

# PERSONAL

# COMPUTER

THE COMPLETE COMPUTING WEEKLY

**NEWS**

MAY 13 - MAY 20, 1983 Vol 1 No 10 **35p**

## !SOFTWARE EXCLUSIVE!

### Infomast: A three-in-one package for the Commodore 64.

Check it out, page 26



**GAMEPLAY**  
**SPECTRUM STRATEGY**  
Pit your wits against prowling patrols and pick up a princess

**SOFTWARE PROGRAMS ON**  
**ESPON'S FANCY CHARACTER**  
Pro-test of the OX10, the micro with a fountain of fonts

**FORAMIN'S SPECIAL**  
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**PERSONAL PROTEST EXCLUSIVE**  
**MICRO MALESTRO**  
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**EVERY  
35p  
WEEK**

**SPECTRUM SOFTWARE**

**TIME-GATE**

4D Space/Time adventure in fast moving graphics  
4BK

**Author: John Hollis**  
**THE CHESS PLAYER**

With Speech and personality 4BK

**Author: Martin Wren-Hilton**

**METEOR STORM**

With speech and Hi Res Graphics, 16K or 4BK

**Author: John Hollis**

**SPACE INTRUDERS**

With mutants and Hi Res Graphics, 16K or 4BK

**Author: John Hollis**

**EASYSPEAK**

Add speech or music to your programs, 4BK

**Author: John Hollis**

**MINED-OUT**

With 9 levels of minefield, 4BK

**Author: Ian Andrew**

**SOFTWARE FOR THE ZX81 WITH 16K RAM**

**QS ASTEROIDS**

... very good  
... addictive game!  
(C & VG)

**Author: John Hollis**

**QS DEFENDA**

... better than any other arcade game I've seen.  
(Sync)

**Author: Nick Lambert**

**QS SCRAMBLE**

... amazing, fantastic!  
(PIC W)

**Author: Dave Edwards**

**QS INVADERS**

... just like the real thing!  
(C & VG)

**Author: Dave Edwards**

**MUNCHEES**

Features 1 to 4 Ghosts, 3 Munchees, Power pills

**Author: A. Laird**

**GALAXIANS & GLOOPS**

Features two types of swooping Galaxian

**Author: T. Brock with CROAK & CRAWLA**

With Frogs, Lornis, Logs, Crocodiles, Turtles, Flies,

**Author: John Field**

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... addictive game!  
(C & VG)

**SPECTRUM & ZX81 GAMES FROM QUICKSILVA**  
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**Author: David Shee**

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**Features:** Full attract mode, 5 attack waves, 10 levels of difficulty rapid fire, meteor storms, changing aliens, plasma bolts, killer bombs, full colour hi res graphics, full sound.  
**Author: John Edwards**  
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... g Clear Text are automatically questioned. Load/save commands

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**Author: R Baker**  
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**Author: A. Morgan**  
ZX81 with 16K RAM

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**Author: C. K. Tame**  
ZX81 with 16K RAM

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**Features:** Fast, 3D graphics, fast scoring, four types of target, eight instrument displays, wave drive, resurging aliens, time limit, 17 levels of progressive difficulty, high score table.

**Author: M. Sudworth**

ZX81 with 16K RAM

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**Author: P. Crane**

ZX81 with 16K RAM

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**Author: Marion Stubbs.**

ZX81 with 16K RAM

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The pixel extravaganza concludes with more from the Dragon, Vic 20, Spectrum, Oric, and BBC machines.

Micropaedia Graphics Part 5

**REGULARS**

**Monitor 2**

In seven pages of news, Sinclair tells all, page 2; Grundy re-organises for CP/M Newbrain, page 3; US robots are on the march, page 4; Compec Europe report from Brussels, page 5, with PCN Charts; Record companies muscle in on software, page 6; and more news of the microcomputer world.

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Cover illustration by Robin Harris (with a slight acknowledgement to John Ingledew)

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**CHARACTER SET** EDITORIAL: Editor Cyndy Miles Deputy editor Geof Wheelwright Production editor Keith Parish Sub-editors Peter Worlock, John Lettice News editor David Guest News writers Ralph Bancroft, Wendie Pearson Software editor Shirley Fawcett Systems editor Max Phillips Hardware editor Richard King Peripherals editor Ian Seales Listings editor Sandra Grandison Editor's assistant Harriet Arnold Art director Jim Dunsie Art editor Jimmy Egerton Assistant art editor Floyd Sayers Art assistant Dolores Fairman Publishing manager Fiona Collier Publishing assistant Jane Green ADVERTISING: Advertisement manager Mark Eisen Assistant advertisement manager Nic Jones Senior sales executive Sue Hunter Sales executives Robert Stallibrass, Matthew Parrott, Bettina Williams, Simon Treasure, Ian Whorley, Sarah Barron Production manager Eva Wroblewska Advertisement assistant Jenny Dunning Subscription enquiries Simon Magg Subscription address 53 Frith Street London W1A 2HG 01-439 4242 Editorial address 62 Oxford Street London W1A 2HG 01-436 6890 Advertising address 62 Oxford Street London W1A 2HG 01-323 3211 Published by VNU Business Publications, Evelyn House, 62 Oxford Street, London EC1. Printed by Chase Web Offset, St Austell, Cornwall. Distributed by Seymour Press, 334 Brixton Road, London SW9, 01-733 4444. Registered at the PO as a newspaper

# Sinclair looks to the future

## Plug-in power on Spectrum

By Geof Wheelwright

You will be able to buy cartridge software for your Sinclair Spectrum late this summer.

The cartridges will sell for under £10 each and plug in through a less-than-£20 interface box that you must buy in order to use the new software. Sinclair managing director Nigel Searle hailed the move last week as a major breakthrough. He said the cartridges will put an end to the hours of frustration many Spectrum users have experienced in trying to load cassette software, because the cartridges will load the moment you power up your machine.

'We are going to be bringing out later this year a lot of software for the Spectrum in ROM cartridges, and that means you will no longer need to use the internal RAM for program space, and you will be able to run in a 16K Spectrum a lot of programs which weren't available for that machine before,' he said.

The major problem with

cartridge software has been the cost — £20 or more for each cartridge. But Mr Searle said the high prices have been the fault of video games manufacturers, rather than any inherent expenses involved in cartridge production.

'I think it's a matter of volume; if you look at games cartridges for video games the manufacturers are obliged to make very high margins on the cartridges because they make very little money off the video games and they have no other source of accessories to sell,' he said.

## Modems and microdrives

It's unlikely Sinclair will ever sell a modem for its Spectrum micro.

Mr Searle said last week that Sinclair has scrapped plans for its acoustic modem largely because Micronet and other companies have offered modems at far less than it had planned.

'There's no point in doing it if other companies are willing to operate on lower margins and sell very inexpensively.

'There will be modems for the Spectrum whether they come from us or other parties,' he said.

■ Sinclair will be releasing its Microdrives some time in the last two weeks of this month. And Mr Searle said the low-cost storage devices will not be transferable to other popular micros. Despite intense speculation that Sinclair will try to make the Microdrives an industry standard for low cost storage, he said Sinclair is building the drives so they will work only with Sinclair's machines — starting with the Spectrum.

■ Meanwhile, Timex has delayed plans for release of the Spectrum in the US. Timex is Sinclair's licensee in America and had planned to release the Spectrum this month as the TS-2000.

■ Mr Searle denied that the recent price cut on the company's products was simply because Oric was offering its 16K machine for £99. 'We reduced the price, not because the Spectrum had become uncompetitive, but because we want to expand the market and establish a position in the market.'



Give Sinclair: an exclusive interview in next week's PCN.

## ZX84 means business

Sinclair Research will launch a new business computer early next year.

Code-named the ZX84, it will sell for slightly more than £1,000 and run on a non-standard operating system of Sinclair's own invention. Sinclair managing director Nigel Searle said last week that the company is counting on software houses to write packages for the machine, even though it's scorning the PC-DOS and MS-DOS operating systems.

Mr Searle said the machine may be a portable, and hinted that it could use Sinclair's flat-screen TV technology. He added that he doesn't expect it to be a business machine in the sense of competing directly with the IBM PC.

## Citizen canes print costs

Two low cost printers should arrive from Japan in about a month.

Based on the 505 series, the Citizen 510 will cost £155 and the 520, £165, plus VAT. You can choose from a parallel or serial printer — interfaces are built in, so all you need is connecting cable.

These 40-column printers are said to print at high speed and come in desk top or panel mounted versions.

The two new printers will initially be available from Datac in Altrincham, Cheshire on 061-941 2361.

Datac also manufactures printer interfaces, and distributes Centronics printers.

# Pre-packed micros

In the wake of the price war started by Sinclair Research (PCN, issue 9, May 6-13) Commodore is to market a Vic20 'starter pack' for £139.99 including VAT.

Aimed to seduce the first-time buyer who isn't sure what to choose, the pack incorporates the Vic20 computer, a cassette deck, Introduction to Basic Part 1 and four cassette games — Blitz, Hoppit, Race and Type-a-Tune.

The current retail price of these items if sold separately is £249.99.

Basic Part 1 consists of a manual and two cassettes which teach you elementary aspects of Basic, example programs, and give questionnaires on topics covered in the manual.

The packs will be available from the usual Vic20 haunts, ie Dixons, Boots, selected branches of Smith, Laskys and smaller outlets, from June 1.

Although the Vic itself would cost about £90 in this deal Commodore says dealers will not be allowed to split the package.



■ Not to be outdone Laskys is offering an Apple package which it says includes a free portable colour television plus £100 worth of software. For £1,398 you get a 64K Apple IIe, disk drive and control adaptor, graphics package, 14in colour TV and software covering games, education, and home finance. But Apple itself offers the Apple IIe Starter Pack at £1,473.

# CP/M strains Grundy

By David Guest

The Newbrain with CP/M is imminent, but Grundy Business Systems is going through the mill to get it out.

'We are re-organising to bring CP/M online,' says dealer sales manager Keith Beverton. And finance director Tony Wheeler adds that the company is trying to secure extra finance

to carry through a program that has been dogged by embarrassing delays.

According to Mr Beverton pre-production machines running CP/M will be on show to dealers on May 20. Production models will come out at the rate of 250 in June, 500 in July, and 1,000 in August.

Grundy has been promising

CP/M since late last year, and its advertising has featured the development. But successive deadlines have slipped as the company struggled with what is understood to have been a bug in the disk controller.

'Although we might be late, there are other people who haven't started the race,' says Mr Beverton.

He describes Grundy Business Systems' re-organisation as 'minor changes — we are looking at the problems we're going to encounter when we launch a system that will multiply out turnover ten-fold.' Mr Beverton assures current Newbrain users: 'From an external point of view nothing is happening.'



Software from Peachtree is one of the blandishments that Sharp is offering businessmen among you with its MZ3541 system. The Peachtree packages it includes are the MBasic range and the Office Productivity Systems — word processing, a spelling checker, mailing list, spreadsheet, and comm's manager. With a green screen you pay £1,795, and for colour £2,450.

## Alpha boost for VisiCalc

A connection allowing you to upgrade your 64K Apple VisiCalc to 256K IBM VisiCalc power, should be available now from Pete & Pam Computers.

Called the Apple-IBM Connection and made by Alpha Software, of the US, it retails at £139 plus VAT and comes with spoken instructions.

It means your worksheets can be larger and your Apple Wordstar 130K floppy capacity can be increased to the IBM DOS Wordstar 320K capacity.

Designed for non-technical users, the Apple-IBM Connection comes with a disk for the Apple as well as one for the IBM.

## Microsoft mouse loose for IBM PC

The IBM Personal Computer has trapped itself a mouse. Chasing the Lisa bandwagon, Microsoft has released a mouse-compatible word processing package.

Microsoft's mouse only works with its new Multiword package, and only on the IBM PC, but the company plans a Mouse Mark Two, which will fit an RS232 interface on any MS/DOS machine.

There will also be a new version of Multiplan, Microsoft's other package in its Multi-tools range, which the mouse will be able to operate quite happily.

Multiword will sell for \$375 in the US, or \$475 with the mouse thrown in, while the mouse alone will cost \$195. But Micro-

soft is not saying how much it will be charging in this country, or when shipments will start.

The package will work either with or without the mouse. It's compatible with Multiplan, the Microsoft spreadsheet, so data can be passed between the two. It features on-screen formatting, and the mouse can be used to point to chunks of text, then select the appropriate command from the bottom of the screen to underline, copy, put into bold face, and so forth.

Multiword supports foreground and background processing, and different character fonts can be displayed on screen if the micro has the graphics capability. It also features the window concept beloved of Apple, with the option of having several editing windows on different parts of a single document, or onto another document to copy parts of it.

Microsoft can be contacted on 04427 75091.

## Multi-colour print shop

A seven-colour dot-matrix printer is on the way from Seikosha. The GP700A will be distributed here by DRG and the end-user price will be £399 plus VAT.

The printer uses a special multi-coloured cassette ribbon with green, blue, red, yellow, black, magenta, cyan and purple. In addition to these primary colours the printer can produce 30 different shades.

As you would expect colour graphics are its forte.

It comes with pin and friction feed and a Centronics interface. An RS232C is available as an extra. Print speed is either 38 or 40cps and noise is low.

● PCN will be featuring a full Peripherals Pro-Test on the GP700A when it first becomes available in late June.

## Gavilan out of the traps

One of the biggest little systems to come out of the US will be in the shops by autumn.

The Gavilan machine demonstrated in London last week looks like the first in what could be a line of very high performance, high capacity micros that is bound to include offerings from such as IBM and Apple.

Based on an 8088 processor it has no less than 1.2Mb of RAM, and in one small unit weighing 9lbs it incorporates a full size keyboard, a 320K microfloppy, and a 66 x 8 Liquid Crystal Display. It runs MS/DOS.

Even with a letter-quality printer attached the Gavilan is

genuinely portable at 14lbs, making devices like the Osborne seem obese. Between battery charges you can get eight hours of use from the system.

But probably its chief feature, as far as the shape of things to come is concerned, is the touch-sensitive panel that takes the place of a mouse on systems with similar approaches to the convenience of the user. The panel also allows you to use windows and its software includes context-dependent help screens.

The Gavilan Corporation will be aiming to attract those of you in business. Its system



comes with integrated applications — a spreadsheet, word processing, a diary, and communications facilities that can use a built-in modem.

Its design will allow you to use a full-size monitor and any microfloppy. There is also provision for a cartridge system.

The Gavilan (a Spanish word meaning 'hawk') should be on sale in the UK in October. It will cost around £3,000.

## VIEW FROM AMERICA



## Iron hand in a velvet glove

From Chris Rowley

At Fujitsu's Fanuc automated robot-building plant in Japan, the union was recently driven to ask that the plant's robots join the union and pay dues to keep the union solvent. There are already robots that build robots and now they are to pay subscriptions for the privilege.

Which is a thought guaranteed to bring a smile to the lips of that growing group of humans that even now is blistering its thumbs while building a whole generation of home robots for \$2,000 and less. As they wrestle with soldering irons and fragile pin arrays, you have to wonder if they realise what a giant step forward for humanity they are taking.

The fact is that robots are among us now and they're not likely to go away. They will be a broad spectrum phenomenon. Thus the near future will not only see industrial robots but also a variety of home robots. Something the size of a radio with a phone tie-up for security purposes might add a fresh wrinkle to the old hassle of burglary.

When the burglar is taking the powered metal clippers to your security gate the home robot can not only phone you but allow you to negotiate with the burglar, try to tell him that there's nothing worth stealing (while notifying the police, of course) and in the end the robot can proffer a \$1,000 note and say: 'Why not call it quits?'

Suggestions that 'armed, murderous' robots will be on sale soon are nonsensical — there are laws against that sort of thing.

A lot of the hot-eyed enthusiasts with the solder burns on their thumbs are building the same machine, the Heath Hero, a 40 lb we electronic beastie with three wheels and a carapace that vaguely resembles an R2D2 unit from Star Wars.

But Hero is on sale for \$1,495 in kit form or \$2,495 fully assembled. Moreover, Heath has set up a users' group to co-ordinate information as it pours in from all those involved in the experiment.

Furthermore, Hero has the right stuff. He gets around for up to an hour on batteries between recharging, uses four 6V 4amp gelled electrolyte re-chargeable cells, and has an arm and a claw that can pick up objects and carry them around. Hero's brain is a processor board and there are add-on slots for 8K more. Hero also talks using a Votrax voice chip and will say things like 'Happy Birthday' and 'I don't do windows'.

Sensors powers include a microphone to pick up sounds between 200Hz and 5,000Hz. It has a light-dependent resistor on its head that can be pointed at a light source to determine direction, and an ultrasonic sensor that can detect objects on the ground. For many frustrated home robot builders, the Heath Hero is the answer.

After all, the robot builders used to be lumped in with the home computer hackers. Then came the Cupertino gang and Mr Sinclair and when the dust settled we had 256K RAMs, \$50 micros, and IBM — but the robot builders were still welding Fischer-Technik kits and stepper motors in home-made arrays. And they still weep over Meccano.

And the future? One of these days I expect a new entry in the Manhattan Yellow Pages between Road Service & Towing and Rock Shops. Meanwhile Hero is drawing competition. There are other small robots appearing, some with jokey extensions like Androbot's Androwagons on which the \$995 Androbot can hold snacks in the TV lounge.

On a more serious note, at Odetics Corp in Anaheim, California, they are building Functionoids. These are walking, functioning robots such as the Odex-1, which runs on 24V aircraft batteries, stands 6ft high on six articulators (arms or legs) and which can manoeuvre well on rough terrain. It weighs 370lbs and can lift loads of 1,000lbs or more.

Odex-1 doesn't sound like a home robot to me, but somewhere on the curve between him and the little Hero lies the future home robot. Not will things stop there. Give tomorrow's robot 256K of RAM and some kind of mass storage system, perhaps from a VCR unit, and then give them new touch sensors being developed at MIT for robot fingers. What you have is the first truly sensuous household robots with silky-smooth fingers for expert stroking of their owners, mixing the martinis, polishing the car, and, of course, joining the union.

# Sinclair keyboard swop

Substitutes for the Sinclair keyboards are springing up like mushrooms for those of you who don't like the membrane or tacky rubber styles.

Steatite Insulations has produced a typewriter-style model for the ZX81. It has keys that typists know as full-travel, and inserts we as plastic (for longer life).

The keyboard (pictured) is fitted with a cable, and it comes with instructions on how to disconnect the incumbent keypad. It costs £30.95 and Steatite is on 021-454 6961.

For the Spectrum, DK'Tronics has a cased keyboard due to be released in June. It has 52 keys, 12 of which are set aside in a numeric keypad.

To install the keyboard you have to remove the system from its original case and screw it into the new one. DK'Tronics' unit also includes a motherboard, if

you want to repackage a ZX81 inside it. The case doesn't forget the usual connections on the back, and it won't stop you using any add-ons.

It will cost £45 and DK'Tronics is on Saffron Walden 26350. ●PCN has already Pro-Tested two other Sinclair-replacement keyboards, from Fox Electronics and Telford Electronics and Computing (PCN, issue 9, May 6-13).



## Juki breaks into print

If you're thinking of splashing out on a daisywheel printer to get a bit of typewriter-like text from your micro it might be an idea to have a look at the latest Japanese daisywheel from a company called Juki.

The big selling point of the Juki 6100 is its price. At £399 plus VAT it seems to have broken a significant barrier. There's always a drawback though — speed is rated at a rather modest 18cps.

The Juki is promised in the next couple of months and PCN will be doing a Peripheral Pro-Test on it.

# User power

By Ralph Bancroft

Micronet has given in to badgering from BBC owners and agreed to release version 4.0 of the Prestel software.

The extra features and compatibility with new telesoftware standards made version 4.0 attractive to BBC users who learnt about it through Prestel's own electronic grapevine.

The new software can be downloaded by Micronet subscribers for free (on \*600558#). Other BBC users can download a free copy if they have a Prestel adaptor with downloader software courtesy of Viewfax 258 (on \*258200066#).

In addition, the author of version 4.0, Soft Machinery, is selling the package on tape with a manual for £19.95.

Version 4.0 offers improved cursor controls; a failsafe mechanism that stops you leaving Prestel if mailbox messages are waiting; and the ability to cope with the telesoftware standard promoted by the Council for Educational Technology.

Bob Clarke of Soft Machinery said that version 4.0 should have been the version used when Micronet was launched.

He said he was surprised it was held back.

It was completed and delivered to OEL (which makes Micronet's acoustic modems) in time for the March launch date.

Soft Machinery's address is Kiln Cottage, Higham, Colchester.

# Brussels sprouts 16 bits

By Ralph Bancroft

Bigger, better, faster was the underlying theme of Compec Europe, with 16-bit machines well to the fore.

Future Computers, for example, had on display the first two FX20 micros to roll off the production line. The machine should be in full production by August and will be supplied complete with CP/M-86 as the operating system and the top rated Spellbinder as the free word processing package.



Future FX20—August production

Future Computers will also supply Concurrent CP/M-86 as a standard feature and MS/DOS 2.0 as a £50 extra.

One UK firm demonstrating Concurrent CP/M up and running was Future Technology Systems (no relation).

At the top end of the scale, Plessey was demonstrating its new System 68 machine. Based on the true 16-bit 68000, with half a megabyte of RAM, Winchester disk and tape streamer back up, it certainly is a gutsy micro. But you will have to save up to buy one as, with Unix included, you won't get much change out of £15,000.

The Eurog earns are not slow to get in on the 16-bit act. The Tulip from Holland (PCN, May 13) was showing-off its high resolution colour graphics, and

Olympia used the exhibition to launch its German-made answer to the IBM PC.

Called the People computer, it is based on the Intel 8086 and comes with 128K of RAM (expandable up to 512K), two 5¼in floppies, each with a capacity of 655K, a 10Mb Winchester, 640 by 475 pixel graphics that use 128K of dedicated RAM, and a keyboard with a numeric keypad and 12 programmable function keys.

In Belgium the machine will sell for BFr230,000, which is about £3,000. The price includes not one but three operating systems: CP/M-86, concurrent CP/M-86 and MS/DOS.

The People will be available in the UK in the autumn.

Another stand drawing a crowd was Commodore, with a bevy of Commodore 64s grabbing attention through a demonstration program whose musical sound effects were loudly amplified through the building.

One product that didn't need amplifying was Unix. It seemed to be everywhere, creating the impression that the next generation of micros will all be running this operating system (or some alternatively named lookalike) on a Motorola 68000 CPU plugged into a Multiboard or VME bus.

Real Time Systems, a UK company, is convinced this is the way things will go and was promoting a system called Idris.

Produced in the US, the great claim for it is that unlike other Unix systems it guarantees true portability of software between machines, right down to insisting on a single disk format for all machines it is implemented on.

Linked with this, the company is selling a C-compiler (the language that Idris is written in)

that can run on a wide range of machines. The latest micro-processor able to run the language is the 6809. A C-compiler running on a Dragon? The mind boggles.

Lucidata was showing the £2,000 6809-based Concept-09 to demonstrate its Pascal compiler. Elsewhere on the stand was its range of Diplomat protocol converters and modems.

The collection of peripherals at the show was wide, but there

appeared to be little new. The most interesting newcomer was a daisywheel printer from Fujitsu. Called the SP830, it runs at an incredible 80cps — that's almost twice as fast as the Diablo 630 for only a marginal increase in the price.

There was one machine at the show that didn't have a price tag on it, and that was the Heathkit Hero 1 robot. It seemed to spend most of its time escaping from the Zenith stand and terrorising visitors.

## PCN Charts

PCN Charts follows the rise and fall of the UK's best-selling micros. This fortnightly top-of-the-shops list tells you what's selling best over the counter; it does not take account of mail order and does not count deposit-only orders. This week's figures show the number of machines sold in the two-week period ending two weeks before publication date (in this case May 13), so these charts tell the story in high streets between April 16 and April 30.

Machine prices quoted are for the no-frills models and include VAT. Information for the PCN Charts is culled from retailers and dealers throughout the country and compiled by MRIB, London. They will be updated every alternate week . . . so watch for the arrows to follow the ups and downs of the best-sellers.

### Top Twenty up to £1,000

	MODEL	PRICE	DISTRIBUTOR
▶ 1 (1)	Sinclair Spectrum	£99	(SI)
▲ 2 (3)	Sinclair ZX81	£40	(SI)
▲ 3 (5)	Atari 400	£160	(AT)
▼ 4 (2)	BBC Model B	£390	(AC)
▲ 5 (7)	Commodore Vic 20	£179	(CO)
▲ 6 (10)	Texas TI99	£150	(TE)
▼ 7 (4)	Dragon 32	£200	(DR)
▲ 8 (12)	Commodore 64	£345	(CO)
▲ 9 (11)	Newbrain A	£228	(GR)
▼ 10 (8)	Oric 1	£100	(OR)
▼ 11 (9)	Sharp PC 1500	£170	(SH)
▼ 12 (6)	Lynx 48	£225	(CA)
▲ 13 (18)	Epson HX20	£472	(EP)
▶ 14 (14)	Atari 800	£400	(AT)
▲ 15 (16)	Jupiter Ace	£90	(JU)
▲ 16 (—)	Apple IIe	£969	(AP)
▼ 17 (13)	Sharp PC 1251	£80	(SH)
▲ 18 (19)	Colour Genie	£224	(LO)
▲ 19 (—)	TRS 80 Model 1	£199	(TA)
▼ 20 (17)	Acorn Atom	£174	(AC)

### Top Ten over £1,000

▶ 1 (1)	Sirius 1	£2,754	(ACT)
▶ 2 (2)	Osborne 1	£1,581	(OS)
▲ 3 (5)	IBM PC	£2,392	(IBM)
▲ 4 (6)	Commodore 8032	£1,029	(CO)
▼ 5 (4)	HP 86A	£1,541	(HP)
▼ 6 (3)	Olivetti M20	£2,754	(OL)
▶ 7 (7)	Apple III	£2,780	(AP)
▲ 8 (9)	Sanyo MBC 1000	£1,195	(SA)
▲ 9 (10)	Xerox 820	£2,415	(RX)
▲ 10 (—)	Televideo TS800	£1,495	(COL)

AC Acorn Computers. ACT — ACT Sirius. AP — Apple Computers. AT — Atari International. CR — Computers. CO — Commodore. COL — Colt Computer Systems. DR — Dragon Data. EP — Epson. GR — Grundy Business. HP — Hewlett-Packard. IBM — IBM. IC — Icarus Computers. JU — Jupiter Ace. LO — Lowe Electronics. OL — Olivetti. OR — Oric. OS — Osborne Computers Corporation. RS — Rank Xerox. SA — Sanyo Marubeni. SH — Sharp. SI — Sinclair. TA Tandy. TE — Texas Instruments.



The Commodore stand—a bevy of 64s

# Music men cometh

By Sandra Grandison

Buying software could become as easy as picking up a copy of the latest records with giants like Virgin and K-Tel stepping into the market.

From June 14, Virgin Games will be making its debut with a batch of new releases for three popular micros, and K-Tel has taken its first steps in software distribution.

Virgin is opening with games for the Spectrum, BBC and Vic-20. Priced at £7.95 each, titles for the Spectrum include Golf, Yomp, Star Fire and Sheep Walk. For the BBC model B there's Bug Bomb, Landfall and Space Adventure.

And for the Vic-20 Mission Mercury.

Nick Alexander, managing director of Virgin Games, said: 'Our target is to sell our software through every shop that sells computers. And as a start we shall be selling them in four of Virgin's record stores.'

Virgin intends to boost the image of the authors of programs by putting a picture and a small autobiography of the author on the cover of the cassette. Mr Alexander said: 'The idea behind this is that people will start to buy a package because they like the author's programs.'

So far the software has been

flooding in at a rate of 50 programs a week, of which 50 per cent is usable.

K-Tel has placed an initial order worth £150,000 for Spectrum games from DK'tronics. It will distribute DK'tronics' tapes to stores like WH Smith, Boots and Woolworth, but ordinary record shops may follow.

'Our expertise is in marketing to multiple chains and offering a very fast service,' said K-Tel's director of information services Guy Wood. 'It is definitely possible to sell tapes through hi-fi shops, and I'd guess that in a matter of months we'd see the demand from High Street shops.'

The deal with DK'tronics is K-Tel's opening move in an arena that is increasingly attracting record companies. But K-Tel will simply act as a distributor, where others like CBS are considering using their tape duplication facilities, or like Virgin are signing exclusive distributorships.

K-Tel's first batch from DK'tronics will be 15 games and it hopes to add five new games each month.

Mr Wood said that K-Tel was unlikely to start commissioning games, but he stressed that the deal with DK'tronics was the first of what could be several distributorships.

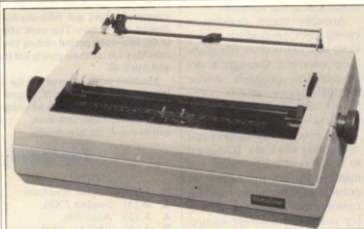
## Etching on the Genie

A program for the Colour Genie that makes it easier to draw pictures and diagrams can be yours for only £5.95.

Called Electric Etch it has 20 single key commands to change colours, leave a trail, draw lines, arcs, circles, triangles and boxes. The shapes are then filled in automatically using points that you have told the computer to remember.

Anything drawn on the screen can be saved as a named file on cassette and recalled for future display or editing. You can also use the program in conjunction with your own programs to put pictures on the high resolution screen, edit them and save the results on tape.

Electric Etch will be available from B P Cooper of Brittain Laboratories Ltd (0232-751549) in about two weeks.



Hestair Dataline's new RP1600 daisywheel.

## Daisywheels from Dataline

For people who like to retain the illusion of typewriter-style text or letters, Hestair Dataline has a pair of new daisywheel printers.

The Dataline RP1300 and RP1600 feature 8K buffers, bi-directional printing and operator control over pitch and line feed.

You can select from Centronics, IEEE or RS232C interfaces for the basic price.

The difference between the two models is speed. The RP1300 is capable of 35cps and costs £1175 plus VAT, while the RP1600 goes at 60cps and costs £1595 plus VAT from Hestair on (0533) 56215.

## Base for IBM

The choice of database management systems for the IBM PC grows by the week. Following Obase (PCN, May 13) there is Data Design, from Insoft of Oregon.

Data Design is slightly more expensive than Obase at £150 and it lacks some of Obase's verification routines, but according to its UK distributor, it scores on ease of implementation.

Its standard features include

command choices held in menus, interactive help manuals built into the software, and interactive 'browse and modify' facility, and even a telephone-communications subsystem to help you get information into the appropriate hands quickly if your PC is tied into a network.

Data Design is a multi-key database that structures your data into tables.

Pete and Pam Computers is on 01-769 1022.

## Colourful calculation from Zenith

Owners of the Zenith Z100 16-bit micro can now run SuperCalc and Wordstar in living colour.

Zenith has brought out customised packages that take advantage of the machine's colour capabilities. SuperCalc costs £200 and Wordstar £276.

In use, colour SuperCalc shows negative quantities in red, protected entries in yellow and unprotected entries in white. Error messages are also displayed in red.

With colour Wordstar you can select the colours used for the menu display and the colour of the background and foreground of the text area.

Zenith is on 01-837 6332. ● Zenith tell us that the much-loved Z89 series of micros will shortly cease production. In fact, of the four models in the range only the Z90 (without disk drives) is still being made. And even this version is due for demise.

## CP/M network

If CP/M has been stopping you hooking your system into a communications network, the Corvus Systems' Omnet local area network can now accommodate you.

For more information on Omnet contact Ken Computers on 01-236 5325.

## BBC merger

Concurrent printing and sequential file merging are now available in a word processing package for BBC users.

The £15 Wordsworth Mark 2 works on the BBC 0.1 operating system as well as under the two subsequent releases without internal modifications.

It is a new program which will print like you type.

Contact Ian Copesake on Woking (048) 674755.

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Dragon Selection Two		Dragon Data	17C013	£7.95	Space Intruders	16K	Quickshiva	12D049	£4.95
Personal Finance		Dragon Data	17C016	£7.95	Meteor Storm	16K	Quickshiva	12D050	£4.95
Graphic Animator		Dragon Data	17C017	£7.95	Meteoroids		DK Tronics	09D063	£4.95
Computa Vue		Dragon Data	17C018	£7.95	3D Tans		DK Tronics	09D064	£4.95
Typing Tutor		Dragon Data	17C022	£7.95	Centipede		DK Tronics	09D065	£4.95
Alcatraz		Microdeal	21C028	£8.00	Ground Force Zero		DK Tronics	09D066	£5.00
Defense		Microdeal	21C029	£8.00	Master Chess		Micro Gen	06D067	£6.95
Dragon Invaders		Microdeal	21C030	£8.00	Sorcerers Castle		Micro Gen	06D068	£5.50
Escape		Microdeal	21C031	£8.00	Cosmic Raiders		Micro Gen	06D069	£5.95
Managers Adventure		Microdeal	21C032	£8.00	Orbiter	16/48K	Silversoft	29D001	£5.95
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# Portable Televideo

By Richard King

Televideo's first portable machine will be on sale by the autumn, and with hardware and software costing less than £1,500 it should be worth a close look.

The Teletote I is a 25lb machine with a Z80 processor and 64K of RAM, which makes it a pretty standard CP/M configuration, but the memory is expandable to 128K, and there is a single 368K 5¼ inch floppy built in.

As well as two RS232 ports for printer and modem connections, there's a port for the SuperMouse, which is intended to control graphics applications. Vision, where are you? The Teletote looks like good

value, considering that not only is CP/M included in the price, but so are a 'powerful word processor package' and a spreadsheet, as well as TeleChart, a graph-plotting program which works interactively with the spreadsheet.

This last item is written with the long-awaited GSX-80 graphics systems extension, which Digital Research, publisher of CP/M and GSX, hopes will be recognised as an international standard.

One interesting facet of the new machine is that it is totally compatible with the more up-market Televideo 803. The intention, according to Phil Hwang, Televideo's president, was to provide a machine which

is portable, and can be used as an exact replica of the main office machine, generally the 803, since the disk-format is identical.

If you're accustomed to Televideo terminals, you will know that they are styled (if that's the word) on the lines of a '54 Buick.

Not so the 803. Apparently Televideo has used a new design-house, giving the entire range a facelift. The new styling is much more European and makes more than token bows in the direction of ergonomics.

The actual processor and ancillaries are kept in a strange L-shaped housing, which also acts as a kind of frame to hold the screen in place. This allows

the VDU to tilt up and down, but keeps the machine as a single unit.

An advantage of this design is the fact that the circuit boards are mounted vertically, which Televideo says is to provide cooling without fans.

Naturally, in the limited time available, it wasn't possible to do more than run a couple of demo programs, and then try as hard as possible to bomb the machine. I was singularly unsuccessful in this, and the machine obstinately refused to do anything wrong at all.

The standard 803 configuration costs £1,975 from Televideo dealers.

● PCN will Pro-Test the Televideo 803 in a future issue.



**GLARING OMISSION** — If your eyes suffer from screen glare this Polaroid CP-70 Contrast Enhancement Filter may help. Distributed by Cave Tab of Northampton, it is designed to absorb the harsh reflections and ambient reflected glare often produced by VDUs. It costs £76. For more details call Cave Tab on 0604-47238.

## APL means business for Sage users

A version of the programming language APL has been launched for the Sage IV 16-bit micro.

Produced by MicroAPL, APL 68000 is a full implementation, together with enhancements to improve its usefulness in commercial applications. It is designed to run under the Mirage operating system.

MicroAPL is selling the language and OS as a complete system together with a Sage IV with 1 Mb of RAM and a 12 Mb hard disk. It costs £7,800.

APL is something of a cult language with a band of enthusiastic followers. Originally developed as a shorthand notation for scientific equations, it is now used as a high-level language for both scientific and commercial programs. Its advocates claim that APL projects are typically written in 15-20 per cent of the time taken using Cobol, Basic, Fortran or Pascal.

## NSC puts Supercalc on BBC

With a bit of tweaking NSC Computer Shops has adapted Supercalc to run under CP/M on your BBC micro with Torch disk drives.

Normally Supercalc is only available on CP/M systems and

although it tries to run under CP/M it doesn't get far. NSC used Torch drives and a terminal emulator to fool the BBC into behaving like a CP/M machine.

For more information contact NSC on 061-832 9788.

## Insurance offers extra protection

Another low-cost solution to the problem of insuring your computer has been provided by insurance brokers Graham Brown and Company.

The company is offering a policy for micros under two

years old. It gives cover against 'all risks' including internal breakdown and accidental loss or damage, including damage during transit.

The cost of the scheme starts at £7.50 a year for a system worth up to £100. For a £500 system the cost would be £15.

These costs are slightly higher than getting an extension on your existing home contents insurance policy (PCN, March 25).

## Detroit accent

It may not be up to Olivier's standard but a new speech synthesis unit tries to be easier on the ear than the usual grating monotone.

The Personal Speech System (PSS) from Votrax of Detroit has programmable inflection and amplitude — you can play with its oratory to try to produce a more realistic sound.

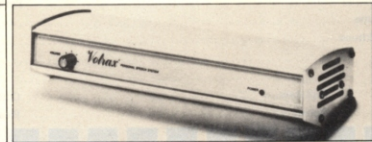
The PSS can run off most micros with its serial and parallel ports and programmable baud setting, and at £375 it really should be a cut a above run-of-the-mill units. Driven by a Z80 it has a 3.5K input buffer

which can be split to give a printer buffer, and the unit can run in parallel with a printer to give hard copy output of its verbal efforts.

According to UK distributor Cyber Robotics, the key feature of the device is its ability to translate 95 per cent of English words from text.

Besides its programmable tendency to lilt, the PSS can function as a music synthesiser with a range of eight octaves. It also includes a clock.

For further information contact Cyber Robotics on Cambridge (0223) 210675.



# Krypton factor in the office

A new family of business computers — the Krypton Series — will be in the shops soon.

Produced by Transec Computer, the series consists of four models — the Krypton 800K, 1600K, M5 and M10, differing mainly in storage capacity.

At £1,695 plus VAT, Krypton 800K comes with 64K RAM, two 400K floppies, a green monitor, slimline keyboard and CP/M 2.2 as its operating system. The 1600K costs £1,995 plus VAT.

The hard disk systems come with floppy disk drives for back-up purposes and all models can have UCSD p-system and CP/M Plus operating system at extra cost. The M5 costs

£3,107 plus VAT and the M10 £3,750 plus VAT.

In addition, the systems can be hooked up for a multi-user, multi-processor network — with a maximum of 30 users having 64K RAM each.

Transec is also selling add-ons. The Centurion Colour Graphics system gives you colour — an extra board slots into your computer and gives you up to 1024x1024 graphics resolution. It will cost £795 plus VAT.

And if you want to boost your main memory to 256K, a RAM disk is available for £450 plus VAT.

Transec is on Bristol (0272) 277462.

## Holidays for the disabled

Computing holidays for the disabled will be held at the University of Southampton this summer.

Up to 25 people, aged from nine, will join each week-long course at Clarkson House, the university's purpose-built accommodation for the disabled.

The course costs £160, but organiser Dr Lionel Wardle has asked the Department of Industry to put some cash into the project and cut the price to £60. Talks to achieve this are still going on.

Course participants will spend five days learning about computers leaving two days' free time. BBCs, Ataris, Spectrums and ZX81s will be available and will be adapted for use by disabled people.

## Computers in Beds

Government money is helping Bedfordshire people try their hands at micro business systems.

Bedfordshire County Library is equipping some main branches with Sinclair, BBC and IoTech systems. The mic-

ros will be available free to anybody who wants to book time on them.

The scheme is funded by a £90,000 Department of Industry grant. Eventually 36 systems will be installed around the county with the emphasis on business software.

The first library to go live with the systems will be Luton Central on May 20.

## £5,000 chess challenge

Five thousand pounds is up for grabs in a computer chess championship sponsored by Sinclair Research and Intelligent Software.

The prize will go to anybody whose chess program can beat Intelligent Software's IS Chess, a £9.95 program that runs on the Spectrum. Intelligent Software's chairman, David Levy (no mean player himself) is prepared to stick his neck out:

'We are willing to bet that it can win a match against any other chess program which is currently commercially available for the Sinclair Spectrum.'

The number of possible contenders is put at 'at least half a dozen' by Sinclair. Battle will commence when they come forward. If you fancy your chances, contact David Levy on 01-636 7016 or Sinclair on 01-235 9649.

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

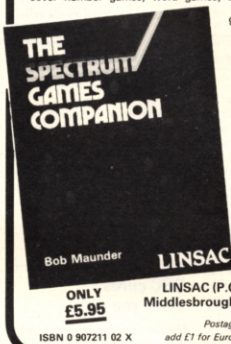
"Far and away the best" — *Your Computer*

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

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

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

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



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## Software piracy — OK among friends

Much has been written in the press recently about ordinary users pirating copies of software house programs, especially games. One survey said that only one copy in 50 of Acornsoft's 'Snapper' was an original. Other articles have talked about 'massive losses of revenue' through such illegal practices.

This is not necessarily as bad as some would have you believe. There are two types of software piracy — one is for fun and the other for profit. I agree that for the latter, *ie* people selling pirated programs as their own, legislation should be introduced to clarify the copyright law and introduce heavier penalties for offenders. On the other hand, 'piracy among

(c) People, in general, are more likely to buy a computer if they know they can obtain a certain amount of software without paying for it. The resulting higher sales of computers can only be of benefit to the industry.

(d) Software houses may mean about piracy, but how many are going out of business? How much profit are Quicksilver, Acornsoft and the like going to make this year with Sinclair and BBC computers topping the sales charts?

Let us hope the industry as a whole will concentrate on stopping those who make a profit on other people's hard work, and cease the endless innuendo about harmless domestic piracy — a practice which, in any case, they are helpless to stop.

*Alastair McLeod,  
Torrance, Glasgow.*

## BBC cures while you wait

Over the last few months I have read numerous complaints about the poor service received from computer manufacturers and dealers. I therefore thought that readers (especially in the Midlands area) would be interested to know about the excellent service I have received from my Acorn dealer since purchase of my BBC micro last December.

On power up I discovered that I had a machine with a MOS0.1 and that several errors occurred while loading programs, so I phoned the dealer. The Daventry Computer Centre, and was told that they would let me know when the MOS 1.2 was available. This they did and my exchange chip was fitted two days after arrival in the shop.

A couple of days later I experienced a loading error: nothing would load at all, so again I gave the shop a call. 'Bring it in,' they said, so I did and the computer was set up on the test bench and checked with an oscilloscope. One of the chips in the cassette interface section of the board had blown so they sorted it out for me, while I waited.

The machine has been fine since then.

*Chris Rain,  
PH Educational,  
Shipston-on-Stour, Warks.*

## More about WP, please

I think it is a pity that you never cross the barrier you seem to have set up for yourselves between the personal computer and the office machine costing a bit more.

There are surely many people besides myself who are seriously interested in the word processing abilities of microcomputers and would like to see more comparison between the speeds and ease of use and relative virtuosity of the various forms of word processing, from the simplest up to the IBM Displaywriter standard.

We may not be able to afford the latter but we badly want to know what we might be missing and what to look for as each new machine and its software is launched. There must be many self-employed people on the brink of word processing or ready to go up-market who read your magazine.

Surely it is time that somebody who actually *does* word processing for a living could be persuaded to tell us more.

For this is as much of a revolution as any other aspect of computer activity. Besides, I understand that word processing is fun. Please give the games a miss for once and go into it in depth.

*Deenagh Gould-Adams,  
Bath, Avon.*

*I'll keep games, but we'll do our best to look at word processing in depth, too (for starters, see page 20) — Ed.*

## The great micro software con

After having read the latest batch of advertisements in the magazines, I was compelled to write to you about the standard of advertising.

Although the standard in many is good, many advertisements are dishonest, or uninformative. For example, several firms manufacture games for both the ZX Spectrum and the ZX81, many fail to point out that the ZX81 version will not have colour, sound, moving graphics etc.

Also several firms fail to tell the reader how many K is required for a program. Several times I have seen a program

advertised, however the advertisement failed to say which computer it was for!

*Peter Talks,  
Warwick*

## Cut out the cowboys

I am writing to help draw attention to some of the 'junk' software around. Now that the computer industry has taken off so quickly and strongly there are quite a few 'cowboys' joining in.

Recently I saw an advertisement in a computer magazine for 'The best Maze Chaser game ever!'

Feeling confident that the program was of good quality I mailed a cheque for £5.95. Eight days later I received a poor-quality cassette, photocopied inlay card and a game worth less than the tape it was on.

Surely some official body should be set up to control the quality of software for micros. The public should be made aware of good and bad software companies. Some people are just out to make a fast buck and are spoiling the scene.

They seem more interested in a colourful advert than in the program.

*K Meredith,  
Cymerod, Cardiff*

*We try to sort good from bad in our weekly software and game-play reviews — this should save some disappointments — Ed.*

Ed.

## BBC screen test

I am writing in to inform Owen Staley (*Random Access*, May 7) that he has made a mistake, in that the BBC Model A does not offer an 80-character screen display as standard. It has to be upgraded with another 16K of memory before an 80CSD is possible, or hi-res graphics.

Also both Newbrain models A and AD offer 80CSD as standard as well as a good full screen editor and 32K of memory, expandable to 2Mb of RAM and 4Mb of ROM, and in my opinion offers far higher quality at a lower price than any of the BBC computers.

*D Scott,  
Glenrothes, Fife.*

## PCN £10 Star Letter



friends' is not only harmless but maybe of benefit to the personal computer industry.

Consider the following:

(a) Would computer users buy all the programs which they were not able to obtain free? Would any more original copies of 'Snapper' be bought, for example? I think not. Most people have a limited amount of money to spend on software, so that the interchange of programs between friends means simply that each user has more software for the same cost.

(b) In a group of users, where this 'illegal piracy' takes place, you can be sure that every participant will have to buy their share of programs... Who would keep supplying a friend with programs who never returns the favour?

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## What's the word on translation?

**Q** I own a 48K Oric 1 and have recently thought about converting a program for the 380Z. It's quite long and I'd like to know the pros and cons before I attempt it.

Some of the words I don't recognise are ON, GRAPH, DEF, CLEAR and RANDO-MIZE.

Jon Watts,  
Barnet, Herts

**A** Unfortunately, it's suck it and see time. It does depend on what the 380Z program does and how. For example, anything that uses CALLS to 380Z HRG is going to be a lot harder than anything that sticks with its text screen.

The basics shouldn't be too difficult. Most 380Zs are now using a 16K Microsoft Basic while the Oric is yet another revival of Ye Olde 8K Micro-soft.

So the bulk of the basics are the same. You'll have trouble with some of the 16K extensions, such as INSTR.

The trick is to simulate the commands. Dig the command out of the RML manuals, find out exactly what it does and then write a subroutine to simulate it. Then replace references to the instruction with subroutine calls.

If you make a mistake with the simulated command, you only have to change the subroutine. This technique avoids having to unravel the 380Z program and reprogram it for the Oric. You can just do a verbatim translation into subroutine calls.

Screen handling will cause some problems. But the Oric and the 380Z both have text-like screens. Provided there's no high resolution graphics in the 380Z program, you shouldn't have to change much.

Most of the words you list shouldn't be a problem. They are in Oric Basic and they are in the Oric manual. ON is part of ON . . . GOTO or ON . . . GOSUB. DEF is part of DEF

FN. CLEAR does the same thing on both machines though 380Z Basics like you to reserve string space with a following number. So CLEAR 3000 would be just CLEAR on the Oric.

GRAPH selects either a full text screen or a graphics window with four lines of text (a bit like Oric HIRE). GRAPH1: GRAPH0 is a common 380Z way of clearing the screen. Use CLS instead. RANDOMIZE reselects the 380Z's random number generator so that it's not always giving the same sequence of 'random' numbers. The Oric has a similarly weak RND but Oric forgot to put RANDOMIZE in the Basic.

You may find the conversion is difficult at first. But as you come to know both Basics, it will get easier and easier. And once you've done it, you can always do it again.

## Expansion can be restrictive

**Q** I own a ZX81 and am 16 years old. Instead of buying a new machine such as an Oric 1 or Spectrum, I am going to expand by buying colour, sound and so on. I wonder if any software companies produce software for such an expanded ZX81?

D Ansell,  
High Wycombe, Bucks.

**A** It is unlikely that you'll find programs that use the add-ons. There's such a range of different devices and techniques in use that it would be ridiculously difficult to produce ZX81 programs that recognised and used some, let alone all, of the possibilities.

Software houses will also be unlikely to commit programs to particular configurations. They have as little idea as you do as to how many of each particular add-on is in use. So they stick where it's safest . . . with the standard 16K Ram, ZX printer configuration.

So usually the only people you find supporting odd ZX81 hardware are the people who put it out. This tends to mean that programs that work with one particular add-on are easy enough to come by, but it's unlikely you'll find programs to support a full range of expansions.

Now that the Spectrum costs

less than £100, you might like to rethink your decision. Spectra have colour, sound, High resolution graphics and so on as standard. So most programs dare to use them.

## Will your ZX81's number come up?

**Q** I want my ZX81 to print random numbers without printing the same number more than once. The problem relates to football pools permutations where no number can be used more than once. I can solve this problem with a megabyte but not in 1K

Carl Richards,  
Belle Vale, Liverpool

**A** I know how to do this. It's a common problem and there's a common solution, even in 1K.

```
10 RAND
20 LET N=35
30 DIM A(N)
40 FOR I=1 TO N
50 LET A(I)=1
60 NEXT I
70 LET C=N
80 LET X=INT
  (RND*C+1)
90 PRINT A(X),
100 LET A(X)=A(C)
110 LET C=C-1
120 IF C>0 THEN GOTO
  80
```

This manages to print the numbers from 1 to 35 without repeats. You could probably force N a bit bigger with some work.

The program works by storing a list of numbers to choose from in array A. This is set up by lines 20 to 60. C is used to store the number of numbers left in the list. So this starts off at 35 (N) in line 70.

Eighty and 90 select and print the next number. After you've picked one of the numbers it needs to be crossed off the list to make sure it's not chosen again. The obvious way to do this would be to shuffle all the numbers up one place in the list to close the gap made by the chosen number. But this takes time.

Line 100 just takes the last number of the list and stuffs it in the gap. This doesn't matter since we don't care about the order the numbers are in anyway. Next, since we've got one less number in the list, we take 1 off C at line 110. Finally, just for demonstration, line 120 loops

until all N numbers have been printed.

This approach limits the range of numbers you can generate. A much slower but perhaps more suitable method would be to work the other way around — start with an empty list and add used numbers to it. Each time you pick a new number, you step through the list and check if it has been used. When you're sure you've picked a new number, add it to the list to make sure it doesn't appear again. This takes time but in 1K you should be able to generate 30 different numbers.

## Spectrum-Lynx link-up

**Q** I own a Lynx 48K and a Spectrum 48K. With the imminent arrival of the Spectrum RS232 interface in mind, what would be the advantages of linking these two computers together?

Martin Rocliffe,  
Teignmouth, Devon

**A** You tell me! Nobody gets anywhere unless they think of new things to do with computers. Yes, there are advantages. You've found a solution, now come up with a problem.

I can't see any immediate use. Normally, you link a little machine (including 48K Spectrum and Lynx) to a big disk-based machine. Then you develop on the big machine and move stuff over to the little one to test. So if you had drives on the Lynx or (to be speculative) microdrives on the Spectrum, it might make life easier.

You might also be able to play at having a network. You could use the Lynx as a window display which can be updated and controlled from the Spectrum. You could even have a program which used the Lynx as a fancy front end to a database stored on the Spectrum. The Spectrum could be looking up the next record while the Lynx edited the last one.

Far fetched? Certainly quite hard work. But the link could prove entertaining and educational. If not useful. And there's always time to think of more things.

It will be a while before you can get a Spectrum interface and a working Lynx RS232 port together on the same piece of ribbon cable.

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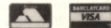
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A stairway to the stairs, outlined in graphic detail by Adrian Boot. This week: the build-up.

# ZX81 calling ET: help is at hand!

A certain extra-terrestrial has been trying to phone home for some time now, but all British Telecom's intergalactic lines are busy. So you and your ZX81 will have to help the lonely chap make his way round.

To do this you'll have to write a graphics program on your ZX81. This week we give you a number of graphics routines and examples which you can use next week to build into a game that guides our alien friend around.

**W**e start with PLOT AND UNPLOT, which respectively fill and unfill pixels. The example:

```
10 PLOT 20,20
produces a small rectangular block at about the middle of the screen, using PLOT to specify the x and y co-ordinates of the pixel to be plotted. In order to get the 2709 pixels on-screen, the ZX81 must have 63 x co-ordinates (pixel columns) and 43 y co-ordinates (pixel lines).
```

When the ZX81 is using character positions, it can display only 704. The character positions are calculated by multiplying the 22 lines and 32 columns (22 x 32 = 704).

The demonstration program below uses INPUT statements to plot pixels with the x and y co-ordinates;

```
10 INPUT X
20 INPUT Y
```

```
30 PLOT X,Y
40 IF X= OR Y=0 THEN GOTO 60
50 GOTO 10
60 STOP
```

The INPUT statements in Lines 10 and 20 ask for the co-ordinates — they could easily be combined in a single statement. Line 30 is self-explanatory. Line 40 stops the program if it finds any zeroes, and Line 50 cycles the program back to line 10.

## Computer art

A better way to use the computer as a machine aid to art is demonstrated with the following program.

```
5LET X = 20
7LET Y = 25
10 IF INKEY$="5" THEN LET X=X-1
20 IF INKEY$="8" THEN LET X=X+1
30 IF INKEY$="6" THEN LET Y=Y-1
40 IF INKEY$="7" THEN LET Y=Y+1
50 IF INKEY$="0" THEN GOTO 200
70 IF Y>40 THEN LET Y=40
80 IF Y<1 THEN LET Y=1
90 IF X>60 THEN LET X=1
100 IF INKEY$("<>") THEN PLOT X,Y
120 GOTO 10
200 STOP
```

Lines 10 to 20 all use the INKEY\$ function. INKEY\$ reads the keyboard and identifies the being pressed.

Line 10 uses the "5" key to decrease the variable X by 1. The "8" key also doubles as the LEFT arrow. This key is used by the program to direct the graphic to the left.

Lines 20, 30 and 40 are similar. They use the RIGHT, UP and DOWN arrows.

Line 50 causes the program to GOTO line 200 and STOP. IF the "0" is pressed.

Lines 70 to 100 make the graphic continue from the opposite side of the screen if the x or y values get too large.

Line 110 PLOTS only if a key is being pressed.

Line 120 makes the computer GOTO line 10, ready to read the keyboard again and PLOT the next pixel.

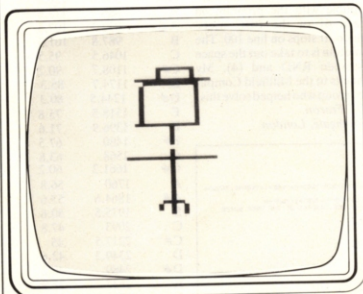
RUN the program. When one of the red arrow keys 5 to 8 is pressed a line is drawn in the direction of the arrow.

## Stars

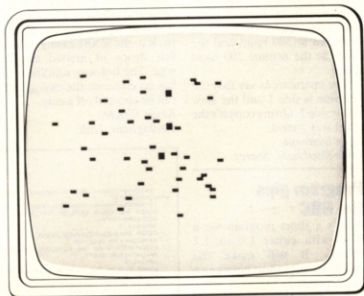
This routine generates an animated graphic of stars twinkling in an alien sky. Leave it running for a few minutes to observe the full twinkling effect.

```
10 LET X=INT (RND*40)
20 LET Y=INT (RND*40)
50 PLOT X,Y
60 UNPLOT X,Y
80 GOTO 10
```

Lines 10 and 20 generate random whole numbers between 1 and 40. The INT



This picture shows the product of the 'Computer art' program, which lets you draw graphics using the ZX81 arrow keys. Here we have drawn a little ET-type figure to get you in the mood for next week's grand finale. Note that you can change the start position of the cursor by modifying the value of X and Y in statements 5 and 7.



You'll get all starry-eyed over the product of the Stars program, pictured here. It takes only five lines to produce and begins your journey to the heavens in black and white. The RND function makes the placement of the stars a random affair, while INT insures that all random numbers generated will be integers.

function gives you a whole number while the RND function generates a random number.

Note line 60. This uses UNPLOT to un-fill the pixel described by the coordinates *x* and *y*.

### Skyline

The routine below draws a New York-type skyline — with a different vista every time you run it.

```
10 FOR I=0 TO 40
20 LET R=INT (RND*8)
30 FOR J=0 TO R
40 PLOT I, J
50 NEXT J
60 NEXT I
```

The outer loop in the program (the I loop) is described by lines in the program (the I loop) is described by lines 10 and 60. The program gives the variable I a value of 1 through 40 as it loops. It loops 40 times, increasing the value of I by 1 on each cycle until a value of 40 is reached.

The inner loop (the J loop) is described by lines 30 and 50. This inner loop gives the variable J values of 0 through R for each cycle of the outer loop.

Line 20 gives the variable R a random whole number value between 0 and 8.

The effect is to produce a skyline of skyscrapers, each a maximum of eight pixels high.

You can change the skyline programme to display taller skyscrapers. Change the number 8 in line 20 for higher values.

The Stars and Skyline programs can be combined to display a rather odd Manhattan-at-night cityscape. Enter the Skyline program first, followed by Stars. You will have to change the line numbers in Stars so that they follow on to give a larger, new program.

```
10 FOR I = 0 TO 40
20 LET R = INT (RND*8)
```

```
30 FOR J = 0 TO R
40 PLOT I, J
50 NEXT J
60 NEXT I
70 LET X = INT (RND*40)
80 LET Y = INT (RND*40)
90 PLOT X, Y
100 UNPLOT Y, X
110 GOTO 70
```

It would be nice if you could just stick two smaller programs together and make one larger, more powerful one. Unfortunately, things aren't so simple. If you run this program (it just fits into an unexpanded ZX81 — 1K of memory) you will notice that the stars twinkle below the skyline. Add a couple of lines to confine the stars effect to the sky *above* the skyline.

Here is the corrected *Manhattan at Night* program:

```
10 FOR I=0 TO 40
20 LET R=INT (RND*8)
30 FOR J=0 TO R
40 PLOT I, J
50 NEXT J
60 NEXT I
70 LET X=INT (RND*40)
80 LET Y=INT (RND*40)
85 IF Y< 10 THEN GOTO 95
90 PLOT X, Y
95 IF X< 10 THEN GOTO 110
100 UNPLOT Y, X
110 GOTO 70
```

Lines 85 and 95 confine the stars effect to above the skyline.

Combining small routines to make larger programs is common. Smaller programmes are easier to test but be careful — your combined programs could be larger than your ZX81's memory. If this is the case, you will have to modify the program in some way to get it all in.

But be very careful to change your GOTO statements if you have to change the line number.

### Realism

Below is a more convincing way of producing a stars effect on the ZX81. Let's call it the Realistic Manhattan at Night programme:

```
10 FOR I=0 TO 40
20 LET R=INT (RND*8)
30 FOR J=0 TO R
40 PLOT I, J
50 NEXT J
60 NEXT I
```

```
70 FOR I=1 TO 15
80 FOR J=1 TO 20
90 LET R=INT (RND*4)
100 IF R< 1 THEN PRINT AT I,J;" "
110 IF R> 1 THEN PRINT AT I,J;"*"
120 NEXT J
130 NEXT I
140 GOTO 70
```

The program is split into two modules in the above listing for the purpose of clarity. The first module is the Skyline program. The second is a new Stars program that doesn't use the PLOT keyword.

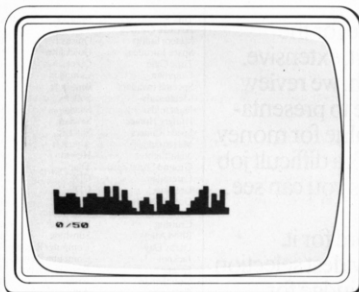
Instead it uses the PRINT AT pair of keywords to print full stops and blank spaces over the screen at random.

The outer FOR NEXT loop (lines 80 and 130) sets the value (I) for the line at which the PRINT AT statements are executed. The inner FOR NEXT loop sets the value (J) for the column.

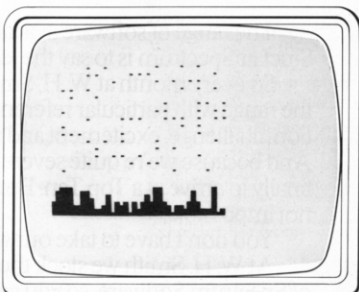
From what you've produced already, you should be able to see some resemblance between your own display and some arcade games. But you should also be able to see the connection between the display and what you key-in.

What your display needs now to turn it into a fully-fledged game, of course, is movement.

**Next week:** Combine these routines and others to build the ET-type game.



New York, New York . . . all in less than 1K of memory on your ZX81. This picture illustrates the results of the Skyline routine. Again the RND function makes the skyline random so that you could be in New York, Paris, Cambridge or even London, depending on which random numbers are generated by the program.



Here it all comes together — using the routines to draw both Stars and Skyline, we get Manhattan at Night. The programs will still run separately, even after they're combined with lines 10 to 60 generating the skyline and lines 70-140 generating the stars.

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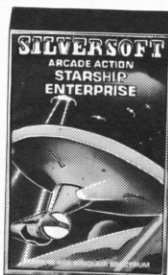
The range of software available for the Sinclair Spectrum is to say the least, extensive. So every month at W. H. Smith, we review the range with particular reference to presentation, challenge, excitement and value for money. And because we're quite severe it's a difficult job finally to arrive at a Top Ten. But as you can see, not impossible.

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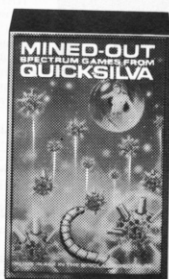
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	Artic	48	£9.95	
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	Ship of Doom	Artic	48	£6.95	
	Espionage Island	Artic	48	£6.95	
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	The Orb	Computer Rentals	48	£5.95	
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	M/C Code Test Tool	Oxford	16	£9.95	
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	Compiler	C P Software	48	£6.95	
	Soft Talk II				
	Family Games				
	Reversi	Sinclair	16	£7.95	
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	Test Match	Computer Rentals	48	£5.95	
	Backgammon	C P Software	48	£5.95	

	Title	Producer	K	RAM	Price
	Draughts				
	Practical				
	Vu-Calc	Sinclair	16	£8.95	
	Vu-File	Sinclair	16	£8.95	
	Vu-3D	Sinclair	48	£9.95	
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	Shiva Special 1	Shiva	16	£5.95	
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	Producer	K	RAM	Price
	C P Software	48	£6.95	
	Sinclair	16	£8.95	
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	Sinclair	48	£9.95	
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	Oxford	16	£8.95	
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	Shiva	16	£5.95	
	Melbourne House	16	£5.95	
	Melbourne House	16	£5.95	
	Melbourne House	16	£5.95	

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Having stopped Atari owners in mid-zap last week, Geof Wheelwright spells out the WP choices.

# Atari A, B or C?

The Atari 400 and 800 computers can be used for word processing — that much we established last week.

This week we look at three word-processing packages for the Atari: Datasoft's Text Wizard, LJK's Letter Perfect and Atari's Word Processor. They vary in price from £68.95 for Text Wizard up to £109.95 for Letter Perfect — with Word Processor also hovering near the top at £99.95.

**A** Text Wizard is the cheapest of the three programs in our comparison, and it is therefore no surprise that it also comes in the smallest package and has the slimmest documentation.

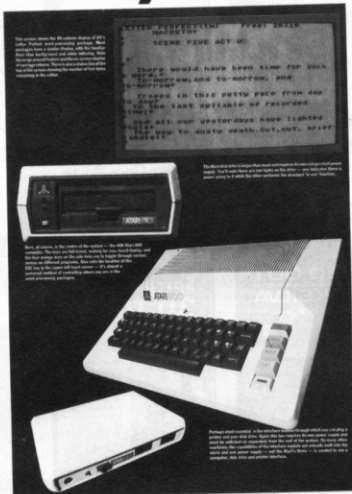
But this economy of size is not necessarily a bad thing. The documentation may be slim, but it's also well written and easy to follow. The instruction guide starts by acquainting you with the Atari keyboard as it is used by Text Wizard. The first thing you'll notice is that the System Reset key is disabled by the program, making it more difficult to lose your precious words of wisdom. This feature is also common to Letter Perfect, but noticeably absent from Atari's own Word Processor.

Text Wizard outlines its needs clearly and understandably — although it perhaps overstates its own case by suggesting that you *must* buy a box of blank diskettes when in fact a few would do to start with. But you can't really fault Datasoft for erring on the side of caution.

You soon arrive at the section on backing up diskettes, and Text Wizard gives some good advice on making back-up copies of disks. It is made all the easier by Text Wizard's use of standard Atari DOS, so you don't have to format disks exclusively for your word processor.

Once you enter Text Wizard, you'll notice it's command-driven rather than menu-driven. You get one menu at the beginning, which instructs you to 'Press Start' — you don't really get much of an on-screen choice after that because all further activities are controlled by your intimate knowledge of the program's commands rather than on-screen instruction.

God help you if you misplace your manual — the commands for using this program won't be spoon-fed to you on-screen. You can take minor solace from the knowledge that major commands such



The Ataris have a deservedly high reputation as games machines, but reasonably-priced word-processing is another of their talents.

as LOAD, SAVE, PRINT, DELETE and DIRECTORY are all controlled by pressing the Option key and one other.

Once you've pressed the appropriate Option key/single key combination, you begin typing, and soon discover that Text Wizard doesn't turn off the Atari's annoying 'click-click' keypress sound when you hit the keys. This is probably a matter of taste, however, as it can be a help if you're a touch typist who is not used to the Atari keyboard.

Another thing you'll have to get used to is its rather terse deletion commands. Most word processors now have some sort of safety delay that usually takes the form 'are you sure you want to delete x?' before you delete a phrase or file. Not Text Wizard — this little sucker moves right in on your file and wipes it out the moment you give a delete command. There are no second chances either, as the deleted text doesn't get saved to a buffer.

There aren't too many other ways to crash the program — even when you ask it to use a printer and one isn't hooked up, or you hit reset. In the first case, you are just returned to your text, and in the second you are returned to the main

menu — but your on-screen file is not deleted.

Text Wizard has all the other word-processing functions you might expect from a package in its price range — Insert, Block moves, Block duplications, Search and Replace — as well as a number of printing commands.

The print commands are actually quite ambitious, including headers, footers, sub- and super-scripted text, underlining, page numbering and CHAINING of files during printing.

All in all, this isn't a bad package for the price — as long as you don't mind learning the commands necessary to run it and make sure you know what you want when you're deleting text.

**B** Although not the most expensive of the three packages, Atari's Word Processor is the most comprehensive. It is the best documented of the three and includes an instructional audio tape, two copies of the master diskette, a training data diskette and two large manuals.

The whole package is bound in a three-ring easel-back notebook that can be stood up to flip through as you go through the training sessions. The training package includes the two audio tapes and a 128-page training manual.

This manual assumes you've never used a word processor before and slowly steps you through disk formatting, text creation, SAVEing, printing, LOADING, editing and screen formatting. The program is entirely menu-driven, so you know exactly what your options are at any time without even laying an eye on the manual. The other useful thing about this menu-driven construction is the ability to move back through different menus just by pressing Escape.

Atari has attempted to overcome the 40-column limitation on its display with the now-traditional 'window' approach. You are shown a 40-character window of an 80-column screen which scrolls across as you type — just like Wordstar on the Osborne I or Magic Window on the Apple II. This is very useful, as it allows you to see exactly how your text will be printed out before it goes to the printer.

In addition to the window, there is a page layout control display that shows you exactly where your text will be printed on

the page and allows you to adjust the position, line spacing, indentations, tabs and page size.

And if you find the scroll-across window annoying, you can always define your page as 40 columns across, and then define the page for 80 columns when you print it out.

After learning how to use the basics of the word processor, you move onto Atari's reference manual, which starts with a chapter on connecting the word-processing system. This is perhaps a little misplaced, since you have to get the system set up in order to run through the training sessions.

The second reference chapter is an alphabetical glossary of all the Word Processor's functions, starting with Alignment and ending with Write-Protect.

You then get a brief chapter on error messages — one page to be exact.

The final chapter discusses system components, including the disk drive, the computer, Atari's printer and interface module.

Although the training manual and glossary of functions are excellent, the idea that there is both a reference manual and a training manual is a bit misleading. The training manual and reference manual would be better integrated into a single volume, although separating them as Atari has is no doubt a good marketing gimmick.

Atari's package also maintains the annoying click-click of keys, but apart from that and the other minor foibles noted earlier, this is one of the best packages you can buy for word-processing on the Atari. Perhaps its only real drawback is that it's so comprehensive you could easily feel intimidated.

**C**Letter Perfect, the most expensive of the three packages on test, is the only one to offer word processing in cartridge form and combine the best features of the other two packages.

Just as Word Processor is completely menu-driven and Text Wizard command driven, Letter Perfect alternates between the two. It begins with an all-too-terse menu asking which printer you want to use — Epson, Atari 825 (or Centronics-type printers), Qume (or Diablo) or a specialised printer requiring the running of Letter Perfect's printer-driver program on diskette.

Unless you have the manual in front of you, the instruction which opens the first menu, 'Select (EADQ):', would be quite incomprehensible. But things soon get better. After asking you which file and database unit you want for primary storage and retrieval (which doesn't matter if you have only one drive), the more meaty menu-driven aspect comes into force.

The main menu has 13 options: Editor; Change Parameters; Load; Save; Merge; Screen Format; Printer; Data Base Merge; Lock; Unlock; Delete; Format Disk, and Quit.

The Editor is obviously where most of the work is done, and offers the usual wrap-around, insert modes, cursor movement and block deletes. It does not offer the scroll-across available on Atari's Word Processor, nor the same kind of preview screen to position text.

There are two nice features to this mode: first it eliminates the ticking on keystrokes that both the other packages retain, and secondly it offers a safety check on block deletes by making you press the hash key

whenever you need to effect the delete.

There is also a buffer to which you can SAVE information that you may want to retrieve later. Headers, footers and various formats are supported. And like Atari's package, Letter Perfect allows you to go back to the main menu any time merely by hitting 'Esc'.

The other functions listed in the main menu are quite self-explanatory, and differ little from those on other packages — although it's worth noting the Screen Format selection which shows you on-screen what your document will look like on the printer.

Documentation is good, but not as good as Atari's. The 100 page A4-size manual comes in a three-ring binder and divides up into four sections (not including the introduction and appendix), one each on the editor, disk operation, use of printers and a tutorial.

In summary, Letter Perfect is certainly a good package, although perhaps its name and price may be a little overblown. After all, the reference card that comes with this package is headed 'Letter Perfect' — an intentional error, we hope.

**The ratings on this table are awarded out of five. So when Atari's word-processor scores five out of five for documentation, you know you're not likely to find better documentation for an Atari 800 wordpro package from anyone else. Three criteria — unique features, interface with DOS, and price — can't be measured the same way as the rest, so only text or numbers have been included. Price versus performance is measured by the features included in the packaged, stacked against its price.**

	<b>A</b>	<b>B</b>	<b>C</b>
	<b>Text Wizard</b>	<b>Word Processor</b>	<b>Letter Perfect</b>
<b>Screen presentation</b>	⌘⌘⌘	⌘⌘⌘⌘	⌘⌘⌘
<b>Documentation</b>	⌘⌘⌘	⌘⌘⌘⌘⌘⌘	⌘⌘⌘
<b>Unique features</b>	can edit Basic	80 col scroll across	cartridge version available
<b>Ease of use</b>	⌘⌘⌘	⌘⌘⌘⌘	⌘⌘⌘⌘
<b>Document formatting</b>	⌘⌘⌘	⌘⌘⌘	⌘⌘⌘⌘
<b>Safety checks</b>	⌘⌘	⌘⌘⌘	⌘⌘⌘⌘
<b>Interface with Dos</b>	Atari	Atari	Non-standard
<b>Price</b>	£68.95	£99.95	£109.95
<b>Performance versus price</b>	⌘⌘⌘⌘	⌘⌘⌘⌘	⌘⌘⌘

The Silicon Office scaled down for the Commodore 64? Barry Miles scans Infomast.

Infomast is one of the first of the new breed of programs for the Commodore 64. It has the type of facilities Silicon Office has, but scaled down for the smaller machine. The package consists of a random access filing system, a word processor and a programmable calculator all working together.

Attempting to set up such an ambitious undertaking on a slow disk drive and a slow and noisy printer is a considerable task, and it isn't surprising that perfection has not been achieved.

## Features

The filing system has a maximum record length of 255 characters, and a maximum of 30 fields. Access is by full or partial string, multiple fields, or by record number. The calculator allows the use of up to 26 variables, and works to nine significant figures of accuracy.

The word processor has a maximum page width of 80 characters, and a page length of 70 lines. You can have up to 10 tabs, and right justification is available too. The text is formatted as you go.

It's strange to see the text moving about a fixed cursor, and I didn't like this feature, since it led to text scrolling sideways off the screen, even when you restricted the document width to the width of your screen. It's a common approach, however. The similarity to the view you get when using a typewriter is no doubt the reason for this.

The package reminds me of what Dr Johnson said about a dog standing on its hind legs. 'It is not done well, but you are surprised that it is done at all.' There's little chance of using the Vic 1515 printer for serious business word processing, simply because the font is so primitive that no business person with any sense would dream of sending out the letters it would produce. Similarly the Serial 1541 disk unit is slow, and its capacity is so small that I would hesitate to use it for 'real' applications.

The filing system is also limited: there is no way of deleting a record, and no way of splitting a file when its capacity — 669 records — is approached.

Anyone planning to use the system must seriously consider using a better quality printer, and one of the more advanced faster Commodore disk drives. Versions of these are in the pipeline.

## Presentation

The manual starts by dealing with date insertion — you can then use the date automatically. It is a pity, however, that no

# Enticing Infomast



steps are taken to validate the date of entry time.

The manual is clearly written in a friendly style, with suitable warnings where necessary. It comes in a strong, two-ring A5 size binder. Help screens are always available, however, and this means you won't need the manual much once you are familiar with the program.

The contents are easy to understand, and at the right level of difficulty for the potential users of the package. There is no quick reference index, which is a surprise because the single sheet flier produced for promotional purposes contains the help you need.

The disks are clearly labelled, and the LOADING instructions, important because you have to add an extra parameter to ensure that the program LOADs in the correct area of memory, are printed on the disk itself.

## Getting started

The manual takes you through the setting up procedure gently, so the rawest beginner will find this easy. You are taken by the

hand and led through the process of setting up a file, stage by stage.

Early on, the manual gives you a heavy warning that the machine may 'hang' and that you'll lose all your work if you don't make sure the printer and disk drive are switched on and ready to go.

## In use

The screen layouts and commands are consistent throughout the package, so you always know that the prompt will appear on the bottom line, and that that is where warnings will flash.

I would have welcomed warning sounds too. When putting data into fields, you are shown, by judicious use of the underline and brackets, how much space you have available for your data.

The commands are consistently two characters, and the help screens are available by 'h1' and 'h2'. These soon become unnecessary, because the mnemonic design of the prompts means you memorise the commands by use. For example 'cs' copies the screen to the printer, partly or completely, and 'ch' changes a record.

It's easy to change your entries on a file, but there is no way to change your mind about using a command when you have hit the first character.

**The filing system:** Setting up a new file is a long drawn out process, so it's best to plan your layout on squared paper before you produce the mask into which your files will be put.

The reason for this is that you indicate on the screen where you want the prompt for a field to start, and the data will wrap around onto another line if you are starting too far to the right. You cannot change your mind other than by completely repeating the process.

But on the other hand, the user is aided in the definition of fields by good prompts. You are restricted to a maximum of 31 fields, and a maximum field length of 38 characters. As you define your fields, you are told how many characters you have left to play with.

Default values can be defined, and one of these is 'today'. This ensures that whenever you make an entry in a date field, the machine will supply the date you set at the beginning of the day's operations.

You may have password protection, and this is an unusual feature on an inexpensive program.

Once you've set up the mask so that you have defined where all the fields

are to be displayed, the work disk is prepared.

Each file requires two disks, one called 'Work', and one called 'Data'. This is quite expensive, and you will end up with a lot of cash tied-up in disks if you use the program for many applications. A very serious limitation of the software is that no provision is made for backing up the disks, indeed no emphasis is placed upon this. The single drive is a major problem for backing up. The best program so far designed for it requires the disks to be inserted three times each.

There's also no facility for showing you the directory of any disk, and this seems an amazing oversight.

Adding data is simple, and the details from the previous record accessed are available to you if you move from field to field by means of the cursor controls rather than the Return key.

This facility is also available within the change data option.

The most powerful function is the Sort, which sorts the file on the key field. This is quick because the keys are maintained in RAM. In addition, you may change the key field, which enables you to sort consecutively in different ways for different purposes. You can only sort on one field, and partial field sorts are not possible.

Any command can be used repeatedly by pressing the F1 function key. This aids browsing through a file, backwards and forwards by use of the 'Next Record' and 'Previous Record' commands.

**Using the calculator:** The calculator is quite powerful, using 26 variables, termed 'Memories', for calculations, which can be displayed at one time. These variables can be SAVED on your work disk, so they can be modified at a later date.

The calculator works in conjunction with the database, so you can transfer data from fields into variables, perform calculations on them, and store them in a field of the relevant record. Programs can be recorded on disk for repetitive use. They cannot be listed on the printer, but this will change on later versions. The language is like a primitive subset of Basic, and has Goto but no Gosub, so believers in structured programming are in for a hard time.

You can total the contents of a field, with a 'Simple Addition' (SI) command. The computer can search for a record, on a partial string or on a full string. It can also search on multiple fields, with the added opportunity of searching with Boolean comparisons, which aids totalling of a field of records selected by criteria.

**Using the word processor:** LOADING the word processor is described in considerable detail in the manual because you will need to select the appropriate work disk. This is doubly important, because you have no access to a Directory. Entering the word processor gives you the chance to select page width and length, and you will then be ready to type the document. Information about which column and page you are on is given all the time.



Top to bottom: the help screen, word processor and filing system of Infomast.

you to move text to the right hand margin which is convenient for addressing, for instance.

Left justification is also available, as is centring. All these commands are performed by use of the Function keys. Users who make prolific use of the word processor will find it worth using adhesive labels to mark these keys.

'F' will find any string, and 'R' will find and replace, but this is very restricted, as the new string must be the same length as the one it replaces. 'INS/DEL' inserts characters at the cursor, and deletes the character under the cursor. A major disadvantage is that if you insert after the last character on that line reaches the end of the line, it will fall off.

The 'Storage' command SAVES the document to disk. The manual gives a very heavy warning that you must not SAVE the document onto the data disk. That is reserved exclusively for random access files used by the random access filing system.

The Print option is geared to the Vic 1515 printer at present, and includes a limited merge facility for direct access into the random access filing system. You put a '↑' at the point where merging is required, followed by the field number. The merging is manual, so you specify the file, and the record number.

## Reliability

The program is reliable enough, although there is the ever-present problem of failing to heed the various warnings about using the right disks and making sure the printer is connected correctly. The major defect is that if you try to call up a non-existent file — easy to do with no directory at your disposal — the machine will hang, permanently!

## Verdict

Infomast is difficult to sum up. It is frustrating to use after you've used more expensive, more sophisticated packages which run on more advanced equipment. But bearing in mind that the cost of the hardware for this is below £800 and the software costs £79, it represents very good value for money.

Some of the claims about what it will do are a little fanciful; for instance patient records, client records and the like. But it is the only package of its kind currently available for this machinery, and the price is very low.

### RATING

#### Features

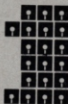
#### Documentation

#### Performance

#### Usability

#### Reliability

#### Overall value



**Name** Infomast. **Application** Integrated filing, word-processing, programmable calculation System Commodore 64, Vic 1515 printer, Vic 1541 disk drive. **Price** £79. **Publisher** Rabbit Software, 01-863 0833. **Format** Disk. **Language** Compiled Basic. **Outlets** Mail order.

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Can Mace make it among the high Motorolas? Ted Ball tests a Dragon machine code monitor.

# Monitoring with Mace

The Dragon 32 is built around the Motorola 6809E, the most advanced 8-bit microprocessor so far. Mace is a ROM cartridge containing a machine code monitor, editor and assembler that allow you to produce machine code programs and make full use of the powerful features of the 6809.

## Features

The monitor provides only a limited number of commands, and some of them could have been better implemented, but it does have the minimum you need for debugging.

Two of the monitor commands could have been greatly improved without a lot of extra programming. The Shift command moves a block of memory but it always works from low to high memory and cannot be used to move data up in memory if the source and destination blocks overlap.

This is a common fault in machine code monitors, but it is not difficult to write a move routine that always works correctly.

The second command that could have been improved is Calculate. This does addition and subtraction, allowing you to mix hex and decimal numbers in the same expression, and gives the answer in hex.

However, the assembler allows expressions in operands with addition, subtraction, multiplication and division, on a mixture of hex, decimal, binary, octal and ASCII. With a little foresight all this could have been included in the monitor's Calculate command.

The most obvious missing feature is a disassembler. With the assembler in the same package you can manage without a disassembler when working on your own programs, but a disassembler is still useful.

The editor allows you to create, edit and assemble an assembly language source file. It gives a comprehensive set of commands, but you have to remember that it is line oriented, not character oriented like the Dragon's Basic editor.

For example, the *I* command in the Mace editor allows you to insert lines, while in Basic *I* allows you to insert characters.

Mace's *E* command is like the *X* command in Basic, displaying the line with the cursor at the end so you can extend the line or delete and retype part of it.

The *A* command has a number of forms which include allowing you to assemble with or without a listing on the screen, and with a listing to a printer.

The assembler allows all standard Motorola 6809 opcode mnemonics and standard syntax for all the addressing modes.

Mace does not accept the 6800 instructions that are not included in the 6809 instruction set, but the manual gives a list of these, together with equivalent 6809 instructions and some notes on other alterations required when entering 6800 source code.

The assembler directives are not completely standard, but there are no serious differences and you should have no difficulty adapting source code that uses fully standard directives.

Mace's main departure from the Motorola standard is in labels.

Mace allows two types of label, global and local. Global labels are like standard labels but may include a full stop as well as

the standard capital letters and digits.

Local labels consist of a colon followed by a decimal number, and are valid only between one global label and the next, allowing the local labels to be reused in other parts of the program. This is not standard, and you would be wise to avoid local labels.

Mace also allows the use of opcode and directive mnemonics, and register names as labels. The source code must be in a fixed format, with a label having to start in column 1 and lines not prefixed by a label having a space in column 1.

Because Mace requires this fixed format the assembler does not get confused by the use of reserved words as labels, but it is not good practice, and most assemblers will not allow it.

Macros and conditional assembly are not allowed, but these features are rarely found in assemblers for small computers.

## Presentation

The cartridge comes in a black plastic box, with a printed label on top, and is easy to plug in and remove.

The 80-page manual is nicely printed, and as well as giving instructions for using Mace it includes a reference section giving information about some useful ROM routines in the Dragon, and details of 6809 assembly language.



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# PCN PRO-TEST SOFTWARE

I noticed one omission in the documentation, where the Motorola standard requires two assembler source forms for

## EDITOR COMMANDS

(Enter)	Display current line
(Number)	Display line (Number)
↑	Move down the file one line
↓	Move up the file one line
P	Print lines on the display
B	Go to the bottom of the file
N	New. (Erase the file)
I	Insert line(s)
D	Delete line(s)
O	Overlay the current line
E	Edit the current line
=	Replace the current line
C	Change a string
S	Save a file on tape
L	Load a file from tape
?	Display the current file name
M	Go to the system monitor
X	Exit to Basic
A	Assemble the file

## MONITOR COMMANDS

V	View memory, in hex and ASCII
M	Memory examine and change
I	Insert (fill block)
S	Shift block
F	Find sequence of bytes
C	Calculate
B	Set a breakpoint
R	Display registers saved by breakpoint
J	Jump to machine code program
G	Go (Continue execution following a breakpoint)
(Break)	Exit to editor

the operand in program counter relative addressing (CONSTANT, PC where the actual value of CONSTANT goes into the object code, and LABEL, PCR where the signed offset from current address to LABEL goes into the object code). Mace does accept both forms and handles them correctly, but only the second form is mentioned in the manual.

## Getting started

The instructions are quite clear, and there is an example program included with a full description of how to enter and run it.

The manual does not teach you to program in 6809 assembly language, but it recommends some textbooks, and is sufficiently easy to use that you should have little difficulty using it as you learn.

## Reliability

I could not find any serious bugs, but I did find some minor items that could cause trouble:

- 1) You must use the assembler directive ">" in order to get a 16-bit offset in program counter relative addressing. The assembler gives an error message if you fail to do so.
- 2) If a number or expression evaluates outside the range  $\pm 65535$  or  $\pm 255$  (according to the size of operand required by the instruction) the result is reduced mod 65535 or mod 255, but no warning message is given.
- 3) If you include more than one ASCII

character in an operand the assembler accepts it but ignores all but the first character. For example, the source code line LDD# 'AB gives object code CC 0041. There should be an error message in this case.

There is a good selection of error messages, and the manual explains them fully, so you can easily find out where you've gone wrong.

## Verdict

The machine code monitor is fairly limited but does include some useful debugging aids, and although the assembler is not completely standard it is near enough for you to have little difficulty adapting programs.

I would recommend Mace to anyone who wants to use the Dragon to learn 6809 assembly language or to write serious assembly language programs.

## RATING

Features  
Documentation  
Performance  
Useability  
Reliability  
Overall values



Name Dragon Mace. Application Machine code monitor/editor/assembler. System Dragon 32. Publisher Windrush Micro Systems, Worstead Laboratories, North Walsham, Norfolk NR28 9SA. Format ROM cartridge. Language Machine code.

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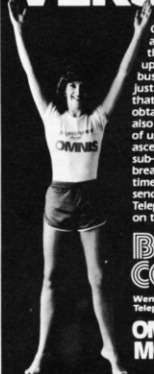
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What happens when cheap micros meet music? Francis Monkman is the man with the notes

# Microtechnology going for a song?

Computers aren't the only things that have experienced plummeting prices over the past few years.

The same process is apparent with the digital synthesiser. A synthesiser that used to fill a room in the old analog days can now be condensed to fit a cabinet about the size of a thick bread-board. Little wonder, then, that consumer products sharing such a common background should eventually get together and form an affordable package for the technically-minded musician or the musically-minded microenthusiast.

Francis Monkman is an experienced professional musician — having played in Curved Air and the jazz/rock/classical fusion group Sky. Francis is also a microenthusiast — who better, we thought, to review Roland's latest offerings: the MC202, a digital synthesiser and the CMU-800 driven by an Apple II computer running Roland's Compu-Music software package.

Using the package you can compose 'on-screen' and then run the finished product through the CMU-800.

The software will also be available for the Sharp MZ80 and the NEC 8001 and Roland also has the ZX Spectrum, BBC Micro and Commodore 64 in mind.

Two new products from the Roland stable this week, one from the parent company, the other from one of Roland's subsidiaries, Amdex, with its own brand name, logo, etc.

The Roland machine, the MC202, is primarily conceived as an independent unit, whereas the Amdex CMU-800 is a peripheral device for, in my case, an Apple II.

## Roland MC202

Before I looked through the documentation for the MC202 MicroComposer (the MC202 is so new that this was still in the 'upside-down photocopy with blank pages' stage of release) I had fondly assumed that a MicroComposer was a box that not only allowed you to store the tunes you had written, but was also prepared to try a few of its own.

OK, so random melodies are seldom anything other than yawn-provoking, but maybe a company with the resources of Roland might be studying some of the probability-theory algorithms being used with such success by the graphics people. Mightn't it?

Ah well . . . anyway, it turns out that

what everybody else calls a sequencer. Roland calls a composer; I wonder what it calls a composer?

In reality the MC202 is a grey plastic box some 13 x 8 x 2 inches in size, with 16 mini-faders, four switches and five knobs to control the synthesiser's functions, 18 buttons to control the sequencer, a calculator-style LCD readout, and a 2½ octave keyboard.

There are sockets at the rear for audio and headphone output, control of/by another synth/drum-box/keyboard, cassette memory storage, and also provisions for synchronising to a tape recorder, so that if you have, for instance, a four-track recorder, you can use one track for the synth pulse, leaving three tracks for recording/bouncing (one track at a time). All in all, this adds up to an impressive spec for such a tiny machine, so what's it like to use?

## Keyboard performance

Well, the first thing you will have noticed is that 13 inches is not much room for a 2½ octave keyboard (actually about ten inches wide), so this machine's use as a keyboard performance instrument is effectively precluded, unless you own/buy a suitable add-on.

The keys themselves, outlined in a kind of generalised imitation of the real thing, are small rubber pads identical to those used on the ZX Spectrum — not guaranteed to help evolve a frustration-free keyboard technique.

The keys double as functions, which are printed above and below them, and who knows? a whole new system of tonic sol-fa could spring forth.

The synthesiser is monophonic (one note at a time), mercifully, as any attempt at polyphonic playing on this keyboard could constitute a serious health hazard. It has all the facilities (or lack of them) that seem standard on small synths these days — a waveform oscillator (sawtooth and square/pulse) which can be switched to one of four pitches or 'footages', with an additional 'sub osc' (squarewave one octave down or square/pulse two octaves down).

(A brief digression here; if you understand footage, then skip. Footages are used by organ-builders to describe the pitch of a rank of pipes by their length, *ie* bottom C at piano pitch would be eight feet long, so the pitch became known as 8'. 4' is an octave up, 16' an octave down. Synthesizers with preset footages are easier to tune

(and to build) but you can't do things such as sweep the oscillator(s) through their range.)

All three can be mixed together in any proportion, and certainly the 'sub osc' lends a very beefy element to the sound, which would increase its value as a single-line-riff instrument in a band.

Pitch, pulse width and filter contour can be modulated either by the envelope (standard Attack Decay Sustain Release or ADSR) or by the low frequency oscillator (triangle wave at about 1 Hz to 20 Hz) for swoops, vibrato, etc. In fact, I think the sound quality is the strongest feature of this unit — the oscillators and filter (24db per octave) have a good ring to them (speaking musically rather than electronically), which reminds me of the Arp Odyssey (circa 1972) and would not sound out of place through a 100 watt stack.

The decay was particularly smooth and controlled.

The sequencer, duophonic so you can play one other synth 'voice' from it, is where this machine and I part company. Even when micro-controlled analog synthesizers were quite well established, Roland continued to insist on compatibility with its huge range of analog synthesizers (a philosophy grossly at variance with its motto, 'We design the future') with the usual combersome result.

(We shall see later how, with the computer-based Amdex machine, this has led to a sequencer programming language which is made to look outdated by even the earliest music-making programs for the Apple II).

## Readout

On this machine, all readout is via a six-digit LCD, which incidentally displays the name of each note as you play it. Like other analog sequencers, no looping is available, except of the whole piece. Look at it this way: most music, and especially rock/synth music, has lots of repetition, but usually segmented into sections.

So mostly you will want to do some repetitions, do something different, and then repeat the process, perhaps adding new material. If you can't tell the machine to do this kind of thing, it not only means much key-pressing, but also that you risk exceeding your machine's memory capacity surprisingly fast. On which subject, if you are playing direct into memory from the keyboard and the memory gets full, bang! Start again.



Jan McKeinnell

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The MC202 is definitely a toy, but a good one. If it costs around what the ZX Spectrum costs by then, it's good value; I'd rather save up my pocket money for something better.

### Amdek CMU-800

The blurb says inscrutably: 'Compu-music is revolutionary. Compu-music consists of 2 parts.'

It is more sturdily constructed than the other and looks like it could handle the occasional knock. Basically, the hardware consists of an interface board (the simplest I've ever seen), the wherewithal to control up to eight external synthesiser voices, plus some internal sound generators (melody, bass, four-part chords and a drum-box — with a very good hi-hat), faders to mix them with, and individual and mixed audio outputs.

The internal oscillators are pretty much pre-programmed, although you can set sustain and decay on Melody and decay on Bass and Chord, the last being a sort of all-purpose rhythm 'jab', not unlike a paper/comb combination.

All very well, but CMU-800's manual's claim for a 'six-voice synthesiser' must be examined in the light of the designer's taste in musical arrangement. Certainly the examples on disk were mainly the kind of thing you find in hotel lifts, although *Good Vibration* was programmed with singular accuracy and faithfulness to the original, similarly the delightful *Maple Leaf Rag*.

Nowhere to be found was Bach, promised in the manual, but then his biographer said he had 'rhythm in every member', so I expect he found a way off the disk.

So, if you don't have those external synths knocking around, don't put too much hope in this as a synthesiser.

Still, as the makers rightly point out, the hardware is only as good as the software that drives it (where have I heard that before?). This, for the Apple II, is CMU106, meaning Compu-Music version 1.06, described by Roland as a 'personality package'.

Evidently, computers acquire personality more easily than they acquire feelings. In fact, Roland means that the Amdek is currently available for, in addition to the Apple, the Sharp MZ-80 and the NEC 8001. Other plans include as possible the BBC micro, ZX Spectrum and Commodore 64. All this information comes from Roland DG, short for Digital Group, which is spearheading Roland's digital breakthrough.

Well, I must say that their X-Y plotter looks like what I'm looking for, but I feel their music software has come up against a bit of a brick wall. Because Roland, at the risk of repeating myself, has carried analog techniques into its music programming language in order to maintain compatibility with its existing range.

For instance, it is most unhelpful to be forced to define pitches by their absolute number on the keyboard, and the situations where it might be useful, eg note pattern creation using maths formulae, are definitely not supported by this language



Roland's hardware: Compu-Music (top) gets its musical instructions from Apple software; the Micro-Composer stand-alone musical computer (bottom).

You enter note number, step time, and gate time: these represent pitch, note length, and articulation, and could easily be machine-translated into a more easily understood representation.

Pitch numbers start at zero (*ie* middle C = 24), a condition which could usefully have been reserved for a musical rest, here defined as the note of your choice with a gate time of zero. Tempo is not under software control. To speed up you turn the knob.

I can't help feeling that Apple II users have come to expect something better than this. Even the early programs that beeped the speaker did pulse width modulation, and could work out notenames (one line of Basic code), while later, still relatively cheap and unsophisticated products like the Alf (what happened to the Alf?) had a hi-resolution graphics music notation.

Mountain Hardware even gives you a light-pen, and you get 16 fully digital voices (although like many digital synth makers it is a little heavy-handed on the output filters, which can be removed/modified).

Including software the CMU costs £450. For that sort of sum, Apple II users have come to expect a fair deal.

That said, the software seems reliable and easy to use, with commands for copying blocks (much typing saved, much memory used) and inserting loops (not nested, which are useful and easily done in software).

Unless you're already a Jupiter-8 owner (Roland's £4,000 flagship), in which case this is probably just the thing to control it, I would arrange to try it out before you buy it.

My conclusion about both machines is that Roland has built a toy sequencer and put a real synthesiser inside it, while Amdek has built a real sequencer, and put a toy synthesiser inside it.

**Product MC202 synthesiser Price £365 inc VAT. Distributor Roland Tel: 01-568 4578.**

**Product CMU 800 plus composing software package interface — Apple card included. Price £450 inc VAT.**

Ralph Bancroft feels the pulse of a hard-wired modem which permits micro-to-micro communication.

# Prestel bypassed

**T**welve months ago the cheapest way to hook your micro up to the telephone was to buy an acoustic modem costing £300.

Then there came Micronet — as part of its package it offered an acoustic modem at a discounted price of £57, which included software so that micro users could talk to Prestel.

Unfortunately, acoustic modems have their faults. Having the right-sized telephone handset helps (there are five different kinds), but even then you can never be too sure that you will get a perfect acoustic seal.

Background noise can make funny characters appear on the screen, and worse still, data can become corrupted — making your downloaded software unusable.

But from June these problems could become a thing of the past. Prism Microproducts, one of the joint partners in Micronet, is launching a hard-wired modem for £89.95, which includes the cost of the terminal software. Instead of using an acoustic coupler, which acts like a reverse telephone handset with a speaker opposing

the microphone in the handset and a mike opposing the speaker, a hard-wired modem sends pulses directly down the telephone line.

PCN was provided with a prototype version to Pro-Test. We think it will open a new era in personal computing.

Prism's is no ordinary Prestel modem. In addition to the usual 1200 receive/75 transmit baud rates it also has settings for 1200 baud rates in a half duplex mode. This opens up the realms of micro-to-micro communication over the telephone network, bypassing Prestel. My only complaint with this option is that since it is half-duplex you will have to switch repeatedly between transmit and receive modes in order to have a conversation with another micro.

In its Prestel mode the modem could not be faulted. Using the standard Micronet terminal software on a BBC micro all you have to do is follow the on-screen instructions, leaving out the one that tells you to put the receiver into acoustic coupler.

The difference compared to using the

acoustic coupler was startling. No longer did background noise in the office turn the characters on screen into a load of gibberish. Trial runs of downloading software were all successful.

The first of these chip modems will go to Micronet users, but when volume supplies become available (most probably in September) they will be available from retail outlets such as WH Smiths.

## Two versions

Two versions will be on offer. One will be a simple plastic box. The other will be tailor-made to sit under the telephone.

The reason for this second option is to do with the way the device connects up. Connection with the micro will be by way of an RS232 port. Connection with the telephone network will be via a new-style telephone connector (a small rectangular plug compared to the old style round and chunky one). The telephone itself plugs into the back of the modem, again by way of a new-style connector.

The disadvantage of this arrangement is that if you don't have a new-style telephone connection in your house (and very few do) you will have to get one installed.

How much Buzby will charge for this service remains to be seen. But the impression I get is that British Telecom is keen to see all telephones connected this way. Perhaps it would be worth suggesting that you are doing them a great favour by having a modem installed!

The advantages of wiring up this way are, first, you will have full use of the telephone when the modem is not in use. Secondly, especially with the box under the phone version, it leaves everything tidy.

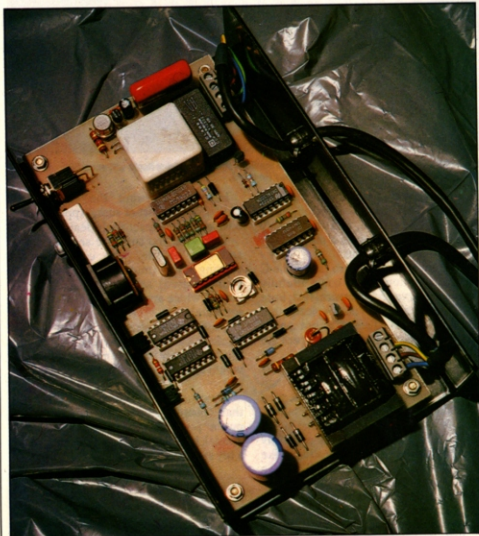
Prism is expecting a heavy demand for the product. The company says it is trying to buy up the entire UK supply of Texas Instruments' 'modem on a chip'.

The modems have reason to be optimistic, as the product is competitively priced. But purists may have grounds for suggesting it could have more features. Having used a Torch as a Prestel terminal, I for one appreciate the convenience of having a built-in auto dialler and programmable customer ID.

Prism says that these features could have been included, but only at the expense of another £20 on the purchase price and a delay in bringing the modem on the market.

Another facility that would be attractive is 300 baud full duplex mode, as is used not only by some commercial databases but also by the handful of micro bulletin boards around the country.

**Product** Prism directly coupled modem **Price** £89.95 **Interface** RS232 **Contact** Micronet (if a Micronet user), 01-837 3699, or Prism Microproducts, 01-359 7481.



Chips with everything: Prism's acoustic coupler alternative revealed.

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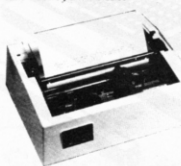


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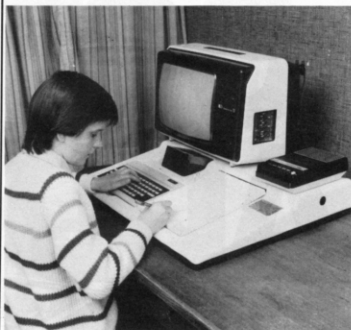
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- GENERAL PURPOSE DEVICE; can be used between PET and any RS232 device.



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\*The OCTET-KSR and MSR typewriter interfaces are sold exclusively by BRITISH OLIVETTI and their distributors. Please contact your local agent for further details.

Introducing a micro of many faces, from Greek to Olde English. Karl Dallas finds it's just his type.

# PCN tests the Multifont micro EPSON QX10

Epson's newcomer — 'So cosily friendly it practically cuddles up to you in bed'.



Ian McKinnell

**T**he bad news about Epson's new QX10 computer is that it doesn't come with Valdocs, the ultra-friendly software that caused America's Byte magazine to rhapsodise over the machine as being 'noteworthy for the way in which its software and hardware are integrated.'

The word is that it hasn't worked as well as it should, and Epson UK isn't even willing to hazard a guess as to when we'll

see it, if ever. So, the question lots of people are bound to ask themselves is: if an integrated hardware/software system turns up without its software, then what's the point?

The point is that, even without the hyped-up ballyhoo about a system so cosily friendly it practically cuddles up to you in bed, the QX10 is actually a neat and logically designed three-unit computer

(keyboard, low-line CPU unit with twin integral disk drives, separate monitor) which performs so well it almost makes me repent of the rude things I've said in the past about CP/M.

Besides 11 extra CP/M commands unique to the QX10, the machine does have one significant plus which will give reviewers and salesmen enough to talk about, even without the missing Valdocs.

This is 'Multifont', which gives it the ability to display and print (on a dot matrix printer) any of 16 different alphabet sets, ranging from classically-readable Helvetica and Bodoni faces to near unintelligible Olde Englyshe styles — two of them.

So the QX-10 is in fact a rather sophisticated machine whose capabilities I am still exploring as I write.

### Documentation

Two fat and clearly-written manuals are supplied—one is an operations manual for the equipment, which includes details of the CP/M commands and how the MFont Multifont option can be used from within CP/M, while the other is an MFBASIC reference manual. The latter makes reference to a Programmer's Guide, which confused Epson UK somewhat, the company denying all knowledge of any such publication.

Not supplied as standard, but loaned to me with the machine, was a very fine Technical Manual *Principles of Hardware Operations*.

None of these is indexed, and far from being 'the first anybody-can-use-it computer', as it is described in the American publicity, the manuals would be harder for a first-time user to penetrate than, say, the widely criticised Commodore documentation.

After assembling and booting the system, you are thrown into the deep end without the step-by-step idiot's guide to programming you usually find next.

It doesn't help your confidence in the manuals, by the way, to find that the first six pages of the operations manual turn out to be tinted paper corrections to the Diskcopy command references in the body of the book.

### Construction

Each unit is very light, but doesn't seem at all fragile. The CPU case is very neat, being only 10cm high. In fact, when the extendable rear feet of the keyboard are raised, it is a slight problem getting disks into the drives.

Throwing the switch at the rear of the right-hand panel after connecting the monitor and keyboard to the CPU turns on the fairly quiet fan, and boots the system if the system disk has been left in drive A. There is a recessed reset button under the right-hand disk drive, easily pushed by a moderately thin finger (or blunt end of a pencil) but impossible to trip by accident, I'd say.

Apart from the low lines of the CPU/disk unit, the other notable things about the system's physical make-up are the specially designed keyboard and very lightweight, clear green-screen monitor. This is powered from the CPU by the single connecting cord, and though it has no tilt facility, if it is stood upon the CPU case it seems to be the ideal height for viewing.

### Keyboard

Though the keyboard layout is slightly different from the American, it is clearly still based on Epson's own HASCI (Hu-



man Applications Standard Computer Interface, since you ask) standard.

Along the top of the keyboard are ten function keys, in two sets of five, a set of four system control keys (BREAK, PAUSE, SCR N DUMP, HELP), and then four type-style selection keys for accessing the various fonts available.

The ten function keys are pre-assigned to two sets of character strings (DIR, LIST, RUN etc), but these are not SHIFTed/UNSHIFTed as you might assume. One set is available when in MFBASIC, the other within CP/M, and this is not explained until you get to the part of the manual dealing with the PFKSET command, for user-redefining the function keys.

The operation of three of the four system keys is fairly obvious. BREAK not only terminates program, LIST or similar operation, but also turns off the AUTO line-numbering mode. PAUSE does just that, with programs or LISTings.

Pressing any key resumes the PAUSED operation, SCR N DUMP outputs whatever is currently displayed to the printer and HELP doesn't appear to do anything, and the MFBASIC Reference Manual says 'This key has no function under MFBASIC.'

The operation manual says: 'Pressing this key enters a HELP code (0)'. Pressing it under CP/M displays '△@' but nothing else happens, even if you press RETURN.

However, since its ASCII code is zero, as the display of an '@' sign on screen

indicates, it could be employed in a programmed 'help' sub-routine, eg

```
10 AS=INKEY$:IF LEN(AS)=0 THEN
10
20 IF AS="@ "[or IF ASC(AS)=0]
THEN PRINT ("help string") [or GOTO
(help subroutine)]
```

It might be just as easy to define 'h' for the same purpose, of course.

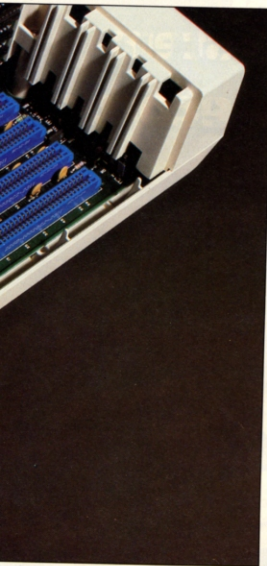
BREAK is equal to CTRL C, which is one of ten control codes, many of them duplicating such things as TAB (by CTRL I) and the BS back-space delete (by CTRL H).

Up to 22 escape codes can be programmed in Basic by using CHR\$(27) and the appropriate single character string or CHR\$(code), or directly under CP/M using ESC and the appropriate key.

One of the more interesting is ESC CHR\$(123), which enters the SECRET mode, causing all characters to be displayed as blanks. It is turned off by ESC CHR\$(125). ESC C allows the user to select one of eight international character sets, detailed in the appendices in both manuals, by following with the appropriate initial letter (it doesn't matter whether caps or lower case). ESC C U or C u produces US ASCII, ESC C E produces English, and so on for French, German, Danish, Italian, or Spanish. The only odd one out is Swedish, which uses ESC C W to avoid confusion with the Spanish.

## PCN PRO-TEST HARDWARE

The inside of the main board (left) shows five option slots. Design is very clean, shown in the rear view (below) and in the twin slimline disk drives (bottom).



Within MFBasic, OPTION COUNTRY 'country initial' does the same thing. This reconfigures the keyboard (eg so that in German a 'y' is a 'z' and vice versa), but error messages etc remain in English, fortunately.

The system boots in US mode, which is identical to British except that the £ sign is replaced by a hash-mark. There is no SHIFT LOCK, and CAPS LOCK only operates on the alpha keys.

Below the right-hand SHIFT is GRPH SHIFT, which allows the display of 32 graphics symbols by pressing the appropriate alpha keys. These range from fairly basic block graphics to a rather arbitrary selection of special symbols — telephone, little man in a tribly, Model T-type automobile, jet, two kinds of trees, and musical quaver (half-note) sign, but no crochet (whole note).

They can all be redefined by using

the special CP/M command CHARADEF.

There are eight screen-editing keys (four cursors, plus HOME, CLS, INS and DEL, the latter two locking), and a 19-key numeric keypad, which includes a treble zero (000), exponentiation, and a duplicate RETURN/ENTER key.

The four style selection keys above the keypad, numbered SF1, SF2, SF3, SF4, are pressed in various combinations to create the various type-styles available.

### Storage

The two integral drives have a specially developed mechanism which seems very positive, as well as taking up minimal depth.

In addition to these two 'real' drives, lettered A and B in the usual CP/M manner, it is also possible to access two sections of memory in the 256K version as if they were disks — though the speed of access is obviously much faster.

These 'disk image RAM' areas are 56K each of virtual memory, and are lettered E and F. Of course, the contents of disk image RAM are lost on power-down, but in addition there is also a battery-backed CMOS chip which can hold up to 2K in its non-volatile memory after power-down.

### Expansion

Expansion of the memory and insertion of special cards seems much easier than most other up-market micros. On the left-hand

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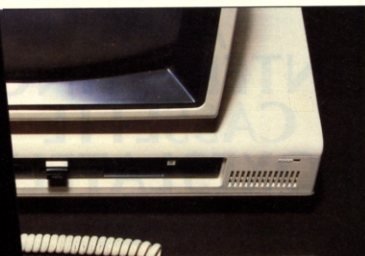
Two excellent new machines have just been added to our coverage – the Commodore 64 and the Oric. Software for these machines will be in our next Newsletter. Remember, membership is completely free of charge and you are under no obligation to buy anything from the Club unless you really want to. If you use a ZX81 (16k), Spectrum (16k or 48k), BBC (A or B), Dragon 32, Vic (expanded or unexpanded), Commodore 64 or Oric, you should join THE CLUB.

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P.O.Box 166, Oxford, OX2 9BJ, England.

Left — A selection of the large range of character sets available.

Below — The neat, ergonomic keyboard with triple keypad incorporating a twin set of function keys and the font-selection keys.



top side of the CPU case is an easily removable cover, allowing access to the eight IC sockets for bank 3 of the user memory. In this section, also, is the Multifont Basic card (supplied) and four more slots for other cards, such as a colour display interface or GP-IB interface.

Connections at the rear of the CPU include power, light-pen, display (monitor), Centronics-type parallel printer, and RS232C serial.

## Operation

CP/M is CP/M, you might think — but apart from incomprehensible filenames like GAIJL.SYS, dictated by the eight-character name plus three-character type limitations, the Epson CP/M is almost human in the way it operates. In addition to the standard built-in commands and 11 transient commands, resident on the system disk, the QX10 has 11 unique transient commands of its own. These are:

- CHARADEP, to define graphics characters
- CONFIG, to reconfigure the system for various printers and RS232C communications formats, to reset the battery back-up calendar/clock, and to select one of the eight international character sets
- DIRINIT, to erase and re-initialise a

- disk's file directory
- DISKCOPY, to format, copy, or verify a disk (or all three)
- FORMAT, to format a new disk
- MFBASIC, to enter Multifont Basic mode
- MFONT, to allow the 16 possible character fonts to be accessed from within CP/M without LOADING MFBASIC
- NORM, to return to normal CP/M from MFONT mode within CP/M
- PFKSET, to assign character strings to any of the programmable function keys
- TERM, allowing the use of the QX10 either as a terminal or host computer for

remote operation.

- AUTOST, so that an assigned program on the system disk is run immediately on booting (not to be confused with the MFBASIC command AUTO, which turns on auto line-numbering).

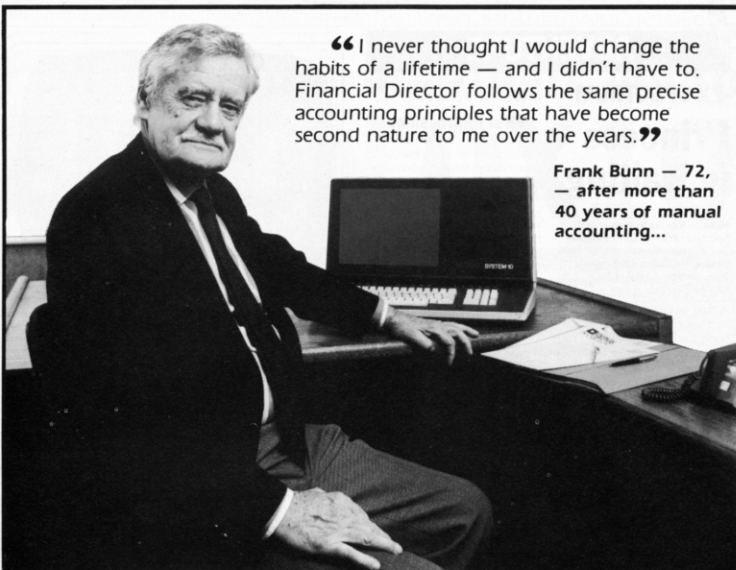
## Verdict

Bearing in mind the complexity of options available, I encountered remarkably little difficulty in operating the QX10.

Costing just under £2,000 inc VAT, it's a powerful machine and reasonable value for money, even without considering the plus value of its superb programmable graphics and multifont capability.

## SPECIFICATIONS

**Price:** £1,995.25 inc VAT  
**Processor:** muPD780-1 (Z80A compatible)  
**RAM memory:** 192K expandable to 256K plus 2K non volatile CMOS RAM  
**Text screen:** 25 x 400  
**Graphics screen:** 640 x 400  
**Keyboard:** 103 HASCI inc 10 function keys, 19-key numerics, 4 font keys  
**Interfaces:** parallel (Centronics-compatible) printer, RS-232C serial communications, plus colour display, IEEE488, optical fibre, direct modem  
**Storage:** 2 x 320K double density, double-sided 5.25 floppies, plus 2 x 56K 'disk image RAM'  
**OS/Language:** CP/M 2.2, Multi-Font Basic  
**Distributor** (supplied by): London Computer Centre (01-388 5721)  
**Software supplied:** System disk, Diagnostic disk, Demo  
**Software available:** Most CP/M, plus packages soon from Peachtree and Pearl.



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## ADVENTURE

## ZX SPECTRUM

Princess  
in waiting

**Name**—Rescue System—48K  
**Spectrum Price**—£5.95 **Publisher**  
 —Computer Rentals, 01-247 9004  
**Format**—Cassette **Language**—  
**Basic Outlets**—Mail order,  
 Smiths, Menzies, Boots

At last, at last, here's one game that's got all the qualities you'd hope for in a good adventure. Graphics, variety, plenty of surprises, a good plot, easy to play—yes folks, Rescue has the lot!

You are an agent of some kind, who has to try to rescue a princess held captive in a castle, and bring her back to your base—alive. You'll need a 48K Spectrum to get you through in one piece...

## Objective

Yes, the princess is there in the castle, just waiting to be rescued.

But before you can rescue her, you have to break into the castle—and before you can do that, you have to find it. And before you can find it, you have to collect various objects to help you—a torch, a gun, a rope, a uniform, that sort of thing—and of course, you have to find them, by hunting in couple of dozen different places where they could be concealed.

Oh, and all this must be done while at the same time avoiding prowling enemy guards and

notching up the points you'll need to survive the castle...

## First impressions

At first glance at the cassette, you'd suppose that this is a remarkably simple adventure game. No instructions at all, apart from how to load it. Then you realise that what it's telling you is that the instructions are there on the tape—and so massive are they that loading them takes almost as long as loading the game itself.

You can choose to read them or go straight on to load the game—but if you vote to read them, you'd better have a pencil and paper at hand, because they go on for over 20 screensful. And there's no provision to print them out with the ZX printer, so you'll just have to get scribbling.

I wished heartily that Computer Rentals had produced a separate sheet of printed instructions.

Four levels of play are offered, from 1, that's easy, to 4—otherwise known as impossible.

I consider myself to be a reasonably smart bloke, so I chose level 1. A good luck message was printed, and the game was underway.

## In play

The game is played on a 'board' made up of concentric circles, linked together like a spider's web—and a fresh board is created every time you play.

You start by hunting for a map and radio in the innermost ring, and only then can you move out to search for other objects in the next three rings.



From the outermost ring, you get to cross various obstacles, such as a river, to look for the castle on the other side—but only if you have the right object, for example, a boat, with you to help you cross.

I moved around the middle ring, nine-men's-morris style, since you can only move to an adjacent location or an adjacent one on the ring or rings next to yours. I looked in the house, but all I got was a few points for visiting it, and 'Sorry, there appears to be nothing here'.

Undeterred, I tried the garage where I found the map, and picked it up. Now the Spectrum displayed a map showing the layout of the rings, and my position, and after finding the radio, I was also shown the exact positions of the enemy patrols.

These two guards keep on the move at the same time as you, and if they catch up with you, are well and truly dead.

And they play pretty intelligently, lurking near locations where you might want to go when you have collected a particular object, and doing a neat pincers movement to try to cut you off.

They certainly kept me on my toes.

You are shown a status panel after every action you make, showing you your location, score, objects you have acquired, patrol locations, and the options open to you—MOVE, PICK, LOOK and so forth.

I finally crossed the river with the boat I'd found, and managed to find the castle. Armed with my chosen entry object, a key, I broke in and started the hunt for the princess. But there

are a large number of rooms to be searched, on several floors, and each may hold dangers as well as princesses, and you have only a limited supply of energy. If it runs out—back to the drawing board.

Well, I got wiped out in no uncertain terms, by a large and deadly cobra, so I can't tell you what would have been involved in getting my princess back to home base. Probably I should have saved the game, but although you can in fact do so, this option is not mentioned in the instructions.

You cannot re-run the game at a later date with the same difficulty level, hoping it will be the same—because it certainly will not. It is different every time it is played.

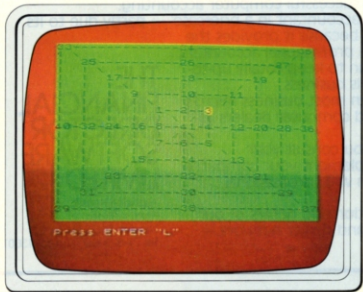
At a guess, I'd say you would need about three hours at level 1 to complete the game successfully—I say 'guess' because I haven't managed to do it!

## Verdict

This is the best adventure game I have ever played. It is excellent, for a number of very good reasons. Many adventure games give you a severely limited range of ways to achieve things—to pass a dragon, say, you either kill it or cast a spell. But Rescue has a different philosophy. You decide how to rescue the princess, you decide what tactics to employ, you decide what objects to use and how to use them.

I give my blessing...

David Janda



## RATING

**Lasting appeal** 🐾🐾🐾🐾  
**Playability** 🐾🐾🐾🐾🐾  
**Use of machine** 🐾🐾🐾🐾  
**Value for money** 🐾🐾🐾🐾

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SINCLAIR USER FEBRUARY 1983

➔ *Although I'm no great football fan, I really enjoyed playing this game — excellent use is made of colour and user-defined graphics. The game is very logically put together, so that the development of strategy and tactics has a real effect. For example, one of my teams got through to the fourth round of the F.A. Cup where it was beaten by a second division side. This upset morale and meant that our promotion bid failed. Perhaps I should have given up the F.A. Cup run and had some good players back — the possibilities are endless. Brian Clough had better watch out!*  
\* SPECTRUM VERSION ONLY. ZX COMPUTING FEB/MARCH 1983

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# RULING PASSIONS

## SPECTRUM

### Banana drama

**Name** Dictator System 48K  
**Spectrum Price** £4.95 **Publisher** D K Tronics 0799-22359 **Format** Cassette **Language** machine code  
**Other versions** none **Outlets** mail order, most retail.

Somewhere in the Caribbean—or is it central Africa—lies the tiny, troublesome and fundamentally bankrupt Republic of Ritimba. Its two main industries are bananas and revolution, although nowadays revolutions are often imported from the neighbour— and hostile—Republic of Leftoto.

El Presidente is a reasonable man, and realising the futility of trying to hold on to the reins of power for any length of time, has decided to divert as much money as possible from the treasury to his pension plan.

### Objectives

You are cast as the dictator of Ritimba, and your goals are first, to stay in office for as long as possible, second, to get as much money out to Switzerland as possible, and third, to take yourself out of Ritimba before the Ritimbans take it out of your hide.

### In play

No expense has been spared—it looks like the aid budget was paying— to bring you a particularly slick and colourful text game. It starts with the Ritim-

ban national anthem on a loop — 'Press any key when you can't stand it any longer', as the instructions say — and proceeds through gunfire sounds, raspberries from the secret police if you're unpopular with them, to the dead march.

The country's running expenses tick away as the game goes on, and each month one of the interest groups, the army or peasants for example, comes to you with some request.

After the audience you usually get a chance to please a group, strengthen a group, raise cash, or please yourself. The latter can involve increasing your bodyguard, buying an escape helicopter — very bad for your popularity, that one — or moving half the treasury's current funds to Switzerland.

Sooner or later, you face a revolution. You can try to crush it (if you succeed you get to shoot the ringleaders) or run.

### Verdict

Dictator seems fairly simple on the first few plays, but as you get the hang of it you find it actually has hidden depths. I initially thought I'd worked it out when I managed to play-off all the groups against one another, crushing a series of revolutions on the way, but then I ran into a new problem. If everyone's too weak to start a revolution, how do you run away?

It's certainly the Duce of a job being a dictator. **John Lettice**

### RATING

**Lasting appeal**   
**Playability**   
**Use of machine**   
**Overall value** 



## SPECTRUM

### Augustus ascendant

**Name** Roman Empire System 16K  
**Spectrum Price** £5.50 **Publisher** M C Lothlorian, Dept C20, 4 Granby Road, Cheddle Hulme, Cheddle, Cheshire **Format** Cassette **Language** Basic **Other versions** Atari 400/800, Dragon, Tandy Colour Computer, ZX81 **Outlets** mail order, various dealers

If you're not quite ready to conquer the galaxy in the latest arcade game, why not start small, and conquer the ancient world first? Roman Empire is set in the first century BC — so you're not likely to meet anyone you know — and is a game for the thinking megalomaniac.

### Objectives

The game gives you ten legions, six enemies, and sets you the problem of adding them together to come up with the answer, World Domination. You can do it at three levels of difficulty.

### In play

If you've any notions of being Julius Caesar and fending-off countless numbers of Gauls with one legion tied behind your back, forget it — your trusty veterans may be twice as efficient as the enemy, but they only get results if there are twice as many of them.

That, unfortunately, is your problem. You need to bring superior numbers to bear on each of your enemies in turn, with the ultimate aim of wiping them all out. Making a desert and calling it civilisation, as Tacitus put it.

You also have to cope with the fact that fighting tires out your legions, and as there are six of the enemy and only one of you, your men tend to get tired six times as fast. You need to manage your resources so you don't end up weeny, weedy and weak.

On top of this, barbarians breed if you leave them alone, whereas the Romans don't.

Battles take place at the end of every game-turn, and after a period of shilly-shallying and beeping, the computer flashes up the result, thinks for a little longer, and tells you to press a key. It then thinks for even longer — heaven knows what it's up to — then takes you back to the main menu for the next go.

Once you've killed off everyone else, or been killed off yourself, the program gives you a percentage rating for your generalship.

### Verdict

Roman Empire doesn't really use the Spectrum's colour capabilities, and has only one 'battle' graphic which is sandwiched between game-turns (the Atari, Dragon and Tandy versions are apparently better from a graphics point of view).

You are also forced to press Enter after keying-in instructions, and this, together with the slowness of the program, is tiresome. But the game is an interesting challenge, and you keep going back to it to try different solutions to the problems. And all this in the comfort of your own Rome. **John Lettice**

### RATING

**Lasting appeal**   
**Playability**   
**Use of Machine**   
**Overall value** 



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PILOT ERA

VIC 20

Airborne rescue

**Name** Choplifter System **Vic 20**  
**Price** £24.95 **Format** Cartridge  
**Language** Assembler **Outlets** Mail  
order and Commodore dealers

Choplifter seems to have been inspired by the rescue attempt for the Iranian hostages. It runs on the unexpanded Commodore Vic with the aid of a joystick.

**Objectives**

This is a one player game, and more socially acceptable than most. You are using three helicopters to try to rescue hostages in enemy territory. Your score, indicated on the screen, is one point for each hostage rescued and successfully delivered to your home base.

You control the direction of the three helicopters with the joystick, and turn them by using the firing button. You fire your weapons—in self-defence only—by pressing the fire button on and off quickly.

**First impressions**

The packaging of the cartridge is colourful. It comes in a sturdy box with an illustration on the front and instructions on the back. There is a warning that a joystick is needed and this should prevent disappointment. The instructions are clear, and a demo program shows you what is in store.

**In play**

This is a very good game, with impressive use of graphics and sound. You are attacked by killer kamikaze satellites which try to ram you, by jet aircraft which try to bomb you, and by tanks which mercifully can only shoot to a certain height, but which are devastating when you load or unload the men.

When you've rescued all the men from one blockhouse you seek out another and shoot it open, to release more. The US Cavalry has arrived!

There is only one level of difficulty, but this is high enough to sustain the interest of the most experienced of players. The waving of the hostages, and the realistic sounds of bombs, helicopter blades, and bullets all add to the fun, as do the lifelike graphics. These include clever high resolution, almost three dimensional, effects, which are very impressive. You can also change the colours by pressing a function key, although the instructions do not tell you this.

**Verdict**

The game is good fun for a wide variety of age groups, and uses the capabilities of the Vic to the full.

Priced quite high, no doubt because it is imported from the US, it is none the less good value for the more affluent gamesplayer. **Barry Miles**

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



VIC 20

Reach for the sky

**Name** Skyhawk System expanded Vic 20 with joystick **Price** £7.95  
**Publisher** Quicksilva (0703-20169)  
**Format** Cassette **Language** Basic and machine code **Outlets** Mail order

Bandits at ten o'clock. With a glance at your radar you push forward on the joystick and your jump jet leaps up. Hard left and the townscape rushes beneath you as you race to engage the marauders, lining up the targets on radar. The enemy bombers flash into view.

This is Skyhawk from Quicksilva, and you are in the hot seat.

**Objectives**

You must defend the town from the attacking fighter bombers, amassing points for kills. You start with three lives, with a fourth as a bonus for reaching 3,000 points. Believe me, you'll have earned it.

The enemy starts in formations of two, rising to three at 400 points, and four at 1,500. Just to make things interesting, you have to refuel and rearm periodically, presenting yourself as a sitting target for what seems an eternity.

**First impressions**

The cassette artwork is up to Quicksilva's usual high standards, with a double-fold cassette inlay containing LOAD-ing instructions and a (perhaps excessive) story outline. Playing instructions come on a printed sheet.

One side of the tape contains the 6.5K version of the game, while the other plays on the 8K expanded Vic.

The game LOADs in two stages. Press the fire button and it's straight into the action.

**In play**

The graphics in Skyhawk are superb—an excellent example of the use of multicolour mode graphics and manipulation of the Video Interface Chip to give full screen action.

The game is set above a town represented in effective 3D, and features excellent scrolling to left and right. Everything moves quickly and smoothly, with up to five jets, bombs, missiles and blazing wreckage zipping about simultaneously. The sound effects are good.

The scoring system has been well thought out to encourage aggressive play.

You begin with 900 fuel units and 100 rounds of ammunition which must be replenished by landing on a service pad, of which there are five. However, the enemy are out to bomb these so you may have a problem finding one.

It must also be said that your opponents are damn good pilots too. If shot down, they will usually manoeuvre their blazing jets into one of your refuelling pads.

**Verdict**

Simply excellent. This is a game that will have you fearing for your joystick and rolling in the armchair as you make those high-G turns **Peter Worlock**

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



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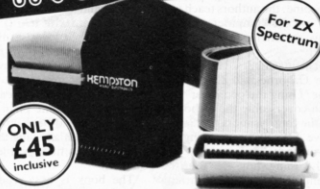
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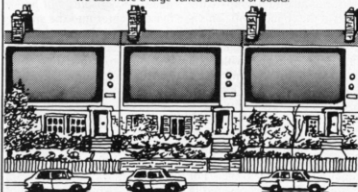
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## DATABASES FOR FUN AND PROFIT



'Databases for Fun and Profit' by Nigel Freestone, published by Granada at £5.95 (paperback, 133 pages)

Picture the scene, a couple of people in a public house, one a publisher, the other a computer buff. The publisher says to the buff: 'How do you feel about writing a book on databases for the uninitiated?'

'No problem! How many pages do you want?'

'About 130.'

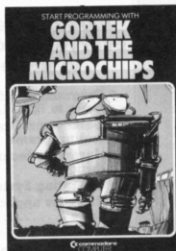
'OK, I'll have it to you next week.'

I hope this book wasn't commissioned in that way but after reading it I can only say that the execution falls way below intention. It seems such a shame that a topic like this is treated so badly and is more likely to turn people off the use of databases as a useful tool on microcomputers.

The woefully poor illustrations and captions look more like page fillers than useful devices to enhance the text. Ah, the text! Well this is better but still weak — it appears to be aimed primarily at 8-year-old computer owners (and even they would find it boring) but performs quantum jumps to the level of the gnoscentist. This is not a good writing technique.

The inference from the title is that your computer will make you money by teaching you a series of database handling methods in a fun way — it doesn't! The best it does is point out the things that databases can be, and are, used for without going into the detail required for the topic. For example, Payroll is covered in all of five and a bit pages, two of which tell you who to contact to find out about tax calculations. Anyone who has had to deal with that sort of program would find this treatment just a little facile.

This book wastes a golden opportunity to increase computer literacy among micro users — and, at the price, forget it! NC



'Gortek and the Microchips' by Heather Scott, Stuart Alexander and Gary Bowie, published by Commodore Business Machines (UK) at £15.95 (paperback, 40 pages plus cassette).

This is a new departure for Commodore, which has decided to back up its new 64 machine with a special learning aid designed for children between the ages of ten and 13.

English graphics designers have been invited to work on the project and the result is a glossy book running to 40 multicoloured pages, dedicated to the idea that the children should couple a space adventure story with elementary lessons in Basic programming.

Two cassettes accompany the course, containing educational games and other programs, notably quizzes for checking progress so far.

The book is the first of a series to be marketed world-wide by Commodore and should be successful, although I think that many 13-year-olds will be too blasé to enter into the spirit of the fantasy. Younger children will, however, find it great fun, and the programs alone are a fair return for the asking price.

By the end of the course the child will understand about INPUT, GOTO, PRINT, LET, IF . . . THEN, and of course END! The point then is not whether there is a sufficient wide knowledge for programming use (which it certainly is not), but whether enough interest and curiosity has been aroused to encourage further study. Since the idea that computing is fun will have been firmly established, the future is assured. BM

## COMPUTER MANUALS FOR DUFFERS



'Computer Manuals for Duffers' by D C Mills and G P Guest, published by Mills and Guest at £1.75 (paperback, 32 pages).

The two most striking things about *Computer Manuals for Duffers* are its slowness and the words 'foreword by John Cleese' on the cover. The latter name comes several type-sizes larger than those of the authors.

The booklet sets out to take 'duffers' from their state of total ignorance to the point where they will have the ability and confidence to learn about their computer from the manual.

Alongside this modest aim, the authors give some equally modest — but highly effective — advice on how to buy your first computer. This boils down to advising you to shop around for your computer sales person first, then once you've found the right one, ask. The duffer could certainly do a lot worse.

Once you've got your machine, the authors teach you to 'use the computer a little'. This is where the problems start.

The machines dealt with are the Osborne and the Apple. The 'Using the computer' section covers only the Osborne, so the cataclysmic duffer might have difficulty transposing the commands.

Learning how to use the computer involves learning how to perform simple tasks with Wordstar and Supercalc, and once you've completed this 'you can approach the manuals with confidence. They have become your servant.'

Now it's certainly important to get people using software that can help in their business, and it's also important to build up the beginner's confidence — it's quite clear that *Computer Manuals for Duffers* does this — but I'm afraid I can see the join.

All the poor old duffer has to do is blunder into a marginally

user-hostile manual, and all that lovely confidence is going to drain away. JL



ROGER HUNT AND JOHN SHELLEY

'Computers and Commonsense' (3rd edition) by Roger Hunt & John Shelley, published by Prentice Hall International at £5.50 (paperback, 175 pages).

Introductory books on computing normally come in two types. First, there is the book that covers a particular subject in detail — such as microcomputers. Secondly there is the book that tries to cover the lot — micros, mainframes, data processing and so forth.

*Computers and Commonsense* is of the second type, and although I found it gives a large amount of information, it falls short in a few places.

Its objective is to give the layman or student a first-level introduction to computing. Three main areas are covered: What is a computer, what can it do, and how does man communicate with it?

At first sight I was surprised at how much the authors managed to cram in, from why the computer was invented, to decision tables. But on reading the book it became plain that the subjects had been covered cursorily, even allowing that it is intended as first-level introduction.

The book is best read sequentially. References are constantly made to other chapters by footnotes, and computer terms explained in one chapter are not explained again.

The history of computing must be a pet subject of the authors as references to what used to be crop up throughout.

Even so, I found *Computers and Commonsense* a good read, and recommend it as an introduction to the subject. The reader should take notice of the bibliography though — you'll need it. DJ

# PCN ProgramCards

Another bumper crop of goodies, for you to cut out and keep, over the next six pages. Although we have a large stock of your programs to put in this section we still require more for Dragon, Lynx, ZX81, Oric, Atari, Newbrain, TI, Jupiter Ace, Sharp and Colour Genie Tandy so pull your collective digits out and get them to us at the address below.

## This week

For those of you who have just acquired a Lynx computer we have a neat little demonstration program from Satnam Singh, of Liverpool, showing the colour and sound capabilities of the machine by drawing a Union Jack then scrolling it on the screen to electronic accompaniment.

Peter Hinton, of Dereham, Norfolk, has obviously put a lot of thought and effort into his game for the Sinclair Spectrum. This program is an easy-to-play game requiring the player to get a robot from a point on the screen to his home through a randomly generated, and increasingly

tortuous, block maze that is built as the game progresses.

The CBM Database saga continues this week with yet another three PCN ProgramCards from the formidable Cheltenham duo of Ray and Alison Schofield. The final three cards will be published next week to complete this useful package.

How many of you wonder, are contemplating graduating to Forth but can't get to grips with stack concepts? Well if this is your problem then this week's subroutine and example program from the PCN library of subroutines should help you. This pair of cards allows the user to specify a string as a formula and convert it into two stacks of operator data so that these can be analysed.

## The price of fame

If you want to see more programs for your computer in this section why don't you send examples of your expertise to the Programs Editor at the address below so that they can be included in this section.

In addition to seeing your name in print we will send you real money (in cheque form) at our standard rates for our seemingly bottomless budget.

To make life easier all round it would be appreciated if, when submitting programs for inclusion here, you could send it/them on cassette or disk accompanied by a plain white paper listing and a few brief notes about the program(s).

The Programs Editor would like to take this opportunity to thank all of you who have responded to the request for referees for submitted programs and will be writing to each of you with full details in the near future.

As it is we now have a large panel of referees to call upon but if you feel that you have specialist knowledge that should be put to use then please send details to the address below.

Programs Editor, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

## PCN ProgramCards

### Union Jack

### Card 1 of 3

8310UJ1/3

A Lynx demonstration program which draws the Union Jack on screen and scrolls it to a musical accompaniment.

```
100 REM * * * * UNION JACK. * * * *
110 REM * * * * *
120 REM * DEMO FOR THE LYNX 48K *
130 REM * * * * *
140 REM *****
150 REM
160 REM
170 PROTECT BLACK
180 CLS
190 PAPER BLUE
200 LET Z=00

210 CLS
220 INK BLACK
230 FOR X = 250 TO 255
240 MOVE X,0
250 DRAW X,251
260 NEXT X
270 FOR X = 201 + Z TO 255 + Z
280 MOVE 0,X
290 DRAW 254,X
300 NEXT X
310 MOVE 0,251
320 DRAW 0,0
330 DRAW 255,0
340 INK WHITE
```

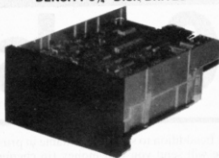
### Lynx 48K Lynx Basic

Application: demonstration  
Author: Satnam Singh

```
170 Unprotect all screen colours
180 Clear screen
190 Set PAPER (background)
colour to blue
200 Z holds constant to determine
how far down screen the flag
will be drawn
210 Clear screen
220 Set INK to black (rubout)
230-330 Rubout unwanted area of
screen leaving blue area on
which to add white and red
stripes of flag.

340 Set INK to white to paint
diagonal stripes
```

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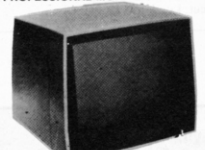
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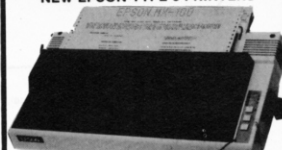


This microcomputer is based on TMS9900 16 bit microprocessor. It includes 16K RAM, 16 colour high resolution graphic (192x256). The screen display is 32 characters, 24 lines TI-BASIC. Full size keyboard. For Software there are about 1000 Programs to choose from. There are a lot of peripherals available e.g. Disk Drives, Disk Interface, Speech Synthesizer, Extra RAM, Additional Languages (PASCAL, TH-LOGO ASSEMBLER). Prices: TI Home Computer £149.95; Personal Expansion System £149.95; Disk Controller Card £144.95; Disk Drive £199.95; Speech Synthesizer £41.95. All prices inclusive of VAT. Please send large SAE for full price list.

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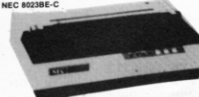
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**PCNProgramCards****Union Jack****Card 2 of 3**

8310UJ23

```

350 FOR X = 0 TO 20
360 MOVE X, 1+Z
370 DRAW X+90, 80+Z
380 MOVE 1, X+Z
390 DRAW 90, X+80+Z
400 MOVE X, 200+Z
410 DRAW X+90, 120+Z
420 MOVE 1, 200-X+Z
430 DRAW 90, 120-X+Z
440 MOVE 250-X, 1+Z
450 DRAW 160-X, 80+Z
460 MOVE 250, X+Z
470 DRAW 160, X+80+Z
480 MOVE 250-X, 200+Z
490 DRAW 160-X, 120+Z
500 MOVE 250, 200-X+Z
510 DRAW 160, 120-X+Z
520 NEXT X
530 INK RED
540 FOR X = 1 TO 10
550 MOVE 1, X+Z
560 DRAW 90, X+80+Z
570 MOVE X, 200+Z
580 DRAW X+90, 120+Z
590 MOVE 250-X, 1+Z
600 DRAW 160-X, 80+Z
610 MOVE 250, 200-X+Z
620 DRAW 160, 120-X+Z
630 NEXT X

```

350-520 Paint white diagonals on blue background

530 Set INK to red  
540-630 Paint red diagonals**PCNProgramCards****Union Jack****Card 3 of 3**

8310UJ33

```

640 INK WHITE
650 EQ# X = 55 TO 80
660 MOVE 1, X+Z
670 DRAW 250, X+Z
680 MOVE 1, X+65+Z
690 DRAW 250, X+65+Z
700 NEXT X
710 FOR X = 81 TO 105
720 MOVE X, 1+Z
730 DRAW X, 200+Z
740 MOVE X+64, 1+Z
750 DRAW X+64, 200+Z
760 NEXT X
770 INK RED
780 FOR X = 77 TO 125
790 MOVE 1, X+Z
800 DRAW 250, X+Z
810 MOVE X+25, 1+Z
820 DRAW X+25, 200+Z
830 NEXT X
840 PAUSE 50000
850 OUT&0006, 13
860 LET P=19
870 FOR X = 1 TO 63
880 BEEP X, P, 63
890 BEEP 63-X, P, 63
900 LET Z = X AND 15
910 IF Z < 8 THEN OUT&0007, ( X AND 7 ) *32
920 ELSE OUT&0007, ( 15 - Z ) *32
930 BEEP X+62, P, 63
940 BEEP 125-X, P, 63
950 NEXT X
960 GOTO 870

```

640 Set INK to white to paint horizontal and vertical stripes  
650-760 Paint white stripes770 Set INK to red  
780-830 Paint red vertical and horizontal stripes840 Pause for five seconds  
850-950 Routine to move flag and play music simultaneously

960 Repeat lines 870-950 indefinitely

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## Escape

## Card 1 of 3

8310E1/3

An easy-to-play game involving random block maze generation.

```

5 POKÉ 23658,0: REM CAPS LOCK ON
10 DATA BIN 00011000,BIN 00111000,BIN 01100110,BIN 11000011,BIN 01111110,BIN 0
0111100,BIN 11100111,BIN 01100110
15 LET a=BIN 01111110
20 DATA 0,a,a,a,a,a,a,0

30 FOR b=146 TO 147
40 FOR c=0 TO 7
50 READ d: POKÉ USR CHR$ b+c,d
60 NEXT c
70 NEXT b
100 REM "ESCAPE"
110 FLASH 1: PRINT AT 10,10:"STOP THE TAPE": FLASH 0: PAUSE 200
120 PRINT AT 0,3:"The object of this game is to get the ROBOT,to the point
marked,H."
130 PRINT AT 4,4:"To move him you use the arrows above the figures
5,6,7 and 8."
140 PRINT AT 8,2:"Unfortunately he has little protection from the blocks:th
e appear to block his way so he has FLASTERS, to weld on to
his wounds."
150 PRINT AT 15,10:"IMPORTANT."
160 PRINT AT 17,4:"He can only survive 20 such impacts,after that he becomes
useless."
170 PRINT AT 21,3:"PRESS ANY KEY TO CONTINUE."
180 PAUSE 0
190 CLS
200 PRINT AT 10,11:"If it becomes impossible for the robot to reach HOME,the
button 1 will abort and you will ,START AGAIN."
210 PRINT AT 10,7:"PRESS ANY KEY.": PAUSE 0

```

Sinclair Spectrum  
Spectrum BasicApplication: Game  
Author: Peter Hinton

5 Set "Caps Lock" on  
10 Data statements for Robot  
15 character in binary  
20 Define block character  
30-70 Data statements for block  
character  
Loop to read and create the  
appropriate characters for  
Robot and block

110-210 Game introduction and  
instructions

## Escape

## Card 2 of 3

8310E2/3

220 LET E=3: LET F=20

230 LET L=0

240 BORDER 6: PAPER 6: INK 0: CLS

250 LET A=20: LET B=30.

260 PRINT AT 21,2:"FRAME NO. ":E-2

270 PRINT AT 21,16:"PLASTERS="F": " "

280 PRINT AT 0,0:"H"

290 PRINT AT A,B:"c": REM GRAPHIC C

300 FOR D=1 TO E

310 PAPER 2

320 PRINT AT INT (RND\*21),INT (RND\*32):"d": REM GRAPHIC D

330 NEXT D

340 PAPER 6

350 PRINT AT INT (RND\*3),INT (RND\*3):" "

360 IF INKEY\$="1" THEN GO TO 710

370 IF INKEY\$="5" THEN PRINT AT A,B:" ": LET B=B-1: LET L=L+1

380 IF INKEY\$="6" THEN PRINT AT A,B:" ": LET A=A+1: LET L=L+2

390 IF INKEY\$="7" THEN PRINT AT A,B:" ": LET A=A-1: LET L=L+3

400 IF INKEY\$="8" THEN PRINT AT A,B:" ": LET B=B+1: LET L=L+4

410 IF A&lt;0 THEN LET A=0

420 IF A&gt;20 THEN LET A=20

430 IF B&lt;0 THEN LET B=0

440 IF B&gt;31 THEN LET B=31

450 IF ATTR (A,B)=16 THEN GO SUB 400

460 IF A=0 AND B=0 THEN GO TO 550

470 GO TO 260

480 LET F=F-1

490 IF L=1 THEN LET B=B+1

500 IF L=2 THEN LET A=A-1

510 IF L=3 THEN LET A=A+1

220

E is counter for block  
generation. F is counter for  
"PLASTERS"

230

L is Robot movement indicator  
Set screen attributes. Clear  
screen

240

Start position of Robot  
Score line

250

260-270

280

Target of Home

290

Draw Robot at start point. "c"  
is Graphic C character  
Loop to generate blocks  
randomly

300-330

320

"d" is Graphic D character

340-350

Ensure 3 \* 3 area around  
Home is clear

360-400

Check for keyboard entry for  
Robot movement "1" — Abort  
game: "5" — Left: "6" —  
Down: "7" — Up: "8" — Right

410-440

Keep Robot on screen

450

Copsidaisy!! Robot collides  
with block

460

At last Robot made it home!

470

Round again

480-540

Routine to deal with injured  
Robot. When no "PLASTERS"  
left then game ends



## Escape

## Card 3 of 3

8310E3/3

```

520 IF L=4 THEN LET B=B-1
530 IF F=0 THEN PRINT AT 21,25;"0": PRINT AT A,B;"C": PRINT AT 10,10;"THE END."
"1 PAUSE 200: GO TO 720
540 RETURN
550 BORDER 5: INK 1: PAPER 5: CLS
560 FOR B=1 TO 5
570 INK 5
580 FOR A=0 TO 1
590 PRINT AT 10,10;"WELL DONE."
600 PAUSE 10
610 INK 1
620 NEXT A
630 NEXT B
640 INK 1
650 CLS
660 PRINT AT 12,5;"CAN YOU DO IT AGAIN."
670 PRINT AT 14,7;"PRESS SPACE KEY TO TRY."
680 IF INKEY="" THEN GO TO 690

685 GO TO 680
690 LET E=E+1
700 GO TO 240

710 PRINT AT 10,7;"You have aborted."
720 PRINT AT 12,21;"PRESS SPACE KEY TO TRY AGAIN."
725 PRINT AT 14,10;"PRESS N TO STOP "
730 IF INKEY="" THEN CLS : PAUSE 50: GO TO 120
735 IF INKEY="N" THEN GO TO 1000
740 GO TO 730
750 GO TO 240
1000 CLS : PRINT AT 10,0;"PRESSING ANY KEY WILL CLEAR THE MEMORY": PAUSE
0: NEW

```

530 "c" is Graphic C character

550-630 Loop to flash "WELL DONE."

450-670 Prompt for next frame

680 Single key response — space continues game

685 Get it right!!

690-700 Increment frame and block speed counter then play again

710-1000 Routine to deal with aborted game.

Note: At the end of the program will be deleted from memory

## CBM Database Card 7 of 12

8310CD7/12

```

5400 PRINT PRINT "x=8,2 - SORT ROUTINE"
5402 PRINT "VALUE OF P TO INPUT IS ";(A-1);" - INPUT P"
5405 INPUT P
5410 RESTORE
5415 FOR I=1 TO (P)
5420 READ A(I),B(I),C(I),D(I)
5430 NEXT I
5431 PRINT "DO YOU WANT A SECOND SORT ON SUBJECT ? Y OR N " : INPUT V$
5432 IF V$="Y" THEN PRINT "SECOND SORT WILL BE BY SUBJECT"
5433 IF V$="N" THEN PRINT "SECOND SORT WILL BE BY DATE"
5440 FOR I=1 TO (P-1)
5450 FOR J=1 TO (P-I)
5455 IF B(I) < B(I+J) THEN GO TO 5520
5460 IF B(I) > B(I+J) THEN GO TO 5470
5462 IF V$="Y" THEN GO TO 6100
5464 IF V$="N" THEN GO TO 6150
5470 LET M=B(I):L=A(I):N=C(I):O=D(I)
5480 LET B(I)=B(I+J):A(I)=A(I+J):C(I)=C(I+J):D(I)=D(I+J)
5490 LET B(I+J)=M:A(I+J)=L:C(I+J)=N:D(I+J)=O
5520 NEXT J:PRINT I,J:PRINT "INCREMENT 1"
5530 NEXT I:PRINT I,J:PRINT "INCREMENT ENDED"
5552 PRINT"DO YOU WANT OUTPUT TO PRINTER Y/N " : INPUT O2$
5554 IF O2$="" THEN GOTO 5554
5556 IF O2$="Y" THEN GOTO 7200
5560 FOR I=1 TO P
5570 PRINT B(I),C(I),TAB(30) A(I),TAB(50)D(I)
5580 NEXT I
5590 RETURN
5600 PRINT PRINT "x=8,3 - SORT ROUTINE"
5602 PRINT "VALUE OF P TO INPUT IS ";(A-1);" - INPUT P"
5605 INPUT P
5610 RESTORE
5615 FOR I=1 TO (P)
5620 READ A(I),B(I),C(I),D(I)
5630 NEXT I

```

5400 Prompt

5402 Prompt

5405 Response

5410 Set read pointer to one

5415-5430 Loop to read data to array

5431-5433 Sub-field sort prompts and response

5440-5550 Loop to perform sort routine according to input

5552-5556 Printer option prompts and response

5560-5590 Display sorted array on screen

5600-5602 Prompts

5605 Response

5610 Set read pointer to one

5615-5630 Loop to read data to array

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**Issue 1, 18 March 18**

**Pro-Tests:** Apple's Lisa, Telex TX800, Spectrum speech synthesiser, Apple printer, Commodore network, 3D on Spectrum, graphics package for Apple and IBM, BBC graphics system.

**Features:** computer chess, Ocean parallel processing language, Vector/Sirius function keys.

**ProgramCards:** Towers of Baram (Pascal), Rhythm (Apple II), Roman Year (Apple II), Shape Utility (Apple II).

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

**Databases:** micro and peripherals.



**Issue 2, March 25**

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

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

**ProgramCards:** String editor (Spectrum), Analogue Clock (BBC Model B), Chart generator (Spectrum), String extract/replace.

**Databases:** full software listings.



**Issue 3, April 1**

**Pro-Tests:** TI Professional, Apple speech synthesiser, Facit 410 printer, IBM keyboards, Petspeed compiler, Sirius toolkit, Dragoncalc.

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

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

**Databases:** micro.

**Micropaedia:** Anatomy of the BBC, part 3.



**Issue 4, April 8**

**Pro-Tests:** Pled Paper Communicator, Olympia ESW3000 printer, Namsal Superkater, Commodore Calcutt, Spectrum Pascal, Cash-book (BBC).

**Gameplay:** Dark Crystal (Apple II), St George (Dragon), Wizard War (Dragon), **ProgramCards:** Fruit Machine (C64), Tunesmith (Oric), Array Editor.

**Databases:** peripherals, **Clubnet:** Micropaedia: Go Forth, part 1.



**Issue 5, April 15**

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

**Features:** speech packs, monitors, **Gameplay:** Grand Prix (Dragon), Derby Day (Spectrum), Deadline (Apple), **ProgramCards:** Wacky Racers (Oric), Fruit Machine (C64), Parse Integer.

**Databases:** Software, **Clubnet:** full list of user groups, **Micropaedia:** Go Forth, part 2.



**Issue 6, April 22**

**Pro-Tests:** Tycom Microframe, IBM PC, Scorpio Disks, Dragon sound module, ZX81 graphics, Bottom Line Strategist (CPM), PaperClip word processor.

**Features:** IBM PC DOS, BBC word processing, PC-1251.

**Gameplay:** Mined Out (Spectrum), Transylvanian Tower (Spectrum), Lunar Leeper (Apple II), Evolution (Apple II).

**ProgramCards:** Wacky Racers (Oric), Mortgage Comparison (SharpMZ80K), Computer Set Up (BBC), Day of Week.

**Databases:** micro.

**Micropaedia:** Graphics, part 1.



**Issue 7, April 29**

**Pro-Tests:** Mattel Aquarius, Epson FX80, Olivetti JP101, Lasp on Spectrum, Vic 20 assembler, Supergraf on Victor/Sirius.

**Features:** Dealer support, Atari graphics, **Gameplay:** Krakki (ZX81), Cruising On Broadway (Spectrum), Kakaki (Vic 20), Fantastic Voyage (ZX81).

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

**Databases:** peripherals.

**Micropaedia:** Graphics part 2.

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### Anatomy of the BBC micro

**Part 1:** Tune into the BBC — an exploded view; Tube map; blossoming into colour; second opinion — a first timer's look; maths and science on the Beeb; programming the function keys; learning with Logo; BBC Basic; User Guide extra; alternative languages.

**Part 2:** Introduction to peripherals; playing games — reviews and programs; word processing on chip and cassette; history.

**Part 3:** Networking; interview with Acorn's Herman Hauser; faults and servicing; video recorder link-up; turtle graphics; Beeb books.

### Go Forth

**Part 1:** Basic and Forth compared; Forth on your micro; assembler language; changing up; the Jupiter Ace.

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# CBM Database Card 8 of 12

8310CD8/12

```

5671 PRINT "DO YOU WANT A SECOND SORT ON SUBJECT ? Y OR N " INPUT V#
5672 IF V#="Y" THEN PRINT "SECOND SORT WILL BE BY SUBJECT"
5673 IF V#="N" THEN PRINT "SECOND SORT WILL BE BY SUM"
5674 FOR I=1 TO (P-1)
5675   IF C(I) < C(I+1) THEN GO TO 5720
5676   IF V#="Y" THEN GO TO 5700
5677   IF V#="N" THEN GO TO 6250
5678 LET H=C(I):L=R(I):M=B(I):D=W(I)
5679 LET C(I)=C(I+1):R(I)=R(I+1):B(I)=B(I+1):W(I)=W(I+1)
5680 LET C(I+1)=H:R(I+1)=L:W(I+1)=M:B(I+1)=D
5681 NEXT J:PRINT I:PRINT "INCREMENT 1"
5682 NEXT I:PRINT I:PRINT "INCREMENT ENDED"
5700 PRINT"DO YOU WANT OUTPUT TO PRINTER Y/N " INPUT Q#
5701 IF Q#="Y" THEN GOTO 5754
5702 FOR I=1 TO P
5703   PRINT C(I):TRB(20)R(I):TRB(40)B(I):D(I)
5704 NEXT I
5705 RETURN
5900 PRINT PRINT "Y=0, 4 - SORT ROUTINE"
5901 PRINT "VALUE OF P TO INPUT IS "(P-1)" - INPUT P"
5902 INPUT P
5903 RESTORE
5904 FOR I=1 TO (P)
5905   READ R(I):B(I):C(I):D(I)
5906 NEXT I
5907 PRINT "DO YOU WANT A SECOND SORT ON SUBJECT ? Y OR N " INPUT V#
5908 IF V#="Y" THEN PRINT "SECOND SORT WILL BE BY SUBJECT"
5909 IF V#="N" THEN PRINT "SECOND SORT WILL BE BY SUM"
5910 FOR I=1 TO (P-1)
5911   IF B(I) < B(I+1) THEN GO TO 5970
5912   IF V#="Y" THEN GO TO 5970
5913   IF V#="N" THEN GO TO 6350
5914   LET C=B(I):L=R(I):M=C(I):W=B(I+1)
5915 LET B(I)=B(I+1):R(I)=R(I+1):C(I)=C(I+1):W(I)=W(I+1)
5916 LET D(I+1)=D:R(I+1)=L:C(I+1)=M:W(I+1)=W
5917 NEXT J:PRINT I:PRINT "INCREMENT 1"
5918 NEXT I:PRINT I:PRINT "INCREMENT ENDED"

```

5631 Prompt for secondary sort  
5632-5633 Response answers  
5640-5750 Loop to perform dual sort

5752-5756 Printer prompt and responses

5760-5780 Loop to display sorted array

5790 Return to main line  
5800-5805 Prompts and response for fourth sort routine

5810 Set read pointer to 1  
5815-5830 Loop to load data array

5831-5833 Prompts and responses for secondary sort

5840-5950 Loop to perform dual sort

# CBM Database Card 9 of 12

8310CD9/12

```

5952 PRINT"DO YOU WANT OUTPUT TO PRINTER Y/N " INPUT Q#
5953 IF Q#="Y" THEN GOTO 5954
5954 FOR I=1 TO P
5955   IF Q#="Y" GOTO 5970
5956   PRINT B(I):TRB(20)R(I):TRB(40)B(I):C(I)
5957 NEXT I
5958 RETURN
6000 IF B(I)<B(I+1) THEN GO TO 5320
6010 GO TO 5270
6020 RETURN
6050 IF C(I)<C(I+1) THEN GO TO 5320
6060 GO TO 5270
6070 RETURN
6100 IF R(I)<R(I+1) THEN GO TO 5520
6110 GO TO 5470
6120 RETURN
6150 IF D(I)<D(I+1) THEN GO TO 5520
6160 GO TO 5470
6170 RETURN
6200 IF R(I)<R(I+1) THEN GO TO 5720
6210 GO TO 5470
6220 RETURN
6250 IF B(I)<B(I+1) THEN GO TO 5720
6260 GO TO 5670
6270 RETURN
6300 IF R(I)<R(I+1) THEN GO TO 5520
6310 GO TO 5670
6320 RETURN
6350 IF B(I)<B(I+1) THEN GO TO 5520
6360 GO TO 5670
6370 RETURN
7000 PRINT"MAKE SURE THE PRINTER IS ON!" FOR I=1 TO 2000:HEX$(I)
7005 OPEN#4:2:"O"
7010 OPEN#4:1:"O"
7020 PRINT#4:"XXXXXXXXXXXX 9999.99 999999 999999"
7100 FOR I=1 TO P
7150 PRINT#4:R(I):CHR$(25):B(I):C(I):D(I)
7100 NEXT I
7160 PRINT#4:CLOSE#4
7190 PRINT#7:CLOSE#7
7195 GOTO 5590

```

5952-5954 Printer prompt and response  
5960-5980 Loop to display sorted array

5990 Return to main line  
6000-6370 Independent tests for previous sort routines

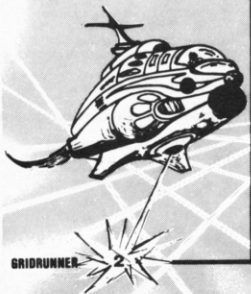
7000-7195 Routine to print data array on printer

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16K

16/48

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LEVEL 2

A/B

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## Evaluate Card 1 of 1

8310SubE

This subroutine demonstrates the facilities of formula evaluation using simple input. This is compared against a user defined set of operators. Currently, for instruction purposes, the routine is limited to the most simple of formulae but will be enhanced in future issues.

```

2000REM A SUBROUTINE TO EXAMINE A FORMULA AND RETURN A RPN/FORTH STRING
2010SI = 0: SO = 0

2020FOR N = 0 TO SS: SR(N) = " ": DR(N) = " ": L(N) = 0: NEXT N

2030FOR N = 1 TO LEN(I$)
2040C = MID$(I$,N,1)
2050IF C >= "A" AND C <= "Z" THEN SR(SI) = C: SI = SI + 1
2060FOR M = 2 TO LEN(OD$): STEP 2
2070IF C = MID$(OD$,M,1) THEN DR(SO) = C: SO = SO + 1: L(SO) = ASC(MID$(OD$,M,1))
2080NEXT M
2090IF SI > SS OR SO > SS THEN I$ = ""
2100NEXT N
2110IF I$ = "" THEN RETURN
2120SI = 2: I$ = SR(SI) + SR(1)
2130I$ = I$ + DR(SO)
2140 RETURN

```

Written in Microsoft Basic it can be modified to work on all machines

2010 SI, SO are the indices to the operator and operand stacks.  
 2020 SS must be defined to the maximum number of operands. SS(\*), OS(\*), L(\*) must be DIMensioned in the user program and are the operator and operand stacks  
 2030 Start of loop to analyse the input string  
 2040 Character being compared to  
 2050 If character is a valid alphabetic value then store in stack and update index  
 2060 Loop to examine the operator values for a match  
 2070 If a match is found then store in stack and also store the precedence level of the operator in the stack  
 2090 Do not exceed size of stack  
 2110 Bad formula  
 2120-2130 Sets I\$ to return string  
 N.B. This section will be enhanced to allow complex formulae in future issues.

## Formula Card 1 of 1

8310F1/1

A very simple program to demonstrate the use of the subroutine EVALUATE to help those with difficulty in understanding Forth or Reverse Polish Notation. By restricting the input to the simplest of formulae understanding should be gained here prior to moving on to the full program which will feature in future issues

```

1000REM A PROGRAM TO DEMONSTRATE SIMPLE RPN/FORTH ARITHMETIC/STACK HANDLING
1010SS = 2: DIM S$(SS), O$(SS), L$(SS)

1020OB$ = "1-2*2/3+3-"

1030REPEAT
1040PRINT "ENTER FORMULA USING ^ * / + - AS OPERATORS"
1050INPUT "FORMULA IS ", I$

1060GOSUB 2010
1070IF I$ = "" THEN PRINT "FORMULA CANNOT BE EVALUATED - RETRY": GOTO 1090

1080PRINT "TRANSLATION IS "
1090PRINT "FIRST STACK ENTRY IS : "; LEFT$(I$,1)
1100PRINT "SECOND STACK ENTRY IS : "; MID$(I$,2,1)
1110PRINT "OPERATOR IS : "; RIGHT$(I$,1)
1120UNTIL FALSE

```

## BBC Model B

## BBC Basic

Application: Demonstration

1010 SS defines the maximum number of operators/operands SS(\*), OS(\*), L(\*) are the stacks used in the subroutine to hold the decoded formula  
 1020 SS holds the user defined operators and their appropriate precedence levels for operation and must be defined as: LEVEL (numeric 1-99), OPERATOR (all must be of the same length)  
 1030 Loop to take user input start  
 1040 Prompt  
 1050 Prompt and input of formula to evaluate  
 1060 Perform the subroutine EVALUATE  
 1070 If formula too long or complex then I\$ is returned empty  
 1080 Prompt  
 1090 First operand is displayed  
 1100 Second operand is displayed  
 1110 Operator used is displayed  
 1120 Perform this loop forever  
 Note: Future issues will contain enhanced versions of this program to eventually perform complex and lengthy formulae

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Clubnet keeps you in touch with the microcosm of personal computer enthusiasts throughout UK. It is divided into two sections — clubs and user groups.

We publish a list of each section on alternate weeks. This week it's the turn of clubs, which are listed alphabetically by county then by town.

From time to time we will be reporting on the activities of an

individual club or user group. If you've just started a micro club or if your club is planning something special, then drop us a line and we'll spread the word.

Write to Clubnet, Personal Computer News, VNU, 62 Oxford Street, London W1A 2HG.

The listings are based on information supplied by the Amateur Computer Club.

## CLUBS

### AVON

**Multi-User Club** produces bi-monthly magazine, subs: £7.50. Contact Valerie Boyd-Shaw, Nailcote 1333.  
**Worle Computer Club**. Meets at Woodsprings Inn Functions Rooms on alternate Mondays at 7-10.30pm (annual subs: £12). Contact S W Rabone, 18 Castle Road, Worle, Weston-super-Mare, Avon, tel: 0934-513068

### BEDFORDSHIRE

**Bedford Amateur Computer Club**. Meets at Star Rowing Club, Bedford, on the first and third Tuesday of each month at 8pm (annual subs: £3). Contact Rowan Smith, 74 High Street, Great Barford, Beds MK44 3LB, tel: 0234-870763.  
**Chilerns Computer Club**. Meets at Five Belles, Eaton Bar, Near Dunstable, Leighton Buzzard on second and fourth Monday of each month (annual subs: £2 senior members, £1 under-14s). Contact Steve Betts, 42 Wallace Road, Eaton Bar, Bedfordshire OUS6 2DF, tel: 0252-220922.  
**Luton College Computer Club**. Contact John Rodger, tel: 0582-3441.  
**Luton Computer Club**. Contact P Fletcher, 1 Trowbridge Gardens, Luton, Beds LU2 7JY, tel: 0582-45068.

### BERKSHIRE

**Easthamstead Computer Club**. Meets at Easthamstead Park School, Easthamstead Park Mansions, Bracknell, on the first Wednesday in each month at 8pm. Contact Brian Poolton, tel: 0344-84423.

### BIRMINGHAM

**Birmingham Amateur Computer Club**. Meets at CBS Consultants, Watery Lane, Small Heath, Birmingham 10, on the first and third Wednesday of each month at 7pm (annual subs: £4.20 adults, £1.50 juniors). Contact Dr M Bayliss, 125 Berryfield Road, Sheldon, Birmingham B26 3UJ, tel: 021-743 7197.

### BUCKINGHAMSHIRE

**Hemel Hempstead Computer Club**. Meets at Quaxendon Youth Club every Friday at 7.30pm (annual subs: £5). Members also meet at Mandeville County Secondary School the first Thursday of each month at 7pm. Contact Ken Knight, 22 Mount Street, Aylesbury, tel: 0296-5181.  
**Chiltern Microcomputer Club**. Meets at the Garden Centre, School Lane, Chalfont St Giles, on the first Wednesday of each month (annual subs: £4 for six months). Contact Mrs W Tibbatts at Ellwood, Deansway, Chalfont St Giles, Buckinghamshire, tel: 024-07 4906.

**Iver Computer Club**. Contact P A Seal at 1 Ormonde Flats, Church Road, Iver, Bucks, tel: 0753-652792.  
**Iver Computer Society** meets at Huntsmore room, Iver Village Hall on the second and fourth Thursday every

month at 7.30pm. Contact John Haigh, 141 Leas Drive, Iver Bucks, SL0 9PR.

### CAMBRIDGE

**Cambridge Microcomputer Club**, meets on the third Wednesday of each month. Contact Derek Tripp at 3 Parguons Avenue, Waterbeach, tel: 0223-316662.  
**Haverhill Microcomputer Club**, meets at St Mary's Church Hall, Camps Road, Haverhill, on the second, third and fourth Wednesday of each month at 7.30-10.30pm (annual subs: £5 adult, £1 OAP and students; meetings 25p). Contact Andrew Holliman, at 5 Trinity Close, Babham, Cambridge CB1 6DW, tel: 0223-029-983.  
**Peterborough Personal Computer Club**, meets at Crosfield Electronics Social Club, fortnightly on Mondays, Contact Andrew Pike, tel: 0753-44342 after 5pm.

### CHESHIRE

**Altrincham Computer Club**. Meets at N. Cestrian Grammar School, Durham Road, Altrincham, fortnightly. Contact Martin Hocking at 39 Barrington Road, Altrincham, Cheshire WA14 1H2, tel: 061-941 4547.

**Brum Computer Club**. Meets at St Werburgh Community Centre on alternate Wednesdays at 7 to 10pm. Contact Mr R Simpson at The Coats, Stockwood, Cheshire.  
**Cheshire Computer Club**. Contact W Collins at 37 Garden Lane, Chester, Cheshire.

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

**Holmes Chapel Micro Club** meets at Leisure Centre, Holmes Chapel 47 30 0 to 9.30pm on the first and third Tuesday of each month (annual subs: £5 adults; £2.50 children; OAP and students. Or weekly subs: 30p adults, 20p children). Contact Margaret Baker, at 1 Helton Close, Crews, Cheshire, tel: 0477-34238.

**Kinder Peak Computer Club** meets at New Mills School every other Monday, subs: Adults £2 per quarter, £1 members under 11. Contact John Eary, New Mills 43870.

**Northwest Computer Club** meets fortnightly, meetings 25p. Contact John Lightfoot at 13 Aston Drive, Frosham, Warrington, Cheshire WA6 7UP, tel: 0728-31519.

**TOP meets** at Canteen English Truck Centre on the second and fourth Wednesday every month at 7pm. Annual subs: £5, reduced fees for students. Contact David Washford, 1 Alexander Road, Bournemouth, Dorset BH6 5JA.

**Purbeck Computer Club**, contact 31 North Street, Wareham, Dorset BH21 0AD.

### DURHAM

**Darlington Computer Club**, weekly meetings and informal discussion. Technical library available. Contact L Boxell, 8 Vane Terrace, Darlington DL3 7AT, tel: 0325-67766.

### ESSEX

**Genies Computer Club**, subs: £1 ZX81 members, £1.50 Spectrum members. Contact 30 Webber House, North Street, Barking, Essex.

**Brentwood Amateur Computer Club**, proposed new club. Contact R Sadler, 18 Wancost Road, Brentwood, Essex CM15 9HD.

**Springfield Computer Club** meets on the first Friday of every month. Contact Stephen Cousins, 1 Aldeburgh Way, Springfield, Chelmsford, Essex CM1 5PB, tel: 0245 50155.  
**Colchester Microprocessor Group** meets at University of Essex on the second and

fourth Tuesday of every month during school term at 7.30pm. Annual subs: £2. Contact Information Centre, University of Essex, near Colchester.  
**Stanway School Computing Club**, only school members present. Contact G Floyd, c/o Physics Department, Stanway School, Stanway, Colchester, Essex.  
**Dragon Independent Owners Association**, produces newsletter, gives discounts on software, subs: £8. Contact Doug Bourne, School House, Nevein Road, Rayleigh, Essex.

### CORNWALL

**Cornish Radio Amateur Club**—Computing Section. Contact Bob Reason at 54 Mitchell Road, Camborne, Cornwall.

**Cornwall Area Computer Club**. Contact M F Grove at 35 Causway Head.

**St Austell Computer Club and Computer Town meets** at ECIPL Labs, Penwarran St, Austell, fortnightly on Mondays at 7.30pm. Contact NG Day at 2 Clendale Close, St Austell, Cornwall PL25 3DD.

### DERBYSHIRE

**Derby Micro Society** meets at Littleover Church Hall, Shepherd Street, on every other Thursday at 7pm. Annual subs: £5, £2.50 children, £7.50 for families, 50p entrance non-members. Contact Mike Riordan, tel: 0332-769440.

**Glossop Computer Club**. Contact John Dear, 2 Spynney Close, Glossop, Derbyshire.

### DEVON

**Exeter & District Computer Club** meets at Exeter School, Magdalen Road, Exeter, on the second and fourth Tuesday every month, 7.30pm. Annual subs: £7.50 adults, £2.00 for students. Technical library. Contact T G Holden, 14 Greenville Avenue, Teignmouth, Devon TQ14 9NJ.

**Torbay Users Computer Club** meets at Devon Computer Services, 96 Dartmouth Road, Paignton on Mondays fortnightly. Annual subs: £2.00 juniors, £5.00 adults, meetings 20p, children welcome. Technical library available.

### DORSET

**Bournemouth Area Computer Club** meets at Kinson Community Centre on the third Wednesday every month. Annual subs: £5 adults, £2.50 juniors. Contact Peter Hibbs, 54 Runnymede Avenue, Bournemouth, Dorset BH1 19SE, tel: 03252-76547.

**TOP meets** at Canteen English Truck Centre on the second and fourth Wednesday every month at 7pm. Annual subs: £5, reduced fees for students. Contact David Washford, 1 Alexander Road, Bournemouth, Dorset BH6 5JA.

**Purbeck Computer Club**, contact 31 North Street, Wareham, Dorset BH21 0AD.

### DURHAM

**Darlington Computer Club**, weekly meetings and informal discussion. Technical library available. Contact L Boxell, 8 Vane Terrace, Darlington DL3 7AT, tel: 0325-67766.

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**Stanway School Computing Club**, only school members present. Contact G Floyd, c/o Physics Department, Stanway School, Stanway, Colchester, Essex.

**Dragon Independent Owners Association**, produces newsletter, gives discounts on software, subs: £8. Contact Doug Bourne, School House, Nevein Road, Rayleigh, Essex.

**Rouffou Club**, a new club. Contact Mr D Norden, 138c Church Road, Romford, Essex.

**South Essex Computer Society** meets at Hockey Club at Roots Hall, near Southend Football Stadium on Wednesday at 7.30pm. Open to members over 14. Contact Robin Knight, 128 Little Waking Road, Little Waking, Southend-on-Sea, Essex, tel: 0702-218456.

### GLOUCESTERSHIRE

**British Amateur Electronics Club**. Independent club with newsletter, beginner's section, library, annual exhibition catering for all ages. Contact Mr J Margels, 3 Bishopscote Close, Cheltenham Valley, Cheltenham.

**Cheltenham Amateur Computer Club** meets on the third Tuesday of each month at 7.30pm. Contact Mike Fallin on 0242-25617 or Robin Phipps on 0242-584343.

**GCHQ**, Contact D W Adam, 16 Court Road, Prestbury, Cheltenham.

**Cheltenham Amateur Computer Club** meets at Prestbury Scout Headquarters, on the third Tuesday of every month at 7.30pm. Annual subs: £3. Contact M Hughes, 30 Riverside Way, Cheltenham, Gloucestershire.

### HAMPSHIRE

**Commonore Computer Club**, inaugural meeting at Bury House, Bury Road, Gosport on May 6 at 7.30pm. Contact Brian Cox, Fairham 280530.

**Farnham and Portsmouth Amateur Computer Club**. Contact Alan Smith, c/o Francis Close, Lee-on-the-Solent, Gosport, Hants PO13 8HB, tel: 0705-550007.

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

**Southampton Amateur Computer Club** meets at Medical Science Building, Bassett Crescent, East Southampton, on the second Wednesday of every month at 7.30pm. Annual subs: £2.50 students & OAPs. Contact P Maddison, 'Gardenways', Chilworth Towers, Chilworth, Southampton SO17 2TH.

### HEREFORD

**Hereford Amateur Computer Club**, proposed new club. Contact Stuart Edinborough, 2 Warwick Walk, Bobblebrook, Hereford HR19 4TG, tel: 0432-269700.

### HERTFORDSHIRE

**Harpden Microcomputer Club** meets at Silver Cap, Harpenden on alternate Mondays. Annual subs: £2.50. Contact David James, 5 Ox Lane, Harpenden, Hertfordshire AL5 4HH.

### HUMBERSIDE

**Grimby Computer Club** meets at Grimby Central Library fortnightly on Mondays at 7.30pm. Contact Jensen Lee, 29 Park View, Cleethorpes, tel: 0472-4259.

**Scunthorpe & District Microprocessor Society** meets at Community Centre, Lindholme, Scunthorpe, every Tuesday at 7.30pm. Annual subs £2, families £5. Contact G Hinch, 21 Old

## Remember

Let us know about your micro club or user group so we can be sure the information printed here is up to date. Drop a card to Sandra Grandison, Listings Editor, at *Personal Computer News*, 62 Oxford Street, London W1A 2HG, or give her a call on 01-636 6890.

# CLUBNET

Crosby, Southcoote, South Humberston DN15 8PU.

**KENT**  
Canterbury ACC proposed new club. Contact I. Fisher, 21 Mamwood Avenue, St Stephens, Canterbury, Kent CT2 7AH.

**Midway Amateur Computer & Robotics** Organisation meets on the first Tuesday and third Wednesday of every month. Annual subs £5. Contact Paul Cameron, Small Community Centre, Lordwood Lane, Lordwood, Chatham, Kent: tel: 0634-63036.

**North Kent Amateur Computer Club** meets at Lecture Theatre, Charles Darwin School, Jall Lane, Biggin Hill, Kent, on the first Thursday of every month at 7.30pm. Annual subs £3. £1 students. Contact Ian Howe, 28 Canadian Avenue, Catford SE6 3AS, tel: 01-690 5441.

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

**Rameter** Computer Club, annual subs: £2 for under 18s, O.A.P.s. Contact Rupert Steele, St John's College, Oxford OX1 3JP.

**National Personal Computer User** Association, annual subs £12. Contact Eric Keeley, 29 Spring Street, Manston, Ramsgate, Kent.

**Sevenoaks School Computer Club**. Contact G Somerhoff, Technical Centre, Sevenoaks School, Sevenoaks, Kent: tel: 0732-456340.

**Tonbridge & Tonbridge Wells ACC**. Contact Ray Szatkowski, 1 Cromer Street, Tonbridge, Kent, tel: 0732-355960.

**LANCASHIRE**  
**Blackburn** Micro Computer Club. Contact Roger Longworth, 123 Sharp Road, Accrington, Lancs.

**Bolton** Computer Club meets at E2/4 Bolton Institute of Higher Education, Deane Road, Bolton, on Thursdays.

Annual subs: £1. Contact David Atherton, 16 Douglas Street, Ashton, Manchester M29 9FB, tel: 0942-876210.

**Burnley** Computer Club meets at 101 Fostel Street, Burnley, on Tuesdays 7.30-11pm. Contact Clive Tallon, 27 Bassnet Street, Burnley, Lancs BB10 3EQ.

**Chorley** Computer Club meets at Townes Arms, Chorley, every other Tuesday at 8pm. Contact Chris Hicks, 131 Market Street, Chorley, Lancashire.

**Clough Valley** Computer Club meets at Staff Centre, Pendle Carpels Ltd, West Bradford, on the second and fourth Monday of every month at 7.30pm.

Contact Ian Thornton-Bryar, 25 Southfield Drive, West Bradford, Clitheroe, Lancs BB8 4TU.

**Lancaster & Morecambe** Computer Club. Contact Sarah Blackwell, tel: 0524-33553.

**Cloughdale** Computer Club meets at Turf Lane Centre, Turf Lane, Chadderton, on Thursdays at 7.30pm.

Contact Mr Jakeman, 26 Mardale Street, Dorker, Oldham, Lancs, tel: 061-682 120.

**LEICESTERSHIRE**  
**East Leake** Computer Club. Contact Andrew Jones, 59 Bateman Road, East Leake, Loughborough, Leicestershire LE12 6NN.

**LINCOLNSHIRE**  
**Lincoln** Computer Club, meets at Handlings Public House, High Street, Lincoln on the first and third Wednesday of every month. Contact John Clifford, 448 Newark Road, Lincoln LN6 8RX, tel: 05222 2168.

**Shepperton** Computer Club, meets at County Hotel every other Monday, 7.9-30pm. Contact Reg Pottier, 118 Beresford Avenue, Skegness, 01574 3594.

**LIVERPOOL**  
**BBC Microgroup** Liverpool meets at Old Swan Technical College, Liverpool, on the first Wednesday of every month. Contact Nick Kelly, 56 Queens Drive, Walton, Liverpool L46 5H.

**LONDON**  
**Croydon** Micro-Computer Club meets on the first and fourth Tuesday of every

month. Contact Vernon Gifford, 111 Selhurst Road, Selhurst SE25 6LH, tel: 01-653 3207.

**East London** Amateur Computer Club meets at Harrow Green Library, Clahal Road, E11, on the second and fourth Tuesday of every month at 7.10pm.

Annual subs: £5. Contact Fred Linger on 01-554 3288.

**Forest-80 London**, contact Leon Jay on 01-296 0700.

**Forum-80 Wembley**, contact Victor Saleh on 01-902 2546.

**Harrow** Computer Group meets at Harrow College of Higher Education, Room W24, Northwick Park, on alternate Wednesday at 7pm. Contact Baya Butcher on 01-950 7068.

**Imperial College** Microcomputer Club meets at room 445, level 1, on Tuesdays at 7.30pm. Contact Tim Panton, c/o I.C. Union Office, Prince Consort Road, London SW7 2BZ.

**Richmond** Computer Club. Contact Burlington Daines School, Dane Building, Du Cane Road, Hammersmith, London.

**Repton** Police Amateur Computing Club meets on the first Thursday of every month at 7pm. Contact S Farley on 01-725 2423.

**Sandwich** Hobby Computer Club meets at the Polytechnic of North London, Holloway, London N7 8DB, on every Monday, Tuesday, Wednesday every Monday during term time, and one evening a week during holidays.

Annual subs: adults £25, family £40, jobless, pensioners, poly students £5. Contact Bob Palmer on 01-482 3762.

**Paddington** Computer Club meets at Paddington College, 25 Paddington Green, London W2 1NB. Contact Peter Street on 01-723 5762.

**Pest Office HQ** Microcomputer Club meets at room B145, River Plate House, 12-13 South Colindale Ave, Moorgate, on the second Thursday of every month.

Contact Terence Oatley, British Telecom Enterprises, Cheapside House, 138 Cheapside EC2U 6JH, tel: 01-726 4716.

**Richmond** Computer Club meets at Richmond Community Centre, Sheen Road, Richmond, on the second Monday of every month at 8pm.

Contact Bob Palmer, 506 Margaret, Twickenham, Middlesex, tel: 01-892 1873.

**THE SOBAT** Computer Club meets the first Tuesday of every month. Annual subs: £1. Contact T Kayari, 12 Calderon Road, London E11 4EU.

**South East London** Microcomputer Club meets at Thames Polytechnic, Greenwich, Woolwich SE18, on alternate Wednesdays at 7pm. Annual subs: £5.

Contact Peter Phillips, 61 Grainger Hill, London E11 4EU.

**Southgate** Micro Computer Club meets at Room B106 Southgate Tech, fortnightly on Thursdays at 7.30pm.

Annual subs: £5. See Prestel page 2502.

Contact Kevin Pretorius on 01-882 2282.

**West London** Personal Computer Club meets at Back Room, Fox & Goose pub, High Street, Uxbridge, on the first Tuesday of every month at 7.45pm.

Annual subs: £5 adults, £2 50 under 16s & pensioners. Contact Graham Brain on 01-897 8986.

**Wandsworth** Computer Club meets at York Gardens Community Centre, Battersea, London SW11 for all ages and all machines. Contact C Verrier, 112 Clarendon Library, Magdalen Road, London SW18.

**MANCHESTER**  
**Manchester** Computer Club meets at the Department of Computer Science, Manchester University, Oxford Road, Manchester, on the first and third Thursday of every month at 7.30pm.

Contact David Wade, 061-941 2486.

**Small Business Computer Users Club**. Proposed new club to meet the late Beaver computer users £7.50. Contact K Wadsworth on 061-7407232 after 5pm.

**MERSEYSIDE**  
**Bolton** Computer Club meets Room E4/E24 Bolton Institute of Higher Education, Beech Road, Bolton, on Thursdays. Annual subs: £1. Contact

David Atherton, 16 Douglas Street, Atherton, Manchester M29 9FB.

**The Hardwax Exchange**, Contact D. Edwards, PO Box 13, Birkenhead, Merseyside L4 4BB.

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

**Southport** Computer Club meets weekly. Contact Ian Brimstone, 28 Weld Road, Southport, Merseyside PR8 2DL, tel: 0704-64524.

**Wirral** Microcomputer Users Group meets at Birkenhead Technical College every Monday. Contact P Phillips, 41 Helton Close, Birkenhead, Merseyside L43 9HP.

**MIDDLESEX**  
**68 Microgroup** meets at Regents Park Library, Robert Street, NW1, on the third Tuesday of every month at 7.30pm.

Annual subs: £5. Contact Jim Andrews, 41 Peabody Road, Harrow, Middlesex.

**Richmond** Computer Club meets at Richmond Community Centre, Sheen Road, Richmond, on Monday of every month at 8pm.

Contact Bob Fisher, 18a The Barons St Margarets, Twickenham, Middlesex, tel: 01-892 1873.

**Sandwich** Computer Club meets at St Benedicts Hall, Napier Road, Ashford, on the last Tuesday of every month at 8pm.

Contact Simon Taylor, 8 Priory Close, Surbury-on-Thames, Middlesex. Contact Simon Clark, 83 Welling Street, Twickenham, Northants NN12 7AG.

**NOTTINGHAMSHIRE**  
**Ashton** Computer Club meets at Carisc Junior School, St Mary's Road, Sutton in Ashfield on the first and third Thursday every month. Annual subs: £3.

Contact Derrick Daines, c/o Cuttings Avenue, Sutton in Ashfield, Notts.

**Eastwood Town Micro Computer Club** meets at Devenish Junior School every Wednesday at 4.55pm.

Annual subs: £5. 50 adults, £2 50 juniors, £4 O.A.P.s. Contact Ted Ryan, 15 Oneacre, Eastwood, Nottingham N4 60BJ.

**Nottingham** Microcomputer Club meets at Friends Meeting House, Clarendon Street, Nottingham, on the first Tuesday of every month. Annual subs: £0 adults, £2 50 juniors, O.A.P.s. Contact Mr E Harvey, 68 Rosleigh Avenue, Nottingham NG6 3FH, tel: Nottingham 6849.

**Workshop Computer Group**. New club, first meeting June 14 in Workshop library lecture room. Contact Mr Andrews, 01-482 4327.

**NORFOLK**  
**Anglia** Computer User Group, Contact Jan Rejzl, 128 Templemere, Sprowton Road, Norwich, tel: 0603-29652.

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

**North Norfolks** Computer Group meets at Anchor House, Mount Lane, Lowestoft, on Wednesdays at 7.30pm.

**OXFORDSHIRE**  
**Association of Computer Clubs**. Annual subs: £5, £2 50 under 16s and O.A.P.s.

Contact Rupert Storey, St John's College, Oxford OX1 3JP.

**Microcos** meets at Clarendon Lab, Parks Road, Oxford, every week during term.

Contact Rupert Steele, St John's College, Oxford OX1 3JP.

**Oxford Personal Computer Club**. Annual subs: £8. Contact Len Phelps, Southport Cottage, Sutton Courtenay, Nr Abingdon, Oxon OX11 5AU.

**Amateur Radio** Special Interest Group proposed group for those interested in Computers and Amateur Radio.

Contact Peter Whittle, 49 Barlemas Road, Oxford OX4 1WX.

**Ridgeway** Computing Club meets at Swan Hotel, East Ilsley, on the second Tuesday every month. Contact Mike Magney, Beaver, South Street, Blunbury, Didcot, Oxon OX11 0JL.

**SHROPSHIRE**  
**Ludlow & District** Microcomputer Club meets at Diocesan Education Centre, Lower Galdeford, Ludlow, on the second Monday of every month at 7.30pm. Annual subs: £7.50 family, £5

adult, £2 50 student.

**Telford** Computer Club meets at Telford ITEC on every Monday 6-9pm. Annual subs: £3.50, £1.50 unemployed. Contact John Murphy, 10 Brimley, 10 Brookside, Telford TF3 1TF, tel: 0952-595959.

**SOMERSET**  
**Sharn M280** Club, contact Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset TA8 8BQ.

**Yeovil** Computer Club. Contact D G Carrington, 2 Rimesey Road, Yeovil, Somerset BA1 5XN.

**STAFFORDSHIRE**  
**Abinger** Computer Club, meets at Abinger Comprehensive School, Stoke-on-Trent, Staffs, on the first Monday of every Tuesday. Contact Rex Charlesworth on 09363-77270.

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

**Walsley** Branch of Micro Club, c/o Walsley Ecclesstone, 26 Browns Lane, Tamworth, Staffs.

**Tame Valley** Computer Club, contact Tim Rowland, 32 Millon Avenue, Leyfields, Tamworth, Staffordshire B79 9AG.

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

**SURREY**  
**Ashted** Computer Club meets on the last Tuesday of every month. Contact P Palmer, 8 Corfe Close, Ashted, Surrey.

**Thames Valley** Computer Club meets in Griffin Pub, Caversham. Annual subs £1. 50p a meeting. Contact Phil Warn, Reading RG4 47A.

**Thames Valley Amateur Computer Club** meets at Griffin, Caversham, on the first Tuesday every month. Contact Brian Upton, 25 Rousay, Camberley, Surrey GU15 1NR, tel: Camberley 22186.

**Essex** Micro Club, contact Dave De Silva, c/o Kingston Road, Ewell, Surrey KT19 0SU.

**Farnham** Computer Club, meets at Farnham fifth Form College, Molesey Road, Farnham, Surrey GU14 7JH, on the second Wednesday every month. Annual subs: £2. Contact Adam Sharp, 14 Thorn Road, Bournemouth, Farnham, Surrey.

West Surrey Computer Club meets at Paddock Room, Green Man Public House, Burpham, Guildford, the first Thursday of every month. Annual subs £2. Contact Chris Karney on 0483-68121.

**ITN Computer** Club meets on Fridays. Contact A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, tel: 0485 62035.

**THI Home Group**, annual subs: £12. Contact P Dicks, 157 Bushdops Road, Morden, Surrey.

**West Surrey** Computer Club meets at 10pm on Tuesdays 4-10pm. Contact P Goldman, PO Box 100, Surbiton, Surrey KT5 8HY.

**Sutton Library** Computer Club meets at Central Library, St Nicholas Way, Sutton, Surrey, on the first Friday of every month at 6pm and second and third Tuesday of every month. Annual subs: 75p O.A.P.s, £2 50 under 16s. Contact Dave Wilkins on 01-642 3102.

**Atari** Computer Enthusiasts meets at 8 Coscath Avenue, Wallington, Surrey SM6 9RA, subs: £20. Contact Adrian Miles, tel: 01-847 1515.

**Association of London** Computer Clubs, contact Len Stuart, 89 Mayfair Avenue, Worcester Park, Surrey KT7 4TS.

**APCA** (Amateur Personal Computer Association) Exchange), tel: £2, Overseas £3. Produces 3/4 magazines a year. Contact c/o M Gavin, 79 Ardrossan Gardens, West London, W10 4JL.

**Worthing & District** Microcomputer Club meets at Rose Wilmot Youth Centre, Littlehampton Road, Worthing, on alternate Sundays 11am-1pm. Annual subs: £4 adults, £2 50 under 16s. Contact B. Thomas, 11 Gannon Road, Worthing, W. Sussex, BN11 2DT, tel: 0903 36785.

**SUSSEX**  
**West Sussex** Microcomputer Club meets at Room R06, Robinson Road Amnexe,

# CLUBNET

Crawley, on the first and third Monday every month. Annual subs: £6 adults, £3 students. Contact J Clarke, 31 Hyde Heath Court, Pound Hill, Crawley, W Sussex, tel: 0293-884207

**Mid-Sussex Microcomputing Club**  
Contact Jeff Hadden, 21 Hillary Close, East Grinstead, W Sussex RH19 3XQ. **Micro Enthusiasts**, new club proposed.

**Arco Micro Computer Club** at Wick Amenity Centre, Wick Farm Road, Littlehampton, W Sussex, on the first Monday of every month at 8pm, and third Sunday of every month at 6pm. Fees: £3 six months, £1 joining fee. Contact P Cherriman, 7 Talbot Road, Littlehampton, West Sussex DN17 7BL.

**TYNE & WEAR**  
**Newcastle upon Tyne Personal Computer Society** meets at Room D103, Newcastle Polytechnic on the first Tuesday of every month. Annual subs £6. Contact Pete Scargill, 21 Percy Park, Tynemouth, tel: 0632-573905.

**WEST MIDLANDS**  
**Cannock Computer Society** meets at Cannock Computer Systems, Old Penkridge Road, Cannock, fourthly. Annual subs: £3 adults, £1 students. Contact Terry Sale, 20 Redwood Drive, Chase Terrace, Walsall WS7 8AS.

**Walsall Computer Club** meets at Park Hall Community School on the second and fourth Monday every month 6.45-9.45pm. Annual subs £5 adults, £3 students. Contact Alan Hunt, 58 St. Princes Avenue, Walsall, W Midlands, WS1 2DH, tel: 0922-23875.

**National Westminster Personal Computer Society**. Contact P Moore 021-2366176, ext. 382.

**Central Program Exchange**, annual subs: full membership £25 Europe, small users service £10 Europe. Contact Mrs Judith, tel: Wolverhampton 28521.

**West Midlands Amateur Computer Club** meets at Enfield School, Lovc Lane, Stourbridge, on the second and fourth Tuesday every month. Annual subs £4. £3 full-time students. Contact John

Tracy, 100 Booth Close, Brierley Hill, W Midlands, tel: 0384-70097.

**WILTSHIRE**  
**Chippenham and Calne**, proposed new club. Contact Matthew Jones, Pinhills, Calne SN11 0L Y.

**WORCESTER**  
**Worcester & District** Computer Club meets at Old Piccadilly Inn, New Street, Worcester, on the second Monday every month at 8pm. Contact D Stanton, 55 Vauxhall Street, Rainbow Hill, Worcester WR3 8FA.

**YORKSHIRE**  
**Barnsley Co-Op Computer User Group** meets at Co-Op Social Club, Pogmore, Barnsley, on the last Tuesday every month at 7.30pm. Annual subs £10. Contact James Brindson, c/o 39 Kereloth Hall Road, Barnsley, South Yorks S70 6NF, tel: 0226-41753.

**Doncaster Amateur Computer Society** meets in YMC, Wood Street, on the first Wednesday every month. Contact John Wilkinson, 316 Bawtry Road, Doncaster, S. Yorkshire, tel: 0302-868379.

**Greenhead Grammar School Computer Club**. Contact Brian Smith, Greenhead Road, Keighley, West Yorks BD20 6EB, tel: 0535-62628.

**Huddersfield Amateur Computer Club** meets every month at 8pm. Contact Chris Townsend, 760 4 Manchester Road, Linthwaite, Huddersfield, tel: 0484-657299.

**Leeds Microcomputer Users Group** meets at St. Andrew's Street, Chapel Allerton, fourthly on Thursday at 6pm. Contact David Parsons, 22 Victoria Walk, Horsforth LS18 4PL.

**Program Power**, contact R Simpson, 5 Wensley Road, Leeds LS7 2BX, tel: 0532-683186.

**Pennine & District** Computer Club meets at 26 Mill Hill, Haworth, W Yorks, on Saturdays and Sunday. Contact Douglas Bryant, 26 Mill Hill, Haworth, W Yorkshire, tel: 0535-43807.

**Shipley College** Computer Group meets on Tuesdays. Contact Paul Channell,

tel: 0274-995731.  
**South Yorkshire Personal Computer Group** meets at General Lecture Theatre, St George's Building, Mappin Street, Sheffield, on second Wednesday every month at 7.30pm. Annual subs: £4. Contact Paul Sanderson, 8 Vernon Road, Terley, Sheffield S17 3QE.

**Thurnscoe & District Micro Users Club** meets at Thurnscoe Comprehensive School, Physics Lab, Clayton Lane, Thurnscoe, every Wednesday at 7.30pm during school term. Contact Mr James Davis, 62 Dover Street, Thurnscoe East, tel: 0709-893880.

**West Yorkshire Microcomputer Group** meets on Tuesdays. Contact Phillip Clark, c/o Suite 204, Crown House, Arley Road, Leeds LS12 2ES, tel: 0532-632532.

**York Computer Club** meets at the Enterprise Club every Monday at 8pm. Contact K Thomas, Green Lea, Ripon, Harrogate, North Yorkshire HG1 2BY, tel: 0904-38239.

**SCOTLAND**  
**Bishopthorpe Computer Clubs** meets at 'Cwa Ben', Sachelcourt Avenue, Bishopthorpe, Renfrewshire, on Sunday once a month (next at 11pm May 22 at 2.30pm). Contact Alasdair Law, 10 Dugglass Road, Bishopthorpe, Renfrewshire PA7 3EP.

**Scottish Amateur Computer Society**, contact Mike Anthony, 46 Moreuden Park Gardens, Edinburgh EH11 7JR.

**Central Scotland Computer Clubs** meets at Falkirk College of Technology, Grangemouth Road, Falkirk, on the first and third Thursday every month. Contact James Lyon, 78 Slamannan Road, Falkirk FK1 5NF.

**File Computer Users Club**, contact Murray Simpson, 31 Tom Steward Lane, St Andrews, Fife, Scotland KY16 8YB.

**Grampian Amateur Computer Society** meets at 35 Thistle Lane, Aberdeen, on the second and fourth Monday every month at 7.30pm. Annual subs: £12, £5 student, £2, 50 joining fee. Contact Alan Morrison, 21 Beech Road, Westhill, Skene, Aberdeenshire AB3 6WR.

**Kemnay Computer Club** meets weekly. Contact S Stubbs, 15 The Glebe, Kemnay, Inverurie, Aberdeenshire. **Perth Personal Computer Club** meets every second Tuesday at 7.30pm. Subs: adults £5, juniors £2.50. Contact Gyl Mackenzie, 38 Arlockend Street, Inverness IV2 3EX, tel: 0463-220922.

**Perth & District Amateur Computer Society** meets at Hunters Lodge Motel, Bankfoot, on the third Tuesday of every month at 7.30pm. Annual subs £5. Contact Alastair McPherson, 154 Oakbank Road, Perth PH11 1HA.

**Shake and Lachalca Computer Society**, proposed new club. Contact C Maxwell, 25 Breacans loch, Isle of Skye IV42 8QA.

**Strathclyde Computer Clubs** meets at Wolfson Centre, 106 Rottenrow, Glasgow, on the third Wednesday of every month. Contact B Duffy, 24 Lomand Drive, Condorrat, Cumbernauld G4 8NW.

**WALES**  
**Abergele** Computer Club meets at Abergele CI Offices every Thursday at 7.30-10pm. Annual subs: £5 adults, £2 50 juniors. Contact G Jones, 77 Millbank Road, Rhyl, Clwyd, North Wales.

**Coblyn Computer Club** meets at the Greens Hotel, Coblyn Bay, at 7pm.

**81 Club** annual subs: £30 + vat. Contact Mike Hayes, tel: 0222-371732.

**Quest Amateur Computer Clubs** meets at St Mary's Institute, Stow Hill, every Thursday at 7.30pm. Annual subs: £3, 50. Contact Robert Harris, 16 Alanbrook Avenue, Newport, Gwent, Wales NP17 6GJ.

**Pontypool Computer Clubs** meets at The Settlement, Roachkill Road, every second Friday.

**Contact Graham Lovernidge**, on Pontypool 2827.

**Swansea & South West Wales** Amateur Computer Club meets on the first Friday of every month. Contact Paul Griffiths, 1 Prescilli Road, Penlan, Swansea SA5 8AF.

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# DATABASICS

This week PCN Databasics lists a selection of add-ons for your micro. PCN keeps you up to date in three-week cycles, listing peripherals, then software, followed by micros.

Printers are best categorised by print-head type. The two most common methods of transferring type to paper are the **Dot matrix** and **Daisywheel** techniques.

A dot matrix printer uses a row of pins which are programmed to strike the paper in a light or dark pattern.

A daisywheel printer uses a character as a pattern of dots. The daisywheel acts like a typewriter, the character set being pre-formed on a wheel with each character. The character set is interchangeable when it is struck by a hammer to form the character impression. Dot matrix printers tend to be faster than daisywheel but offer lower print quality.

In selecting a printer make sure the **interface** on your computer is compatible with those available as standard or at extra cost on the printer.

The **●** sign means the interface is included in the price; **O** means you have a choice of interfaces included in the price; + means the interface will cost extra.

**Max Baud rate** indicates the approximate characters-per-second rate as they are fed into the printer.

The **buffer stores** characters sent by the computer. The printer can take characters in chunks, at a rate quicker than they are able to be printed, sometimes allowing the computer to be freed for further use.

**Lines per inch** indicates the maximum number of lines printed in a vertical inch. **Characters per inch** can be varied on some printers as the typesizes they deliver can be adjusted.

**Maximum print positions** as indicated by the manufacturer tends to be a little optimistic. **Maximum print positions** tells you the optimum number of characters that can be printed on one line by the smallest character size on the printer. **Maximum paper width** is the widest paper the printer can take.

**Size** represents the space the printer takes up on a desk top. **The weight** of the printer is given in kilograms.

**Maximum copies** indicates the number of carbon copies that can realistically be produced at one time.

**Underlining** puts a line under characters while **bold type** thickens the characters to make them stand out. **True descenders** indicates that the print method allows for fully formed tails on letters such as p, q or g.

**Proportional spacing** puts the same space between characters whether they are a long 'm' or a short 'i'. **Block graphics** builds up pictures using rectangular blocks, while **High Resolution Graphics** uses smaller dots. **Bidirectional** means the printer can save time by printing left to right and then doing the next line backwards right to left. Similarly, **Logic Seeking** enables the machine to save more time by printing the short lines without sweeping over the whole width of the page.

**Feed methods** comprise 'fanfold' which uses continuous stationery sheets (folded road-map style) drawn into the printer by a tractor mechanism. The tractor cog fits into holes in the lamid paper and takes the paper past the printer mechanism. **Roll** is a roll of paper that feeds into the printer, usually printed on the back. **Sheet** where the paper is gripped between two rollers, typewriter-style. **Cut sheet** indicates the printer uses single sheets like a typewriter.

**Distributor:** to find which company distributes a particular add-on, use the code listed in this column to refer to the distributor table.

The table is at the end of the listings, and gives the distributor's name and telephone number.

## PERIPHERALS

Model	Price	Printed type (M = matrix)	INTERFACES					Max baud rate	Buffer Memory Size	Lines per inch	Characters per inch	Max print Speed (CPS)	Max print positions	Max paper width in inches	Size (Desk area in cms)	Weight (In Kilos)	Max copies	Underlining	Bold type	True Descenders	Proportional Spacing	High Resolution graphics	Bi Directional	Logic Seeking	Fan Fold	Cut Sheet	Tractor	Fribol	Distributor
			IEEE	Centronics	Serial	Parallel	Other (+)																						

## PRINTERS

Adler THD 170	£933	Daisywheel	●	●	●	●	●	9600	256	6.8	10,12,15	17	198	15.5	56×37	13	6	●	●	●	●	●	●	●	●	●	●	●	T2
Anadex DP 9000A	£1,397	M7×9, 9×9	●	●	●	●	●	9600	2700	6.8	10,12,5,15,16,17	200	106	9.5	40.9×57	13.6	6	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9001A	£1,397	M7×9, 11×9	●	●	●	●	●	9600	2700	6.8	10,12,5,15,16,17	200	132	9.5	40.9×57	13.6	6	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9500	£1,397	M 9×9	●	●	●	●	●	9600	700	6.8	10,12,13,3	200	176	15.5	39×58.9	16	6	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9500A	£1,397	M7×9, 9×9, 13×9	●	●	●	●	●	9600	2700	6.8	10,12,13,3	200	176	15.5	40.9×70.3	16	6	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9500L	£1,295	M7×9, 9×9	●	●	●	●	●	9600	700	6.8	10,12,13,3	150	132	15.5	39×58.9	16	6	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9501	£1,397	M7×9, 11×9	●	●	●	●	●	9600	700	6.8	10,12,5,15,16,17	200	220	15.5	39×58.9	16	6	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9501A	£1,397	M7×9, 11×9	●	●	●	●	●	9600	2700	6.8	10,12,5,15,16,17	200	220	15.5	40.9×70.3	16	6	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9600A	£1,489	M7×9, 9×9, 13×9	●	●	●	●	●	9600	1500	6.8	10,12,5,15,16,4	200	216	15.5	40.9×70.3	16	6	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex WP 6000	£2,616	M up to 18×20	●	●	●	●	●	19200	4500	6.8, 12, 16	10,12,16,7	285	220	15.5	48.7×74.9	25	6	●	●	●	●	●	●	●	●	●	●	I1	
ASP 3500	£377	M 9×7, 9×9	○	○	○	○	○	9600	80	6.8	10,12,16,5	180	217	14	61.5×60.5	19	6	●	●	●	●	●	●	●	●	●	●	M1	
Brother HRI	£747	Daisywheel	○	○	○	○	○	9600	2000	4.5, 6	10,12,15	35	198	16.5	38.1×71.2	16	8	●	●	●	●	●	●	●	●	●	●	J1	
Canon AP-400	£1,140	Daisywheel	○	○	○	○	○	19200	4000	4, 6, 8	10,12,15	25	197	15.5	50.8×48.2	18.5	6	●	●	●	●	●	●	●	●	●	●	D1	
Centronics 159.4	£362	M 9×7	●	●	●	●	●	9600	768	6	5, 8, 16, 10, 16, 36	150	80	10	38×35.6	10	5	●	●	●	●	●	●	●	●	●	●	B1	
Centronics 150.4	£362	M 9×7	●	●	●	●	●	19200	768	6.8	10,12,16,36	150	132	9.5	38.1×35.5	9.1	3	●	●	●	●	●	●	●	●	●	●	R1	
Centronics 152.4	£788	M 9×7	●	●	●	●	●	19600	708	6.8	10,12,16,5	150	217	9.5	38.1×35.5	9.1	3	●	●	●	●	●	●	●	●	●	●	R1	



Logbook LX217	E2242	M9×9	+	9600	400	6.8	10.12.16.5	160	218	15	57.1×43.2	17	5	●	T3
Micro Peripherals 96G	E517	M9×7, 11×9	●	9600	2048	6.8	10.12.16.5	100	136	9.5	41.1×27.3	6.7	2	●	T3
Micro Peripherals 150G	E918	M9×7, 11×9	●	9600	8152	6.8	10.12.16.5	150	228	15	58.4×39.9	11.2	2	●	T3
MT120 L	E900	M9×7	+	9600	132	6.8	10.12.5.16.6.20	160	132	10	34.3×24.1	7.5	4	●	M3
MT120 L	E765	M9×7	+	9600	132	6.8	10.12.5.16.6.20	160	132	10	34.3×24.1	7.5	4	●	M3
MT1802 L	E1845	M7×9	+	9600	218	6.8	10.16.6	200	218	16	55.9×76.2	8.6	5	●	M3
MT1802 L	E2205	M7×9	+	9600	218	6.8	10.16.6	200	218	16	55.9×76.2	8.6	5	●	M3
MT140 L	E1966	M9×7	●	9600	220	3.4,6.8,12	10.12.5.16.6	400	220	16	66.4×5.7	36	5	●	M3
MT140 L	E2185	M9×7	●	9600	220	3.4,6.8,12	10.12.5.16.6	400	220	16	66.4×5.7	36	5	●	M3
MT140 L	E882	M9×7	●	9600	220	3.4,6.8,12	10.12.5.16.7	200	220	16	66.4×5.7	36	5	●	M3
MT140 L	E954	M9×7	●	9600	220	3.4,6.8,12	10.12.5.16.7	200	220	16	66.4×5.7	36	5	●	M3
MT140 L	E1583	M9×7	●	9600	218	6.8	10.12.5.16.7	200	220	16	66.4×5.7	36	5	●	M3
MT140 L	E1869	M9×7	●	9600	220	3.4,6.8,12	10.12.5.16.7	200	220	16	66.4×5.7	36	5	●	M3
MT140 L	E747	M9×7	●	9600	220	3.4,6.8,12	10.12.5.16.7	200	220	16	66.4×5.7	36	5	●	M3
Newbury Labs 1550	E552	M9×7	○	9600	2000	6.8	5.6,8.5,10.12,17	120	230	15.5	58.9×30.5	11	3	●	M1
Newbury Labs 8510A	E1478	Daisywheel	○	9600	3000	6.8	5.6,8.5,10.12,17	120	132	10	56.9×28.6	8.5	3	●	N1
Newbury Labs N.40	E1478	Daisywheel	○	2400	2000	6.8	10.12	40	163	15.5	56.9×43.2	14	2	●	N1
OKI Microline 80	E242	M5×7	●	9600	256	6.8	5.10,16.5	80	132	9.5	34.2×24.5	6.5	4	●	X1
OKI Microline 82A	E425	M9×7	●	1200	132	6.8	5.8,3.10,16.5	120	132	9.5	36.1×32.8	8.9	4	●	X1
OKI Microline 83A	E908	M9×7	●	1200	132	6.8	5.8,3.10,16.5	120	132	15	51×32.8	14	3	●	X1
OKI Microline 84	E975	M	●	4800	132	6.8	5.8,3.10,12,17	200	231	15	51×32.8	14	3	●	X1
Olivetti DM6500	E375	M7×9	●	9600	1000	6	10.12.5.16.5	100	132	9	11.8×30	7.5	2	●	B2
Olivetti DM6500	E1033	M7×9	●	9600	256	6	10.12.5.16.5	140	220	14.75	59.2×40.1	17	4	●	B2
Olivetti DM6500	E1391	M7×9	●	9600	256	6	10.12.5.16.5	200	220	19.75	59.2×40.1	17	4	●	B2
Olivetti DY-211	E882	Daisywheel	○	9600	1000	6	10.12.15	29	198	17	54.1×32.8	16.3	4	●	B2
Olivetti JP101	E1322	Daisywheel	○	9600	1000	6	10.12.15	36	225	17.25	60×50	17	4	●	B2
Olivetti JP101	E420	Dry Ink Jet	●	9600	1000	6.8	10.12.18	50	147	9	39×26.8	5.2	1	●	B2
Olivetti Th40	E961	Thermal	●	9600	1000	6	10.12.15	240	80	8.75	40.1×34	7.5	1	●	B2
Olympia ESW10GR0	E1917	Daisywheel	+	19200	4000	6	10.12.15	24	212	141	52.8×37	13	6	●	15
Olympia ESW10GRK	E1263	Daisywheel	+	19200	4000	6	10.12.15	24	212	17	52.8×43.1	14.5	6	●	15
Olympia ESW200PH0	E1306	Daisywheel	○	19200	4000	3.4,6	10.12.15	50	225	17	60.4×40.8	19.5	6	●	15
Philips Muland GP300	E2287	M	○	19200	512	3.4,6.8,12	10.12.15	300	180	14.4	64.5×52.3	24	6	●	15
Printex 920	E2012	M	○	9600	1792	6.8,12	10.12.13,3.16,7	340	227	16	59×42.5	20	4	●	F2
Quint Sprint 935	E1892	Daisywheel	+	9600	500	3.6,8	10.12.15	35	198	15	61.3×49.9	19	3	●	T3
Quint Sprint 945	E1966	Daisywheel	+	9600	500	3.6,8	10.12.15	45	198	15	61.3×49.9	19	3	●	T3
Quint Sprint 955	E2403	Daisywheel	+	9600	500	3.6,8	10.12.15	55	198	15	61.7×42.5	20.4	3	●	O1
Quint Sprint 955	E2403	Daisywheel	+	9600	500	3.6,8	10.12.15	55	198	15	61.7×42.5	20.4	3	●	O1
Rair Decemter III	E2261	M7×9	+	300	256	2.3,4,6,8,12	5.6,6.8,8.25,10.13,2.16,5	180	132	15	69.9×60.9	46.4	3	●	O1
Rair Decemter IV AA	E1200	M7×9	+	300	256	2.3,4,6,8,12	5.6,6.8,8.25,10.13,2.16,5	30	127	15.7	57.1×39.4	11.3	3	●	O1
Rair 620	E1840	Daisywheel	+	9600	768	6.8	10.16.5	40	197	15	59.9×46.4	27.2	2	●	R1
Rair 620	E1359	M9×7	+	9600	1280	6.8	10.16.5	150	132	15	66×53.4	18.2	6	●	R1
Rair Centronics 1504	E722	M9×7	+	9600	N/A	6	10	150	132	10	38.1×35.6	9	2	●	R1
Rair Centronics Instruments 743	E1437	Thermal	+	300	N/A	6	10	150	132	10	38.1×35.6	9	2	●	R1
Ricoh RP1300 Flowriter	E1144	Daisywheel	○	9600	200	6	10.12.15	37	163	15	59.3×33.2	14	7	●	A1
Ricoh RP1600 Flowriter	E1782	Daisywheel	○	9600	2000	6.8	10.12.15	60	163	15	62.5×35.2	27	7	●	A1
Ricoh RP1600S	E1667	Daisywheel	+	9600	4000	6.8	10.12.15	65	204	13.5	63.5×36.2	22	7	●	M4
Sanders S700	E2875	M	+	9600	2000	6.8	6,10,12,15,17,18	450	234	14.5	47×56.9	23.6	5	●	A2
Seakocha GP100A	E247	M5×7	+	9600	256	6	6,12	50	80	10	43.7×23.8	4.5	3	●	D4
Smith Corona TP1	E557	Daisywheel	○	19200	N/A	3.4,5,6	10.12	120	126	13	49.5×31.5	8.4	5	●	D1
Sord SLP160	E724	M	○	9600	196	6.8,9	10.12	16	138	15	51×36	13	5	●	S12
Sord SWP20	E1444	Daisywheel	○	9600	2000	6.8	10.12.15	16	132	15	66×44.7	22	5	●	S2
Star DP-8480	E261	M	○	2400	132	6.12	10.12,16,17	100	132	10.5	39.4×32.4	8.5	2	●	S3
Systeme System	E1909	M	●	9600	256	6.8	10	120	132	16	71.7×61	53	6	●	S4
Systeme System-P	E1714	M	●	9600	256	6.8	10	120	132	16	71.7×61	53	6	●	S4
Systeme System-S	E1599	M	●	9600	256	6.8	10	120	132	16	71.7×61	53	6	●	S4
Tandy TRS 80 DW2	E1299	Thermal	●	9600	2000	6	10.12	43	163	16.5	62.4×20.4	27	4	●	T1
Telex Instruments 743	E1271	Daisywheel	○	300	N/A	6	10.17	30	80	8.5	39.1×40.6	6	1	●	D5
Telex Instruments 745	E1470	Thermal	○	300	256	6	10.17	30	80	8.5	39.1×40.6	13.5	1	●	R1







## 8 1/2" DISK DRIVES

Make and Model	Price	Capacity	No. of disks	Tracks	Sectoring	Sides and Density	IEEE	RS232	Applet II	Seagate	Termin	Others	Distributor
F-320	£2,300	2.4Mb	2	76	Soft	DS DD							BS
M 2894	£499	1.6Mb	1	77	Soft	DS DD							
M 2896	£493	1.6Mb	1	77	Soft	DS DD							
Megastor 11 DD	£1,133	2Mb	2	77	Soft	DS DD							A3
Megastor 11 SD	£1,018	1Mb	2	77	Soft	DS DD							V1
Megastor 111	£1,121	2Mb	2	77	Soft	DS DD							V1
R.M. FDS-2	£3,789	1Mb	2	77	Soft	DS DD							V1
Tandy Model 11	£999	488K	1	77	Soft	DS SD							R3
Tandy Model 16	£949	1.2Mb	1	77	Soft	DS SD							T1
Tandy Model 16	£1,549	2.5Mb	2	77	Soft	DS DD							T1

## MODEMS

A modem interfaces a computer and the telephone system so computers can communicate over long distances. It converts data to electrical pulses or sounds that can sent down the line. Analog modems are connected to the line directly or acoustically. AD in the connection column represents direct link, while A indicates acoustic coupling. The acoustic coupler is like a female telephone handset with a speaker in the coupler opposing the phone's microphone and a male phone opposing the earpiece. A/B in this column indicates that both methods of attachment are available. **Band rate** shows the speed with which the data is transmitted. The modem must be connected to the computer through an interface. The **interface** column lists the means interfaces featured on each model. **Asynchronous** means that data may be transferred at intervals as available. **Synchronous** data is transmitted at regular intervals. **Simplex** transfers data in one direction, while **half duplex** can transmit in either direction, but not simultaneously. **Full duplex** transmits and receives information in both directions at once.

Some modems can **originate** a call or start a two-way conversation. **Answer** means they can respond to a call from another computer.

Make and Model	Price	Capacity	Connection	Interface	Others	Capabilities	Asynchronous	Synchronous	Simplex	Half duplex	Full duplex	Answer	Distributor
AJ 311	£320	B	300	RS232									A5
AJ 122	£736	B	1200	RS232									A5
AJ A211	£283	A	300	RS232									A5
AJ 1234	£884	A	1200	RS232									A5
AJ 1256	£884	A	1200	RS232									A5

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**Vi 20** tape deck, 16K + 3K Super Expander, Intro Basic 1 & 2, covers, joysticks, software inc. Gorf, Omega Race, physics and maths O-level revision aids books. Worth over £650. Take £350 one. Tel Swainley 67514 (Andrew)  
**Neurwin** Test Paper. Multiple choice database creates own test questions. Excellent performance, recording, value. Great revision aid. £4. B. A. Ely, 69 The Bows, Vicarage Lane, Chigwell, Essex.

**48K Spectrum** and printer, 10 rolls paper. Unwanted gift, original packaging plus software including Hobbit, Pamina, Spectral Invaders, Orbiter and many other books, games. £215. Tel Bourne mouth 0202-767989.

**Acorn Atom 12K**, PSU, manuals, software, all in good condition. £100. Also Atari software, Star Raiders, £20. Temple of Apsah, £20. £35 for both. Tel Purfleet 6625 evenings.

**Wanted BBC** Computer, Model A or B. Will pay up to £250. Call Keith on 01-777 4714 preferably in evenings.

**48K Spectrum** used twice, plenty of software and books including Arcadia, Intruders, Mined-Out and more. £200 complete, (still boxed). Tel Newton Hill 30457 after 4.30pm, ask for Stuart.  
**ZX 81** and 16K improved keyboard. £45. Some software. Tel 01-992 9019 evenings.

**Epson MX80FIT**, perfect condition, rarely used, six months old. £299 one. Tel 01-654 4054 after 5pm. Ask for Alan.

**Ti-99/4A**, speech synthesizer, cassette recorder, cassette cables, joysticks, over £120 of cartridges, plus some cassettes, manuals, magazines. New £600+4, bargain at £450 one. Tel 051-342 2256 (lan) after 5pm. Buyer collects.

**Apple** Silentyte printer, including interface and manual, a new £120. Tel 0902 334106 (Wolverhampton).

**MZ80A** 5 months old, plus software, books etc. a new £400 or exchange other system. Tel 01-908 1460.

**Atari VCS** game £70, with Combat, Jedi, Arena £20, Star Raiders £18, Berserk £15, Chopper Command £15, Empire Strikes Back £17, Atlantis £15, Riddle of The Sphinx £15. Mint Condition. Tel Bristol 838152.

**Sharp PC1500** pocket computer, as new, only 30 hours' use. Paid £160, will sell for £110 one. Not needed as upgraded to bigger machine. Tel Ramsey 842325 evenings.

**48K SPECTRUM** and printer £200. Over £120 of best software and books £60 one. Tel 0734 783563.

**Vi 20** C2N cassette unit, extra membranes, Super Expander cartridge, joystick, games and programmers' reference guide. Five months old, still under guarantee. Cost £230, accept £165. Tel Brighton 37652 (Susan).

**Video Game** EG3003 with sound, RS232 interface, programs including T-Bug, Reumbrer, user defined keys, games, books. £250 one. Tel Gravesend 63331.

Will exchange physiology apparatus-Washington 2 channel oscillograph, biopreamp, couplers, stimulator, etc. cost £1,500 new, for newish commo-ore 64, disk drive, colour monitor/TV. Will sell also for £950 one. Tel Biggin Hill 71798.

**Sinclair Spectrum 16K** as new plus software, inc. Invaders, utility programs. £115. Tel Reading 692977 after 5.30pm.

**Vi 20**, C2N cassette drive, two cartridges (Jelly Monsters and Star Battle). Two books and joystick. Only four months old and in mint condition. £160 one. Tel 0732 355710.

**Screen dumping** for cassette systems, saves contents of the screen on paper, compatible with Research Machines 3802, and other micros using the point

# PC Billard

command when in conjunction with Epson printers. Tel 021-773 3389.

**Super3-D** strategy game which runs on Spectrum (10K and 48K). Full machine code, really tests your skill and wits. £5 one. Tel 01-531 2892 (Freddy) evenings or weekends.

**UK101** 16K, Cegmon, ROM Toolkit, cased, sound board plus software and other extras. £100 one. Tel Medway 576561.

**Vi-20** Super Expander, Forth Language cartridge, games cartridges: Rat Race, Star Battle, C2N. Cassette deck, joystick and stand, magazines, Vic Revealed. Very good condition. Will accept £190. Tel 061 4852477.

**ZX81** plus 16K, proper keyboard, games controller, numeric keypad, joystick interface. £30 of software, all worth £150. Selling for £100 one. As new. Apply to D. Salt, 23 Fore Street, Polruan, Fowey, Cornwall.

**Sharp PC-1500** with printer and cassette interface, instructions, colour pens, cassette leads and 8K RAM. £190. Tel Norwich 610338, after 5.30pm.

**Emucom** Commodore 64 single disk drive (1541), as new, for any Commodore twin disks. Tel Erith 41018 evenings.

**Learning to use the V-20** computer by Ron Geere, new condition £3 p.p. John Wright, 16 Grovenor West, Baldock, Herts SG7 6ZG.

**Sharp MZ-80A** 48K RAM, 6 months old. Comes with original software package (worth £75), Forth and Assembler. First offer over £414 accepted. All in original packaging. Tel 01-642 5785 (Chris) after 6pm.

**Atari 400**, program recorder, Basic cartridge, joysticks, manuals, over £350 software. Star Raiders, SearDragon, Choplifter etc. Excellent condition. In original packaging, still under guarantee. Only £400. Tel Leeds 0533 64980 between 5-7pm.

**Videoaster** database video game cartridges: Boxing, Four in a Row, Maze, Air Sea Battle, Ball and Ball, Shooting Gallery, Space Wars and Horse Racing. All boxed. £5 each. Tel 01-689 8420.

**Sinclair** printer with three rolls of paper and instructions. Excellent condition. £35. Tel Leeds 0532 671856 evenings only.

**Game EG3003** 32K load speaker plus games including Chess, Space Invaders, also three user books, programming book. £250 or £275 with extra tape recorder and lead. Tel Mkt. Harborough 62665, ask for Peter.

**NEWBRAD 32K**, Begonia's Guide, Database, Startrek, £180. Philips amber screen 12in Hi-Res monitor £80 or £240 for both. Tel UKfield 0825 4742.

**ZX81** + 16K RAM. Kayde Graphics ROM, data 2000 console case, plus cassette programs. Worth £125, will sell at £70 one. Tel Stalybridge 803 8530 day or night.

**Godard 95**, Tanx. 8K RAM, basic toolkit + X bug, ROM, many games, word processor, full K.B. £390 one. Epson M800 FT1 printer and connectors. £270 one. Tel Hollington 088 926 221 (Stafos).

**Sold** all my toys, raised £90, need 16K Spectrum or Dragon 32. If you can help £70. Tel Bolton 0204 389498.

**ZON X-81** sound pack £20 one. Sinclair 16K RAM £20 one. Portable cassette recorder (suitable for ZX81) £10. OS3 Asteroids, Invaders, £2 each. Tel 0532 602706.

**Vi 20** games to swap or sell. Great cassettes including: Traxx, Defender, Abductor, Shadowfax, Plus Gorf to

swap for other cartridge or good 8K-16K software. Tel 031-661 7477 evenings or weekends.

**ZX81 16K** manual, books, leads etc. Kayde keyboard, software worth over £50: adventures, arcades, 3D Monster: Maze etc. Books worth up to £30. Asking £70 overall. Tel Liphook 723338 after 6pm preferred.

**Printer £50**. Tandy quick printer-2 for less than a Sinclair ZX printer! New, unused, purchased from Tandy, complete with TRS80 IF cable and four rolls paper. Tel Mike 01-836 8000 (work).

**ViC20** + 3K, Datasette, joystick, Super Expander, Avengers, Rat Race, Starbattler, Omega Race cartridges. 15 Starbattler, including Vicmen, Frogger, Myriad. Many books and magazines. Worth £450, fully boxed. Sell for £270. Tel Tatfield 656.

**BBC software**, 32K Chess (Acorn power), £4. Cassette of Riddles (program) £5 or swap for other games. Tel 021-430 4394.

**BBC** disks manual wanted, to borrow or swap software or maybe buy. Also disk interface chips with fitting details. Tel 0423 872045 evenings/weekends.

**Open University** Hector with complete set of course manuals: Microprocessors and Product Design. A Course for Engineers. Covers 8085 Machine Code. £488 £299. £225. Tel Godalming (0438 22699).

**Wanted:** Commodore Vi-20 Super Expander, motherboard (switchable), Commodore 0 level cassettes, good condition please. Will swap for Gorf and plenty! Plus brilliant cassettes, including Traxx, Defender, Wacky Waters, Skramble! Tel 031-661 7477.

**Black and White** monitor, composite video input in metal case. £45. Tel East Grinstead 24220 (Sussex).

**76K Spectrum, ZX** printer, both two months old, 5 rolls printer paper, two blank tapes, two books and some magazines. £190. Tel 0933 315575 Kieron Brogan, Higham Ferrers after 5pm.

**Nascom 2** 40K RAM 8K Basic built into a fan-cooled case and mains filter. £185. Tel East Grinstead 24220 (Sussex).

**Preval Ace** telecom adapter in perfect condition and never been opened. Comes complete with all connecting leads. Requires only Post Office jack socket. Only £70. Was purchased at £160. Tel Mr Girdlestone 0226-43340.

**Dragon 32K** with two cartridges, Ghost Attack and Meteoroids. Also including four game cassettes and two joysticks, excellent condition, £250, worth £300. Tel Horsham 62953 after 8pm.

**Video Game EG3003** 48K RAM, sound, manuals, books, leads, software. (approx. £700 worth). All worth over £100, bargain at £250 one as need the money. Tel Gt. Yarmouth 0493-662102 after 5pm.

**Acorn Atom** 8K + 12K. Good PSU. B & W. TV. Atom Magic book, Invaders, assorted tapes and listings, £110 the lot. Tel 01-852 7879 evenings or weekends.

**WANTED:** very cheap Acorn Atom, any PSU manual and leads. Offers around £70. Tel Blyth 61096.

**48K Spectrum** one month old, boxed and complete. Plus software including Timegate, Meteor Storm, White Noise and Graphics, Chess, VU-3D, plus books and magazines. Cost me over £210. Bargain at £180. Tel 01-427 7809 evenings.

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**Atom Acornsoft Work Pack (ROM)** £20. Utility Pack 1 (tape) £7. Apple II/II/RS 80 II or III adventures 1, 2, 2. Apple II CRAE program editor (disk) £10. Tel Colkessone 51248 (Dougal).

**Vi 20** F2N cassette unit 16K RAM pack, software included, only 9 months old, condition as new, 15 months guarantee left, only £195 one. Tel Epping 76377 ask for Courtney.

**Vi 20**, C2N, 8K RAM, Super Expander and Boss chess. Bought in November 1982. As new and boxed. Lifetime offer for £150. Contact Abidin, tel 01-205 6390 (London) after 8pm.

**UK101** joysticks, Atari type fully fitted, £15 for one, £25 for two. Also available, see software. Contact M. Leslie, tel Welsyn Garden City 35949 anytime.

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**Sharp MZ80K**, 48K, 15 months old, excellent condition, four languages, U.K. Knight Computer, Copy file, plus approx. 185 programs, dust cover, £430 or will swap for BBC-B. Tel 0264-58454 evenings.

**Vi-20**, cassette unit, tapes, joystick, reference guide, Vic Revealed, 3K-RAM, hi-res cartridge, monitor, books, manuals. £179 one. Spectrum and ZX. Tel 051-526 3775.

**ZX Spectrum** tape of four games and four useful programs, eg Gorilla, Frogga, Histogram and Language, only £3. Worth at least £12. Nick Poulder, 59 Hadrian Way, Sandiway, Cheshire, CW8 2JT. S.A. please.

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**Ti58C** programmable calculator for sale. Good condition with many scientific and games programs. £50 one. Tel 042 555 6513 (London) ask for Philip.

**Vi 20**, C2N cassette player, carrying case, three ROMs, an assortment of cassettes, magazines, manuals and a range of other items, worth £400 one. Tel 01-764 1501 after 4.30pm.

**ZX81** 16K, all Sinclair built. Monster Maze, Traker, Donkey Kong, Black Crystal, plus Arcade Game cassette. Cost £134, will accept £75. Tel 0533-783136 after 5pm please.

**Pet 4016** 16K RAM + programmer's tool-kit. Very good condition, original packaging, some games including Asteroids, Pacman, Invaders. £350 one. Tel 01-267 9035 evenings or on road. Tel Davis, Korn, 51 Lady Margaret Road, London, NW2 5NH.

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**If you have any programs for the Atari 400/800** and would like to swap them then tel Trevor 696601 or write to Sean Horwood, 4 Windwood, Crawley Island, Essex, SS8 8HU.

**Home/Business computer system**, Sharp MZ80K (48K), MZ80 P3 dot matrix printer, interface unit and cables. Hundreds of programs, lots of literature. All manuals under year old. Worth £1,000, sell for £750. Tel 01-891 3413 after 6pm.

**Sinclair ZX 81** five months old, with cassettes, £40. Tel 0302-885855.

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**Acorn Atom** for sale. 12K ROM. Int. Wf. 32K RAM, ROM word processor, manuals, £200 ono. Tel Llanelli 3208 after 6pm. (Davies).

**Spectrum** software disposed of at bargain price! Super 3-D Intelligent Strategy game (16K-48K Spectrum) for only £4.95! Send to Freddy Vachha, 91 Manor Road, London, E17 5RY.

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**ZX Spectrum** used software spectral Invaders, Voice Chess, Football Manager, Super Spr, Galaxians, Spacekay, Autosnake, Arcadia. All eight for £25 or £4 each. N. Pounder, 59 Hadrian Way, Sandiway, Cheshire CW8 2JT.

Please do send SAE.

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**Atari 400** 16K, Atari recorder, one joystick. Atari games including Jumbo Pilot, technical manuals, magazines. Cost over £300, only £250. Tel Brighton 790407 after 5pm. Ask for Mike.

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**32K ZX81** manual, leads, etc. Software including Gulp, Mazogs, Flight Simulation. Machine code book and two 30 program books. £100 ono. Will sell in parts. Tel 01-908 0492 (Kenn) Wembley, London. Evenings only.

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**Acorn Atom** 12K + 12K, Toolbox, £622. VIA, 2 Books, PSU and leads, £1520. Tel 04862-66144 after 6.30pm.

**Vic-20** cartridges, Alien and Jelly Monsters, worth £39.90 — save £13.90, only £26. Will separate at £13 each. Tel S. Benfield 58634.

**Atari** software. Eastern Front £15. Lords of Karma £7.50. Protector £15. Golden Voyage £10. Le Stick joystick, £5. Complete lot book £7. Tel 0702 59545 after 5pm. (Chris).

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**Vic 20** cassette unit, games tape, data base, Vic Programmer's reference guide. One issue *Vic Computing* and piles of listings. Bought February 1983. Guaranteed £125, worth £195! Tel Lawrence 0474 67326 evenings. (Steve).

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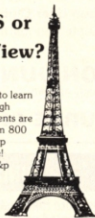
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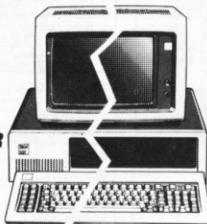
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## Tint tack

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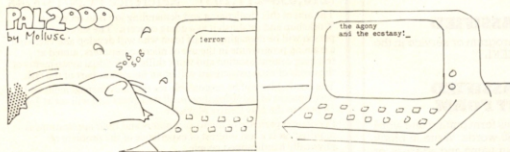
## DK disko?

Buoyed up by his company's £150,000 order from record giant K-Tel, Peter Brownlie of DK'tronics looks to a Golden Age for software buyers. Or at least, a Golden Hour.

With his tongue firmly in his cheek (it was obvious even over the telephone) Mr Brownlie enthused: 'Who knows?'

'When Uncle Clive comes out with his Microdrive, we could see the release of DK'tronics Golden Oldies.'

PAL2000  
by Mollusc.



## PCN DATELINES

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

Organisers who would like details of coming events included in

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

## UK EVENTS

Event	Dates	Venue	Organisers
Compec Scotland International Word Processing Exhibition	May 17-19 May 24-27	Kelvin Hall, Glasgow Wembley Conference Centre, Wembley	Tracey Cannon, Reed Exhibitions, 01-643 8040 Philip Le Masurier, BETA, 01-405 6233
Computers In The City Computer Open Day	May 24-26 May 26	Barbican, London Strathmore Kotel, Luton	Mario Meoli, Online Conferences, 09274 28211 Tony Kaminiski, Couchmead Communications, 01-778 1101
Micro '83 Apple '83	June 1 June 3-5	Conway Hotel, Dunmurry, Belfast Fulcrum Centre, Slough	Micro 1, 0232 664391/2 John Riding, Database Publications, 061-456 8500 Mike Jonstone, 01-801 9172 Clapp & Polliak, 01-747 3131
ZX Microfair Office Automation Show & Conference	June 4 June 7-9	Alexandra Palace, London Barbican Centre, London	Commodore Business Machines UK, 75 74111, Ext 220 Bradley Enterprises, 0772 312677 Julian Wilde, 0993 2355
4th Commodore Computer Show	June 9-11	Cunard International Hotel, London	Roy Bratt, Reed Exhibitions, 01-643 8040
Blackburn Computer Fair South of England Personal Computer Fair Computer Fair	June 11 June 12 June 16-19	King George's Hall, Blackburn Exhibition Hall, Wood Green School, Witney Earls Court, London	

## OVERSEAS EVENTS

Event	Dates	Venue	Organisers
National Computer Conference & Exhibition	May 16-19	Anaheim, USA	American Federation of Information Processing Societies, 1815 N Lynn Street, Arlington, VA 22209
Europe Software Exhibition Computers, Communications & Electronic Technology Exhibition & Conference	May 17-19 May 31-June 3	Utrecht, Holland Melbourne, Australia	Noelle Brown, 01-486 1951 CETIA, PO Box 259, Roseville, Sydney, N S W 2069
International Computer Technology	June 7-10	Hong Kong Exhibition Centre, Hong Kong	Terry Hill, Industrial & Trade Fairs International Ltd, 021-705 6707

SLANTAX  
ERRORSClose to  
the EDG

Back in PCN's launch issue we reviewed EDG Graphics for the BBC machine. Our reviewer, as light in his touch as the next man, had trouble with program crashes — but he tells us he's had no problem with a fresh copy Salamandar sent him, so he reckons his copy was at fault. And he has now found the 'guidelines' referred to in the manual, so his comment that they never appear again is incorrect. Sorry!

## Poor loser

Despite our reviewer's sterling efforts to win at 'Knight's Quest' in Gameplay (PCN No 8) we must confess he was a bit hasty in blaming his failure on program bugs. Alas, he forgot to draw his sword before attacking the elves! Apologies to Phipps Associates for blaming non-existent bugs.

# comart communicator

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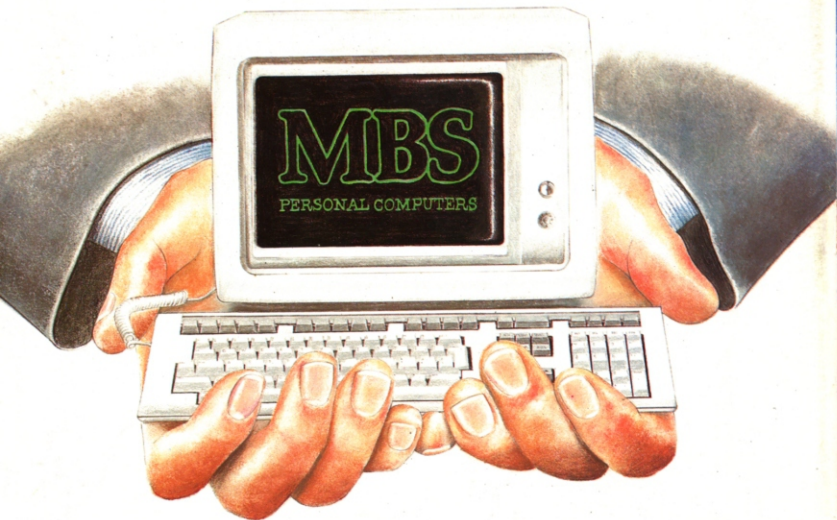
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