computer boom at Christmas.

The central shop is situated in the centre of Akihabara and has seven floors. The entire third floor is occupied by MSX computers. According to Kanbara, the sales of MSX took off as soon as the winter holiday started. The price of an average MSX computer is low enough for school kids. He said that 'quite often, a customer will come in with their parents and spend between ¥70,000 and ¥100,000 (£200-£285). They usually buy joysticks, software and sometimes a monitor together with the computer.'

The most popular MSX machines at this shop are Sony Hit Bit and Yamaha YIS, but Mr Kanbara says that this differs from shop to shop. The MSX computers account for more than 30 per cent of total units sold in this shop.

Commenting on more expensive personal computers Mr Kanbara said that 'computers with a built-in microfloppy disk drive are becoming very popular. The Sharp X1C, which has a 3in floppy, and also the Sony 777 are nice machines and sales are definitely on the increase. The FM 7 by Fujitsu is still very popular.'

Fujitsu's FM 7 is a relatively old machine here. It has been on the market for more than a year, but because of strong graphics capabilities and fast Basic it is selling in a similar manner to the BBC micro in the UK. The FM 7 is a twin 6809 computer with 32K ROM, 32K RAM and a generous 48K of video RAM.

One question many British computer journalists ask is: 'Are Japanese computers as reliable as their hi-fis?' The answer, according to Mr Kanbara, is 'Yes'. He said that 'computer products have now made quite a lot of progress in terms of quality control. We check out everything we sell so we don't have many computers returned to us.' However, there were chronic shortages of the NEC PC 8801 series and PC 9801 series last year. Many shops couldn't get hold of them and had to turn away a lot of customers. The 8801 and 9801 are popular business machines, and demand exceeded production, due to a shortage of ICs used by these machines.



Jane on an Apple—a rival for Lisa.

Lisa's rival is no plain Jane

Apple's Macintosh could be exposed to some April showers when a rival system reaches the UK next month.

A new US company has decided to take on Apple in its own backyard. Arktronics Corp is busily promoting a Lisa/Macintosh system for the Apple II despite Apple's own similar product which was announced in the UK at the same time as the Macintosh.

The software and mouse package

is called Jane and will arrive here in April with a price tag of £314. The software incorporates a word processor, a spreadsheet/calculator and a filing system/mailing list, and the whole system is controlled with the now familiar icons. Arktronics is also working on a graphics package to be integrated into the existing set.

The company's European agent can be contacted in Paris on 010-331 522 1515.

TI 99/4A gets games boost

Friends of the Texas Instruments 99/4A are still rallying round the discontinued machine.

Stockport software house Stainless has published its latest catalogue of programs for the 99/4A

with an undertaking to continue to support the system and a message of hope for the faint-hearted: 'There is no shortage of software for the TI 99/4A!'

The titles include Sky Diver, Devil Craze and Hang Glider Pilot at £8; Happy Math, Spelling and Phonics Tutor at £6 and Pengi (a penguin threatened by yeti) for £5. Stainless Software is at 10 Airstone Road, Stockport, Cheshire.

Apricot is boarded up

Would-be Apricot expanders can look forward to memory boards from Dataflex in early May.

The expansion boards will be 128K upgradeable to 256K with the basic board at £224.50 and the 128K add-on board at £195.50. Dataflex will follow these with an IBM monochrome controller card in the £220 price range.

Director David Low says the company is completing its £172.50 modem board for the IBM and Sirius (Issue 47) though a shortage of components has slowed down progress. This shortage is becoming an increasingly common feature of the UK micro scene.

Fair warning

The next ZX Microfair will take place as usual at Alexandra Palace but organiser Mike Johnston has appealed to people to buy tickets in advance, to avoid the long queues that were a feature of the last fair.

Mr Johnston makes no bones about the lack of gloss on the Microfairs compared to other shows, but adds that it is deliberate. 'We are charging people about a half to one third of what they might pay at an equivalent show.'

He said that to overcome the problem of queues—11,000 people attended the last fair—advanced booking was the most reasonable solution. The venue was large enough, he pointed out, and the exhibitors wouldn't like the idea of extending the exhibition.

First catch your rabbit



Tatung's PC-2000 — more than the average disk capacity.

By Ralph Bancroft

New micros seemed to be pouring out of the Wembley Conference Centre last week at the Computer Trade Show. Not open to the public, it is used by manufacturers to find distributors, and by distributors to find dealers.

Leading the pack of new micros were a home computer from Hong Kong called the Rabbit, a business micro from Tatung (better known for televisions and monitors) and an IBM compatible transportable from Columbia. Then there was a large (and expensive) Unix running machine and a smaller Z80 machine from SGS-Ates. And Husky was

promoting a new version of its Hunter portable.

The Rabbit is so new to this country that the only ones around had arrived the day before the show. It looks like an IBM keyboard and contains a Z80, 80K of RAM (expandable to 144K), 16-colour 256 by 192 pixel screen, 32 sprites and three voice sound. There is an adaptor available to plug in Coleco games cartridges.

The expected price is around £250, though it's not in the shops yet.

The Tatung PC2000 certainly scores on looks and price even though the machine is more or less a

standard Z80-64K RAM-CP/M machine. It costs £1,699 plus VAT and comes with the Fast Accounting sales and purchase system bundled in. Unlike other low-cost machines which offer a barely adequate 200K storage on each disk drive, the PC2000 has two 1Mb drives. Another welcome feature is the 12 month warranty instead of the usual three months.

The Columbia transportable, called the VP, had its first showing this side of the Atlantic and ugly it looked too. But that, together with £2,550, is the price you have to pay for squeezing an IBM compatible and amber monitor screen into a metal box with a handle.

Columbia sees itself as offering a higher degree of compatibility compared to other manufacturers of PC clones. At the show the VP was demonstrating its prowess by running Microsoft's Flight Simulator — considered to be one of the toughest tests of true IBM compatibility.

The aptly named Samson is a large beast aimed at the mini rather than micro market. It runs a version of Unix System III and makes use of go-faster features like virtual memory, dual bus architecture and intelligent communication controllers.

If you can't afford the five figure price tag, SGS-Ates would like to interest you in its UX8-1 industrial micro. Its main plus feature is a rugged metal casing designed to cope with harsh environments. Inside is yet another unpretentious Z80-64K RAM-CP/M machine.

There is nothing standard about the Husky — even though it was being shown for the first time running a CP/M emulator. The Husky is a rugged go-anywhere

laphed portable with anything from 80K to 209K of CMOS RAM.

The emulator allows you to link the Husky to any CP/M computer and download software like Wordstar or dBaseII. The programs can then be run on the Husky and any data entered can be uploaded to the CP/M machine for subsequent processing.

Also new for the Husky is the Reporter, a portable 40 column printer that runs off its own built-in nicad batteries. The printer mechanism is housed in a mounting



Husky Hunter — green redesign.

cradle that can hold the Husky. Also included is a recharging unit that recharges micro and printer at the same time.

Best bargain at the show was the Sage accounts package from GCC of Cambridge. For the standard price of £375 it includes a Z80 second processor for the BBC micro.

The processor board is the ZEP 100 board from Torch but, unlike Torch, GCC has housed it in a separate box that sits next to the Beeb.

Other exhibitors at the show included Computers, generating interest in its new Laureate (Issue 53).



MEGASTORE — With just a hint of 'me too', Micro Memory Systems has released a hard disk subsystem for the ACT Apricot, a week after ACT launched its own hard disk version of the machine. But MMS' storage system is a free-standing, self-contained unit, and two of them can be daisy-chained to one Apricot; the company also has software under development that will let users attach several Apricot or Sirius systems to one disk system. MMS has 5Mb, 10Mb, 15Mb and 20Mb versions with prices rising from £1,244 to £1,495. The company is on 0635 40405.

TVs switch over

A TV-to-monitor conversion programme promises to cut the cost of colour monitors by as much as 50 per cent.

Scottish company Doublemode can offer RGB sets for the BBC micro for £97.75; it hopes to have composite video units for Commodore and Atari users in the coming weeks, and a Sinclair set out by the end of April.

The source of the sets is the early cable network that Visionhire is closing down. Doublemode has picked up 10,000 line sets — these aren't quite televisions but they aren't monitors either, though according to a spokesman they have some of the characteristics that make conversion fairly straightforward.

'We've picked two chassis for

their reliability' he said. 'Being televisions made by a specialist television manufacturer their reliability is very high and any TV engineer can repair them.'

The conversion takes an RGB interface and a very large mains isolating transformer. The transformer carries a five year guarantee and the complete monitor three months.

The operation won't fold up once the Visionhire sets have all gone — Doublemode is also tapping a source at Rediffusion. Its conversion capacity is 250 sets a week, but the spokesman said it could double that overnight if the demand arose.

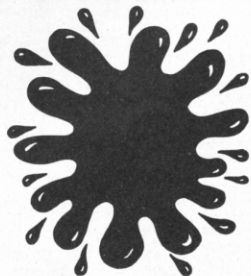
Screens of 20in, 22in and 26in will be available. PCN hopes to Pro-Test a Doublemode monitor in a forthcoming issue.

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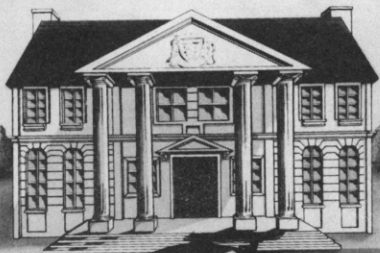
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PCN charts

Hardware Top Ten up to £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▶1	(1)	Spectrum	£99	(SI)
▲2	(3)	VIC 20	£140	(CBM)
▼3	(2)	CBM 64	£229	(CBM)
▲4	(6)	BBC B	£399	(AC)
▼5	(4)	Dragon 32	£175	(DD)
▲6	(8)	Atari 600XL	£150	(AT)
▶7	(7)	Oric 1	£99	(OR)
▲8	(10)	Apple IIe	£750	(AP)
▼9	(5)	ZX81	£40	(SI)
▼10	(9)	Electron	£199	(AC)

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the fortnight up to March 8. The games chart is updated every other week.

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 is updated every month.

PCN Charts are compiled exclusively for us by RAM/C, who can be contacted on 01-692 6596.
Top Ten over £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▶1	(1)	IBM PC	£2,390	(IBM)
▶2	(2)	ACT Sirius	£2,525	(ACT)
▲3	(5)	ACT Apricot	£1,760	(ACT)
▶4	(4)	Apple III	£2,755	(AP)
▼5	(3)	DEC Rainbow 100	£2,359	(DEC)
▲6	(—)	Olivetti M20	£2,180	(OL)
▲7	(8)	Wang Professional	£3,076	(WANG)
▲8	(9)	NCR Decision Mate V	£1,984	(NCR)
▼9	(7)	Kaypro 10	£2,595	(CKC)
▲10	(—)	Data General Ent 1000	£2,645	(DGL)

Distributors: AC Acorn ACT ACT/Sirius AP Apple AT Atari BW Brainwave CKC CKC Computers CBM Commodore DD Dragon Data DEC Digital Equipment DGL Data General EP Epson ICL ICL IBM IBM NCR NCR OR Oric SI Sinclair Wang Wang OL Olivetti.

Machines: SP Sinclair Spectrum AC Acorn BBC 64 Commodore 64 V20 Commodore Vic 20 81 Sinclair ZX81 DR Dragon OR Oric AT Atari



Games Top Thirty

	GAME TITLE	PUBLISHER	MACHINE COMPATIBLE								PRICE	
			SP	AC	64	V20	81	DR	OR	AT		OTHERS
▲ 1 (4)	Chequered Flag	Psion	*									£6.95
▼ 2 (1)	Manic Minor	S/W Projects/Bug Byte	*		*							£7.95
▲ 3 (11)	Fighter Pilot	Digital Integration	*									£7.95
▲ 4 (17)	Atic Atac	Ultimate	*									£5.50
▲ 5 (10)	Scuba Dive	Durell/Martech	*		*				*			£6.95
▼ 6 (3)	3D Ant Attack	Quicksilva	*									£6.95
▼ 7 (2)	Hunchback	Ocean	*		*				*			£6.90
▲ 8 (23)	Rev of Mutant Camels	Llamasoft	*		*							£5.95
▶ 9 (9)	Alchemist	Imagine	*									£3.95
▲ 10 (21)	Hobbit	Melbourne House	*	*	*	*						£14.95
▼ 11 (6)	Flight	Psion	*									£7.95
▲ 12 (—)	Chinese Juggler	Ocean	*		*							£6.90
▶ 13 (13)	Death Chase	Micromega	*									£6.95
▼ 14 (7)	Mr. Wimpy	Ocean	*		*				*			£6.90
▼ 15 (12)	Lunar Man	Ultimate	*									£5.50
▼ 16 (5)	Stonkers	Imagine	*									£3.95
▲ 17 (24)	Skull	Games Machine	*									£6.95
▼ 18 (8)	Space Shuttle	Microdeal	*	*	*	*		*	*			£8.00
▲ 19 (30)	Wheelie	Microsphere	*									£5.95
▲ 20 (—)	Wizard and Princess	Melbourne House	*			*						£5.95
▲ 21 (—)	Quest of Merravid	Durell/Martech	*		*							£7.95
▼ 22 (15)	Jet Pac	Ultimate	*			*						£5.50
▲ 23 (26)	International Football	Commodore	*		*							£9.95
▲ 24 (—)	Fred	Quicksilva	*									£6.95
▲ 25 (—)	Cyrus-is-Chess	Intelligent Software	*									£9.95
▼ 26 (16)	Valhalla	Legend	*									£14.95
▲ 27 (28)	The Snowman	Quicksilva	*									£6.95
▲ 28 (—)	Blogger	Alligata	*		*							£7.95
▲ 29 (—)	Hungry Horace	Psion/Melbourne	*		*							£5.95
▼ 30 (14)	Pool	CDS	*									£5.95

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BIG K – On sale 15th March

Some Atari owners don't know their luck

As proud possessor of many hundreds of programs for the Atari 400, I was greatly amused by BC Heath's letter (Issue 50). If he were to look at the advertisements in magazines such as *PCN* I am sure he would discover many English software houses which produce excellent programs, and many shops which stock independent, as well as Atari software, such as: Calisto Computers of Birmingham, Gemini Electronics of Manchester, Gamer of Brighton, Microchips of Winchester and Micro-C of High Wycombe.

Software manufacturers include: Allrian Data Services of Middlesex, Calisto Software of Birmingham, Channel 8 Software of Preston and English Software Co of Manchester (the best).

If I were to go through all issues of *PCN*, I would certainly find many more.

As for prices, Mr Heath bought the best colour graphics computer in its price range (under £500) excluding 600XL, 800, 800XL etc, and should realise that it is paying for the quality of the games.

However, as some are certainly not worth the money, I suggest he joins a software library. And if still not satisfied, then subscribe to *Page 6*, the Atari magazine, at 18 Underwood Close, Parkside, Stafford.

Alternatively, find a DEC VAX — it's much more fun.

Congratulations on your first birthday. You have this strange tendency to improve with each issue.

Jeff Best,
Sussex.

Many thanks to all of you who replied to Mr Heath. This one sums up your views, I think — Ed.

Anco repeats its delivery promise

I would like to clarify a few points in your article (Issue 51) with regard to the non-delivery of tapes to your readers.

First, you stated that I had banked your readers' money and not sent goods because of a continuing feud between Cascade Software and my company Anco Software. This is not the true state of affairs: I will continue to send out tapes to every customer who orders

Share your thoughts in the UK's liveliest micro weekly letters columns. Funny, feisty or fanciful, your letter could win you £10 if it's of star status.

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RANDOM



ACCESS

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

the same, and orders are not being stopped in any way because of this matter.

Second, the article implied there were a vast number of people who had not had their tapes, when in fact I was informed of the names of two of your readers who had complained to your magazine.

I am personally supervising the dispatch of orders to every customer in an effort to eradicate the problem of delays in receipt of tapes, and would ask anyone who orders by mail order to print their name and address clearly to avoid any mistakes.

On the subject of the claim of infringement of copyright by Cascade, I am not selling the same games as Cascade is selling and I have numerous letters from customers saying how pleased they were with the quality of the games on the Anco tape.

Anyone who has any complaint of non-delivery should write to me personally as soon as possible with details of the tape ordered, date, etc, and I will look into the matter at once.

Philip Sands, proprietor,
Anco software,
25 Corsewall St, Coatbridge.

Anco should be commended for taking the time to reply. And please take up Mr Sands' offer if you have a non-delivery problem — Ed.

A teacher's taxing problem

During the past four years I have developed a considerable interest in computing. I originally purchased a TRS-80 which I later upgraded to 48K, and then added a disk drive.

More recently I have purchased a BBC Micro, printer, and additional peripherals. I've become a competent Basic programmer with good knowledge of machine code and other languages.

I work in a business studies

department of a local college of further education, and because of my interest in computing, have been given special responsibilities in this field. I persuaded the department to purchase a BBC Micro, disk drive and other equipment. Using this machine, and making extensive use of my own, I wrote a number of software packages eg student records/reports, economic simulations etc, and as a consequence the staff are now increasingly interested and involved. I must stress the local authority provided me with no training or time off for this responsibility or work.

I recently wrote to the Inland Revenue inquiring if it would be possible to claim my £400 micro against tax (as a consequence of its vital role in my work), only to be told in a roundabout way, no.

Without wishing to display 'sour grapes', it seems slightly ironical that a businessman who will use a computer to increase his profits can claim this equipment against tax, while a teacher, who buys it out of his own salary, and then uses his acquired knowledge to educate and benefit others in the new technology (a vital development, if Sir Keith Joseph is to be believed), is penalised in this way.

I Skelly,
Heswall, Wirral

We'd love to hear from anyone who has made a successful claim of this nature. Meanwhile, we'll check out the rules and regulations — Ed.

Attractive circulars with an Epson printer

Members of churches, voluntary organisations or political parties may be interested in how I use my Epson printer to produce attractive circulars.

It is possible to combine the old technology with new and use the printer to cut duplicator stencils. First edit your text, then remove the ribbon, set the print head gap to maximum and insert the stencil

PCN £10 Star Letter



(ribbon feed is, of course, essential).

'Print' your text again and you have a perfectly cut stencil. At first I was worried about damage to the print head and left the ribbon in, which produced reasonable stencils. Then I decided to be brave and took the ribbon out which produced even better results with no ill effects.

It's possible to combine the various character fonts with bit image graphics. My printer manual tells me that I can only mix graphics with normal size characters on the same line. True enough the printer gets 'its knickers in a twist' if you try enlarged or condensed characters on the same line. The answer is to adjust your line feed under software control to a suitable value and print your text and graphics on alternate lines.

To print your text at six lines to the inch, set the line feed to 3/72 inch and go round the following loop:

Line 1 Graphics
Line 2 Text
Line 3 Graphics
Line 4 Just a line feed

Each line of graphics must be six dots deep. You will have to write your own software—you can't use a word processor for this.

By this means I have produced holly leaves at Christmas, hearts on Valentines and a border of crosses and flowers on Easter service notices.

R Wilson,
London, SE26.

***	*****	***
1 APRIL - MOTHERING SUNDAY		10 a.m.
Family Service		
8 APRIL - PASSION SUNDAY		8 a.m. & 10 a.m.
Holy Communion		
15 APRIL - PALM SUNDAY		8 a.m. & 10 a.m.
Holy Communion		
20 APRIL - GOOD FRIDAY		2 p.m.
Third Hour Service		
22 APRIL - EASTER DAY		8 a.m. & 10 a.m.
Holy Communion		
THE LORD IS RISEN ALLELUIA!		

Lost in a maze of bits and bytes, trapped in a forest of errors, bugged by Basic? Whatever the problem, CALL on us. Our panel of experts is at your command.

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

40 and 80 track drive with the BBC B

Q I have a BBC Model B and I have recently purchased a Teac 55 40/80 track Disk Drive.

What is the difference between a 40 track drive and an 80 track drive? I know that with an 80 track drive you can store more data, but there must be other differences.

Could you explain what a double density controller does and where I can purchase one? *Arvinder S Maini, Wembley, Middx.*

A The difference between 40 and 80 track drives lies mainly in the number of tracks per inch from the circumference to the centre. Apart from this they are virtually identical. An 80 track drive steps the read head across the disk in smaller steps than an 40 track drive. This means that the gadgetry inside an 80 track drive needs to be more accurate and is thus more expensive.

Presumably, a double density controller allows four drives to be accessed by the BBC. The disk drive controller inside the BBC has two wires that select which drive is to be used. These two can be decoded to allow four drives to be accessed. Most double density double sided disk systems do this for you internally but half of a 4555 integrated circuit should do the trick.

Oric 5 pin DIN plug shouldn't be used

Q While experimenting with the cassette I/O on my Oric, I noticed that the manual says a five pin DIN plug should not be used. I thought you could get the Oric's sound out to an external amplifier, or speaker, so what's wrong with a DIN plug? *James Eibisch, Cheltenham, Gloucester.*

A You shouldn't use a normal five pin DIN plug because pins 4 and 5 may be connected to pins 1 and 3, which means the tape recorder will be driving the Oric's internal speaker and may damage it.

The diagram shows the pin configuration (looking at the back of the Oric).



1 tape out
2 ground
3 tape in
4 sound out
5 sound in
6 relay (motor control)
7 relay (motor control)
The best cable to use is the simplest: a five pin DIN plug with pins 1 and 3 connected to the centres of 3.5mm jack plugs. The sheaths of both leads should be connected to pin 2 at the Oric end and the outer sections of the jacks at the tape end.

If you want to get sound out of your Oric, you'll need to use pin 4. You could short this across to pin 1, then use the MIC input on the tape.

If pin 5 is shortened across to pin 3, your tape signal is channelled to the Oric's internal amplifier, and then to the speaker.

Pins 6 and 7 are redundant.

Addressing circulars using a 48K Spectrum

Q Is there a software package for my 48K Spectrum that performs the following tasks:

- Print names and addresses (six lines) on name and address sticky label paper on the Spectrum printer.
- Permit two to three field sort routines for the above, using at least six extra fields for information.

D G Smith, Surbiton, Surrey.

A Two problems here. First you need a decent program, and second you need a printer that'll handle the sticky labels. The latter is fairly easy, unless you want to do it on the ZX Printer. Contact Immac on 09285 67551 for more information.

As for the software, we assume you'll be looking for

something that's cheap, and can be used for a variety of purposes. Try Masterfile from Campbell Systems (01-504 0589). This gives you the facility to draw up your own format and generally mess around with the data with very little bother.

How many words can you make from Oric?

Q I have an interest in cross-words and have been trying to convert a ZX81 anagram generator to my Oric 1.

I'm really stuck now, and I just don't seem to be able to get it working. Please can you help? *Peter Ward, Molar, Bucks.*

A A simple anagram generator is quite easy in Basic. The listing below generates anagrams fairly quickly, but has the disadvantage that it will repeat possible combinations of the letters of a word ad infinitum.

```
10 PRINT "ENTER WORD":INPUT
TW$
20 A$ = TW$:AN$ = ""
30 L = LEN(A$):IF L = 0 THEN 80
40 AL = INT (RND(1)*L) + 1
50 AN$ = AN$ + MID$(A$,AL,1)
60 A$ = LEFT$(A$,AL-1) +
RIGHT$(A$,L-AL)
70 GOTO 30
80 PRINT AN$
90 GOTO 20
```

It's difficult to write a program that generates all the possible anagrams of a word, without repeating itself. The only routine we know of to do this relies on recursive subroutines, ie subroutines which call themselves, but it's too long to fit in Routine Inquiries. However, you might gain from looking at Program Cards (Issue 31, page 66).

Printing longer lines — for family trees

Q Many printers appear to be designed to print up to 130-200 characters per line depending on the size of the printer. However, many computers go up to only 80 per line. At the moment I'm learning about computers on the Spectrum where the maximum appears to be 64 with Tasword 2.

Do any word processing programs for the Spectrum produce a longer printed, as distinct from screen display, line? And when I upgrade my computer

which should I consider if I wish to print around 200 characters per line?

I'm interested in the ability to print out extensive family trees. *J M Dickey, Burton-on-Trent, Staffs.*

A You seem to be a little confused here. Some printers do 200 characters per line in condensed mode, but they're relatively expensive, and they wouldn't necessarily be a lot of use for your requirements. On screen Tasword doesn't cater for more than 64 characters (look at the screen to find out why) but your problem doesn't really seem to us to be one that could be solved by a word processor.

What you really want to do is to get yourself some software that allows you to draw up the family tree on screen then do a screen dump. You've got two alternatives — write your own, or get in touch with a company called Bel Tech (07462 5420) which markets a genealogical package for keeping records and producing family tree diagrams.

With this, all you'd have to do would be to get a decent dot matrix and an interface for your Spectrum.

QL advanced interfacing

Q When Sinclair introduced the QL I wrote to the company asking for clarification of one or two points before I placed an order. The next week you reviewed this computer and on the strength of this report I placed an order. To date I haven't received a word from Sinclair, not even an acknowledgement of my order.

My chief concern is to learn whether or not my Microline 80 printer will operate with the QL. Can you help? *EJ Welton, Sutton, Surrey.*

A You don't say whether your printer has an RS232. If it does, you'll have no problem as the QL has an RS232 as standard. If it's Centronics, contact your dealer about getting an RS232 fitted, or wait until someone produces a Centronics interface for the QL.

There's no point rushing, as it could be some time before the machine actually arrives.



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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.*

Dragon screen super switch

I am sure the key to fully mixable text and graphics on the Dragon lies in the essence of the following short program. Try it and see what happens.

```
5 POKE 65495,0
10 X=20:PMODE 1,1:COLOR 0,5
20 PCLS: CIRCLE(125,100),80
30 SCREEN 1:FOR I=1 TO X:NEXT
40 SCREEN 0:FOR I=1 TO X:NEXT
50 GOTO 30
```

What the program does is switch between the graphics screen and the text screen so fast they merge into one and the circle can be seen drawn on the graphics screen superimposed on the characters on the text screen (it's best to list the program before it is run).

Obviously, Basics isn't as fast as machine code even with the speed up POKE at the beginning of the program. A machine

code routine could easily be produced which uses the Dragon's interrupts to switch between text and graphics modes so that programming can continue while the program is running.

*F R Ellahi,
Halifax, Yorks.*

Larger letters on the Vic 20

On the Vic 20 I found that:

```
POKE 646,8:POKE 36879,120
```

will give larger characters on the screen. Any background colour can be used, as long as the border is black. This is because half the characters are black and the other half are the same colour as the border.

*Per Kim Hardysoe,
Mermaid DX-QSL Club,
Grenaa, Denmark.*

Resolution of colour clarified

Here is a method of increasing the Dragon's colour resolution. Normally when using PMODE 3, the X axis is mapped so only the pixels with odd numbers light up, so a value of 128 would be placed in position 127. The Dragon can be coaxed to display all 256 positions, making it possible to overlap pixels and thus double the resolution. Try the following program:

```
10 PMODE 3,1:SCREEN 1,0:PCLS
20 PMODE 4,1
30 CIRCLE (128,96),96
40 PAINT (128,96)
50 GOTO 50
```

CBM screen gets the jitters

The following short program for the Commodore 64 is a useful routine to add to any game requiring a special effect for an explosion. By using the X and Y pixel scroll registers and altering them to random values, the screen is rapidly shaken in all directions. This, combined with other effects such as a flashing screen and sound effects will produce a realistic 'hit'. By adjusting the FOR loop in line 130, the effect can be shortened or extended.

*David Gristwood,
Sunderland, Tyne and Wear.*

```
100 REM 'HIT EFFECT' BY D GRISTWOOD
110 Z1=53265:Z2=53270
120 Z3=PEEK(Z1):Z4=PEEK(Z2)
130 FOR Z5=1 TO 20
140 Z6=INT(RND(CTI)*8)
150 POKE Z1,(PEEK(Z1)AND248)ORZ6
160 POKE Z2,(PEEK(Z2)AND248)ORZ6
170 REM PUT ANY OTHER EFFECTS HERE
180 FOR Z7=1 TO Z6*3:NEXT Z7
190 NEXT Z5
200 POKE Z1,Z3:POKE Z2,Z4
```

Commodore 64 loses its voice

Here is a machine code routine for the Commodore 64 that turns off the sound chip. Once the machine code poker program has been run, whenever the routine needs to be called, type: sys 49152 as a direct command or otherwise. This routine is most useful in long programs dealing with the sound side of the CBM 64. When called, all the sound registers are set to zero (all 20 of them) instantly, and even the machine code contains less data to be poked than the customary:

```
FOR X=1 TO 20:POKE X+S,0:NEXT X
where S is set to point to the start of the sound chip. The process I usually use is:
```

```
10 OFF=49152
and to cut the sound off use:
```

```
100SYS OFF
D Rossiter, Paignton, Devon.
10 REM * MACHINE CODE ROUTINE TO CUT OFF ALL THE SOUND REGISTERS *
30 SA=49152:C=0
40 DATA
164,0,153,0,212,200,196,0,240,3,76,2,192,96,0
50 READ D:POKE SA+C,D
60 C=C+1
70 IF SA+C=49167 THEN 100
80 GOTO 50
100 PRINT*FINISHED, PLEASE TYPE SYS
49152 TO CALL THE POUTINE"
110 END
```

Removing line 20 will clarify the difference. As you will notice, colours cannot easily be controlled in this way, but it is possible.

*C D Bent,
Handsworth, Birmingham*

The 480Z clears the screen

480Z users (Research Machines) using Graphics probably type something similar to CALL "Resolution", A,B near the program's beginning. To clear the screen CALL "Clear" can be used. This is rather slow and an alternative is to use CALL "Resolution", A,B again resulting in instantaneous clearing of the screen.

Note that A and B are parameters that describe the graphics mode to be used.

*S S Alg,
Fulham, London.*

Protect software by fooling the drive

Here is a tip for all CBM 64 and 1541 disk drive owners. Run the following program:

```
10OPEN 3,8,3,"0":PEEK,S,W"
20FOR P=0 TO 23020
30PRINTP;"-";PEEK(P),
40PRINT#3,P,PEEK(P)
50NEXT P
60CLOSE 3
70 END
```

When the program has

finished, the red error light on the drive should flash. Type the following:

```
OPEN 15,8,15
PRINT#15,"50:PEEK"
CLOSE 15
```

Load the directory with:

```
LOAD"5",8
```

When it is listed you'll see there are no blocks left for writing. The DOS thinks the disk is full.

No programs or files can now be saved onto this disk and only programs which were originally on it will remain. The only way to bring the disk back to normal is to re-format it, destroying all the contents. Readers may find this useful when selling their software products on disk.

*Keiren McCorry,
Lurgan, Co Armagh*

Top up the RAM by 200 bytes

A useful routine on the Dragon 32 will push the RAM top up by another 200 bytes. Switch on the machine, then type:

```
CLEAR 24871 <RETURN>
followed by
CLEAR .1 <RETURN>
```

Typing PRINT MEM will result in 25071, an extra 200 bytes of memory.

*Mark Wood,
Byfleet, Surrey.*

Issue 1, March 11-18.

Pro-Tests: Apple's Lisa, Text TTYX00, Spectrum speech synthesizer, Apple printer, Commodore network, 3D on Spectrum, graphics package for Apple and IBM, BBC graphics system.

Features: computer chess, Occam parallel processing language, Victor/Sirius function keys.

ProgramCards: Towers of Braham (Pascal), Biorhythm (Apple II), Roman Year (Apple II), Shape (Apple II).

Gameplay: Darts, Soccer (Atari); Castle of Ribbles (BBC Model B); Pictoria (Spectrum); Flight Simulator (IBM PC).

Databases: micro and peripherals.



Issue 2, March 18-25.

Pro-Tests: Toshiba T100, Casio PB100, ZX81 Basicaire, Vix speech synthesiser, Spectrum spreadsheet, IBM graphics, BBC word processing.

Features: Colecovision, micro backgammon, nursery computing, Gameplay: Ultima II (Apple), Trader (ZX81), Starquest (Vic 20), Hunchy Horace (Spectrum).

ProgramCards: 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, F41 printer, IBM keyboards, Petpac compiler, Sirius toolkit, Dragonical.

Features: Atari upgrade, Lynx programming, Apple music, Gameplay: Mangrove (Vic 20), Mutant Herd (Vic 20), Compendium (Dragon), Patience (Spectrum), Noughts and Crosses (Dragon), Great Britain Ltd (Spectrum), Ulysses (IBM PC).

ProgramCards: Magnify (Spectrum), Spider (Vic 20), Firing Range (BBC).

Databases: micro.

MicroMedia: Anatomy of the BBC, part 3.

Issue 4, April 1-8.

Pro-Tests: Pled Printer Communicator, Olympia ESW3000 printer, Namal SuperTalker, Commodore network, Spectrum Pascal, Cashbook (BBC).

Gameplay: Dark Crystal (Apple), St George (Dragon), Wizard War (Dragon).

ProgramCards: Fruit Machine (Commodore), Tunesmith (BBC), Array Editor.

Databases: peripherals.

Clubnet: Clubs and user groups.

MicroMedia: Go Forth, part 1.

Issue 5, April 8-15.

Pro-Tests: Commodore 700, Ikon Habitat, 1-2-3 (IBM), ZX81 machine code.



Features: speech packs, monitors.

Gameplay: Grand Prix (Dragon), Deadly Day (Spectrum), Deadline (Apple).

ProgramCards: Wacky Racers (Oracle), Fruit Machine (C64), Pares (Oracle).

Databases: software.

MicroMedia: Anatomy of the BBC, part 3.

Issue 6, April 15-22.

Pro-Tests: Mattel Aquarius, Epson 80 printer, VIC 20 assembler, Supergraf on Victor/Sirius.

Features: Dealer support, Atari graphics.

Gameplay: Krakit (ZX81), Cruising on Broadway (Spectrum), Kaktus (Vic 20), Fantastic Voyage (ZX81).

ProgramCards: CBM controls, Computer Set Up (BBC), Wacky Racers (Oracle), Julian Dates.

Databases: peripherals.

MicroMedia: Graphics, part 2.

Issue 8, April 29-May 6.

Pro-Tests: Atari Home Files Manager, Kobay's Vic Star for the Vic 20, Hesterson's Accounts for the Spectrum, Epson RX80 printer, NCR's Decision Mate V, Future Computing's FX30.

Features: Micronet, Compact programming on the TP99A4.

Gameplay: Harvestor (Vic 20), Strategic Command (Dragon 32), A first Book of Micro Rhythms (BBC), Bringing the Time-Money (Spectrum).

ProgramCards: Program Indexer (BBC B), CBM Database cards 1-4, Sort/Extract.

Databases: software.

Issue 9, May 6-13.

Pro-Tests: structured Basic on the Vic 20; Star DP510 printer, Dams and Interop interfaces for Commodore 64; Micro-Printer.

Features: BBC function keys, Atari word-processing part 1.

Gameplay: Dungeons of Intrigue (Oracle), the Castle (Oracle), Starship Command (BBC B), Dragon Trek, Micro-Printer (BBC B).

ProgramCards: Lower case (Dragon 32), CBM database cards 5-6, Micro-Printer synthesizers (Apple Search) (MBasic).

Databases: hardware.

MicroMedia: Graphics, part 4.

Issue 10, May 13-20.

Pro-Tests: Infomast on Commodore 64, Dragon Mac, MC20 and IBM micro music synthesizers (Apple), Print directly coupled model; Epson QX10.

Features: IBM graphics part 1; Atari word-processing part 1.

Gameplay: Rescue (Spectrum), Dictator (Spectrum), Roman Empire (Spectrum), Choplifter (Vic 20), Skyhawk (Vic 20).

ProgramCards: Union Jack (Lynx), Escape (Spectrum), CBM Database cards 7-9, Evaluate (MBasic), Formula (BBC B).

Databases: peripherals.

MicroMedia: Graphics, part 5.

Issue 11, May 20-26.

Pro-Tests: Apple Pascal, PFS-file for IBM, Apple Pascal, Printer computing, Picked Joystick Controller for IBM and Spectrum; CSE Computer Board.

Features: ZX81 graphics part 2, Mator's Mania (Commodore 64), Oracle Flight, BBC micro music synthesizers (Apple), Embassy Asual (Spectrum), Embassy Asual (Spectrum), Torbor (Spectrum).

ProgramCards: Horizontal Barchart (ZX81), Connect Four (Dragon 32), CBM Database, cards 10-12.

Databases: keyboards.

Issue 12, May 27-June 2.

Pro-Tests: Spectrum word processor, PFS-Reporter on IBM, File Handling for Colour Genie; CTI CSD type 1 printer, TO Trackball; SFD 15.

Features: Epson Basic, Oracle sound part 1, Tandy Colour graphics.

Gameplay: Mad Martha (Spectrum), Frenzy (Spectrum), Headbanger (Spectrum), Oracle roundup.

ProgramCards: Election Barchart (Commodore 64), Memory Utility (BBC B), Munch (Spectrum).

Databases: hardware.

Issue 13, June 3-9.

Pro-Tests: Teletext for Dragon 32, Abercromb Fourth for Spectrum, GFS graphics processing system for Apple II; joystick, rales; Ajale.

Features: Dragon meets Tandy, Oracle music part 2, transferring Basic for Colour Genie and Genie (Dragon 32), Time Bomb (Atari).

Gameplay: Everest Ascent (Spectrum), Colour Genie roundup, Meric, Maze (Lynx), Ace, Ota (Atari).

ProgramCards: Cupid (Oracle), Dragon (Dragon 32), Time Bomb (Atari).

Databases: peripherals.

Issue 14, June 16-June 15.

Pro-Tests: Apple Accelerator II board, Modula-2 (Apple II), Oracle Base, Jostyck Control Unit J6, Kompton Centronics Interface, BBC Speech Synthesiser.

Features: Newbrain Base part 1, Sirius designing.

Gameplay: As Diddums (Spectrum), Monopole (Commodore 64), Anatomical (Spectrum), Dragon dramatics.

ProgramCards: Mover (BBC B), Autonopole (Spectrum), Dragon 32, Time Bomb (BBC B), Atari, cont., Sheep Drive (BBC B).

Databases: software.

Issue 15, June 16-June 22.

Pro-Test: Comx 35, Address Manager (Spectrum), Syres (Commodore 64), MST Database (Epson HX-20), Voice Input Module (Apple II).

Features: Newbrain Base part 2, Genie scene.

Gameplay: Cleared for Landing, Playing the Ace (Apple II), Variables, Star Jammer (Dragon 32), ProgramCards: Mover (BBC B), Autonopole (Spectrum), Dragon 32, Star Island (Atari, 3 of 9), Micro-Printer (Colour Genie), Brickbat (Dragon 32).

Databases: hardware.

MicroMedia: Spectrum, part 2.

Issue 16, July 2-9.

Pro-Tests: Atari X, word processing for the Commodore 64, Simpliflex (CPM), MPP-II printer, Z80 Pack (Atari), Molar Maul (Spectrum), Print Shop (Spectrum), Time-Lords (BBC).

Gameplay: Computer Scrabble (Spectrum), Education (BBC), Horace and Spiders (Spectrum), Catcha Snaak (Vic 20).

ProgramCards: Video Titrer (TP99A 3 of 6), Bowling (Spectrum), Star Island (Atari cont).

MicroMedia: Spectrum, part 3.

Issue 17, July 10-17.

Pro-Tests: BBC graphics, Newbrain assembler, BBC turtle, Oracle printer, Triumphtrip.

Gameplay: Franklin's Tomb (Dragon), Hummer Horse of Horror (Spectrum), Jumpman (64), Jumping Jack (Spectrum), Fourth Encounter (Vic), Cyclons (64).

ProgramCards: Collection (Vic), Atari, Defeat (BBC), CPM.

MicroMedia: Sound, part 3.

Issue 18, July 24-August 7.

Pro-Tests: Rasic bareboard, Vix digital tape drive, Seiksha colour printer, Footik (Spectrum), Bonus (Pet payroll), Newbrain monitor.

Features: Computer art, Dragon scrolling.

Gameplay: Rabbit Trail (TP99A 4), Playing the Ace (Atari, Vic 20), TP99A 4, BBC roundup, Joust (Spectrum), Molar Maul (Spectrum), Print Shop (Spectrum), Time-Lords (BBC).

ProgramCards: Tumbler (Oracle), Wreck (Dragon), Atari Errors, Speed Race (Vic 20).

MicroMedia: Spectrum, part 4.

Issue 21, July 28-August 3.

Pro-Tests: BBC graphics, Newbrain assembler, BBC turtle, Oracle printer, Triumphtrip.

Gameplay: Franklin's Tomb (Dragon), Hummer Horse of Horror (Spectrum), Jumpman (64), Jumping Jack (Spectrum), Fourth Encounter (Vic), Cyclons (64).

ProgramCards: Collection (Vic), Atari, Defeat (BBC), CPM.

MicroMedia: Spectrum, part 5.

Issue 22, August 4-August 10.

Pro-Tests: Spectrum Fourth, BBC graphics, Music synthesizers, IBM font, Brother keyswitched, Matron keyboard, Mupid.

Features: Genie assembler, Dragon machine code.

Gameplay: River Rescue, Oracle Attacks (Atari), Zork (64), Knot in 3D, Comb Zone (Spectrum), Moria (Oracle), Velour's Lair (Spectrum).

MicroMedia: CPM part 1.

Issue 23, August 11-August 17.

Pro-Tests: Sord Basic-G, Tasword, BBC microfiles, Microdrive, Tandy Model 4.

Features: Dragon machine code, Atari controllers.

Gameplay: Bridge Master, Styx, Manic Miner (Spectrum), Atari roundup, Candy Floss (Fangman (Oracle), Everest (Dragon), MicroMedia: CPM, part 2.

Issue 24, August 18-August 24.

Pro-Tests: T-Maker III, Spectrum Fifth, Jostyck surveyed, Spectrum digital tractor, Laser.

Features: Videotex, Dragon machine code.

Gameplay: Oracle roundup, Cookie, Egg Farm, Xadom (Spectrum), Sea Lord (BBC), Laitaine (Dragon), The Island (64).

MicroMedia: Commodore 64, part 1.

Issue 25, August 25-August 31.

Pro-Tests: Electron, Simons Basic, Oracle monitors, Microdrive.

Features: Newbrain main, Acorn Atom, Dragon machine code.

Gameplay: Superpadd (64), Terror Dakin, Trant Am (Spectrum), Dragon roundup, Jagger (Oracle), Brigger (Tandy), MicroMedia: Commodore 64, part 2.

Issue 26, September 1-September 7.

Pro-Tests: Microstat 65, BCFI, BBC tracer, 80 column Pet, Oracle interfaces.

Gameplay: Magic Mountain, Smugglers Cove (Spectrum), Spectrum roundup, Matrix, (64), Ninja Warrior (Dragon), Dallas, (Oracle), Call to Arms (IBM).

MicroMedia: Commodore 64, part 2.

Issue 27, September 8-September 14.

Pro-Tests: Sharp MZ700, BBC LIP, Apple editor, IBM mic, Features: Super-Space (Commodore 64).

Gameplay: Zip, Zap, Zoom (Spectrum), Spectrum roundup, Howler Bover, Benji-Space (Commodore 64).

MicroMedia: Dragon, part 1.

Issue 28, September 15-September 21.

Pro-Tests: Zenith Z100, Small Logo, Atari Supergraphics, Newbrain CPM, IBM mic.

Features: The Witness, Super Soccer, Benji-Space (Commodore 64), Oracle, Morocco Grand Prix (Dragon), Pharaoh's Tomb (Spectrum).

MicroMedia: Dragon, part 2.

Issue 29, September 22-September 28.

Pro-Tests: Portico Miracle, Dragon Toolkit, Atari Supergraphics, Atari features, Light pen.

Features: HX20 disassembler, TI translations.

Gameplay: Hall of Death/Sword of Fargool (64), 747 Flight Simulator (BBC), Dots (Dragon 32), Forensic Note Invaders (BBC).

Programs: Search (ZX81), Commodore, Oracle.

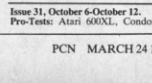
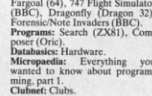
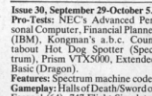
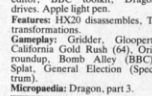
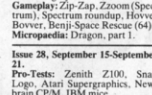
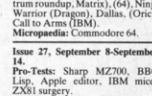
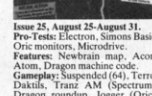
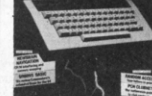
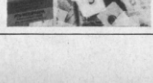
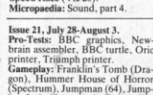
Databases: hardware.

MicroMedia: Everything you wanted to know about programming, part 1.

Clubnet: Clubs.

Issue 31, October 6-October 12.

Pro-Tests: Atari 600K, Concor





PERSONAL COMPUTER
 RETURN OF THE ATARI

Series 20 (IBM), Acacia Non-volatile Drive/Filing system (BBC), ROM extension board (BBC).
Features: Oric sound routines.
Gameplay: Greedy Gulch (Spectrum), Kong (Spectrum), Crazy Kong (64), Cuthbert Goes Walkabout/Movie Producer (Dragon).
Programs: Composer (Oric), 555 (Spectrum), Anagnors (Dragon).
Databases: Peripherals.
Micromedia: Everything you want to know about programming, part 2.
Clubnet: User Groups.

Issue 32, October 13-October 19.
Pro-Tests: Mated Computer Adaptor (Intellivision), Sprite-Gen (BBC), Typing Strategy (Apple), MCode 2 (Spectrum), Crotch Erom Programmer (Apple).
Features: Teletext options, Inside the Genie.
Gameplay: Space Shuttle (Dragon), Atari round-up, Spectraflow Football Pools Program (Spectrum).
Databases: Software.
Clubnet: Clubs.
Programs: Bees Away (BBC), Composer (Oric).
Micromedia: Everything you want to know about programming, part 3.

Issue 33, October 20-October 26.
Pro-Tests: CW-Telex, Sinclair ZX Interface 2, Wat-

PERSONAL COMPUTER
 INCLUDING THE NEW ATARI

ford DFS (BBC), Wordsworth (BBC), Atariwriter.
Features: Oric Operating System.
Gameplay: Dragon round-up, Hunter (64), Crick/Lana Crob (Spectrum), 3 Deep Space (BBC).
Programs: Apple's Jolly MerryArth (Vic 20), Road Hog (BBC).
Databases: Clubnet.
Micromedia: Everything you want to know about programming, part 4.

Issue 34, October 27-November 2.
Pro-Tests: NEC's PC-8201A, Simply File (64), The Forest (Spectrum), Amos DFS (BBC), Curious Microspeech (Spectrum).
Features: Oric Machine Code.
Gameplay: Fort Apocalypse/Pyroan (Atari), Ching (Dragon), Trench Canyon (BBC), Football Manager/Pool (Spectrum).
Programs: French Test (Apple), Babyfall (ZX81), Count (Vic 20), MerryArth (Vic 20), Road Hog (BBC).
Databases: Hardware.
Micromedia: Everything you want to know about programming, part 5.

Issue 35, November 3-November 9.
Pro-Tests: Kaypro 10, Stock Control (Spectrum), Educational games (BBC), Brother EP222 electronic typewriter, ADS Centronics Interface (Spectrum), Jupiter Ace).

Features: Tandy Graphics, BBC Operating System.
Gameplay: Valhalla (Spectrum), 64 round-up, Slinky (Atari), Hexpert (64).
Programs: Mini Math (Spectrum), Multi-Square (Oric).
Databases: Peripherals.
Micromedia: Everything you want to know about programming, part 6.

Issue 36, November 10-November 16.
Pro-Tests: Tiger from HJI, ZX81-Forth, Exmon (Oric), Cycle Planet, Growth Tracker/Diet/Diet Master (Spectrum), U-Con (Apple).
Features: Newbrain sound, BBC ZX commands.
Gameplay: Creepers (Vic 20), Exterminator (Atari), Spectrum round-up, Death Mines of Sirius (Dragon), Mini Math (Spectrum), Pyramid (Spectrum).
Databases: Software.
Micromedia: Everything you want to know about programming, part 7.



Issue 37, November 17-November 23.
Pro-Tests: Apricot, Paint (Atari), BBC Micro Toolbox, Spectravideo Composite (Atari VCS 2000), Big Ears.
Features: Flight simulators, Oric sound routines.
Gameplay: Empire/Treasure Tomb, Crystal Chalice, Temple of Zoren (Dragon), Cobas Maze/Bewitched (Vic 20), Cosmic Con-quest/Planefall (64), Bugaboo/Gordon (Spectrum).
Programs: City Defense (Oric), Falklands Raid (BBC), Pyramid (Spectrum), Monitor (64).
Databases: Clubnet.
Micromedia: Everything you want to know about programming, part 8.



Issue 38, November 24-November 30.
Pro-Tests: Coleco's Adam, Small Business Accounts (Spectrum), Curious Microspeech (BBC), Monitor round-up.
Features: Apple programming, New-Brain editor part 1, Dragon action part 1.
Gameplay: Dragon round-up, Zepplin/Blue Max (Atari), Skramble/Falcon Patrol (64), 737 Flight simulator (BBC).
Programs: Shipment (Spectrum), Monitor (64).
Databases: Hardware.
Micromedia: Guide to Monitors.

Issue 39, December 1-December 7.
Pro-Tests: Dragon 64, Tandy CDP-220, White Knight II (BBC), Cross Reference Utility (IBM).
Features: New-Brain editor part 2, Dragon Action part 2.
Gameplay: Oric round-up, Haunted Hedges/Corridors of Geon (Spec-



Issue 40, December 8-December 14.
Pro-Tests: Times 2058, Thermal Printer TP-10, Cambridge computer joystick (Spectrum), Beechwith the Synth-Music Processor (BBC), Vizawrite/Vizaspell (64), Education games (Spectrum).
Features: New-Brain editor part 3, Dragon Action part 3.
Gameplay: Pinball Wizard (Vic 20), The Quest of Merrivaid (64), Way Navy/Savage Pond (Atari).
Programs: Link Four (Spectrum), Tilt (Dragon).
Micromedia: Buyer's Guide to Peripherals.

Issue 41, December 15-December 21.
Pro-Tests: Apple II, Byte Drive 501, INMAC Power Cleaner, Commodore 1701 Colour Monitor, BC Basic (64), Database-MST-Calc (Dragon).
Features: Computerised Psychotherapy (BBC), Spectrum Display.
Gameplay: Microcopy/Pettigrew's Diary (Dragon), 64 round-up, Dimension Destructors/Sheer Panic (Spectrum), H-Bomb (64).
Programs: Colony Invader (Spectrum), Grid Bike (Vic 20).
Micromedia: Buyer's Guide to Software.

Issue 42, December 22-January 4.
Pro-Tests: Spectrum add-on (i-Microcomputers system), Oric-Filistat, Games Designer (Spectrum).
Features: Micros of 1983, Computer Security, BBC word processing, Dragon Action part 4.
Gameplay: International Football (64), Grouch/Chequered Flag (Spectrum), Way Out/Jet Boot Jack (Atari), Super-vaders/Outback (Vic 20), Danger Ranger/Lup Periscope (Dragon), Database: Clubnet.
Micromedia: Games Special.

Issue 43, January 7.
Pro-Tests: IMS Junior, Grafpad (BBC), Walters WMSD printer Duplex (Spectrum).
Features: Computerspeak, Spectrum Display, Tabs on Oric.
Gameplay: Trace Race/Pinball (Dragon), Colour Genie round-up, Hunter Killer/Mr Wimpy (Spectrum), Crazy Caveman/Goodness Gracious (64).
Programs: Jungle Chase (Oric),

Screen Dump (BBC).
Databases: Hardware.
Micromedia: Electron part 1.

Issue 44, January 14.
Pro-Tests: Hitachi MBE-16002, Canon Teletext (BBC), Integrex Colourjet printer, DTL-Basic (64), Diam-Microprint 42/51/Multifont (Spectrum).
Features: Adventure games, Colour Genie characters.
Gameplay: Devil Assault/Wassup + Dragon Racer (Dragon), 32, Siren City/Furballen Forest (64), Surviv-a-Countdown (Vic 20).
Programs: Minicall.
Databases: Peripherals.
Micromedia: Electron part 2.

Issue 45, January 21.
Pro-Tests: Portables - Commodore SX60, Olivetti MLI, Accion sparkjet printer; Turbo 20 day-wheel; Spectrum educational software; BBC graphics extension ROM.
Features: Bargain buys; Making money with your micro.
Gameplay: Viking and Pub Crawl (Dragon), Traxx and Wild West Henry (Spectrum), Atari/Commodore 64 round-up.
Programs: Battlerstar Fighter (Commodore), Peripherals.
Databases: Software.
Micromedia: Electron part 3.



Issue 46, January 28.
Pro-Test: Apple Macintosh, BBC Hiways ROM board, IEEE interfaces for Commodore 64; Silver Reed EX44 typewriter/printer; Bridge on Spectrum and Dragon; BBC film program.
Features: Buying by mail ordering; programming the Memotech.
Gameplay: Harny Burgers and Gangsters (Spectrum), Bline Bar (Spectrum), Blue Moon and Dancing Fats (Commodore 64).
Programs: Caves of Treasure (Atari).
Clubnet: Modems and communication.

Issue 47, February 4.
Pro-Test: Sinclair QL; Atari Touch Tablet; Silver Reed EXP500 day-wheel; IBM Cobol; BBC Spell Check.
Features: Programming the Memotech part 2; Low cost printers.
Gameplay: Mothership and Quintic Warriors (Commodore 64), Two Gun Turtle and Multigames (Oric), Apple adventures, Spectrum round-up.
Programs: Po Hole (Dragon), Commodore Hardware (64).
Micromedia: A to Z of Atari part 1.



Issue 48, February 11.
Pro-Tests: Spectravideo 328; Atari 800XL; Dragon 3in disk drives; low cost monitors; Aztec C (Apple); BBC educational software.
Features: Sideways printing on Epson HX20.
Gameplay: Bedlam and Morris Meets the Bikers (Spectrum); Commodore 64 round-up; Zorxon's Kingdom and Flight Zero-One (Vic 20).
Programs: Gridtrap (1inx).
Databases: Peripherals.
Micromedia: A to Z of Atari part 2.



Issue 49, February 18.
Pro-Tests: Oric Amos; tracker ball controllers; Spectrum speech synthesiser; Rainbow Writer (Dragon); Colour Genie assembler; Spectrum educational programs.
Features: Computer jargon; 42-column display on Spectrum.
Gameplay: Quadrant and Jetpac (Vic 20), Crazy Balloons and Supacatchatropa (Commodore 64).
Programs: Sprite generator (Commodore 64).
Databases: Software.
Micromedia: A to Z of Atari part 3.

Issue 50, February 25.
Pro-Test: Sanyo MBC550; Commodore speech synthesiser; BBC real-time code tracer; Atari home utilities.
Features: Expanding your Spectrum; introduction to Lisp, Gameplay: Urban Upstart and Goszalla and the Martians (Spectrum), Shuttlezang and Hooded (Dragon).
Programs: Minscape (Oric), Clubnet (64).
Micromedia: Printers part 1.

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In the first of our new weekly club reports, Wendie Pearson goes north of the border to Renfrewshire.

If your association has something special on the agenda or if you've just started a new one, contact us at *Clubnet*, *Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HG.

Our complete listing of clubs and user groups will continue to appear every four weeks. You'll find it in this issue on page 73.

The big squeeze

Go along to an Inverclyde User Group meeting and you'll find a number of final year students from Glasgow and Strathclyde universities, as well as some members as young as 13 years old.

You'll find it's to mull over the latest software releases that members meet each month at organiser Robert Watts' flat. You might also find them wrestling with programming problems, reviewing books and generally set to bandy ideas about.

Maths teacher Mr Watts' pet interest is networking and he recently demonstrated an RS423 interface to the group. Next, some members plan a series of programming lessons. Also in the offing is a public display of home micros — a joint venture to be undertaken with their sibling Inverclyde ZX81 User Group.

On the third Monday of the month you'd be welcome but squashed as Mr Watts' living room is brimming over with the group's business. Rather than network the rest of the flat to cater for numbers, the group may well move to the hall used by the bigger (and younger) ZX81 group which charges 20p per meeting to cover its hire.

If you're female you'd be especially welcome, says Mr Watts. 'We need some positive discrimination. I think the sheer number of boys puts the girls off'.

Wendie Pearson

Name: Inverclyde BBC Micro User Group
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Venue: 9 St Johns Road, Gourcock, Renfrewshire, Scotland
Contact: Robert Watt at above address



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'Graphic Art for the Electron Computer' by Boris Allan, published by Sunshine Books at £5.95 (paperback, 107 pages).

This is almost identical to 'Graphic Art for the BBC', by the same author (Issue 43), covering the theory and practice of turtle graphics and art. It has instant appeal, reads fluently, and turns out to be rather insubstantial.

The theory of turtle graphics was introduced by Seymour Papert in *Mindstorms*, and Mr Allan does little more than iterate Papert's ideas. But the

book does get more interesting as it gets more practical, and the programs add a depth Papert couldn't — micros weren't so well developed when *Mindstorms* was written.

Each idea introduced is built up in subsequent chapters, giving a thorough and practical grounding in turtle graphics. The 'art' side is less tangible, partly because computer art is still loosely defined. **PL**

'Winning Games on the Vic 20' by TP Barrett and AJ Jones, published by Ellis Horwood at £5.95 (paperback, 143 pages).

This is not, as you might think, a guide to clocking up half a million on Defenderoids or a selection of unbeatable strategies for computer chess. It is another collection of programs for you to type in.

But, stifle your groans and do not turn the page. If you ever wanted a book of games and despaired at the dross generally offered, this is the book for you.

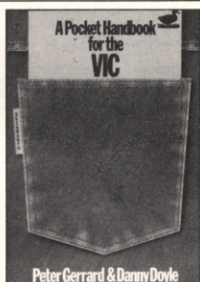
It follows Ellis Horwood's *Mastering the Vic 20*, perhaps the best book ever written for this micro, and is up to the same high standard.

There are 22 programs here,

largely games, and while not particularly original they are generally attractive.

Each program is accompanied by a short introduction and the book's saddest failing is that these do not contain much in the way of explanation of the programs. There are many neat tricks and techniques employed in the games and the value of *Winning Games* would have been enhanced if these had been properly documented.

Nevertheless, it's good value — which is more than can be said for most books of this type — and the listings are full-size dumps to a printer. **PW**



'A Pocket Handbook for the Vic' by Peter Gerrard and Danny Doyle, published by Duckworth at £2.95 (paperback, 93 pages).

This is a twin of the version for the Commodore 64 reviewed in issue 50 and the same criticisms apply. There is much useful information contained within this slim volume, although there are no hints on how to, implement it, and virtually all of it is available elsewhere.

Furthermore, there is one startling omission: the book makes no mention of the VIC chip. On the whole, give it a miss. **PW**

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PCN PRO-TEST HARDWARE

In one of the most important micro launches of the year, IBM unveiled a portable version of its massive success story, the PC. Steve Birchall sent this exclusive review from Boston and also considers the Portable PC's position in the market.



PC ON THE MOVE

Imagine a compact, lightweight portable version of the IBM PC, which you can take almost anywhere. It runs nearly all software from other members of the PC family. It comes with a 9in amber monitor, one disk drive (with space for an optional second drive), 256K of RAM (expandable to 512K), and a colour graphics adaptor card. An optional modem lets you talk to your main PC system back at the office or lab.

This is the new Portable Personal Computer announced by IBM last month.

Neatly packaged in a rugged carrying case, the system weighs just 30lb, measures 20 x 17 x 8 inches, and in the basic configuration sells for \$2,795.

To make the four member PC family more useful, IBM also announced the Cluster system, which permits a user to interconnect as many as 64 machines in a simple network. The main 75 ohm coaxial cable can be up to 3,280 feet long, and individual drop cables can be up to 16 feet.

This type of cable is less expensive than those normally used in a network. For a

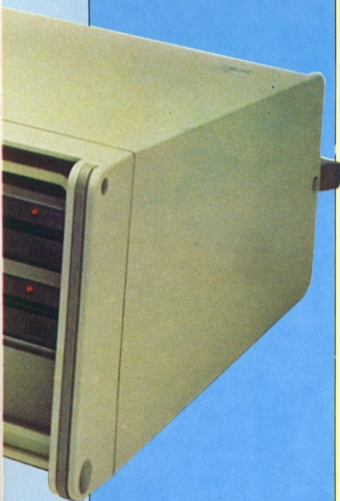
typical small Cluster of five computers, the system cost is about \$2,540 on top of the individual computers.

Presentation

The Portable PC looks similar to the work-alikes made by companies such as Kaypro and Compaq. The detachable keyboard is identical to the standard PC keyboard, and connects to the main unit with a coiled cord stored in a recessed opening in the keyboard module.

When folded into place for transit, the

EXCLUSIVE...EXCLUSIVE...EXCLUSIVE



The new IBM Portable PC has a 9in amber screen, 256K RAM, and a slimline disk drive. An additional disk drive and memory expansion up to 512K are among the available options. In most other respects, it is identical operationally to the PC, and runs nearly all its software without modification.

keyboard covers and protects the front panel, where the monitor and disk drive are. A thoughtful feature is the shielded disk storage just above the top disk drive. At the other end of the main unit, a carrying handle folds up from the back panel.

The outer skin is a rugged, impact resistant plastic material, which surrounds the rigid metal chassis. To protect it from scuffs and scratches, IBM provide a soft nylon carrying bag in 'Big Blue' with an IBM logo on a little designer tag. The bag is well made and has a padded carrying strap.

Weight distribution seems well thought out. The machine balances fairly evenly in all dimensions — an important feature when carrying it around. Thirty pounds is not uncomfortable, particularly when the components are nicely balanced, but the unit should weigh less. Perhaps they decided to trade off a few extra pounds for the advantages of a more rugged unit.

The Portable PC is the kind of computer you can imagine a geologist taking to a remote location to search for oil. An

accountant might take one along when calling on a client, thus gaining access to the mainframe database while working at the client's offices. A busy executive might take one home for an evening or a weekend of report writing. A student might use one late at night to access the library.

The new world of possibilities offered by IBM's Portable PC is fascinating, but it does have limitations. Bear in mind that its size and weight keep it out of the notebook or lap computer category. Its power consumption requires a mains connection rather than battery operation. You won't see students with Portable PCs taking notes in a lecture hall or businessmen using them to juggle accounts on the commuter trains. This computer is simply a transportable version of the PC and will compete with such machines as the Kaypro and Osborne.

The standard configuration has a single slimline (half-height) disk (second drive optional), and 256K RAM (upgradeable to 512K with the memory expansion card).

In a certain sense, this is a boring new product. IBM wisely decided to introduce nothing more than portability. Because of that restraint, the Portable PC is the perfect addition to their PC range. Functionally, the Portable PC is identical to the standard model in nearly every respect. It can exchange data freely by means of disk, modem or Cluster connection with other models (with only a few minor system-specific exceptions).

Storage

The new slimline disk drives occupy half the height of the older drives. They use 5 1/4in double sided, double density diskettes and, with DOS 2.1, can store up to 360K per disk. These are the same drives IBM introduced on the PCjr, and are 41.6mm high, 146mm wide, and 208mm deep. The optional second drive can be installed by the user, adding about 2 1/2 pounds to the overall weight.

Construction

Inside, the Portable PC has seven slots (three hold full-size cards, and four are for short cards). Of these seven slots, two long ones are occupied by the disk drive controller and the monitor display cards. The Cluster Adaptor card, if used, occupies the remaining full-size slot. All IBM special purpose cards (such as the modem or the various printer controllers) are interchangeable from model to model.

The Intel 8087 math co-processor is also available on the Portable for those needing high speed number crunching capability.

The universal power supply operates on 115 or 230V (selectable by setting a rear panel switch) at either 50 or 60Hz. A variety of power cords is available to accommodate different types of mains connections.

The chassis is divided into two halves, separated on top by a rigid metal divider. On the left is the monitor tube, with a

Compatibility — any quibbles

All members of IBM's PC family (the PC, PC XT, PCjr, and the Portable PC) use the Intel 8088 chip and the same Operating System, so software generally works on all systems.

However, since each member of the PC family has certain unique capabilities, there are exceptions.

- The small number of PC programs which rely specifically on the monochrome display will not run on the Portable.

- PCjr software which exploits its enhanced colour graphics must be modified to run on the other systems. IBM has a set of guidelines available.

- Software for the PC XT which requires the hard disk and extra memory will not work on the other systems

It's that compatibility that is important to the user of this family, both in terms of data and software. Also, special purpose cards such as the IBM modem or the various printer controllers work in every model interchangeably. If a card becomes defective you can borrow one from another machine for a quick emergency fix. In a small office, school, or research facility a Cluster of PCs permits people to send messages and data to each other freely. When an executive is finished with a financial analysis it can be sent to a secretary to format it and print it out. Or it might go straight to a colleague for comment. Add a few Portables to the mix and instant input of data from remote locations is possible.

Unfortunately, while IBM have made all the PCs compatible with each other, they have not made them compatible with other IBM product lines. When Douglas LeGrande (Vice President of Operations for the Entry Level Systems Division) presented the Portable PC to the Boston Computer Society last week, it was asked if the PC Cluster could exchange data with the Display Writer. The answer was no. Also, the Cluster can not communicate with the outside world through a modem. However, you can connect the 3270-PC to a Cluster to gain access to mainframes. They have not had time to test the XT/370 for this capability.

shield, and the power supply; on the right, the main circuit board (identical to the PC XT mother board), which occupies the entire bottom of the chassis. Attached to it are the receptors for the seven circuit cards.

Near the front is the disk drive and its shielding. The bottom being one piece gives added rigidity to the structure. Significantly, the Portable PC comes with a twelve month guarantee: IBM knows it will suffer many hard knocks in use.

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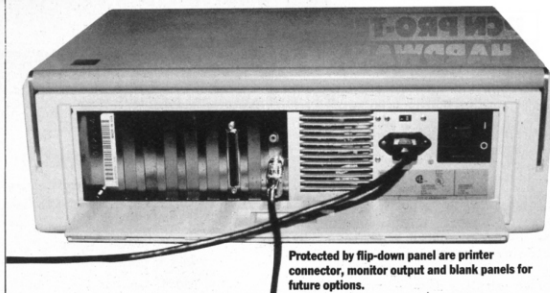
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On the back, recessed under a hinged flip-down cover, are a connector for the printer and another for an external monitor. Blank panels for each of the other slots permit you to attach appropriate connectors for other peripherals. Another connector accommodates the mains cord. Nearby is a switch for 230 or 115V operation, and the system on/off switch. The sides are free of connectors or controls.

Screen

The amber monitor is easy to read and displays 25 lines of 80 characters. For colour displays you may also connect an external colour monitor, which runs simultaneously with the internal monitor. At last week's Boston Computer Society meeting LeGrande emphasised IBM's



Protected by flip-down panel are printer connector, monitor output and blank panels for future options.

growing belief in the importance of colour displays. The new PCjr has enhanced colour graphics capabilities which the other members of the family don't have. The Portable PC is the first model to include the relatively expensive colour/

graphics adaptor card as standard equipment. Most of the IBM accessories work on the Portable, including the new colour printer. It looks very much like an updated version of the popular IDS Prism printer. This dot matrix printer uses a ribbon with ▶

Where to, Big Blue?

As has become usual with IBM micro releases, IBM UK has no immediate plans to release the portable version of the IBM PC in this country, nor does it speculate on its future plans. In the US, however, the impact of the machine will be fairly immediate. It's not so much that the Portable PC represents the latest and greatest in computer technology, it's simply that it represents the first step in what has long been feared as IBM's ultimate objective — to muscle in on the huge ancillary market created by its initial strategy.

IBM's PC surprised the industry by offering a reasonably open system. Not only did the PC use an operating system from another company (Microsoft), but the machine itself incorporated an Apple-style bus system which enables other companies to configure cards for features like serial communications, extra memory and so on.

As a newcomer to the personal computer market, IBM obviously felt its best course of action was to cash in on some of the expertise already available in other companies.

Apple adulation

Apple's introduction of the Lisa and Macintosh was the opening round of the impending battle between Apple and IBM. When AT&T unleashes its home computer this spring, even the apparently impregnable IBM may suffer some battle scars. Lurking in the background are the Japanese manufacturers, who are already promoting software compatibility with their MSX standard. Though IBM and AT&T are formidable competitors, we must remember that the Japanese were able to bring the American automobile industry to its knees.

A clear indication of how the forces are beginning to line up is the difference between two recent meetings of the Boston Computer Society. At the January meeting, Apple's Steve Jobs introduced the Macintosh with an expensive, well-executed multi-media presentation. The BCS had to rent a larger hall for the occasion, and still over 2000 people were turned away. Those lucky enough to get in were

wildly enthusiastic about the power of the Macintosh and its elegantly simple user interface. Cheers and applause interrupted the show frequently. Apple has a computer that people can learn to use in 20 minutes. Macintosh cuts through all the red tape of tedious menu choices or complex command strings. Point at what you want, push a button, and watch while the computer carries out all those boring instruction sequences.

A month later, when Douglas LeGrande from IBM introduced the new Portable PC, PCjr, and Cluster network system to the BCS the presentation was surprisingly plain vanilla: he gave a simple, low-key speech with not a computer on display — not even a picture of one. The computers were all waiting downstairs for hands-on demonstrations.

What IBM wanted to suggest was an easy-going style. But the meeting had all the excitement of a banker's convention: no cheers or applause interrupted this speech. The crowd number was normal for a BCS meeting — but fewer people were in attendance than had been turned away from the Apple meeting. At the tedious demos, the participants evinced the quiet, serious intensity of businessmen evaluating a new piece of equipment.

Clearly, Apple has gained powerful customer loyalty, and has developed an exciting new product. IBM, on the other hand, has acquired

experience dealing with the consumer market only during the past two and a half years. It is still exploring this strange new world and only beginning to understand how to work successfully in it. The new product presentation was adapted from IBM's approaches to the business market. Since IBM has the money and personnel to make any kind of presentation they want, we can conclude they simply do not understand what they need to do if they want to compete in that arena. That may change, but will the change come soon enough?

AT&T will soon introduce a new home computer. Like IBM, it has no problems with manufacturing or technological innovation. Unlike IBM, it has a significant amount of experience in selling technology to home users. 'Human engineering' has always been one of its fortes, and the AT&T home computer may be one of the easiest to use so far. AT&T may also have a significant edge over IBM as, in the US, they have a more familiar brand name.

The Japanese are playing a different game, and have quite a few tricks up their sleeves. Obviously, they can make consumer electronics gear more cheaply than anybody else. But their real strategy involves standards and compatibility. Most of the Japanese manufacturers have agreed on the MSX operating system. (See PCN Pro-File issue 52)

Half-blind dinosaurs

Another variable in the analysis is the growth of automated manufacturing in the consumer electronics industries. In the near future, Japanese manufacturers may not be able to, make things more cheaply than anyone else. Automated factories operate at essentially the same cost anywhere so the area of competition will move to innovative new products.

A small, flexible company able to read the consumer's mind and supply them with the gadgets they need and want at the right time may devastate the slow-moving, half-blind industrial dinosaurs.

Apple is doing exactly the right thing considering the current state of personal computers. IBM is still testing the water, wondering how to appeal to this strange (to them) new market. The fun is just beginning, and we home users will benefit from a tremendous outpouring of creative energy in new consumer electronics products.



PCN PRO-TEST HARDWARE

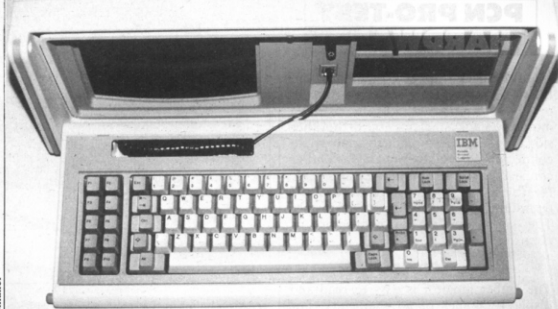
four colour stripes (red, blue, green and black) and shifts the ribbon up and down as necessary. Currently being shipped to IBM dealers, the printer sells for \$1995.

One persistent problem with computers is glare and reflections on the screen. This is not a trivial problem because such things lead to headaches and eyestrain. IBM obviously tried to take care of the problem by using the amber screen, and by recessing it so the top and side of the cabinet project over and alongside the screen, shading it from ambient light. Also, the screen has an anti-glare filter on its surface.

Verdict

IBM has succeeded admirably in producing a portable version of the PC. Maintaining software compatibility among all members of the PC family is an important factor which will make the entire PC range (standard PC, PC/XT, PCjr, Portable PC, and the mainframe-to-PC gateways such as the 3270-PC and XT/370) more attractive to potential users. Because of this, the PC range has acquired a degree of maturity. It now makes sense as a set of related tools.

The Cluster system takes this one step further and integrates all the models at a relatively low cost into a simple network. Now the advantages of a small network are available to PC users who don't have a minicomputer to act as a network controller.



The flip-down keyboard is exactly the same as on the standard PC. When returned to storage position, it becomes the bottom panel of the travelling computer, protecting the monitor and disk drive.

Schools and small businesses should find this network well suited to their applications, and the Portable PC adds an extra measure of flexibility to such an installation.

IBM did not intend, with this round of new product announcements, to answer the challenge of the Apple Macintosh. Neither did it intend to stave off the impending influx of Japanese lap computers. Certainly it has competing machines under development, and will announce

them soon. In the meantime, IBM has encouraged third party software developments such as VisiCorp's Vision and Microsoft's windows and mouse. These will run on the Portable until IBM's answer to the Macintosh appears.

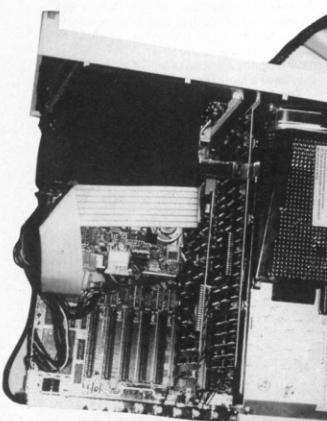
It is difficult at this stage to know when, or even if, the portable will be making an appearance in the UK. Experience tells us that its arrival may be at least some months away: as usual IBM refuses to "speculate" on its own plans.

Specifications

Price	\$2,795
Processor	Intel 8088 at 4.77MHz. The 8087 high-speed math co-processor is optional
RAM	256K standard, expandable to 512K
ROM	40K
Text Screen	80 characters by 25 lines
Graphics Resolution	same as standard PC
Colour Graphics Capability	Colour/graphics adaptor card included as standard equipment
Keyboard	Full 83 key standard PC keyboard
Storage	Slimline 5 1/4 in disk drive stores 320K under DOS 2.1 on double-sided double density diskettes. Second disk drive optional
Operating System	MSDOS
Language	Basic
Expansion Slots	3 full-size, 4 short
Dimensions	20 x 17 x 8 inches
Weight	30lbs

Available options

Slimline Disk Drive	\$425
Colour monitor	
64/256K memory expansion	
Printer adaptor	
Game control adaptor	
Expansion unit	
Asynchronous communications adaptor	
Binary synchronous communications adaptor	
Synchronous data link control communications adaptor	
Graphics printer	
Colour printer	\$1,995
Compact printer	
Cluster adaptor	
8087 math co-processor	



The motherboard forms the bottom of the chassis. Receptors for the expansion cards are attached to it, and the disk drive is attached to the front panel. Notice the shielding around the disk storage compartment above the disk drive. On the other half of the chassis are the monitor tube and power supply.

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But page 6 is not totally inviolate, and with a little thought we can make more progress.

You've probably noticed that the positional statements seem strangely offset. This is because the operating systems set up the screen display but doesn't keep a check on it. The display merrily runs along at 40 bytes per line, then goes into a graphics mode which uses only 20 bytes.

The result is a spare 20 bytes per line. The simple solution is to stick to modes that use the same number of bytes per line, although you could probably work out something more complicated by keeping to factors of the previous modes.

Our next problem is the fact that the LMS instruction works inside 4K. If you keep an eye on the amount of bytes you have used you simply use another LMS. The next two numbers equal the original LMS address plus the amount of memory used so far for the DL. The Atari is so friendly that it doesn't mind particularly where the new instruction comes, so you can use it in less than 4K.

Unfortunately this second LMS address can be above RAMtop. Also if you lower RAMtop (location 106), be sure to include some extra memory for this reason.

If you've stayed with me this far you may have realised that if you load up a LMS with the wrong memory location you won't get the desired effect. What you may see is a screen full of coloured dots which, believe it or not, is the graphics equivalent of what is stored in the computer's memory. Change the display list with a joystick routine and you can run through the memory.

If you look at line 1000, you'll see that the DL starts with 112. So DL+4 is the location G1. This is the low byte, i.e. 0 to 255. If we change this by one byte at a time we can actually shift the screen memory, which means changing what you'll see on the screen. If you remember that Graphics 0 has 40 bytes per line in any direction you have effectively moved what is shown on the screen one whole line up or down. Try listing x to show what I mean.

Line 20 stops the program from breaking and giving an error report. The next thing to do is to see the rest of the memory. For

this you simply replace DL+4 with DL+5. You now shift memory in 256 byte blocks. When you come to the bottom of RAM you'll see some locations being constantly updated. By the way, the large empty space is unfiled user RAM.

If you push the joystick up, line 40 will recognise this and add 1 to what it finds at DL+4. Similarly, line 50 will subtract 1. Thus the screen display is shifted by 1 to either the right or the left. If you wish to see the TRAP statement in action, just add:

```
70: E7 DL
Line 20 stops the program from breaking and giving an error report. The next thing to do is to see the rest of the memory. For this you simply replace DL+4 with DL+5. You will shift memory in 256 byte blocks. When you come to the bottom of RAM you'll see some locations being constantly updated. By the way, the large empty space is unfiled user RAM.
```

If you go back to the program when we

were using DL+4, change line 40 to add 40 to the PEEK (DL+4), then change line 50 to subtract 40 from the PEEK (DL+4). You'll move the screen one line at a time. You're now scrolling—in fact, what you're doing is termed coarse scrolling. Chris Crawford's 'Eastern Front — 1942' is a good example of fine scrolling.

But as far as what we've got here is concerned, I suggest that when DL+4 becomes less than 0 you reset it to 255, and reset DL+5 to 1 less than it was. Conversely, if DL+4 is greater than 255 reset it to 0 and reset DL+5 to 1 more than it was. This will make the scrolling a bit smoother. Sadly, fine scrolling involves registers (locations 54276 and 54277) and will have to wait until another time. **PCB**

If you have any queries about this series of articles, Mark Hutchinson is willing to try to help you out. Write to him at PO Box 123, Belfast BT 10 ODB. Please enclose a stamped addressed envelope.

Listing 2

```
9 REM *** Set up Graphics and put something
  on the screen
10 GRAPHICS 0: LIST
19 REM *** Clear TRAP and stop ERROR 3
20 TRAP 40000: TRAP 20
29 REM *** Find where DL is
30 DL=PEEK(560)+PEEK(561)*256
39 REM *** Read joystick for up. Amend DL
40 IF PEEK(632)=14 THEN POKE DL+4, PEEK(DL+4)+1
49 REM *** Read joystick for down. Amend DL
50 IF PEEK(632)=13 THEN POKE DL+4, PEEK(DL+4)-1
59 REM *** Slow the action down
60 FOR TIME = 1 TO 50: NEXT TIME
80 GOTO 40
```

Additional information in the DL:

- 16 = 2 blank lines
- 32 = 3 blank lines
- 48 = 4 blank lines
- 68 = 5 blank lines
- 80 = 6 blank lines
- 96 = 7 blank lines
- 112 = 8 blank lines
- 65 = jump and wait

Table 1

DL Mode	Basic Gr. Mode	No of pixel lines per Mode line	No of Colors	Bytes of memory used per line	Text or Plot Mode
0	—	—	—	—	blank line
1	0	8	2	40	text
2	0	8	2	40	text
3	new	10	2	40	text
4	new	8	4	40	text
5	new	16	4	40	text
6	—	8	5	20	text
7	2	16	5	20	text
8	3	8	8	10	plot
9	4	4	8	10	plot
10	5	4	4	10	plot
11	6	2	2	10	plot
12	7	1	2	10	plot
13	new	1	2	10	plot
14	new	1	4	40	plot
15	8	1	2	40	plot



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Tom Sato looks at the current chip wars and says someone is going to get battered.

Starving industry

As far as British micro manufacturers are concerned the current chip shortage is probably only the tip of the iceberg. Although Britain does have one major semiconductor manufacturer in the shape of Immos, the likes of Acorn and Sinclair are heavily dependent on manufacturers in Japan and the US. And as these two countries lumber up for battle in the chip war, the British micro companies could well find themselves the meat in the sandwich.

The chip production industry went through a minor recession in 1981-82, but sales have now picked up dramatically and the race to dominate the world's silicon industry is on. In the US Intel has just turned in a net profit of \$116 million on turnover of over \$1 billion, while Motorola notched up \$224 million on \$4 billion turnover. Even TI has practically turned round the losses it made in the home micro field, and all the Japanese semiconductor companies are breaking sales records.

But the healthy state of the semiconductor companies' balance sheets is not necessarily good news for the micro manufacturers. These profits have been generated by unprecedented demand for chips, to the extent that the semiconductor companies have not the slightest hope of making enough chips to keep everybody happy.

Intel admits that it will have great difficulty meeting demand for its 16-bit CPUs this year, and TI is thought to be cutting back on exports to Japan because of the increasing demand from IBM and other US computer firms.

In Japan there is a serious shortage of TTL (Transistor Transistor Logic devices) and 16K dynamic RAMs. In fact, anything integrated is in such short supply that the prices of chips have gone up despite increased production. TTLs are at the top of the shortage charts. These logic chips are vital to computers and are the nuts and bolts of digital electronics.

Manufacturers are currently only supplying 70 per cent of the orders placed by large customers, and are turning new customers away. TTLs selling for around Y100 (30p) early last year were going for Y500 by the end of the year.

To make matters even more confusing, profit margins on 16K dynamic RAM chips have fallen so low that manufacturers are no longer keen to make them. The consequence is that there is an acute shortage of 16K chips. And although the more profitable 64K chips are less of a problem, they too are in very short supply.

This is the root of the problem we saw over Christmas, where Acorn and Sinclair simply could not get the chips to enable them to manufacture enough of their current machines to meet demand. But what about the machines that are to follow them? If anything, the situation looks even bleaker.

Testing time

Japanese observers say that, in order to avoid more friction on the trade front, Japan's manufacturers caught up. But now that several American manufacturers have announced 256K RAMs all deals are off, and seven of Japan's main semiconductor firms have moved towards full production.

NEC and Hitachi alone will be producing them at the rate of 100,000 a month while Fujitsu, Oki, Sharp, Mitsubishi and Toshiba are also headed for mass production. On the American side Motorola, Western Electric and Mostek are ready to supply 256Ks while Intel is thought to be developing its own version.

An early salvo in the 256K was fired courtesy of Hewlett-Packard. H-P carried out a quality test of 256K dynamic RAMs produced by four Japanese and three US manufacturers. Much to the annoyance of the Americans, who are trying to roll back the Japanese, H-P announced that the four Japanese came out top in terms of quality and reliability after 1,000 hours' non-stop operation.

At the moment IBM buys around half the 64K RAM chips NEC produces, and the word is that the US giant is negotiating to buy 256K chips from the Japanese. If IBM mops up 256Ks in the same way as it does 64Ks, it will gain a massive advantage by starving the smaller companies of the next generation of chips.

But the chip war isn't just limited to spending power. Last year Intel sued NEC over the copyright of its 8080, 8085 and

8086 CPUs. The 8086 is one of the most popular 16-bit CPUs and Intel claimed that NEC manufactured them without a second source licence. The odds were overwhelmingly against NEC, which agreed to an out of court settlement. The terms of this haven't been disclosed, but it seems that NEC has stopped making the 8086 and agreed to second source the 8080 and 8085. This puts the Japanese company in a difficult position, as it manufactures 16-bit business micros which use the 8086.

At the same time NEC was being sued by Zilog, the originator of the Z80. NEC's UPD780 sold vast quantities because of its Z80 compatibility, and last June Zilog took the matter to the US International Trade Commission to seek \$30 million in damages. In January NEC again settled out of court, paying an undisclosed sum and resuming operations under a Zilog second source agreement.

It's an understatement to say NEC is cheesed off—in fact, the company is livid. NEC supplied an alternative source when Intel and Zilog couldn't meet orders, and the company did much to boost the popularity of the Z80 and 8086. NEC has now had enough, and is developing its own range, the 16 to 32-bit V series.

NEC is currently only coping with 60 per cent of its orders for 8-bit chips, and those with long delivery times. Its own 16-bit CPU is in short supply, and the large volume of 16-bit machines NEC produces means the company has a king-sized headache.

Hitachi, alarmed by NEC's experience and with troubles of its own—Hitachi and Mitsubishi were found guilty of industrial espionage against IBM—is withholding its CMOS version of the 68000. Low power consumption makes CMOS ideal for lap-held portables, but it seems a 32-bit 68000-toting portable will have to wait a while. Hitachi's own order to delivery period is now in excess of six months, despite production increases.

Meanwhile, in Silicon Valley paranoia reigns supreme. One hapless Japanese academic had his camera confiscated at every semiconductor factory he visited.

All this causes wild rumours to spread. Some people in Japan believe that Intel





and TI are conspiring to cut Japan out of the market. And they think IBM, which recently took a large stake in Intel, is behind it all.

Who suffers the most from all this? In Hong Kong, Taiwan and Korea, electronics manufacturers are screaming for silicon. The economic recovery in the US has increased demand for cheap electronics products, so the south east Asian countries are trying to buy more integrated circuits from Japan. But the Japanese chip makers are turning them away, and buying from the US seems out of the question.

The shortage is also preventing prices from falling. The 68000, for example, is still very expensive despite its rising popularity, and CMOS prices are also staying high. There's no indication that Epson will reduce the price of the HX20, despite the fact that it has competition in the shape of the Tandy 100 and the NEC

PC8201.

Where does Britain fit in? British manufacturers should have felt the pinch by now, although they're unlikely to admit it. British companies have always relied heavily on Japanese manufacturers so, should the Japanese decide to supply themselves, the British are in big trouble.

Britain is quite a contrast to Japan, where even the smaller electronics manufacturers are equipping themselves with IC production units and the more established companies are using shiftwork to keep the lines rolling.

Fujitsu has opened a number of labs around the world, including Britain, to assist customers in the development of gate array chips. The company has also come to an agreement with TI to let the latter second source its popular gate array chips.

Not all manufacturers are fighting. Seiko, the watch maker, has also set up

shop in the States to sell its CMOS and static RAMs.

Even the Koreans have set up a semiconductor company to build 64K and 256K RAM chips, with a target of a million a month from this November. Meanwhile, Britain has Immos, which produces 64K chips and will be producing 256K chips shortly. The company also pioneered the Transputer, an ultra high technology processor that is a leap into the future. But Immos' efforts are only a drop in the ocean, and the company, currently state-owned, may even be sold off.

The facts are plain. It is clear that there's a huge profit to be made from the semiconductor industry, but equally there are huge losses to be made by ignoring it. If British manufacturers don't start making popular chips soon the consequences could be dire for the whole UK electronics industry.

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All Keyed up



Real keys for your Spectrum, and a colourful peel-off transfer conceals the hard work it took to get the Fuller set up.

Spectrum keyboards feel the light brush of John Lettice's fingertips.

In the beginning was the word, and the word was that there was a professional keyboard for the Sinclair Spectrum just around the corner. But the tale grew in the telling, as did the waiting lists.

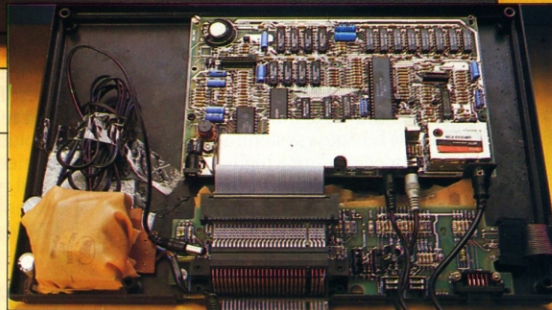
At the end of last summer there were, apparently, plenty of keyboards on the market. We asked for samples from a half-dozen companies in order to compare them. They almost all said they'd send one within ten days, and, with the honourable exception of DK Tronics, they all failed to come up with the goods.

Five months on, Fuller has finally launched the FDS and Transform, a newcomer, has started supplying a class-looking keyboard. And we've still got the one from DK Tronics, so here goes.

Fuller FDS

Considering the gestation period, the Fuller FDS should be first rate — it certainly looks good. The keyboard layout is essentially the same as on the Spectrum, with a number of additions. You get a full-size space bar, a delete key on the left of the top row, an extra four cursor keys and two function keys which split the role of the symbol shift.

The symbol shift is also duplicated on the left of the keyboard, and there's an extra shift on the right. Most important is a comma key plus a full stop key on the right hand side of the bottom row. They look isolated sitting alone on their two keys, but



Inside, the power pack stays wrapped up in its araldite and rubber sheeting, and sellotape keeps stray wires at bay. All cables have to be plugged in inside the keyboard, before you replace the cover.

they're crucial if you want to use the Spectrum for word processing.

The keys themselves have a smooth feel to them, and click when you hit them. They come with the relevant characters ready printed on the top and the front. The colours aren't the same as on the original Spectrum case, and the colour codes 1-7 are missing. So it could be a bit confusing.

I'm not suggesting the FDS is an unmitigated success — we haven't looked inside yet. When you open the case for the first time you don't realise the full horror of the situation. Six small screw holes allow the printed circuit board to be secured either at the front or the back of the case. Just consider the interfacing implications of having the board at the front. Four pillars at the rear right house the power supply.

The latter could be terminal for the unwary. When we asked Fuller about the power supply, the company was categorical that an amateur should not take the Sinclair power supply unit out of its case and fit it into the FDS case. The company

will fit its own power supply, which looks safe and sturdy. But since there's no official warning in the documentation, someone is likely to try to fit it the Sinclair power unit, *even though we warn against it*. I risked life and limb and gave it a try.

One Fuller advert says: 'The Microdrive is easily adapted to go inside along with the power supply. Fixing is simplicity itself, no soldering or technical knowledge is required.' I'd say this is fairly misleading, but read on, unless you're of a nervous disposition and/or work for Sinclair Research.

My first problem was the fact that the power unit I had was secured by three screws, and the FDS had four pillars to screw it to. So I hacked off the four pillars, and did a measuring job with a view to supergluing the power unit base into the FDS. No dice. Even hacking off the various projecting bits of plastic on the unit case still left me about 5mm short when I tried to close the FDS.

I finally got together a strictly temporary arrangement consisting of Araldite adhe-



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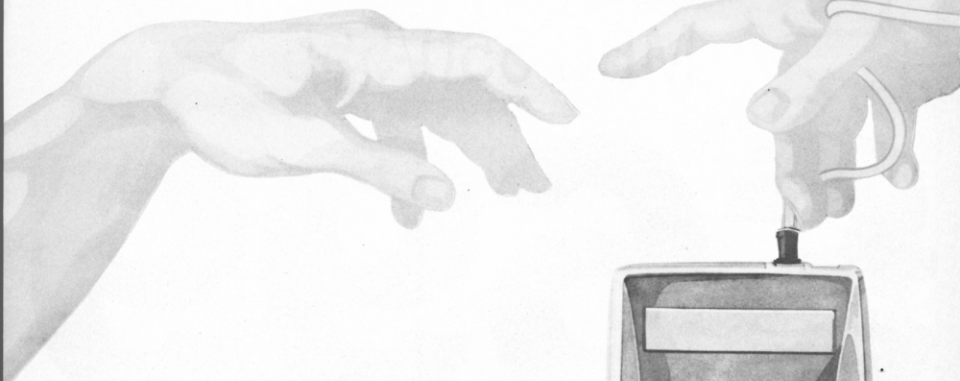
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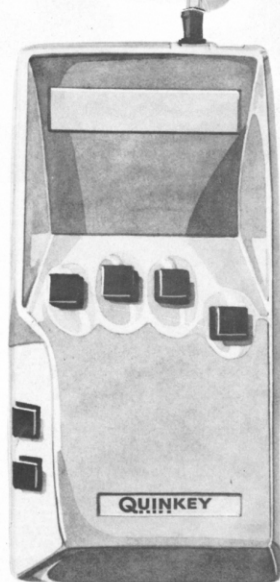
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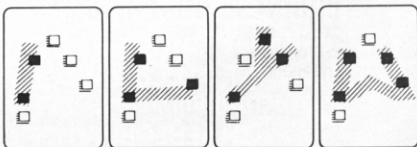
You simply press the keys in different combinations. Each combination represents a character.

Quinkey has 5 keys plus a Control key, each finger belonging to its own key — so there's no need to hunt and peck... BUT...



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lative and rubber sheeting for insulation, the latter because the ventilation grille at the back of the FDS is so large you could easily poke something in by mistake. So even if you were mad enough to try this you'd come to the same conclusion I did and buy a Fuller power unit.

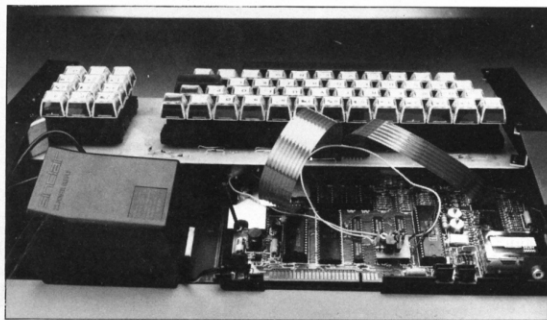
The recommended method for installing Interface 1 is to remove it from its original case, connect it to the back of the Spectrum board with a ribbon connector, then attach it to the back of the keyboard base. Investigations at the ZX Microfair revealed that Fuller itself uses double-sided transparent adhesive tape.

I reverted to Araldite adhesive and rubber sheet, filing off the various screw sockets on the keyboard base so I could get it lying flat, then weighting it with tins of corned beef while the glue dried. You've probably worked out disadvantages in this method, not least being the problems getting Interface 1 repaired.

Two last details. You need a hacksaw to enlarge the hole at the back of the case so



The Transform is a metal cased keyboard, with plastic topped keys which allow you to interchange the inscriptions. The Transform also boasts a separate numeric keypad, for those with an interest in accounting.



The Transform has the advantage of having room to fit the power supply unit inside without de-casing it. The ribbon cables provided are considerably more sturdy than their Sinclair counterparts.

you can use the RS232, and you must cut a slot at the side to run the ribbon cable for the Microdrives out of the machine. Then plug in the tape cables, TV cable and Microdrive cable and close the case.

Cost will have dictated short cuts, but it would be nice to have screw holes in the right place to fit Interface 1, and proper tape control and TV sockets on the back rather than inside.

A Fuller story

Despite Fuller's promises that customers' complaints regarding the delivery of Fuller products would be attended to (Issue 48) PCN still receives regular Fuller queries. Fuller's complaints number (051 709 9280) seems to be badly overloaded, and one spot check with an auto-dialling machine took five hours to get through.

There also seem to be problems with some FDS units. On some keyboards, hit both function keys at the same time while running machine code, and the Spectrum crashes. There have also been cases of keyboards which did not allow accessing of some keywords. These problems are apparently related to the keyboard scanning, possibly made worse by the way the power to the Spectrum PCB runs through the Fuller circuit board first.

DK Tronics

The DK Tronics keyboard suffers from the same problems inside, this time compounded by the four pillars for the power unit having no screw holes, and the fact that the board sits at the back, leaving no room for Interface 1. The only way to fit the latter would be to do a hacksaw job on the base of the keyboard.

The instructions point out mains voltage can kill, but suggest that, if you know what you're doing, you can bolt the power unit to the base of the case. I won't try this until I find a non-conductive bolt.

The keys themselves are stiff to use, and there's no space bar. There is a numeric keypad, but you have to stick your own legends on the keys. The main advantage of this one is that it's cheap and available.

Transform

Transform's keyboard is a weightier metal-cased beast. An on-off switch sits on the right hand side, there's a numeric keypad and an LED shows you when it's on. At the moment the keys are clear plastic with the legend on the underside, but later models should have standard

printed plastic keys.

Assembling it isn't as tricky as the FDS. You keep the circuit board in the base of the Spectrum case and bolt it onto the base of the Transform. You attach Interface 1 to the Spectrum's original base and bolt it all inside. The provisions made for the power unit are equally logical. All you have to do is place the whole thing inside the Transform case.

If you're using the switch and LED you have to wire them up, but that's the only hassle. I was rather disturbed by the prospect of the switch—it's supposed to go in the cable from the mains, and although it seemed relatively safe, it's not something I'd like to do with a metal-cased keyboard.

The keys themselves are of a higher quality construction than the Fuller keys, but there's little qualitative difference in the feel. The numeric keypad is a boon for programmers, but the qwerty section of the keyboard falls down in that the keys, apart from Enter and the space bar, are the same size. There's also only one caps shift, unless you count the extra one on the numeric keypad.

However, it does have full stop and comma keys, and the review model had a rubout although it had no legend on it. One other blank key is intended to be a semi-colon, just as soon as it's wired in.

The final test for a professional keyboard for the Spectrum is to see how it works with Tasword 2. Because of the springy keys the DK Tronics keyboards couldn't keep up with my typing speed, nor could the Fuller and Transform. This would suggest that the keyboards and Spectrum can't keep up with each other, so there might be a case for a buffer to store the extra characters.

PCN

Product Fuller FDS keyboard Price £49.95 inc VAT, add £2.50p & p Manufacturer Fuller, 051-2366109

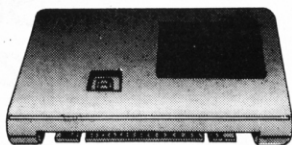
Product Transform keyboard Price £69.95 inc VAT Manufacturer Transform, 01-6586350

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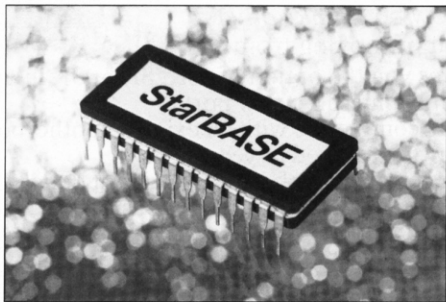
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PCN 2

DIP INTO BEEBFONT

Garry Marsh watches as Watford Electronics' Beebfont creates some very fancy lettering.

Beebfont is a new release which gives additional character fonts to the two available on the BBC (teletext and modes 0-6). The fonts are in an EPROM which is fitted into one of the sideways ROM sockets underneath the keyboard. Being a ROM, it will only work on machines with operating versions of 1.0 or above.

Presentation

The package contains the EPROM, a utilities disk and a 20-page, spiral-bound manual. It is easy to follow, taking you through the facilities in a logical manner with examples and detailed explanations at most points.

BEEBFONT - PCN

In use

After installation, I encountered a few problems. The first being that the utilities disk should have 'auto-booted' but failed to because the disk option had been incorrectly set. After resetting the option it worked well displaying a fair amount of its capabilities, such as coloured text. You can learn a lot about using Beebfont from listing the sample program.

Although the other problems were minor and mostly due to the 'pecking order' of the ROMs, the disk fault was quite confusing. It should not need me, or anyone else, to effect the necessary

BEEBFONT - PCN

changes. I rang the publisher, Watford Electronics about it, only to be told, 'No, that can't be right, are you sure you're doing it right?' When I rang again later and told them I had changed it so that it now worked properly, they replied with 'Oh, well, that's OK then, thanks for ringing.'

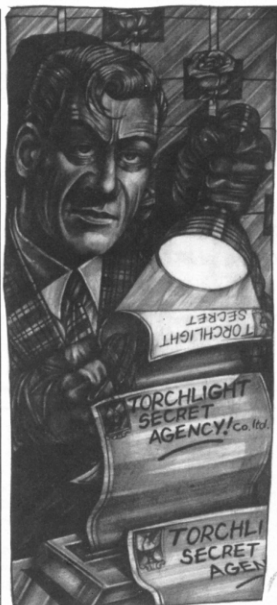
Features

There are six different fonts, ranging from a standard typeface, which can be programmed for double width and/or double height, through Roman script, to a 'mod-

BEEBFONT - PCN

ern' style character set. All but one has both upper and lower case. The fonts themselves are good; I produced some rather nice letterheads with them.

The utilities disk also contains two other programs and these are what really make



the package worthwhile. Spooler sends a formatted file from disk to printer (Epson range only at present). The file is printed as graphics, so appears exactly on paper as it does on screen. Spooler also allows for printing 'variations', including inverse mode *ie* appearing as white on black when printed (see illustrations).

I was a bit disappointed that a demonstration program of Spooler, mentioned in the manual, was missing from my disk.

BEEBFONT - PCN

The other program is Editor, which allows you to create your own character fonts. Once loaded, the screen is split in two; the left showing the currently loaded RAM-based font, and the right a large grid which is used for designing characters. As usual with character-defining programs, you move the cursor around the grid, filling in the cells. A small (actual size) character is shown as well, allowing you to see what the final product will really look like.

Once finished you can save the definitions to tape or disk. A nice feature of this program is that the provided fonts can be edited to suit your requirements. This saves a lot of time and gives the utility greater flexibility.

BEEBFONT - PCN

Documentation

The manual has its own problems and in places is misleading because of some unfortunate ambiguities. But it is detailed, and has a number of appendix-like chap-

Beebfont - PCN

ters which cover memory usage and RAM areas to avoid. There is a small paragraph on making an EPROM copy of Beebfont, which Watford Electronics give you permission to do. At the end there is a useful summary of all the codes.

Verdict

The 'niggles' I experienced made me limit myself to a few simple projects such as a dozen letterheads. The high cost of the package could deter potential buyers since it has limited practical use for either the

Beebfont - PCN

home or a small business. For £45 there shouldn't have been as many problems as I experienced and rather more helpful support. However, it should find a niche in the ROM collection of anyone who relies more than most on their printer.

Its main advantage is that it can make printout from a humble Epson look very pretty indeed, even if you do have to wait much longer than usual for output.

RATING (/5)

Features
Documentation
Performance
Usability
Reliability
Overall value



Name Beebfont Application Character font generator Price £45 (ex VAT) System BBC Publisher Watford Electronics, Cardiff Road, Watford, Herts (0923) 40588/37774 Format EPROM Other Versions None Outlets Mail order

Make the most of your micro with these two new books

COMPUTING WITH THE ORIC 1

Ian Hickman

This new book is for all users of the Oric 1 micro. It complements the Oric Manual and can be used alongside it. An introductory section covers the initial switching-on and setting-up and is followed by some simple BASIC programming. Later chapters introduce more advanced BASIC, high-resolution colour graphics, the sound feature and interfacing, with a special section on the printer and another on machine code programming. A number of original programs are included in this practical guide.

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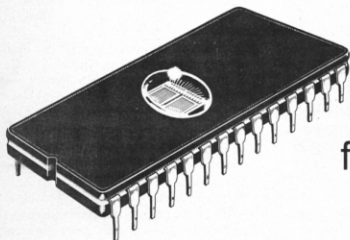
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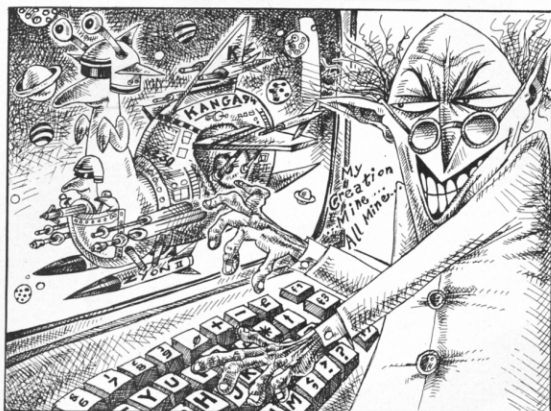
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D-I-Y Games

Pete Gerrard has game designs on his Vic 20

The unexpanded Vic 20 is a rather small machine on which to attempt to produce a games designer program. After all, you've got only 3.5K of RAM to play with. Galactic Software gets round the problem by taking the modular approach.

Games Designer gives you a number of linked programs which load separately, each program dealing with a separate aspect of designing or editing an 'arcade-style' game. However, due to the memory limitations of the Vic, the results are rather disappointing.

The idea of any games designing package is to take the chore out of writing games in assembly language. They should also make it relatively easy to alter a game you've 'written', so you don't have to go through re-entering all the data.

Games Designer's modules allow you to define or change the characters, background, tunes, game rules and so on. In theory at least, you should have access to an unlimited number of different games. Also in theory at least, there's no limit to the number of possible flavours of ice-cream... but it's still ice-cream.

In play

Games Designer comes on two sides of a cassette. Side one has the editing modules while side two carries the main game base (which must be loaded before you can play a game) and three sample games which you can alter. This provides a gentle introduction to the editing programs.

Each game must be loaded into memory, the tape rewound and the main game base loaded before you start play.

First up is Kanga—about as interesting as reading a bus ticket. You are a

kangaroo, a rather amorphous user defined blob, sorry, graphic. You have to move through a maze of sorts to get to some food at the foot of the screen. This is needed for your starving baby roos, to whom you must return with the food.

A major problem is that within the maze are numerous horse-drawn wagons, likely to turn you into instant roo-burger. These move from left to right within the maze, doing an about-face at irregular intervals. Avoiding them is none too easy and the more points you get, the faster they trot.

Not a very promising start, on the whole.

The second game, Zyon, is set in deep space. You are in charge of a little roo-like spaceship, the maze has disintegrated somewhat and what's left has turned into stars and planets which impede your progress.

Guess what you have to do? Right: drop to the bottom of the screen to collect fuel and return with it to your home base. A major problem is the horde of alien rockets moving from left to right, and turning about-face at irregular intervals. One touch from them turns your spaceship into so much cosmic debris. The more points you get, the faster they zoom.

In the third program, Crazy Maze you negotiate your way from the bottom left of a maze to the bottom right to collect some cash, avoiding alien snails moving from left to right, doing about-turns...

In use

Getting the drift by now? Games Designer may allow you to produce lots of different games, but of one limited type.

The first part of the designer lets you define all the graphics characters using the

fairly standard procedure of moving the cursor (misspelt as cursor at one point) within a grid, setting or resetting cells (pixels of the character). The hero is a single character, but has to be defined as four profiles for moving up, down, left and right. The 'aliens' are made up from four characters which are produced as a block to make a large single shape. As they can only move from right to left and vice versa, the profiles are much easier to work out.

You are given scope to design other shapes as well, and in the next part of the program you position them on-screen and design the background.

After that, you get the opportunity to define the rules of the game, things like number of lives; initial speeds; relative alien/hero speed; points to be scored; name and author (for the credits) and so on.

A further section allows you set up background music and 10-note tunes to be played when you score points or get killed.

Finally, the masterpiece can be saved to tape for future use or editing. What a pity you can't play the game before saving it to make those last minute adjustments and corrections.

The program comes in a standard cassette box and the documentation is a slim volume which just fits inside the case. It's printed in a tiny typeface, so may be quite difficult to follow. The instructions are not particularly well laid out whether on-screen or in the manual.

Sometimes you have to press a key to continue, but nowhere are you told this. Another clumsy feature is that for questions which require one of two letters, such as Y/N, you have to press ENTER to make the selection. Surely by now programmers must realise the value of the single key press entry?

Verdict

Games Designer is certainly easy to use, and you can create a limited style of game with it. However, all the games will be much of a muckness so don't expect to produce any spectaculars.

Given the memory limitation, Games Designer is a valiant try—perhaps the best that can be done. But Galactic Software's forecast that Games Designer will force down software prices is an optimistic claim.

Versions for other machines are said to be in the pipeline and I will be interested to see how, or if, Galactic makes use of the extramemory.

PCN

RATING (5)

Features
Documentation
Usability
Reliability
Value for money



Name Games Designer System VIC 20 Price £9.50 Publisher Galactic Software, Unit 7, Larchfield Estate, Dowlish Road, Ilminster, Somerset TA19 0PF Tel (04605) 5161 Format Cassette Language Machine code/Basic Other versions None yet Outlets Mail order/Retail

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PCN 3

ATARI

Tough travels

Name Airstrike 2 **System** Atari (16/32K) 400/800/XL **Price** £9.95
Publisher English Software, 061-835 1358 **Format** Cassette **Language** Machine code **Other versions** None

If claustrophobia isn't a problem you might welcome a chance to go underground once again. This latest version in the cavern-flying Scramble genre gives a thorough testing of your reflexes.

Objectives

Progressing through five sectors, you fly through an alien cavern system, endeavouring to wipe out the defences before they get you.

The game can be played with one or two players on any of five skill levels. To complete the quintet motif, you are given five lives.

In play

Your fighter craft, controlled by joystick alone, flies left, right, up and down. It can fire missiles and drop bombs, by pressing the space bar on the keyboard and/or by a tricky upward flick of the joystick.

The cave system is a bit out of the ordinary, having more than one route through it. Some of the caverns have split levels — you decide which fork offers the best route, not forgetting you have a limited amount of fuel. Just like most Scramble versions, you need to bomb fuel dumps to replenish your own —

daft but consistent. Ammunition is also limited so you'll need to bomb ammo dumps to restock — equally barmy but again par for the Scramble course.

As you fly, the caverns scroll evenly away revealing more of the tortuous and defence-filled system. Dropping from the roofs are large fireballs — while from below, ground to air missiles come whooshing up, giving you just a split-second to react. Some of these rockets are buried in silos, making them fairly difficult to hit. As you penetrate into the system's core other hazards await.

Points are earned by shooting down anything that moves and by destroying ground-based transport and installations. Some of the cavern passages are blocked by pulsating laser shields — you need to blast a hole in them big enough for your ship to get through. Some of these shields have a nasty habit of switching back and forth between lasers and rock.

One interesting innovation — you can buy separate data cassettes with different landscapes to load into the Airstrike 2 Program.

Verdict

The caverns are filled with defence systems, making the game possibly the toughest and most varied version of this classic to date.

Bob Chappell

RATING (5)

Lasting appeal



Playability



Use of machine



Overall value



Winning formula

Name Pole Position **System** Atari 400/800/XL **Price** £28.95
Publisher Atari **Format** Cartridge **Language** Machine code **Other versions** None **Outlets** Centresoft stockists

Pole Position, a three-dimensional motor racing game, won high acclaim for its exciting graphics when it first appeared in the arcades. Atari has now made it available for its range of home computers — and what a superb job it has made of the transfer. It's all here: the incredible high-speed racing, the full perspective graphics and the excellent sound effects.

Objectives

Before you can compete in the main event, you first take part in a qualifying race where a lap time of 73 seconds or better must be achieved. If you succeed, and your qualifying time is good enough, you are allocated one of the eight starting positions in the big race.

There are three tracks to choose from, and a race can be up to eight laps long. You also have the option of a practice run with no other cars on the course.

In play

The game is every bit as good as the original arcade version. True, there are some small differences. The cars are not so impressive in appearance and, although the hoardings are still alongside the track, there is no writing on them.

Your view of the action is

from a position slightly above ground level, just behind your car, so you see the track stretching away into the distance. The black track has a broken centre-line and is bordered by red and white markings.

At the start of the qualifying lap an air ship scuds past bearing the banner "Prepare to Qualify" and you're off. Pushing the joystick forward once puts you into low gear and your car picks up speed automatically. Pulling the joystick back once takes you into top gear. There is no accelerator to worry about — the car keeps going faster until it reaches its maximum speed. The fire button acts as the brake and a left to right movement of the joystick keeps the steering simple.

The effect of being on a race track is really astonishing, especially when your car is hammering along at top speed. When cornering the whole perspective shifts smoothly, and swiftly.

Sound is used to great effect as well. I particularly liked the roar of the engines, the squeal of tyres on a bend (you could almost smell the burning rubber), the explosion when your car hits a hoarding and the jaunty, sporting musical theme played at the start of a race.

Verdict

Exciting, exhilarating, excellent, Pole Position takes the lead as the best Atari race game around.

Bob Chappell

RATING (5)

Lasting appeal



Playability



Use of machine

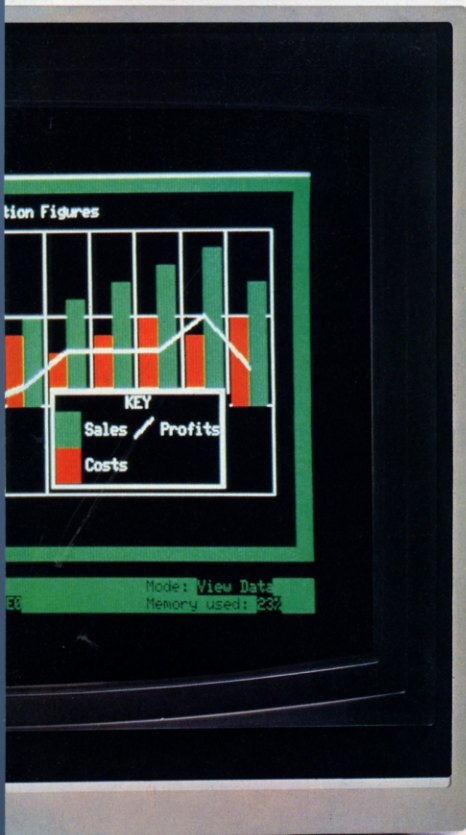


Overall value



New-Sinclair QL

There's no comparison chart, b



The Sinclair QL is a new computer.

Not just a new Sinclair computer, but a totally new sort of computer – nothing like it exists anywhere.

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The Sinclair QL has 128K RAM. Big deal?

Several micros offer 128K RAM, or more, as standard. The 'What Micro?' table for December 1983 lists over 50 of them – but 40 of the 50 micros listed cost over £2,500!

The Sinclair QL offers you 128K RAM for under £400, and an option to expand to 640K. That's a lot of bytes to the pound!

The Sinclair QL has a 32-bit processor. Who else?

Under £2,700, nobody. Even the new generation of business computers, such as the IBM PC, are only now beginning to use 16-bit processors.

At prices like this, the Motorola 68000 family – widely regarded as the most powerful microprocessors available – will remain a luxury.

Yet with the Sinclair QL, the 32-bit Motorola 68008 is available for less than £400.

You can also be sure that the QL will not become outdated. 32-bit architecture is future-proof.

32-bit processor architecture, 128K RAM, and QDOS combine to give the QL the performance of a mini-computer for the price of a micro.

Exclusive: new QDOS operating system

No competition! QDOS sets a new standard in operating systems for the 68000 family of processors, and may well become the industry standard.

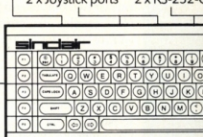
QDOS is a single-user, multi-tasking, time-sliced system using Sinclair's new SuperBASIC as a command language.

One of its most significant features is its very powerful multi-tasking capability – the ability to run several programs individually and simultaneously. It can also display the results simultaneously in different portions of the screen. These are features not normally available on computers costing less than £7,000.

Eleven input/output ports

QL ROM Cartridge slot

2 x Joystick ports 2 x RS-232-C



Expansion slot

New professional keyboard

The QL keyboard is designed for fast input of data and programs.

It is a full-size QWERTY keyboard, with 65 keys, including a space bar; left- and right-hand shift keys; five function keys; and four separate cursor-control keys – key action is positive and precise.

A membrane beneath the keyboard protects the machine from dust (and coffee!), and for users who find an angled keyboard more comfortable, the computer can be raised slightly at the back by small detachable feet.



£399

because there's no comparison!

Advanced new friendly language – Sinclair SuperBASIC

The new Sinclair SuperBASIC combines the familiarity of BASIC with a number of major developments which allow the QL's full power to be exploited.

Unlike conventional BASIC, its procedure facility allows code to be written in clearly-defined blocks; extendability allows new procedures to be added which will work in exactly the same way as the command procedures built into the ROM; and its constant execution speed means that SuperBASIC does not get slower as programs get larger.

Included – superb professional software

The suite of four programs is written by Psion specially for the QL and incorporates many major developments. All programs use full colour, and data is transportable from one to another. (For example, figures can be transferred from spreadsheet to graphics for an instant visual presentation.)

Word-processing

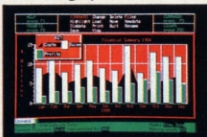


Certain to set a new standard of excellence, QL Quill uses the power of the QL to show on the screen exactly what you key in, and to print out exactly what you see on the screen.

A beginner can use QL Quill for word-processing within minutes.

QL Quill brings you all the facilities of a very advanced word-processing package.

Business graphics



QL Easel is a high-resolution colour program so easy to use you probably won't refer to the manual! It handles anything from lines, shaded curves or histograms to overlapping or stacked bars or pie charts. QL Easel does not require you to format your display before entering data; it handles design and scaling automatically or under your control. Text can be added and altered as simply as data.

Spreadsheet



QL Abacus makes simultaneous calculations and what if model-construction easier than they've ever been. Sample applications are provided, including budget-planning and cash-flow analysis. QL Abacus allows you to refer to rows, columns and cells by names, not just letters and numbers. Function keys can be assigned to change a variable and carry out a complete 'what if' calculation with a single key-stroke.

Database management



QL Archive is a very powerful filing system which sets new standards, using a language even simpler than BASIC. It combines ease of use for simple applications – such as card indices – with huge power as a multi-file data processor.

An easy-to-use labelling facility means that you don't have to ask for your file by its full name – a few letters are enough.

New – the Sinclair QLUB

The QLUB is the QL Users Bureau. Membership is open to all QL owners. For an annual subscription of £35, QLUB members receive one free update to each of the four programs supplied with the QL, and six bi-monthly newsletters. Sinclair has also made exclusive arrangements for QLUB members to obtain software assistance on QL Quill, Abacus, Archive or Easel by writing to Psion.

The Sinclair QL challenge

If you're seriously considering any other computer, post the coupon for a published-blow comparison chart for the machine you're considering (not one we've created ourselves) and give you the Sinclair QL figures, detail by detail.

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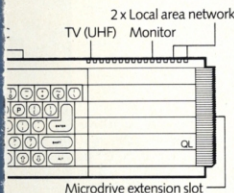
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Phone Camberley (0276) 686100, or use the coupon to get a QL brochure. Due to demand, delivery may take more than 28 days. Your order will be acknowledged immediately with an expected shipment date. Remember that Sinclair offers a 14-day money-back undertaking.



Two 100K microdrives built in

The Microdrives for the Sinclair QL are identical in principle to the popular and proven ZX Microdrives, but give increased capacity (at least 100K bytes each) and a faster data-transfer rate. Typical access speed is 3.5 seconds, and loading is at up to 15K bytes per second. The Sinclair QL has two built-in Microdrives. If required, a further six units can be connected.

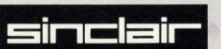
Four blank cartridges are supplied with the machine.



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SPECTRUM

On your bike

Name Deathchase System Any
Spectrum **Price** £6.95 **Publisher**
Micromega, 230-236 Lavender
Hill, London SW11 1LE **Format**
Cassette **Language** Machine code
Other versions None **Outlets** Retail,
mail order.

Micromega seems to be specialising in attempts to bring 3D to your Spectrum, and after the fun-but-limited Pac-Man variation, Haunted Hedges, comes a more exciting proposition with vague similarities to both 3D Tanx and Imagine's Zoom.

Objectives

It is the year 2501 and the North American continent is ruled by mighty warlords. You, as one of the elite Riders of the Big Bikes, must patrol the forests and rid them of the enemy riders, thus earning yourself \$1000 a time.

In play

The game is Kempston joystick compatible, but is easily playable from the keyboard.

The front of your own bike stays static at bottom centre of the screen while the trees of the forest rush towards you from the horizon. While two enemy riders roar through the forest, you must accelerate to top speed to bring them within range of your photon bolts.

The range indicator at the front of the screen flashes when you have the enemy in range — also shown are your three lives, your score and a

high score.

Your handlebars switch left and right as you race through the trees firing at the hostile riders, who nip through the woods with ease, trying to tempt you to a head-on collision with a passing pine. From time to time you are given the chance to fire on an enemy helicopter or tank, and you remain on the first sector till you've seen off the two riders you're after.

Then there's a brief halt while night-time falls and it's back to full revs in search of two more riders accompanied this time by enemy tanks, and naturally the forest seems to get thicker the further you go.

The cassette cover claims the greatest reward will go to the rider who can penetrate eight sectors, but as I only managed to get through the first four before losing three arguments with tree-trunks I can't tell you what this is.

The graphics of Deathchase seem to have been simplified to keep the game at breakneck speed, but I for one would rather have the extra speed of operation. Relentless sounds add to the excitement of the chase.

Verdict

While not totally original, Deathchase restored to me the excitement of playing the original Space Invaders.

Mike Gerrard

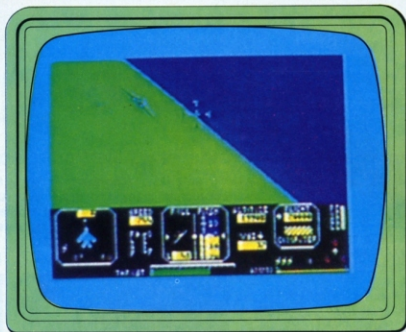
RATING (5)

Latest appeal

Playability

Use of machine

Overall value



Pile it on pilot

Name Fighter Pilot System 48K
Spectrum **Price** £7.95 **Publisher**
Digital Integration, 22 Ash
Church Road, Ash, Aldershot,
Hants **Format** Cassette **Language**
Machine Code **Other versions** None
Outlets Some retail

Digital Integration seems to have circumvented US arms and technology embargoes and imported a McDonnell Douglas F15 Eagle.

Fighter Pilot is a high-performance flight simulator, complete with enemy intruder aircraft to shoot down.

Objectives

There are several versions you can play, varying from landing practice at trainee level to air-to-air combat at ace level, with or without visibility. The combat settings are obviously the most interesting, partially for bloodthirsty reasons, and partially because they solve the endemic problem of flight simulators, which is finding something to do with yourself once you're off the runway.

In play

So you pile on the power till you're at maximum revs, let off the handbrake, pull back the stick and... crash. Wheels up at more than 300 knots, so you're back on the tarmac. The trouble is, the thing goes up like a lift, and you have the few seconds between 140 knots (take off speed) and 300 knots to get the wheels up.

Having mastered this, you switch to combat mode, which locks your radar on the first

intruder, and set an intercept course. That's where your problems really start.

First time out I headed straight at the enemy plane. On full power you'll be doing anything between 900 and 1,400 knots. With the other side doing 550, intercept doesn't take long.

The first sighting — a little blob in the distance — grows fast until it is clearly a large delta wing beast, obviously a Vulcan.

After a few more abortive intercepts it became clear that there wasn't a lot of future in mixing with it. Plan B, which involved climbing to 65,000 ft, then diving past, guns blazing, was also unsuccessful, and left unsightly craters on the ground, with me in them.

Once you've got the first four, you'll be on the verge of running out of fuel, so you'll have to land to rectify this.

This is not easy — the F15 will apparently fly at Mach 2.5 upside down, climb vertically and spin like a top, but it's well nigh impossible to slow it down enough to actually land.

Verdict

We're not at the fully-functioning dogfight yet, but it's still a pretty effective piece of work. If there are any US airpersons out there reading this, put Chubb locks on your bases, as some of us may have difficulty refraining from slipping inside and trying the real thing...

John Lettice

RATING (5)

Latest Appeal

Playability

Use of Machine

Overall value



Dust off that old lantern and grab your rusty axe. Bob Chappell and his BBC go adventuring.

Model B odysseys

It's time to springlean the brain cells with these six stimulating text adventures for BBC B owners.

Gideon's Gamble



Superior Software supplies this tale of a treasure hunt on the High Seas. Legend has it that the infamous pirate Hezekiah Gideon buried all his ill-gotten gains on a desert island. King Nimble III has commissioned you, famed adventurer Captain Hogwash, to embark on an expedition to locate the island and recover the treasure.

Before you can up anchor, you must furnish your ship with essential cargo. As there is a limit to how much your galleon can carry, supplies must be chosen with care. There are quite a few places to search for your provisioning, so stocking up isn't easy.

This adventure has its tongue firmly in cheek. For instance, although your ship is wind-powered, you just might find that you need to take a bus and train ride before you set sail!

Some simple graphics and sound effects enhance what is basically a traditional text adventure. Function keys are reserved for use as single-key entry of common commands such as TAKE, DROP or HELP.

An enjoyable adventure — but watch out for the Roggin, whatever that may be!

Star Trek — The Adventure



Also from Superior Software comes Star Trek which has you playing the part of the bold Captain Kirk. Starship Enterprise has been waylaid by Klingons and badly-damaged; all the crew have abandoned ship, leaving just you and Mr Spock. Spock has beamed over to the Klingon ship to negotiate a truce. He should have known better than to try to reason with a Klingon — he is now being held prisoner.

The adventure starts with you on the deserted bridge of the Enterprise. A quick check



round reveals that most of the ship's systems are dead or inoperable and you don't seem to be able to do too much about it. The dark room nearby surely must lead someplace — but where to find a light? Calling on the HELP command only provokes the response: 'Help prohibited by Starfleet Prime Directive 5'.

Survivor



An unusual one, this. The year is 1910 and you're in deep trouble — that's unless trying to swim in a shark-infested sea is your idea of fun.

The lifeboat nearby looks full already. Apparently you were sailing in an antiquated tramp steamer bound for Borneo when the engine blew up, thus accounting for your present damp predicament.

The aim in this adventure from MP Software is to forget all about treasure hunts and just survive. If you make it to an island there's still lots to worry about — cannibals, an oddball castaway, crocodiles, rapids and soldier ants to name but a few of the hazards to survival. Original and challenging.

Castle Frankenstein



You thought that the Frankenstein monster had died in a fire decades ago, didn't you? Epic Software

knows better — several unsolved murders have taken place near your village which just happens to be close to the site of the notorious Castle Frankenstein.

Renowned adventurer that you are, it is only natural that the locals should choose you to pay a visit to the castle to track down and destroy the creature.

This all-text adventure is pleasingly presented in white upper and lower case, with interline spacing, against a blue background. The program recognises and acts upon about 140 words, including the essential SAVE and LOAD options, although there is no HELP facility.

There's quite a bit of exploring and collecting to do before you can get into the castle itself — a pit, forest and graveyard are likely to slow down your progress.

A pretty tough beginning to a text adventure which should have you wracking your brains to avoid getting rated by the program as "Trained Chimp".

Blue Dragon



Written in machine code, this text adventure from MP Software gives instant responses to your commands.

According to a myth, fabulous treasure is lying waiting for someone to come and get it. Reputed to belong to the Sun God, it's been hidden on an island. Not having much faith in banks or safes, he has set a

fearsome blue dragon to watch over it. In this adventure you'll need magic. But don't rely too much on it as it has nasty habit of backfiring.

Although locations and objects remain constant, there are several random events which you'll have to learn how to deal with. The program usually gives you two choices when confronted with one of these incidents. For example, when suddenly being charged upon by a terrifying black knight on horseback, you are given the option to hide or stand your ground. At another point, a passing wagon provides an opportunity for hitching a lift or hiding.

Blue Dragon plunges you into the action right from go — strange birds, orcs, knights, witches, yellow-slit eyes, and dark, dangerous caves are just a few of the early unpleasantries you're likely to encounter.

Plenty of action and interest, the pace is aided by lightning response to your input. Highly commended.

Quest for the Holy Grail



If you want to be a Knight of the Round Table, you must first prove yourself worthy. Just a small trial: 'Seek out the Holy Grail,' says King Arthur, so off you go.

En route through forests, marshes, rivers, mountains, castle and dungeons you will encounter an assortment of characters, some friendly, some not.

Due to the use of text compression techniques, there are a large number of places to explore. The program is in machine code so response is fast. An interesting adventure with enough puzzles to keep those brain cells ticking away.

Gideon's Gamble; Star Trek Adventure (cassette each £7.95) Superior Software, Leeds. Tel (0532) 842714

Blue Dragon, Survivor (cassette each £7.48) MP Software, Merseyside. Tel (051334) 3472

Castle Frankenstein (also for Electron), **Quest for Holy Grail** (cassette each £7.95) Epic Software, Leicester.

OTHELLO

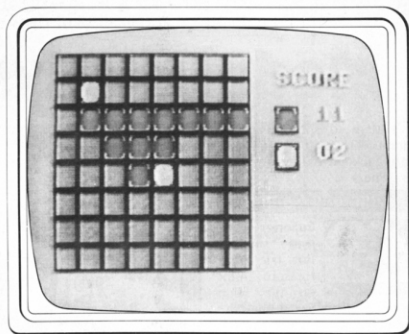
Reversi is a board game for two players that many people will have heard of. It was first invented in the 1880's by Lewis Waterman of London. John W Mollett also claims to have been the originator, but Waterman seems to have had his rules published first.

It was re-invented in 1971 by Goro Hasegawa of Japan who altered the first four playing positions and renamed it Othello.

The game starts with four pieces placed in the centre of the 8 by 8 board and moves are made by placing your piece next to one of your opponent's. This is only allowed when, by placing your piece, a row is formed with one of your pieces on either end, your opponent's being in between. You then claim all the pieces by turning them over so that they are your colour. The winner is the player who has the most pieces left when the board is full.

This version from SP Rodgers of London is for two players and makes good use of the Commodore 64's graphics facilities and sprites. It also includes a replay mode to allow you to see how you got to your current position. Pieces are placed by moving the Commodore symbol to the position you require, using the joystick or cursor keys, and then pressing fire or the space bar. If the move is not valid the computer will ignore it.

The latter feature makes the game very easy to learn since the only bad moves you can make are tactical ones. These are not against the rules.



This week sees the start of the utilities section of PCN programs. Each week a routine or program will be listed at the end of the main programs section. If you have any routines that you think will be of use to other readers, why not send them in for publication? Just send your routine on cassette together with some notes on what the routine does and how it does it:

Kenn Garroch PCN Programs Evelyn House 62 Oxford Street London W1A 2HG

Remember, though, it must be your own work, not previously published elsewhere.

All contributions will be returned as soon as possible after I have had time to look them over.

Title: *Othello*
Machine: *Commodore 64*
Language: *CBM Basic*
Application: *Game*
Author: *SP Rodgers*

- 10 Reserve memory.
 20 Print the opening graphics screen and set up the graphics.
 50 Print at variable.
 60 Set up the scores array, it turns array and the replay flag.
 120 Light green (comm 6).
 130 Light blue (comm 7).
 140 Brown (comm 2).
 220-250 Set up the magnified characters.
 310-350 Then the magnified numbers.
 420 Set the colours for the multicoloured sprites.
 430 Set position.
 520 Set the colour for enlarged sprite.
 530 Set position.
 1010 Switch off the sound and set F to 3 or 0.
 1020 Display 0 or 2 sprites.
 1040 Are all pieces placed?
 1060-1100 Convert the joystick to RS.

```

10 POKF56,56:POKES2,56:CLR
20 GOSUB5000:PRINT "OK TO CONTINUE? (Y OR N) "
30 GET#1:IF#=" "THEN30
40 PRINT "Y":IF#="N"THENEND
50 UD#="00000000000000000000000000000000"
60 DIMSC(2):DIMTU(1,65):FF#0
99 :
100 REM **** BOARD CELLS ****
110 DIMB$(2)
120 B$(0)="#H#B#C#D#E#F#G#I#J#"
130 B$(1)="#1#J#K#L#M#N#O#P#Q#R#"
140 B$(2)="#1#J#K#L#M#N#O#P#Q#R#"
199 :
200 REM **** MAGNIFIED CHARACTERS ****
210 DIMCH$(7)
220 CH$(0)=" "
230 CH$(2)="Z"
240 CH$(4)="V"
250 CH$(6)="1"
299 :
300 REM **** MAGNIFIED NUMBERS ****
310 N$(0)=CH$(2):N$(1)="79"
320 N$(2)="="
330 N$(4)="-"
340 N$(6)="*"
350 N$(8)="."
399 :
400 REM **** SPRITE #0 ****
410 POKE2040,13
420 POKEV+20,1:POKEV+37,2:POKEV+38,7:POKEV+39,6
430 POKEV,26:POKEV+1,50
499 :
500 REM **** SPRITE #1 ****
510 POKE2041,14
520 POKEV+29,2:POKEV+23,2:POKEV+40,14
530 POKEV+2,220:POKEV+3,83
599 :
600 REM **** SELECT CHARACTER SET ****
610 POKEV+24,30
699 :
700 REM **** SELECT MULTICOLOUR ****
710 POKEV+22,216:POKEV+34,4:POKEV+35,9
799 :
800 REM **** SET UP SCREEN ****
810 GOSUB9010
899 :
999 :
1000 REM ***** MAIN LOOP *****
1010 POKES+24,0:F#F+3:IFF3THENF#0
1020 POKEV+21,F:POKEV,26+24*(XX-1):POKEV+1,50+24*(YY-1)
1030 IFFTHEN7000:REM COMPUTER REPLAY
1040 IFSC(1)+SC(2)=4THEN#000
1050 GET#1:PEEK(56320)

```

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BOZO'S NIGHT OUT



A brand new character game. Poor old Bozo, all he has to do is to get home after a night out with the lads. That's easy until a wobble becomes a lurch and a stagger. Later into the night, all rules go out of the window as he disbelieves what's happening in front of his blood-shot eyes. An epic journey with ultra-smooth graphics and sprites which run rings round normal games.



SUPER PIPELINE

Keep the pipeline open. Foreman Fred and Plumber Pete have their work cut out. The evil ladderman drops metal wedges to plug the pipeline - and only Pete can fix 'em. Pete trusts Fred to defend him against the six-legged Venusian pipe spiders and the hard case lobster while he knocks out the plugs and restores the flow. Full accompanying music and effects, options and hi-score table.

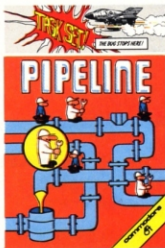
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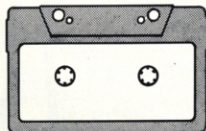
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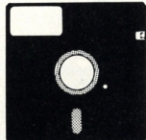
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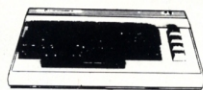
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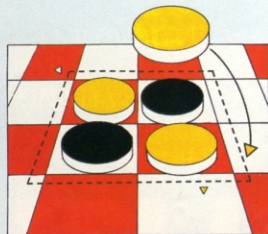
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OTHELLO

- 1150 If the position is vacant then switch off sprite 0. Check for the F8 key.
- 1160 Check for CTRL+C pressed.
- 1170 F1 is the successful go flag.
- 1210 Search 8 directions. Fis the found a line flag. Check all 8 places, if place vacant then end the search at this direction.
- 1240 If the adjacent piece is the same colour then no line in this direction.
- 1250 Found a line.
- 1260 If there is a line in this direction fill it in.
- 1270 Next direction.
- 1280 If the go was successful then change players.
- 1310 If not the first time then miss 1320.
- 1330-1380 Change every counter in the line, then change the scores.
- 1380 Set the successful go flag.
- 1410 Print the player piece in the correct place and update the board array.
- 1420-1430 Make noise.
- 1510-1540 Print both the scores.
- 5010-5020 Change player and move sprite 1.
- 5030 Record the go in the TU array then reset XX, YY.
- 6010 Switch off the sprites.
- 6020-6050 Flash the board colours.
- 6060 Select ROM characters and select border and background colours.
- 6130 After CLR, S and V are redefined.
- 7010 If not the first time then miss changing the screen.
- 7020-7040 Fresh screen and print message.
- 7050-7060 Get the position from the TU array and position accordingly.
- 7070 Rapidly flash the sprites until the appropriate key is hit.



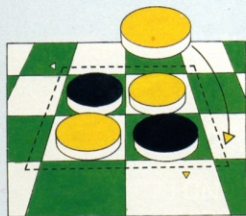
```

1060 IF J0=125 THEN R#="R"
1070 IF J0=126 THEN R#="J"
1080 IF J0=119 THEN R#="M"
1090 IF J0=123 THEN R#="M"
1100 IF J0=111 THEN R#="M"
1110 IFR#="R" THEN V#=#V+1: IF Y08 THEN V#Y=1
1120 IFR#="J" THEN V#Y#V#-1: IF WY11 THEN V#Y#R
1130 IFR#="M" THEN X#=#X+1: IF X08 THEN X#R#1
1140 IFR#="M" THEN X#=#X-1: IF X011 THEN X#R#0
1150 IFR#=" " AND R0(X, Y) < 1 THEN POKEV+21, 2: GOT01210
1160 IFR#=" " THEN S010
1170 IFR#=" " THEN FF#1: TU#0
1180 GOT01010
1190
1200 REM **** LOOK FOR LINES ****
1210 F1#0
1220 FOR D#=-1 TO 1: FOR D#=-1 TO 1: F#=#: IF D#<0 AND D#>0 THEN L#270
1230 FOR I#1 TO 8: B0#=#X+D0#*I, Y#=#Y+D#*I: IF B0# THEN I#8: GOT01260
1240 IF I#1 AND B0# THEN I#8: GOT01260
1250 IF B0# THEN I#F#-1: I#8
1260 NEXT I: IF F THEN G0S0B1310
1270 NEXT D, D#
1280 IF F1 THEN S010
1290 GOT01010
1299
1300 REM **** UPDATE BOARD, SCORES ****
1310 IF F THEN I330
1320 V#Y#V#&B0#(CPL)#SC(CPL)+1: B0(X, Y)#PL: G0S0B1410
1330 FOR I#1 TO 8: IF B0(X#I, D#Y+J) D#Y#J#D#Y#PL THEN I#8: GOT01380
1340 IF PL#1 THEN SC(2)#SC(2)-1: GOT01360
1350 SC(1)#SC(1)-1
1360 SC(CPL)#SC(CPL)+1: G0S0B1510
1370 X#=#X+I, D#Y#Y#Y#I#D#Y#G0S0B1410
1380 NEXT I, F: F1#1: RETURN
1399
1400 REM *** PRINT COUNTER, NOISE ****
1410 PRINT LEFT$(UD$, (Y-1)*4+1) TAB (X-1)*3; B0(X, Y): PL
1420 POKES+5, 15: POKES+6, 81: POKES+24, 15
1430 POKES+4, 129: FOR T#25 TO 35: POKES+11, T: POKES, T: NEXT T: POKES+4, 128
1440 RETURN
1499
1500 REM **** PRINT SCORES ****
1510 PRINT "*****" TAB(32): FOR I#1 TO 2
1520 PRINT NO$(INT(SC(1)/10)) NO$(SC(1)-INT(SC(1)/10)*10)
1530 PRINT "*****" TAB(32)
1540 NEXT I: RETURN
1599
5000 REM **** CHANGE PLAYERS ****
5010 IF PL#1 THEN PL#2: POKEV+3, 125: GOT05030
5020 PL#1: POKEV+3, 83
5030 TU#0, TU#X: TU(1, TU)#Y: TU#TU+1: X#1: Y#1: GOT01010
5999
6000 REM **** END OF GAME ****
6010 POKEV+21, 0
6020 FOR I#1 TO 50
6030 POKEV+35, 6: FOR J#0 TO 50: NEXT
6040 POKEV+35, 14: FOR I#0 TO 50: NEXT
6050 NEXT
6060 POKEV+24, 21: POKEV+33, 0: POKEV+32, 0: PRINT "*****"
6070 PRINT SPC(14) "*****"
6080 PRINT SPC(14) "GAME OVER *"
6090 PRINT SPC(14) "*****"
6100 PRINT "***** PLAYER ONE (BLUE) SCORED" SC(1)
6110 PRINT "***** PLAYER TWO (WHITE) SCORED" SC(2)
6120 PRINT SPC(14) "*****"
6130 CLR: S#54272: V#53248: GOT01030
6999
7000 REM **** COMPUTER REPLY ****
7010 IF TU#0 THEN 7050
7020 G0S0B9000
7030 PRINT "LEFT$(UD$, 18) TAB(29) CH$(5) CH$(0) CH$(4)
7040 PRINT "TAB(27) CH$(7) " CH$(2) CH$(3) " CH$(6)
7050 X#TU#0, TU#Y: Y#TU(1, TU)
7060 POKEV, 26+2*(X#0)-1: POKEV+1, 50+24*(Y#1)
7070 POKEV+21, 3: GETR# IFR#<="R" AND R#<="J" THEN POKEV+21, 0: GOT07070
7080 POKEV+21, 0
7090 IFR#=" " THEN 7110
7100 IF TU#0, TU+1 < 8 THEN 1200
7110 FF#0
7120 PRINT LEFT$(UD$, 17): FOR I#0 TO 4: PRINT TAB(27) " " : NEXT
7130 GOT01010
7999
8000 REM **** COPY CHARACTERS ****
8010 FOR V#0 TO 7: X#0
8020 FOR B1#0 TO 7
8030 IF (PEEK(53248+CH#0+BV) AND B1) THEN (X#X+2) (B1#2)+2+(B1#2+1)
8040 NEXT B1
8050 POKER#BV#2, X/256
8060 POKER#BV#2+1, X/256
8070 POKER#16+BV#2, X-(INT(X/256)*256)
8080 POKER#16+BV#2+1, X-(INT(X/256)*256)
8090 NEXT BV: A#A+32: IFA#14576 THEN A#A+40
8100 RETURN
8999
9000 REM **** FRESH BOARD ****
9010 FOR I#1 TO 8: FOR J#1 TO 8: B0(I, J)#=NEXT I, J
9020 B0(4, 4)#2: B0(5, 5)#2: B0(4, 5)#1: B0(5, 4)#1
9030 POKEV+33, 14: POKEV+32, 14: PRINT "J"
9040 FOR I#1 TO 8: FOR J#1 TO 8: PRINT B0(I, J): NEXT I: NEXT J: NEXT

```

OTHELLO

- 7080 Sprites off.
7100 If the TU array is not empty then:
7110 Switch off the replay flag.
7120 Blank out the message.
8010-8020 Copy characters 8 bytes by 8 bits.
8030 If bits set then 2 bits in X.
8050-8060 Store the left 8 bits of X.
8070-8080 Store the right 8 bits of X.
8090 Move 4 characters along, avoid redefining spaces or quotes.
9010-9020 Reset the board array.
9030 Select colours and clear the screen.
9040 Print 64 cells depending on the contents of the board array.
9050-9070 Print the scores and the player piece.
9080 Set scores position. Blue starts.
9082 Print the scores.
58010 Set V,S. Set colours.
Clear the screen to Cyan.
58020-58030 Print the grid.
58040-58090 Print the logo.
58100-58200 Print the details.
58210 If the cassette buffer has 255's then miss graphics setup.
59010 Set check Base address.
59020-59040 Read and poke data for the first 18 characters.
59100-59110 Standard procedure for copying the ROM characters.
59120 Read 16 character codes and magnify them.
59130-59140 Set up characters.
59210 Fill space character with zeros.
59310-59340 Define sprite 0.
59410 Define sprite 1 as a solid block.
60000-60018 Data for board graphics.
60100 Data for magnified characters.
60200-60208 Sprite data.



```

9050 PRINT"*****TAB(27); FORI=0T04:PRINTCH(I); NEXT:PRINT
9060 PRINT"*****TAB(27)BOX(1)
9070 PRINT"*****TAB(27)BOX(2)
9080 SC(1)=2:SC(2)=2:XX=1:YY=1:PL=1:TU=1
9090 GOSUB1510
9090 RETURN
9099 :
58000 REM **** LOGO ****
58010 V=524E: S=54272:POKEV+33,11:POKEV+32,11:PRINT"
58015 FORI=0T05:FORJ=0T019:PRINT" I";NEXTJ:PRINT" "
58020 FORI=0T019:PRINT" I";NEXT
58030 PRINT"*****
58035 PRINT"*****
58040 FORI=0T01:PRINT"*****
58045 PRINT"*****
58050 PRINT"*****
58060 FORI=0T01:PRINT"*****
58065 PRINT"*****
58070 PRINT"*****
58080 FORI=0T02:PRINT"*****
58085 PRINT"*****
58090 PRINT"*****
58100 PRINT"*****
58110 PRINT"*****
58120 PRINT"*****
58130 PRINT"*****
58140 PRINT"*****
58150 PRINT"*****
58160 PRINT"*****
58170 PRINT"*****
58180 PRINT"*****
58190 PRINT"*****
58200 PRINT"*****
58210 LFPEEK(996)=255:THENRETURN
58215 :
59000 REM **** SET UP GRAPHICS ****
59010 CH=1000:R=14336
59020 READD:IFD=255:THENGOSUB59500:GOTO59020
59030 IFD=0:THEN59100
59040 CH=CH+D:POKEV,D:R=R+1:GOTO59020
59100 POKE56334,PEEK(56334)+RND254
59110 POKE1,PEEK(1)+RND251
59120 FORI=0T016:RENDCH:GOSUB80000:NEXTI
59130 POKE1,PEEK(1)+R4
59140 POKE56334,PEEK(56334)+R1
59199 :
59200 REM **** CLEAR SPACE ****
59210 FORI=0T07:POKE14336+32*#I,0:NEXT
59220 :
59300 REM **** SPRITE#0 ****
59310 CH=1000:R=832
59320 READD:IFD=255:THENGOSUB59500:GOTO59320
59330 IFD=0:THEN59400
59340 CH=CH+D:POKEV,D:R=R+1:GOTO59320
59399 :
59400 REM **** SPRITE#1 ****
59410 FORI=0T062:POKE896+I,255:NEXT
59420 RETURN
59499 :
59500 REM **** CHECK SUM *****
59510 IFD=0:THENR=1000:RETURN
59520 PRINT"*****
59590 :
59700 :
60000 REM **** BOARD GRAPHICS DATA ****
60010 DATA170,170,149,149,149,149,149,149,149,234
60020 DATA170,170,85,85,85,85,85,85,1850
60030 DATA170,170,86,86,86,86,86,86,1856
60040 DATA149,149,149,149,149,149,149,149,149,2192
60050 DATA85,85,85,85,85,85,85,85,1680
60060 DATA86,86,86,86,86,86,86,86,1688
60070 DATA149,149,149,149,149,149,149,170,170,2234
60080 DATA85,85,85,85,85,85,170,170,1850
60090 DATA86,86,86,86,86,86,170,170,1856
60110 DATA170,170,149,151,159,159,159,151,2308
60120 DATA170,170,85,255,255,255,255,255,2700
60130 DATA170,170,86,214,246,246,246,254,2632
60140 DATA191,191,191,191,191,191,191,191,2528
60150 DATA255,255,255,255,255,255,255,255,3040
60160 DATA254,254,254,254,254,254,254,254,3032
60170 DATA191,159,159,159,151,149,170,170,2308
60180 DATA255,255,255,255,255,85,170,170,2700
60190 :
60100 REM **** MAGNIFIED CHARACTERS ****
60110 DATA3,5,15,18,19,21,28,31,49,50,51,52,53,54,55,56,57
60199 :
60200 REM **** SPRITE DATA ****
60201 DATA0,0,0,0,12,0,3,252,1267
60202 DATA0,15,240,0,63,0,0,68,1378
60203 DATA0,0,240,42,168,240,42,128,1852
60204 DATA0,42,0,240,0,0,240,0,1767
60205 DATA0,240,0,0,240,21,0,240,1741
60206 DATA21,64,240,21,80,252,21,80,1779
60207 DATA0,0,0,63,0,0,15,240,1378
60208 DATA0,3,252,0,0,12,0,1267,-1

```

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CHARPATT

The following program, from John Press of Huddersfield, West Yorkshire, displays the character patterns of all the 256 characters on the CGL M-5. It also displays the character pattern numbers for use with the command for storing characters on the G1 graphic screen.

There are two options available, the first displays the whole character set, the second allows you to specify the character to be displayed, explicitly.

Title: Charpatt
Machine: CGL M-5
Language: Basic-1
Application: Utility
Author: John Press

150 Puts the computer into Graphics 1 mode.
 170-220 Print the menu and get option in BS.
 230-350 Recall character patterns for each character in turn, print the details and wait for the space bar to be pressed, then return to the menu.
 360-380 Allow the user to select single character recall, print the details and return to the menu.
 390 Option 3, call the power on reset routine, this clears the programs and goes to 'Ready'.
 400-420 Flash a prompt and wait for the space bar to be pressed.

Note that control characters are denoted by square brackets. Therefore [K] (home) is obtained by pressing Func+Ctrl and K simultaneously.

```

100 REM CHARPATT
110 REM
120 REM FROM J PRESS
130 REM FEB 1984
140 REM
150 CLS:PRINT "[U][S][L]";
160 PRINT CURSOR(9,10);"CHAR.PATTERN
DEMO";CURSOR(9,11)"-----";
170 PRINT:PRINT:PRINT "Options":PRINT "-
-----"
180 PRINT:PRINT "1:- LIST all Patterns
(0-255)"
190 PRINT "2:- SHOW pattern for selected
character"
200 PRINT "3:- END the demo"
210 PRINT CURSOR(0,22);"Please select
noe":LET B$=INKEY$:IF B$="" THEN GOTO
210
220 IF B$="1" THEN GOTO 230 ELSE IF
B$="2" THEN GOTO 360 ELSE IF B$="3" THEN
GOTO 390 ELSE GOTO 210
230 LET Y=0:LET Z=255
240 CLS:FOR CH=Y TO Z:PRINT "[K]ASCII
CODE ";CH;IF CH<33 THEN PRINT ELSE
PRINT CHR$(CH)
250 PRINT:LET A9$=""
260 PRINT " *****"
270 FOR I=CH*8+10240 TO CH*8+10247
280 LET A=VPEEK(I):PRINT
RIGHT$(HEX$(A),2);
290 LET A9$=A9$+RIGHT$(HEX$(A),2)
300 PRINT " *";LET K=128
310 IF A AND K THEN PRINT CHR$(244);
ELSE PRINT CHR$(32);
320 IF K=1 THEN GOTO 340
330 LET K=K/2:GOTO 310
340 PRINT " *":NEXT I:PRINT "
*****"
350 PRINT CURSOR(0,13);A9$;GOSUB
$FLASH:NEXT CH:GOTO 100
360 CLS:PRINT "Enter character";
370 LET A2$=INKEY$:IF A2$="" THEN GOTO
370
380 LET Y,Z=ASCII(A2$):GOTO 240
390 CALL 0
400$FLASH:PRINT CURSOR(3,20);"Press
'SPACE' to continue";FOR D=1 TO
400:NEXT
410 PRINT CURSOR(3,20);"[X]";FOR D=1 TO
400:NEXT
420 IF INKEY$="" THEN RETURN ELSE GOTO
400

```



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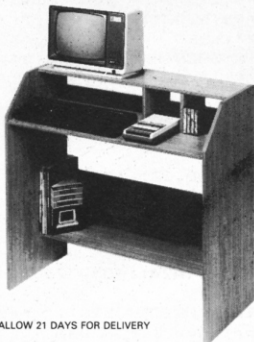
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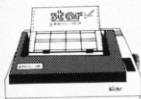
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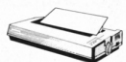
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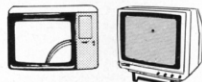
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Clubnet keeps you in touch with enthusiasts throughout the country. It is divided into clubs and user groups and lists of both will be published every four weeks.

USER GROUPS

- Acorn**
Coverity Acorn Atom User Group. Peter Frost, 16 Frankwell Drive, Coventry, 0203 611556.
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. Clem Rutter, c/o St John's Fisher School, Ordance Street, Chatham, Kent, 0634 42811 (day), 0634 373459 (evenings).
- Manchester Acorn** User Group. Meets at AMC, Crescent Road, Crusell, Manchester 8 on Tuesdays except school holidays. John Ashurst, 192 Vendure Close, Falsworth, Manchester, 061-681 4962.
- Apple**
Ashtead Apple User Group. Meets first Monday of every month. Contact M Lawrence, 15 Petters Road, Ashtead, 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, 0720 72917.
Birmingham & Region Apple Group. Contact Mel Golder, 021-426 2275.
Birmingham Midapple User Group. Contact Merylinder Gold to Pool Farm Boys Club, Hillmeads Road, Kings Norton, Birmingham.
Bristol Apple Users and Dabblers. Meets at 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, once a month. Ewa Dabkowski, c/o Datalink, 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, 0272 213427.
Buckinghamshire Apple User Group. Steve Proffitt, The Granary, Hill Farm Road, Marlow Bottom, Buckinghamshire, 062 84 73074.
Chelmsford Apple Users Club. Proposed new club. Contact D Beckingham, 571 Galleyswood Road, Chelmsford, tel: Chelmsford 66948.
Croydon Apple User Group. Meets at Sidda House, 350 Lower Addiscombe Road, Croydon, on second Monday of month. Paul Vernon, 60 Fawkhurst 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 Marlon 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, Chaffron Way, Milton Keynes.
Warrington Apple User Group. Meets at Horse & Jockey on first Monday of the month. Contact Jim Roscoe, Warrington 38101.
- Nottingham** Atari User Group. Meets second and fourth Monday of each month at the Congregational Federation Centre, Castle Gate. Contact Richard Rose on Nottingham 623766.
- Atari**
Birmingham User Group. Meets at the Malaga Grill, Matador 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 5322.
Lea Valley Atari User Group. Meets every month. Details from Matthew Tydemann, 125 Cadmore Lane, Chessutt, Herts.
- South Cheshire** Atari User Group. Meets at the Earl of Crewe, Nantwich Road, Crewe, on first Thursday of each month at 7.30pm. Contact A Davies, 48 Biagg Lane, Nantwich, Cheshire, 0276 262969.
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 Hayes, 01-301 1111.
Manchester Atari Computer Enthusiasts. Meets at the Ellismere, Worsley Road, Worsley, on the second and last Thursday of every month. Contact Martin Davies, London 700757.
South Middlesex Atari Club. Meets fortnightly, Tuesdays, at Staines Methodist Church Hall, Kingston Road, Staines.
Contact Brian Milligan, 50 Linkcroft Avenue, Middlesex. Tel: Ashford (69) 45387.
Norwich Atari User Group. Ken Ward, Norwich 661149.
Preston Atari Computer Enthusiasts. Meets at KSC Club, Merriem House, Beach Grove, Ashton, Preston, on third Thursday of month at 7.30pm. Roger Taylor, 0253 738182.
UK Atari Computer Owners Club. Contact PO Box 3, Raleigh, Essex.
- Atom**
Liverpool BBC and Atom User Group. Meets at Old Swan Technical College, Room C33 on first Wednesday of month at 7.30pm and at Birkenhead Technical College on third Thursday of month at 7.30pm. Nick Kelly, 061-525 2934 (evenings).
BBC
Inverclyde BBC Micro User Group. Meets on third Monday of each month at 9 St John's Road, Gouk, Renfrewshire. Contact Robert Watt on Gourcock 39967.
Lasernig is an international user group for the BBC micro. Paul Barbour, 10 Dawley Ride, Colnbrook, Slough, Berks, 02812 30614.
Braham, Sheridan Williams or David Geeguh at PO Box 50, St Albans, Hertfordshire AL1 2AR.
Bolton BBC micro and Electron User Group. Meets in Room E5-15, Bolton Institute of Higher Education, Deane Road, Bolton, Lancs. Contact Chris See on 0942 720984.
Bedford BBC network user group. Contact Tom Short/Mike Taylor at the Computer Centre, Bedford College of Higher Education, Caidwell Street, Bedford. Tel 0234 45151.
Bournemouth BBC User Group. Meets at Lansdowne Computer Centre, 5 Holdenhurst Road, Bournemouth on first and fourth Wednesday of month at 7.30pm. Norman Carey, 0202 749612.
Brent/Barnet User Group. Meets on last Sunday of month. Joseph Fox, 4 Harman Close, London NW2 2EA.
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.
Format 40/80 Club (BBC Disk User Group). Send SAC to Peter Hughes, Five Marsh Street, Bristol BS1 4AA.
Huddersfield BBC User Group meets third Wednesday of each month. Contact Stuart Atkinson on 0484 665395, eves, or write to 34 Ryefield, Scholes, Huddersfield, West Yorks.
- Liverpool** BBC & Atom Group. 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 Nick 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. Contact Ric Keyworth on 01-734 9235 (7am-3pm Mon-Fri only).
Northern North Sea User Group. Potential members with Helicopters welcome. Contact Ian Wilkins on board MSV Stative, Brent Field, East Shetland Basin, Northern North Sea (100 miles off Shetland Islands).
Nottingham BBC User Group meets on second Monday of each month. Contact John Day on 0602 255660.
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 Rugby Hotel, Lea, Preston, on last Tuesday of month at 7.30pm. Duncan Coulter, 8 Briar Grove, Ingot, Preston, Lancashire, 0772 725793.
Tyne & Wear BBC User Club. Contact Ian Waugh, 13 Briardene Drive, Wardley, Tyne & Wear NE10 8AN.
Wakefield BBC Micro User Group. Meets at Hoimfield House, Clarence Park.
Wakefield on first Wednesday of each month at 7.30pm. Contact R Bilton tel: Wakefield 382274.
Wellington/Barnet BBC Owners User Group. Contact R Houghton, 49 Addington 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.
- Basic**
Welwyn Basic User Group meets on last Friday of each month at 7pm. Contact Debi Colthorpe, 36 Birids Close, Welwyn Garden City. Tel: Welwyn Garden (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**
CJA User Group. Adrian Waters, 9 Moss Lane Romford, Essex.
- Commodore** ICPCG
Basildon. Contact Walter Green, 151 The Hatherley, 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 Cleveleys, Blackpool FY5 3ST.
Birmingham. Contact J A McKain, PPI Ltd, 177 Lovells Road, Birmingham, tel: 021-544 0202.
Bournemouth & Poole. Contact Douglas Shave, 97 Canford Cliffs Road, Poole, Dorset BH13 7EP.
Bury St Edmunds. Contact Alan Morris, 30 Kelsa 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 Mosley, Rosemount, Romney Hill, Maidstone, 0622 37643.
Cardiff. Contact John Day, 19 Carruburn Road, Cardiff, Gwent, Antrim BT38 7ND, 09603 63788.
Chelmsford. Contact A G Surridge, 97 Shelley 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.
Chilwell. John Poole, 6 Ridgway Close, Conny's Quay, Ciywd GHS 4L.
Corby. Peter Ashby, 215 Winchyn 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 Lyberty Road, Sheyehale, 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 DE1 2SG.
Devon. Contact Matthew Stibbe, The Lawn, Lower Woodfield Road, Torquay, Devon.
Durham. North-East Pet and ICPU. Meets at Lawson School, Burnley at 7pm second and third Mondays. Jim Cocalis, 20 Worcester Road, Newton Hall Estate, Durham, 0385 67045.
East Sussex. Simon Knowton, 097 086 030.
Gosport. Meets at Bury House, Bury Road, Gosport, Hants at 7pm. Contact Tony Cox, 10 Staples Reach, Rowen, Gosport, Hants.
Hainault. Meets at Grange Remedial Centre, Woodman Path, Hainault, Carol Taylor, 101 Courtlands Avenue, Cranbrook, Kent, 0223 4556.
Gloucester. Dr Jim MacBrayne, 27 Daldymie Crescent, Newton Mans. Glasgow, 041-639 5696.
Gloucester and Bristol Area. Meets last Friday of each month. Contact Janet Rich, 20 Old Court, Spring Hill, Cam, Gloucester.
Gloucester North ICPU user group meets last Thursday of each month. Contact R. C. Harvey on 0240 527588.
Hamphshire. Meets at 70 Reading Road, Farnborough, on third Wednesday of month. Ron Geere, 109 York Road, Farnborough, Hants, 0252 542921.
Hants. Contact Tony Cooke, 7 Russell Way, Petersfield, Hampshire GU31 4LD.
Hertfordshire. Meets at Provident Mutual Assurance, Purwell Lane, Hitchin, on last Wednesday of month. B Grainger, 73 Minehead Way, Stevenage, Herts SG1 2HS, 0438 72925.
Kilmarnock. Meets at Symington Primary School on first and third Thursday of month at 7pm. John Smith, 19 Brewlands Road, Symington, Kilmarnock K1 5RW, 0563 830427.
Liverpool. Meets at The Merchant Taylor School for Boys, Crosby, on second Thursday of month at 7pm. Tony Bond, 27 Ince Road, Liverpool L23 4JL, 051-924 1505.
Llandysul. Contact T Townsend, The Hill, Rhydowen, Llandysul, 05455 5291.
London. Alan Birks, 135 Queen Alexandra Mansions, Judd Street, London WC1, 01-430 8025.
London North. Barry Mills, Department of Business Studies, North London Polytechnic, Holloway Road, London N7, 01-607 2789.
Maidstone. Meets on first Wednesday of every month contact Ron Mosley, Lord Romney Hill, Weavering Maidstone, Kent, 0622 37643.

Mappery. Meets at Arnold & Carlton College, Digby Avenue. Mappery every Friday. Contact Mark Graves, 8 Digby Hall Drive, Gunthorpe Road, Gedling, Notts NG4 4JT.

Merseyside. Meets fortnightly. Contact P Leather, 27 St Luke's Drive, Formby, Merseyside, tel: 36 74694.

National. Contact Membership Secretary, 30 Brancroates Court, Newbury Park, Ilford, Essex IG23 7EP.

Norfolk. Proposed new club. Contact J Blair, 7 Beach Road, Cromer, Norfolk. **Norfolk.** Peter Potts, Bramley Hale, Wrayton, King's Lynn, Norfolk PE33 9QS, 0365 506922.

Northampton. Contact Peter Ashby, 215 Lincoln Way, Corby, Northants.

Northen Ireland. Meets last Wednesday of each month. Contact David Weddell, 9 Upper Cavelhill Road, Belfast BT15 5EZ, 0232-711580.

Northumberland. Graham Saunders, 22 Front Street, Guide Post, Northumberland.

Nottingham. Commodore User Group meets fourth Monday of each month — contact Christopher Solomon on Nottingham 873228.

Rhyl. Contact Frank Jones, 77 Millbank Road, Rhyl, Cynw, 0745 54820.

Slough. Meets at Slough College on second Thursday of month at 7.30pm. Brian Jones, 53 Beechwood Avenue, Woodley, Reading RG5 3DF, 0734 661494.

Somerset. Contact Paul Montague, 12 Laxton Close, Taunton, Somerset.

South-East. Regional Group. Meets at Charles Darwin School, Jai Lane, Biggin Hill, Kent, on third and fourth Thursday of month at 7.30pm. Jack Cohen, 30 Brancroates 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.

Staffordshire. 57 Clough Hall Road, Kidsgrove, 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, 01-977 2346.

Watford. Meets on second Monday of month. Stephen Rabagliati, c/o Institute of Grocery Dist. Grange Lane, Letchmore Heath, Watford, Herts, 01-779 7141.

Widney. Contact Ian Blyth, 40 Wilmot Close, Widney 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 Clive Embrey, 17 Stanton Ave, Fallowfield, Manchester or Keith Bowden, 47 Park Ave, Barking, Essex, enclosing SAE.

Somerset. 3891 B Street Free User Group for Commodore 64 owners in the south-west. Contact P Montague on 0823 75630.

Commodore Pet
Blackpool. West Lancashire Pet Users Club. Meets at Arnold School, Blackpool on the third Thursday of month. D Jowett, 197 Victoria Road, East Thornton, Blackpool FY5 3ET.

Southern Users of Pets Association. Howard Pigram, 42 Compton Road, Brighton BN1 5AN.

Pet User Group Crawley. Richard Dyer, 33 Patnam 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, Edgware Road, Room 320 on alternate Tuesdays, 6pm. Barry Miles 01-607 2789.

Pet User Club. Margaret Gullford, 818 Leigh Road, Slough Industrial Estate, 0753 74111.

Independent Pet Users Group. 57 Clough Hall Road, Kneisgrove, Stoke-on-Trent, Staffordshire.

Commodore Vic
National Association of Vic-20 Owners. Contact S Tomaszek, 20 Milner Road, Sherwood, Nottingham.

Burnley. John Ingham, 72 Ardwick Street, Burnley, Lancashire.

Clywd. Contact A Stammers, 1924 Willow Park, Queensferry, Deeside, Wales 816603.

London. Vic 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 7050 x 413. Meets at University College, 26 Bedford Way, London WC1, second Tuesday of each month at 8pm.

Norfolk. J Blair, 7 Beach Road, Cromer, Norfolk, 0263 512849.

Compucolour
Caversham. Compucolour Users Group UK. Meets at Community Centre, Caversham Park Village twice a year. Peter Hiner, 11 Pennycroft, Harpenden, Hertfordshire, 05827 64872.

CP/M
Chiltern CP/M User Group. Contact Kenneth Hirst, Welwyn Garden City 28723.

UK CP/M Users Group. Meets monthly in Dublin area. Doug Nottley, Gardiner House, Ballsbridge, Dublin 4, Dublin 686411.

London. CP/M User Group (UK). Subs £7.50. Produces newsletter. Contact David Powys-Lybbe, 01-247 0691.

UK CP/M Users Group. Lesley Spicer, 11 Sun Street, London EC2M 2DD, 01-247 0691.

COSMAC
COSMAC Users Group. James Gough, 7 Harrowden Court, Harrowden Road, Luton, Bedfordshire, 0582 423934.

DAI
DAI UK User Group. Manchester: Contact Dave Atherton, 16 Douglas Street, Atherton, Manchester. Tel: 0942 876210.

d-BASE 11
UK d-Base 11 User Group. Contact Ian Turner at Ashton Tate (UK) Ltd, on 0908 568866.

Decus
Decus UK & Ireland. Contact Tracey Parrott, DECUS, PO Box 53, Reading, Berks RG2 0TW.

Digital Equipment
Digital Equipment Users Group. The Secretary, PO Box 53, Reading, Berkshire, 0734 387725.

Dragon
Cornwall. St Austell Dragon User Group. Contact Martin Starke on Par 4922.

Slough. Contact J Griffin, 1 Garrard Road, Birwell Estate, Slough. Tel: 75 25286.

Greater Manchester. Contact Melvin Franklin, 40 Cowles, Westhoughton, Bolton, Lancs.

Nottingham. Dragon User Group. Meets second Monday of each month. Contact Mike Johnson on Nottingham 288541.

Dragon User Group. Romsey, Hants. Contact A. Adams on Romsey 23041.

Ware Dragon User Group. Contact Paul Kennedy, 61 Broadmeads, Arwell End, Ware, Herts. Tel: Ware 68264.

Epson HX20
London. Contact Terence Ronson, 25 Swaylers Lawn, Drayton Bridge Road, Ealing, W13, 01-998 1494.

Luton. The Dragon's Den. Contact D Buckingham, 83 Neville Road, Limbury, Luton, Beds.

Education
Birmingham. Education ZX80-81 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, Weoley Park Road, Birmingham, 021-471 3723.

Dublin. Computer Education Users Group. Dairmaid McCarthy, 7 St Kevin's Park, Kilmacud, Blackrock, Co. Dublin.

Middlesex. Educational Users Group. Offshoot of National TRS-80 User 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, 48 Chadcotte Way, Catshill, Bromsgrove, Worcestershire B61 0JT.

Electron
Independent national user group for the Acorn Electron. Contact PO Box 50, St Albans, Herts.

Forth
Forth Users Group. David Husband, 2 Gorleston Road, Branksome, Poole, Dorset BH12 1NW, 0202 764724.

Forth Interact UK User Group. 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 Grymsyke, Great Missenden, Buckinghamshire HP15 0LP.

Genealogists
Society of Genealogists Computer Interest Group. Anthony Camp, 01-373 7054.

Colour Genre User Group. Details of meetings/membership from Pat Doohan, secretary, Nottingham (0602) 278791.

Intel MDL
Intel MDL Users Group. Lewis Hard, c/o S. P. A. C. E., The Old Coach House, Court Row, 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 Noyce, Remsoft, 18 George Street, Brighton BN2 1RH.

Lynx
National Independent User-Group. Subs £9. Contact Robert Poat, 53 Kingswood Avenue, Sanderstead, South Croydon

Mattel
Mattel Intellivision TV Game Group. Warrington 62215 after 4pm.

Medical
National Primary Health Care Group. Contact Dr Nicholas Robinson, 4 Alderney Avenue, Hounslow, Middlesex. Tel 01-577 5431.

8BC Medical Group. Contact Dr Ken Walton, 141 Lancelot Road, Wembley, Middlesex.

Sinclair Medical Group. Contact Dr Williams, The Medical Centre, Todmorden, Lancs.

Micronet
Micronet Independent User Group. Contact George Foote, Prestel Mailbox No. 892852867.

Nascom
Berkshire. Nascom Thames Valley User Group. Meets at Frogmore Hotel, Windsor, on Thursday fortnightly, 6pm. Mike Rothney, 37 Eaton Wick Road, Eton Wick, Windsor, Berkshire, Windsor 56106.

Birmingham Nascom User Group. Meets at Davenport's Social Club, Granville Street, Birmingham on the last Thursday of month, 8pm. Martin Sidebottom, 021-744 3093.

International Nascom Microcomputer Club. 80 Oakfield Corner, Sycamore Road, Amersham, Buckinghamshire HP8 6GD.

Merseyside 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 Hodges, 15 St John's Court, Wakefield WF1 2RY.

Welwyn. Contact Angela Watkiss, 4 Ninnings Lane, Rabley Heath, Welwyn, Herts AL6 9TD.

Ohio Scientific User Group. Tom Graves, 19a West End Street, Somerset, 0458 45359.

Oric
Avon. Contact Bob Green, 1 Marlborough Drive, Worle, Avon, tel: 0934 21315.

International Oric Owners' User Group. Send £1.00 plus SAE for details to R. Green, 1 Marlborough Drive, Worle, Avon or phone 0934 510279.

Oric Owners Group. Paul Kaufman, 3 Club Mews, Ely, Cambridgeshire.

Cardiff. 12 Tregarth Court, Creigiau, Cardiff.

Kent. Contact Roger Pyatt, 23 Arundel Drive, Orpington, Kent with SAE or call 66 20281.

SCOTLAND
Stuart Wilson Oric User Group. Contact Stuart Wilson at 21 Loch Aweaway, Whitburn, West Lothian EH47 0RJ with SAE, or phone 0501 42673 (hrs).

Strathclyde Oric 1 User Group. Contact Colin Faires on 041-776 3654, or SAE to 14 Muirside Ave, Kirkintilloch, Glasgow G66 3PR.

Osborne
British Osborne Owners Group. J. Angless, Flat 19, Rowan House, Milton Road, Handsworth, Birmingham B20 2JR.

OSI
OSI UK User Group. Richard Elen, 12 Bennerley Road, London SW11 6DS.

OS & User Group. 1st Floor, 16 New North Parade, Huddersfield. Contact Mr Ellis. Tel: 0484 516179 day or 0484 864130 after 6pm.

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.

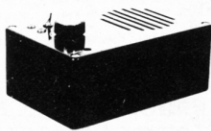
Hertfordshire. PDP11 User Group. Pete Harris, 119 Carpenter Way, Potters Bar, Hertfordshire EN6 5QB. 0707 52091.

Pilot
UK Pilot User Group. Alec Wood, Wirral Grammar School for Boys, Cross Lane, Bebington, Wirral, Merseyside LG3 3AQ.

Prestel
ACC National Prestel Committee. Administrates Club Spot 800 (hobbyists on Prestel). Rupert Steele, St John's College, Oxford OX1 3JP.

Research Machines
Leamington Spa. West Midlands RML User Group. Spencer Instone, c/o 59 Avenue Road, Leamington Spa.

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Newcastle. NERM 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, RMNUC, c/o Research Machines Ltd., PO Box 75, Oxford.

West Midlands RMU User Group. Contact 0926 38751.

Sharp M280

Aberdeen. International Sharp Users Group. Graham Knight, c/o Knights Computers, 108 Rossmore Place, Aberdeen, 0224 630526.

Essex. Sharp M280K User Group. Joe Street, 16 Elmhurst Drive, Hornchurch, Essex RM11 1PE.

Leeds. Sharp PC1211 Users Club. Jonathan Dakyne, 281 Lidgett Lane, Leeds LS17 3AQ.

Leeds. Sharp User Group. Postal only. Enquiries to Craig Kennett, 17 Moseley Wood Way, Cookridge, Leeds 16 7HN.

Somerset. Sharp M280 Users Club. Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset BA21 4AE.

Sinclair

Aylesbury. Sinclair ZX Computer Club. Ken Knight, 0295 5181.

Brighton. ZX Users Group. J Ireland-Hill Jr, 145 Godwin Road, Hove, Brighton.

Colchester. Sinclair User Group. Meets fortnightly. Richard Law, 102 Prettygate Road, Colchester, Essex.

Cardiff. ZX Club. Meets on last Sunday of month, 2pm. Mike Hayes, 54 Oakley Place, Grangeview, Cardiff, 0222 371732.

Doncaster & District. Sinclair User Group meets at Graceloch Hall, Doncaster, each Wednesday at 7pm.

Contact Tony Cooper on 0302 853124.

Folkestone. ZX Spectrum User Group for under 16s. Contact D. J. Parish, Brookhouse, Etchinghill, Folkestone, Kent.

Glasgow. ZX80/81 User Group. Ian Watt, 10 Greenwood Road, Clarkston, Glasgow, 041-638 1241.

Gloucester. Sinclair Spectrum user group. Contact B Ledbury, 8 Linnet Close, Gloucester. Tel 0452-23186.

Liverpool. ZX Computer Club. Meets each Wednesday at 7pm in the Youth Activities Centre. Contact Keith Archer on 051-236 6109.

London. National ZX User Club. Tim Hartnell, 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.

Harlow. ITEX Spectrum User Group. Contact K Sutton on Harlow 442034.

London. Aquarius Users' Group. Contact L Leboff, Aquarius User Group, 4th Floor, Hyde House, The Hyde, London NW9.

Manchester. Sinclair Users Club. Meets at Longsight Library, 519 Stockport Road, Longsight, Manchester, every Wednesday at 7.30pm. Call 061-225 6997 or 061-445 6183.

Mid-Glamorgan. Sinclair User Group. Meets on second Sunday of each month. Contact Steve Brokenshire on 0656 863473.

Nottingham. ZX Spectrum Club. D Beattie, 53 Kingsley Crescent, Sawley, Long Eaton, Nottingham NG10 3DA. Enclose SAE please.

Nottingham. Sinclair User Group meets third Monday of each month. Contact Graham Bassford on Nottingham 654522.

Sinclair User Group meets 7.30pm each Tuesday at the Veterans Club, Croft Road, Blyth, Northumberland. Contact G. Campbell on Blyth 263405.

Scarborough. Grange Farm ZX Computer Club. Scarborough, 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.

Sudbury. Comrad Sinclair User Group meets bi-weekly on Wednesdays. Contact Neil MacDonald, 15 Potkin Road, Gt Cornhill, Sudbury, Suffolk.

Suffolk. ZX Amateur Radio User Group. Paul Newsam, 3 Red House Lane, Leiston, Suffolk, SA6 Essential. No telephone inquiries.

Surrey. Guildford ZX80/81 Users Group. Meets Fridays, 8 Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE. 0463 62035.

Sussex. ZX80/81 User Club. David Bigden, PO Box 159, Kingston-upon-Thames, Surrey KT2 5UQ.

West Sussex. Hassocks ZX Micro User Club. Paul King, 25 Fir Tree Way, Hassocks, West Sussex.

Sinclair IOLUG. Independent QL User Group. Contact Brian Pinn in Milton Keynes on 0906 564271.

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 Peppworth Road, Harrow, Middlesex.

6809 User Group. 6809 User Group. Contact Mr Gibbons, 9 St. Thomas Hill, Laurenceau, Cornwall.

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 1JS. 0855 290333.

Sorcerer

Liverpool European Sorcerer Club. Monthly meetings. Colin Maric, 32 Watchdog Avenue, Formby, near Liverpool L37 0JH, 07048 72137.

Surrey. Exidy Sorcerer User Group. Andy Marshall, 44 Archers Bridge Road, Woking, Surrey GU21 4NT.

Spreadsheet. International Electronic Spreadsheet Users Group. UK Alpha House, 7th Floor, Rowlands Way, Manchester M22 5RG.

Tandy. Tandy Model 100 NEC PC-8201 User Group. SAE to Remsoft, 18 George Street, Brighton, Tel: 0273 602354.

Tangerine

Angon. Tangerine Users Group. Bob Green, 1 Melborough Drive, Wote, Avon, 0934 2135.

Bristol. Tangerine Homebrew. A Coales, 35 Mugg Street, St Werburghs, Bristol BS2 9UB.

Texas Instruments. Brighton. Contact Clive & Audrey Scally, 40 Barnhill, Brighton, Brighton, Sussex.

Ireland. Proposed new club. Contact Mrs Ann Flynn, 53 Georgian Close, North Road, Drogheda, Co. Louth, Eire.

Leeds. TI99A/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. TI9900 User Group. Chris Cadogan, Department of Computer Science, University of Manchester

Maidenhead — UK Texas Instruments User Group. Contact Katie Lomax, PO Box 190, Maidenhead, Berks. Tel: 0628 71696.

Nationwide TI Users Group. Contact T199/4A Exchange, Independent TI Users, 40 Barnhill, Pateham, Brighton BN1 8UF.

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 2266.

Chelmsford. TRS-80 User Group. Michael Dean, 22 Roughtons, Galleyswood, Chelmsford, Essex.

Darham. 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 Moringside Drive, Edinburgh EH 10X, 031-447 6651.

Herts. Contact Reg Smith, 24 Sempill Road, Hemel Hempstead, Herts, 0442 60085.

Hull & District. TRS-80/Beeth Users Group. Meets second Tuesday of month and Thursday 16 days later at Psychology Dept, Hull University, Cottingham, Levenye, 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, 22 Woodes 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, Westhoughton, Bolton, Lancs.

Lancs. TRS-80 Colour Computer Group. Subs: 53. Contact Ian Wild, 53 Dartmoor Road, Ashton-Uy-June, Lancs OLS 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 01-934 2123.

Merseyside. TRS-80 User Group. N Rushin, 123 Roughwood Drive, Northwood, Kirby, Merseyside.

Milton Keynes. National TRS-80 and Genie User Group. Brian Pinn, 24 Oxford Street, Stony Stratford, Milton Keynes.

Nottingham. TRS-80 Genie Users Group. Meets at Wilford Moderns Rugby Club on first and third Wednesday every month at 7.30pm. Contact Geoffrey Hillier, 5a Gregory Street, Lenton, Nottingham NG7 2LR, Nottingham 783938.

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 London Regin. 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.

UCSD

Hants. UCSD System Users Society. John Ash, Dicolli Data Systems Ltd, Bond Close, Kingsland Estate, Basingstoke, Hants RG2 0GB.

Oxford. UCSD Pascal UK Users Group. Malcolm Harper, Oxford University Computing Laboratory Programming Research Group, 45 Banbury Road, Oxford OX2 6PE.

Unix

Unix User Group UK can be contacted at Langley House, Langley Mill, Notts.

6502

Bedfordshire. 6502 User Group. Water Walkerton, 21 Argyll Avenue, Luton, Bedfordshire LU3 1JE. 0582 26927.

Hants. 6502 User Group (Southern Region). Steve Cole, 70 Sydney Road, Gosport, Hants.

CLUBS

AVON

Bristol. Berkeley Nuclear Laboratories Club. Contact Neil Walker, 53 Wolfride Ride, Alveston, Bristol, 0454 414262.

Bristol. Micro Computer Club. Meets at the Pavilion, Southend Road, Filton, Bristol, every other Tuesday. Darryl Collins, 80 Mackie Rd, Filton, Bristol BS12 7NA, 0272 792982.

Bristol. Format 40/80 Disc Club, for BBC disk users. Contact Peter Hughes, Format 40/80 Disc Club, c/o The Leading Library, Five Marshal Street, Bristol BS1 4AA.

Multi-User Club. Valerie Boyd-Shaw, Nailsea 851337.

Warice 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.

Children Computer Club. Meets at Five Belles, Eaton Bray, Near Dunstable, Leighton Buzzard on second and fourth Monday of each month. Contact Steve Burt, 42 Wallace Road, Eaton Bray, OU6 2DF. 0525 220922.

Luton College Computer Club. John Rodger, 0582 3411.

Luton Computer Club. J P Fletcher, 1 Troutbridge Gardens, Luton, LU2 7JY, 0582 450687.

BERKSHIRE

Bracknell. Computer Club meets second and fourth Thursday of each month at Easthampstead Community Centre, 7pm. Contact Paul Tinsley, 31 Pembroke, Hanworth, Bracknell, Berkshire.

Easthampstead Computer Club. Meets at Easthampstead Park School, Bracknell, on the first Wednesday in month at 8pm. Brian Poulton, 0344 844223.

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 725340.

Primrose Hill Centre Micro Club. Meets Wednesday at 7.15pm at the Primrose Hill Centre, Shannon Road, Kings Norton, Birmingham. Contact Keith Bellfield. Tel: 021-459 8995.

BUCKINGHAMSHIRE

Aylesbury. Hampshire Club. Meets at Quarrendon Youth Club every Friday at 7.30pm and at Mandville County Secondary School the first Thursday of each month at 7pm. Ken Knight, 22 Mount Street, Aylesbury, 0296 5181.

Children Microcomputer Club. Meets at the Garden Centre, School Lane, Chalfont St Giles, on the first Wednesday of each month. Mrs W Tibbitts, Eltwod, Deanway, Chalfont St Giles, 024 07 4906.

Iver Computer Club. P A Seal, 1 Ormonde Flats, Church Road, Iver Heath, 0753 652972.

Iver Computer Society meets at Huntsmoor, Iver Village Hall on the second and fourth Thursday every month at 7.30. John Hargh, 141 Leas Drive, Iver, SL0 9RP.

CAMBRIDGESHIRE

Cambridge. Microcomputer Club, meets on the third Wednesday of month. Derek Trip, 3 Spurgeons Avenue, Waterbeach, 0223 315662.

Peterborough. Personal Computer Club meets at Crossfield Electronics Club, 0535

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CHESHIRE

Atrincham Computer Club. Meets at N. Cestrian Grammar School, Durham Road, Atrincham, fortnightly, Martin Hickling, 39 Barnington Road, Atrincham, WA14 1H2, 061 941 4547.

Bromel 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.

Crew Computer Users Club meets at Buffaloes Club, Earl Street, Crew, 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, Crew, 0477 34238.

Kinder Peek Computer Club meets at Bew Mills School every Monday. John Eary, New Mills 43670.

Kettleholme National Computer Buyer's S. Sell SAE to Barry Edwards, Laneside House, Paddock Lane, Kettleholme, nr Stockport, Cheshire.

New Mills & District PCC meets at New Mills School, fortnightly on Fridays at 7 to 9.30pm. Mr G M Flanagan, 11 Sundown Close, New Mills, Stockport, SK12 3DH, 0653 44051.

Northwich Computer Club meets fortnightly. John Lightfoot, 13 Aston Drive, Frodsham, Warrington, WA6 7PU, 0728 31519.

Northwich 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 Relford, 53 Cavendish Road, Hazel 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.

Stockport 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 PAICC meets at the Penzance Micro Centre every Friday. S. Taylor, Hayle 754845.

St Austell Computer Club and Computer Town meets at ECP Labs, Penzance Road, Fortnightly on Mondays at 7.30pm. N G Day, 2 Cidale Close, St Austell.

CUMBRIA

Ambleside Computer Club. Contact Jeremy Westerman, 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 Thursday of each month at 7pm. Frank Taylor, 0332 559334.

Glossop Computer Club. John Dearn, 2 Spinney Close, Glossop.

DEVON

Adventure Helpline Club for desperate adventurers. Contact C P. Wong, 20 Stangray Avenue, Plymouth, Devon.

Brigham Computer Club meets each Wednesday night at 7.30pm at the Golden Lion, New Road, Brigham, Devon.

Computers Against the Bomb. Contact Paul Couchman, 29 Clifton Place, North Hill, Plymouth, Devon.

Exeter & District Computer Club meets at Exeter School, Magdalene Road, Exeter, on the second and fourth Tuesday every month. T. Hodson, 14 Greenville Avenue, Teignmouth, TQ14 9NT.

Exeter & District Amateur Computer Club meets second Tuesday every month. Doug Bates, Fortescue House, Stoke Cannon, Exeter. Specialist meetings on third and fourth Tuesday.

Okhampton Computer Club. Contact Cheri Grabe, Okhampton 3523, or Okhampton Community College, Okhampton 3600. Meets 7pm each Monday 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 7pm. Contact Nick Hews on 07695 3446.

Torbay Users Computer Club meets at Devon Computers, 39 Tolnes Road, Paignton on Mondays fortnightly.

DORSET

Bournemouth Area Computer Club meets at Kinson Community Centre on the third Wednesday every month. Peter Hibbs, 54 Runnymede Avenue, Bournemouth, BH11 9SE, 0202 576547.

TOPIC meets at Canten English Truck Centre on the second and fourth Wednesday every month at 7pm. David Wadsworth, 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, 6 Vane Terrace, Darlington DL3 2AT, 0325 67766.

ESSEX

Epping Computer Club meets Tuesdays at 7.30pm at Centrepoint, Epping. Call G. Rees on Epping 75055.

Genesis Computer Club. 30 Webber House, North Street, Barking.

Great Dunmow Computer Club. Contact T Coombs, 4 Oakroyal House, Oakroyal Avenue, Great Dunmow, Essex CM6 1HQ. Meets once a month. R Holland, 0277 221260.

Springfield Computer Club meets on the first Friday of every month. Stephen Coomas, 1 Aldborough Way, Springfield, Chelmsford, CM1 5PB, 0245 50155.

Evax Computer Club. Contact Dean Williams, 17 Morington Road, Canvey Island, Essex SS8 2AT.

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 Potten, 14 Foxmead, Rivenhall, Witham, Essex CM8 3HD, Witham 516335.

Elsenham Computer Club meets on first Friday of each month. Contact Ray Frankston on 0279 815089.

National Westminster Personal Computer Society, 412 Eastern Avenue, Gants Hill, Ilford, P J Moore, 01-554 9699.

Stanway School Computing Club, only school members at present. G Floyd, c/o Physics Department, Stanway School, Stanway, Colchester.

Modern 80 Computer Link Club, meets Wednesday evenings. Contact F Ferrant, 55 South Street, Barming, Kent, 0622 27885.

Naltes Multi-User Club. Contact Valerie Boyde-Saw, 0272 851337.

Romford Club, a new club. Mr D Norden, 138c Church Road, Romford.

Roundacre Micro Computer Users Club. Meets at the Roundacre Youth House, Laindon Link, Basildon every Wednesday at 7.30pm. Contact Mrs L. Daden, Basildon 285119.

South East Essex Computer Society meets at Hockley Club at Roots Hall, near Southend Football Stadium 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 Margolis, 3 Bishopstone Close, Golden Valley, Cheltenham.

Cheltenham Amateur Computer Club meets on the third Tuesday of each month at 7.30pm. Mike Pullin 0242 25617.

GCHQ, D W Adam, 16 Court Road, Prestbury, Cheltenham.

Cheltenham Amateur Computer Club meets at Buffaloes Scout Headquarters, on the third Tuesday of every month at 7.30pm. M Hughes, 36 Riverways View, 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 280530.

Fareham and Portsmouth Amateur Computer Club. Alan Smith, c/o Francis Close, Lee-on-the-Solent, Gosport, Hants PO13 8BH, 0705 550907.

Portsmouth Co-operative Computer Club — contact A. May on 0705 820339.

RAF Odiham Computer Club. Contact c/o Officer ic, Royal Air Force, Odiham, Nr Basingstoke, Hants.

Rosney Computer Club. Contact A. Adamson on Rosney 23041.

Southampton Amateur Computer Club meets at Crestwood Centre, Shakespeare Road, Boyatt 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, Bobbiestock, HR4 9TG, 0452 269700.

HERTS

Elsenham Computer Club. Meets on second Wednesday of each month at the New Village Hall Committee Room, Elsenham, Bishop's Stortford, R. Franklin 0279 815088.

Sawbridgeworth Computer Club, meets at Sawbridgeworth Parish Hall, 7pm, Fridays. M. Marwood, 38 Sayesbury Road, Sawbridgeworth, Herts, CM21 0EB.

HUMBERSIDE

Bridlington Microcomputer Club. Meets 7.30pm alternate Fridays at Old Star Inn, High Street, Bridlington. Contact D. Complan, 0262-601859.

Grimley Computer Club meets at Grimsey Central Library fortnightly on Mondays at 7.30pm. Ian Fell, 0472 49248.

Scunthorpe & District Microprocessor Society meets at Community Centre, Lindon Street, Scunthorpe, every Tuesday at 7.30pm. G Hinch, 21 Old Crosby, Scunthorpe, South Humberside DN15 8PU.

KENT

Canterbury ACC proposed new club. Contact L Fisher, 21 Marwood Avenue, St Stephens, Canterbury, CT2 7AH.

Gravesend Computer Club. Meets at School Room Extra Tuition Centre, 39 The Terrace, Gravesend. Contact c/o The Extra Tuition Centre, 0474 50677.

Maldstone Computer Club meets third Tuesday of each month. Contact P. Davies, 24 Hartnup Street, Maldstone, Kent.

Ordnay Amateur Computer & Robotics Organisation. Meets at 7.30pm on first Tuesday and third Wednesday of every month. Annual subs £5. Contact Paul Cameron, Unit 3, Walderslade Centre, Walderslade Road, Chatham, Kent, 0634-63036.

North Kent Amateur Computer Club meets at Lecture Theatre, Charles Darwin School, Jai Lane, Biggin Hill, on the first Thursday of every month at 7.30pm. Iain House, 28 Canadian Avenue, Cufford SE8 3AS, 01-

690 5441.

Orpington Computer Club meets at The Large Hall, Christ Church, Chaterhouse Road, Orpington, every Friday at 8pm-10.30pm. Mr R Pyatt, 23 Arundel Drive, Orpington, Kent BR6 9JF. Orpington 20281.

National Personal Computer Users 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 ACC. Ray Szczkowski, 1 Cromer Street, Tonbridge, 0732 335960.

LANCASHIRE

Blackburn Micro Computer Club. Roger Longworth, 12 Sharp Close, Accrington.

Bolton Computer Club meets at Bolton Institute of Higher Education, Deane Road, Bolton, on Thursdays. Bill or Suzi Hartley, 0204 792803.

Burnley Computer Club. Meets at Burnley Technical College on Tuesdays 7.30-11pm. Contact Clive Tallon, 27 Bassnet Street, Burnley, Lancs.

Chorley Computer Club meets at Towler Arms, Chorley, every other Tuesday at 8pm. Tony Higson, 23 Brock Road, Chorley, Lancs. Chorley 68429.

Ribble Valley Computer Club meets at Staff Cartmen, Pendle Carpets Ltd, West Bradford, on the second and fourth Monday of month at 7-9pm. Contact Ian Thornton-Blythe, 25 Bradford Drive, West Bradford, Clitheroe, BB7 4TU.

Lancaster & Morecambe Computer Club, Sarah Blackler, 0524 33553.

Lancaster Computer Club meets each Tuesday at 6.30pm. Contact Brian Sheldon on 0524 423134.

South Chadderton 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 8NN.

Haverhill Siddleby Computer Club. Contact R. Wraith, 6 Naseby Drive, Loughborough LE11 0WU.

LINCOLNSHIRE

Lincoln Computer Club, meets at The Clarence's Hat, 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.

Skiffness Computer Club, meets at County Hotel every other Monday, 7.30-9.30pm. Ray Potter, 118 Bedford Square, Skiffness, 0754 3594.

LONDON

Association of Computer Clubs. Contact Rupert Steele, 17 Lawrie Park Crescent, London SE26, 01-778 6824. National Club of Croydon Microcomputer Club. Meets at Croydon Central Reference Library. Contact Vernon Gifford, 01-653 3207.

East London Amateur Computer Club meets at Harrow Green Library, Gathall Road, E11, on the second and fourth Tuesday of month at 7-10pm. Fred Linger on 01-554 3288.

Forum-80 London. Leon Jay, 01-286 6207.

Forum-80 Wembley. Victor Saleh, 01-902 2546.

The Foundation, c/o Princess Street, Tottenham, London N17. Postal club for science fiction/fantasy software. Contact David Hodson, 01-808 4053.

Harrow Computer Group meets at Harrow College of Higher Education, Room W24, Northwick Park, on alternate Wednesday at 7pm. Bazyle Butcher, 01-950 7068.

Imperial College Micro Club meets at room 401 in the Royal School of Mines on Wednesdays at 2pm. Jan-Simon Pandry, Micro Club, c/o Imperial College, London SW7 2BB.

London School Computer Club. Burlington Danes School, Dane Building, DuCane Road, Rammersmith.

Metropolitan Police Amateur Computing Club meets on the first Thursday of month at 7pm. S Farley, 01-725 2428.

68 Microcomp meets at Regents Park Library, Robert Street, NW1, on the third Tuesday of month at 7.30pm. Jim Anderson, 41 Pelworth Road, Harrow, Middlesex.

North London Computer Club meets at the Polytechnic of North London, Holloway, N7 8DB, 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 College, 25 Paddington Green, W2 1NB. Peter Hill, 01-723 5762.

Post Office HQ Microcomputer Club meets at room B145, River Plate House, 12-13 South Place, off Moorgate, on the second Thursday of month. Vernon Quintance, British Telecom Enterprises, Cheapside House, 138 Cheapside EC2U 6JH, 01-726 4716.

Queens Crescent Computer Club. Meets at Queens Crescent Library, 165 Queens Crescent, London NW5, 01-485 4551.

The SOBAT Computer Club meets once a fortnight. Mr T Kayani, 12 Calderon Road, London E11.

South East London Microcomputer Club — contact Mark Benson on 01-856 5555 x 313.

Southgate Microcomputer Club meets at Room B106 Southgate Tech, fortnightly on Wednesdays at 7.30pm. Kevin Pretorius 01-882 2282. See Prestel page 25820645.

West London Personal Computer Club meets at Back room, Fox & Goose pub, Hanger Lane, Apton, 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.

Small Business Computer Users Club. Proposed new club to meet the last Tuesday of month. K Wadsworth, 061-740 7232 after 5pm.

South Trafford Microcomputer Club. Meets fortnightly. Contact Ian White, 16 Leicester Avenue, Timperley, Altrincham WA15 6HR, 061-969 2080.

MERSEYSIDE

Ellesmere Computer Club meets alternate Mondays at 7.30pm. Contact David Walker on 051 355 2299.

Merseyside Microcomputer Group meets at Merchant Taylor's School, Crosby, on second Thursday monthly. 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 2DL, 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, Irby, Merseyside.

MIDDLESEX

Brigadier Computer Club. Meets on the first and third Monday of every month at Brigadier Youth Centre, Brigadier Hill, Enfield at 7.30 pm. Contact Steve Ward, 28 Brodie Road, Enfield, Middx EN2 0EU, 01-383 3786.

Micromodeller User Association. Meets three times a year. Contact Philip

Matthews, Phillip Morris House, 21 High Street, Feltham TW13 4AD, 01-751 6388.

Sunbury Computer Club meets at St Benedicts Hall, Napier Road, Ashford, on the last Tuesday of month at 8pm. Simon Taylor, 8 Priory Close, Sunbury-on-Thames, Middlesex. Simon Clark, 83 Watling Street, Towcester, Northants NN12 7AG.

Middlesex Micro Club. Contact Pete Kaver, 17 Manor Vale, Brentford, Middlesex.

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 Stephen Bickle on 0536 514381.

South Northants microcomputer club. Contact Simon Clark in Towcester on 0327 52191.

NOTTINGHAMSHIRE

Asfield Computer Club meets at Carisc Junior School, St Mary's Road, Sutton in Ashfield on the first and third Thursday monthly. Derrick Daines, c/o Cuttings Avenue, Sutton in Ashfield, Notts.

Eastwood Town Micro Computer Club meets at Devonshire Drive Junior School Wednesday at 5.45pm. Ted Ryan, 15 Queens Square, Eastwood, Nottingham NQ16 3BJ.

Nottingham Microcomputer Club meets at Congregational Federation Centre, Castle Gate Centre, Nottingham, second Monday of each month at 7.30pm. Mr E Harvey, 68 Roseleigh Avenue, Nottingham NG3 6FH. Nottingham 608491.

Retford Computer Club meets bi-weekly at the Ivy Leaf Club, Retford, at 7.30pm.

Contact John Lanning on Retford 700134. **Workop Computer Group.** Mr Andrews, Workop 487327.

NORFOLK

Anglia Computer User Group. Jan Rejz, 128 Templers, Sprown Road, Norwich. 0603-29652.

Brecklands Computer Club. Contact Andrew Hion, 11 Annafewes Close, Tharford, Norfolk. Meets each Saturday, 5pm at this address.

Dereham & District Computer Club. Meets at Middle School, Westfield Road, Toftwood, East Dereham on every second Wednesday at 7.30pm. Contact Mrs Fran Cook, Dereham 67732.

East Anglia Computer User's Group meets at Cromes Community Centre, 1 Telegraph Lane, Norwich. Gill Rizer, 88 St Benedicts, Norwich.

Yarmouth Computer Club meets each Friday at 7pm. Contact the club at Unit 26, Longs Estate, Englands Lane, Gorleston, Great Yarmouth, Norfolk, 0983 662871.

NORTHERN IRELAND

Belfast Computer Club meets 7pm on first Monday of each month at Ashby Institute, Stranmillis Road, Belfast 9. Contact Patrick Roddison on Holywood 3212.

North Down Microcomputer Club meets on the last three Mondays of each month. Contact E. Dook on 0247 50902.

OXFORDSHIRE

Association of Computer Clubs. Rupert Steele, St John's College, Oxford OX1 3JP. **Microsoc** 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 Phillips, Southport Cottage, Sutton Courtenay, Nr Abingdon, Oxon OX14 4AU. **Ridgeway Computer Club** meets at Swan

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SCOTLAND

Bishopston Computer Club, Renfrewshire, meets bi-weekly. Contact Alisdair Law on Bishopston 863137.

Dundee — Kingsway Amateur Computer Club. Meets in rooms C11 & C12. Kingsway Technical College, Old Glamis Road, Dundee on Thursdays at 6.30pm. Contact J. Cook at the college on 0382 819021 or C. Macleod, 101 Peddie Street, Dundee.

Edinburgh Home Computing Club meets at Crosswinds Community Centre, Tollcross, Edinburgh, on the 2nd, 3rd and 4th Thursday of the month from 7-10pm. 1. Robertson, 031 444 2361.

Scottish Amateur Computer Society, Mike Anthony, 46 Moreuden Park Gardens, Edinburgh EH17 7JR.

Cairns Computer Club meets each Saturday at 7.30pm at Cairns Church Hall, Lanark, Scotland. Contact N. Kirkpatrick, 3 Wellington Terrace, Lanark, Strathclyde, Scotland.

Central Scotland Amateur Computer Club meets at Falkirk College of Technology, Grangemouth Road, Falkirk, on the first and third Thursday of the month. James Lyon, 78 Slamannan Road, Falkirk FK15 5NF.

File Computer Users Club meets fortnightly. Murray Simpson, 31 Tom Steward Lane, St Andrews, Fife.

Glasgow Amateur Computer Society meets at 35 Thistle Lane, Aberdeen, on the second and fourth Monday every month at 7.30pm. Alan Morrison, 21 Beech Road, Westhill, Skene, Aberdeenshire AB3 6WR.

Kemnay Computer Club meets weekly. S. Stubbs, 15 The Giebe, Kemnay, Inverurie, Aberdeenshire.

Inverness Personal Computing Club meets every second Tuesday at 7.30pm. Gyl Mackenzie, 38 Ardenholme Street, Inverness IV2 3EX, 0463 220922.

Perth & District Amateur Computer Society meets at Riverside Lounge, Bridgend, Perth, on the third Tuesday of month at 7.30pm. Alastair McPherson, 154 Oakbank Road, Perth PH11 1HA.

Slieve and Lochalsh Computing Society. Contact C. Manwell, Tigh na Paic, 25 Lower Breackish, Isle of Slieve, 04712 317.

Strathclyde Computer Club meets at Wolfson Centre, 106 Rottenrow, Glasgow, on the third Wednesday of month. B. Duffy, 24 Lomand Drive, Condorrat, Cumbernauld.

SHROPSHIRE

Ludlow & District Microcomputer Club meets at Diocesan Education Centre, Ludlow, on the second Monday of month at 7.30pm.

Shrewsbury Micro Club meets at Shrewsbury Shirhall once a month. Mr V. Ives, 6 Bramley Close, Severn Meadows, Shrewsbury SY1 2PT.

Telford Computer Club meets at Telford ITEC on Monday 6-9pm. John Murphy, 10 Brichmore, Brookside, Telford TF3 1TF. 0562 595959.

SOMERSET

Taunton Computer Club meets 6pm on Tuesdays during term time at Somerset College of Arts and Technology. Contact David Elliott at Fir Tree House, Back Lane, Westbury-sub-Mendip, Wells, Somerset.

Yeovil Computer Club. D G Carrington, 2 Romsey Road, Yeovil, BA21 5XN.

STAFFORDSHIRE

Alsager Computer Club, meets at Alsager Comprehensive School, Stoke-on-Trent. Staffs, fortnightly on Tuesday. Rex Charlesworth, 05663 77270.

Mixed Byte Computer Club, meets bi-weekly at Dilhorne Recreation Centre, Dilhorne, Stoke-on-Trent. Contact Andrew Cope on 0782 396003.

North Staffs Amateur Computer Club meets on the third Wednesday of each month. J. Roll, 16 Hill Street, Hednesford, Staffordshire WS12 5DS.

ICL Birmingham Branch Micro Club, c/o WBA Ecclestone, 26 Browns Lane, Tamworth, Staffs.

Tame Computer Club. Contact A. Beckett, 57 Adonis Close, Tamworth, Staffs. Meetings bi-weekly, Friday, 7pm.

SUFFOLK

Haverhill Microcomputer Club, meets at St Mary's Church Hall, Camps Road, Haverhill, on the second, third and fourth Wednesday of month at 7.30 to 10pm.

Andrew Holliman, 5 Trinity Close, Balmsham, CB1 6DW, 022 029 583.

Newmarket Home Computer Group. Meets at Anchor House, Moat Lane, Towcaster, at 7.30pm. Contact Simon Clark, 83 Watling Street, Towcaster, Northants NN12 7AG, 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 the month. Contact P Palmer, 8 Corfe Close, Ashted.

Deaf Microcomputer Users Group. Contact Chris Marsh, 3 Delaporte Close, Epsom, Surrey KT1 7TJ, 0181 252 222.

Thames Valley Amateur Computer Club meets at Griffin, Caversham, on the first Tuesday of month. Brian Quarm, 25 Roundway, Camberley, GU15 1NR, Camberley 22186.

Ewell Micro Club. Dave De Silva, 316 Kingston Road, Ewell, KT19 0SU.

Farnham Computer Club, meets at Farnham 6th Form College, Morley Road, Farnham, on the second Wednesday of month. Adam Sharp, 14 Thorn Road, Boundstone, Farnham.

West Surrey Computer Club meets at Paddock Room, Green Man Public House, Burpham, Guildford, the first Thursday of month. Chris Kamey, 0483 88121.

ITM Computer Club, meets at Farnham, A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0485 62035.

CBSS London meets on Sundays 4-10pm. P Goldman, PO Box 100a, Surbiton, KT5 8HY.

Richmond Computer Club meets at Richmond Community Centre, Sheen Road, on the second Monday of month at 8pm. Bob Foster, 18a The Barons St Margarets, Twickenham, Middlesex, 01-892 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

Arav Microcomputer Club meets at Wick and Ince, Wick Farm, Littlehampton, on the first Monday of month at 8pm, and third Sunday of month at 6pm. P Cherriman, 7 Talbot Road, Littlehampton, West Sussex DN17 7BL.

Bognor Computer Club meets at RAFA club, Waterloo Square, Bognor Regis, West Sussex at 7.30pm on last Thursday of each month. BBC subgroup meets second Thursday. Contact Leo Hughes, 20 Pinehurst Park, Aldwick, West Sussex.

Brighton, Hove & District Computer Club. Meets 7.30pm every second Wednesday at Southwick Community Centre. Contact J Smith, 30 Leicester Villas, Hove, E Sussex.

Crowborough Computer Club meets first, second and fourth Tuesday of each month. Contact Bruce Piggott on 089 28 82970.

SWVC Video Games Club. Contact G Bond, 7 Swift Lane, Langley Green, Crawley.

Eastbourne & District Computer Club meets at 7.30pm on last Wednesday of each month at the WRVS Centre, Hyde Road, Eastbourne. Jim Booth, 0323 51437.

Northam Microcomputer Club. Meets at the Forest Community School, Compton

Lane, Horsham on second Wednesday of each month from 7.30pm. Philip Dickinson 0403 60965 or Jim Lang 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 3XQ.

West Sussex Microcomputer Club meets at Room R06, Robinson Road Annex, Crawley, on the first and third Monday of month. J Clarke, 31 Hyde Heath Court, Pound Hill, Crawley, 0293-884207.

Worthing & District Microcomputer Club meets at Rose Wilmut Youth Centre, Littlehampton Road, Worthing, on alternate Sundays 11am-1pm. B. Thomas, 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 Scarpill, 21 Percy Park, Tynemouth, 0632 573905.

WALES

Abergele Computer Club meets at Abergele CI Offices every Thursday at 7.30-10pm. W Jones, 55 Milbank Road, Rhyll, Clwyd.

Beddau & District Computer Club, meets at Beddau Community Centre, 7pm, Mondays. Nigel Butters, Newport, Llantwit 206305.

Clywd '80 Computer Club. Contact Allan Jones, The Island, 1 High Street, Connah's Quay, Deeside, Clwyd, 0244 816893.

Deeside Deeside Community Centre, Queensferry, Deeside on Thursday at 7pm.

Colwyn Computer club meets at the Greens Hotel, Colwyn Bay, at 7pm. Contact D Bevan, c/o Abergele Road, Colwyn Bay, Clwyd LL29 7PA.

Gwent Amateur Computer Club meets at St Mary's Institute, Slow Hill, Thursday at 7.30pm. Rofelley Morris, 10 Alambrook Avenue, Newport, Gwent. Wales NP23 6GJ.

Haven Computer Club meets each Tuesday at 7pm. Contact Alex Majewski on 06462 5278.

Llantwit Major Computer Club. Meets at Adult Education Centre, Llantwit Major, every Tuesday. Contact Douglas Mountain, 16 Denbigh Drive, Llantwit Major, South Glamorgan CF8 6GQ.

Mold Computer Club. Meets 7.30pm on the first and third Thursday of each month at the Daniel Owen Centre, Earl Street, Mold. Contact G Johnson, 18 Daytona Drive, Northop Hall, Mold, Clwyd, Wales. Tel Deeside 821945.

Millford Centre Computer Club. Open to schoolchildren, meets every lunch hour and evening. Contact Harry Evans, Millford Centre School, Prioryville, Millford Haven, Dyfed, 043 784 571.

Newtown & District Computer Club meets first and third Wednesday of each month. Contact John Dale on 068 688 502.

Pontyfool Computer Club meets at the Settlement, Roachhill Road, Pontyfool, Gwent, on Tuesday. Graham Loveridge, on Pontyfool 2827.

Swansea & Southwest Wales Amateur Computer Club meets on the last Friday every month. Paul Griffiths, 1 Prescilli Road, Penlan, Swansea SA5 8AF.

Swansea Computer Club. Meets at 10 (pub), Union Street every Tuesday at 7.30pm. Contact Robert Palmer, 044 123 602.

Wrexham & District Computer Club. Meets each Thursday. Contact Mike Houghton, 1 Snerwell Avenue, Wrexham, Clwyd, Wales.

WARRICKSHIRE

Stratford Computer Club meets at the Wesley Hall, Stratford upon Avon, on the second Wednesday of each month at 7pm. Details from Chris Parry on 0789 68080.

WEST MIDLANDS

Cannock Computer Society meets at Cannock Computer Systems, Old Penkridge Road, Cannock, fortnightly. Terry Sallie, 20 Redwood Drive, Chase Terrace, Walsall WS7 8AS.

Coventry Computer Circle. Contact Chris Baugh, 9 Hillman House, Smithford Way, Coventry CV1 1FZ.

Coventry Micro Club meets on Wednesdays at 7.30pm at Walsgrave Junior School. Jack Hewitt, 3a Boswell Drive, Walsgrave-on-Sowe, Coventry. Tel: 615543.

Hull Computer Club meets at Park Hall Community School on the second and fourth Monday 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, Brierley Hill, Kingswinford, 0384 70097.

WILTSHIRE

Chippenham and Calne, proposed new club. Matthew Jones, Pinihills, Calne.

Chippenham Computer Club. Contact Peter Knaggs, 12 Seymore Road, Chippenham or call Chippenham 654940.

WORCESTER

Worcester & District Computer Club meets at 102 Whitland Inn, New Street, Worcester, on the second Monday month at 8pm. D Stanton, 55 Vauxhall Street, Rainbow Hill, WR3 8PA.

YORKSHIRE

Barnsley Co-Operative Computer User Group meets at Co-Op Social Club, Pogmore, Barnsley, on the last Tuesday month at 7.30pm. James Bridson, c/o 39 Kerelorth Hall Road, Barnsley, South Yorks S70 9NF, 01953 1753.

Calderdale Computer Club meets on first Tuesday of each month. Contact Ray Franklin on 0279 815088.

Greenhead Grammar School Computer Club. Brian Smith, Greenhead Road, Kettleigh, West Yorks, 0535 62828.

Huddersfield Computer Club meets every Monday. Chris Townsend, 78/0 Manchester Road, Lintwath, Huddersfield, 0484 557299.

Ilkley Computer Club meets alternate Fridays at Ilkley College, West Yorks. Contact C. Prince, 15 Sandholme Drive, Burley in Wharfedale, West Yorks.

Kelley Computer Club. Meets each Wednesday at 7.30pm at Methodist Church Hall, Market Street, Kettleigh, West Yorks. Contact Simon Midgley on 0535 681463.

Leeds Microcomputer Users Group meets at 8 Regent Street, Chapel Allerton, fortnightly on Thursday at 6pm. David Parsons, 22 Victoria Walk, Horsforth.

Shipley Computer Club group meets on Tuesdays. Paul Channell, tel: 0274 59573.

South Yorkshire Personal Computer Group meets at General Lecture Theatre, St Georges Building, Mappin Street, Sheffield, on second Wednesday month at 7.30pm. Paul Sanderson, 8 Vernon Road, Tetley, Sheffield S17 3QE.

Thurston & District Micro Users' Club meets at Thurston Comprehensive School, Physics Lab, Clayton Lane, Thurston, Wednesday at 7.30pm during school term. Mr James Davis, 62 Tudor Street, Thurston East, 0799 893880.

West Yorkshire Microcomputer Group meets on Tuesdays. Philip Clark, c/o Suite 204, Crown House, Armley Road, Leeds LS12 2ES, 0532 635232.

York Computer Club meets at the Enterprise Club every Monday at 8pm. K. Thomas, Green Lea, Ripon Road, Harrogate, HG1 2BY, 0194 38239.

Special thanks to the Association of Computer Clubs from whom clubnet was originally compiled in PCW's early days.

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The first two correct entries drawn (in which BOTH the survey and questions are completed) will win a Mac and software. All entries must be in by May 1.



- 1) What are the small picture labels on the Mac's screen called?
- 2) Name the Mac's two processors
- 3) How much capacity does a Macintosh disk have?
- 4) How many dedicated cursor keys does the Mac have?

PCN READER SURVEY

1. NAME: _____
2. ADDRESS: _____

3. AGE: UNDER 15 15—18
 19—25 26—35
 36—45 46—65
 OVER 65

4. SEX: MALE FEMALE
5. OCCUPATION:
PROFESSIONAL & BUSINESS
EDUCATION
STUDENT
COMPUTER INDUSTRY
OTHER

Continued ▶

If yes For Q6-Q9, please specify make and model in each case.

6. DO YOU OWN A MICRO?: _____
MAKE & MODEL _____
7. DO YOU OWN DISK DRIVES?: _____
MAKE & MODEL _____
8. DO YOU OWN A PRINTER?: _____
MAKE & MODEL _____
9. DO YOU OWN A MONITOR?: _____
MAKE & MODEL _____
10. IF YOU UPGRADED YOUR SYSTEM
(a) Which micro would you buy _____

(b) Which peripherals would you buy _____

11. HAVE YOU OWNED YOUR MICRO FOR:
UNDER 3 MONTHS
3-6 MONTHS
6-12 MONTHS
OVER 1 YEAR

12. WHERE DO YOU BUY HARDWARE & SOFTWARE:
H S
MAIL ORDER
SPECIALIST SHOPS
CHAIN STORES
TOY SHOPS
MAGAZINE ADS
SECONDHAND

13. HOW MUCH DO YOU SPEND ON SOFTWARE PER MONTH:
UNDER £15
£15-£20
£20-£30
£30-£50
£50 AND OVER

14. WHICH PROGRAMMING LANGUAGE(S) DO YOU USE:

15. WHICH OPERATING SYSTEM(S) DO YOU USE:

16. WHAT DO YOU USE YOUR MICRO FOR MAIN USE ONLY:
GAMES
PROGRAMMING
BUSINESS
EDUCATION
SCIENTIFIC/ENGINEERING
SYSTEM DEVELOPMENT
WORD PROCESSING

17. HOW OFTEN DO YOU USE YOUR MICRO EACH WEEK:
1 HOUR OR LESS
2 HOURS
3-5 HOURS
5-8 HOURS
OVER 8 HOURS

18. PLEASE INDICATE THE PROPORTION OF SOFTWARE BUDGET (%) SPENT ON:
GAMES _____
UTILITIES _____
LANGUAGES _____
APPLICATIONS _____
EDUCATION _____

19. IF YOU ARE A STUDENT, DO YOU USE A MICRO AT SCHOOL/COLLEGE:

- YES NO
IF YES, PLEASE GIVE MAKE AND MODEL _____

20. ARE YOU A MEMBER OF A COMPUTER CLUB OR USER GROUP:

- YES NO
IF YES, HAVE YOU BEEN A MEMBER FOR:
UNDER 3 MONTHS 3-6 MONTHS
6-12 MONTHS 1-2 YEARS
OVER 2 YEARS

21. DO YOU READ PCN: EVERY WEEK
OCCASIONALLY RARELY

22. HOW DID YOU FIRST HEAR ABOUT PCN? _____

23. PLEASE INDICATE YOUR INTEREST IN THE FOLLOWING PCN SECTIONS

	A lot	Some	Little	None	Stop buying PCN removed	Like to see removed
MONITOR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PCN CHARTS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RANDOM ACCESS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ROUTINE INQUIRIES	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MICROWAVES	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
READOUT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PCN PROGRAMS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DATABASICS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BILLBOARD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
QUIT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HARDWARE REVIEWS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HARDWARE PRO-TESTS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SOFTWARE PRO-TESTS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PERIPHERAL PRO-TESTS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPECIAL FEATURES	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MICROPAEDIA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HARDWARE DATABASICS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SOFTWARE DATABASICS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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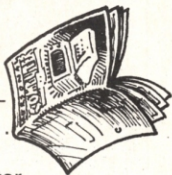
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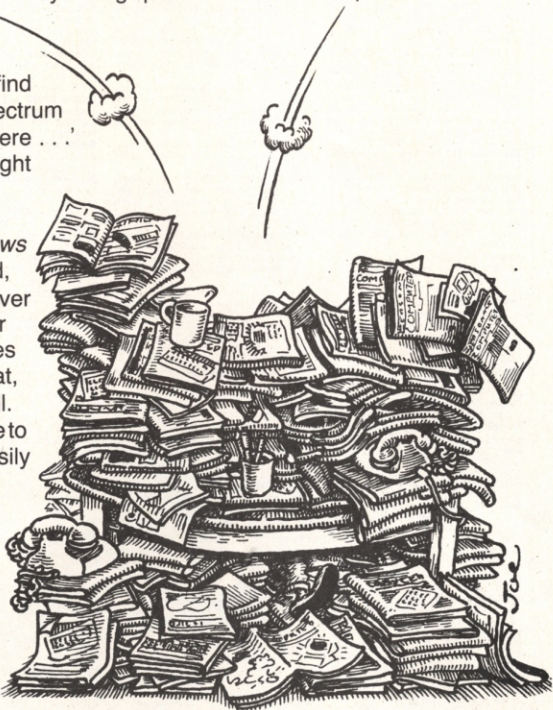
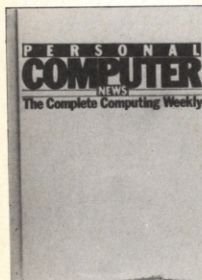
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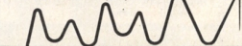
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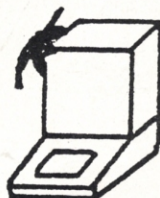
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Golf games par for a course

Back in Issue 47 we gave out a hostage to fortune after a mild disagreement over the first course-specific golf game.

Was it St Andrews or Royal Birkdale? Or does anybody have 'an unsung Scarborough Pitch and Putt out there'? we asked. To which Stephen Lambert of Hull replied: 'I am

developing an 18-hole full simulation on the Oric based on the Scarborough North Cliff course. Will this do?'

It certainly will. In a month or two, when the weather improves, perhaps Stephen and anybody else could send in their programs and we'll hold a tournament.

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for sir? (Scurries off for aid.) Second Assistant: 'What mi... er... printer's that for sir?'

In an unprecedented burst of philanthropism, the very same chain is currently advertising a BBC B at £398 in its sale — reduced from £399, although this isn't mentioned.

Microgame Simulations of Cambridge has asked us to point out that, though it sells a program called Battle of Britain, it has no connection with Maincomp (Issue 53). Nor is there any similarity in the software, apart from its title: Maincomp's Battle of Britain runs on the Vic-20 and costs £9.95. Microgame Simulations' is a Spectrum game costing £5.95.

Microwaves Issue 52 contains a couple of errors. In comparing two methods to fill BBC squares, the first line of the second program should read:

```
10 MOVE 0,130
and the second line of the first program should read:
20 GCOL 0,2
```

A few impedimenta (not speech) stopped some of the functions working in the Learn to Lisp article (Issue 50).

SLANTAX ERRORS

In the function EXT, the sixth line should read:

```
(EQ FN (READ HDL))
In the function EXT, the second to last line should be:
```

```
(SET (CAR FPAR) 'UNDEFINED))
In the function ELIST, the ninth line should have had one less closing bracket (
```

```
(UNTIL (EQ DUM 'NIL))
Some Lispers may prefer to swap this line for the previous one to get rid of the NIL at the end of the list of contents of the file.
```

NEXT WEEK

In Touch — pt 1 — How communications can open windows from your micro in a three-part pull-out.

In Touch — pt 2 — PCN Pro-Tests the Hewlett-Packard 150, the micro with the sensitive screen.

SPECTROM — Basic too basic? Get to grips with machine code morsels for the Spectrum.

Limelight — PCN turns the spotlight on light pens.

Programs — Draw a high-resolution bead on this program for the Dragon.

PAL 2000

by Mollusc

Have you finished these calculations yet?



PCN DATALINES

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
Microcomputer Applications Workshop	March 26, 27	Computer Laboratory, Liverpool University	Ms C Bryson 051 709 6022
Microcomputer Networks Workshop	March 27, 28	Computer Laboratory, Liverpool University	Ms C Bryson 051 709 6002
Sinclair Education Exhibition	March 28-30	Central Hall, Westminster	Computer Marketplace (Exhibitions) Ltd., 01-930 1612 Susie Lipman 061-456 8383
Electron & BBC Micro User Show	March 29-April 1	New Horticultural Hall, Westminster, London	Reed Exhibitions, 01-643 8040
Computer Aided Design	April 3-5	Met. Exhibition Hall	Warm Boot Ltd, 01-368 7561
Artificial Intelligence Seminar	April 7-8	City University, London	Alan Henderson, Welwyn Garden 23367/8
Sir Frederick Osborn School	April 8	Sir Frederick Osborn School, Welwyn Garden City	Reed Exhibitions, 01-643 8040
Computer Fair	April 10-12	Cardiff University	A4 Publications Ltd., 088-385 2051
COMPEC WALES	April 12	Cavendish Conference Centre, 82 New Cavendish Street, London W1	Mike Carroll, 01-636 6890
Computers for Builders Exhibition	April 12	Solithull Conference Centre, Birmingham	
Personal Computer Games Show	April 20-22		

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Hanover Fair	April 4-11	Hanover, Germany	Deutsche mess-und Ausstellungs AG Hanover, 01-651 2191
Vidextex '84	April 16-18	Hyatt Regency, Chicago	Sally Summers, 0101 212 279 8890

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