

# PERSONAL COMPUTER

50p January 28, 1984

No 46

NEWS

BRITAIN'S BIGGEST WEEKLY

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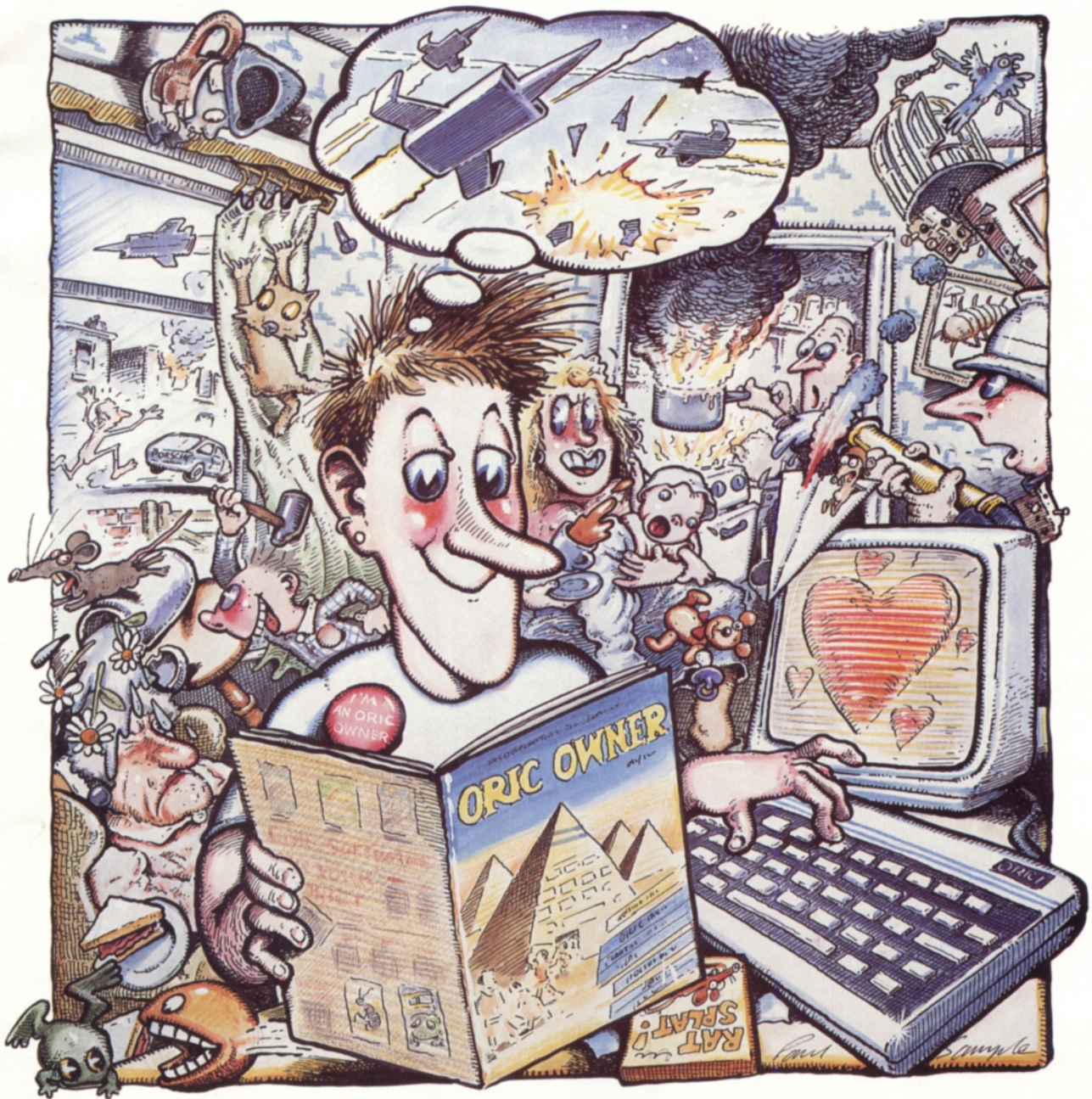
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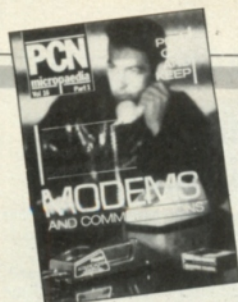
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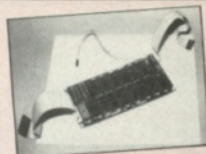


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# Mac attack

Apple has launched the long-awaited Macintosh, the system which is due to pick up the baton from Lisa in its race against IBM.

The Mac comes with 128K of RAM, 64K of ROM containing operating system and built-in graphics generation firmware, a single 400K 3.5in microfloppy, monochrome screen, full-moving keyboard with desk-top mouse, two serial interfaces and a bus slot for further expansion. It should cost about £1,800.

The system has also been designed to be reasonably 'luggable' with small footprint, vertical appearance and carry-bag.

The Macintosh has been launched into a market, in the US at least, heavily dominated by the IBM PC and its compatibles. Rather than go for IBM compatibility (though this can't be ruled out as a future option) Apple has decided to go it alone on the strength of its

Lisa-type interface which, the company claims, offers a considerable advance in ease of use over conventional offerings. Instead of controlling applications programs through control characters or function keys, the Mac uses a tabletop mouse so you can select functions by manipulating a series of on-screen icons.

Apple hopes that Mac will sell well as an MS/DOS alternative and claims that application package prices will be held down at £75.

It also hopes to avoid the mistakes that plagued the Lisa's US appearance by having systems ready for delivery immediately, and in the next month or two in the UK. In addition it can point to a deal with 24 of the leading universities in the US — including names like Harvard, Yale, and Princeton — where the Mac will be on sale to students at only \$1,000.

■ For a full and exclusive Pro-Test of the Macintosh turn to page 18.



# Receiver confident as ailing Almarc takes spirited stand

A cash flow crisis has forced Almarc Data Systems into receivership, but the maker of the Spirit series of micros is continuing to trade and to support its customers.

The company went into receivership on January 3, but managing director Alan Wood was optimistic last week about the prospects for Almarc. 'We are hopeful of an early sale to a prospective purchaser,' he said. 'We have had several offers and expect Almarc to be OK again in 10 days time.'

Richard Turton of Spicer & Pegler and joint receiver at Almarc, said: 'I believe there is a great future for this company — it has a jolly good product and the customers certainly like it.'

Almarc continues to trade from its Nottingham office though its Marlow premises are closed for the

time being. Mr Wood said that Almarc had taken numerous orders since running into problems.

As far as users are concerned, there are two possibilities: 'If the whole business can be sold, and I feel that is a distinct possibility, there is no problem whatsoever. Failing that, there is a fall-back position, where I have received expressions of interest from people who want to pick up the maintenance side alone,' Mr Turton said.

He added that time was working against Almarc and that the matter should be resolved within the next two weeks.

New premises and the launching of its micro range (Issue 18), priced from £2,645, are said to have contributed to the financial problems of the seven year old Nottingham company.

**FORTH KEY** — If you think you've seen this computer before, think again. For beneath the Cotron monitor and standard Peerless enclosure, lies the first production model of the Microkey 4500, the Forth-running computer that PCN readers helped design. Microkey (0273-672911) is now taking orders for the machine at £650 plus VAT. For your money you get a 6502 processor running at 2MHz, 128K of RAM, eight colour 640 by 200 graphics (or monochrome 1280 by 200 graphics), an RS232 interface, three bi-directional parallel ports, disk controller and Forth in ROM. Sony 3in disk drives will cost you £210 each and you will also have to pay extra for the recommended Cotron monitor.



# All change at Commodore

Jack Tramiel, founder and driving force behind Commodore, has resigned as its chief executive officer, and will cease to be a director. In a surprise announcement the company said although leaving the company he will continue to assist as a consultant and advisor.

Mr Tramiel said only: 'Personal reasons prevent my continuing on a full-time basis with Commodore.'

He will be replaced by Marshall F Smith, currently president of Thyssen-Bornemisza, an industrial conglomerate involved in everything from soft drinks packaging to the manufacture of car parts.

Irving Gould, Commodore's chairman, praised Mr Tramiel's contribution to the company. 'Under Mr Tramiel's management and guidance, a very strong and talented primary and secondary management structure at Commodore has been put in place,' he said.

Despite the compliments, reports from the US suggest Jack Tramiel's departure was forced on

him in the wake of continuing complaints from employees and shareholders about his autocratic and idiosyncratic management style.

Over the last three years, three presidents and numerous senior staff, including marketing executives, have been sacked by Tramiel and others have left of their own accord.

According to one report it was the possible recruitment of Mr Smith to run Commodore's international business that led to Mr Tramiel's departure. Mr Gould wanted to appoint Mr Smith to the post but he was reluctant to take the job while Mr Tramiel was still in overall charge.

## Successors to 64

Commodore's UK successors to the 64 will be similar to two machines it exhibited at the Consumer Electronics Show in Las Vegas earlier this month.

The two new machines are likely to be in the £400-plus range and aim

to compete with the bottom end of the business market. They will have 32K ROM and 64K RAM, an extraordinary 60K of which is user-addressable.

As yet it isn't clear to what extent the new systems are expected to replace the 64, which is barely a year old in this country and which has been a spectacular success. US observers had expected a Commodore 128, but as usual the company has caught them on the hop.

The two machines were shown in the US under the names 264 and V364. But only the V364 is likely to be sold under the same name here. John Baxter, marketing manager of Commodore (UK) explained there are currently at least seven options open to Commodore for the exact specification of the smaller machine, and that final decisions were still being made.

One or both of the new machines will probably feature the Magic Voice speech chip built-in, and both machines will have new keyboards. The V364 will have more keys than

the smaller machine, and also a separate numeric keypad as standard. In common with just about every other new micro on the market the new Commodores will have extended Basic — probably Basic 4, the language in Commodore's range of business machines.

Due to the nature of the new language and the new chip used (the 7501) the new machines will be compatible with neither the Vic 20 or the Commodore 64, enabling Commodore to keep faith with a long standing tradition.

Commodore plans to have the 264 and V364 on sale in the US from April 1, and in the UK from May or June.

■ Commodore is also preparing to announce a new 1Mb 5.25in disk drive, though this will probably not be available in the UK for some months. It is expected to retail at about £570. Commodore's choice of 5.25in technology is mysterious when so many manufacturers are now moving on to the more reliable 3 3/4in drives.

# Which's brew

By John Lettice

Down in the concrete jungle something stirred. The white heat of technology was warming up the echoing halls of Birmingham's National Exhibition Centre last week, as the 1984 Which Computer? Show got under way.

Sinclair Research wasn't there, so the QL remained a ghost at the feast. Sinclair Consultants of London NW9 was however doing a roaring trade explaining that quite a lot of people are actually calling Sinclair.

There were launches aplenty, although not everyone pushed the boat out. Prism went glossy to launch the Wren Micronetting portable and Topo the robot.

The Oric 2, hereafter referred to as the Atmos, also made its appearance, in the same week as the Oric 1 was done to death. The latter has gone out of production, but if you got one of the old ones for Christmas don't worry — Oric will trade it for an Atmos, complete with a ROM that works, for only £50. There may, however, be difficulty in getting your old programs to run on the new one.

The Oric disk drives, now due to be on sale next month, were tucked in one corner of the stand, having only arrived on the morning of the show. They're black and oblong and look nothing like the rather ergonomic 3in beasts that the ads showed slotting in pairs behind the now defunct Oric I. An Oric spokeswoman had told PCN that they were in production towards the end of November, but as it was only decided that the drives would not have an integral power supply



Oric Atmos and drives — loose coupled until next month.

during December, they quite clearly could not have been.

The Show Guide says: 'See for yourself why the Oric 1 was voted home computer of the year in France.' Because we've stopped making it? Because there aren't any on the Oric stand? The mind boggles.

Back in the business mainstream, portables and IBMs were multiplying, with and without floating point arithmetic. Sanyo's sub-£1,000 IBM lookalike was there as was the NEC 8201 lap-held, and the larger (strap held?) Sharp PC5000 portable. With Sord also bidding in this area, there seems to be a new dictum in the micro stores — if you can't lift it, you won't shift it.

Everybody's doing it, although some are still doing it the Osborne way. The Prism Wren is a portable of around Hyperion size, the Apple stand was graced by a portable IIe, while Commodore's portable 64 was also at the show in force. All these machines have a tiny screen in common, and are likely to make eyestrain the watchword for 1984.

The Brother EP-44 printer/type-writer and the HR-5 printer (see next week's PCN for a review) were strong contenders for the cuteness of the show title.



**EXTRA-NEC** — The first peripherals for NEC's 8201 book-size portable have arrived. The company was showing a thermal printer and a cassette recorder, both of which matched the dimensions of the micro itself. The PC-8221A printer is a tiny unit 11cm wide; with an 8-bit parallel interface it costs £85. For 58 there is the PC8281A data recorder. Other news from NEC — as of February its APC business system is expected to run Concurrent CP/M, but memory upgrades to the 8201 could be delayed by a shortage of CMOS chips.

## Optim in business while IBM grows Peaches

Optim became the latest new name on the business micro scene with the launch of its 1050 dual processor system.

The system has 128K driven by a Z80, with another 32K and a 6502 to control all screen operations. It comes with twin 400K floppies and CP/M Plus for £1,995.

The 1050's keyboard has 17 function keys, a numeric pad, and a help key apart from 93 plain keys in a qwerty arrangement. Its screen has 640 by 300 bit-mapped graphics. Bundled software includes Wordstar, Mailmerge, Multiplan and DR Graph. Optim is on 01-969 6768.

■ There was celebration on the Peachtree stand where IBM was toasted with lurid cocktails.

IBM had announced that it was making Peachtree's Sales and Purchase Ledger packages available on the PC. 'For any company to have its products marketed by IBM is an accolade,' said Peachtree UK's general manager Dick Moore. It should also be a password into Aladdin's cave.

IBM is now selling four Peachtree packages.

■ Two major Japanese micro makers were demonstrating systems that first appeared towards the end of last year. Fujitsu and Sharp now have systems on the brink of full availability.

Sharp's PC-5000 is the portable device with a built-in printer and LCD screen plus an option on 128K of bubble memory. It will cost from £1,195 and will be in stock next

### Sord is secretive about new micro(s)

Sord is about to give Japan another contender in the book-size computer stakes — it expects to launch a system called the IS-11 in two or three months.

The machine will have 64K of CMOS RAM, an LCD screen, some unspecified proprietary software, and a standard keyboard with a plug-in numeric key-pad. It is expected to cost under £500.

### New Epsoms to arrive in spring

Two new printers from Epson will be in the shops by March. The LQ1500 dot matrix printer will be about £1,000, while the DX100 daisy-wheel is £540.

The LQ1500 prints at 200cps and has a multifont option from a matrix of 17 × 24.

### Sanyo means double trouble for IBM

Sanyo's IBM rival was on show in two versions. The MBC 550 costs £805 without a monitor, and the MBC 555 is £1,035 for a complete system.

Both are due to be available by the middle of next month. The 555 has 128K of RAM which can be doubled, dual 160K drives, eight colours and a dot resolution of 640



Optim 1050 — business newcomer.

month.

Fujitsu's FM7 and FM16S not only mark the arrival of two interesting systems, but also the entry of one of the world's biggest computer companies in to the UK.

The FM7, from £495, is an 8-bit colour system with 64K of RAM, 48K video RAM, Fujitsu Basic and a Centronics interface. With the addition of disk drives, a Z80 card, interfaces and other peripherals it builds into a system costing £1,450.

The FM16S has an 8086 and Z80A, RAM starting at 128K building to 1Mb, additional video and monitor memory, twin floppies with 320K each, and the possibility of a degree of IBM compatibility. Fujitsu intends to go with DR operating systems rather than chase MSDOS' tail, and it is already running Concurrent CP/M version 3 (with windows) on the FM16S. The system starts at £2,170.

### Rumours circulating before Christmas indicated that Sord might use the Which Computer? Show to launch the IS-11, and that the machine would have a degree of IBM-compatibility. Sord is reluctant to comment on the IS-11 and it could be that there are in fact two new machines on the way from the manufacturer of the M5 (Issue 12).

The DX100 runs at 13cps. Using interchangeable daisywheels you have a choice of more than 180 type faces, and by changing ribbon cassettes you can print in two colours.

The DX100 also has a useful 5K buffer.

Based on the 8088, it runs MSDOS and is supplied with a bundle of Micropro software.

Its junior version, the 550, has a single disk drive but the same amount of user memory. To add a monitor from Sanyo will cost you £146 for a monochrome and £575 for a colour model. The 550 also has less software.

## VIEW FROM JAPAN



By Serge Powell

## Japanese giants play chequers

It seems to me that there could be room in these fun-packed game-crazy days for a modern version of an ancient game.

Let's call it Japanese Chequers—it's an updated form of the Chinese Chequers that you might remember or still play. The object, for those who do neither, is to manoeuvre your pieces from one corner of a six-pointed star to the opposite corner. In the tangled centrefield area you proceed by jumping over your own or other players' pieces. The winner is the first to get all his pieces home.

In Japanese Chequers the layout of the board is the same but the object is subtly different. Instead of moving across the board with all his/her pieces, each player simply moves into the central area and stays put, or at most moves in apparently purposeless feints to either side, with the result that the area of no-man's land begins to look like a writhing snake-pit.

The players may as well be named: they are Sharp, Fujitsu, Toshiba, Matsushita, Sanyo and Hitachi. For the sake of variety an occasional game might include Sord or Sony or one of the others—the players needn't always be the same. The board represents the personal computer business.

But it doesn't often happen that a player drops out altogether— as a number have done in the US and UK tournaments—so you have to think of Japanese Chequers as a sort of circulating event.

Why do none of them drop out? The short answer is that they can stand a loss—home computers (or computers of any kind) are rarely the be all and end all of their existences. Sharp for example, has recently launched three new models in the PC line, but the press handout that trumpeted their merits also covered a new microwave oven, an office copier and a couple of solar-powered calculators.

Or take Toshiba. This company has a respectable range of 8-bit micros, some more powerful office systems and some Japanese word processors. Even so it is hardly a dominant force in the personal computer market.

But if you want a power plant it's the one to call on; or how about rolling stock for your electric train (not the one in the basement, the one that links London and Glasgow). For entertainment you could order your own TV station with all the trimmings—cameras, monitors, lighting, broadcasting equipment, even a satellite. If you fall ill Toshiba can supply the most sophisticated medical appliances, and to speed the get-well cards on their way it provides the post offices with automatic sorting equipment.

But I'm labouring the point. I could go on, or take another manufacturer or five; but let's get down to the PC and look what goes into it—memory chips, processor chips, peripherals and the rest. Most of the micro makers make their own—Sharp, for example, is using bubble memory chips where the likes of National Semiconductor gave up with the technology years ago.

This self-sufficiency adds another string to their bow, gives them greater control over quality, and reduces prices by cutting out the middle man.

If sales are slow to take off they usually have plenty of fat to live off from their other endeavours (Fujitsu is an exception, being almost exclusively a computer manufacturer, but even so it spans the entire range from micro to mainframe). They can afford to operate for longer on less, because the chances are that business will be strong in some other area in which they are active.

As operating systems bring us closer to a tolerable level of compatibility the main difference between suppliers will be value for money—that will go with economies of scale, reliability, and the range of models offered. The *mélée* on the Japanese Chequers board will go on and the names will probably not change, but it's far from futile activity, especially if you're a customer—they all tend to be there from one day to the next.

## CBM 700 back on launchpad

By David Guest

The system that is launched almost as regularly as the Space Shuttle is inching on to the pad again.

Commodore is to launch its 700 business micro for the third time in 15 months in March. The 700 made its first UK appearance last January in Birmingham. It was effectively re-launched after months of indecision at the Commodore Show in June; now it is set to go up for the third time, trailing flags and bundled software as the band plays on.

Commodore is not talking in any detail about its plans for the 700 except to say that the machine would, finally, be plainly visible.

The software is expected to include Superscript, Calcesult, and a database of some description. At the Which Computer? Show last week a 700 was running Facts business applications, but these are not thought to be part of the package.

The price of Commodore's new/old 700 is to be extremely competitive, according to a spokesman. The 700 originally tested by PCN in Issue 5 was selling for £1,374, but since then it has been subject to a cut of 18 per cent (Issue 26) and there could be a further reduction to celebrate its return to favour.

The 700 range was launched as the top of Commodore's business line at last year's Which Computer? Show. At the time it was accompanied by the 500 series, a science-orientated line of systems. The 700 was warmly received—PCN's reviewer (Issue 5) said: 'The

CBM700 series has amply fulfilled all I expected from it.' It promptly disappeared, and although it lived on in the memories of some dealers its fate was uncertain for several months. The 500 series disappeared for good.

Commodore UK's John Baxter revealed in early June: 'The machine went into production this week' and to back him up Commodore produced a 700 for its summer Fair. The system at that time was haltingly running CP/M, having originally been restricted to Basic.

Now it looks to be on the verge of yet another bid for the limelight. The original was due to have a Z80 second processor and disk drives built in to the main box—these features could star in the re-launch.



CBM 700—now you see it.

## Hitachi adds peripherals

Hitachi has added a Winchester disk system with 11.5Mb to go with the MBE-16002, now renamed the PC-1 and reviewed in PCN, Issue 44.

The disk system costs £2,293. It is available through the company's

dealer network, and users can chain two disk systems together to boost considerably the storage on their systems.

Also due for release in February is a relative of the PC-1. To be baptised the PC-2, it is a monochrome version of the original, identical in specs apart from the lack of colour. It will cost £2,523, as opposed to the £2,985 of the colour model.

## Alps disk drive Pascal for 64 from Oxford

Apple users have a new line into cheap disk storage from CW/P, which is selling the Alps slimline disk drive for £159.

The Alps unit also carries a 12-month guarantee, and is just one-third the height of Apple's own unit. More to the point, it is only just over half the price—Apple's drive costs £281.75.

It isn't the only alternative from third party suppliers: Cumana's AS100 is £171.35 and Avietta's £220.80.

Pascal used to be criticised as the language that was designed by committee; even so, it can hardly be worse than Commodore 64 Basic so Oxford Computer Systems could have a winner on its hands.

Oxford, which specialises in Commodore systems software, is to release a full Pascal compiler for the 64 in the next few weeks. It will charge about £50.

# Scene set for ACT II



ACT's Roger Foster — moving the Apricot towards networks.

ACT, maker of the Apricot and distributor of the Sirius, will launch a system costing less than either in the autumn of this year.

Its plan is to introduce a machine which will broaden its range, so the new system will be significantly cheaper than the Apricot and less powerful, but still aimed at business users.

The company also plans two major improvements to the Apricot but is delaying their introduction. It is currently selling all the machines it can produce and any enhancement at this stage could result in longer waiting lists for the machine.

Perhaps the most significant is the introduction of a Winchester disk drive. One of the few complaints levelled against the Apricot is that its new 3in drives have insufficient

capacity for complex business functions. The Winchester option would successfully overcome this problem.

ACT also plans to introduce a modem for the Apricot, but is still seeking the necessary approval from all the regulatory bodies before making it available. These should be forthcoming in a few weeks, and it will then be possible to link the Apricot into networks — seen by ACT chief Roger Foster as one of the major growth areas of business computing.

ACT is also pressing hard to build up overseas distribution and sales for the Apricot, particularly in Europe, and hopes again to be able to make an announcement of the first such links in the next few months.

## Tandy adds portable 4

A portable model 4 is due from Tandy in April, weighing in at 26lbs.

It will be compatible with its weightier sire, with the same Z80 processor and a 9in screen displaying 24 lines x 80 columns.

It will join Tandy's other well-known portable, the model 100, currently priced at £499. There is no price fixed yet for the portable 4 in the UK, but the new machine has been on sale in the US since Christmas, where it is priced at \$1,799.

Tandy is on 0922 648181.

## Sharp MZ700 to be kitted out with drives

By Wendie Pearson

The £250 Sharp MZ700 should be supporting a disk drive in a week's time with CP/M following at the end of February. Second, third and fourth plug-in drives are due to be available from March.

The drive, to be distributed in the UK by Kuma, (07357-4335), will cost a hefty £569.25.

The price includes interface card, cable, disk operating system and disk Basic. The capacity is 280K and the drive will take standard 5¼in floppies. It is fully compatible with MZ80A disk Basic.

Kuma meanwhile is hurrying to produce software for it.



## SOFTWARE

### PCN rounds up the software releases.

#### Games

**Spectrum/BBC:** Well someone had to do it — a game based on the activities of the peace women of Greenham Common. Called *Base Invaders* it involves avoiding policemen and cutting down the fences of the base. Appropriately, the game comes from an all women company called 'Maginations'. Some of the proceeds from sales will be donated to the Greenham Common Fund. 'Maginations' is on 0632 653224.

**Commodore 64:** Audiogenic (0743 595647) is continuing its departure from traditional shoot-em-up games with *R Nest*. You get a workman to jump around a large pyramid made of three dimensional cubes. Whenever he lands on a cube it changes colour. The objective is to change all the cubes to one colour.

**Apple/IBM:** Two more Infocom adventures from Pete & Pam

(0706212321). In *Infidel* you are a small-time explorer searching for a great lost pyramid in the heart of the smouldering Egyptian desert. *Planetfall* is a science fiction adventure: escaping from an exploding space ship you land in a mysterious and desolate world plagued by floods, pestilence and a mutant wild kingdom. Here you meet Floyd, 'a mischievous multi-purpose robot with the mentality of an encyclopaedia and the maturity of a nine year old'. You get Infocom's usual high standard of packaging and extra little goodies included in the £33.95 (plus VAT) price.

#### Business

**Future:** Torpak and Flightpak are two specialised packages for small to medium-sized tour operators. They will handle all aspects of organising package holidays and flight-only travel, claims Alexander Systems Limited (0483 34444).

**Unix:** Sphinx, the Unix specialist, now offers XED, the word processing system. Multi-level menu prompts, three levels of onscreen help, wide screen editing and spelling checker are some of the features. Sphinx is on 01-734 2907.

**IBM:** R:base is claimed to be a new generation of relational database software allowing the creation of forty files and 10 billion records. It is fully compatible with Multiplan and costs £345 from Softsel (01-844 2040) dealers.

**IBM/MSDOS/CP/M:** Also from Softsel comes a database for users with no programming knowledge. It comes in three levels of complexity. *MAG/base* is a simple filing system for mailing lists and customised form letters. *MAG/base 2* adds an information system to create a relational database. *MAG/base 3* includes menu definition, password protection, screen management function, a data

management language and multi-keyed file management systems. Prices are £205, £345, £555 respectively.

**Hewlett Packard:** BAI Pert is a project management system for the HP 9845 and Series 200 computers. Starting with a simple network description you can produce PERT diagrams showing critical path, Gantt charts and calendar schedules. It is distributed in the UK by Protek Electronics (01-834 3602).

**DEC Professional:** Calling all GPs. DEC GP is based on the Exeter Community Health Project set up in the early seventies to explore the impact of computer technology in the administration of patient care. The program has eight modules that allows you to record patient details, repeat prescriptions, items of service and recalls as well providing word processing and data archiving facilities. Further details can be obtained from DEC on 0734 868711.

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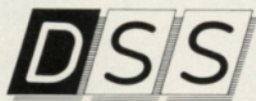
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# PCN charts

## Hardware Top Twenty up to £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▶1	(1)	Spectrum	£99	(SI)
▶2	(2)	CBM 64	£220	(CO)
▲3	(4)	Sinclair ZX81	£45	(SI)
▼4	(3)	BBC B	£399	(AC)
▶5	(5)	Vic 20	£140	(CO)
▲6	(8)	Atari 600XL	£160	(AT)
▼7	(6)	Oric 1	£99	(OR)
▲8	(9)	Lynx 48/96	£225	(CA)
▼9	(7)	Dragon 32	£170	(DD)
▲10	(12)	TI/994A	£90	(TI)
▼11	(10)	Sharp MZ700	£240	(SH)
▲12	(13)	Atari 800	£300	(AT)
▼13	(11)	Apple IIE	£750	(AP)
▲14	(15)	Sharp MZ80A	£349	(SH)
▲15	(16)	Aquarius	£70	(MA)
▼16	(14)	Colour Genie	£168	(LO)
▲17	(18)	Epson HX20	£472	(EP)
▲18	(—)	Electron	£199	(AC)
▶19	(19)	CGLM5	£150	(SO)
▼20	(17)	Tandy Colour	£180	(TA)

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets in the two weeks up to January 14th.

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

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

## Top Ten over £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
1	(2)	IBM PC	£2,390	(IBM)
2	(1)	ACT Sirius	£2,525	(ACT)
3	(6)	Apricot	£1,719	(ACT)
4	(4)	Commodore 8000 series	£1,200	(CO)
5	(4)	Apple III	£2,780	(AP)
6	(7)	Kaypro	£1,949	(CKC)
7	(10)	Televideo TS-800 series	£1,495	(MD)
8	(5)	HP86A	£1,570	(HP)
9	(9)	DEC Rainbow	£2,714	(DEC)
10	(8)	Epson QX10	£1,995	(EP)

**Distributors:** AC Acorn ACT ACT/Sirius AP Apple AT Atari Brainwave CA Computers CKC CKC Computers CO Commodore DD Dragon Data DEC Digital Equipment EP Epson HP Hewlett-Packard IBM IBM LO Lowe Electronics MA Mattel MD Midtron OR Oric SH Sharp SI Sinclair SO Sord TA Tandy TI Texas Instruments  
**Machines:** SP Sinclair Spectrum AC Acorn BBC 64 Commodore 64 V20 Commodore Vic 20 81 Sinclair ZX81 DR Dragon OR Oric AT Atari

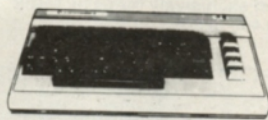
## Games Top Thirty

	GAME TITLE	PUBLISHER	MACHINE COMPATIBLE								PRICE			
			SP	AC	64	V20	81	DR	OR	AT		OTHERS		
▶ 1	(1)	Atic Atac	Ultimate	*										£5.50
▶ 2	(2)	Lunar Jetman	Ultimate	*										£5.50
▲ 3	(5)	Pyramid	Fantasy	*										£5.50
▲ 4	(6)	Ant Attack	Quicksilva	*										£6.95
▲ 5	(17)	Snooker	Visions	*	*	*	*							£8.95
▼ 6	(3)	Valhalla	Legend	*										£14.95
▲ 7	(12)	Kong	Ocean	*										£5.90
▼ 8	(4)	Chequered Flag	Psion	*										£6.95
▼ 9	(7)	Splat!	Incentive	*										£5.50
▶ 10	(10)	The Hobbit	Melbourne	*	*	*				*				£14.95
▲ 11	(21)	Manic Miner	Bugbyte	*										£5.95
▲ 12	(30)	Death Chase	Micromega	*										£6.95
▲ 13	(14)	Mr Wimpy	Ocean	*										£6.90
▲ 14	(—)	The Alchemist	Imagine	*										£5.50
▲ 15	(—)	Hunchback	Ocean	*		*				*				£6.90
▲ 16	(8)	Flight Simulation	Psion	*										£7.95
▲ 17	(—)	Pool	CDS	*										£6.95
▼ 18	(13)	Arcadia	Imagine	*		*	*							£5.50
▲ 19	(24)	Penetrator	Melbourne	*										£6.95
▼ 20	(11)	Hunter Killer	Protek	*										£7.05
▲ 21	(—)	Jet Pak	Ultimate	*			*							£5.50
▼ 22	(15)	Falcon Patrol	Virgin			*								£7.00
▼ 23	(9)	Metagalactic Llamas	Llamasoft				*							£6.00
▲ 24	(—)	3D Time Trek	Anirog			*	*							£7.00
▼ 25	(18)	Moonbuggy	Anirog			*								£7.00
▲ 26	(—)	Crazy Kong	Interceptor			*	*							£7.00
▼ 27	(16)	Horace And The Spiders	Psion/Melbourne	*										£6.95
▲ 28	(—)	International Football	Commodore			*								£9.99
▼ 29	(19)	Hovver Bovver	Llamasoft			*								£7.50
▲ 30	(—)	China Miner	Interceptor			*								£7.00

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## Successful Sinclair draws a blank

I noticed in Monitor, Issue 42, that to celebrate the production of the one millionth ZX Spectrum, a white version was presented to Sir Clive. What a waste of time.

Why didn't they put this albino Spectrum in a box along with a message suggesting the purchaser contact Sinclair Research for a full refund and some publicity, thus going some way towards saying thank-you to all the people who have bought Sinclair's computers and made the man a multi-millionaire.

What I would like to know is whether Sir Clive needs a ZX Spectrum and if he will ever use this gift or if it will be put in a glass case for people to admire.

D W May

Chiswick, London.

*I see your point, but many would say Sir Clive deserves a moment for what he's done for the industry — other than, of course, his bulging bank accounts—Ed.*

## Commodore advert is misleading

Is Commodore practising 1984 'Double-Talk'. Proudly, through every paper and journal, it claims 'Peripherals? Yes Commodore have everything — right now'.

To the best of my knowledge, and phone calls to at least ten suppliers, there hasn't been a 1526 printer in the country for months. I've been waiting since August.

At least other manufacturers have the good grace to apologise for their delays; Commodore plays ostrich and says there aren't delays.

Also, have you tried phoning the number in their ad?

AJ Taylor

Quorn, Leics.

*Well, Commodore, the ball's in your court I think—Ed.*

## How's this for spolling?

With reference your Loony Language article in Quit, PCN Issue 41. I received the following in a three-page list of software for the T199/4A: Under development assortment: This programme is being designed to sort by different parameters a file created by CASSFILE. It is not included in CASSFILE as this

# RANDOM



# ACCESS

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

would reduce to an unacceptable level the amount of memory available for data storage. Price will be £4.95

My wife checked this to ensure I haven't added to the errors. I thought it was improving until I came to 'available'. And to finish it with a price 'drop', now there's marketing for you.

Bryan Cloud

Ipswich, Suffolk.

*Hmm — and who said computers were causing illiteracy? — Ed.*

## IBM puts the record straight

Your article, 'IBM Meets Taiwanese Imitators', (Monitor, Issue 33) incorrectly stated that IBM welcomed moves by Taiwanese manufacturers to make IBM look-alike micros.

On the contrary, we have made our position on this subject very clear to manufacturers, assemblers, distributors and retailers of high-technology products: we intend to vigorously protect our trademark, copyright and patent assets and will take whatever action is necessary to prevent any infringements of these property rights.

J F Wells

Press Relations Manager  
IBM, Portsmouth

## Text adventure's in the best of health

I was somewhat surprised at John Lettice's statements (Issue 44) that 'the Spectrum was in the forefront of the drive towards graphics adventures' and 'The Hobbit was revolu-

tionary... because it combined a text adventure with high-resolution graphics'.

As any Apple owner knows, the revolution started long before the Spectrum appeared on the micro scene.

Also, if he thinks the text adventure is dead he might like to look at the sales figures for the Zork trilogy. The game even has its own user group in America.

Cliff McKnight

Crawley Down, Sussex

*But in the UK, the Spectrum is crucial in the area of graphic adventures. The point John was making was that programmers are now producing work that, although based on earlier concepts, is developing into something radically different. And I'm sure he meant no disrespect to a trusty old stager like the Apple... Ed.*

## A plea for some standardization

This Christmas, many more people have been introduced to the world of computing. By the end of January, hopefully, a good number of them will be thinking about putting their micros to serious uses, even if just writing programs. One thing that should be taught from the start is standards.

The world would be a mess (well, I mean a lot worse) if we didn't have standards. We wouldn't have the simplest of things like rulers, pencils, cupboards, cars, because all the sizes and measurements would be different. The same should apply in the computer industry.

When computers first came

on the scene, there was no need for standards, there were only one or two around, no-one had to bother about connecting their micro up to something else. But now it's different. We would get a lot further if there were proper standard connections between, say, a printer and a computer, instead of about four 'standards' (but all with different pin connections) and over 100 non-standards.

The same applies to software. Look at Basic and Forth. In 1979 a group of people got together to form the Forth 'standard', at the same time another group of people defined FIG Forth. Now there are always arguments going on as to which is best.

However, we must not become too standard, going as far as having a standard computer, as the Americans and Japanese are working on. If we do that, we will not be making use of the

## PCN £10 Star Letter



technology again; the Spectra-video computer, which is one of the first Japanese 'standard' computers, uses a TI graphic chip, General Instruments sound chip and a Z80A CPU.

No-one can persuade me those chips are the best in the world and will remain so for at least 20 years. They've already had their day, they should be gone by now.

Nevertheless it is time micro manufacturers got together and made some plans.

Chris Haine

Rugby, Warks.

*I quite agree — the problem is treading that tricky middle path to promote compatibility and encourage innovation at the same time. — Ed.*

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### Spectrum colour variation

**Q** When colours are used on my Spectrum, why do they not appear as expected, eg red comes out as dark green, and green is dark brown.

**A** I have tried the machine on two separate TVs—one of them brand new—and the same thing happened on both.

Robert Crowe,  
Ashton-on-Ribble, Preston.

**A** The short answer is no, we can't tell you why. That you've checked it on two TVs makes it sound like a hardware problem, but it's highly unlikely that a hardware fault could produce a systemic translation of colours.

The earlier Spectrums liked Sony TVs best, so if you can check it with one of these make sure you are still getting the same effect. If you are, then it depends on the sort of colour variation you're getting.

If you're getting these wrong colours in near perfect definition, contact Sinclair Research—Sir Clive could well give you a job.

If, as is more likely, the colour you're getting is unstable, contact whoever sold you the machine. They'll check it out, and if they get the same effect they should replace it.

We assume you haven't been putting up with this effect for long, so your machine will still be under guarantee. Even if it isn't, what you've got is so bizarre the dealer may stretch a point.

### Taped Spectrum programs disappear

**Q** I own an issue 3 Spectrum. When I try to save programs on cassette I get all the lines and flashing borders, but when I try to verify the programs they are not there. Is it due to the cassette player I use.

Glenn Knights,  
Woodbridge, Suffolk.

**A** The major source of problems with saving Spectrum programs is not disconnecting the EAR cable when

using the MIC cable. If this isn't what you're doing, then your problem is either something to do with your tape machine or with the Spectrum's hardware.

Does your Spectrum load commercial software from tape? If so, save one of your own programs, then listen to the tape. If you get a relatively clear (and fairly unpleasant) morse-code style noise, then the recording is going according to plan. If not, try saving on a different tape recorder. If this works fine it's your tape recorder that's to blame.

If not, take your Spectrum back to the shop for an exchange—it clearly doesn't work.

### Converting US standards to UK

**Q** I'm an American studying in the UK for the next three years. I need a hardware package primarily for word processing, ideally one easily and cheaply convertible to US electrical standards (including TV/monitor and voltage/Hz differences).

**A** Would I be better off buying hardware in the US and having it converted here?

Adam Gilinsky,  
Edinburgh.

**A** It's only really worth worrying about conversion from US to UK standard, or vice versa, if you're set on spending a fair bit of money on your equipment. If you were just buying a cheap micro you might as well sell give/throw it away when you're going back to the States, as the conversion hassles will be too great for it to be worth your while bothering.

Equipment tends to be cheaper in the US, though probably not enough to make personal imports worthwhile. However, assuming you're going back there after your course (the Home Office probably assumes this, so we're in good company) it would make sense for you to buy there and make temporary conversions while you're here.

If you buy a complete system there all you should really have to do is to use a transformer while you're over here. You won't be able to use a British TV, but if you're going for a pro

system you'll be getting a monitor anyway. Otherwise anything with a composite video output should work with a UK monitor.

The transformer will change the voltage, but US current comes through at 60Hz and as it is 50Hz in the UK, you may have difficulty here, as the difference may disrupt the internal clock.

Check this out with the relevant manufacturer before you buy to be absolutely sure. On some micros—the Apple II for example—it's possible to make adjustments to the frequency quite easily.

Your next problem is actually getting the thing into the country. If you buy anything approaching high technology in the US they'll probably want to send its fingerprints to Washington. US customs want to know you're not exporting it to the Russians before they'll let it out of the country, so check up on export licences with US customs before you buy anything.

Finally, you've got the problem of not paying duty and VAT when you bring the thing in. If you were a UK resident you'd have considerable problems here, but as you're not you'll just have problems.

Your goal will be to bring the hardware in as personal effects—logical enough, as you'll be taking it out with you when you go back home. However, customs is unlikely to see it like that, and if you've just whipped over to the States for two weeks and come back with a shiny new PC plus receipt, they are liable to take a dim view.

### Vic-20 strategies and simulations

**Q** I'm hunting a flight simulator for my 16K Vic 20. I would like to know if you could recommend a good one or similar simulations and/or strategy games.

David Williams,  
Rhewl, Clwyd.

**A** We only know of one flight simulator for the Vic. This is Flight Zero-One-Five, from AVS, price £6.95. If you have a look around the shops you should be able to nail down a copy. It's for the unexpected

Vic 20, so probably isn't as complex as you'd like, but it does do quite a lot considering the memory it uses.

As regards other simulations the same memory considerations apply. One way around this is to look for cartridge games and one of the best simulators is Thorn-EMI's Submarine Commander.

You are better placed for strategy games. Commodore's own Sargon Chess cartridge plays a good game and is a bargain at around £10. Audiogenic produces an excellent version of Othello on cartridge called Renaissance.

If you're prepared to buy mail order from America, get a copy of Compute! magazine and lust after the enormous range of US software.

### Oric-1 listing lock-up

**Q** I have just started programming my new Oric 48K and have run into a few problems saving my programs. My programs seem to be saved alright but when I come to load them I run into difficulties about 75 per cent of the time.

I either get 'FILE ERROR — LOAD ABORTED' or I only get part of the program, the last line number being followed by lots of 'U's'.

**A** If I try to edit out this last line number, the computer crashes completely.

R Benbow,  
Walsall, W. Midlands.

**A** Your problem is corrupted data. Your Oric is reading most of the program fine, but some of it is read in from tape incorrectly.

It may be that the record/playback head is out of alignment.

Another possibility is the Oric is picking up some mains hum if you're running the recorder of the mains—try batteries if possible.

You could also try inserting a dummy line as the first line of a program after loading a program (eg 1 PRINT), then immediately deleting it by typing 1 and pressing RETURN. This will force the Oric to sort out its program line pointers and sometimes cures the 'U' problem.

# Disc drive



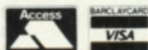
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## Controlling the Oric's graphics

In response to Mr. Stiles comments on *LORES1* for the Oric-1 (issue 40), I have a simple solution to preserve the screen mode despite the screen scrolling. Simply type:

```
LORES 1:POKE#26B,9: INK7
The explanation of what this does is simple. Locations £26B and #26C contain two logical control codes which are displayed in the left two columns of the screen. Location #26B should contain the control code to set the background colour (16-23) and #26C the foreground colour (0-7). When the user selects LORES 1 the computer places control code 9 (Prestel graphics mode) into column 0 on the screen, but subsequent scrolls lose these codes and they are replaced with the defined background colour (location #26B). By replacing the control code in this location with another we can achieve alternative control codes permanently, but with the loss of background colour (the background remains black). It is still possible to change the background colour globally by printing the esc character followed by the appropriate code.
```

Alternatively, you may try control code 10 (double height lettering), such as:

```
POKE#26B,10:INK7:POKE#26A,PEEK(#26A) OR 64:CLS
or possibly control code 11 (double height Prestel graphics):
```

```
POKE#26B,11:INK7:POKE#26A,PEEK(#26A) OR 64
As can be seen, all combinations of double height, flashing and Prestel type graphics can be generated. The appropriate codes can be found in appendix C (p 147) of the Oric's programming manual. However,
```

remember to print only even number lines when using the double height features.

And finally, to restore the Oric back to normal text mode:

```
PAPERO:POKE#26A,PEEK(#26A)
AND-65
N Jones,
Middlesbrough, Cleveland
```

## Screen dump links Beeb to Epson FX80

The following screen dump is designed for use with the BBC model B computer and an Epson FX80 printer.

It is designed to dump a four colour graphic screen in MODE 1, but should work in any graphic mode.

```
3000DEFPROC DUMP
3010VDU 29,0;
3020LOCAL X,Y
3030VDU 2
3040VDU 1,27,1,65,1,1,1,1
3050VDU 1,27,1,15,1,1
3060FOR Y=896 TO 1 STEP-2,361
3070FOR X=0 TO 1279 STEP 9,7
3080IF POINT(X,Y)=0 NUM=32
ELSE IF
POINT(X,Y)=3 NUM=46
ELSE IF
POINT(X,Y)=2 NUM=45
ELSE IF
POINT(X,Y)=1 NUM=42
3090VDU 1,27,1,NUM,1,
3100NEXT X
3120NEXT Y
3130VDU 1,64
3140VDU 3
3150ENDPROC
Vana G Rearburg,
Bishopston,
Bristol
```

## Take the hassle out of switching ROMs

Here is a simple idea for those who have three or more software-based ROMs for the BBC and do not, as yet, have a ROM extension board. What you probably have to do now is to keep opening the Beeb to change your ROMs. Instead, why not take one of your sockets outside?

Here's how. What you need is a 28 pin ZIF (zero insertion force) socket, about 1.5 metres of 28 way ribbon and a 28 pin DIL (dual in-line) plug.

You solder each pin on the ZIF socket to the corresponding pin on the 28 pin plug, or use insulation displacement connections. The DIL plug will go into one of the empty sockets and you stick (with double-sided sticky tape) the ZIF

socket on the corner of your computer.

The items mentioned above are available from most electronics suppliers for under £10 (except for the soldering iron).  
SS Alg,  
Fulham, London

## RENUMBERING your Lynx programs

The LYNX's RENUM command can be useful but its use is sometimes restrictive if only certain parts of the program need renumbering.

By altering the contents of &61FA, which points to the start of the Basic program (usually &694D), it is possible to use RENUM on only part of the program.

To renumber from any line in the program to the end simply:  
DPOKE &61FA,LCN(X)-7  
where 'X' is the line number you wish to begin from. Now simply RENUMBER as required and then return the pointer to its original position using:

DPOKE &61FA,&694D  
If only a section of the program needs renumbering, ie lines A to B inclusive, change the starting pointer as before:

```
DPOKE &61FA,LCN(A)-7
Make note of the original value of your 'B' end value:
PEEK(LCN(B)-7)+PEEK(LCN(B)-2)
Poke into this position &80 (standard end delimiter) as follows:
```

```
POKE LCN(B)-7+PEEK(LCN(B)-2),&80
RENUMBER the program as appropriate.
```

Before listing the whole program you must return original pointers. The starting pointer is:

```
DPOKE &61FA,&694D
The end pointer must be reset to the new line number of 'B':
POKE LCN(B)-7+PEEK(LCN(B)-2),X
where 'X' is the value originally at 'B'.
M S Fowkes,
Bearpark, Durham
```

## Invisible lines on the Spectrum

Many Spectrum owners trying to conceal the listings of their programs need look no further. Simply type in your line and ENTER it. Then EDIT it and press the two shift keys and 7. Having

done this press down both shift keys and hold down the caps shift and 7 again.

T Dalziel,  
Bridge of Don,  
Aberdeen, Scotland

## BBC 'star' FXs are revealed

I have discovered that it is possible to find the value of certain \*FXs by PEEKING into the operating system work-space on my BBC. As it is not possible to enter PRINT \*FX 144 etc I have compiled a list of the \*FXs, and their effect.

Dec	*FX	addr	Effect
	4	637	Disable cursor keys
	5	645	Select printer type
	6	646	Set printer ignore character
	9	595	Set flash period of first colour
	10	594	Set flash period of second colour
	11	596	Set auto repeat delay
	12	597	Set auto repeat period
	16	589	Select number of ADC channels
	144	656	Same as *TV
	210	610	Turn off all sound
	230	630	Enable/disable escape key
	231	631	Enable/disable 6522 IRQ
	232	632	Enable/disable 6850 ACIA IRQ

As well as being PEEKED at, these addresses can also be POKED. The addresses above apply to OS>1.0, and OS 0.1 may well be different.

David Clifton,  
Doncaster, S. Yorks

## Tidying up the bumbling bees

Readers may be interested in a slight modification to the Bees Away program (issues 32-33). Just change the following

```
800VDU23,228,0,112,136,100,22,45,175,46
810VDU23,229,0,14,17,38,104,180,245,116
840BE$=CHR$228
```

Delete lines 820-830 and add to line 690:

```
:BE$=CHR$228
and to line 700:
BE$=CHR$229
```

This changes the bee to a tidier, smaller insect and stops it from flying backwards.

Timothy Smith,  
Halifax, W. Yorks

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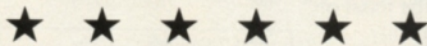
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Which book would your micro want you to buy? PCN's review page helps you choose.



'CP/M Bible' by Mitchell Waite and John Angermeyer, published by Howard Sams, distributed by Prentice/Hall International at £16.95 (paperback, 429 pages).

Mitchell Waite and John Angermeyer have written in the CP/M Bible the best CP/M documentation I've seen.

In fact, I hope it'll be a horrible shock to a lot of people, because it proves that even as idiosyncratic and complicated a subject as CP/M, can be documented clearly and comprehensively.

All versions of CP/M are covered in detail, as are MP/M

and Concurrent CP/M, not to mention each built-in command and the common transient commands, the majority of commonly-used development tools such as languages, assemblers, linkers, translators and so on, to the extent that I found myself digging around in the standard documentation after finding certain details which I'd previously overlooked. Such details are covered by the standard docs, but they're far easier to find in the CP/M Bible.

The sheer volume of information could render the whole mass inaccessible, but the authors have provided multiple methods of finding a particular subject.

The handling of screen-output is equally well done.

This book is how CP/M should have been documented, and it's to the eternal shame of the industry that we have to rely on third parties to do the work, rather than doing it properly the first time. I cannot recommend this book highly enough to anyone who uses CP/M regularly, at whatever level. **RK**



'Fancy Programming in Applesoft' by Gabriel Cuellar, published by Reston, distributed by Prentice/Hall International, at £12.70 (paperback 245 pages).

An interesting book, which makes a moderately successful attempt to teach advanced level Basic. Unfortunately it doesn't go far enough, and as a result, some of Mr Cuellar's programs are less than satisfactory.

I think a diligent reader who typed in all the listings would have more questions than

answers at the end.

In the introduction the author claims it is possible to program almost any task in Basic, provided you don't mind how slowly it runs.

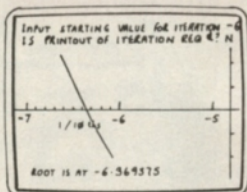
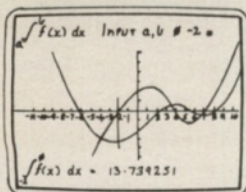
For example, he demonstrates a technique for making the filenames found in the disk catalog available to a program. Oddly, this is quite hard to do in Applesoft, so this technique could be very handy. However, when examining the code, I found that he is calling DOS to do a normal CATALOG, then PEEKING into the screen-memory and reading each character from the screen itself.

Perfectly valid, but with the disadvantage that it uses up the whole screen, and may well destroy carefully designed layouts.

It's not all bad, and at times very good . . . I particularly liked his handling of how to implement a recursive subroutine in Basic, and the section on sorting and sort routines was better than most that I've seen.

Overall, worth a good look, but not a final definition of what is practical in Applesoft. **RK**

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No, we have not stooped to reviewing raincoats, we just let Ian Scales loose on Apple's latest progeny.

# Meet the Macintosh

Some new micros offer little more than a drop in price, or a slightly novel facility; not many make you think you're witnessing the cutting edge of computer technology.

But then, very rarely, you know you're seeing something which represents a big step forward.

Such was the first impression of Apple's Macintosh (nothing to do with winter apparel, a Macintosh is a strain of Apple). Apple is hoping to see the Mac repeat the success of the Apple II, but the new machine is no 6502-based upgrade along the lines of the Super IIe. Instead it's a downgrade of the much-acclaimed Lisa (PCN, issue 1), complete with a full 16-bit 68000 processor, 128K of RAM and 64K of ROM.

Like the II it will make extensive use of third party software and peripherals, but it slots into what Apple terms its Lisa family of products.

In many ways the Mac is the antithesis of the Apple II which was very much a 'configure it yourself' system (see PCN Issue 41 for an overview of the II) requiring its users to get inside the case and add cards to incorporate such features as 80 columns of text, printer and disk drive interfaces, and so on.

The Mac has been designed as an unpack-and-use-it system. It's an integrated unit with a single micro floppy drive, monochrome screen, detachable keyboard and mouse and it packs into a



reasonably portable bag.

But the real feature of the Mac is not what it is, although its hardware specifications are impressive, but the way the software presents itself.

Early in 1983 Apple released the Lisa. The Lisa is an expensive machine with a megabyte of RAM, a hard disk, 68000 processor and two subsidiary processors. Apple's idea was to use the power available through a 16-bit processor to substantially enhance, not so much the sort of processing

which could be carried out, but the power of the user interface.

The Apple approach takes the reasonable view that users want to take a computer home or into the office, plug it in and start working. With the present crop of (non-Apple) operating systems and application programs this is not easily

achieved. Although the average application program is becoming 'friendlier' to use by incorporating more menus, better documentation, and more consistent procedures, there is still a long way to go. The basic problem is that computer A is designed to use operating system B or C which in turn run application programs from various companies.

Because of this diversity among software suppliers there are always distinct differences in the way each application program

interacts with the user.

Every time you use a package you have to sit down and spend several hours learning a new set of procedures, control codes and function codes. They're not called codes for nothing.

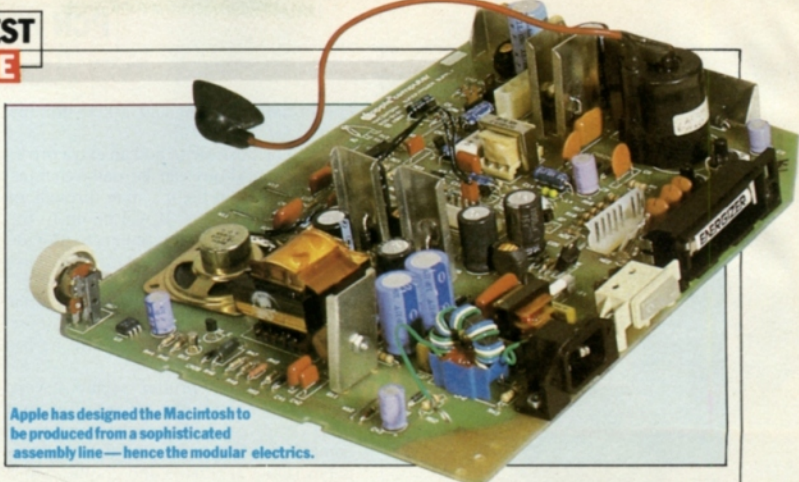
How much easier it would be if the programs run on a computer used a consistent method of presenting themselves. When I use a package (it's usually a word processing program), I construct an imaginary model of what's happening to the information as I manipulate it around the system.

For instance I subconsciously understand the scrolling function as just that — as the text is scrolled down the screen I have the image of it rolling up at the bottom and unfurling again when I need it.

I find it's crucial to have a mental model of what's happening with the files — a system which mysteriously starts mucking about with intermediate swap files without telling you what it's doing is most unsettling. It takes a lot of time to understand a process like this and have a model mapped out in your mind.

The problem would be part-solved if applications programs used a common set of procedures — dedicated function keys with overlays for each separate application is one popular method as an alternative to a fairly meaningless clutch of control codes which must be learnt by rote.

Apple has taken the 'friendly' approach a step further. What most new computer users are used to is paper technology. They understand information and its storage and organisation in terms of pieces of paper, folders, rubbers, and pencils. The setting for these storage media and tools is usually a desk.



Apple has designed the Macintosh to be produced from a sophisticated assembly line — hence the modular electrics.

Like Lisa, the Macintosh presents material on the screen just as if it were on the top of a desk. The Mac makes full use of a mouse. The mouse is a hand-held device used to position the cursor on the screen by means of a ball arrangement. As it is drawn across a flat surface, the ball rotates and the cursor is sent in the appropriate direction.

The Mac mouse also has a single button — so you move the cursor to an appropriate icon, then press the button to cause whatever function you're after at the time. The icons are small representations of such things as waste-paper baskets, pencils, and so on. In some cases words are used instead of images.

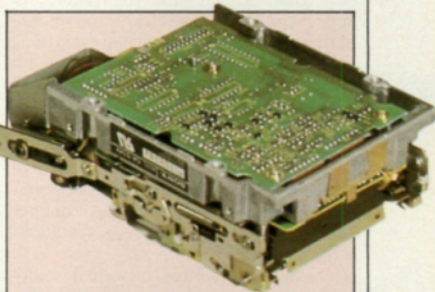
### Getting started

At the pre-testing of the Mac, I was able to use the standard Mac word processor, Mac-Write. A session at the computer goes something like this.

The first thing is to load up the application program — nothing unusual

here: you simply slide the microfloppy into the single disk drive and the appropriate code is automatically booted into the system. An interesting feature of the disk drive is its ability to spit the disk at you at the appropriate moment — at the end of the session or when a new data disk is required, for instance.

Once the whirring and clicking is over, the Mac's representation of a desk-top with various options in the form of icons and sheets of paper are displayed.



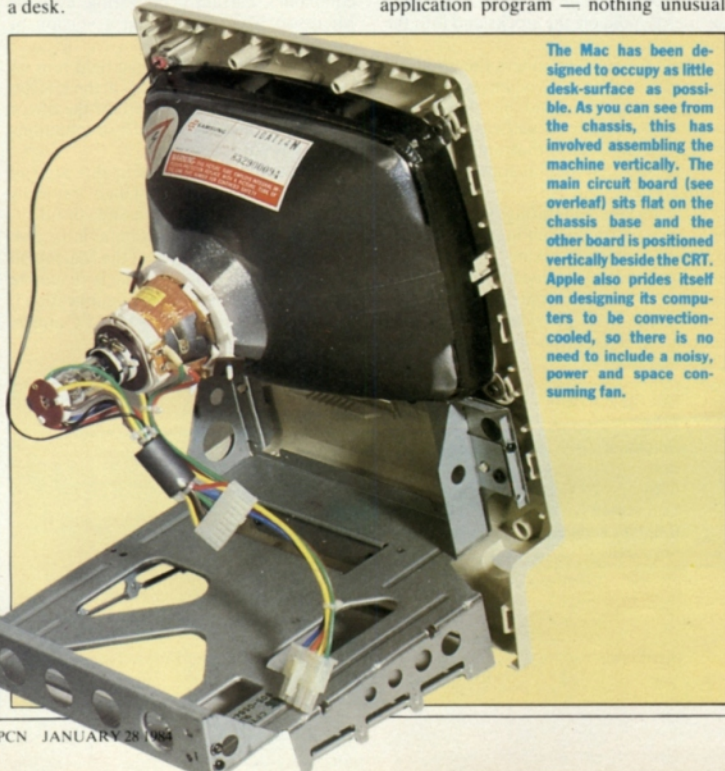
The single disk-drive handles hard-shelled micro-floppies. As well as being extremely quiet it automatically ejects the cartridge.

At this stage it's all mousework — you simply use the mouse to position the cursor over the appropriate icon and press the button. The whole process is fairly self-explanatory and easy to learn. But this initial process is even more fascinating if you watch a practised user.

The prime bugbear with the conventional type of 'friendly' user interface is that the 'hand-holding' way the program goes about coaching the user can become decidedly tedious once the procedures have been learnt.

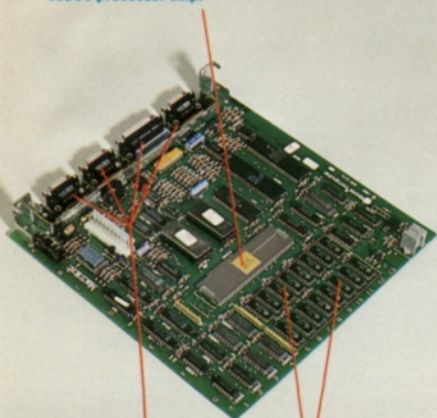
Using a mouse you can become ultra-speedy within a relatively short space of time — zapping the cursor back and forth, pushing buttons and causing magical things to happen, and far quicker and easier than with a conventional arrangement.

The features of the word processing system are quite staggering. For instance, there is a line of words above the document — 'font' and 'style' for instance. By putting the cursor over the word *font* and pressing the button you get a small document rolled down over your existing document, and it stays there as long as you keep the mouse



The Mac has been designed to occupy as little desk-surface as possible. As you can see from the chassis, this has involved assembling the machine vertically. The main circuit board (see overleaf) sits flat on the chassis base and the other board is positioned vertically beside the CRT. Apple also prides itself on designing its computers to be convection-cooled, so there is no need to include a noisy, power and space consuming fan.

The main circuit board is dominated by the impressive-looking Motorola 68000 processor chip.



The interface circuitry and sockets are located at the rear.

Two banks of 64K RAM chips provide the necessary memory.

appropriate moment and asking for the next.

It will be possible to add an extra drive, and other add-ons can be daisy-chained from the back of the machine through an Apple standard bus. It will be up to the third party peripheral suppliers to provide many of the extra goodies like a Centronics interface.

The Mac comes with two RS432 serial interfaces: one has been designated for use by the printer and the other will be for communications.

The dedicated printer seems a very impressive beast and is priced at around £350. It obviously has to be capable of committing what appears on the screen to paper (fancy typefaces and graphics) and this it does at a good speed considering Apple's competitive pricing. The printer will be called the Imagewriter and is manufactured under licence in Taiwan to Apple's own design.

The Mac also has impressive on-screen graphics. By snatching the relevant icon with the mouse you can easily draw lines, do shading, lasso areas of graphics and integrate the results into the word processing package.

Apple has gone firmly for monochrome display so far in the 'Lisa range' — it keeps the price down, the resolution up and, as Apple rightly points out, the hard-copy output is usually photocopied in any case. Around the office, for instance, the drawing facilities of the Mac will make it ideal for composing forms.

The Mac is only one in a planned range of Lisa products and as such has been priced to occupy a certain slot. It would never do to have a cheaper product almost competing with the Lisa or whatever else Apple decides to take off the stocks and into the shops.

Apple fondly remembers the good old days of the Apple II when every West Coast programmer and his dangle was working on Apple II software. The big hope with the Mac is that the strategy to provide an open system together with a sophisticated and presumably slightly straight-jacketed operating system will not only prove attractive enough to convince software writers to create a diverse and inventive array of products to run under it, as they did with the Apple II, but that the end results will provide a reasonable amount of integration and a consistent



The rear of the machine provides all the I/O connections. From the left is the Mouse socket, an external disk drive interface, the RS 432 dedicated to communications, the second RS 432 dedicated to the printer. The vertical slot on the left side is for the bus connector.

419 button depressed.

You then move the cursor down the little document until you reach the specified font (the kind of type-face you require to appear on screen), release the mouse button and the existing text and everything you type on your document from this point on appears in that font and style.

### The hardware

The Mac is designed as a take it home and turn it on, complete with a core of firmware, which controls the disk operating system and a lot of the routines necessary for the graphics representations *ie* the icons.

The object is to force software developers to provide a common user-interface. According to Apple the firmware is well tested and (as far as is known) bug-free. It would seem sensible, therefore, for anyone writing software to avoid re-inventing the wheel and include the tailor-made routines.

Apple plans to sell a lot of Macs: companies always say this, but this one is talking about an automated assembly line process capable of churning out a machine every 27 seconds. Apple has cause to be this optimistic. The Mac features stunning performance for its price.

It would be a mistake to view the Mac as a cheap Lisa — the problem with integrating software is that you have to provide a lot of power and memory for the system to do it (and do it quickly enough for it to be of any use). The Mac doesn't allow the user the luxury of concurrently available applications programs.

Apple makes no bones about the fact that the system still involves a fair amount of disk-swapping.

The machine has been designed so that it is only necessary to use one disk drive — a 3.5 in Sony with 400K. This makes back-up problematical as it requires multiple swapping, but the machine eases the burden as far as possible by ejecting the disk at the

user-interface. In effect, Apple hopes for the sophistication of Lisa coupled with the third party activity which produced Visi-Cal.

### Verdict

On first appraisal it appears that Apple has come up with a winner. According to the company there are more than 100 software developers currently working on products. Apple hopes that it can control the end-user prices for applications programs at around the £75 mark. One of the companies currently beavering away is Microsoft which is redoing a version of Multiplan.

Apple also vows to keep a tight rein on the price of the Macintosh — in the UK the only price changes expected for the life of the computer will be caused by fluctuations in US/UK currency rates.

However, expectations in this area of microcomputing may change radically following the launch of the Sinclair QL.

Obviously, we hope to be able to give you a more detailed look at the Macintosh in action once the machine is available (which it will be by the time of publication). If anything can take on the IBM PC and its compatibles this machine can.

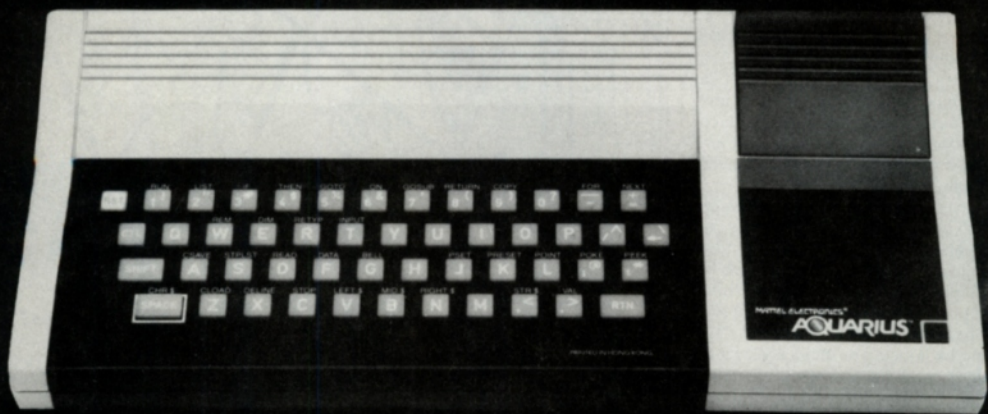
#### SPECIFICATION

Price	around £1,800
Processor	Motorola 68000
RAM	128K
ROM	64K
Text screen	dependent on fonts and type sizes
Graphics screen	512 × 342
Keyboard	58 keys plus mouse
Storage	1 3.5 inch drive
Interfaces	RS432 dedicated printer interface, RS432 communications, mouse connector, disk drive and bus connectors
Distributor	Apple Computer (0442) 60244 Eastman Way, Hemel Hempstead, Herts HT2 7HQ

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John King considers the disadvantages of buying through mail order.

# Deadlier than the mail?

**W**hat do you do when the gas bill arrives? Do you forget about it until the red one follows on, and do you do this in order to improve your own finances or just to be inconvenient to yet another monopoly?

But what do you think about companies who do similar things to you? As a hypothetical suggestion — consider a company which has produced a new and improved design of nutcracker. Research and development costs, as you can imagine, are high — and the sales volume is unpredictable.

In many such situations it is common practice to use a test-market to identify the probable sales and to find some of the more obvious design flaws. In markets such as our example there is more competitive pressure than usual so corners must be cut, quicker results are wanted and, above all, cash must be injected to finance yet more research.

An easy method of improving the cash flow position of a company is to either delay payments to suppliers or to get sales revenue in before delivery of the goods. From the proper accounting viewpoint this makes no difference to the real financial position — but this concerns the company less than their cash-flow. So you could find yourself drumming your fingers for some time while the company solves its cash-flow problems and makes your nutcracker.

## Problems

So what can you do after you have sent in your order for a new nutcracker to the mail-order department of such a company? It largely depends on the exact wording both of the advertised offer, and rather more to the wording of the company's letter acknowledging your order. This particularly applies to any suggestion by them of unforeseen delays. The standard excuses include:

'Demand has exceeded our wildest expectations . . .'

'We have been having problems with an outside supplier's quality control . . .'

'There have been some significant design modifications . . .'

'Too much vinegar on the chips' etc etc

Another reason that is usually a little better concealed is the existence of preferential customers *eg* chain stores and other major outlets. This becomes particularly clear if ever the product hits the streets before all the mail-order customers have been cleared.

What can you do about it? Where it appears that the company has not been as straightforward as it might have been you can write and request them to pay you the interest on the money they are holding. This may seem a small sum at first, but



don't forget how many others are in the same plight.

If a company were to sell a gadget for £200 and had a waiting list of 50,000 the cash involved is £10,000,000, the interest on this per day is £2,739.73 at ten per cent pa. So the manufacturer is not only improving its cash-flow but saving on paying overdraft interest of over £1,000,000 per year.

Moral pressure is much easier to exploit publicly via the media or an organised letter campaign. No company wants the sort of bad publicity such an attack would generate.

Some might try to float with the tide until the fuss died down (and the cash flow improved) but this is no good for the future image of a company, or for its future product launches.

There are various side-issues to this argument:

Is there a discount to the mail-order purchasers?

Is there any discount for long delays?

Does the company otherwise give good service *eg* on faulty machines?

If you get fed-up, is the company quick and helpful about repaying?

Does the company allow partial deposits to

secure a place in the queue once a long delay is obvious?

Is the deposit money held in a special account? Should the company go bust, this helps you get your money back.

Does the company give adequate reasons for any new delay?

## Failing

On a more legal plane of discussion, the law of contract states that the contract between the buyer and the seller is made not, as you might think, by the purchaser agreeing to the price and conditions of the seller, but rather by the purchaser making an 'offer to buy' and this then being accepted.

The situation in this nutcracker case may be that the company is later failing to abide by the terms of the contract.

The exact details of the law on mail-order requires very specialised knowledge, the exact analysis of any situation being subject to a variety of interpretations. But in any such case the bigger party must always be careful to avoid any impression of bullying. It is therefore an ideal target for various forms of moral pressure — in any case, this is preferable to any legal attack as the latter always works out much more expensive.

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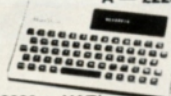
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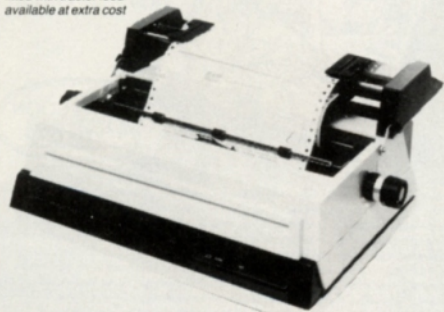
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### SPECIFICATIONS

Print Speed: 120 WPM  
Character Set: 128 ASCII, 88 printable  
Character Spacing (pitch): 10 CPI or 12  
CPI

Printing: Undirectional  
Paper Width: 13" (33cm) max.  
Writing Line: 10.5" (26.7 cm)  
— 128 character line in 10 pitch  
— 126 character line in 12 pitch

Line Spacing: 6 lines per inch  
Paper Feed: Friction: single sheet or  
terfido  
Paper Thickness: 002" paper thickness  
Impression Control: Operator Selectable 5  
level

Interface:  
Parallel: 7 bit ASCII data, 3 control lines  
(Data Strobe, Busy Acknowledge)  
TTL compatible

Serial: EIA RS232C, 110 to 19,200 baud,  
strap selectable; character length and  
parity are strap selectable.

Power Requirements:  
240 V ± 10%  
50HZ, 120W

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Types & Life:

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Still getting to grips with your brand new Memotech? Keith Hook follows up on the manual.



# Take a memo

The Memotech is an attractive micro, but as happens so often with new machines, the manual doesn't cover everything. The MTX offers the programmer an excellent variety of display modes for use with text or graphics:

**Text mode** User definable graphic characters; 40 × 24 character screen.

**Text with graphics** User definable graphics, sprites; 32 × 24 character screen.

**Text with 256 × 192 pixel graphics** User definable graphics, sprites, 16 colours for characters.

Using these different modes via Basic creates no problems, as the instruction

manual is very thorough in this respect — although it does omit instructions on how the novice can easily detect sprite collisions. Implementing the assortment of screens using Assembly language is a more daunting task. It is not made any easier by the omission of ROM entry points from the manual, which seems a lack of concern for the more advanced programmer, by a company that took the trouble to incorporate an editor/assembler in the front end of the machine. On the other hand there are numerous pages in the manual devoted to the graphic facilities, though in some places it is so thorough, it is a headache to sort the wood from the trees.

The following explanations and sub-routines, using the in-built assembler, should allow the end-user to easily set up different display modes.

Graphic Mode 2 gives the programmer a great deal of scope when designing games programs, and it is this mode that's been chosen for the illustrations. It should, however, be a simple matter to convert the information given, to set up other display modes.

Using this mode, 768 different characters can be designed and displayed at one time. It also provides a choice of defining 2 colours for each byte of the 8 byte character, with the effect that each of the 768 (32×24) screen locations can display an exclusive character.

The following descriptions, use the conventions used by Memotech in their manual *ie*: the bits of a byte are numbered MSB bit = 0 and LSB bit = 7.

The MTX decides which mode it should operate in by looking at VDP Registers 0 and 1. Mode 2 is entered by setting bit 6 in Register 0 to 1 and resetting bits 3 and 4 in Register 1.

When setting up a screen the MTX uses the following tables which are located in Video RAM: pattern generator table; pattern name table; colour table; sprite attribute table; sprite generator table.

**Pattern generator table** This is really a sophisticated form of character generator which is normally installed in a ROM chip in other computers, characters so generated are numbered chr\$(0) to chr\$(255). With the MTX you can design all 256 and more.

**Pattern name table** This table is a copy of the screen in VRAM. If the value of 128 is placed in location 32, it is like saying: PRINT@32, CHR\$(128). This is a simple translation but it illustrates the function of the pattern name table.

**Colour table** Each byte of this table holds the colour information for the corresponding

## DATA TRANSFER FORMAT

*Write to registers of VDP*

Out (02), data

Out (02), register number (bit 7 must be set to 1)

*Write to video RAM*

Out (02), LSB address

Out (02), MSB address (bit 7 must be 0; bit 6 must be set to 1)

Out (01), data

*Read from VRAM*

Out (02), LSB address

Out (02), MSB address (bits 7 & 6 must be 0)

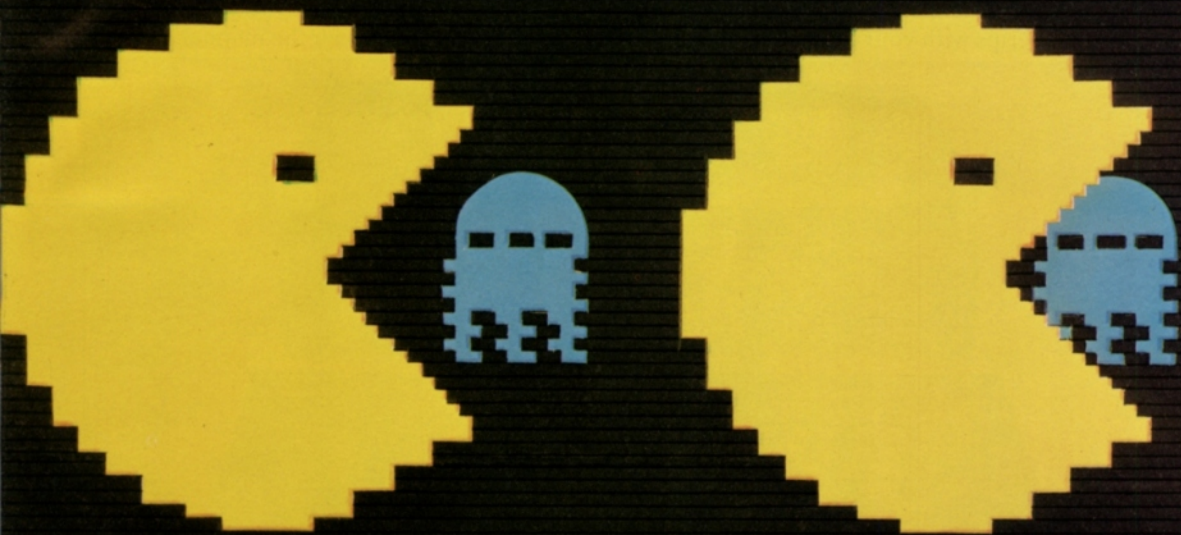
In (02), data

*Read from DP registers (status register 'read only')*

In (02), data

## VIDEO RAM LOCATIONS FOR GRAPHIC MODE 2

Pattern generator table	Start Location 0000H	END 17FF H
Pattern name table	Start location 1800H	END 1AFF H
Colour table	Start location 2000H	END 37FF H
Sprite attribute table	Start location 1C00 H	(32 × 4 byte entries)
Sprite generator table	Start location 3800 H	(2048 byte table)



"Gobble"

"Gobble"

# Now that Atari your computer, ou Forget ghostly imitations. They need not darken your screens a moment longer.

## a ghost of

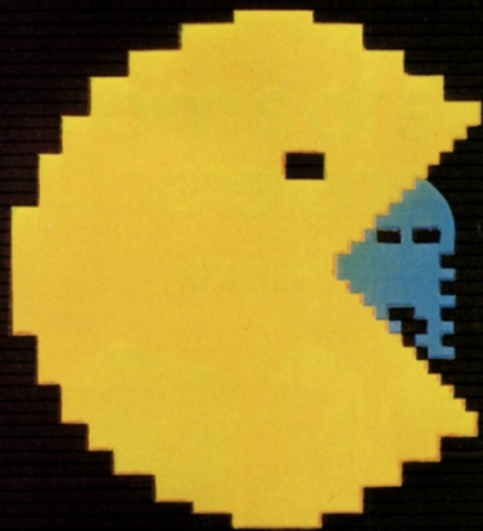
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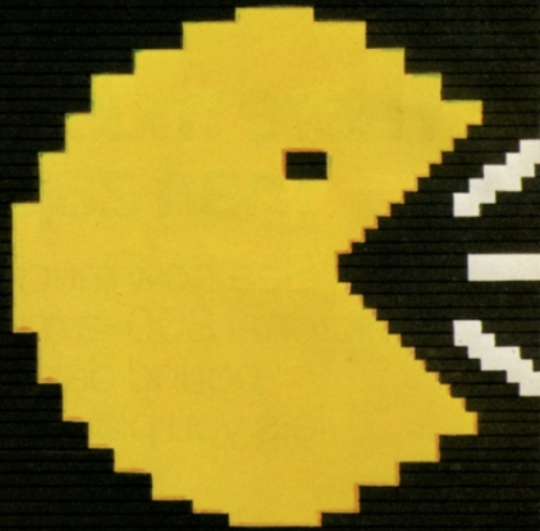
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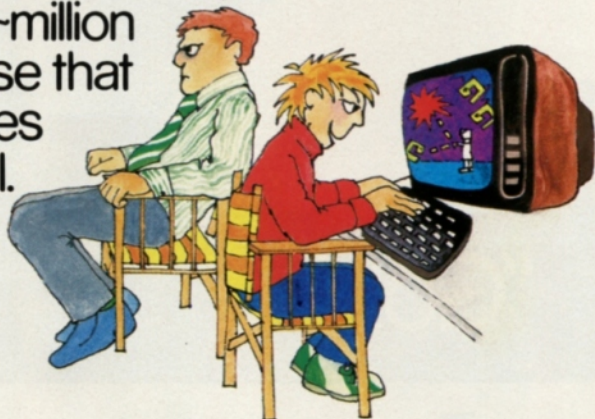
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byte of the character in the pattern generator table.

The colour and pattern Generator tables are 6144 bytes long. Each character is  $8 \times 8$  pixels and 8 pixels are held in each byte. Since there are 768 locations on the screen  $8 \times 768 = 6144$  bytes. The pattern name table is 768 bytes long.

As there are only 256 character codes available at any one time, the MTX overcomes this problem by splitting the pattern generator table into 3 sections of 2048 bytes (8 bytes  $\times$  256 chars). Therefore, the 256 character names (0 - 255) are used 3 times, once in each section of the table.

The pattern name table is similarly divided into 3 sections to match the pattern generator table. The top section of the table corresponds to the top 3rd of the screen. The colour table follows the same format. It is plain that if character code 128 describes a space invader in the top section of the screen, and the invader is moved around the screen, the code 128 must also describe the invader in the screen section it moves into. This is not strictly true, but for the sake of simplicity let's stick to this explanation. See diagram 1.

Once the tables have been set up in VRAM, animation is easily achieved by changing the values in any of the 3 tables. And, as the VDP automatically increments the address register, once the start address has been loaded into the VDP sequential writes to VRAM only need the 1 byte data transfer by Out (01), data.

**Setting up VRAM tables** The location of each table in VRAM is set by transferring the relevant information to the VDP via the VDP Registers. (see tables 1 and 3). The values chosen set each table to addresses which allow for easy translation between the different tables.

**VDP registers** The correct procedure for writing information to the VDP Registers is:

Data first byte

Register number 2nd byte

The VDP then calculates the correct location in VRAM according to the value of the Data byte. eg For Register 2 (name table), the value transferred is multiplied by 1024, and the resulting value is the start address of that table. In our examples Register 2 is located at 6144 (1800h) in VRAM.

For all writes to the VDP Registers, bit 0 must be set to 1 in the Register number byte. This is accomplished by adding 128 (80h) to the value. The sub-routine in listing 1 takes care of VDP writes. First define your values with Data first, register number second. eg

VALUES:db data, Reg no, data,Reg no.....etc

Then set up a loop as in listing 1 until all 8 Registers have been fed information.

**Write to VRAM** Data is written to VRAM by feeding the DESTINATION address to the VDP LSB first MSB second followed by the data byte. Note that the bit 7 must be 0 and bit 6 set to 1 in the MSB of the address byte. This is done by adding 64 (40h) to this byte. The sub-routine for writing to

## MAIN LISTING

```

4000 NOP:~~~~ THIS PROGRAM WILL DISPLAY CHARACTERS ON YELLOW BACKGROUND
400E NOP: TOP 3RD OF SCREEN
400F NOP:BLACK CHARACTERS LIGHT RED BACKGROUND MIDDLE 3RD
4010 NOP:REST OF SCREEN AND BORDER MAGENTA
4011 NOP
4012 NOP
4013 LD SP, (#FA96); LOAD STACK POINTER FROM SYSTEM STACK
4017 LD DE, #0000; ZERO ALL REGISTERS
401A CALL REG
401D LD B, #08; NUMBER OF REGISTERS
401F LD HL, #RESSET; MAKE HL POINT TO DATA BUFFER
4022 LF1: LD E, (HL); PUT DATA IN DE
4023 INC HL; NEXT DATA SET
4024 LD D, (HL)
4025 INC HL
4026 CALL REG; SEND TO REGISTER
4029 DJNZ LF1; DO 8 TIMES
402B LD HL, #3FFF; TOTAL LENGTH OF VRAM
402E LD DE, #0000; ZERO ALL VRAM
4031 CALL VRAM
4034 LD C, #00
4036 CALL LOOP
4039 LD DE, #2000; START OF COLOUR TABLE TOP 3RD OF SCREEN
403C CALL VRAM; SEND ADDRESS
403F LD C, #1A; 1=COLOUR OF CHARACTER 1'S A= COLOUR OF 0'S
4041 LD HL, #0200; HOW MANY BYTES TO FILL
4044 CALL LOOP; DO IT
4047 LD C, #18; AS ABOVE
4049 LD HL, #0200
404C CALL LOOP
404F LD C, #18
4051 LD HL, #0800
4054 CALL LOOP
4057 LD DE, #0808; ADDRESS OF CHARACTER NO 2 TOP 3RD SCREEN
405A CALL VRAM; LOAD ADDRESS
405D LD HL, #INU; MAKE HL POINT TO CHARACTER BYTES
4060 LD B, #08; 8 BYTES EACH CHARACTER
4062 AGN: LD C, (HL); PUT DATA INTO C
4063 CALL DATA; SEND TO UDP
4066 INC HL; ALIGN TO NEXT BYTE
4067 DJNZ AGN; DO UNTIL FINISHED
4069 LD DE, #0608; CHARACTER NO 2 MIDDLE 3RD SCREEN
406C CALL VRAM; SEND TO REGISTER
406F LD HL, #INU; AS FOR TOP 3RD
4072 LD B, 08
4074 AGN1: LD C, (HL)
4075 CALL DATA
4078 INC HL
4079 DJNZ AGN1
407E LD DE, #1800; START OF TOP 3RD OF SCREEN
407E CALL VRAM; SEND ADDRESS
4081 LD C, #01; CHARACTER NUMBER
4083 CALL DATA; SEND TO UDP
4086 LD C, 01; SEND SAME CHARACTER TO BE DISPLAYED AT SCREEN POS 2
4088 CALL DATA; DO IT
408B LD B, #08; SAME AS ABOVE BUT SEND 8 ONE AFTER THE OTHER
408D FL: LD C, 01
408F CALL DATA
4092 DJNZ FL
4094 LD DE, #1944; THIS IS IN THE MIDDLE 3RD OF SCREEN
4097 CALL VRAM; SEND ADDRESS
409A LD C, 01; 2ND CHARACTER FROM MIDDLE 3RD OF CHARACTER GEN TABLE
409C CALL DATA; DISPLAY
409F LD C, 01; DISPLAY
40A1 CALL DATA; SAME CHARACTER NEXT SCREEN POS
40A4 STOP: NOP; LOOP AT END OF RUN
40A5 JR STOP
40A7 REG: PUSH AF; ***** SEE NOTES FOR THESE SUB ROUTINES
40A8 PUSH BC
40A9 LD A, E
40AA OUT (02), A
40AC LD A, D
40AD ADD A, #08
40AF OUT (02), A
40B1 POP BC
40B2 POP AF
40B3 RET
40B4 VRAM: PUSH AF
40B5 PUSH BC
40B6 LD A, E
40B7 OUT (02), A
40B9 LD A, D
40BA ADD A, #40
40BC OUT (02), A
40BE POP BC
40BF POP AF
40C0 RET
40C1 DATA: PUSH AF
40C2 LD A, C
40C3 OUT (01), A
40C5 POP AF
40C6 RET
40C7 LOOP: CALL DATA
40CA DEC HL
40CB LD A, H
40CC OR L
40CD JR NZ, LOOP
40CF RET
40D0 REGSET: DB #02, #00, #C2, #01, #06, #02, #FF, #03, #03, #04, #38, #05, #07, #06, #0D, #07
40E0 INU: DB 66, 165, 189, 219, 60, 36, 66, 129
40E8 RET
40E9 RET
40EA RET
40EB RET
40EC RET

Symbols:
REG40A7REGSET40D0
LP14022VRAM40B4
LOOP40C7INU40E0
AGN4062DATA40C1
AGN14074FL408D
STOP40A4

```

# MEMOTECHNIQUES

◀ 29 VRAM is shown in Listing 2.

**Reading from VRAM** This is accomplished by writing the address from which you want the information, followed by a 'READ'. See table 1.

**Reading from the VDP status register IN (02)** data. Bit 2 is the sprite collision flag set whenever pixels from two active sprites overlap. The state of this bit can easily be achieved:

```
IN A,(02)
BIT 6,A (Normal Z80 bit convention)
JR NZ,COLLIDE
JP Move
```

The function of the other bits is described in the manual.

After filling the pattern generator, the colour table requires setting to the correct values for each of the characters. The first 4 bits (LSB), describe the colour of the O's in your design, and the MSBits describe the colour of the 1's; in fact, background and text, in the other modes. See Diagram 2.

Completion of these steps allows you to direct the desired format to the screen by loading the pattern name table with the correct value for the character you wish to

display. Don't forget that sequential writes to the pattern name table can be accomplished with only one address transfer *ie* OUT (02), LSB ADDRESS  
OUT (02), MSB ADDRESS  
OUT (01),DATA  
OUT (01),DATA... etc  
This format holds true for all tables.

**Sprites** Sprites are introduced to the display by using the sprite generator and sprite attribute tables.

The attribute table requires a 4 byte entry for each sprite. Using all of the 32 sprites available will cause the table to be 128 Bytes long. The format for this table is:  
byte 1 Vertical distance from top of screen  
byte 2 Horizontal distance from LHS of screen  
byte 3 Pointer to sprite pattern  
byte 4 Colour of sprite

The sprite generator functions in the same way as the pattern generator table. The maximum length is 2048 bytes, which allows you to define 256 different patterns for the normal size 0 sprite. Using size one (16x16 pixels) reduces the number to 64 (32 bytes each sprite pattern).

Sprites are displayed on the screen by setting the X,Y values in the sprite attribute table. Movement is accomplished by updating the values. Diagram 1 shows the relationship between X,Y and pattern name table addresses. 1 should be deducted from the Y positions shown in actual practice, as X=0, y=-1 is the top most lefthand corner of the screen. Positioning of the sprite is from the top lefthand bit of the sprite pattern.

So, changing the pattern or the colour of a sprite is easily accomplished by altering the relevant byte in the attribute table. This leads to very impressive moving displays. If you restrict the majority of movement to 8 pixels each move, calculating the corresponding screen position for checking collisions with other graphics is easily accomplished. Listing 4 takes care of these calculations. Listing 3 calculates the reverse positions.

We have included a fully documented listing that illustrates the practical use of some of these points within a program. The possibilities available to you are only limited by your own imagination. **PCN**

## LISTING 1

```
11 REM
20 REM ON ENTRY HL POINTS TO DATA
30 REM D = REGISTER NUMBER
40 REM E = DATA
50 REM
60 CODE

4096 BUFFER: DB #0C1 DATA
409C DB 041 REGISTER
409D DB 1271 AND SO ON FOR ALL REGISTERS
409E LD HL,BUFFER: BUFFER HOLDS DATA
40A1 LD B,#001 NUMBER OF REGISTERS
40A3 LOOP: LD E,(HL): GET DATA
40A4 INC HL
40A5 LD D,(HL): GET REGISTER NUMBER
40A6 INC HL: ALIGN FOR LOOP
40A7 CALL SETUP: GO AND TRANSFER IT
40A8 DJNZ LOOP: DO IT 8 TIMES
40AC SETUP: LD #A1 DATA FIRST
40AD OUT (02),A1 SEND IT
40AF LD A,D1 GET REGISTER NUMBER
40B0 ADD A,#001 MAKE SURE BIT 7 SET
40B2 OUT (02),A1 SEND IT
40B4 RET: ALL DONE RETURN
40B5 RET
40B6 RET

Symbols:
BUFFER4096SETUP40AC
LOOP40A3
```

## LISTING 3

```
10 REM Convert screen to X,Y CO-ORDINATES
20 REM
30 REM
40 REM
50 REM ON ENTRY HL POINTS TO SCREEN POSITION
60 REM
70 REM
80 CODE

40A4 LD DE,#1800: START OF SCREEN
40B1 OR A: CLEAR CARRY FLAG
40B2 SBC HL,DE: SUB FROM SCREEN LOCATION
40B4 LD DE,#32: NUMBER OF COLUMNS
40B7 LD B,#00: CLEAR ANSWER REG (QUOTIENT)
40B9 LOOP: OR A: MAKE SURE CARRY FLAG CLEAR
40BA SBC HL,DE
40BC JP M,EXIT: EXIT IF MINUS
40BF INC B: INC ANSWER
40C0 JR LOOP: GO DO IT UNTIL MINUS
40C2 EXIT: ADD HL,DE: GET TRUE REMAINDER
40C3 RET: ON RETURN HL=X POSIT & B=Y POSIT
40C4 RET

Symbols:
LOOP40B9EXIT40C2
```

## LISTING 4

```
20 REM Convert X,Y to SCREEN POSITION
30 REM
40 REM
50 REM
60 REM ON ENTRY BC = X POSITION
70 REM " " HL = Y POSITION
80 REM
90 REM
100 CODE

40B7 PUSH BC: SAVE X POSITION
40B8 LD B,#001 CLEAR QUOTIENT
40BA LOOP: OR A: CLEAR CARRY FLAG
40BB SBC HL,DE: DIVIDE BY SUBTRACTION
40BD JP M,EXIT: EXIT IF MINUS
40C0 INC B: INC QUOTIENT
40C1 JR LOOP: DO IT UNTIL MINUS
40C3 EXIT: ADD HL,HL: MULTIPLY BY 32
40C4 ADD HL,HL: BY SUCCESSIVE ADDS
40C5 ADD HL,HL
40C6 ADD HL,HL
40C7 ADD HL,HL
40C8 POP BC: GET X POSITION
40C9 ADD HL,BC: ADD IT TO ANSWER
40CA LD DE,#1800: START OF SCREEN LOCATION
40CD ADD HL,DE: GET SCREEN POSITION
40CE RET: HL = SCREEN LOCATION
40CF RET
40D0 RET

Symbols:
LOOP40BAEXIT40C3
```

## Register set up for above values

**Register 0 : Value 02 H** *'set to mode 2*  
**Register 1 : Value C2 H** *'8x8 sprite Mag 1*  
**Register 2 : Value 06 H**  
**Register 3 : Value FF H** *'MSB set to 1*  
**Register 4 : Value 03 H** *'MSB set to 0*  
**Register 5 : Value 38 H**  
**Register 6 : Value 07 H**  
**Register 7 : Value A1 H** *[sets Text/Background colours]*  
**NB Setting bit 7 to 1 in REGISTER 3, puts the colour table in the top 8K of VRAM. Set to 0 would put it at the location of the pattern generator in this example — as would setting bit 7 to 1 in the pattern generator register, put it in the location of the colour table in this example. eg Value FF H = location 2000**

## LISTING 2

```
20 REM
30 REM ON ENTRY DE HOLDS ADDRESS
40 REM ON ENTRY C HOLDS DATA
50 REM
60 REM
70 CODE

409C LD A,E: GET LSB OF ADDRESS
409D OUT (02),A1 SEND IT
409F LD A,D: GET MSB OF ADDRESS
40A0 ADD A,#40: RESET BIT 7 SET BIT 6
40A2 OUT (02),A1 SEND IT
40A4 LD A,C: GET DATA INTO A
40A5 OUT (01),A1 SEND IT
40A7 RET: RETURN TO CALL OUT
40A8 RET
```

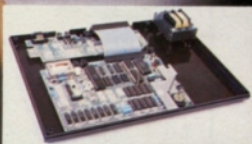
Next week's issue of PCN will include a handy diagram which will help you understand the Memotech's screen modes better, and will further clarify the points touched on in this article.

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Avoid dashing away with a soldering iron — David Janda tests a BBC sideways ROM board.

# All boarded up

**R**omex 13 is a BBC sideways ROM board which allows use of a maximum 16 ROMs/EPROMs, keeping instant access to software.

The board can be (mostly) plugged into the BBC, (avoiding the need for a soldering iron). It also sticks to the underside of the micro's lid, leaving room for more boards.

## Features

This flow-soldered board is buffered and has 13 28-pin sockets. It is compact, measuring 19 by 9.5cm, and unlike other boards it can be stuck to the roof of the micro by four sticky printed circuit board spacers. The Romex board can be removed by pressing in tiny latches on the spacers, allowing easy access to the fitted board.

Three leads connect the board to the BBC, there's a 28-pin and a 16-pin plug cable, and a two-way ribbon cable which slips on the lower of the two links of S21 on the BBC.

ROM-based software, such as the word-processing chip, View, can be plugged into any of the spare sockets on the Romex board, or the main BBC board.

Four different types of EPROM software can be used. The most popular, 27128 (16K) and the 2764 (8K), plug into any socket on the Romex board. The 4K and

2K EPROMs, (2732 and 2716) can also be used on making changes to links on the board. There is, however, only one socket on the Romex board which can be used for the 2K EPROM; apparently the issue two version to be available late in January incorporates the facility to use more than one 2K EPROM.

## Installation

Installing the board was made easier by the excellent documentation as both text and diagrams are clear and easy to follow.

Remove the micro's lid and turn the keyboard on its front. Remove IC76 from its socket and insert one end of the 16 pin dual-in-line plug.

If your BBC doesn't have IC76 in a holder, GCC send you a four-way cable and instructions free. The four-way cable replaces the 16-pin Dill plug, and must be soldered to pins 11 to 14 of IC76. To do this, remove the IC next to IC76 from its holder, as this will give you more room; also use a fine tipped soldering iron. Although the task of soldering the cable to IC76 was fiddly, the cable was helpfully colour coded with the individual wires a decent distance apart.

Next, plug the 28 way Dill plug into one of the BBC's spare sideways ROM sockets. Remove the tape from the spacers on the Romex board and stick the board to the

inside of the micro's lid. Release the latches to remove the board and stick on a fifth spacer to support the middle of the board.

If IC76 is in a socket, it can be plugged into a reserved socket on the Romex board, and the 16 and 28 way cables plugged into their own sockets.

However, this proves easier said than done, because you need to get someone to hold the lid while you fiddle with all the cables.

## In use

Now you can install your ROMs/EPROMs. IC14 on the Romex board takes priority so it's best to install a frequently used ROM here. The socket with the lowest priority on the board is IC3 and after that it's IC's 101, 100, 88 and 52 on the BBC. The 28-way Dill plug uses up one of the BBC sockets and there's a socket on the Romex board which will incorporate the ROM that would have been in its place.

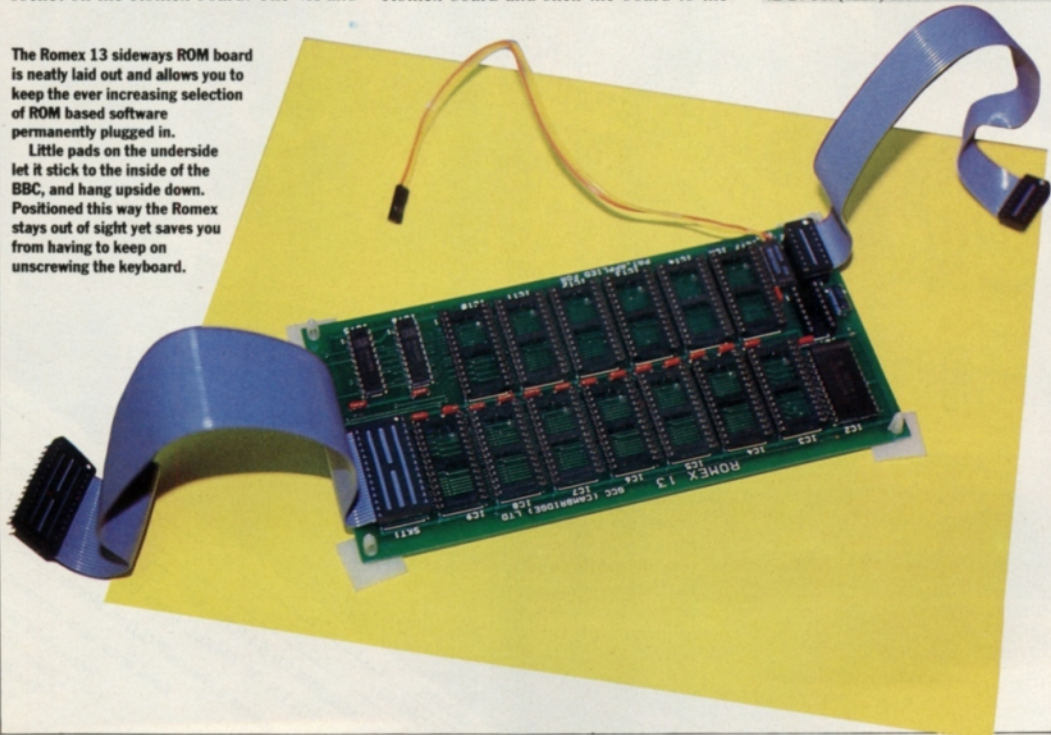
## Verdict

The Romex 13 is good value for money, and well designed. Sticking the board to the lid of the Beeb allows greater air circulation and doesn't clutter up the main Printed Circuit Board. The board doesn't allow the use of CMOS RAM chips, but for those who use prepared software, the Romex 13 is the best I have seen.

**Name** ROMEX 13 Item Sideways ROM board  
**Machine** BBC Manufacturer GCC, Cambs. CB2 4BG. Tel (0223) 835330 **Price** £39.95 + VAT.

The Romex 13 sideways ROM board is neatly laid out and allows you to keep the ever increasing selection of ROM based software permanently plugged in.

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Give your Commodore true IEEE compatibility. Barry Miles on two new adaptors.

**O**wners of the Commodore 64 who wish to use the earlier model disk drives need an adaptor, since the 64 is designed to be used with the very slow Serial 1541 Disk Unit. Two new IEEE adaptors, the Buscard and JCL, are now available.

Usually devices like these, with the exception of the Interpod from Oxford Computer Systems, insert code somewhere into the memory of the 64. If you plan to use commercial software, always obtain firm assurances from the manufacturer that the device is compatible with those programs.

### In use

The Buscard adaptor is a sophisticated device. Set-up is different from usual: you must open up the Commodore 64, and hook two sprung hooks over the end of a couple of transistors. This is easier than it sounds, but the cautious may want to ask the assistance of their dealer. The design approach is interesting, because dip-switches are available on the top of the box, which permit the IEEE device number of the disk drive or printer to be changed from hardware. Printers are also controlled through the Buscard: either use any interface which you already have, to connect your parallel printer to the IEEE port, or use the special cable available from the importers of the Buscard, Kobra. If you are using the 1541 Disk Drive and an earlier drive eg 4040 or 8050, you have two choices. Either leave them both as device 8, and reset the computer while switching the disk drives on and off. Alternatively, the manual outlines the well-known bit of Basic code needed to change the disk device number of the earlier Commodore drives, from software, which is more satisfactory.

The Buscard offers major enhancements to the 64. Firstly, it puts a machine language monitor into RAM, which is an advantage. Secondly, it also puts disk handling commands into RAM. The latest version of Buscard puts a complete version of Basic 4 into the RAM of the 64, with all the convenient disk commands in that version of Basic. An earlier Buscard, which was arguably more attractive was tested. It puts a cut-down version of the well-known Dos Support program into RAM. This gives the ability to view a disk directory without disturbing the program in memory, including the use of pattern matching to obtain a selective directory. In addition, all the usual COPY, NEW, and RENAME commands can be used. Disk error messages can be retrieved without the tedious programming which is otherwise necessary. Disk directories can be paused by hitting the space bar, which is particularly pleasant. Unfortunately, loading, and loading and running of programs are not available.

The monitor is not the latest Micromon, but has most of the more useful commands needed by the machine language programmer. The manual is quite adequate, and

# 64 plug-in power



The J6L IEEE-488 and Buscard are both compact packages which slot into the 64. The unusual visible dip-switches on the Buscard can be seen above.

gives details of the memory locations used by the Buscard, and useful information on programming considerations.

The manual for the newer version was examined, and it offers additional features in the monitor: a printing disassembly, and a transfer of memory too.

The JCL IEEE-488 Bus Adaptor Cartridge is also highly innovative. It is neat and offers one IEEE connection only, an edge connector, rather than the 'D' type favoured by the Buscard. The features



provided are extensive and imaginative. A 'Mini Dos Support' is provided. The adaptor offers simultaneous use of the Serial and IEEE-488 buses, and multiuser access to floppy disk for SAVE, LOAD and VERIFY.

The left arrow key, conveniently sited on the top left corner of the keyboard, becomes a useful Soft key. It is easily programmed with even a lengthy routine in Basic which can be invoked simply. Its advantages are further extended by the fact that you can save the command to disk, and reload it merely by pressing CTRL and the space bar together.

There is also a cunning Batch File system. For this you save the eight programs of your choice, and these are

then loaded from disk and run when you press one of the function keys. The Batch System can be turned on and off by means of a simple POKE.

It is possible to boot any program of your choice on power up automatically. Merely give that program a special name. If you do not want the computer to look for this program, you hold down the stop key during power up.

A screen dump to a Commodore printer is provided. Because of possible memory conflict problems, arrangements have been made to enable you to switch off nearly all of the facilities, although the interface itself naturally must use some memory. A peculiarity of the device is a delay on power up of several seconds, while the cartridge does its thing, and there is no screen warning about why the computer seems to be hanging. However, often you will hold down the shift key during power up, which results in greater speed. You will have the basic IEEE-488 facilities, but no batch-file, DOS support, soft key, or screen dump.

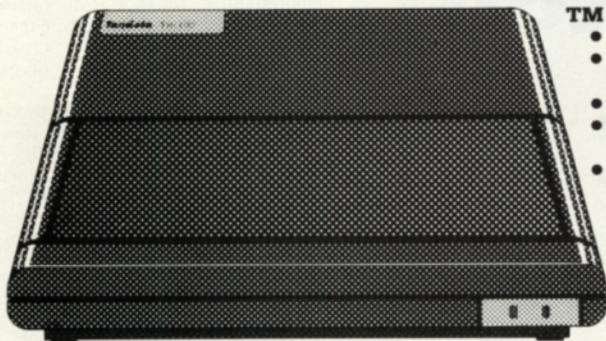
### Verdict

All in all these are sophisticated devices, and the product of considerable thought. Both deserve to succeed.

**Product** Buscard **Manufacturer** Batteries Included **Supplier** Kobra Micro Marketing, West Ealing. 01-977 6666 **Price** £148.35 inc VAT **System** Commodore 64

**Product** JCL Software IEEE-488 Bus Adaptor Cartridge **Manufacturer & Supplier** JCL Software, 47 London Road, Southborough, Tunbridge Wells, Kent. 089227454 **Price** £68 inc VAT **System** Commodore 64

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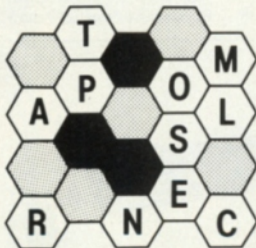
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## ADS

This daisywheel typewriter was successfully hooked up to a couple of David Williams' micros.

# Typewritten print-out

**T**he Silver Reed EX44 is a typewriter with a difference. It can be interfaced with a computer.

I tested it with a Dragon 32 and a BBC model B and it worked with no real problems on either.

## First impressions

The machine comes in two separate boxes, a large box containing the typewriter and the smaller containing the interface. Packing was good and the contents were adequately protected.

The documentation has all the basic details, with good diagrams.

The EX44 is an electronic, daisywheel typewriter. Silver Reed makes a number of daisywheels for the machine giving a very comprehensive choice of type pitches and faces. The ribbons came on easy-to-fit cartridges, and there's a choice of one-time carbon ribbons in a variety of colours or reusable nylon ribbon — similar to a standard typewriter ribbon.

As standard the machine is fitted with a 10-pitch, Prestige Pica wheel, a black carbon ribbon and a correcting tape. The correcting tape is on a reel to reel and fits under the main ribbon cartridge. The instructions for its installation are not perfectly clear, and the person who had last used the machine had failed to fit it correctly — back to front in fact, which resulted in the ribbon apparently running out, but after some trial and error I was able to re-fit and start using the machine again.

I make this point only because the nature of the carbon and nylon ribbons results in having to use a different type of correcting ribbon for the different cartridges.

Silver Reed makes two models, the EX42 and the EX44 which are very similar. There appears to be some confusion at present about the EX42's capabilities of being connected to a computer. The interface connection is there, and it is possible to hook them up, certainly on some models which have been around in the stores lately. However, for computer users there is a snag. The EX44 has extra keys on it and by use of a switch marked KB1 gives you extra characters which include the ( ) ] / etc. For those wishing to use the printer for serious computer work these are essential.

## Setting up

The interface is contained in a small

black box which has a cable to connect to the printer and a 36-way Centronics socket for connection to the computer. A switch on the top of the interface box enables you to switch between typewriter and computer mode.

Inside the interface box are blocks of dip switches so that the machine can recognise different character sets — US, English, Japanese, European etc. The options appear to be very comprehensive.

The instruction book with the interface box is again adequate, and gives most of the relevant information, including pin connections.

## In use

As a typewriter the machine provides no problems. It is well supported with the usual functions, tab stops, margins etc. The correcting facility is simplicity itself. The machine memorises the last 16 characters and pressing the 'X out' control will automatically backspace and erase the letters. If you wish to erase any characters beyond 16, you position the carriage over the letters to be erased and retype to erase. A relocation key will get you straight back to where you left off.

Connecting it to the computer is simple. The printer has a line buffer, but anyone expecting any speedy work is in for a disappointment. The nominal speed is

12cps, which is slower than the the average daisywheel, but on the other hand it means that you can use a word processor with the computer and — for shorter documents anyway — leave the printer to type them out. The quality of the print is impressive enough to excuse the slowness of the operation.

Since the EX44 is designed primarily as a typewriter it will only take single sheet paper, so it is necessary to keep feeding it with paper on longer documents. There is no paper feed advertised as an optional extra, but I suspect it may be possible to fit one if the necessary hardware can be found.

A feature lacking on the machine is the ability to underline in the computer mode. I spent some time trying to figure out how to get it to do it; the manual says nothing, but I am sure that since the interface and the printer are logical it should be possible to achieve.

## Verdict

The price at around the £300 mark for the typewriter with another £100 for the interface does make the EX44 an attractive proposition for the small business user who doesn't have the services of a typist, but needs to produce smart looking letters etc. The printing speed will probably rule it out for anyone who is just looking for a printer for use with a computer, since dot matrix printers generally have a speed up to ten times faster.

Compared with some of the dedicated daisywheel printers on the market the EX44 stands very fair comparison. I used it with a Dragon and a BBC, but it is capable of connection with most computers, even the Commodore with a special interface plug and circuit board.

**Product** Silver Reed EX44 printer/typewriter  
**Manufacturer** Silver Reed (UK) Ltd, 19-23 Exchange Road, Watford  
**Distributors** C/WP 01-828 9000 **Price** £399 inc VAT **Outlets** Retail.



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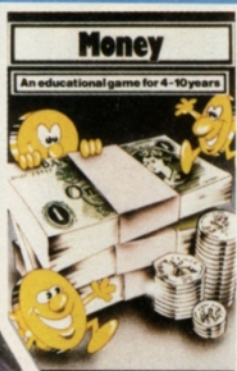


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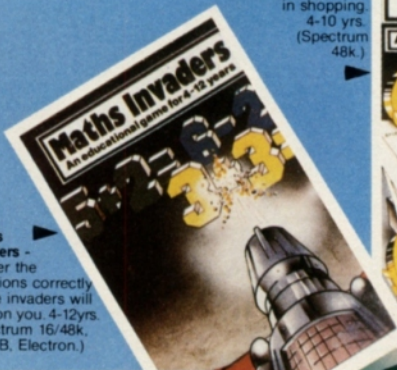
**Money** - an introduction to coins and notes and their use in shopping. 4-10 yrs. (Spectrum 48k.)



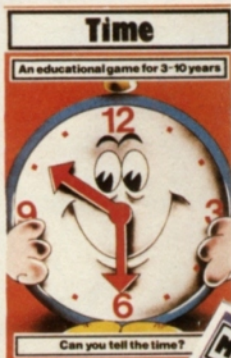
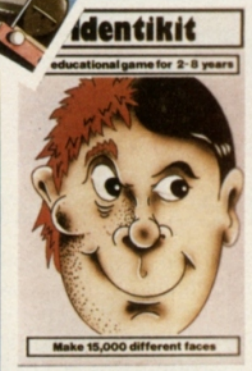
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# MODEMS

## AND COMMUNICATIONS





There are two basic types of modem: the acoustic modem and the "hardwire" modem that connects direct to a computer.

The acoustic modem takes the sound emitted from one computer and passes to another computer in much the same way an ordinary telephone handset passes information through ear and mouthpieces. You can see the "cups" on the acoustic modem where the ear and mouthpieces for an ordinary telephone plug into the modem.

The hardwire modem takes signals directly through the telephone line without the risk of noise or interference that can sometimes result from the background noise picked up by the "microphone" in an acoustic modem.

## COMMUNING COMPUTERS

A spaghetti network of special data-lines enables mainframe computers to communicate with each other nationwide. For the home micro user this facility is a relatively new addition.

It's not a question of just tying a piece of wire between the micro and a telephone — you must use a modem.

**Principles of modems** 'Modem' is an abbreviation for 'modulator/demodulator'. It is an electronic device which interprets the signal that comes in and out of the computer, and translates it into a form which can be transmitted down a wire to another modem. This modem in turn is connected to a computer which understands it. A message can go from one room to another, or around the world.

Modems connects two micros, or with the correct software, turns a micro into a remote terminal for use on a large mainframe at a central location. Computers whose languages and programs are normally incompatible communicate through modems. They also allow remote access to data bases or information services, such as Prestel.

Electronic shopping, banking, mailboxes and a host of other services are literally at your fingertips with a modem connected to your micro. Small businesses can get, for example, up-to-the-minute financial reports or stock-exchange information. Freelance journalists can now have access to a news service provided by the Press Association, through their micro.

Any micro with a serial interface port (RS232 or equivalent) can usually be hooked up. Even if your micro doesn't sport an interface as standard many manufacturers are providing them, such as for the Dragon or Spectrum.

Some modems are more 'intelligent' than others. Some automatically dial your computer for you, and will also transmit your personal password. Some even answer your phone. But it's all easier described than done, and needless to say not every modem is exactly the same.

Modems can be divided into two broad categories according to how they connect to the telephone and how fast they communicate.

There are two main coupling methods — acoustic and direct connection. Until recently acoustic couplers were usually cheaper and

therefore most common, but some manufacturers have now developed relatively low-cost direct-connection modems.

An acoustic coupler not only costs less, but it doesn't require any special connection (saving the British Telecom charges) and works with most standard BT telephones. If you want to carry your micro around you can use the telephone system with the minimum trouble.

Battery-powered couplers with the latest portable computers mean that you can send data down a call-box line to a remote source.

A problem with acoustic couplers is that you must use the regular telephone handset. Although improved, the microphones in them are prone to noise and if you are trying to operate somewhere noisy, extraneous noises can be sent down the line and the data becomes corrupted.

Direct connection modems generally get around this problem, but do require connection to the BT network, usually using a jack socket. BT don't take kindly to amateurs 'hard wiring' across the incoming telephone lines.

**Baud rates** Unfortunately your next step is not a simple question of plugging in and going, you have to agree a common transmission frequency, or baud rate.

There are, for example, different transmit rates — ie baud rates. A baud rate is the frequency at which the information is transmitted. This is like a radio frequency — the higher the frequency, the faster the transmission.

Prestel normally operates on a split baud rate. The receiver works on 1200 baud and the transmission on 75. It is possible to use 300 baud in both directions, but the most common split rate is 1200/75 baud. However many of the bulletin boards and commercial databases work with a 300 baud rate.

Some micros have the ability to alter the baud

rate at which they operate, but most don't so it's up to the modem to do the work.

The table below indicates the different baud rates of some modems and their respective frequency widths.

**Duplexing** Communications can be either half-duplex or full-duplex, used in communications, these terms refer to whether or not two-way communication is available simultaneously. Half-duplex can be likened to walkie talkie radio use; you can talk to each other, but only in one direction at a time. Full-duplex is like a telephone conversation.

Although modems use telephone lines some are not capable of receiving while they transmit. Some computers, when receiving information from a remote terminal via modems, confirm the reception by echoing the characters back to the sending terminal which obviously requires full duplexing. Some modems are switchable between full and half-duplex for greater compatibility.

Although the basic price is falling with the increasing market, you will still have to pay well in excess of £200 for some of the more sophisticated modems on the market. Even at the lower end of the price bracket you can get modems which will work through your telephone without having to disconnect it each time you use it, and there are modems around which will automatically differentiate between data and voice.

Auto-answer is another feature available on more expensive models whereby the micro answers the phone automatically when called by another. An unattended computer can answer calls, upload (receive) programs from the sender, or download (send) programs, if requested.

A host of other facilities are available, such as self test and carrier detection — usually an LED that lets you know when you are connected.

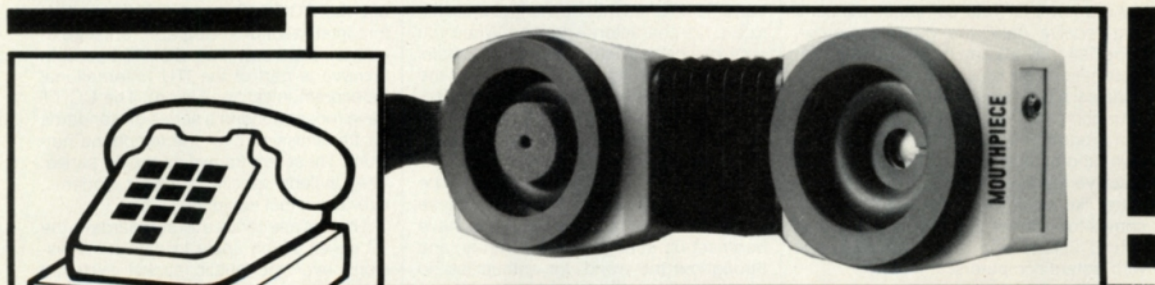
Whether you're running a portable acoustic modem (see picture below — right-hand side) or a hardwire mains modem (see picture on left-hand side) with a telephone, your communications are only going to be as good as the phone lines you're making them over.

If you get a crossed line, not only will the data coming over the phone be corrupted and probably unreadable, but you may experience the odd sensation of hearing a real human voice coming through your computer's loudspeaker!

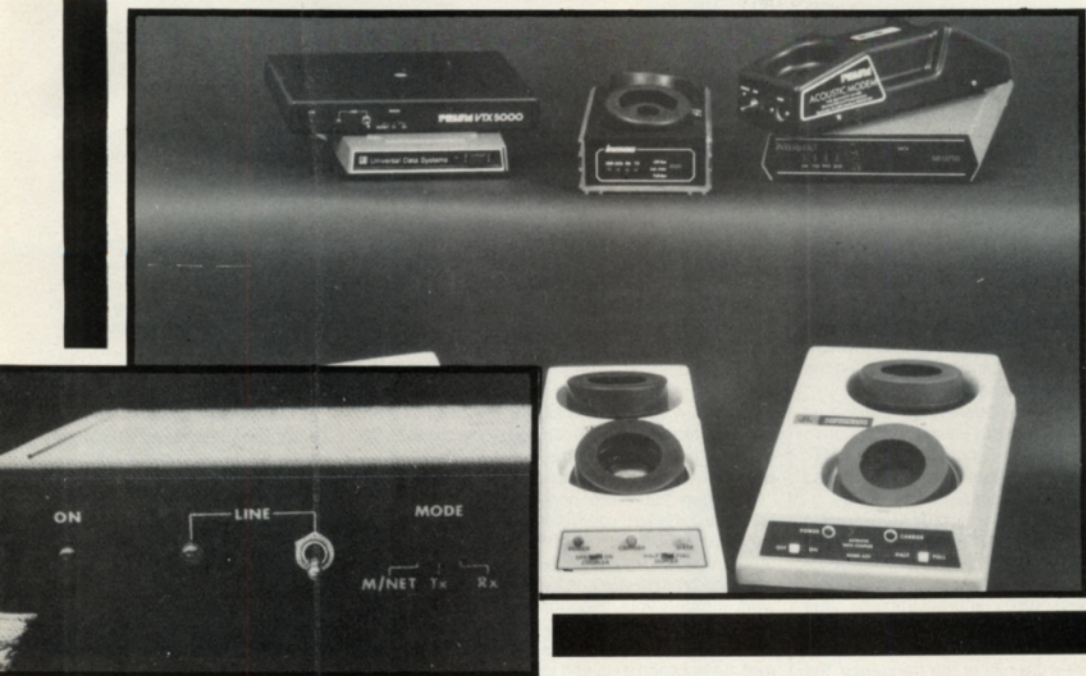
Even more important, however, are the send and receive baud rates of the modem. Some of the less expensive modems will only work at fixed send and receive rates — and you'll be unable to pick up some telephone-based databases and bulletin boards with them.

Prism's BBC Micro acoustic modem for the BBC, for example, will only send information at 75 baud and receive it at 1200 baud. So if you were to try and use this modem to access many of the 300 baud bulletin boards dotted about the country, you would get nothing but garbled text.

The computer also has to be able to 'recognise' the computer on the other end if you're using a telephone service — like Prestel — that offers on-screen graphics facilities. This recognition becomes less important when you use services that send standard ASCII code — such as Telecom Gold.



MODEM	BAUD RATE (BPS)	DUPLEX	Transmit Frequency		Receive Frequency		Answer TONE FREQ Hz
			SPACE Hz	MARK Hz	SPACE Hz	MARK Hz	
Bell 103 Orig	300	Full	1070	1270	2025	2225	—
Bell 103 Answ	300	Full	2025	2225	1070	1270	2225
CCITT V21 Orig	300	Full	1180	980	1850	1650	—
CCITT V21 Answ	300	Full	1850	1650	1180	980	2100
CCITT V23 Mode 1	600	Half	1700	1300	1700	1300	2100
CCITT V23 Mode 2	1200	Half	2100	1300	2100	1300	2100
CCITT V23 Mode 2 Equalised	1200	Half	2100	1300	2100	1300	2100
Bell 202	1200	Half	2200	1200	2200	1200	2025
Bell 202 Equalised	1200	Half	2200	1200	2200	1200	2025
CCITT V23 Back	75	—	450	390	450	390	—



**S**oftware All modems require software for operation. Although most of the modems sold directly into the home computer market don't have software with them, most of the manufacturers will sell you the software written for your make of computer at the same time as the modem. If not, you have to shop around.

The software is a program to fool your computer into thinking it is a remote terminal.

As a terminal your computer will send and receive data; the other computer, especially if it's a mainframe at an information service — *ie* Prestel — handles processing tasks. In fact, using your computer as a remote terminal, you can program the central mainframe in its own language and take advantage of its massive storage capacity. Terminal software, like modems, varies widely when it comes to features. Some software allows you to upload and download programs with distant computers.

**General compatibility** Before going out to get a modem make sure it is totally compatible with your computer. Is the interface correct? Does it rely on your computer for its power supply? Does the software come on disk or cassette? Have you enough memory in your computer to take the software? These are all questions which you must answer before going out to buy.

**Hardware** In pure simple terms there is not an awful lot to a modem. If you take one apart there's very little inside apart from a printed circuit board, a few wires and connectors.

Putting aside the refinements for the moment, the first thing to find out is what initial use you are going to make of a modem. That decision affects the baud rate you require.

If your use is going to be simply for Prestel, either using Micronet or any other 'access' Information Providers, you need a modem rated 1200/75. This is because Prestel transmits at 1200 baud, but receives its signal back from you at 75 baud. 1200 baud means the transmission rate is 120 characters a second. When you receive a page of information from Prestel it takes about ten seconds for all the information on the page to be displayed. When you send information back to the Prestel computer it is sent back at 75 baud, is about 7.5 characters a second.

An increasing number of people are discovering the 'bulletin' boards. These are information data bases which have been set up throughout the country, and throughout the world, for enthusiasts to use their micros to communicate with one another. Bulletin boards use a baud rate of 300/300. This means that your modem must be capable of transmitting/receiving at this rate. However, it's not that straight forward.

For example, 300 baud in this country doesn't mean the same as 300 baud in the USA. A modem which communicates fine in this country will not work if hooked up to a transatlantic bulletin board. This is because the American Bell telephone company use a different frequency for their telephone transmissions.

To understand just take a simplified look

at what happens when sending/receiving with a modem.

So that data can be sent in both directions, four different frequencies are used, two in each direction. In order for two modems to communicate with each other, one must be switched into the originate mode; in the UK that's 980Hz and 1180Hz. Each modem receives the alternate pair of frequencies to those which it transmits.

In this country, and much of Europe we use the CCITT (Consultative Committee for International Telegraph and Telephone) standard. The CCITT, based in Geneva is part of the ITU (International Telecommunications Union). The CCITT have recommended a series of standards for transmission over the telephone network. These are known as the 'V' series. They include specifications for modems, interfaces, test equipment etc.

There is a second set of standards—the 'X' series which apply to data transmissions over the public packet switched networks, *ie* PSS operated by British Telecom.

Each piece of information is transmitted as either a "0" or "1". To transmit this the modem converts it into a signal which transmits each bit at a different frequency. As you can see in the table in Figure 1 the "0" bit, for example, on the Bell 103 Originating modem is 1070Hz, while the "1" bit is transmitted at 1270 Hz. The modem receives its signals back at two more frequencies, 2025Hz and 2225Hz respectively.

To prevent interference between the two directions of communication, filters

are needed to pass the required frequencies in each direction. Although the frequency shift is only 200Hz the required band width of these filters depends on the baud rate. Modems operating at a higher baud rate must have a higher separation between frequencies: at 1200 this is as much as 800Hz.

The list of CCITT recommendations for the 'V' standard is long and includes modems for use in car telephones and higher frequencies than those that we are directly interested in here.

The main ones which affect us are the standards V21 and V23. V21 covers the 300/300 rates. As you can see from the chart the frequencies covered by 300 baud on the CCITT standards are different from those used in the States. The transmit frequency is 1180Hz for "O" and 980Hz for "1", with 1850Hz and 1650Hz being used for receive.

For this reason if you wish to communicate with someone in the USA you will have to make sure that your modem is capable of using the Bell 103 standards. Switchable modems are available, and someone with a reasonable knowledge of electronics should be able to tweak the frequencies. But like all things, unless you know what you're doing, leave it to the experts.

Recent developments have seen the emergence of a new chip with all the varying frequencies built into it, and future modems should become less expensive and easily switchable between the various standards.

The CCITT V.23 standard covers 600, 1200 and 75 baud modems. This is the standard employed by Prestel and some other professional databases. You will see from the table that the frequency gaps between the on and off bits are much wider — 2100Hz and 1300Hz when operating at 1200 baud. Since the receive and transmit frequencies are the same, obviously these can only operate at half duplex — you can imagine the confusion if both tried to operate full duplex on the same frequency.

So far we have mentioned only the originate modems, since initially these are the ones you are most likely to come across. Modems are available which will answer your phone as well. In crude terms these operate in a similar fashion to a telephone answering machine. After a preset number of rings the modem takes over and answers the phone. Instead of being met with a recording of a human voice, the caller is greeted with a high pitched tone.

This method of answering the phone is a little unfriendly: if the caller is not expecting it and usually it is only used on dedicated phone lines. However, some modem manufacturers are looking at ways of producing inexpensive modems for home use which can be intelligent enough to realise that if a human being is at the end of

the line: it will relay either a tape message telling the caller that a computer will answer or a voice chip inside the modem will do the same thing.

With an answer modem callers can leave messages for you on your computer, when you are out or you can call in (from another computer) to check on information which you may have sitting in the computer or on disk.

If you want to communicate with someone who has an originate/answer modem the problem arises when you want to communicate, since it would be necessary to contact them first to make sure they have their modem in the correct mode to answer your incoming call.

have been designed for this task.

The nature of the software depends on your computer, but if you buy a modem from Tandata or Prism, for example, both of them will be able to provide the software for a range of computers. The software comes on disk, cassette or ROM.

At the time of writing a ROM is available for the BBC machine which plugs straight into the sideways ROM socket. The software is menu-driven and is usually available through Micronet on joining. Other versions of the software are available for the BBC either on cassette or disk. The Spectrum can be connected up to Prestel using a special modem which comes complete with the software. Other



**The Buzzbox from Scicon is a hardwired modem offering both originate and auto-answer for £70.**

If you use one of the public access computers obviously they always leave theirs in the answer mode so there is no problem.

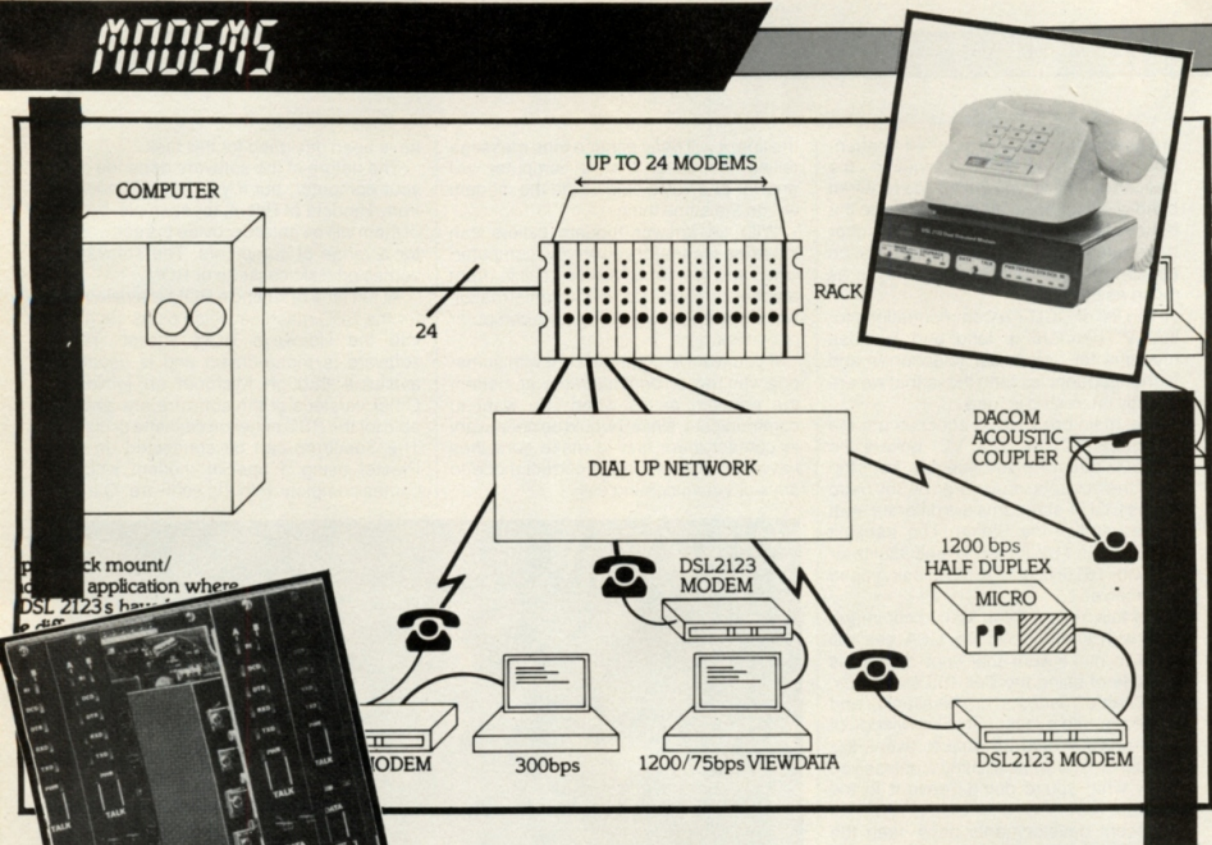
**Build your own** Instead of buying a modem you can buy a kit to build your own. The most popular, and at present the cheapest, is from Maplin Electronics. The kit comes complete with printed circuit board and is designed to operate at 300/300 baud.

This method of obtaining a modem is inexpensive but really should only be attempted by someone with a reasonable degree of soldering iron prowess. The instructions take you through the construction step by step and also have checking stages built into them so that you can make sure you are doing the right thing. The same kit can also be purchased fully assembled, but it does cost twice the price.

**Access** Once you have your modem, you put it to work. To do this you need to obtain the necessary software. If your use is going to be only with Prestel, whether it be with Micronet or by any other access, you will need one of the sets of software which

computers can be connected up with varying degrees of success including the Commodore Vic20, 64 and 3000, 4000 and 8000 models. Software is also available for the Apple IIe, and the Dragon — which comes on a plug-in cartridge and contains a connection through to a modem, since the Dragon 32 does not support a normal serial port. The ZX81 can also be connected up as can the Tandy TRS 80s.

More software is being written all the time, so increasing the number of compatible computers. The main problem lies with the fact that Prestel uses a 40 column teletext display — ideal for the BBC computer, but a problem for some of the others. The problem with the Dragon has been got round by using the high resolution graphics area, and although a colour computer, it only uses two colours at a time and means that the Dragon cannot at present support the full Prestel colour displays. The same applies to using the Apple and ZX81, although a colour card is available for the Apple at extra cost.



## DIAL D FOR DATABASES

A dual standard modem like the DSL 2123 (pictured above left) can be hooked into a vast network of telephone and inter-computer communications.

In the diagram you'll see a series of DSL 2123s set to three different modes. The viewdata terminal, for example, runs a modem on the 1200/75 baud viewdata standard rate, while two others communicate to computer to computer through an acoustic coupler.

A larger rack modem is also shown in the diagram, which can take up to 24 modems within its frame.

**B**ritish Telecom's Prestel phone-in database includes a section for micro-users called Micronet.

Micronet sells a modem and Prestel membership together for under £100 on most micros. Most people probably join Micronet to take advantage of large amounts of telesoftware available through Prestel, including both free and bought programs.

Prestel bills you for them quarterly. When you log onto Prestel you use a unique account number which the computer recognises. A further check is made when you enter your own personal password; until that happens, and the computer recognises it you can't get any further. These passwords are your protection to make sure that no one else gets into the system and runs up a large bill on your account.

When you download software an amount appears at the top of the screen which tells how much each frame costs. To download a telesoft program could take anything up to 30 or 40 frames depending on its size.

Micronet is not the only Prestel source for telesoftware. Viewfax 258 has an open database offering news and reviews about micros as well

as an extensive software library. The Prestel database, however, is much more comprehensive than for just downloading telesoftware.

The Nottingham Building Society and the Bank of Scotland have got together to provide a home banking database using Prestel. On joining you can operate your bank account 24 hours a day, pay bills, check your bank balance, move money between the building society and your account and purchase goods through the screen.

A pilot scheme is underway in the Midlands at present offering a whole host of services through the Prestel system called Club 403. The most popular is a home-grocery service. Subscribers are provided with a list of grocery and other household goods, and they place an order through the television set for delivery to the house 24 hours later. Club 403 also offers many other services such as an updated Whats On for the local area, home booking of theatre seats, hotels and holidays. All this uses the modem attached to the micro.

The costs of these types of database can vary; Micronet will cost the user £32 a year plus £5 a quarter Prestel charge and, of course, the cost of the phone call to the computer. Using the system

during normal business hours costs you a computer time charge of 5p per minute.

The Nottingham Building Society's Homelink service has a sliding scale of charges, but you must have a minimum balance of £1000 in your account at all times or some of the home banking facilities are automatically withdrawn. Club 403 charges a flat rate of £4 per month which includes the Prestel quarterly and there are no computer time charges.

With all these schemes run through Prestel you have access to the large Prestel database which is over 200,000 pages, most of them free. There is also the mailbox message service. Subscribers, using the Enterprise computer in London, can send messages to any other subscriber through the same computer.

But Prestel is not the only method of communication for the computer user. Other systems operate databases and are there for access, some of it restricted but much of it free.

The growing area of contact is through the bulletin boards. To access them you need a 300/300 modem plus the necessary software. There are a number throughout the country, and all of them are free.

Messages and notices can be posted and retrieved over the telephone. Most are for the computer hobbyist and typically include items for sale, wanted, personal messages, hints and tips plus a library of free software.

Software for the bulletin boards can be obtained from a variety of sources, often free. User groups have simple terminal software available to members, and some is available commercially. A simple program can be written to access a bulletin board, providing you don't want to do more than communicate with it. Software making full use of all the facilities, such as downloading, saving to tape and so on is much more complicated.

To write a simple program just write a routine which takes what you type at the keyboard and transfers it to the RS232 (RS432) port, and another to display incoming data to the screen.

When the bulletin board answers, you give your name and it scans its memory to see if there are messages for you.

When you access a bulletin board for the first

time, the computer will ask you some relevant information about your system which is put into its memory for future use. Don't be alarmed—they make sure the software on the bulletin board can read/write to your computer. The operator will want to know about your screen width line feeds and so on. If you aren't sure about the answers, a cry for help on screen will usually result in some kind of human intervention.

Interest in bulletin boards started in the USA where there are literally hundreds operating nationwide. The British ones are up to about three years old.

One of the first was Forum-80, started in Hull and it's run by Fred Brown. Using a Tandy TRS-80 with 3 disk drives and an assortment of software he operates the service most nights, but switches over to the US Bell 103 standard at midnight, so that anyone wishing to communicate with the USA does so without the expense of a transatlantic telephone call by leaving a message through Hull. Some of the other bulletin boards are also using this idea.

If you bank with Midland Bank you may find you can join their experiment in home-banking, using a micro and the appropriate software/modem. The standard Prestel software works as the database is configured on the Prestel format. The Midland aren't providing a full banking service, but you can check your last statement, see your current balance, examine standing orders, order cheque books and so on.

There are many other Public Access systems. Some local authorities are providing an access system using Prestel-like frames to provide local information.

Some companies also offer public access to their databases to order goods. Maplin Electronics, for example, give the caller the chance to order anything from their whole range of electronic components through the screen.

For some time travel agents have had access through Prestel to a major range of holiday companies and airlines. Many of these use what is called a Gateway system where the customer has immediate confirmation of the ticketing.

By letting your computer think it is a dumb terminal, a whole new world of communications can be opened up.

## Bulletin boards

### UK Networks

#### CBBS North East

Trevor Smith and Malcolm Piper Tel 0207 543555  
2.30pm-9am daily; Tel 0207 32447 (7pm-12.00 CCITT);  
12.00-8.30 Bell 103 (US)

#### Mailbox-80, Stourport

Jim Roden Tel 0384 635336  
6pm-8am

#### Forum-80, Hull

Fred Brown Tel 0482 859169,  
6-12pm CCITT, 12pm-9am  
Bell 103 (US)

#### Forum-80, London

Victor Saleh Tel 01-902 2546  
evenings and weekends  
CBBS, London

Peter Goldman Tel 01-399  
2136 Sun 5-10pm

#### Forum-80, Milton

Leon Heller and Brian Pain Tel  
0908 613004 (24 hrs)

#### Mailbox-80, Liverpool

Peter Toothill Tel 051-428  
8924 (24 hrs)

#### TBBS, London

John Newgas Tel 01-3489400,  
9am-1pm, CCITT 1pm-7am  
Bell 103 (US)

### American/Canadian networks

Forum-80 0101 816 861 7040

CBBS 0101 312 545 8086

FBBS 0101 312 677 8514

ABBS 0101 613 725 2243

ABBS 0101 703 255 2192

MABBS 0101 904 862 1072

Bull-80 0101 205 492 0373

Conn-80 0101 212 441 3755

### European networks

ELFA Sweden 010468

7300706

ABC Sweden 010463

5110771

CBBS Sweden 010463

1292160

(1200/75)

010463

1690754

(300/300)

This is just a small selection of what is available, the various user groups and bulletin boards can put you in touch with others.

### Commercial

Micronet 800 01-837 3699

Prestel Freephone 2296

Club 403 021-236 3366

Homelink 0602 419393

Maplin 0702 552941

Rochford 0702 546373



Information sent down a telephone line, through a modem and into a computer can often then be transferred to a printer. The printers in this picture, sold by Tantaton, are displaying pictures generated by the Prestel database.

## MODEMS & SOFTWARE AVAILABLE FOR PRESTEL

Micro Computer	Modem Manufacturer	Model	Hardware Price £	Software Price £	Total £	Disk/ROM/Cassette	Comments
BBC-B	Tandata	TM 100	98.90	19.55	118.45	C	
	Prism	Modem 1000	69.95	19.95	89.90	R	
	Prism	Modem 2000	84.95	19.95	104.90	R	
	OEL	Telemod 1	69.95	14.95	84.90	C	
		do	69.95	19.95	89.90	R	
	OEL	Telemod 2	84.95	14.95	99.90	C	
		do	84.95	19.95	104.90	R	
	Thorn/EMI		109.25	?		R	
Spectrum	Prism	VTX 5000	99.95	00.00	99.95	N/A	Modem includes software
Apple IIe	Tandata	TM 100	98.90	46.00	144.90	D	B & W. Price excludes serial card
		do	98.90	86.25	185.15	D	B & W. Price includes serial card
	Prism	Modem 1000	69.95	29.95	99.90	D	Standard version — see notes
		do	69.95	49.95	119.90	D	Super version — see notes
	Prism	Modem 2000	84.95	29.95	114.90	D	Standard version — see notes
	do	84.95	49.95	134.90	D	Super version — see notes	
Tandy I	Prism	Modem 1000	69.95	24.95	94.90	C	Computer must have serial port
	Prism	Modem 2000	84.95	24.95	109.90	C	Computer must have serial port
Tandy III	Prism	Modem 1000	69.95	29.95	99.90	D	16K computer must have 48K memory and must be fitted with disc drive
	Prism	Modem 2000	84.95	29.95	114.90	D	16K computer must have 48K memory and must be fitted with disc drive

Standard version connects to Apple games port, Super version supplied with Comms card into Apple's expansion slot.

## OTHER MODEMS & SOFTWARE AVAILABLE FOR HOME COMPUTERS

Modem Manufacturer	Model Name	Baud Rate	Hardware Price £	(A)ccoustic (H)ard wire	Comments
Tandata 06845 68421	TM 200	1200/1200 1200/75 300/300	249.95		Available 1984
Dacom 0908 311885	Buzzbox	300/300	79.95	H	
	DSL 2123	1200/75 300/300 1200/1200	328.90	H	
	DSL 2123GT	0-9600	575.00	H	Many Features
Maplin 0702 552941	LW 99H	300/300	39.95 c.80.00	H	Kit Form Ready built
Pace 0274 729306		300/300 1200/75	c.100.00	H	Available late January 1984
Computer village 0952 506596	TRX 1200 300/300	1200/75	98.90	H	

Various software packages are available through Bulletin Boards. PACE make a ROM for the BBC for £34.00.



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Two bridge packs for Spectrum and Dragon are dealt by Ted Ball, but does either come up trumps?

# Bridging the difference

**B**ridge is a new arrival on the home computer scene, probably because it is more difficult to program. CP Software's Bridge Player for the 48K Spectrum is the first program I have seen to actually play random bridge hands. The other bridge programs available are for teaching and allow you to play only predetermined hands.

The program deals random bridge hands. You bid the south hand while the program bids the other three hands, and at the end of the bidding you play the contract as declarer and the program plays the two defenders' hands.

## In use

The instructions for using the program and some information about the Acol bidding system used by the program are printed on the cassette insert. The program is very easy to use, with prompts appearing on the screen whenever necessary.

There is not a lot in the way of graphics, you get a full size display of your hand in the bidding but during the play the hands are laid out like a diagram in a book.

The program is accurate on opening bids and first round responses to opening bids, and gives the correct replies to the Stayman and Blackwood conventions. Apart from

that it is very erratic, sometimes making the right bid but more often under or overbidding, calling a suit instead of no trumps, or vice versa. But, if your own bidding is steady you can get into a reasonable contract, although it will not always be the best.

The program is similarly erratic in its defence. The opening lead usually attacks your weak point, probably because it 'cheats' and looks at all four hands, and the program will cash enough top tricks to defeat the contract whenever it can. The rest of the defence is very poor, apparently worked out on a trick by trick basis rather than planned ahead. The program makes elementary mistakes like establishing a

long suit but getting it blocked so it can't run the suit. The worst mistake I found, was when it ruffed with a card that could be overruffed by dummy although it had a trump higher than any in dummy.

The program is written entirely in Basic, but the only really slow part is when it shuffles, deals and sorts hands. In bidding and playing, the program responds in seconds.

## Verdict

Bridge Player is good enough to give you an enjoyable game and shows a home computer can play the game. Although it is likely to be superseded by machine code programs it is a creditable first attempt.

### RATING

#### Features

#### Documentation

#### Performance

#### Usability

#### Reliability

#### Overall value



**Name** Bridge Player **System** ZX Spectrum, 48K  
**Price** £8.95 **Publisher** CP Software, 17 Orchard Lane, Prestwood, Great Missenden, Bucks HP16 0NN **Format** Cassette **Other versions** None  
**Outlets** Mail order.



**B**ridge Master is a package for the Dragon 32, intended to teach bridge to beginners or intermediate players.

You get a ROM cartridge containing the control program, a cassette containing data for 100 bridge hands, and two booklets, all packed in a colourfully labelled plastic library case. One booklet is the user manual, giving instructions for using the program and a brief introduction to bridge, the other consists of comments on the hands.

The instructions for using the program are set out fully and clearly, but the introduction to bridge is very brief and covers only the mechanics of the game.

The comments on the first few hands cover the fundamental features of the Acol bidding system, but apart from this there is no real teaching. Most of the comments cover only the difficult points that occur in the hands, and the comments are more concerned with telling you what to do rather than why.

## In use

The program is very easy to use. You need only the arrow and enter keys to select a bid or play, and you can use a joystick instead of these keys. Other features, such as getting advice on what you should do or automatic bidding and play are selected with single letter keys.

The graphics are excellent, with the cards being shown in outline and identified by the suit symbol and letters or numbers.



The cards are dealt one at a time with smooth movements, but you can get a fast deal if you don't want to wait. The cards also move smoothly into the centre of the screen when they are played.

You are only allowed to bid and play the cards in one order. If you select the wrong bid or card you are told it is wrong and have to try again. However, during the play of the cards you are sometimes told that your card is a valid play, and the computer will make the predefined play for you. This distinction between 'wrong card' and 'valid play' is not made properly all the time and you are frequently told that you have played the wrong card when your card is perfectly valid. The program gives you a percentage score based on the number of

bids and plays you get right first time, with a bonus for getting critical points right, but the score is not really meaningful.

## Verdict

Bridge Master is not suitable for complete beginners because it does not provide any proper tuition and moves to advanced play too quickly. If you have played some bridge you could find Bridge Master useful for practice and for the hints it gives, but you will need books or lessons to learn the game systematically.

Bridge Master comes off worse in comparison with another program of the same name (reviewed PCN Issue 23) for the BBC and Spectrum. This other Bridge Master is an excellent teaching package for beginners, with a similar system of practice hands for you to work through but also giving you an introductory text book and instruction on audio tapes.

### RATING

#### Features

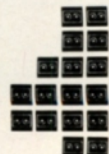
#### Documentation

#### Performance

#### Usability

#### Reliability

#### Overall value



**Name** Bridge Master **Application** Bridge tutor  
**System** Dragon 32 **Price** £29.95 **Publisher** Dragon Data **Format** Cartridge and cassette  
**Outlets** Retail.

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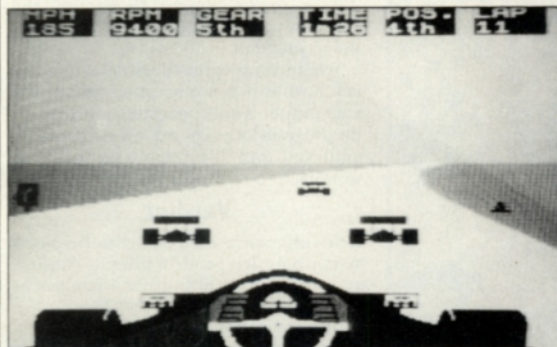
## COMMODORE SOFTWARE

Native compilers for the CBM 64 and the 700/B-128 are available only from Commodore.

**Oxford Computer Systems (Software) Ltd.**  
Hensington Road, Woodstock, Oxford OX7 1JR, England  
Telephone (0993) 812700 Telex 83147 Ref. OCSL



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Bucks HP16 0NN

cp software



Looking for a reliable keeper of records? Nigel Farrier tests out a new program for the BBC B.

# Just for the record

The Record Keeper is a simple database which comes on cassette and has two versions of the same program — one for use on a cassette based system and the other for use with a disk drive.

## Features

The Record Keeper allows you to enter information under nine headings each of which can contain a maximum of only 26 characters. Under each heading you can have either numeric data or characters, though not much calculation can be performed upon the numeric data. The program allows approximately only 80 records as all the information is held in memory along with the program. Records can be sorted, searched and printed in a user-defined format.

The Record Keeper comes as two separate programs, loaded independently. The Editor program allows the addition and updating of information and the Report Generator permits you to define how the information is printed.

Both these programs are in Basic: you are encouraged to adapt them to your own requirements and several examples are given. It is therefore possible to extend the length permitted of information from 26 characters to say 30, but you will decrease the number of records allowed.

## Presentation

The 48-page manual accompanying the program is neatly laid out and well-written with a few screen illustrations. It has no index, but the important parts of the manual are usefully in bold type.

## In use

After loading the Editor you are given several options on the main menu: your first choice would be to load an existing data file or create a new one.

When you create a new data file you give it a name using up to seven characters only, and then give each header or field a label. If you choose to only have six fields that's what you're stuck with unless you re-enter all of the information.

Having loaded an existing data file or created a new one you are then moved to the secondary menu which is for data manipulation. Here you can add, delete or amend any records, sort or save the records, or search for any record(s).

You can sort records using any of the nine fields. This program's search facility is a very powerful tool. You can have up to six different types of search requirements in each of the nine fields. These include <(less than), >(greater than) and ?(wild card) facilities. The 'less than' and 'greater than' facilities can be used on character as well as numeric data.



Name The Record Keeper System BBC B Price £13.95 Publisher BBC Soft Format Cassette/disk Outlets Mail Order/Retail.

Other options on the main menu include deleting a data file, amending the headers and generating a report. The last of these will load in the 'Report Generator'.

The main part of the 'Report Generator' program is the creating, editing, saving and deleting of report formats. The program has a standard report format but permits you to edit every feature to suit your own requirements.

It's possible to print any of the nine headers in any order you wish and have some control over where they appear on the printout. Other features include page numbering, single/double line spacing, header title not being printed, and horizontal and vertical tab settings alteration.

On the main menu you can also load in your data file, sort it, search it and print it using your report format. The search facility is the same as for the 'Editor' and can be used to search your file.

## Reliability

All in all the programs are extremely reliable. Should you forget to save an altered file when changing from the 'Editor' to the 'Report Generator', the program will do it automatically to save losing your data.

Where the program does unfortunately fall down is if you request a printout but your printer is not connected or turned on the program locks up and will not continue until you turn the printer on and it is working.

## Verdict

If this program is used on a cassette-based system only, it is good for printing data in a set format but has little use as a database as it would be quicker to do it by hand.

To use the program's features effectively it should be used with a disk drive.

One of the main drawbacks is that the program uses RAM to store both itself and all of your data which limits its capabilities. However, it is a well-written menu-driven program, exceptionally easy to use, and a very reasonable price.

The authors have tried to choose between adding features which take up precious memory leaving room for only a few records, and scrimping on the program to make room for more records. They appear to have hit upon a reasonable compromise.

## RATING

Features  
Documentation  
Performance  
User interface  
Reliability  
Overall value



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This Spectrum program on machine code and assembly language may be too elementary says Ted Ball.

# Basic principles

**B**yond Basic is a tutorial and simulation program for the 48K Spectrum, designed as an easy introduction to some of the fundamental ideas behind machine code and assembly language.

## Features

Beyond Basic divides into three sections. The first two contain the tutorial material, which consists of a mixture of text and animated diagrams.

The first covers how a computer is organised as a microprocessor with RAM and ROM, an explanation of the microprocessor registers and their use in some simple machine code instructions, as well as an animated demonstration of what happens in the memory and the microprocessor when a simple machine code program is running.

The second section has more detail of the microprocessor registers and some of the simpler assembly language instructions for the Spectrum's Z80 microprocessor. Animated diagrams show what these assembly language instructions do.

Finally, the last section, Experimentor, allows you to type in assembly language programs, using the instructions described in the second part of Beyond Basic. You can then run your program one instruction at a time, noting how each affects the registers and memory. You can also save programs on tape and load them back.

## Presentation

The cassette and a small booklet come in a colourfully labelled box.

The booklet tells only how to set up the Spectrum and load the tape, and what the program is for. All the tutorial material is in the program.

## In use

The program is menu-driven, with clear prompts on the screen, but one annoying feature is that in some menus you just have to press a key to move on while in others you have to press a key and then press the ENTER key.

Beyond Basic is straightforward to use when working through the two tutorial sections in order: you just press a key to get to the next screen. However, when using the Experimentor section it is very tedious to refer to the other sections. You must go through the whole first section in order, and you can't get out of it before the end. In the second section, the Assembler Command Tutor, you can look up the explanation of a single instruction, but if you only want the screen that lists the instructions available you still have to go through one of the explanatory screens before you can get back to Experimentor.

The editor for typing in and altering assembly language programs is very sim-



ple, allowing you only to insert, delete or replace whole lines, but it is adequate for the short programs you would want to try out.

Beyond Basic is designed to teach the fundamental principles behind using machine code rather than teach assembly language programming, and the concepts introduced in the program have deliberately been kept simple. It does explain the principles simply and you should be able to work quickly through the tutorial sections and into the Experimentor whether you haven't studied machine code at all, or you have started on a textbook and had difficulty understanding it.

There are, however, some points where Beyond Basic needs some improvement, without destroying its simplicity. Near the beginning it tells you that RAM addresses in the Spectrum run from 0 to 16K or 0 to 48K, which could cause problems for you later on as the RAM addresses actually start at 16K and go up from there. One basic topic not mentioned is the relation between machine code and assembly language. Many people have more difficulty understanding this than any of the topics that are covered in Beyond Basic.

More guidance in using the Experimentor section of the program properly would be helpful. The question usually asked about the simple assembly language instructions explained in Beyond Basic is not 'what do they do?' but 'what can you do with them?' What is required is two or three example programs in the instruction booklet for you to type in and run, and some suggestions for simple programs that you can write yourself using the limited instruction set available in Beyond Basic.

## Reliability

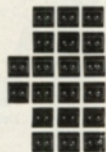
On the whole, Beyond Basic is reliable, ignoring wrong keys in the menus as it does and telling you when you have typed in an incorrect assembly language instruction. However, there were two bugs in the Experimentor section. The first bug is minor — if you type in something like 'LD A,' where there should be something after the comma, it treats it as 'LD A,0'. The second bug is more serious: instructions of the form 'LD A,A', 'ADD A,A', 'CP A', 'SUB A' don't work properly. Executing one of these instructions leaves a dash or a blank as the value of A, and sometimes executing the next instruction gives a screen full of nonsense.

## Verdict

Beyond Basic goes a long way towards introducing fundamental ideas behind assembly language, but not quite far enough to justify a price of £9.95. It could be greatly improved, at little or no extra production cost, by including some reference information and some programming ideas in the instruction booklet.

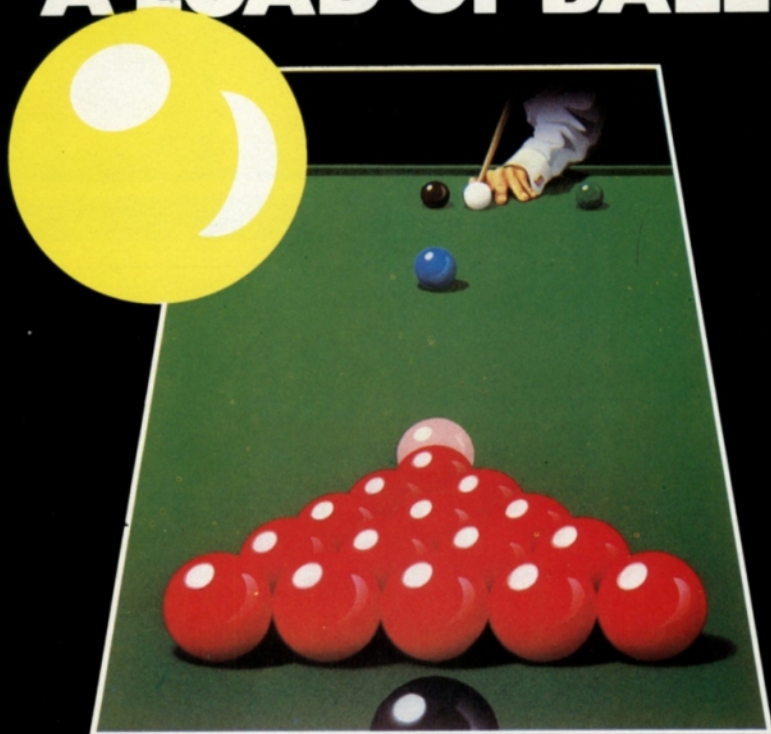
### RATING

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



**Name** Beyond Basic **Application** Tutorial on fundamentals of assembly language **System** ZX Spectrum, 48K **Price** £9.95 **Publisher** Sinclair Research **Format** Cassette **Language** Basic **Outlets** Retail/Mail order.

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# SPECTRUM 48K

## Chefs on ladders

**Name** Barmy Burgers **System** Spectrum (48K) **Price** £5.95 **Publisher** Blaby Computer Games, Leicester Tel (0533) 773641 **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Mail order and Sinclair dealers.

Burgers are becoming as popular on the micro as on the High Street! Issue 43 saw our review of Mr Wimpy — possibly the definitive burger game. Here we take a look at another game from Blaby, which doesn't come up to scratch.

This one has you fleeing from fried eggs and frankfurters. Sadly, the hero in this one moves so jerkily and unresponsively that he appears to have gorged himself on starch, rather than 100 per cent beef hamburgers.

### Objectives

Faced with three disassembled hamburgers, your chef must stomp all over pieces of bun, lettuce and beef, so they fall down a level to create the finished hamburger. A fried egg and two frankfurters chase the chef in an effort to halt burger production.

### In play

An excellent title page of a giant fried egg and frankfurter of quite human aspect is displayed during loading. This turns out to be the high-spot of the program.

The screen displays an

assortment of platforms and ladders, with the burger ingredients scattered around the various levels. Your chef is presented as a tiny, front-facing, stiff-limbed figure, with all the elasticity of a frozen scarecrow.

On the move he merely leans to one side then the other, like Long John Silver on a bad day. When climbing ladders or moving onto a platform, the chef must be positioned spot-on or gets stuck. He's not very responsive to the joystick, making the game very frustrating, especially as the pursuers move quite quickly.

Throwing pepper at the chasing frankfurters and egg is much more hazardous than it should be as it only works if hurled at the last possible moment *ie* when the pursuer is but a sausage-skin width away from you. With the slowness of joystick response, you are obliterated more than obliterating.

If you do manage to shake the pepper at the right moment, the be-peppered object vanishes, only to reappear (temporarily frozen) at the side of the screen. These moments of inactivity seem to be erratic in duration.

### Verdict

A weak implementation of a good concept, despite the well-illustrated title page.

Bob Chappel

### RATING

Lasting appeal



Playability



Use of machine



Overall value



## The boys are back

**Name** Gangsters **System** 48K Spectrum **Price** £6 **Publishers** CCS, 14 Langton Way, London SE3 7TL **Format** Cassette **Language** Basic **Other versions** None **Outlets** Retail and mail order.

This strategy game based on the prohibition days in 1920's America casts you in the sort of role formerly played by James Cagney or Edward G. Robinson.

### Objectives

For a change you're not required to take over the world, merely a city, Spectral City, and you do it by hook or, more likely, by crook.

The game sets you against four rival gangs with nine levels of difficulty.

### In play

You know when this tape stops loading, as there's a loud rat-tat-tat and the screen is spattered with bullets. This sets the tone. You're first shown a grid map of the city, then a table showing the respective strengths of all five gangs with regard to cash in the bank and the numbers of distilleries, speakeasies, brothels and casinos owned... a very degenerate game. You can buy more assets, or hire more gangsters, then state your 'Protection factor'. The higher this is then the safer you are, but this takes protection away from your assets.

Stage two is 'The Thorny Question of Bribes'. The more you pay the less likely you are to be arrested. Here you can also

try shopping one of your rivals to the police, but if they're then found innocent in court you'll be in trouble. Next stage gives you the chance to raid one of your rivals' assets, and you'll also be given some indication of their secret armoury's whereabouts. Finding it could put one of the other gangs out of business.

You can also do this in 'Murder Mode'. You take out a contract on one of the gang leaders, if you have enough in the bank to hire a rather expensive killer, such as Wild Pete Garuchi or Bugsy Spi-toone. This is one of the sections of the game which has a little graphics, though I'm sure even the programmer would agree that they're not going to win any prizes. If your contract is successful you may then be able to take over the other gang's assets, after being given a message like 'Congratulations! Morale in Gang 4 has reached zero.'

The final stage is a monthly summary of your activities, with a very business like income and expenditure account and a chance to read your intelligence report on what the others are up to by way of recruitment or buying up casinos. Then it's February 1920 and you're back to stage one again, till you either get to be top dog or bumped off in the process.

### Verdict

Buy it or CCS will undoubtedly be sending the boys round.

Mike Gerrard

### RATING

Lasting appeal



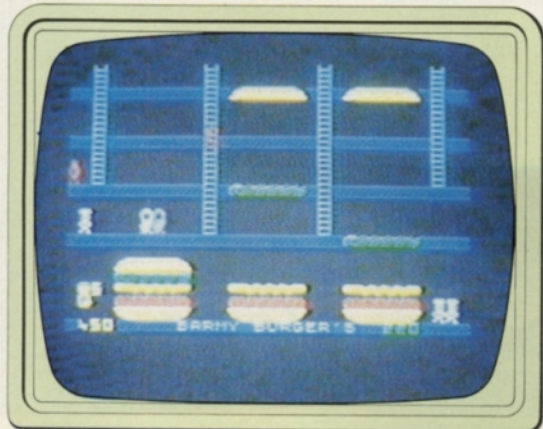
Playability



Use of the machine



Overall value



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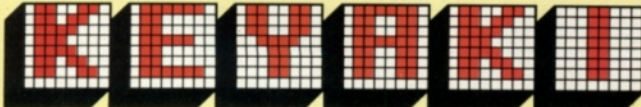
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BBC B

# Armchair golf

**Name** Birdie Barrage System BBC B  
**Price** £7.95 **Publisher** Computasolve, 8 Central Parade, St. Marks Hill, Surbiton, Surrey **Format** Cassette **Language** Basic **Outlets** Mail Order and Dealers.

Sports games seem to be getting more and more popular these days and as some of them have been rather poorly done, this one comes as a welcome addition.

George Bernard Shaw defined golf as the best way he could think to ruin a good walk. He might well have approved of Birdie Barrage, which allows you to test your golfing skills without leaving your armchair.

## Objectives

The program presents an 18 hole golf course with a variety of different lengths and configurations of hole: you complete the round with as few strokes as possible. Par for the course is 72.

## In play

The program presents each hole in turn as a plan view, depicting tee, fairway, rough, water, bunkers and the green. The course must have been constructed on a series of islands, judging by the amount of water shown. It is all done in a fairly symbolic fashion, down to the clumps of identical art deco bushes, but is attractive nonetheless. A random wind blows across the course, changing speed and direction be-

tween holes. You carry a full complement of clubs with four woods, nine irons, a sand wedge and a putter. For each shot you select a club, input the direction of your stroke using a compass marker and adjust the strength of shot on a thermometer-type scale. The strength of shot uses the up and down cursor keys. The travel of the ball seems accurate, the wind affecting its flight when it is slowing and falling to earth.

Once you've got the ball on the green, the display changes to give a close-up view of the ball and hole. You use your putter and simply input direction and strength until you sink the ball. There are three different speeds of green and quite a difference in the strength of shot required on each type.

In between holes your score is shown. This is useful, but it would be valuable to have a stroke count during play of each hole so that you can see how you're progressing.

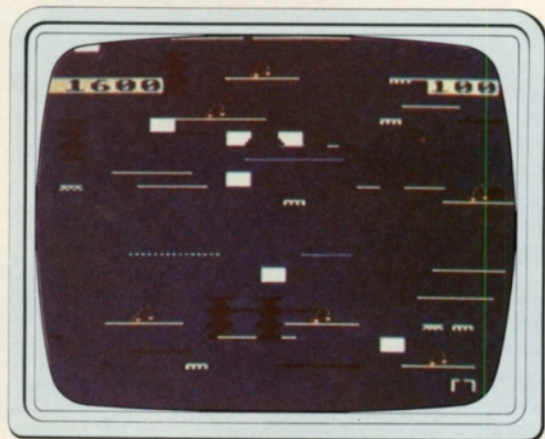
## Verdict

A full 18 holes takes anything up to half an hour to play and it would have been nice to be able to select a shorter round, or to play certain holes only, or even to be able to play a partner, taking it in turns to play each shot. Otherwise, there is very little to fault in this implementation of golf. All in all, a straightforward idea well presented and as accurate as you're going to get.

Simon Williams

### RATING

<b>Lasting appeal</b>	★★★★
<b>Playability</b>	★★★★
<b>Use of machine</b>	★★★
<b>Overall value</b>	★★★★



# Walk the plank

**Name** Plankwalk System BBC B  
**Price** £7.95 **Publisher** Virgin Games Ltd, 61-63 Portobello Road, London W11 3DD **Format** Cassette **Language** Basic/Machine Code **Outlets** Mail Order and Dealers.

It is still fairly novel for the main object of a game to be to stay on the screen. Considering there is nothing shooting at you either, playing such a game may seem a simple task . . .

## Objectives

Scaffolding Sid is chased by a large black monster jumping from plank to plank to avoid it, while collecting points by dropping through blocks, picking up cherries and falling not too far. The more exercise this involves, the more energy Sid uses up.

## In play

The cassette comes attractively packaged with pseudo 1930s artwork. It loaded first time to display a title screen identifying the various objects in the game. The instructions proper are included in the cassette insert. There are four levels available for play and selection of one starts the game.

Pretty soon you realise that Plankwalk is not one of the super-detailed, multicoloured graphic works of art common nowadays. Sid consists of an inverted Y with a crossbar, the blocks are plain white squares and the monster appears to be a left-over space invader, although being drawn black on a dark blue background, it's

pretty hard to tell. The cherries are multicoloured, but overall the graphic content is a little uninspired.

The game itself is a clever idea and works reasonably well. The various planks and objects scroll fairly smoothly up the screen, and you have to be quite nippy with the movement controls (left, right and fast) to avoid the pursuing monster.

Fall onto a white block and you pass through, gaining points, and drop onto whatever is below. Walking sideways through a cherry also scores points and your energy may be recharged by walking into an elevator. Some of the planks have a built-in slope or are false. These are indicated with different colours or flashing effects. You lose one of your three lives by dropping off the bottom of the screen, being lifted off the top by the rising planks, scurrying too far off either side or being caught by the monster.

The higher levels of play don't seem to have much effect on the speed or difficulty of the game, but provide more blocks, cherries and elevators, allowing you to achieve a high score with comparative ease.

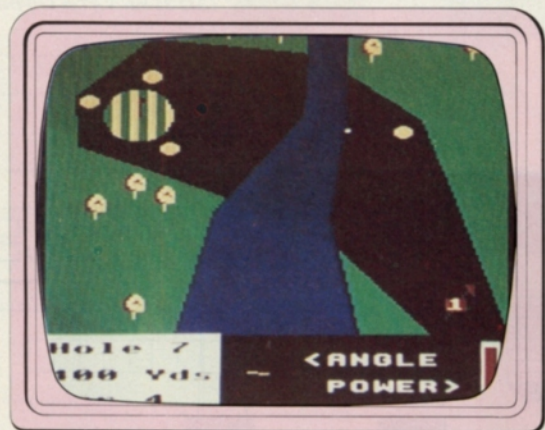
## Verdict

The overall idea is very good and could prove quite addictive. The graphics, however, are rather poor considering the potential the BBC micro offers.

Simon Williams

### RATING

<b>Lasting appeal</b>	★★★★
<b>Playability</b>	★★★★
<b>Use of machine</b>	★★★
<b>Overall value</b>	★★★★



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# COMMODORE 64

## Blow away the blues

**Name** Blue Moon System **Commo-**  
**dore 64 Price** £6.50 **Publisher**  
Merlin Software. **Format** Cassette  
**Language** Machine Code **Other**  
**versions** None **Outlets** Mail Order.

Blue Moon is one of the more enjoyable games involving some form of space travel.

### Objectives

You are the pilot of the ubiquitous inter-galactic spacecraft, your mission to return a sister ship and her crew safely to Blue Moon. In order to remain intact you must blast your way through various hazardous encounters.

The makers of these games come up with some ridiculous names for either the spacecraft or what it fires. In Blue Moon your firepower is nothing less than triple sonic de-atomisers.

### In play

Your task is in five stages. Stage one is the docking of the two spacecraft which must be completed to continue. Initially, this can be difficult but the technique is quickly mastered.

The comet storm comes next. You can either avoid them or shoot them with your triple sonic thingsies. This stage is very easy, though at higher levels of difficulty they do get more numerous.

Stage three is, I think, probably the hardest section of all.

Here you tangle with the Blue Bouncers. They bounce around the screen in sprightly fashion, firing at you. They also drop on top of you, and if they miss they multiply.

The Tecom man is the penultimate stage. He's a portly creature and easy to hit. He walks across the top of the screen and, extraordinarily, lays eggs which hatch into birds which fire plasma bolts at you.

At last, you get to land on Blue Moon, with a choice of three landing sites. There is one large one worth 50 points and two smaller ones worth 200 points each which I didn't find any more difficult. A successful landing raises a flag to the tune of the American national anthem.

Successful completion of a round awards you an extra life, and a repetition of the game on the next level of difficulty. The difference between the various levels is the number of comets or Blue Bouncers. It's a pity the authors didn't include some additional hazards.

### Verdict

The game has some very good and fast graphics and it uses the sound channels well. Initially I found it very enjoyable but this wore off due to the lack of variation between the levels of difficulty.

**Nigel Farrier**

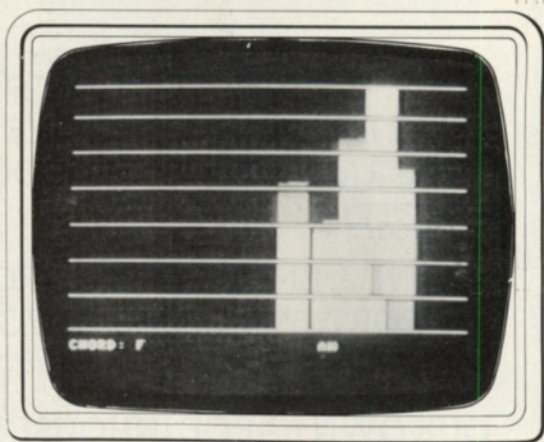
#### RATING

**Lasting appeal** ☹☹☹☹

**Playability** ☹☹☹☹

**Use of machine** ☹☹☹☹☹☹

**Value for money** ☹☹



## Joystick Virtuoso

**Name** Dancing Feats System **Com-**  
**modore 64 Price** £6.95 **Publisher**  
Softcomm **Distributor** Artic Com-  
puting Tel (0401) 43553 **Format**  
Cassette or disk **Language** Machine  
**Language Other Versions** None  
**known Outlet** Mail order and  
dealers

Dancing Feats is the latest in a long line of micro musical programs. It reinforces the argument that the Americans consistently produce some of the best software.

### Objective

The program is designed as an introduction to music and music theory, and does a lot of the hard work for you. Music can be saved onto cassette or disk and played back later, and the program itself has a record and playback feature which simply stores music in the micro's memory.

Your musical instrument is the joystick and, like any other instrument, you should experiment with its capabilities.

The 64 provides most of the basic musical output, such as bass lines, style of play, speed of play, and so on, and it's up to you to put the icing on the cake as a joystick-wielding Jimi Hendrix.

### In play

The program starts by showing a display of its musical capabilities, which should inspire even the most unmusical to play a note or two.

While playing, the major chord that you're in is displayed

at the bottom left of the screen, and whatever note is produced with the joystick is shown mid-right at the bottom.

The main use of graphics in the program is a rather interesting representation of your note.

As far as the displays go, forget everything you ever learnt about telephone wires and tadpoles, since Dancing Feats produces a multi-coloured vertical bar on the screen whenever you play a note. It may not suit Andre Previn, but it certainly looks pretty.

Most of the program is menu-driven, using the joystick, and you can easily choose from a variety of background accompaniment, including bass, jazz and so on. If you like synco-pated music, you can even have that.

As a final note you can also play acappella, (without instrumental accompaniment) and amaze and annoy everyone with a dazzling solo on the electric joystick.

### Verdict

This is an unusual program, but for anyone interested in music it is well worth investigating. Needless to say the use of sound depends to a large extent on the user, but some quite amazing results can be achieved.

Dancing Feats may not be as riveting as a fast game, but it does provide a very different and entertaining use of the 64.

Move over Mike Oldfield.

**Pete Gerrard**

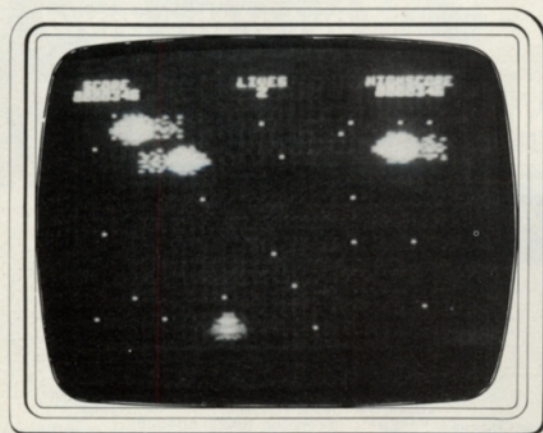
#### RATING

**Lasting appeal** ☹☹☹☹

**Playability** ☹☹☹☹☹☹

**Use of machine** ☹☹☹☹☹☹

**Value for money** ☹☹☹☹



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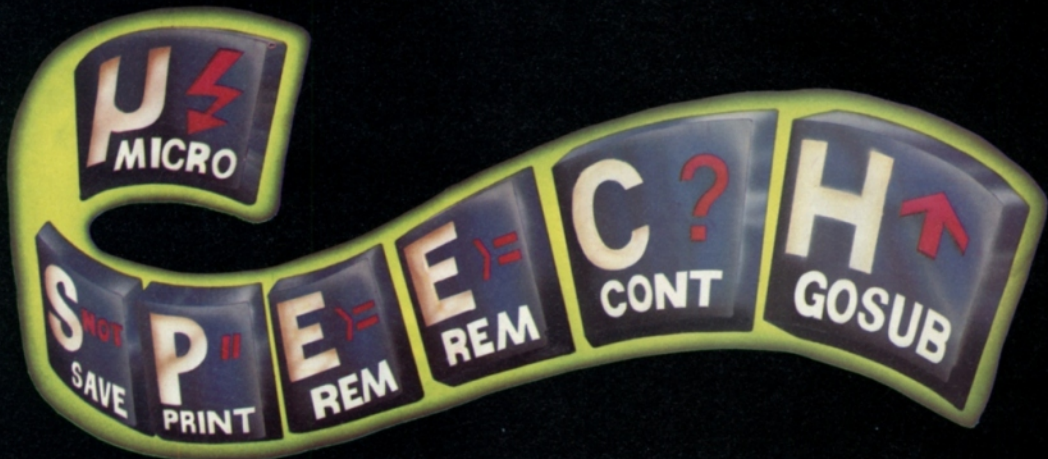


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Jeff Mirter has taken Gridrunner - the game that topped bestseller charts in USA and UK - and created an awesome sequel. Graphically superb, it features multiple screens, new aliens and attack waves, mystery bonuses, renegade humanoids, deflexor fields, diagonal tracking, countdown/panic phase and much, much more... Packed into 20 mind-zapping zones and accompanied by incredible sonics. 8K expansion required. Available for Commodore 64 £7.50 and VIC-20 £6.

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# Caves of treasure

Heroes and heroines are normally only found in books and stories that happen to other people. This program, from D Barke of Harlow in Essex, drags you into an adventure fantasy world the likes of which ZX81 has rarely seen. You move around the caves, using the cursor keys, through a network of 21 caverns filled with monsters and deadly lungoloids. Your only protection is a bow and some arrows. These are fired by pressing 'F' and a direction to aim. New arrows are available at the entrance to the caves, at

a cost to your treasure. In cave 21 there is a hoard of treasure guarded by a growing serpent which will attempt to seal off the exits. Shooting holes in it is only a temporary solution, unless you shoot at something else, in which case the serpent will go after whatever you shot at. A monster is worth five and treasure ten. Arrows cost 4 and reincarnation costs 50. Program Notes ... The game is written in sections shown by the REM inverse comments. The

program, from lines 5 to 95 set up the variables, arrays and strings used in the rest of the program. Lines 150 to 224 draw the cave onto the screen using bunches of blocks. Note that the top and bottom walls are contained in C\$. Lastly this section puts some treasure "\*" into the cave.

**Title:** *Caves of Treasure*  
**Machine:** ZX81 + 16K  
**Application:** Game  
**Language:** ZX Basic  
**Author:** D Barke



## MAIN PROGRAM NOTES

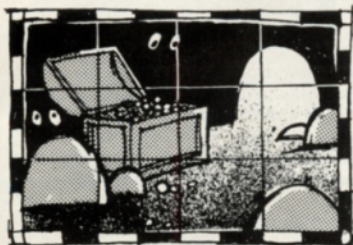
- 225-255 Put the monsters onto the screen. The number of monsters is selected randomly from 1 to 3 and then move randomly around the cave.
- 265-360 Monitor the keyboard and position the hero in the cave. If F for fire is pressed then the FIRE subroutine is used, otherwise this section gets the new position and checks whether the hero has blundered into anything.

```

1 REM "COT"
5 DIM D(3,2)
7 DIM T(20)
3 LET Z$="YOU ARE IN THE ENTR
ANCE HALL"
10 LET LR=0
11 LET C$="████████████████████"
13 LET C$=C$+"██████████"
15 LET C$=C$+"██████████"
20 LET ARR=5
25 FOR I=1 TO 20
30 LET T(I)=1
35 NEXT I
37 LET PS=0
40 LET S=0
55 LET Q=PEEK 16396+256*PEEK 1
6397+1
60 LET TR=0
65 RAND
68 LET NOW=INT (RAND*5000)
70 LET B$="9BE9AF9DG9CHAHIBIJ"
72 LET B$=B$+"CJKEKEFLFGMGMHN"
74 LET B$=B$+"I00JOPKPTLMRMS"
76 LET B$=B$+"LRTO0UPTLUN059RS"
80 LET R1=0
82 LET R2=0
84 LET R3=0
95 GOTO 1300
150 CLS
160 REM CAVE PLOT
162 RAND (PR*10+NOW)
165 FOR I=0 TO 20
170 LET IY=RND*16+2
175 LET IX=RND*27+2
180 PRINT AT IY,IX;"██";
185 IF RAND>.5 THEN PRINT AT IY-
1,IX-1;CHR$(128+RND*2)
190 PRINT AT IY,IX+1;"██";
195 PRINT AT IY+1,IX;CHR$(128+
RND*2);
200 IF RAND>.6 THEN PRINT AT IY+
1,IX+1;CHR$(130);
205 PRINT AT I,0;"██";AT I,31;"██"
210 NEXT I
212 PRINT AT 0,1;C$;AT 20,1;C$;
214 PRINT AT 0,17;R1;AT 20,17;R
215 LET N=11
220 LET M=1
222 IF T(PR)=1 THEN PRINT AT IY
,IY+1;"*";
224 LET T(PR)=0
225 REM DEMON PLOT
230 LET DEM=INT (RAND*4)
235 FOR I=1 TO DEM
240 LET D(I,1)=INT (RAND*19+1)
245 LET D(I,2)=INT (RAND*30+1)
250 PRINT AT D(I,1),D(I,2);"██";
255 NEXT I
265 REM HERO RUN
275 PRINT AT N,M;"X";
280 IF INKEY$<>"F" THEN GOTO 30
285 IF ARR=0 THEN GOTO 300
290 LET ARR=ARR-1
295 GOSUB 1000
298 PRINT AT 21,0;"ARROWS:";ARR
300 LET N1=N
305 LET M1=M
310 LET M=M+(1 AND INKEY$="8")-
(1 AND INKEY$="5")
315 LET N=N+(1 AND INKEY$="6")-

```

## CAVES OF TREASURE



810-970 Here you select the cave when the hero moves from one to the other. The hero (stand straight there, but don't knock the computer over) is told the current score and position. The next cave is the selected and the routine jumps to the cave drawing section.

1000-1125 Contain the subroutine to fire the arrows at the demons. The direction to shoot is found in lines 1030 to 1035. The arrow (+) is then drawn moving from the hero. The rest of this section checks to see if the demon has been hit and if so the demon is removed.

1200-1255 Allow the demon to run away from the arrows if they get the chance in line 1005.

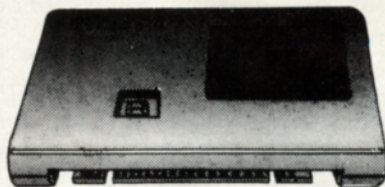


```
(1 AND INKEY$="7")
320 LET Q1=PEEK (Q+33*N+M)
325 IF Q1>62 THEN GOTO 2000
330 IF Q1=23 AND TR<50 THEN LET
TR=TR+10
335 IF Q1=8 THEN GOTO 800
338 IF ABS (10-N)=10 THEN GOTO
2000
339 IF PR=21 THEN GOTO 355
340 IF DEM=0 AND RND<.03 THEN L
ET DEM=1
342 IF RND<.3+TR/200 THEN GOSUB
1200
345 PRINT AT N1,M1;" ";
350 GOTO 265
355 GOSUB 3000
360 GOTO 345
800 REM ROOM SWITCH
805 CLS
810 LET LR=PR
812 IF PR<>21 THEN GOTO 815
813 LET PR=INT (RND*19+1)
814 GOTO 825
815 IF N=0 THEN LET PR=R1
820 IF N=20 THEN LET PR=R1
822 IF PR=0 THEN GOTO 1505
825 PRINT AT 3,2;"YOU ARE IN TH
E TUNNEL"
830 PRINT AT 5,2;"BETWEEN ";LR;
" AND ";PR
835 PRINT AT 8,2;"YOU HAVE ";AR
R;" ARROWS";
840 PRINT AT 11,2;"YOUR SCORE I
S ";TR+5
915 IF PR=21 THEN GOTO 2050
920 LET R$=8$(PR*3-2)
925 LET R1=CODE (R$)-37
930 LET R$=8$(PR*3-1)
935 LET R2=CODE (R$)-37
940 LET R$=8$(PR*3)
945 LET R3=CODE (R$)-37
960 IF R1=LR THEN LET R1=R3
965 IF R2=LR THEN LET R2=R3
970 GOTO 150
1000 REM START
1003 IF PR=21 THEN GOSUB 3000
1005 IF RND<.5 THEN GOSUB 1200
1010 LET F$=INKEY$
1015 IF F$="" OR F$="F" THEN GOT
O 1000
1020 LET Y1=N
1025 LET X1=M
1030 LET MY=0+(1 AND F$="6")-(1
AND F$="7")
1035 LET MX=0+(1 AND F$="8")-(1
AND F$="5")
1040 LET X1=X1+MX
1045 LET Y1=Y1+MY
1050 IF ABS (15-X1)=15 OR ABS (1
0-Y1)=10 THEN GOTO 1125
1053 IF PEEK (Q+33*Y1+X1)<>0 THE
N GOTO 1070
1055 PRINT AT Y1,X1;"+";
1060 PRINT AT Y1,X1;" ";
1065 GOTO 1040
1070 LET DHIT=DEM
1075 FOR I=1 TO DHIT
1080 LET Y=D(I,1)
1085 LET X=D(I,2)
1090 IF X<>X1 OR Y<>Y1 THEN GOTO
1115
1095 PRINT AT Y1,X1;" ";
1098 LET S=S+5
1100 LET D(I,1)=D(DEM,1)
1105 LET D(I,2)=D(DEM,2)
1110 LET DEM=DEM-1
1115 NEXT I
1117 IF PR=21 THEN LET FX=X1
1118 IF PR=21 THEN LET FY=Y1
1120 PRINT AT Y1,X1;" ";
1125 RETURN
1200 REM DEMON RUN
1201 FOR I=1 TO DEM
1205 LET X=D(I,2)
1210 LET Y=D(I,1)
1215 PRINT AT Y,X;" ";
1220 LET Y=Y+SGN (N-Y)
1225 LET X=X+SGN (M-X)
1235 PRINT AT Y,X;" ";
1238 IF X=M AND Y=N THEN GOTO 20
00
1240 LET D(I,1)=Y
1245 LET D(I,2)=X
1250 NEXT I
1255 RETURN
1295 REM START
```

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Signed.....

### SUPPLIERS KEY

SU — Sunlock; SO — Solar; PI — Pixel; IM — Imagine; AN — Anirog; UL — Ultimate; ME — Melbourne;  
HE — Hewson Consultants; IP — Impact; AR — Artic; QU — Quicksilver; DK — DKtronics; OC — Ocean; PS — Pas;  
SK — Softek; PE — Peaksoft; JK — J. K. Greye; NG — New Generation; CD — CDS; TE — Terminal; BB — Bug-Byte.

# CAVES OF TREASURE

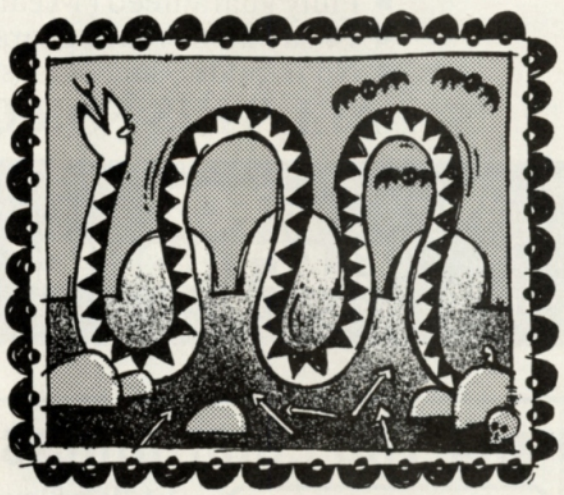
```

1297 CLS
1300 PRINT "                WELCOME TO
                CAVES OF TREAS
URE"
1305 PRINT " YOU ARE IN A NETWO
RK OF CAVES."
1310 PRINT "YOU ARE LOOKING FOR
GOLD."
1315 PRINT "IF YOU ARE CAREFUL Y
OU MAY REACH"
1320 PRINT "THE TREASURE ROOM, B
UT BEWARE:"
1325 PRINT "THERE ARE MONSTERS W
HITCH WILL"
1330 PRINT "EAT YOU: EVEN TO TOU
CH THE ROCKS"
1335 PRINT "MEANS INSTANT DEATH.

1340 PRINT Z$
1342 PRINT "CHOOSE CAVE 1,2,3 OR
4;"
1345 INPUT PR
1350 IF PR<1 OR PR>4 THEN GOTO 1
345
1360 LET LR=0
1500 GOTO 915
1505 PRINT Z$
1510 PRINT "YOUR TREASURE IS SAF
E HERE"
1515 PRINT "YOUR SCORE IS ";S+TR
1516 PRINT TAB 0;"YOU HAVE ";ARR
;" ARROWS."
1520 PRINT TAB 0;"ARE YOU GOING
BACK IN?"
1525 INPUT F$
1530 IF F$(1)="N" THEN PRINT "YO
U SCORED ";S+TR
1532 IF F$(1)="N" THEN PRINT "
1535 IF F$(1)="N" THEN STOP
1540 LET S=S+TR
1545 LET TR=0
1550 PRINT "HO MANY ARROWS DO YO
U WANT?"
1560 PRINT "THEY ARE 4 POINTS EA
CH"
1570 INPUT F
1580 IF F*4>S THEN GOTO 1650
1590 LET S=S-F*4
1600 LET ARR=ARR+F
1610 GOTO 1342
1660 CLS
1665 PRINT " YOU CANT AFFORD TH
EM"
1660 GOTO 1550
2000 REM DEATH OF A HERO
2005 CLS
2010 PRINT AT 5,1;"UNFORTUNATELY
YOU HAVE PERISHED"
2015 PRINT AT 8,1;"YOU SCORED:";
S+TR
2018 PRINT
2019 PRINT
2020 IF S+TR<50+PS THEN GOTO 350
S
2025 LET S=3-15
2028 LET PS=S+TR
2029 PRINT "YOU PLAYED WELL:";,,
2030 PRINT "I SHALL DEDUCT 15";,,
2031 PRINT
2032 PRINT "FOR DAMAGE TO THE BO
DY"
2033 PRINT
2034 PRINT "YOU MAY CONTINUE";
2035 FOR I=1 TO 50
2037 NEXT I
2038 CLS
2040 GOTO 1505
2045 REM TREASURE ROOM
2050 PRINT AT 0,0;
2052 CLS
2055 FOR I=-10 TO 10
2058 LET AI=ABS I
2060 PRINT TAB 0;C$( TO AI);
2065 PRINT TAB (30-AI);C$( TO AI
)
2070 NEXT I
2075 PRINT AT 0,10;C$( TO 10)
2080 PRINT AT 20,10;C$( TO 10)
2085 PRINT AT 10,0;"■";TAB 29;"■
2086 LET DEM=1
2087 LET QW=INT (RND*4)

```

- 1295-1500 Set the scene and start the entry into the cave.
- 1505-1660 Are used when the hero reaches the entrance hall again. You are allowed to buy arrows here; at a cost!
- 2000-2040 Inform you that your hero is dead and give you the chance to continue.
- 2045-2115 Draw the treasure room.
- 3000-3035 Are a trap in cave 21.
- 3500-3530 Give you the option to be a hero again.
- 9990-9999 Are used to auto run the program, after loading.



```

2090 FOR I=1 TO QW+1
2095 PRINT AT 12+I,12+(RND*2);"*
*";
2100 NEXT I
2105 LET N=10
2106 LET MY=-1
2107 LET MX=0
2108 LET K=18
2109 LET J=7
2110 LET M=2
2111 LET FX=J
2112 LET FY=K
2115 GOTO 265
2999 REM "TRAP"
3000 IF PEEK (0+33*(K+MY)+J+MX) =
0 THEN GOTO 3015
3002 LET AD=MY
3005 IF AD=0 THEN LET MY=MX
3006 IF AD=0 THEN LET MX=0
3007 IF AD<>0 THEN LET MY=0
3008 IF AD<>0 THEN LET MX=0-AD
3015 LET J=J+MX
3020 LET K=K+MY
3025 PRINT AT K,J;"*";
3030 IF RND>.5 THEN PRINT AT FY,
FX;"*";
3032 IF RND<.25 THEN GOSUB 1200
3035 RETURN
3500 REM SECOND CHANCE
3502 FOR I=1 TO 50
3503 NEXT I
3505 CLS
3510 PRINT "DO YOU WISH TO PLAY
AGAIN? (Y/N)"
3511 LET Z$=INKEY$
3515 INPUT Z$
3520 IF Z$="N" THEN STOP
3525 IF Z$="Y" THEN GOTO 1297
3530 IF Z$=" " THEN GOTO 3510
9990 LET Z$="COT"
9995 SAVE Z$
9999 RUN

```

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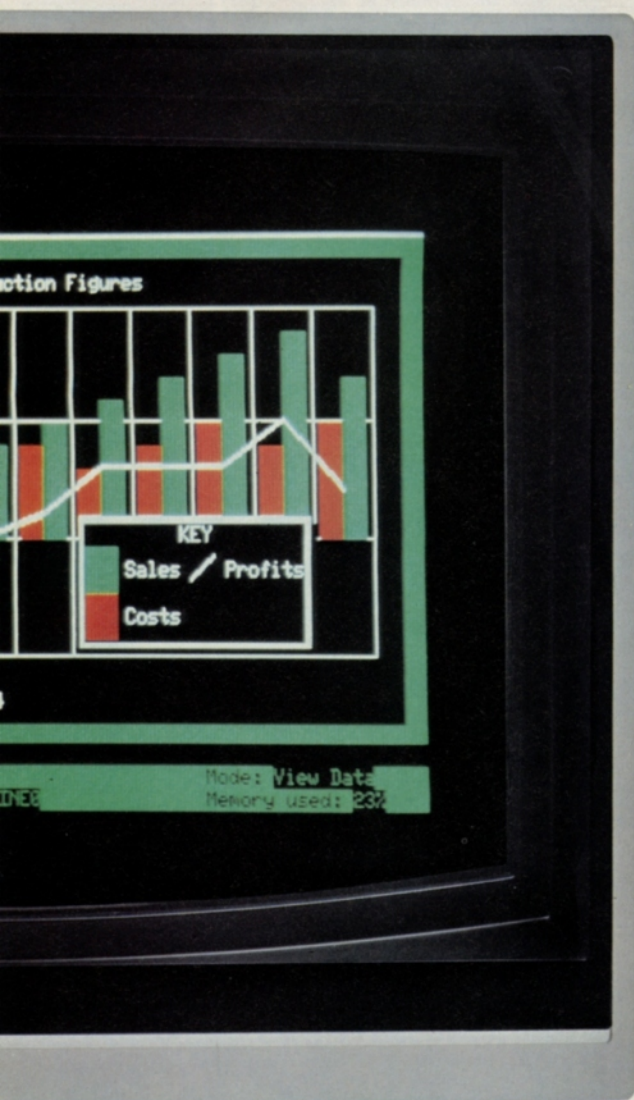
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# New-Sinclair QL

## 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.

It's not just a bit better than this, or a bit cheaper than that – it's a computer that's very hard to compare with anything. Just check the features below – and if you don't agree, take up the challenge at the end of the advertisement.

If you do agree, there's only one course of action you can take... get yourself a Sinclair QL at the earliest possible moment.

### 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.

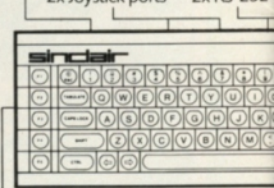
QDOS is a single-user, multi-tasking, time-sliced system using Sinclair's new SuperBASIC as a command language.

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

2x Joystick ports 2x RS-232C



### 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

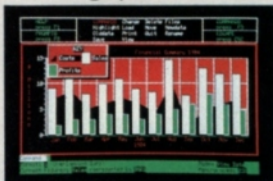


Certain to set a new standard of excellence, QL Quill uses the power of the QL to show on the screen exactly what you key in, and to print out exactly what you see on the screen.

A beginner can be using 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 blow-by-blow comparison. We'll take a published comparison chart for the machine you're considering (not one we've created ourselves) and give you the Sinclair QL figures, detail by detail.

## Take action today!

### To order by mail

– complete the coupon and send it to the FREEPOST address below. For credit card holders it may be possible to extend your credit limit. Full details will be sent when we acknowledge your order.

### To order by telephone

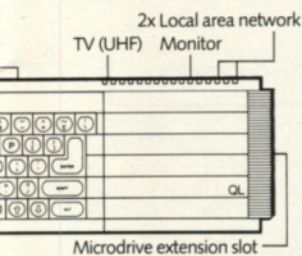
– phone Camberley (0276) 685311; – have your credit card (Access, Barclaycard, Trustcard) number ready. It may be possible to extend your existing credit limit. Please ask our telephone staff for more details. **Please do not use this number for other enquiries.**

### For more information

Phone Camberley (0276) 686100, or use the coupon to get a QL brochure.

Please allow 28 days from receipt of order. Remember that Sinclair offers a 14-day money-back undertaking.

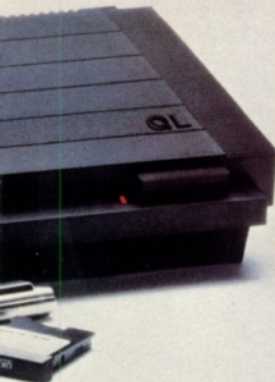
© Sinclair, QL, QDOS, QLUB and ZX Microdrive are trade marks of Sinclair Research Ltd.



## 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.



Qty	Item	Code	Item Price £	Total £
	Sinclair QL Computer	6000	399.00	
	QLUB membership (one year)	6100	35.00	
	Postage & packing (any order over £390)	6999	7.95	

Please tick the appropriate box-

- I enclose a cheque made payable to Sinclair Research Ltd for £ \_\_\_\_\_ £ \_\_\_\_\_
- Please charge my Access/Barclaycard Trustcard Account No. \_\_\_\_\_

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Mr/Mrs/Miss \_\_\_\_\_

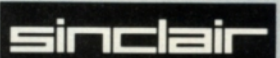
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- Please send me a Sinclair QL brochure

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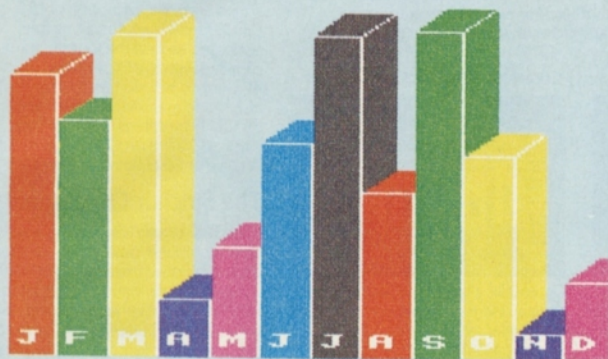
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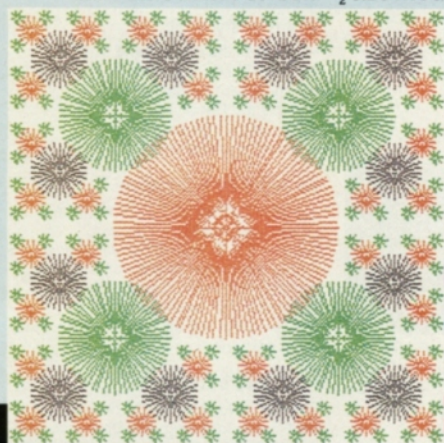
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Clubnet keeps you in touch with enthusiasts throughout the country. It is divided into clubs and user groups and lists of both will be published every four weeks.

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.

# Addressed informally



'No committee' is the motto of Aylesbury Computer Club, set up roughly four months ago.

Organiser Ken Knight is anxious the club shouldn't become too formal but he aims to have a central theme to each meeting: when *PCN* visited, the elusive Electron was under the spot light.

Chris Pyves spoke about the machine, pointing out that while the BBC is used in schools, the Electron is intended more for home use.

Previous talks have covered program

generators and codewriters for the Commodore 64.

One member of the club, Nik Posadzki, works in a local computer shop as a salesman and demonstrator, and his extensive knowledge of the business has proved invaluable. He is at college studying science and technology.

The club meets every Thursday at 7.30pm at the Mandeville school in Aylesbury, attracting 12 to 15 members using Spectrums, BBC's, the RML 380 and the Commodore 64, all provided by the

school. There is a sister club which concentrates mainly on the Spectrum and meets on Fridays at Quarrendon School.

Nik says the club isn't opposed to games players, but they would not like to become inundated by them. As for subscriptions, activities are funded by the school.

**Janice McKenzie**

**Name** Aylesbury Computer Club **Venue** Mandeville School, Churchill Avenue, Aylesbury, Bucks **Meetings** Each Thursday at 7.30pm **Contact** Bob Winterson on Aylesbury 82416

## 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, 60 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 Lending Library, Five Marshal Street, Bristol BS1 4AA.

**Multi-User Club** Valerie Boyde-Shaw, Nailsea 851337.

**Warle** 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.

**Chilterns** Computer Club. Meets at Five Bells, Eaton Bray, Near Dunstable, Leighton Buzzard on second and fourth Monday of each month. Contact Steve Betts, 42 Wallace Road, Eaton Bray, 006 2DF, 0525 220922.

**Luton College** Computer Club. John Rodger, 0582 3411.

**Luton** Computer Club. J P Fletcher, 1 Trowbridge 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 Tilsley, 31 Pembroke, Hanworth, Bracknell, Berkshire.

**Easthampstead** Park School. Meets at Easthampstead Park School, Bracknell, on the first Wednesday in month at 8pm. Brian Poulton, 0344 84423.

**Crown Wood** Computer Club. Meets at Crown Wood Community Centre, Bracknell, each Thursday at 8pm. Ray Ayrton 0344 59264.

### BIRMINGHAM

**Birmingham** Amateur Computer Club. Meets at Free Church Hall, Land Lane, Marston Green, Birmingham on first and third Thursday of each month at 7.30pm. Contact Les Moore, Secretary, Wolverhampton 725340.

**Primrose Hill Centre** Micro Club. Meets Wednesday at 7.15pm at the Primrose Hill Centre, Shannon Road, Kings Norton, Birmingham. Contact Keith Belfield. Tel: 021-459 8995.

### BUCKINGHAMSHIRE

**Aylesbury** Computer Club. Meets at Quarrendon Youth Club every Friday at 7.30pm and at Mandeville County Secondary School the first Thursday of each month at 7pm. Ken Knight, 22 Mount Street, Aylesbury, 0296 5181.

**Chilterns** Microcomputer Club. Meets at the Garden Centre, School Lane, Chalfont St Giles, on the first Wednesday of each month. Mrs W Tibbitts, Ellwood, Deanway, Chalfont St Giles, 024 07 4906.

**Iver** Computer Club. P A Seal, 1 Ormonde Flats, Church Road, Iver Heath, 0753 652792.

**Iver** Computer Society meets at Huntsmoor room, Iver Village Hall on the second and fourth Thursday every month at 7.30. John Haigh, 141 Leas Drive, Iver, SL0 9RP.

### CAMBRIDGESHIRE

**Cambridge** Microcomputer Club, meets on the third Wednesday of month. Derek Tripp, 3 Spurgeons Avenue, Waterbeach, 0223 315662.

**Peterborough** Personal Computer Club meets at Crosfield Electronics Social Club, fortnightly on Mondays. Andrew Pike, 0733 44342 after 5pm.

### CHESHIRE

**Altrincham** Computer Club. Meets at N. Cestrian Grammar School, Durham Road, Altrincham, fortnightly. Martin Hickling, 39 Barrington Road, Altrincham, WA14 1HZ, 061 941 4547.

**Brunel** Computer Club. Meets at St Werburgh Community Centre on alternate Wednesdays at 7 to 10pm. Mr R Simpson, 4 The Coots, Stockwood.

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

**Crews** Computer Users Club meets at Buffaloes Club, Earl Street, Crews, on the third Thursday of each month at 8pm. Bram Knight, 0270 623375.

**Holmes Chapel** Micro Club meets at Leisure Centre, Holmes Chapel at 7.30 to 9.30pm on the first and third Tuesday of month. Margaret Baker, 1 Helton Close, Crews, 0477 34238.

**Kinder Peck** Computer Club meets at Bew Mills School every Monday. John Eary, New Mills 43870.

**Kettleshulme** National Computer Buyer's Club. Send SAE to Barry Edwards, Laneside House, Paddock Lane, Kettleshulme, 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, 0663 44051.

**Northwest** Computer Club meets fortnightly. John Lightfoot, 13 Aston Drive, Frodsham, Warrington, WA6 7PU, 0728 31519.

**Northwest** Computer Club, weekly meetings. Tom Wyatt, 29 Summer Lane, Halton, Runcorn Cheshire WA7 5PG. Runcorn 533745.

**Mid-Cheshire** Computer Club meets at Winsford Library on the second Friday every month at 7.30pm. Simon Sadler, Winsford 53339.

**Stockport** Software Exchange Club. Send SAE to P Redford, 53 Cavendish Road, 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.

**Stockton** Amateur Computer Club meets at YMCA, Stockton, each alternate week at 7-9pm. Peter Cheshire, 60 Croft Road, Eaglescliffe, Stockton-on-Tees, TS16 0DY.

### CORNWALL

**Cornish Radio** Amateur Club — Computing Section. Bob Reason, 24 Mitchell Road, Camborne.

**Cornwall Area** PAICC meets at the Penzance Micro Centre every Friday. S Zenith, Hayle 754845.

**St Austell** Computer Club and Computer Town meets at ECIP Labs, Penpewar Road, fortnightly on Mondays at 7.30pm. N G Day, 2 Clendale Close, St Austell.

# CLUBNET

## CUMBRIA

**Ambleside Computer Club.** Contact Jeremy Westernman, 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, Sheperd 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.

**Brixham Computer Users Club.** Meets at Computer Systems (Torbay), Pump Street, Brixham, Saturdays at 2.30pm. Ian Chipperfield, 22 Brookdale Court, Brixham, Devon (Brixham 59224).

**Computers Against the Bomb.** Contact Paul Couchman, 29 Clifton Place, North Hill, Plymouth, Devon.

**Exeter & District Computer Club** meets at Exeter School, Magdaliene Road, Exeter, on the second and fourth Tuesday every month. T. G. Holden, 14 Greenville Avenue, Teignmouth, TQ14 9NT.

**Exeter & District Amateur Computer Club** meets second Tuesday every month. Doug Bates, Fortescue House, Stoke Canon, Exeter. Specialist meetings on third and fourth Tuesday.

**Okehampton Computer Club.** Contact Cheri Graebe, Okehampton 3523, or Okehampton Community College, Okehampton 3800. 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 Totnes 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 Canteen English Truck Centre on the second and fourth Wednesday every month at 7pm. David Washford, 1 Alexander Road, Bournemouth, BH6 5JA.

**Purbeck Computer Club,** contact 31 North Street, Wareham, Dorset BH20 1AD.

## DURHAM

**Darlington Computer Club,** weekly meetings. L. Boxell, 8 Vane Terrace, Darlington DL3 7AT. 0325 67766.

## ESSEX

**Genius Computer Club.** 30 Webber House, North Street, Barking.

**Great Dunmow Computer Club.** Contact T Coombs, 4 Oakroyal House, Oakroyal Avenue, Great Dunmow. Essex CM6 1HQ.

**Brentwood Amateur Microcomputer Club** meets once a month. A R Holland, 0277 221620.

**Springfield Computer Club** meets on the first Friday of every month. Stephen Cousins, 1 Aideburgh Way, Springfield, Chelmsford, CM1 5PB. 0245 50155.

**Canvey Computer Club.** Contact Dean Williams, 17 Morningson Road, Canvey Island, Essex SS8 8AT.

**Colchester Microprocessor Group** meets at University of Essex on the second and fourth Wednesday of every month at 7.30pm. Information Centre, University of Essex, near Colchester.

**Colchester Computer Society.** Meets at Severalls Hospital Social Club, Colchester. Contact A Potten, 14 Foxmead, Rivenhall, Witham. Essex CM8 3HD, Witham 516335.

**Elsenham Computer Club** meets on first Tuesday of each month. Contact Ray Franklin on 0279 815086.

**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 College, Stanway, Colchester.

**Modern 80 Computer Link Club,** meets Wednesday evenings. Contact E Ferrant, 55 South Street, Barming, Kent, 0622 27885.

**Nailsea Multi-User Club.** Contact Valerie Boyd-Shaw, 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. 0207 218456.

## GLOUCESTERSHIRE

**British Amateur Electronics Club.** Mr J Margrets, 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.

**CGHC,** D W Adam, 16 Court Road, Prestbury, Cheltenham.

**Cheltenham Amateur Computer Club** meets at Prestbury Scout Headquarters, on the third Tuesday of every month at 7.30pm. M Hughes, 36 Riverviews Way, Cheltenham.

## HAMPSHIRE

**Commodore Computer Club.** Meets on the first Friday of every month at Bury House, Gosport Community Centre, Bury Road, Gosport at 7pm. Brian Cox, Fareham 280530.

**Fareham and Portsmouth Amateur Computer Club.** Alan Smith, c/o Francis Close, Lee-on-the-Solent, Gosport, Hants PO13 8BH. 0705 550907.

**RAF Odiham Computer Club.** Contact c/o Officer i/c, Royal Air Force, Odiham, Nr Basingstoke, Hants.

**Southampton Amateur Computer Club** meets at 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, Bobblestock, HR4 9TG. 0432 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 Sablesbury 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.

**Grimsby Computer Club** meets at Grimsby Central Library fortnightly on Mondays at 7.30pm. Ian Fell, 0472 49248.

**Scunthorpe & District Microprocessor Society** meets at Community Centre, Lindy Street, Scunthorpe, every Tuesday at 7.30pm. G. Hinch, 21 Old Crosby, Scunthorpe, South Humberside DN15 8PU.

## KENT

**Canterbury ACC** proposed new club. Contact D Fisher, 21 Manwood 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.

**Medway 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, Cattedow SE6 3AS. 01-690 5441.

**Orpington Computer Club** meets at The Large Hall, Christ Church, Chatterhouse Road, Orpington, every Friday at 8pm-10.30pm. Mr R Pyatt, 23 Arundel Drive, Orpington, Kent BR6 9JF. Orpington 20281.

**National Personal Computer User Association.** Eric Keeley, 11 Spratling Street, Manston, Ramsgate, Kent.

**Sevenoaks School Computer Club.** G Sommerhoff, Technical Centre, Sevenoaks School, Sevenoaks, Kent 0732 458340.

**Tonbridge & Tunbridge Wells ACC.** Ray Sztakowski, 1 Cromer Street, Tonbridge, 0732 355960.

## 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 Hatton, 0204 792803.

**Burnley Computer Club.** Meets at Burnley Technical College on Tuesdays, 7.30-11pm. Contact Steve Tallon, 27 Basnett Street, Burnley, Lancs.

**Chorley Computer Club** meets at Townley Arms, Chorley, every other Tuesday at 8pm. Tony Higson, 23 Brock Road, Chorley, Lancs. Chorley 68429.

**Ribble Valley Computer Club** meets at Staff Canteen, Pendle Carpets Ltd, West Bradford, on the second and fourth Monday of month at 7-9pm. Contact Ian Thornton-Bryar, 25 Southfield Drive, West Bradford, Clitheroe, BB7 4TU.

**Lancaster & Morecambe Computer Club.** Sarah Blackler, 0524 335553.

**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 6NN.

**Hawker Siddelle Computer Club.** Contact R Wrathall, 6 Naseby Drive, Loughborough LE11 0WU.

## LINCOLNSHIRE

**Lincoln Computer Club,** meets at the Cardinal'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.

**Skegness Computer Club,** meets at County Hotel every Monday, 7.30-9.30pm. Reg Potter, 118 Beresford Avenue, Skegness. 0754 3594.

## LONDON

**Association of Computer Clubs.** Contact Rupert Steele, 17 Lawrie Park Crescent, London SE26. 01-778 6824. National Club.

**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, Cathall 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 Princes 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 Pendry, Micro Club, c/o Imperial College Union Office, Prince Consort Road, London SW7 2BB.

**London School Computer Club.** Burlington Danes School, Dane Building, DuCane Road, Hammersmith.

**Metropolitan Police Amateur Computing Club** meets on the first Thursday of month at 7pm. S Farley, 01-725 2428.

**68 Microgroup** meets at Regents Park Library, Robert Street, NW1, on the third Tuesday of month at 7.30pm. Jim Anderson, 41 Peabworth 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 Quaintance,

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 NWS, 01-485 4551.

**The SOBAT Computer Club** meets once a fortnight. Mr T Kayani, 12 Calderon Road, London E11.

**South East London Microcomputer Club** meets at Thames Polytechnic, Greens Ends, Woolwich SE18, on alternate Wednesdays at 7pm. Peter Phillips, 61 Grainger Road, SE3. 01-853 5829.

**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, Alperton, 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, 061-989 2080.

## MERSEYSIDE

**Merseyside Microcomputer Group** meets at Merchant Taylor's School, Crosby, on second Thursday of month. Mr F Shaw, 14 Albany Avenue, Eccleston Park, Prescot. 051-426 5536.

**Southport Computer Club** meets weekly, Ian Bristone, 28 Weld Road, Southport, Merseyside PR8 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 7.30pm. Contact Steve Ward, 28 Brodie Road, Enfield, Middx EN2 0EU, 01-363 3786.

**Microcomputer User Association.** Meets three times a year. Contact Phillip Matthews, Phillip Morris House, 21 High Street, Feltham TW13 4AD, 01-751 6388.

**Sunbury Computer Club** meets at St Benedict's Hall, Napier Road, Ashford, on the last Tuesday of month at 8pm. Simon Taylor, 8 Priory Close.

**Sunbury-on-Thames, Middlesex.** Simon Clark, 83 Watling Street, Twotower, Middlesex NW12 7AG.

**Middlesex Micro Club.** Contact Pete Kayner, 17 Manor Vale, Brentford, Middlesex.

## NORTHAMPTONSHIRE

**Corby Universal 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 Bickie on 0536 514381.

**South Northants Computer Group** meets at Anchor House, Moat Lane, Twotower, on Wednesdays at 7.30pm.

## NOTTINGHAMSHIRE

**Ashfield Computer Club** meets at Carse 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 Dewsham 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.

# CLUBNET

Contact John Lannigan on Retford 700134.  
**Workop** Computer Group. Mr Andrews, Workop 487327.

## NORFOLK

**Anglia** Computer User Group. Jan Rejzl, 128 Templerey, Sprouton Road, Norwich. 0603-29652.

**Brecklands** Computer Club. Contact Andrew Hiom, 11 Annafewes Close, Thetford, Norfolk. Meets each Saturday, 5pm at this address.

**Dereham & District** Computer Club. Meets at Middle School, Westfield Road, Tottowood, East Dereham on every second Wednesday at 7.30pm. Contact Mrs Fran Cook, Dereham 67732.

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

**Gorleston** Computer Club meets at Unit 26, Longs, Englands Lane, Gorleston, Great Yarmouth on Fridays at 6.30pm. Tel: 0493-600003.

**Yarmouth Computer Club** meets each Friday at 7pm. Contact the club at Unit 26, Longs Estate, 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 Roddie on Holywood 3212.

**North Down** Micro Users Club. Meets at Bangor Central Library, Hamilton Road, every fourth Tuesday. Contact A Robson, 0247 67060.

## 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 Phelps, Southport Cottage, Sutton Courtenay, Nr Abingdon, Oxon OX14 4AU.

**Ridgeway** Computing Club meets at Swan Hotel, East Ilsley, on the second Tuesday month. Mike Magney, Beavers, South Street, Blbury, Didcot, Oxon OX11 0JU.

## SCOTLAND

**Bishopston** Computer Club meets at 'Cwa Ben', Sachelocourt Avenue, Bishopston, Renfrewshire, on Sunday once a month Alasdair Law, 10 Dundglass Road, Bishopston, Renfrewshire PA7 5EF.

**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 month from 7-10pm. I. Robertson, 031 441 2361.

**Scottish Amateur Computer Society,** Mike Anthony, 46 Moreuden Park Gardens, Edinburgh EH17 7JR.

**Central Scotland** Computer Club meets at Falkirk College of Technology, Grangemouth Road, Falkirk, on the first and third Thursday of month. James Lyon, 78 Slamannan Road, Falkirk FK1 5NF.

**File** Computer Users Club meets fortnightly. Murray Simpson, 31 Tom Steward Lane, St Andrews, Fife, KY16 8YB.

**Gramplan** 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 Glebe, Kemnay, Inverurie, Aberdeenshire.

**Inverness** Personal Computing Club meets every second Tuesday at 7.30pm. Gyl Mackenzie, 38 Ardconnell 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 PH1 1HA.

**Skye and Lochalsh** Computing Society. Contact C Manwell, Tigh na Paic, 25 Lower Breakish, Isle of Skye IV42 8DA, 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 G4 8NW.

## SHROPSHIRE

**Ludlow & District** Microcomputer Club meets at Diocesan Education Centre, Lower Galdeford, Ludlow, on the second Monday of month at 7.30pm.

**Shrewsbury** Micro Club meets at Shrewsbury Shirehall once a month. Mr V Ives, 6 Bramley Close, Severn Meadows, Shrewsbury SY1 2TP.

**Telford** Computer Club meets at Telford ITC on Monday 6-9pm. John Murphy, 10 Birchmore, Brookside, Telford TF3 1TF. 0952 595959.

## SOMERSET

**Sharp M200** Club. Tim Powell, Computer Centre, Yeovil College, Yeovil. 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 Romsay Road, Yeovil, BA21 5XN.

## STAFFORDSHIRE

**Alsager** Computer Club. meets at Alsager Comprehensive School, Stoke-on-Trent, Staffs, fortnightly on Tuesday. Rex Charlesworth, 09363 77270.

**North Staffs** Amateur Computer Club meets on the third Wednesday of each month. J. Roll, 16 Hill Street, Hedgesford, Staffordshire WS12 5DS.

**ICI Birmingham** Branch Micro Club. c/o WBA Ecclestone, 26 Browns Lane, Tamworth, Staffs.

**Tame Valley** Computer Club. Tim Marshall, 32 Milton Avenue, Leyfields, Tamworth, Staffordshire B79 8UG.

## 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, Balsham, CB1 6DW, 022 029 583.

**Newmarket** Home Computer Group. Meets at Anchor House, Moat Lane, Towcester, at 7.30pm. Contact Simon Clark, 83 Watling Street, Towcester, 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 month. Contact P Palmer, 8 Corfe Close, Ashted.

**Deaf** Microcomputer Users Group. Contact Chris Marsh, 3 Delaporte Close, Epsom, Surrey KT17 4AF.

**Thames Valley** Amateur Computer Club meets at Griffon, Caversham, on the first Tuesday of month. Brian Quarm, 25 Roundwood, 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, Bounstone, Farnham.

**West Surrey** Computer Club meets at Paddock Room, Green Man Public House, Burpham, Guildford, the first Thursday of month. Chris Karney, 0453 68121.

**TN Computer Club** meets on Fridays. A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0485 62035.

**CBBS 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 Forster, 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

**Arum** Microcomputer Club meets at Wick Amenity Centre, Wick Farm Road, Littlehampton, on the first Monday of month at 8pm, and third Sunday of month at 6pm. 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.

**Chichester** Computer Club meets first, second and fourth Tuesday of each month. Contact Bruce Piggott on 089 26 62970.

**CVBC** Video Games Club. Contact G Bond, 7 Swift Lane, Langley Green, Crawley Sussex.

**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.

**Horsham** Microcomputer Club. Meets at the Forest Community School, Compton Lane, Horsham on second Wednesday of each month from 7.30pm. Philip Dickinson 0403 6965 or Jim Laing 0403 67522.

**Midhurst & District** Computer User Group. Meets at the Grange Centre, Midhurst, at 7pm on the second and fourth Thursday of every month. Contact Val Weston, tel: Midhurst 3876.

**Mid-Sussex** Microcomputing Club. Contact Jeff Hayden, 2 Hillary Close, East Grinstead, RH19 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 Wilmot Youth Centre, Littlehampton Road, Worthing, on alternate Sundays 11am-1pm. B. Thomas, 11 Gannon Road, Worthing, W. Sussex, BN11 2DT, 0903 36785.

## TYNE & WEAR

**Newcastle upon Tyne** Personal Computer Society meets at Room D103, Newcastle Polytechnic on the first Tuesday of every month. Pete Scargill, 21 Percy Park, Tynewood, 0632 573905.

## WALES

**Abergele** Computer Club meets at Abergele CI Offices every Thursday at 7.30-10pm. W Jones, 77 Millbank Road, Rhyd, Clwyd.

**Beddau & District** Computer Club. meets at Beddau Community Centre, 7pm, Mondays. Nigel Butters, Newfown, Llantwit 260365.

**Clwyd '80** Computer Club. Contact Allan Jones, The Island, 1 High Street, Connah's Quay, Deeside, Clwyd, 0244 816893. Meets at 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, Stow Hill, Thursday at 7.30pm. Rothery Harris, 16 Alanbrook Avenue, Newport, Gwent, Wales NP1 6DJ.

**Llantwit Major** Computer Club. Meets at Adult Education Centre, Llantwit Major, every Tuesday. Contact Douglas Mountain, 16 Denbigh Drive, Llantwit Major, South Glamorgan CF6 9GQ.

**Mold** Computer Club. Meets 7.30pm on first and third Thursday of each month at the Daniel Owen Centre, Earl Street, Mold. Contact G Johnson, 18 Daytona Drive, Northop Hall, Mold, Clwyd, Wales. Tel: Deeside 821945.

**Milford Central** Computer Club. Open to schoolchildren, meets every lunch hour and evening. Contact Harry Evans, Milford Central School, Prioryville, Milford Haven, Dyfed, 043 784 571.

**Newtown & District** Computer Club meets first and third Friday of each month. Contact John Dale on 068 688 502.

**Pencoeed** Amateur Computer Club meets fortnightly on Saturdays at Pencoeed Welfare Hall, Philip Williams, 38 Bryn Rhydym, Pencoeed, Bridgend.

**Mid-Glamorgan** CF35 6TL, 0656 860307.

**Pontypool** Computer Club meets at The Settlement, Roackhill Road, Pontypool, Gwent, on Friday. Graham Loveridge, on Pontypool 2827.

**Swansea & Southwest Wales** Amateur Computer Club meets on the last Friday every month. Paul Griffiths, 1 Precelli Road, Penlan, Swansea SA5 8AF.

**Swansea** Computer Club. Meets at No 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.

## WARWICKSHIRE

**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.

**Idiots' Computer Club.** £1 gives you an elastic band and information sheet. This club is for morons only. Contact William Mitchell, Highmore House, Green Lane, Welton, Lincolnshire.

## WEST MIDLANDS

**Cannock** Computer Society meets at Cannock Computer Systems, Old Penkridge Road, Cannock, fortnightly. Jerry Sale, 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.

**Walsall** 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, Pinhills, Calne SN11 0LY.

**Chippenham** Computer Club. Contact Peter Knaggs, 12 Seymore Road, Chippenham or call Chippenham 654940.

## WORCESTER

**Worcester & District** Computer Club meets at Old Pheasant Inn, New Street, Worcester, on the second Monday month at 8pm. D Stanton, 55 Vauxhall Street, Rainbow Hill, WR3 8PA.

## WALES

**YORKSHIRE**

**Barnsley Co-Operative** Computer User Group meets at Co-Op Social Club, Pogmore, Barnsley, on the last Tuesday month at 7.30pm. James Brdson, c/o 39 Kereforth Hill Road, Barnsley, South Yorks S70 6NF, 0226 41753.

**Calderdale** Computer Club meets on first Tuesday of each month. Contact Ray Franklin on 0789 815088.

**Greenhead** Grammar School Computer Club. Brian Smith, Greenhead Road, Keighley, West Yorks BD20 6EB, 0535 62628.

**Huddersfield** Computer Club meets every Monday. Chris Townsend, 760-4 Manchester Road, Lindthwaite, Huddersfield, 0484 657299.

**Keighley** Computer Club. Meets each Wednesday at 7.30pm at Methodist Church Hall, Market Street, Keighley, West Yorks. Contact Simon Midgley on 0535 681463.

**Leeds** Microcomputer Users Group meets at 8 Regent Street, Chapel Allerton, fortnightly on Thursday at 6pm. David Parsons, 22 Victoria Walk, Horsforth LS18 4PL.

**Program Power**, R Simpson, 5 Wemsley Road, Leeds LS12 2BK, 0532 683186.

**Shipley College** Computer Group meets on Tuesdays. Paul Channell, tel: 0274 595731.

**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, Tetterley, Sheffield S17 3QE.

**Thursoe & District** Micro Users' Club meets at Thursoe Comprehensive School, Physics Lab, Clayton Lane, Thursoe, Wednesday at 7.30pm during school term. Mr James Davis, 62 Tudor Street, Thursoe East, 0709 893880.

**West Yorkshire** Microcomputer Group meets on Tuesdays. Phillip Clark, c/o Suite 204, Crown House, Armley Road, Leeds LS12 2ES, 0532 632532.

**York** Computer Club meets at the Enterprise Club every Monday at 8pm. K Thomas, Green Lea, Ripon Road, Harrogate, HG1 2BY, 0904 38239.

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.

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.

# Doncaster group's street credibility

Doncaster & District Sinclair User Group's main project currently is designing a Doncaster street map which scrolls over the screen showing all the town's major places of interest. The map comprises 50 screens altogether, and can be used to form quizzes and games.

The group uses only Spectrums at present, and runs such groups as Adventure Corner, Basic Programming Corner, and hardware and software review sections.

'We have engineers, a taxi driver, a rock guitarist and a redundant office manager among our members,' said Mr Cooper, who also acts as secretary for the 4,000 members of the Frankie Lane International Appreciation Society. Members are treated to Frankie Lane's music during intervals at the group's meetings, but they don't seem to mind.

The members, aged between 12 and 59, are also designing subroutines to be compiled by three local teachers into a book in which any programming hints will be included.

The group has just moved to larger premises and people on the 30-long waiting



list will be able to join the present 50 members. Seven of these are women, three of whom bring their children along.

Members pay 50p for each attendance.

**Wendie Pearson**

**Name** Doncaster & District Sinclair User Group  
**Venue** Graceholme Social Club, Edlington Lane, Warmworth, Doncaster, South Yorkshire  
**Meetings** Each Wednesday from 7 to 9pm  
**Contact** Tony Cooper, 0302 853124

## USER GROUPS

### Acorn

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

**Kent** Madway 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 Rutler, 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, Crussall, Manchester 8 on Tuesday except school holidays. John Ashurst, 192 Vendure Close, Failsworth, Manchester, 061-681 4962.

### Apple

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

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

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

**Birmingham & Region** Apple Group.

Contact Mel Golder, 021-426 2275.

**Birmingham** Midapple User Group. Contact Marilyn Golder at 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 Profit, The Granary, Hill Farm Road, Marlow Bottom, Buckinghamshire, 062 84 73074.

**Chelmsford** Apple Users Club. Proposed new club. Contact D Beckingham, 571 Galleywood Road, Chelmsford, tel: Chelmsford 66948.

**Croydon** Apple User Group. Meets at Siddy House, 350 Lower Addiscombe Road, Croydon, on second Monday of month. Paul Vernon, 60 Flawkhurst Way, West Wickham, Kent, 01-777 5478.

**London** Apple Music Synthesis Group. Dr Davis Ellis, 22 Lennox Gardens, London SW1.

**South-East London** Apple User Group (Appletree). Contact John Grieve at 106 Maran Way, Erith, Kent or phone 01-311 7681.

**Milton Keynes** Microcomputer User Group. Meets every Tuesday, 7.30pm. Brian Pain, Sir Frank Markham School, Woughton Centre, 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 5232.

**Lea Valley** Atari User Group. Meets every month. Details from Matthew Tyedman, 125 Cadmore Lane, Cheshunt, 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 Blagg Lane, Nantwich, Cheshire, 0270 626969.

**Essex.** Contact John Sarrar, 138 Frederick Road, Rainham, Essex, tel (76) 22077. Meets at Rainham Town Football Club, 7.30pm, second and fourth Friday of each month.

**London** Silica Atari 400/800 User Club. Richard Hawes, 01-301 1111.  
**Manchester** Atari Computer Enthusiasts. Meets at The Ellesmere, Worsley Road,

Worsley, on the second and last Thursday of every month. Contact Martin Davies, Bolton 700757.

**South Middlesex** Atari Club. Meets fortnightly, Tuesdays, at Staines Methodist Church Hall, Kingston Road, Staines. Contact Brian Milligan, 50 Linkscroft Avenue, Middlesex. Tel: Ashford (69) 45387.

**Norwich** Atari User Group. Ken Ward, Norwich 661149.

**Preston** Atari Computer Enthusiasts. Meets at KSC Club, Merion House, Beach Grove, Ashton, Preston, on third Thursday of month at 7.30pm. Roger Taylor, 0253 738192.

**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, 051-525 2934 (evenings).

### BBC

**Inverclyde** BBC Micro User Group. Meets on third Monday of each month at 9 St John's Road, Gourrock, Renfrewshire. Contact Robert Watt on Gourrock 39967.  
**Laserbug** is an international user group for the BBC micro. Paul Barbour, 10 Dawley

# CLUBNET

Ride, Colnbrook, Slough, Berks, 02812 30614.

**Beebug.** Sheridan Williams or David Graham 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 Snee on 0942 720984.

**Bedford** BBC network user group. Contact Tom Short/Mike Taylor at the Computer Centre, Bedford College of Higher Education, Cauldwell 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.

**Chelmsburg.** 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 SAE to Peter Hughes, Five Marsh Street, Bristol BS1 4AA.

**Huddersfield** BBC User Group meets third Wednesday of each month. Contact Stuart Mallinson on 0484 885395, 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 Niki Kelly, 56 Queens Drive, Walton, Liverpool L4 6SH.

**North London** BBC Micro Users Group. Meets at the Prince of Wales, 37 Fortune Green Road, on Tuesdays at 7pm. Dr Leo McLaughlin, Westfield College, University of London, Kidderpore Avenue, London NW3 7ST. 01-435 0109.

**Northern North Sea** User Group. Potential members with helicopters welcome. Contact Ian Wilkins on board MSV Stadvie, 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 225660.

**Norwich & District** BBC Microcomputer User Group. Meets at Norwich City College on the first and third Tuesday of every month at 7pm. Subs: £3; students and OAPs £1.50. Contact Paul Beverley, Department of Electronics, Norwich City College, Ipswich Road, Norwich NR2 2LJ.

**Preston** area BBC Micro User Group. Meets at Plough Hotel, Lea, Preston, on last Tuesday of month at 7.30pm. Duncan Coughler, 8 Briar Grove, Ingol, Preston, Lancashire, 0772 75793.

**Tyne & Wear** BBC User Club. Contact Ian Waugh, 13 Briardene Drive, Wardley, Tyne & Wear NE10 8AN.

**Wakefield** BBC Micro User Group. Meets at Holmfield House, Clarence Park, Wakefield, on first Wednesday of each month at 7.30pm. Contact R Bilton tel: Wakefield 382274.

**Weellingborough** 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 at

Campus West Library, Welwyn Garden City, Herts, on last Friday of each month at 7pm. Contact Debi Colthorpe, 36 Birds Close, Welwyn Garden City, Herts, 96 30082.

## Comal

**London** Comal User Group. Meets at Polytechnic of North London, Holloway, second Wednesday of month, term time. John Collins, 75 74111.

## CUA

**CUA User Group.** Adrian Waters, 9 Moss Lane Romford, Essex.

## Commodore ICPUG

**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 Loxells 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 Kelso Road, Bury St Edmunds, Suffolk.

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

**Canterbury SE.** Meets at The Physics Lab, Canterbury University, on first Tuesday and Wednesday of month. R Moseley, Rosemount, Romney Hill, Maidstone, 0622 37643.

**Carrickfergus.** David Bolton, 19 Carrickburn Road, Carrickfergus, 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.

**Clywd.** John Poole, 6 Ridgway Close, Conna's Quay, Clywd CH5 4LZ.

**Corby.** Peter Ashby, 215 Wincohn Way, Corby, Northamptonshire, 05363 4442.

**Coventry.** Meets at Stoke Park School and County College at 7pm on fourth Wednesday of month except July, August, December. Will Light, 22 Ivybridge Road, Stychevale, 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 2GG.

**Devon.** Contact Matthew Stibbe, The Lawn, Lower Woodfield Road, Torquay, Devon.

**Durham.** North-East Pet and ICPUG. Meets at Lawson School, Burnley at 7pm second and third Mondays. Jim Cocallis, 20 Worcester Road, Newton Hall Estate, Durham, 0385 67045.

**Dyfed.** Simon Kniveton, 097 086 303.

**Gosport.** Meets at Bury House, Bury Road, Gosport, Hants at 7pm. Contact Tony Cox, 10 Stapers Reach, Rowner, Gosport, Hants.

**Hainault.** Meets at Grange Remedial Centre, Woodman Path, Hainault, Carol Taylor, 101 Courtlands Avenue, Cranbrook, Ilford, Essex.

**Glasgow.** Dr Jim MacBrayne, 22 Daidmyre Crescent, Newton Mearns. 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** ICPUG user group meets last Thursday of each month. Contact R.

C. Harvey on 0240 527588.

**Hampshire.** 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 North.** Meets at Provident Mutual Assurance, Purwell Lane, Hitchin, on last Wednesday of month. B Grainger, 73 Minehead Way, Stevenage, Herts SG1 2HS, 0438 727925.

**Kilmarnock.** Meets at Symington Primary School on first and third Thursday of month at 7pm. John Smith, 19 Brewlands Road, Symington, Kilmarnock KA1 5RW, 0563 830407.

**Liverpool.** Meets at The Merchant Taylor School for Boys, Crosby, on second Thursday of month at 7pm. Tony Bond, 27 Ince Road, Liverpool L23 4UE, 051-924 1505.

**Llandyssul.** Contact F Townsend, The Hill, Rhydown, Llandyssul, 05455 5291.

**London.** Alan Birks, 135 Queen Alexandra Mansions, Judd Street, London WC1, 01-430 8025.

**London North.** Barry Miles, Department of Business Studies, North London Polytechnic, Holloway Road, London N7, 01-607 2789.

**Maidstone.** Meets on the first Wednesday of every month contact Ron Moseley, Lord Romney Hill, Weaving Maidstone, Kent, 0622 37643.

**Mapperyie.** Meets at Arnold & Carlton College, Digby Avenue, Mapperyie 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 Road, Newbury Park, Ilford, Essex IG23 7EP.

**Norfolk.** Proposed new club. Contact J Blair, 7 Beach Road, Cromer, Norfolk.

**Norfolk.** Peter Petts, Bramley Hale, Wretton, King's Lynn, Norfolk PE33 9QS, 0366 500692.

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

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

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

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

**Rhyl.** Contact Frank Jones, 77 Millbank Road, Rhyl, Clywd, 0745 54820.

**Slough.** Meets at Slough College on second Thursday of month at 7.30pm. Brian Jones, 53 Beechwood Avenue, Woodley, Reading RG5 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 Brancaster Road, Newbury Park, Ilford, Essex, 01-597 1229.

**South Midlands.** Meets at 12 York Street, Stourport-on-Severn on last Thursday of month. M J Merriman at above address.

**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.

**Witney.** Contact Ian Blyth, 40 Wilmot

Close, Witney 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 Santon Ave, Fallowfield, Manchester or Keith Bowden, 47 Park Ave, Barking, Essex, enclosing SAE.

## Commodore Pet

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

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

**Pet User Group Crawley.** Richard Dyer, 33 Parham Road, Ilfield, Crawley.

**Pet Users Education Group.** Dr Chris Smith, Department of Physiology, Queen Elizabeth College, Camden Hill Road, London W8 7AH.

**UK Pet Users Club.** 360 Euston Road, London NW1 3BL.

**Pet Users Group.** Meets at Polytechnic of North London, Eden Grove, Room 320. On alternate Tuesdays, 6pm. Barry Miles 01-607 2789.

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

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

## Commodore Vic

**National** Association of Vic-20 Owners. Contact S Tomananek, 20 Milner Road, Sherwood, Nottingham.

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

**Clywd.** Contact A Stanners, 192A Willow Park, Queensferry, Deeside, Clywd, 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, third 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

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

**Irish CP/M Users Group.** Meets monthly in Dublin area. Doug Nottley, Gardner 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 2QD, 01-247 0691.

## COSMAC

**COSMAC Users Group.** James Cunningham, 7 Harrowden Court, Harrowden Road, Luton, Bedfordshire, 0582 42934.

## DAI

**DAI UK** User Group, Manchester. Contact Dave Atherton, 16 Douglas Street,

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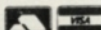
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96-98 North End, Croydon,  
Surrey. Tel: 01-681 7539



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 Pardeou, DECUS, PO Box 53. Reading, Berks RG2 0TW.

**Digital Equipment**

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

**Dragon**

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

**Slough.** Contact J Griffin, 1 Garrard Road, Britwell Estate, Slough. Tel: 75 35268.

**Brixham Dragon Owners Club.** Meets at Computer Systems (Torbay), Pump Street, Brixham, every Saturday at 2.30pm. Ian Chipperfield, 22 Brookdale Court, Brixham, Devon, Brixham 59224.

**Greater Manchester.** Contact Melvin Franklin, 40 Cowlees, Westhoughton, Bolton, Lancs.

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

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

**Epson HX20**

**London.** Contact Terence Ronson, 25 Sawyers 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 Society of Ireland. Dairmuir McCarthy, 7 St Kevins Park, Kilmacud, Blackrock, Co. Dublin.

**Middlesex.** Educational Users Group. Offshoot of National TRS-80 Users Group. Dave Fletcher, Head Teacher, Beaconsfield First and Middle School, Beaconsfield Road, Southall, Middlesex.

**Worcestershire.** Mini and Microcomputer Users in Education. National organisation. R Trigger, 48 Chadcote 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 Interest Group UK.** Meets at Room 408, South Bank Polytechnic London SE1 on the first Thursday of the month. Contact K Goldie-Morrison, Bradden Old Rectory, Towcester, Northants.

**Forum**

**Forum 80 Users Group.** Frederick Brown, 421 Ende Lane, Hull HU6 8AG.

**FX-500P**

**FX-500-P Users Association.** Max Francis,

38 Grymsdyke, Great Missenden, Buckinghamshire HP16 0LP.

**Genealogists**

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

**Genie**

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

**Intel MDS**

**UK Intel MDS 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 CR2 9DD.

**Mattel**

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

**Medical**

**Durham.** Primary Health Care Group. Dr Alastair Malcolm, British Computer Society, Cheveley Park Medical Centre, Belmont, Durham, 0385 64282.

**London.** Medical Micro Users Group. Medicom, 1-2 Hanover Street, London W1.

**Middlesex.** TRS-80 Medical and Laboratory Users. Dr Robinson, The

Residency, Northwick Park Hospital, Harrow, Middlesex.

**Micronet**

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

**Nascom**

**Berkshire.** Nascom Thames Valley User Group. Meets at Frogmore Hotel, Windsor, on Thursday fortnightly, 8pm. Mike Rothery, 37 Eaton Wick Road, Eton Wick, Windsor, Berkshire, Windsor 56106.

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

**International Nascom Microcomputer Club.** 80 Oakfield Corner, Sycamore Road, Amersham, Buckinghamshire HP6 5EQ.

**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 Hodge, 15 St John's Court, Wakefield WF1 2RY.

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

**Ohio**

**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.

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# Kiltdale

QUITE SIMPLY THE BEST

**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 20261.

## SCOTLAND

**West Lothian Oric User Group.** Contact Stuart Wilson at 21 Loch Aweaway, Whitburn, West Lothian EH47 0RJ with SAE, or phone 0501 42673 (eves).  
**Strathkelvin Oric 1 User Group.** Contact Colin Failes on 041-776 3654, or SAE to him at 24 Muirside Ave, Kirkintilloch, Glasgow G66 3PR.

## Osborne

**British Osborne Owners Group.** J Anglesea, Flat 19, Rowan House, Mitton Road, Handsworth, Birmingham B20 2JR.

## OSI

**OSI UK User Group.** Richard Elen, 12 Bennerley Road, London SW11 6DS.  
**OS-9 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 L63 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 Midland RML User Group. Spencer Instone, c/o 59 Avenue Road, Leamington Spa.  
**Newcastle.** NERML 380Z User Group. Meets monthly at Micro-Electronics Education Centre of the Polytechnic Coach Lane Campus. Mr Hatfield or Mr Reed, Computer Unit, Northumberland Building, Newcastle Polytechnic, 0632 326002.

**Research Machines National User Group.** Contact Jim Cooley, RMNUG, c/o Research Machines Ltd., PO Box 75, Oxford.

**West Midlands RML User Group.** Contact 0926 38751.  
**Sharp MZ80**  
**Aberdeen.** International Sharp Users Group. Graham Knight, c/o Knights Computers, 108 Rossmount Place, Aberdeen, 0224 630526.  
**Essex.** Sharp MZ80K User Group. Joe Street, 16 Elmhurst Drive, Hornchurch, Essex RM11 1PE.  
**Leeds.** Sharp PC1211 Users Club. Jonathan Dakeyne, 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 MZ80 Users Club. Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset BA21 4AE.

## Sharp MZ80

**Sinclair**  
**Aylesbury.** Sinclair ZX Computer Club. Ken Knight, 0296 5181.  
**Brighton.** ZX Users Group. J Ireland-Hill Jnr, 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, Grangetown, Cardiff, 0222 371732.  
**Doncaster & District Sinclair User Group** meets at Graceholme Social Club, 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.

**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.

**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 6316.

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

**Nottingham** Sinclair User Group meets first Monday of each month. Contact Graham Bastford on Nottingham 654522.  
**Scunthorpe.** Grange Farm ZX Computer Club. Scunthorpe, South Humberside. Meets first and third Tuesday of month. Contact Sheila & Fred Wilkinson, 0724 842970.

**Staffordshire.** ZX80 National Software Association, 15 Woodlands Road, Wombourne, Staffordshire WV5 0JZ.  
**Suffolk.** ZX Amateur Radio User Group. Paul Newsman, 3 Red House Lane, Leiston, Suffolk, SAE essential. No telephone inquiries.

**Surrey.** Guildford ZX80/81 Users Group. Meets Fridays. A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0483 62035.  
**Surrey.** ZX80/81 User Club. David Bigden, PO Box 159, Kingston-upon-Thames, Surrey KT2 5UQ.  
**West Sussex.** Hassocks ZX Micro User Club. Paul King, 25 Fir Tree Way, Hassocks, West Sussex.

## Sirius

**Sirius User Group.** Ray D'Arcy, Sirius User Club, The Microsystems Centre, Enterprise House, 7-11 Gordon Street, Luton, 0582 412215.

## 68XX

**68 User Group.** Meets every fourth Tuesday throughout the year. Contact 41 Pebworth Road, Harrow, Middlesex.

## 6809 User Group

**6809 User Group.** Contact Mr Gibbons, 9 St. Thomas Hill, Launceston, 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 1JG, 0855 250333.

## Sorcerer

**Liverpool European Sorcerer Club.** Monthly meetings. Colin Marle, 32 Watchyard Avenue, Formby, near Liverpool L3J 3JU, 07048 72137.

**Surrey.** Exidy Sorcerer User Group. Andy Marshall, 44 Arthurs 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 User Group.** SAE to Remsoft, 18 George Street, Brighton, tel: 0273 602354.

## Tangerine

**Avon.** Tangerine Users Group. Bob Green, 1 Marlborough Drive, Worle, Avon, 0934 21315.  
**Bristol.** Tangerine Homebrew. A Coales, 35 Mogg Street, St Werburghs, Bristol BS2 9UB.

## Texas Instruments

**Brighton.** Contact Clive & Audrey Scally, 40 Barrhill, Patcham, Brighton, Sussex.

**Ireland.** Proposed new club. Contact Mrs Ann Flynn, 53 Georgian Close, North Road, Drogheda, Co. Louth, Eire.

**Leeds.** 1199/4A User Group. Meets at 30 Gipton Wood Road, Leeds 8, Mondays 7pm. J 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 M13 9PL.

**Maidenhead — UK Texas Instruments** User Group. Contact Katie Lomax, PO Box 190, Maidenhead, Berks, Tel: 0628 71696.

**Nationwide TI Users Group.** Contact TI99/4A Exchange, Independent TI Users, 40 Barrhill, Patcham, Brighton BN1 8UF.

## Triton

**Triton User Group.** Nigel Stride, Transam Ltd, 12 Chapel Street, London NW1, 01-402 8137.

## TRS-80

**Birmingham.** National TRS-80 User Group. Meets at Adam & Eve Pub, 1st Floor, Bradford Street, Birmingham on last Friday of month. Michael Gibbons, 1 New Street, Castle Bromwich, Birmingham B38 9AP, 021-747 2260.

**Chelmsford.** TRS-80 User Group. Michael Dean, 22 Roughtons, Galleymood, Chelmsford, Essex.

**Durham.** North East TRS-80 User Group. Meets at Information Technology Centre, Gateshead on the third Wednesday of month. 7pm. J Dunn, 8 Ettrich Terrace, North Gateshead, County Durham.

**Edinburgh.** Scottish TRS-80 and Genie User Group. Meets at Mansion House Hotel, Milton Road, second Thursdays of month. Dick Mackie, 72 Morningside Drive, Edinburgh EH9 1DX, 031-447 6651.

**Herts.** Contact Reg Smith, 24 Sempill Road, Hemel Hempstead, Herts, 0442 60085.

**Hull & District TRS-80/Beeb Users Group.** Meets second Tuesday of month and Thursday 16 days later at Psychology Dept, Hull University. Contact J Lawrence, 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 Woodys 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 Cowlees, Westoughton, Bolton, Lancs.

**Lancs.** TRS-80 Colour Computer Group. Subs: £3. Contact Ian Wild, 53 Darnton Road, Ashton-U-Lyne, Lancs OL6 6RL.  
**Liverpool.** Merseyside TRS-80 Video Genie User Group. Meets second Thursday of month. 7.15pm. Peter Toothill, 101 Swanside Road, Liverpool L14 7NL. 051-220 9733.

**London, SW.** TRS-80 User Group. Ron Everitt on 01-394 2123.

**Merseyside.** TRS-80 User Group. N Rushton, 123 Roughwood Drive, Northwood, Kirby, Merseyside.

**Northampton.** National TRS-80 and Genie User Group. Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes.

**Nottingham.** TRS-80 Genie Users Group. Meets at Wilford Moderns Rugby Club House on first and third Wednesday every month at 7.30pm. Contact Geoffrey Hillier, 5a Gregory Street, Lenton, Nottingham NG7 2LR, Nottingham 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 Common Room, The Residency, Northwick Park Hospital on first Sunday of month. Dr Nick Robinson, Central Room, The Residency, Northwick Park Hospital.

**Northants.** TRS-80 User Group. Meets at Welwyn Park Community Centre on alternate Thursdays at 7pm. Neil Griffiths, 0858 65718.

## Colour Genie

**International Colour Genie Users Group.** Write with SAE to The Secretary, NCGUG, 46 Highbury Avenue, Bulwell, Nottingham, 0602 278791.

**National Colour Genie User Group.** Marc Leduc, 46 Highbury Avenue, Nottinghamshire NG6 9DB.

## UCSD

**Hants.** UCSD System Users Society. John Ash, Dicolli Data Systems Ltd, Bond Close, Kingsland Estate, Basingstoke, Hants RG2 0QB.

**Oxford.** UCSD Pascal UK Users Group. Malcolm Harper, Oxford University Computing Laboratory Programming Research Group, 45 Banbury Road, Oxford OX2 6PE.

## Unix

**Unix User Group UK** can be contacted at Langley House, Langley Mill, Notts.

## 6502

**Bedfordshire.** 6502 User Group. Walter Wallenborn, 21 Argyll Avenue, Luton, Bedfordshire LU3 1EG, 0582 26927.

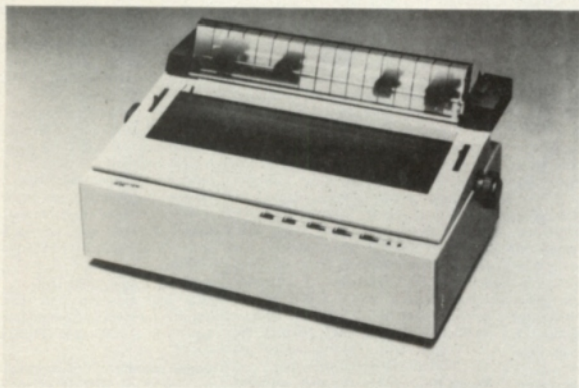
**Hants.** 6502 User Group (Southern Region). Steve Cole, 70 Sydney Road, Gosport, Hants.

**Let us know about your micro club or user group so we can be sure the information printed here is up to date. Drop a card to Wendie Pearson, Listings Editor, at Personal Computer News, 62 Oxford Street, London W1A 2HG, or give her a call on 01-636 6890.**

**Special thanks to the Association of Computer Clubs from whom clubnet was originally compiled in PCN's early days.**

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**Twin hobbit drives** for BBC, dozens of programs £150. Micronet modem and software £25. Andrew Emmerson, Northampton. Tel: (0604) 844130 evenings/weekends.

**BBC software** for sale, all top names, £200 worth for £20. Also TRS80 II 48K with monitor, £140. Tel: 074574-796.

**Atari software**, 400, 800, 600XL, brand new, unwanted Christmas surprise, large selection, SAE for list. 27 Crawford Gdns, St Andrews, Fife. Tel: 75817.

**Dragon 32** c/w telewriter W/P, Dataplan, Pen Draw and light pen, plus games. Includes two joysticks, £210 ono. Tel: Nigel, 01-485 1383.

**TI 99/4A** cassette leads, personal record keeping, home budget management modules, teach yourself basic cassettes and manuals. £120 or swap for Commodore 64 printer. Tel: 0252 511248 Farnborough.

**Commodore 64** software: Rox Mutant Camels, Gridrunner, Falcon Patrol, Kong, French Tech, Grave Robbers, Monopoly, £4 each, or £30 the lot. Tel: 01-954 6966.

**ZX81 16K** with all leads and around £50 of software including Flight Simulation, 3D Defender, Avenger, QS Scramble and many more. £65 ono. Tel: Byfleet 45386 (evenings).

**Wanted C2** cassette recorder for the Commodore 64. Also wanted software for the 64. Tel: Stottesdon 441 after 5pm.

**Vict-20** + cassette recorder + joystick + intro to Basic part one + software worth £100. Only £135 or swap for Spectrum 48K or Oric 48K. Tel: 051-678 2257.

**Wanted ZX81 16K** with manual and leads, between £25 and £30. Telephone Robert after 6pm. Tel: Aylesbury 0296 87906.

**For sale** Acetronic MPU 1000 video game. Takes cartridges and includes Invaders and Olympics. £35 ono. is in excellent condition. If you're interested. Tel: 061-224 2855.

**Sharp MZ-80A**, Basic 2 pascals, Forth, software pack, books, dustcover, 14 months old, excellent condition, offers over £250. Tel: 0292-286456 after 7pm.

**16/48K Spectrum**, Excellent version of the classic arcade game Blitz. £3 to M. Ansdell (PCN), 143 Hadlow road, Tonbridge, Kent TN9 1OE.

**Spectrum software** for sale, £3.50 each. z zoom, Avenger, Sentinel, Cosmos, AH Diddums, Desert Patrol, Airline, Orbiter, Centipede, Cybotron. Many more. Tel: Phil, Newcastle 761396.

**Atari 400/800/XL** software, Canyon Climber and Ghost Hunter original cassettes, £8 each. Le Stick joystick, £12. Wanted: Pole-Position, Joust original cartridges. Tel: 01-341 0464 (evenings).

**Dragon 32K**, 16 tapes. Pacman, Invaders, Centipede, Bezerk, Defender, Donkey, Kong etc. Professional joysticks with magazines, three months old, good condition, £200. Tel: 01-570 7513.

# PCN Billboard

**Apple** compatible slimline disk drive (Alps), unused, boxed, unwanted gift, £140. Tel: 0626 862455.

**Wanted ZX** printer, if it works it'll do! Pay up to £12. Dave Reaney, 138 Marsden Road, Blackpool, Lancs FY4 3DU.

**TI 99/4A** boxed with cassette lead, 4 cassette games, Early Learning Fun, Teach Yourself Basic, Speech Synthesizer, Speech Editor, £30 worth of books. £90. Tel: 01-808 9460.

**TRS-80** expansion interface (for model I), no memory installed but will take 32K, in working order, £60 ono. Tel: Deeside (0244) 821945.

**For sale** 3k RAM expansion, Machine code monitor Sargon, Chess, 2 tapes — Gridrunner, Arcadia for Vic 20. £35, or swap for ZX printer in working order. 20 Wheatley Street, W. Bromwich.

**48K Spectrum** software, Lords of Time, Snowball, Dungeon Adventure, Adventure Quest, Diamond Trail, Smugglers Cove, The Quill. All half price. Tel: Simon, 01-421 1108.

**Wanted ZX81 16K** RAM pack, good condition, willing to pay about £10. Also any software wanted. S.O'Brien, 70 Severn Road, Blakenall, Walsall, West Midlands. Tel: Blokwix 491370.

**CGI** Puck Monster electronic game. Worth £25, sell for £12, or swap for Spectrum software or peripherals. Tel: 0856 3725. A. Cross, 11 Papdale Crescent, Kirkwall, Orkney.

**Atari 400** plus full stroke keyboard, program recorder, basic, 2 joysticks and basic tutorials worth well over £300. Selling for £150. Tel: Slough 20120 anytime.

**Atari 400, 48K** recorder, £180 of software (Defender, Miner, Donkey, Kong etc), magazines, joysticks, in boxes. NB with Basic. Offers? Tel: 01-550 0806 after 6pm.

**ZX81 16K** RAM and Memotech keyboard Flight Simulation and VU-file cassettes. Usual leads etc. As new, all boxed, £70. Tel: Brookham 54139 Surrey.

**Newbrain AD** with beginners guide book and tape. Also manual and other tapes. £150 with cables etc. Tel: Dorrell, 0202 576767 Bournemouth (any time).

**Valhalla** Lunar Jetman, Oracles Cave, Hunchy, Castle, Phoenix, Haunted Hedges, Gyros, Chequered Flag, Games Designer etc. Tel: Tony, 061-881 3651.

**Vict 20 16K** joystick, programmers reference guide, introduction to Basic part 1, £50. Software, all worth £240, only £150. Tel: 0676 23281.

**ZX81 16K** manual, leads etc. MC book, software including High Resolution Invaders, guarantee till 14.5.84. Worth £120, sell £60. Tel: Havant 482700 (after 5pm).

**Wanted**, 32K Cheetah Rampack or SP48 memory extension for ZX Spectrum. Tel: Bolton 0204 653170 (Miles).

**Commodore 4008** 32K plus cassette drive, many programs including Petchess, Cracks of Doom and Football Manager, £300. Tel: 01-868 5117.

**Atari 600 XL**, brand new, unwanted Christmas present plus Star Raiders cartridge, £140. Tel: 01-555 3299 ext 2175.

**Sharp MZ-80K** various Basic languages, Forth and others. Immaculate condition, dust cover plus manuals, £240 ono. Possible swap for BBC or Commodore 64 and tape. Tel: Warrington 571584.

**Apple II** Europlus, 100% compatible, boxed, £345. Latest slimline diskdrive, new, £195. Add-on cards, business, utility, games software, manuals also available. Tel: 091-4175371 for details.

**Sharp MZ80B** with twin 350K disks printer, CP/M Wordstar, WDPRI MLPRO Supercalc, M Basic, C Basic, accounts, games galore, bargain at £1,500 ono. Tel: 0222 568286.

**Atari** software arcade machine disk (original), £20. Tel: 089 283-4240.

**Lynx 48K** with manual, leads etc. Plus software and introductory cassette. Lynx user magazines included, boxed. £190 ono. Tel: 01-572 1738 after 6pm.

**Vict 20** games, books, 16K RAM pack, 3K RAM pack, cost £210 will sell for just £110. Tel: (0282) 63868 after 7pm.

**Vict 20**, 16K, cassette recorder, software includes intro to Basic, Chess, Maths 'O', eleven games. Joystick. £115. Tel: Walton-on-Thames 228431 (evenings).

**Spectrum software for sale**. Spla! Chuckie Egg, Train game, Transylvanian Tower, 3D-Tank, Frenzy, Mined-out, Centipede, Schizoids, many more. £3 or swap for other titles. Tel: 0382-611 825.

**48K Spectrum AD&D** Character Generator: Race, Class, Level, Random, Psionics, HP, Equipment, AC, adjustments etc. £2.50. Paul Honigmann, 55 Wilmslow Road, Rusholme, Manchester.

**TRS-80 level 2** 16K CCR-80 tape-rec, monochrome monitor, lower-case mod, sound amp/speaker, leads, manuals, books, software. £250 ono. Tel: Simon, 01-991 0612 (after 6pm).

**Atari VCS**, good condition with 10 cartridges including Donkey Kong, with extra leaflets. £150 ono. Tel: (0202) 431225 (evenings).

**Oric 1** 48K software printer cable, tape, leads, excellent condition, in original box. Worth £180, bargain £105. Tel: Torquay (0803) 24252, ask for Kevin.

**Panasonic music** centre, excellent condition, cost £310; sell £180 or swap for micro/printer (any considered) or Atari software. Tel: Basildon (0268) 284771.

**Prism VTX5000** modem for Spectrum, as new, £75. Access to Prestel and Micronet, direct communication with other Spectrums. Tel: Leeds 741037.

**TRS-80 L2** 16K all leads, 160+ software, CCR-81 tape recorder, VDU, excellent condition. Worth £500, bargain for £220. Tel: Littlewick Green 3476.

**ZX81** software originals. Football Manager, Galaxians, Othello, Fantasy games, Backgammon, Games tape 2. Swap for Spectrum games or sell £10. Tel: Barnsley 0226 710119 after 6pm.

**Atari 800** disk drive 410 recorder joystick and 20 games worth £900. Sell £600, swap BBC B plus extras. Write N. Brewin, 124 Stephenson Drive, Leicester.

**Spectrum** games swap Scrabble, Games Designer, Manic Miner, Planetoids, plus many others. Over 50 games to swap. Send list to 15 Norwood Drive, Brierley, Barnsley.

**Oric-1 48K** and 16K games for sale. Invaders, Galaxians, Kong and Flight, all at £4.50. Tel: Potton 261000 (after 4pm).

**ZX** printer, two rolls of printer paper, very good condition, £30 ono. ZX81 transformer, £4. Tel: Daniel, Leeds 692948 (evenings).

**Dutch ZX-Spectrum addict**, age 23 seeks program listings or tapes to help him learn more about this computer, or pen pal(s). P. Kolenbrander Turfveldevenholland 37, NL-5632 XH Eindhoven, Holland.

**Swap my** 3 month old Dragon, Wizard War and Invasion plus £50. Cash adjustment for your Commodore 64 and tape. Will consider sale £110. Tel: 0507 82357.

**English cassette** for C64, worth £10, gives for £6. Also BBC-B game Starship Command (Acornsoft). Worth £10, gives for £6. Both in excellent condition. Tel: 021-523 7517.

**Imagic cartridges** for Intellivision game system. Brand new unwanted presents. Dracula, Ice Trek, Atlantis, Tropical Trouble, Dragonfire, Swords/Serpents. £16 each. Tel: 01-764 4075 (after 6pm).

**Wanted fully** working 4K ROM ZX80 (or Nascom 1) in good condition, including leads and manual. Will pay £7. Tel: 0506 411015 for Scott (after 4pm).

**Vict 20/64 printer**, interface and software including books. Swap or sell. £49 for printer and interface. J. Wilson, 31 Carrfield, Woodthorpe, York. Tel: York 704151.

**Swap** 48K Spectrum. DK Troniks keyboard, joystick interface, amplifier inside cassette, joystick, 12 tapes. Want Commodore 64 plus cassette, sell £185 ono. 20 Wheatly St, West Bromwich B70 9TY.

**Commodore 64** Super base, 2 disks and manual, brand new, unused, week old, cost £100. Sell £80 ono. Tel: 01-648 9206 from 5-8pm.

**BBC software**. Snooker, Rocket Raid, Castle of Riddles, Chess. All boxed, as new, £5 each. Unused spare copy of User Guide. £5. Tel: Tamworth 874350.

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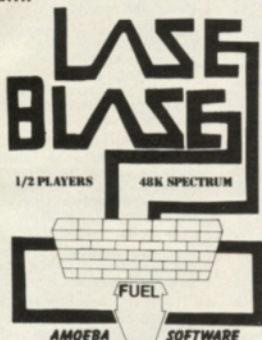
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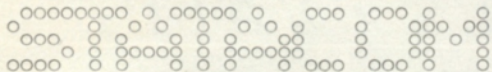
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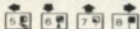
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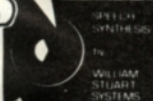
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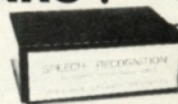
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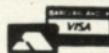
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## Inscrutable

Languages are said to lose something in translation. However, it's true that in some cases they gain, at least from Japanese to English — we couldn't help but chuckle at parts of NEC's PC8201A manual.

The demonstration music tape is described in the following immortal words: 'MDATA 1, MDATA 2. These datas are played by using the music program. You will hear the enjoyable music.'

For the character definer program they come up with: 'PC-8201 has battery to backup the memory. So you can define the character fonts on RAM. Method of defining is complex, but program easily make font of characters and save it.' Quite so.

## Portico callers persevere

One novel feature at the Which Computer? Show was the computerised message board.

A glance at the screen revealed a rolling list of names with their companies and a reference number. Apparently, the idea was that if you saw your name up in lights you picked up the telephone handily placed next to the screen and quoted the reference number.

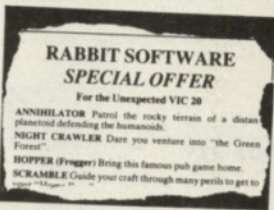
A voice at the other end of the line then read the message over to you.

The number of times 'Portico Technology' appeared on the list was fascinating. Perhaps intriguing is the word we're looking for?

Could it be that someone is experiencing just a little difficulty in making contact with anyone employed by the company?

## Rabbit's eggs

John Miller of Spalding wins a well-deserved £5 for this entry in the PCN Gibberish and Misprints contest. It comes, alas, from PCN — but it was back in April last year, since when we hope we've ironed out these unexpanded snags.



## NEXT WEEK

- QL test** — Exclusive! PCN gives Sinclair's exciting new micro the once (and twice) over.
- Touching** — Atari's touch tablet in a hands-on examination.
- Line Feed** — PCN checks the form in the printer field.
- Cobol** — A name from the past looking ahead on the IBM PC.
- Silver Machine** — A full Pro-Test of Silver Reed's EXP500 daisywheel.
- Games** — Fun software for the Commodore 64, Apple, Spectrum and Oric.
- Plus the week's news and all the regular features.

## SLANTAX ERRORS

Apologies to B & F Software for transposing the ratings of its 'Pub Crawl' game with Dragon Data's 'Viking' last week.



## PCN DATELINES

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

Organisers who would like details of coming events included in

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

## UK EVENTS

Event	Dates	Venue	Organisers
Acorn Education Exhibition	January 25-27	Central Hall, Westminster	Computer Marketplace (Exhibitions) Ltd, 01-930 1612
Peripherals Suppliers	January 31-February 2	Cunard International	Reed Exhibitions, 01-643 8040
Communications & Computer Systems Fair — CABLES	February 2-4	Pontin's, Prestatyn, Wales	Pontin's Ltd., 07456 2267
10th ZX Microfair	February 4	Alexandra Palace, N22	Mike Johnstone, 801 9172
The Apricot & Sirius Show	February 7-9	Kensington & Chelsea Town Hall	Dennis Jarrett, 241 2448
Taunton YMCA Computer Exhibition	February 11	Taunton YMCA, Somerset	P. Wojcik, 0823 74667
LET '84	February 13-15	Heathrow Penta Hotel	Anthony Farrar, 0923 774262
Information Technology & Office Automation Exhibition and Conference	February 21-24	Barbican Centre, London EC1	B.E.D. Exhibitions Ltd., 01-647 1001
OEM Only Conference	March 7	Hilton Hotel, London W1	Tom Lewis, 01-994 6477
Computer Trade Show	March 13-15	Wembley Conference Centre, Middlesex	Reed Exhibitions, 01-643 8040
Scottish Computer Conference	March 13-15	Holiday Inn, Glasgow	Quadrilect, 01-242 8697
Essex Apple Village	March 25-28	Festival Hall, Basildon, Essex	Database Publications, 061-456 8383
Computer Aided Design	April 3-5	Met. Exhibition Hall	Reed Exhibitions, 01-643 8040

## OVERSEAS EVENTS

Event	Dates	Venue	Organisers
National Software Show (East)	February 3-5	Miami Beach, Florida, USA	Raging Bull, USA, 0101 415 459063
Personal Business Computer Show	February 29-March 3	Hong Kong	Overseas Exhibition Services Ltd., 01-486 1951
Personal Computer Show	March 14-17	Sydney, Australia	ECL Ltd, 01-486 1951
International Business Equipment & Computer Show	March 13-17	Singapore	International Business Centre Co. Ltd., 8F Hosoi Building, 15-7, 5-chome Honmachi, Higashi-ku, Osaka, Japan

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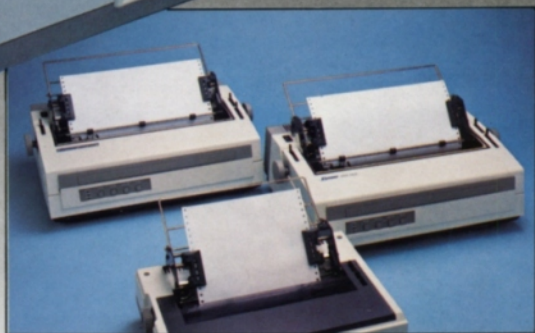
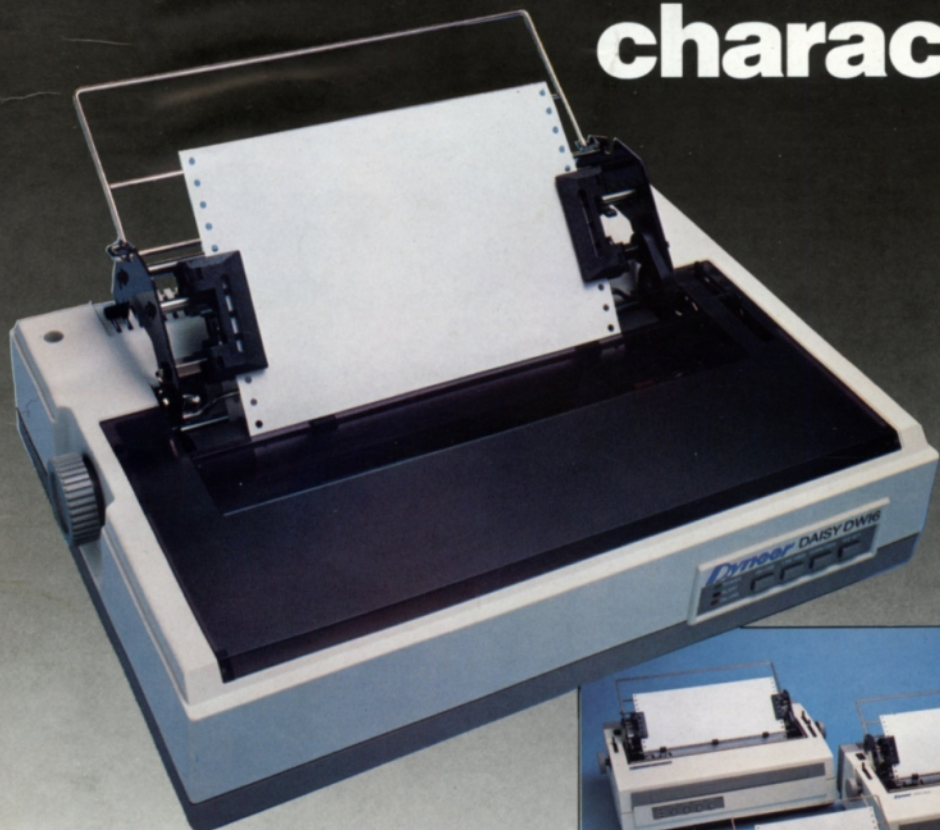
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