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COMPUTER NEWS
THE COMPLETE COMPUTING WEEKLY
APRIL 29-MAY 6, 1983 Vol 1 No 8
35p

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Full Pro-Test, page 34

HARDWARE PRO-TEST
NEW ENTRY
NCR moves into micros with its made for business Decision Mate

GAMEPLAY
MIND GAMES
Unload your lasers and try a little strategy on the Vic and Dragon

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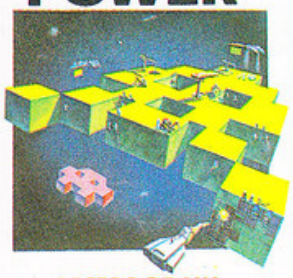

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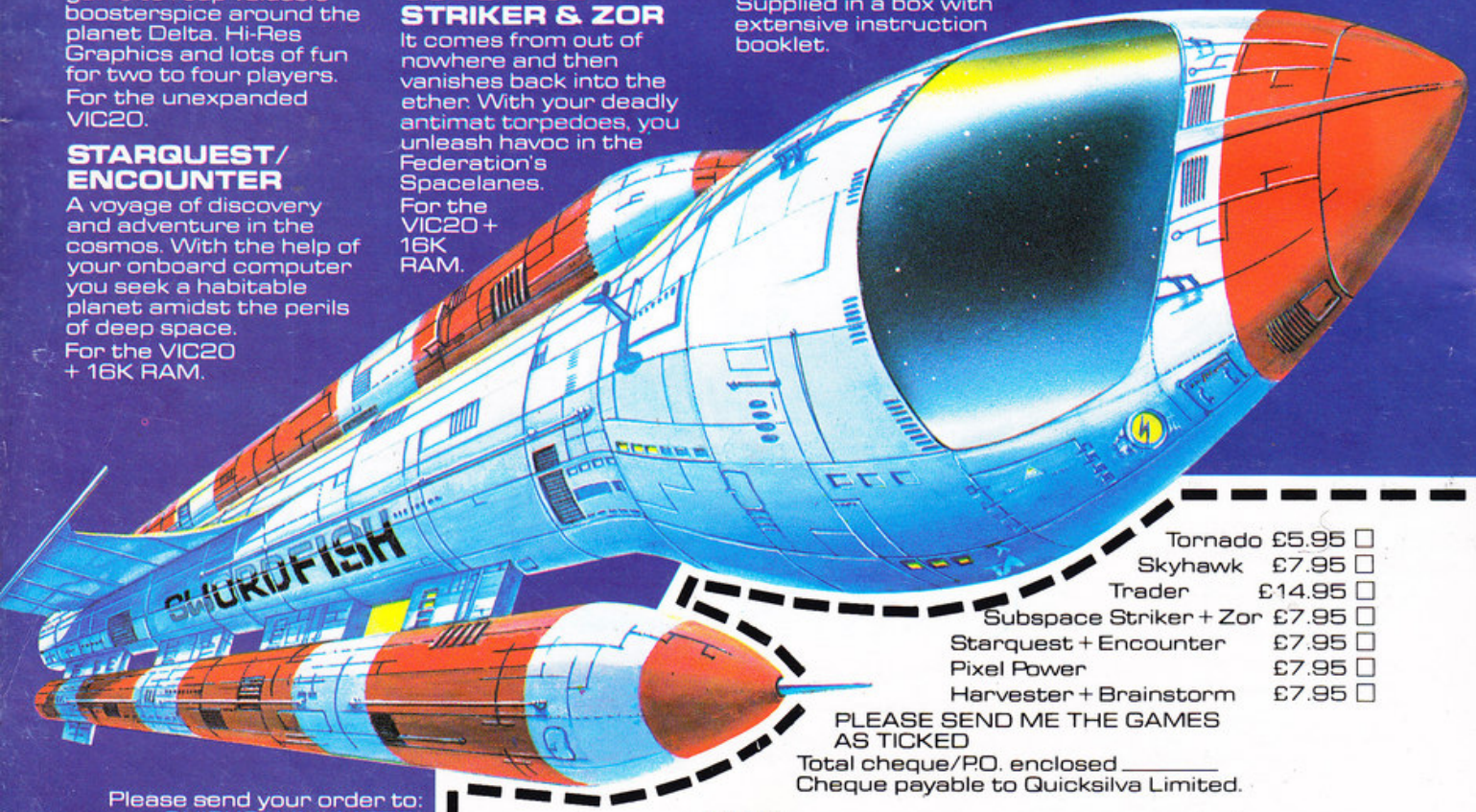

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ALFREDO JUST MUST BRING EXCITING
THE PLAZA QUICKLY
ALFREDO
ALFREDO
ALFREDO

US software flies in

A major invasion of American software could be on the way, as the US's biggest micro software distributor sets up shop near Heathrow Airport. And that might just mean a drop in the price of imported software, with Softsel flying it in by the plane-load.

Herb Blumstein, Softsel's UK managing director, says that the company is stocking 1,800 different packages in its Feltham warehouse, and prices will be tied as closely as possible to their dollar equivalents. Waiting time for US products should also be cut down.

'Not all American software products are well promoted here,' says Mr Blumstein. But since dealers can take Softsel's packages on 30 days' approval and return them if they aren't happy, Mr Blumstein reckons that there should be a much wider choice of software to be had through local dealers.

So far, Softsel has set up links with a number of UK dealers, including Silica Shop, Video Palace, and Personal Computers, and it is on the lookout for others to supply. The company has also arranged to ship Thorn EMI software in the opposite direction, to distribute it in the States.

Softsel doesn't sell direct to the end user at all, nor does it publish software, says Mr Blumstein. But the company does have a full-time product evaluation group to test everything it distributes. Mr Blumstein claims that the 30 day dealer software evaluation period should also mean that dealers are able to give better support.

The Feltham warehouse is stocked up with software for most micros, including Apple, Atari, Commodore, IBM, Tandy, and Texas Instruments. And since Softsel handles the best-selling Lotus Development Corporation's 1-2-3 package in the US, it is a strong contender to import it.

Smith price-cut heralds bank holiday micro fever

Price-cutting fever has broken out over Sinclair systems. Sinclair itself is due to cut Spectrum prices this week, but WH Smith has jumped in before it.

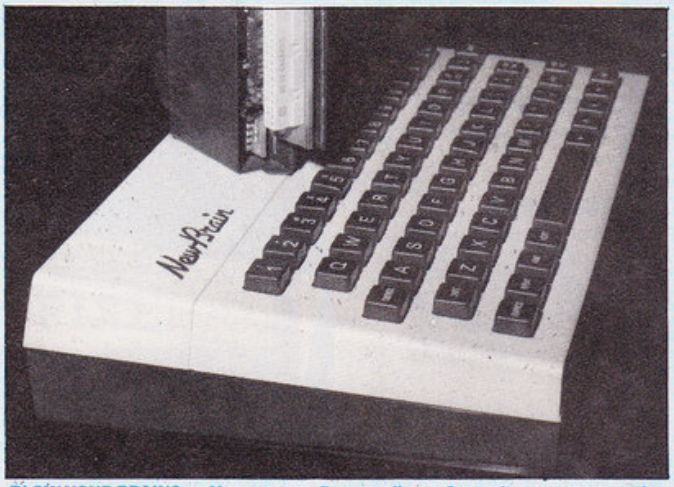
A 16K Spectrum will cost you £99.95 from WH Smith as of now, a £25 reduction. And the cost of a 48K version has fallen further — from £175 to £129.95.

The Smith chain has also brought the price of a ZX81 down by £10 to £39.95.

WH Smith says that it has 245 branches with Computer Know-How departments, and it plans to enlarge them this year to handle more hardware and software. In the next few months it promises to open microcomputer 'shops within shops' to extend its coverage even further.

The explanation for WH Smith's burst of generosity is that it hopes to cash-in on the buying booms it predicts for the Bank Holiday period. 'Many families will want to take advantage of extra leisure time,' said Smith's merchandise controller Stewart Binnie.

■ Oric has confirmed that the first deliveries of its 16K machine will go out to mail order customers in May, and that the price will be above the original £99 (*PCN, April 15*). But if you've been making do with a 48K unit on loan Oric will offer it to you at a 25 per cent discount — £127.50.



BLOW YOUR BRAINS — You can now firm up all your favourite programs on the Newbrain. Grundy Business Systems has brought out a 32K Eprom module costing £63.25 to plug into the micro's expansion port. Send Grundy your programs written in either Basic or machine code and they will 'blow' the Eproms for you. The catch, of course, is the price. It will cost £75 to set up the Eproms for blowing and £8.50 for each Eprom blown (prices subject to VAT). Not surprisingly, Grundy says that the module and 'blowing' service has been designed for systems houses and others who want to customise the Newbrain for a specialised application. Grundy Business System is on 01-943 1901.

Sord on sale

If you have held off buying a home micro because you've heard horrible things about the quality of support that you can expect, Sord hopes to change your ideas with its M5.

The M5 is a Z80 based machine with sound, colour and sprite graphics, looks rather like a Spectrum, and incorporates the software cartridge idea, like several other machines. It will cost £195 with the F-Basic cartridge, and the more advanced G-Basic language — also in a cartridge — will cost £25.

The Japanese manufacturer plans to train the technical support staff of each distributor either in London or at its factory in Ireland. Not only that, but it will keep a supply of back-up machines amounting to no less than 1 per cent of the quantity sold.

Aquarius by summer

The age of Aquarius will dawn in two months' time. Mattel's new £110 Aquarius micro (reviewed in last week's *PCN*) should be in the shops by July, Mattel managing director Michael Lunch said last week.

Mr Lunch said Mattel has organised a massive network of stories in the UK to sell the machines. He added, however, that the Aquarius memory expansion packs and disk drives will take a little longer to produce, and may not be available for the first few months after the machine goes on sale.

Meanwhile, Mattel is hoping to release its new keyboard for the Intellivision games machine by September. The keyboard will sell for about £89.99, and will turn the games machine into a full 16-bit colour micro.

Although the keyboard unit won't be far off the £109.95 price tag of the full-blown Aquarius computer, Mr Lunch believes that most Intellivision owners — who may have spent as much as £300 on hardware and software for their machine — will not want to throw away their investment by buying another micro.

'There are something like 50,000 Intellivision TV games users and right now they're faced with either buying a computer on its own and discarding their Intellivision game or getting the keyboard and having a 16-bit computer,' he said. 'At the moment many consumers are likely to be faced with a confusing choice in the market.'

The new Intellivision keyboard is completely different from the keyboard test-released in the US two years ago. That was a large, cumbersome affair which included a tape drive, and it wrapped around the Intellivision unit to form a large console. According to Mr Lunch, the new keyboard simply plugs into the Intellivision's computer I/O adapter on the right-hand side on the machine. He said the keyboard is very similar in appearance and feel to the Tandy colour computer keyboard.

The Intellivision will also be able to support cassette storage, further memory expansion and an interface that will allow it to accept all the cartridge software currently made for the Atari VCS games machine.

Shy Electron

You'll have to wait until August to get your hands on Acorn's Electron.

Even then the company says there will be limited supplies of the 32K machine until October, so it can spot any problems which may occur.

Priced at around £170, this home computer is said to be a 'chopped down' version of the BBC micro, complete with 6502 processor, high-resolution graphics and ten function keys on its full-size keyboard.

It is powered through a separate transformer and extras will include Econet, teletext, RS423 and parallel printer interfaces, a disk interface and games paddles.

All-micro drive

A disk drive that you should be able to hook up to any micro on the market has crossed the Channel from France.

The manufacturer, Cyborg, calls its unit a multi-computer disk drive and says it can be interfaced to any current micro by changing the connectors at the computer end of the cable.

The key to this apparently remarkable development is a 6500/12 processor chip which controls the disk drive and runs a resident disk operating system with 22 commands. The drive should appeal first to users whose micros have no disks, such as the ZX81, Spectrum and Oric, but whether owners of £50 micros will hook up disk drives costing four or fives times as much remains to be seen.

Text data on one micro should also be readable to another make of computer.

Disk capacity is over 700K. File names can be 18 characters in length and Cyborg claims that each disk contains up to 240 directory entries per side.

Although the drive can connect to any micro this doesn't mean it can use any disk-based program — disk operating system incompatibility is a problem this device won't try to solve. Because the drive won't handle existing disk operating systems, it appears that users will have to be content to write their own programs — there is unlikely to be any packaged software to make use of the DOS.

Of the two problems facing users of low-cost micros who want to configure disks to their systems — price and suitability — the Cyborg scores according to your priorities. When it becomes available to end-users in the summer its price will be between £200 and £250.

Root of the 8/16 bit swop

Now you can move from 8-bit to 16-bit systems without tears — or so Root Computers is claiming with its launch of a version of the UCSD p-system to run under Unix.

Unix-only software house Root says that by using its Rootlink interface package, existing users of the p-system operating system will be able to carry on running their old software in a new multi-user Unix environment, without needing to be aware that Unix is even there.

The package was developed by the South Western Universities Regional Computer Centre — SWURCC — but Root is to market and support it. The company will be selling Rootlink at £500, while the latest version of the p-system will cost a further £495.

Mike Kinton, Root's managing director, said: 'Rootlink will let you save your investment in p-system code, and it widens the amount of software available for Unix.'

Rootlink will let Unix users run a number of different environments, Mr Kinton said, so that a user who likes the p-system could run it at one terminal while another user who prefers Unix could simultaneously run it at another.

The package works by taking p-code — the intermediate code produced by the p-system — and interpreting it into the host micro's machine code. It interfaces between Unix's commands and the p-system.

BASIC GUIDE — Commodore has released its best-selling Basic programming guide for use on the model 64. At £14.95 inc VAT, 'An Introduction to Basic: Part 1' consists of three items. There is a self-study text divided into 15 lessons, two cassette tapes with a collection of 64 programs and a flow-chart stencil to help design correct and efficient programs. Contact VICSoft, Slough 74111.

Lisa-like OS for Apple II

Good news for Lisa lovers — you will soon be able to run a Lisa-like system on your trusty Apple II.

Basingstoke software house Asolv is developing an operating environment based on Smalltalk — the system that originally inspired Apple to produce the Lisa.

Asolv will be producing the system initially for the Apple but the company is looking at adapting it to run on 8088-based machines such as the IBM PC. 'Our aim is to make it machine independent,' says Asolv managing director John Ash.

When it is released onto the retail market in the autumn it is likely to cost £570 and will require the Apple to be equipped with a minimum of 256K of RAM.

It has all the features you would expect, including a 'mouse' to move a pointer around the screen, multiple window overlays and the ability to run a number of applications at the same time.

It will make its debut in this country at the Apple exhibition in June.

Kaypro debut

The Kaypro II is here at last! CK Computers of Plymouth has brought the top selling American portable to the UK after a false start last year by LSI. The business system will sell with software for around £1,950.

It's a 64K RAM, Z80 CP/M system with a built-in 9in monitor. Disk options include 2 x 200K or 400K floppies or a single floppy with a 10Mb hard disk. A graphics board that comes with the 10Mb model will later be offered as an option for the floppy-based systems.

The 26lb machine comes with a heap of software. There's the 'Perfect' range: PerfectWriter, — Speller, — Calc and — Filer. Then there's a second spreadsheet, Profitplan and Wordplus, a second word processor. And the Kaypro Basic compiler, MBasic and about ten games.

The Kaypro is a well-established machine on the American market but this is the first time that a distributor is actively selling the machine here. CK is currently appointing dealers.

The Kaypro was originally shown in November by LSI but the company did not pursue its distribution.

CK Computers is on Plymouth (0752) 780311.

The Kaypro II portable, now being sold in the UK.

VIEW FROM AMERICA

IBM aims to overhaul Apple

From Chris Rowley

Apple Computer has been generating some great figures lately. For instance, Apple made it into the Fortune 500, reaching number 411 in the prestigious listing of the top US companies.

In the first quarter of 1983 Apple's profit jumped 73 per cent on last year's figure to reach $23.5 million. This was generated by a 60 per cent increase in sales from $133.6 million to $214.3 million. Over Christmas, Apple set a month record with sales of $88.3 million.

Meanwhile this year's directory to Apple software has topped 1,000 pages — the biggest such software resource in the micro world.

In addition the Cupertino, California microcomputer pioneer came out with the state-of-the-art Lisa, a $10,000 supermicro that had them gasping with awe at exhibitions all over the country.

So why are so many pundits predicting doom for Apple?

For a start the pundits have chosen this year as the year of the Big Kill. Despite continuing market growth and forecast sales of as many as five million micros this year there is so much competition now that it seems certain that some companies are going to be left on the floor.

Hence the discount fever that's building up as everybody fights for market share. Timex/Sinclair ZX81s cut to $50, Commodore 64s slashed to $369, free Texas Instruments 99/4As being given away with each purchase of a TI business computer, and now there are others doing a good business in 're-polished' Apple IIs at $599 or less.

But it isn't the discounting that really worries Apple watchers. The real threat is coming from the opposite direction and has been looming larger and larger since a Charlie Chaplin impersonator first popped up in TV ads for the IBM PC in late 1981. *Fortune* magazine, the bible of the boardroom, put it so succinctly: 'Big Blue's logo on the front of the machine inspires customer confidence that no other company can match.'

What's happening is that IBM, the sixth largest corporation in the US, looked into its future and decided that it didn't want to be selling mainframes into companies where every executive had an Apple on his desk.

With IBM marketing muscle, plus the inspired Charlie Chaplin campaign from Madison Avenue, the market is rapidly shifting IBM's way. Today it is shipping 20,000 PCs a month from the plant at Boca Raton (literally the Rat's Mouth) and IBM is also going flat out in a bid to move into every sector of the micro market.

Later this year the $1,000-and-under model, with 64K, code-named Peanut will be unleashed in time for Christmas. IBM has already announced two new products described as 'Lisa killers' by making additions to its existing computer inventory.

Analysts believe IBM will overhaul Apple by the end of the second quarter and will have 21 per cent of the market by the year's end.

Of course Apple still has a huge user base (650,000 Apple IIs alone) and that enormous software resource, but how long such advantages will last remains to be seen.

Some signs are not encouraging. For example here in New York, one of the biggest markets in the world, you can't buy a Lisa until July at the earliest. Since most Lisas will be bought by business users, and since business waits for no man, that three months delivery lag simply means a lot of IBM PC sales.

And when VisiOn becomes available this summer for the PC, the gap with the Lisa will narrow in every sector but price, where Lisa will cost $5,000 more.

The pressure's on Apple now, say the pundits, and if the Mackintosh isn't both wonderful and cheap then Apple is in real trouble.

Bug bounties

By Wendie Pearson

Finding a bug in the packaged software you buy could earn you some money.

Open Computer Services of Brighton is offering £100 to users who find a bug in the business software it sells.

Sales manager Simon Backhouse defines a bug as 'hitting one or any combination of keys that crashes you out of the system, losing the data you have collected.'

The company says it has only had to cough up three times in 2½ years.

At Pegasus, the software house based in Kettering, Northamptonshire, marketing director Stuart Whitaker says: 'We have a reputation for shouting our mouths off about how good our software is, and so we'll put our money where our mouth is.'

The company pays £50 to dealers who find an original bug and payment for this goes to the individual bug-hunter, not the company.

'We want dealers to find bugs before they get to the end-user, and to get to know our software well. This is an incentive,' he said.

In 18 months Pegasus has paid out for 21 bugs and it defines such bugs as 'something the system is supposed to do and doesn't'.

Meanwhile, Tabs in Andover, Hants, is only offering £5 per original bug, to both users and dealers.

Marketing manager Bob Forsyth defines a bug as an inconsistency in the program.

Add-on group to offer micro

Memotech's first micro (*PCN, April 29*) should be on sale this summer.

According to Geoff Boyd, Memotech's technical director, the exact price has yet to be decided but he expects it to be closer to £200 than to £300.

The micro has been designed as an entry-level machine to score well on expandability.

It is based on the Z80A chip with 32K of RAM, 16K Microsoft-compatible Basic in ROM and another 16K of RAM dedicated to the video display.

The graphics capability compares favourably with other machines in the price range.

The resolution is 256 by 192 pixels or 40 columns of text. Each column can be any one of 16 colours and the screen can handle up to 32 sprites.

The graphics can be handled using the extra graphics commands built into the Basic which include 26 reserved graphics characters and a Logo subset. In addition, Memotech plans to include a new screen handling language called Noddy.

The machine will have a Centronics interface as standard together with ports for two joysticks, plug-in cartridges, PAL encoded monitor, TV and hi-fi sound.

The keyboard has 79 keys with numeric keypad, cursor controls and eight programmable function keys.

For expansion there will be six slots inside the machine for such things as extra memory (32K, 64K, and 128K boards are planned), 80-column text and disk controller.

Mr Boyd sees the micro as being expandable up to a full business machine with 512K of RAM, 5¼in or 8in dual floppy disks holding a maximum of 1.6Mb and CP/M operating system.

Memotech is on 0993-2977.

Since Apple launched the Lisa mice seem to have been the micro makers' favourite creatures. But the less cuddly turtle has not been forgotten. If you fancy playing with a baby robot, Zeaker offers its new Micro-Turtle at £52 for the kit version or £69.50 for the assembled turtle. Made by Colne Robotics of Twickenham, the turtle is intended for users in education. It comes with interface, power supply, operating manual and software and can be driven by any micro with an 8-bit bidirectional port as well as by the ZX81 or Spectrum for which special interfaces are also available from the company on 01-892 8197.

Osborne 2?

Portable pioneer Osborne has given its popular micro a facelift to produce a new version called the Osborne Executive.

The revamped machine looks pretty much the same as the original Osborne 1, but added features on the Executive include a 7in amber video display, 128K of memory, double-density disk drives, IEEE and two RS232 interfaces.

Other pluses are the operating systems — UCSD p-system and CP/M+, a new version of the standard CP/M used on the original Osborne. And Osborne has included business software plus programming languages within the basic price of about £2,000.

Osborne aims to produce a complete package, which it says is why it has thrown in about £1,500 worth of software to back up the machine.

To keep pace with all the other IBM-compatible machines, Osborne has an upgrade to the Executive in the pipeline.

Apart from the Executive's standard features, the upgrade version will have an 8088 processor and will run the MS-DOS and CP/M operating systems.

A price is not yet fixed, but it's thought it will cost an additional £400. Osborne says the new machines will be available towards the end of the year.

BACK-UP BOX — This hard-disk back-up device from the US is a neat approach to a common problem. The 5Mb hard disk with a removable 5Mb cartridge comes from a Californian company called Genie Computer Corporation. The Genie 5+5 incorporates an IBM or Apple interface and costs £2,405 plus VAT. The cartridge on its own costs £95 plus VAT. Both items will be available in two months from Micro Networks, 01-602 7405.

Modular micro from Cifer

A new contender in the low-cost business stakes will enter the fray next month.

Cifer Systems is bringing out a dual processor micro called the Cifer Club. Costing £3,900, it features a 5Mb hard disk, 800K floppy disk, a Z80A user processor with 64K RAM, a second Z80A running as a display processor with 64K dedicated RAM and CP/M 2.2 operating system.

The Club, like the rest of Cifer's range of terminals and microcomputers, is built on the modular concept, which simplifies maintenance and upgrading.

Using the industry-standard IEEE 488 bus, the Club can take up to four half-height expansion boards. Already available is a graphics processor board that gives full Tektronix 4010 compatibility for £368 and a second-user Z80 with 256K of RAM at £633.

The Winchester-equipped dual processor Cifer Club micro.

For larger applications Cifer is planning an expansion board carrying a 68000 16-bit chip and 256K of RAM costing £633.

Cifer will be distributing the Club through OEMs and systems houses and is in the process of setting up a dealer network.

Puzzle Planet

The BBC micro could be your passport to television stardom this autumn.

BBC producer Ian Oliver needs between six and 12 volunteers to take part in a six-part series starting on BBC 1 in September. Called *The Adventure Game*, the series simulates a computer game which involves people and BBC micros in an elaborate battle of wits.

The programme, aimed at children from five to 15 years old, is educational in that it is intended to teach children logical and lateral thinking by means of role-playing, problem-solving and game-playing.

The action takes place on Arg, a planet inhabited by Argonds, who can change form and shape at will. The chief Arg and little Args test the intelligence and wit of visiting strangers, who are given problems to unravel.

Adventure Game, a cassette for the BBC micro based on the series, will be marketed by Acornsoft at the same time. The game will be available from Acornsoft and BBC micro dealers.

If you are interested in taking part contact Mr Oliver at the BBC, Wood Lane, London W12, on 01-743 8000.

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 April 29), so these charts tell the story in high streets between April 1 and April 15.

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	£125	(SI)
▲	2 (3)	BBC Model B	£399	(AC)
▼	3 (2)	Sinclair ZX81	£50	(SI)
►	4 (4)	Dragon 32	£200	(DR)
▲	5 (8)	Atari 400	£160	(AT)
▲	6 (7)	Lynx 48	£225	(CA)
▼	7 (5)	Commodore Vic 20	£170	(CO)
▼	8 (6)	Oric 1 48K	£170	(OR)
►	9 (9)	Sharp PC 1500	£170	(SH)
▲	10 (12)	Texas TI99	£150	(TE)
▲	11 (13)	New Brain A	£228	(GR)
▼	12 (10)	Commodore 64	£345	(CO)
▲	13 (15)	Sharp PC 1251	£80	(SH)
▼	14 (11)	Atari 800	£400	(AT)
▲	15 (17)	Apple II	£776	(AP)
►	16 (16)	Jupiter Ace	£90	(JU)
▼	17 (14)	Acorn Atom	£174	(AC)
▲	18 (19)	Epson HX20	£472	(EP)
▲	19 (18)	Colour Genie	£224	(LO)
▲	20 (—)	HP 75	£883	(HP)

Top Ten over £1,000

►	1 (1)	Sirius 1	£2,754	(ACT)
►	2 (2)	Osborne 1	£1,581	(OS)
►	3 (3)	Olivetti M20	£2,754	(OL)
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Paper snags Micronet

Less than two months after its launch Micronet has fallen victim to the micro market disease — *Micros mañana*.

Users of the Commodore Pet, TRS 80 and RML 380Z machines should have received their Micronet adaptors from the start of April. But no adaptors arrived.

Richard Hease, Micronet's managing director, is unrepentant. 'The adaptors were available on schedule. The reason for the delay in sending them out is that it took longer than expected to write the instructions to go with them,' he said.

'With so many people wanting to go on to Micronet our staff have been inundated with paper work. The adaptors and software are now available for the Commodore Pet and the TRS 80 Model III.'

The story for other machines is that the Micronet kit for the TRS 80 Model I and RML 380Z should be available from May 1, and for the Apple II and Sinclair Spectrum from May 15.

■Sinclair Spectrum users may face a two-week delay in getting their Micronet adaptors, but it looks as though the wait will be worth it.

Crowded Micronet stand at the three-day London Computer Fair.

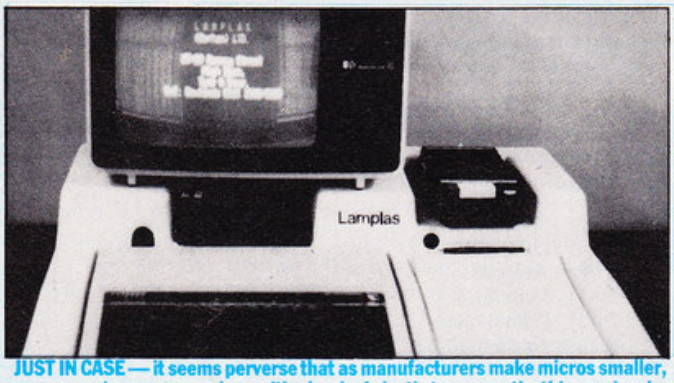
The specially designed adaptors will have a 'modem on a chip' (no need for touchy acoustic couplers), and they promise to turn the Spectrum into an intelligent Prestel terminal costing under £180.

The adaptor will fix underneath the Spectrum and connect into its expansion interface. The software will be in a Read Only Memory and will turn the Spectrum's 32-column screen into a 40-column screen with full Prestel graphics.

The adaptor will also allow you to print Prestel frames, using the Sinclair printer, and SAVE frames on tape for future use.

In addition, you will be able to compose frames offline, saving money on the phone bill when sending messages with the mailbox facility.

The introductory offer cost of the adaptor is £62. Micronet is considering selling a 16K Spectrum and Prestel adaptor as a single unit. No price has been fixed yet, but it is unlikely to be over £180.



JUST IN CASE — it seems perverse that as manufacturers make micros smaller, someone always comes along with a hunk of plastic to encase the thing and make it large again. Fibreglass manufacturer Lamplas has produced a desk-top console for the BBC micro. The console measures a whacking 27½in × 31½in, and is claimed to organise all the peripherals — monitor, tapes, drives and cassette recorder — into a manageable configuration. Lamplas can be contacted on Rowlands Gill 3838/9.

Join Reflex's IBM colour resolution for just £325

The cost of colour on an IBM PC has come down by courtesy of a Canadian video maker.

Electrohome's ECM 1302 13in colour monitor will sell for £325 in the UK. Its UK distributor, Reflex, is backing it with a two-year guarantee.

Two versions of the monitor are available, giving medium or high resolution. The ECM 1302-1 has 370 × 235 pixels and the higher performance 1302-2 has 580 × 235 resolution.

Both models have displays of 25 lines and 80 columns to match the output of most personal computers.

The Electrohome monitors will run off-the-shelf on IBM PC and Apple III systems, but Reflex says that it has the resources to modify the monitor or interface for other machines.

Reflex is on Windsor 46327.

Cure Sinclair's wobble

Sinclair users with wobbly RAMpacks can take heart from two products launched last week.

The ZX81 is notorious for its habit of losing touch with its RAMpack, and casting its unfortunate program into the infinite vortex. The problem, says Adapt Elecronics, is that the ZX doesn't come with an effective mechanical fixing. The edge connector is relied on to make the connection — and it wasn't designed for this job.

To compound the problem, the surface of the male connector is tin-plated and tends to oxidise, causing a bad electrical contact. Adapt has therefore come to the user's aid with the Ramlok Kit, consisting of a gold-plated male connector and a mechanical clamping device which clamps the pack to the computer, solving the RAM wobble problem.

ZX81 owners can install the gadget with the aid of a soldering iron.

The Ramlok Kit costs £7.50 plus 50p postage, and Adapt can be contacted on 01-504 2840.

For those of you experiencing the dreaded wobble on a Spectrum, Cheetah marketing has developed a 32K RAMpack intended to eliminate the problem. It has tackled the matter by moulding the case to fit the back of the Spectrum exactly, and by treating the connector with a chemical that should ensure long life.

The pack is only available by mail order at the moment, but Cheetah intends to have it in retail outlets soon. It comes cased, tested, packaged and guaranteed from Cheetah (01-240 7939), and the price of £39.95 includes VAT and postage.

New line in Vic RAMpacks

If you've had difficulties with a Vic 20 RAMpack bought from Stonechip Electronics at Camberley, Surrey, you aren't alone. The company has had problems with the pack and is discontinuing it, to replace it with another called Vixon.

Engineer Roy Priestley said there was sometimes trouble running machine code, depending on the program involved. 'If people have had problems with it, they should contact us so we can try and sort something out,' he said.

Stonechip is on Camberley (0276) 681131.

12►

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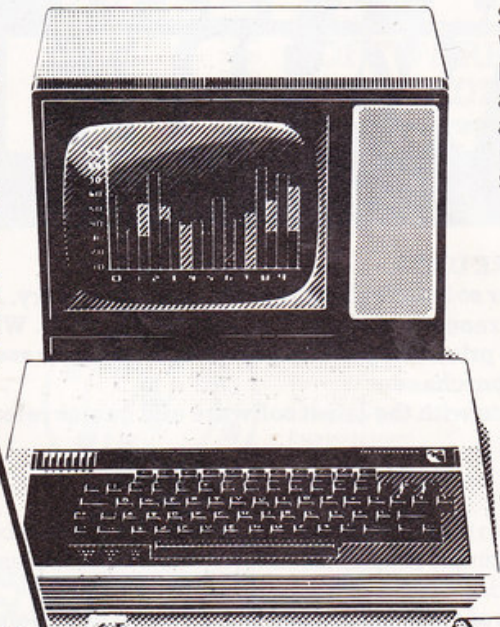

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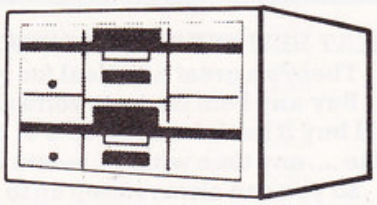

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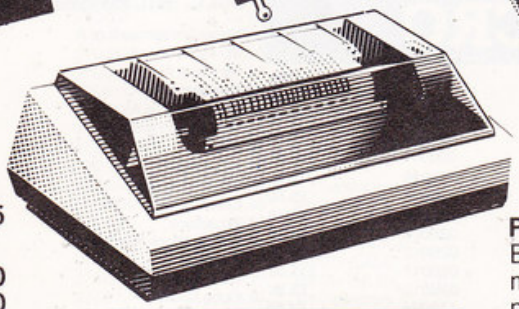

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We have got off to a flying start, and it is great to see that so many people have responded to the idea so warmly. In fact, the response has been so good that we have been almost overwhelmed.

As you probably know, shortly after our launch there was a legal dispute with a software house which was concerned that we were encouraging program copying. I am pleased to tell you that the matter has since been settled amicably and stock deliveries to us are proceeding without interruption. Buy 'n Try is not a software library, and every customer signs an undertaking not to copy software purchased from us.

Both the enormous response and temporary delivery delays have meant that some postal and telephoned orders have not been fulfilled within our normal 14 day limit. However, we have pulled out all stops to dispose of the back–log. If your order has been delayed, please accept my personal apology ... we are doing everything possible to rush it through.

Software Centre has already opened new Buy 'n Try stores at Ilford and Leicester, and we have plans for many more. We exist to give you the best service, to offer the finest programs from the most reputable software houses, and to offer the widest choice through what is probably the most extensive program catalogue in the country.

We are growing fast .... but hope you will bear with us if our 'growing pains' mean that just occasionally demands for particular programs exceed stocks, and it takes a few extra days to complete your order.

Once again, thank you for your support. I am glad to report that we are back on target for quick deliveries ... and we aim to stay that way. Because your satisfaction is ours too.

Yours sincerely

Bill Cannings

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Auto-pilot programs

Those of you without the time to write all your own programs may be interested in two new program generators.

Codewriter comes with a manual and two disks. The first disk is double sided and holds data entry, printer or screen report routines and the menu option generators. You give the system your program design instructions in normal English. Codewriter then gets on with the donkey work of programming.

The second disk contains usable sample programs written with the Codewriter system and designed to supplement the manual. Applications programs can be made for everyday use such as card-index records systems, product stock control and general information.

Reports can be produced on the screen or in printed form and general manager John Marchbanks, of Dynatech Microsoftware, Guernsey, says Codewriter should start reaching the shops this week.

The version for the Commodore 64 costs £125, while those for the Commodore 8000 series and Apple II cost £199. Versions for the IBM PC and Sirius stand at £249.

Autocode, made by London-based software house Stemmos, is a different kettle of fish.

This disk based program generator is now available for Cobol as well as dBase II at £220. It will work on any micro that runs CP/M.

Willard Balthazor, spokesman for Stemmos, said: 'Autocode acts as a translator and will turn what you say into, for instance, bug-free Cobol, putting in all punctuation etc.'

It is basically a report generator and acts as a kind of sieve, setting up menus, sub-menus and sorting programs.

You can buy versions for either Cobol or dBase II from Stemmos in Uxbridge, tel: 740 9444. Dynatech is on Guernsey (0481) 45934.

Spreadsheet sold with micro pack

A system to sort out your balance sheet without plunging it dramatically into the red has been released by Kobra Micro Marketing.

Kobra is offering a Commodore 64 with disk unit, printer and monitor, plus a spreadsheet program called Calcresult for a total of £1,140.

Calcresult is a relatively sophisticated spreadsheet that works to a three-dimensional format to help you create layouts and add pages. The software handles up to 32 pages, represented by the rows and columns of the screen, and you can split the pages horizontally or vertically to look at two sections simultaneously.

Calcresult also lets you make forward projections in the style of financial planning systems by providing a 'what if' option.

Kobra is on Henley (04912) 2512.

SOCKET TO 'EM — Ferguson claims that this 'champagne presentation model' 3T27 cassette recorder comes with computer compatibility. What this means is the recorder has a five-pin DIN socket and a remote control socket. The company says it was designed to work with all makes of micro (except of course the idiosyncratic Commodore machines), and it should start appearing in the shops within the next couple of weeks at a cost of around £24.

More Power to play with

For £69 users of the Commodore 64 can have access to an advanced set of programming tools designed by Brad Templeton, the Canadian whizz-kid.

The new program More Power offers full use of the function keys for LOADing and RUNning programs, directly from the directory. You can call up directories, sequential files and programs and list them, without disturbing the program resident in memory.

You can call up a program and RUN it in the middle of running another program, with the previous program being automatically restored.

The 'Power' product, running on earlier machines, has been around for some time.

Services support for grey IBMs

Independent maintenance outfits around the country are ready to support your IBM PC if you bought it from a defunct grey importer and are wondering where to go.

Bob Woodland, chairman of Ferrari Software in Hayes, Middlesex, said: 'We'd be very happy to carry out those repairs, and we've had a few in already.'

Kevin Reynolds, sales executive at Guestel in London, said: 'We'd consider fixing them, for a price.'

David Geoffrey, manager at Microserve in Huntingdon, said that if parts were available, he would also consider doing repairs.

At independent maintenance company Commercial Data Systems, in Rawtenstall, David Taylor said: 'We haven't had any of those in yet, but it's all business, isn't it?'

Business duo from Open

Businessmen should note that Sales Order Processing and Incomplete Records have joined the software range from Open Computer Services (OCS).

These two disk based packages, at £499 excluding VAT, join Nominal Ledger and Payroll, also at £499, plus Sales Ledger and Purchase Ledger at £399.

Written by OCS they can currently be used on IBM and Sirius and the company hopes to make them available on the DEC Rainbow, HP 125, NCR, Olympia and IBM Displaywriter in the near future.

Incomplete Records, aimed at accountants, is a 'glorified sales ledger allowing an accountant to produce a set of books for one of his retail clients,' according to sales manager Simon Backhouse. This may be integrated with Nominal Ledger to produce profit and loss and balance sheets.

Tel: Brighton (0273) 671666 for more information from Open Computer Services.

Micro trips

Dolphin Holidays, organiser of computer camps for children aged between five and 16, have announced family weekends so that you can all join in.

These weekends will take place at day centres in Sevenoaks, Barnet and Roehampton throughout August and will cost £34.50 for adults and £29.50 for children, excluding VAT.

Dolphin will continue its educational holiday camps at five residential centres in Eastbourne, Edinburgh and Shrewsbury where mornings are spent learning such things as video film and cartoon making, windsurfing and horseriding followed by computing tuition in the afternoons.

Five-day residential courses start on July 18 until the end of August and cost £139, excluding VAT. Dolphin Holidays can be contacted on 01-387 5602.

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Why won't they sell me a micro?

At the sharp end, in the High Street, is where the novice is likely to fall at the first fence. Either that, or to be totally ignored if his ambition rises to anything other than the latest Star Wars epic.

Considering myself the Complete Novice and interested in the possibilities of using a computer to arrange and edit large chunks of text, I ventured unwisely, as it turned out, into my local High Street Shop (name supplied on request) to see what they had to offer. They actually had an Atari 800 nestling in a large cardboard cutout display unit.

Among other things, it offered in large print the business computer facilities I seemed to need, including business software. It seemed to me worthy of further enquiry, and at the moment, sure enough, I was approached by a young gentleman sporting a large name tag.

I offered my enquiry, adding something about test editing, whereupon he turned immediately for help to a slightly older 'expert'. I repeated my enquiry, and for some strange reason, he asked me if it was a videotape recorder I was actually needing.

By this time I realised the situation, but decided to soldier on. I indicated the Atari 800 and was told that this was in no way a business machine, and in any case they had no software available that would help me.

It was now obvious that they thought me an inconvenience . . . one of the assistants had actually broken off from a game and was obviously in a hurry to get back to it.

However, I was offered a Vic 20 which I was assured, somewhat vaguely, could be used for word processing.

Even as a Complete Novice I do know the difference between at Atari 800 and a Vic 20 so I politely withdrew at this point, much to the relief of all concerned.

Is this the common situation in High Street shops . . ? Because if it is, the manufacturers are being ripped off, and so are the prospective customers. A vague idea of requirements is very little protection to the unwary purchaser.

I have finally discovered, after burning much midnight oil, that either a BBC Model A or a Newbrain are the only two that will give me an 80 character screen display. The Lynx offers itself as such but reading the small print reveals that it needs an additional memory to do this.

I would earnestly advise any person wishing to buy a computer for any serious work to do lots of homework, as he can expect little relevant advice from the High Street shops.

Owen Staley,
Garforth, Leeds

PCN £10 Star Letter

English as she is processed

My particular interest at the moment is in word processing, so I am please that a couple of packages have already been reviewed in *PCN*, although I am concerned about the seemingly varied opinions expressed by reviewers in general.

What constitutes an annoying feature of a particular word processor in the eyes of one reviewer invariably becomes a desirable feature in the eyes of another. Not only that, but since the approach of one system tends to differ so much from that of another, it suggests that neither the reviewer nor the consumer knows which approach is best, or which he or she prefers.

For example, in one system the line of text on which one is working is always in the centre of the screen, as is the particular character within that line. This was described as 'useful since one can see the text immediately before and after the edit point.'

However, this necessitated horizontal scrolling after every character entry, and vertical scrolling at the end of each line, which was later condemned as 'enough on-screen activity to drive you mad after ten minutes!'

To avoid this, other WP's allow the cursor to reach the edge of the screen before the text is scrolled, but then one cannot see any text before one reaches it.

That may be a minor area of conflict, but more serious differences occur when one considers the method of entering commands. Does one use single keystrokes, usually typing the first letter of the command, or does one enter a short mnemonic of two or three letters? The former is quicker but problems arise when two or more commands begin with the same letter, thus necessitating the use of odd keys such as *,/,@,&,? etc.

Another major area of dissension is that of editing, in particular, deletion. First, single character deletion often takes places to the right, *ie* opposite to that of normal delete keys on most micros. Differences occur in the way in which large areas of text are deleted.

Often various keys are used to delete lines, sentences, paragraphs, pages and part pages, or else the cursor is used to define the particular area the operator wishes to delete.

Sometimes, deleted text is held somewhere in memory in case the operator later decides it was needed, or else the deletion command has to be confirmed before it is actually executed.

Perhaps we may see WPs tending towards an optimum design, although hopefully they would retain some minor differences in order to provide a little individualism and character. Or maybe some new concept will make them all obsolete.

N R Fleet,
Maidstone, Kent

Spare keys open doors

Keith Bowden (*Random Access, April 1*) dismisses both the Commodore 64 and BBC function keys as stupid. This sweeping statement cannot be left unchallenged.

In writing software for the latter machine we at Chalksoft frequently find that the function keys are the only way round particular problems.

For example, our best-selling program Letters — which allows the user to instruct the computer to draw screen-size lower case letters based on a nationwide handwriting scheme — ran into the problem of needing different keys for two types of letter 'k'. The problem was solved by putting one on the K key and the other on a function key.

Similarly, the function keys are assigned particular roles (eg, return to menu, or finish program), all of which ease the use of a computer by a young child (five to seven) or a busy classroom teacher.

So, Mr Bowden, at least one (educational) software house finds function keys extremely useful. Indeed there are times when we could use more of them.

Brian Kerslake,
Wellington, Somerset

Great graphics — and British too

I have never before written to a magazine, but after reading the letter by Keith Bowden (*PCN April 1*) I thought I must.

I would not try to put the Commodore 64 down as I have not used it, but I must correct some of the half-truths about the BBC.

Mr Bowden states that the 64 only uses 9K for high resolution against 20K on the Beeb. This is correct, but the Beeb's high resolution is 640 × 256 in Mode 0 against 300 × 200 on the 64. Over twice the resolution, not less, as Mr Bowden claims. It is obvious that it will use over twice the memory.

Mr Bowden also obviously has not heard of Mode 7 Teletext on the Beeb. This gives eight colours, and flashing and double-height with low resolution graphics using just 1K RAM.

The Commodore 64 may be a good machine but please find out the facts before running down what is probably the finest home computer on the market today (and British too).

It must be very flattering to Acorn that anybody trying to boost their own computer compares it to the BBC machine and loses.

M S Pease,
Barnsley, Yorks

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Shoot those humanoids

After having hours of fun and frustration playing Acornsoft's Defender for the BBC micro I have now found a bug. The consequence of this bug is that I can beat my previous best score of 225,000 and make it 1,318,125.

Start the game normally until a lander goes up with a humanoid, shoot the lander and catch the humanoid and return him to the ground.

Carry on playing the game and keep the humanoids on board your ship. After a little time a lander will start to rise up the screen as though he had taken a humanoid. Let him reach the top of the screen and mutate.

Then finish the attack wave but leave one alien alive; kill all your humanoids. You will find that you enter into deep space with one humanoid, but before completing the attack wave you must kill him.

When you get your bonus for finishing the attack wave you will get 255 times the bonus for that wave, eg 127,500 on wave five and above.

When the new attack wave starts you will have to shoot about 200 of these humanoids before any aliens will appear on the screen. You can then repeat the process as many times as you like but you must start from step one every time you are killed.

John Benfield,
Hemel Hemstead, Herts

We tried to check this but fell short of even your previous best score! — Ed.

Micros mean opportunities

Your debate on computer games is fast becoming the most interesting feature in any computer magazine's letter section.

G S Milne's letter (*PCN, April 15*) raises several interesting points:

The magazines: This 'host' of games orientated magazines is there because they sell, and sell very well. But not all magazines are of this type. In fact, I would say that out of the micro magazines I've seen in newsagents, only about one third are of the type Mr Milne describes.

More are about business computing than games, but in the middle (where I, and I expect most other *PCN* readers, lie) I still easily become broke buying various magazines.

Micro magazines of all kinds sell well and we're lucky that we have such a large choice. We can ignore the magazines we don't like.

Buy a video game: No, no, no! You can buy computers now for about the same price as a video game. The graphics and sound are vaguely comparable and you always have Basic at hand if you want it.

Also, games are far cheaper on cassette than on cartridge. What's more you are becoming far more computer aware with a micro than with a video games machine.

Play the occasional game: So do I. I have a soft spot for Defender and am an adventure freak. But if given the choice between programming and games playing, eight times out of ten I'll choose programming.

I also feel that Mr Milne has forgotten that video machines use the same technology as micros and that many people get great enjoyment from them.

Finally from Mr Milne's letter, his last paragraph is definitely true. I've met lots of people and made friends through our common interest in micros.

As for Mr Deason's complaints concerning 'bloodthirsty' effects, primary school age children love 'arcade-style' effects and they are a great stimulus to an otherwise routine exercise.

Also your headline on Mr Mortleman's letter (*April 8*) contradicts his comments in the letter. He writes 'in defence of the young users' but you say he is defending the game players. Not what Mr Mortleman intended.

Well done to R J Parsons for his letter, not only for his views, but for starting off a really interesting discussion.

I Smedley,
Potters Bar, Herts

Glad you're enjoying it, Mr Smedley — but we stand by our headline. Mr Mortleman did defend young users who were also games players — Ed.

The high cost of consoles

After reading Gordon J Milne's letter (*PCN April 15*) I feel I should give my point of view in defence of the computer games player. He says it would be much less a waste if a person bought a games console instead of wasting a computer. This is nonsense, and if a games machine were bought instead of a computer the only thing wasted would be a handful of money.

The most popular games console costs around £90 and the cartridges around £30 — by the time you have bought a respectable library you could have spent around £200. I own a ZX Spectrum which cost £125, and also have a good selection of games which cost only £5-£6 each. So as you can see in the long run a games machine would cost more, and only be a games machine, whereas a computer would cost less and also be a very versatile piece of equipment.

Carl Petty,
Anstey, Leics

Serious users gain from games

I think that Mr Gordon Milne has overlooked two aspects of the 'waste' of computers on games (*PCN April 15*).

It is the ever-increasing army of game-players who bring the price of computers down to affordable levels. Their demand for faster processing to make the invaders move a bit more quickly means that the simultaneous equations will be crunched faster, their demand for high-resolution graphics to make the asteroids look sharper and their demand for colour to make a better game mean that 'serious' users can have better graphical displays and more precise function plots.

As a Sixth Form maths student I find my BBC invaluable and I bless the games players everywhere for bringing this marvellous intellectual tool within my financial reach. People such as Clive Sinclair, while designing better and better games machines, put massive number-crunching ability within the reach of any keen programmer.

The other point is that by the entry of micros into peoples' homes a great step is made towards the demystification of computers and associated technology. If one person in twenty stops playing PacMan, says: 'I wonder if I could program this thing', and gets a programming book and tries, that is a marvellous event, and one to be applauded and encouraged.

As for the magazines, some of the older, longer established magazines have very informative articles on programming techniques.

Jonathan Flowers,
Newport, Isle of Wight

Jupiter rising . . . and falling

Can't you make up your mind about who distributes the Sirius 1 and the Jupiter Ace?

According to *PCN Charts (March 18)* the Sirius was distrubted by Sinclair, not ACT (who didn't even get a mention in the key). However, by next issue it was corrected, only to reappear on April 15.

The Jupiter Ace was distributed by Jupiter Cantab until Micro Marketing took it over on April 1 (an April fool?). Their success was not to last for long because on April 15 it's back to Jupiter Cantab who, incidentally, get no mention in the key of that issue.

The price of the Vic 20 quoted is also wrong. It should be around the £130 mark. At least this error is consistent.

Paul Campbell,
Chryston, Glasgow

Point taken on the charts. Clearly, it has more ups and downs than we thought! However, the recommended retail price of the Vic 20 is £170 though you can get it for as little at £130, as you say — Ed.

Resigning micro — at a price

The letter from my old friend Monty Trent (*PCN April 8* — 'Can a micro throw the match') is not quite so far-fetched as one might suppose.

When we were designing the electronics and circuitry for the Milton-Bradley Phantom, which some readers may have seen recently on the BBC's *Tomorrow's World* programme, we seriously considered having the computer knock its king over when it resigned. This would have been possible, but we would then have needed to add a robotic arm, with its own television camera and shape recognition software, so that it could find the toppled king and put it upright.

If Mr Trent would really like such a machine we can arrange it for him at a suitably exorbitant price.

Davd N L Levy,
London W1

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CP/M: the program in charge

Could you please explain what CP/M is?
C Cathcart,
Linwood, Scotland

Not easily in this space. CP/M used to stand for Control Program and Monitor, though it now goes by the grander title of Control Program for Microcomputers. It's an operating system — a program that looks after the general running of a computer system.

But it's no ordinary operating system. CP/M can be made to work on most micros that have an 8080, 8085 or Z80 processor. So it is the program in charge of many different business microcomputers.

As a result, software houses develop programs to work with CP/M systems. So manufacturers get more and more tempted use CP/M on their new machines. CP/M's advantage is that it supports a vast base of readily available and proven programs.

Its basic job is to look after the hardware bits and pieces. It controls the disk drives, keyboards, screen, printer and so on for an application program.

If the program wants to write a message on the screen, it gives the message to CP/M to put on the screen. If it wants to file information on the disk, CP/M will be doing the leg work of figuring out where to put information on the disk, and so on.

There are two advantages to this. First, everybody isn't sitting in their backrooms working on Project Wheel. It allows software houses to get on with their job of making the computer useful.

Secondly, as far as a program is concerned, it doesn't know which machine it is running on. CP/M is its only link to the outside world. And CP/M is always the same from the program's point of view.

It's only the customised bit of CP/M (the BIOS) that changes from machine to machine. So if you write a program that works with CP/M, it works on any CP/M microcomputer.

This portability isn't immediate. Most micros can't read each other's disks. So although any CP/M program will work on any CP/M machine, you have to be able to get the program on disks that your machine can read.

CP/M just about predates micros with screens, so it can't cope with different sceen control codes and you have to 'configure' a new CP/M program to fit your particular machine. And just because CP/M-86, CP/M-68K and so on sound like CP/M, don't think that they have anything to do with CP/M programs.

CP/M also has the responsibility of providing the user with a way of controlling the computer. He has to be able to see what's on his disks, run the programs he wants, copy important files and generally keep house. CP/M lets you do this through a friendly little program called the CCP.

A simple operation like 'make a back-up copy of all the letters I typed today' would be something like:

PIP B: = A: *.LET[V]

It's fine for a programmer's mentality. But it could be having an awful effect on British business. CP/M, especially its latest Version 3 incarnation, is still the standard operating system on 8-bit micros.

In the 16-bit world, most people are using Microsoft's MS-DOS operating system as opposed to the Digital Research CP/M-86 alternative. So CP/M should no longer be such an important part of our lives.

Getting it taped

I have just ordered a 48K Oric 1. I've noticed that some companies sell short blank tapes of different lengths and want to know what lengths I should buy. I want to use the full 48K of the Oric to store around 2000 names, addresses and details.
T King,
Wootton Bassett, Wilts

Here's a brand new formula for working this one out. Length of tape = five minutes + bytes * 8/baud * 60! Bytes is the amount of data you have to store . . . the length of the program or the number of characters in the data. So bytes * 8 is the number of bits you're storing. Baud is the number of bits written to the tape in one second, baud * 60 is the number of bits written in a minute.

Then all you do is add five minutes on to cope with headers, interblock gaps and anything else your particular micro might do when it SAVEs data. In other words C15s are sufficient for most purposes.

In the case of 48K of Oric data, if you SAVEd this at its normal dramatic speed of 2400 baud, it would take about three minutes. Use the slow 300 baud option and it's around 23 minutes!

The problem is that you won't be able to store a full 48K of data with an Oric. You've always got to have some memory taken up by the program that looks after the data and other trivialities such as the screen display memory.

I'll also be very impressed if you get 2000 names, addresses and details into an Oric 1. If you go to some very complex programming, involving data compression and variable length records, you would probably be able to average around 50 bytes a record. Given that you need a program to look after the data, you're only going to have around 35K free. That's space for around 700 records.

The mysterious missing memory

After selling my ZX81, I'm thinking of buying a Lynx. Will I need a special cassette recorder or can I use my own? Also, is it true that only 13.5K is available for programmer's use? What happens to the other 34.5K RAM?
E Simpson,
Esh Winning, County Durham.

The Lynx uses an ordinary cassette recorder for storage. It even comes with a cassette lead. There is only about 13.5K free for Basic programs. Lynx memory is divided into user RAM and display RAM, the bits being swapped over as its Z80 needs them.

The 48K model has a 16K user memory, some of which is used up by Basic. There's 32K of video memory, divided into three 8K blocks for each of the screen composite colours red, green and blue.

There's a spare 8K display bank with the wonderful title of 'alternative green'.

You can't normally get at these banks. But it is possible to switch them off and use them for data storage using the PROTECT command. You can switch between them from Basic or machine code. The information needed to do this is in the Camputers Newsletter, being sent to owners at the end of the month.

Never put off till tomorrow . . .

I am 13 years of age and am very interested in three 'due to be released' home computers: the TI 99/2, Mattel's Aquarius and Video Technology's Lasar 200. I want a computer to learn how to program but I also want one with a fair amount of good software available.

Could you give me some information about these computers and say which one would be most suitable for me.

Are there any other computers priced £50 to £140 which you would consider more suitable?
Michael Bowles,
Retford, Notts

There's very little reason to be interested in 'due to be released' computers. New computers invariably suffer from poor delivery dates, teething troubles and a lack of software. By the time you've waited for one, there will be other computers worth waiting for. So more suitable computers include anything that you can go out and buy.

The ZX Spectrum is still unchallenged, if only because of its cheap, high quality software.

If you want to hang on, the TI 99/2 is a cut down TI 99/4, priced around £75 and black and white. There must be some compatibility between the two machines and Texas says that it already has 20 packages ready. If you specifically want a Texas machine, the elderly TI 99/4A can be picked up quite cheaply and it does have the advantages of a proper keyboard and an expansion ability.

Our Mattel review appeared last week.

The Lasar appears to be a 4K Texet TX8000, priced around £70, so you should get a good impression of it from *PCN*'s Texet review in the March 18 issue.

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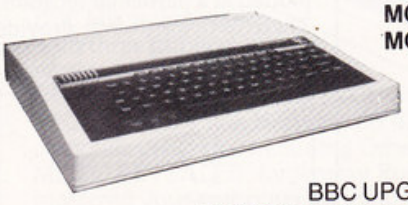

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Keys unlock your Lynx

If you're writing games on the Lynx, you might need to be able to read the keyboard directly. You can do this using the INP function and the values in table 1. So if you wanted to test for the Q key being pressed you could use a statement such as IF INP(&280)=253 THEN . . .

You can read two keys at once. This is easy if the keys chosen affect two different input ports but if they are on the same port, you'll need table 2 to work out the values for each pair of keys. The short program below provides for diagonal movement with the cursor keys and a 'Fire' button with the spacebar.

```
100 I=INP(&980),J=(&80),
    K = (&480)
110 X=X+(I=223)-(I =
    251)
120 Y=Y+2*((=223)-(I=
    239))
130 PRINT @ X,Y;A$;
140 IF K=247 THEN
    PROCfire
150 GOTO 100
```

Kym Wilson,
West Byfleet, Surrey.

Oric characters under control

The Oric 1 provides a set of control characters for controlling effects such as flashing, double height, cursor on/off and so on. But these characters have a toggle effect, so you can't be sure that they have done what you wanted. If the cursor is already off, PRINTing CHR$(17) to turn it off switches it back on again.

You can avoid this problem by POKEing location #26A. This controls printing as follows:—

Bit Action if set (=1)

TABLE 1. VALUES OF I=INP(A) FOR EACH KEY

A(HEX) → / I ↓	80	180	280	380	480	580	680	780	880	980
254	1	3	2	5	6	7	9	0	-	DEL
253		4	G	R	Y	8	I	P	@	]
251		E	W	T	H	U	O	L	[	←
247	SHL	X	Z	V	SPC	M	,	.	/	RET
239	↑	D	S	G	N					→
223	↓	C	A	F	B	J	K	;	:	
191			CTL							
127		SHF								

TABLE 2. RESULTS OF PRESSING 2 KEYS WHICH AFFECT THE SAME PORT

	127	191	223	239	247	251	253
254	126	190	222	238	246	250	252
253	-	189	221	237	245	249	-
251	-	-	219	235	243	-	
247	119	183	215	231	-		
239	111	175	207	-			
223	95	159	-				

Lynx key input — see *Keys unlock your Lynx*

0	Cursor on
1	VDU enabled
2	printer on
3	keyclick silent
4	print next character as an escape character
5	print across a 40 column line
6	print in double height

The next two locations (#26B and #26C) contain the characters placed in two left-most columns of the screen whenever it is scrolled or cleared. These could be set to double height or flashing and then when the screen is cleared, the whole screen will be affected.

As an example try POKE #26A,67: DOKE #26B, #010A: CLS

This gives red double height flashing characters anywhere on the screen without printing or plotting any escape or control codes.

B G Merrick,
Brentwood, Essex.

More BBC *FX calls revealed

Here are a few more undocumented *FX calls for BBC MOS 1.0 and upwards.

*FX 142,X executes Rom in socket X

*FX 200,X X=1 disables Escape key, X=2 flushes memory when BREAK is pressed, X=3 does both.

*FX 211,X Sets VDU 7 beep to channel X

*FX 213,X Sets pitch of VDU 7 beep to X

*FX 214,X Sets duration of VDU 7 beep

*FX 219,X Redefines TAB key as character X

*FX 220,X Redefines key X as Escape

*FX 254,X Sets memory size after a hard reset. X=255 is 32K, X=0 is 18K

Elkan Grech, Cardiff.

Vic suppression and corruption

I have found a way of supressing the Vic's "?" prompt with input statements. Location 19 holds a prompt flag. If it's the usual 0, then the "?" will be displayed. Any other value removes it. Unfortunately, POKEing 19 corrupts the Vic's printing so you must reset it to 0 after using it.

```
10 POKE 19,1
20 INPUT "Enter data ";A$
30 POKE 19,0: PRINT
40 PRINT A$: GOTO 10
```

It's also advisable to clear the keyboard buffer of any stray keypresses before accepting input. Just POKE 198,0.

Darren Morrow,
Stanmore, Middlesex.

Security on the Sinclair

Here's a way to stop people changing your copyright notice on a ZX81 program:

```
1 INPUT A
2 IF A=PEEK 16555 THEN
  GOTO 10
6 POKE 16597,0
7 POKE 16597,0
10 REM Copyright message
```

RUN the program and enter 11. When two noughts come up press Newline and delete lines 1, 2, 6 and 7. You'll be left with line 0 and this can't be deleted.

A Larder,
Norwich, Norfolk.

Ace screen interrogation

As it is supplied, the Jupiter Ace provides no means for interrogating the screen to see if a graphics block has been plotted at a particular location. These two words will provide that facility.

```
: 2^  1 SWAP  ?DUP
      IF
        0
        DO
        2 *
        LOOP
      THEN
;

: ?DOT
    2 /MOD 22 SWAP - ROT
    2 /MOD ROT SWAP AT
    0= SWAP 0= 2 * + 2^
    15388 @ C@ SWAP OVER AND
    0= SWAP 128 AND 0= XOR
;
```

Given x and y co-ordinates on the stack, like a PLOT, ?DOT, will return a 1 if there is a block plotted and a 0 if there isn't.

?DOT corrupts the system variable SCRPOS (15388). If you're mixing text and graphics it may be necessary to stack and restore it before and after using ?DOT.

Gordon Charlton,
Ickenham, Middlesex.

Game for a blast?

Bored with the Air-Raid game on the Lynx introductory tape? Here's a few frills to make it into a complete game. Add these lines to the program to give you a score, high score and repeat games.

You score 20 points for every block of building you destroy. If you reach the ground but still hit a building, you get a 1,000-point bonus. If you land safely, you get a bonus of between 2,000 and 9,998 points plus a new city to destroy.

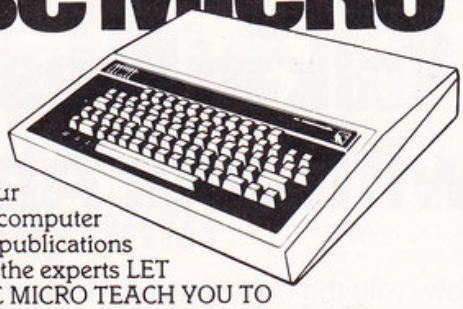
Happy bombing!

Thomas Griffiths,
Teddington,
Middlesex.

```
305 LET h=3000,i=0,S=0,X=0,H=0
332 IF H=180 AND X=108 THEN GOTO 340
334 S=0
336 i=1
542 IF H=180 AND X=108 THEN S=S+(RAND(4000)+1000)*2
544 IF H=180 AND X<108 THEN S=S+1000
735 S=S+20
1115 PRINT @ 10,10;"High score:";h
1061 IF i=0 OR (H=180 AND X=108) THEN GOTO 1069
1063 PRINT @ 40,110;"Your score:";S
1065 'IF S>h THEN PRINT TAB 8;CHR$(18);"You've got the High
Score!!"+CHR$(18)
1067 IF s>H THEN h=S
1068 PAUSE 20000
1069 CLS
```

Air-Raid amendments — see *Game for a blast?*

BBC MICRO



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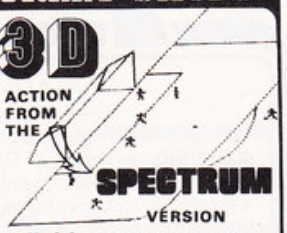

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SINCLAIR USER FEBRUARY 1983

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 held some good players back — the possibilities are endless. Brian Clough had better watch out!
ZX COMPUTING FEB/MARCH 1983

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Micronet give users access to more than 20,000 pages of information. *PCN* gets its number.

On-line to Micronet

PCN unlocks the labyrinth

PCN is a member of Micronet and uses two machines: a BBC Model B with Micronet interface and terminal software, and a Torch, which features built-in modem and autodialling facilities.

To set up the BBC we first had to LOAD the software from cassette. This is time-consuming, if only because it is recorded at 300 baud. Micronet says that it uses this format to improve the chances of the data LOADing properly. Even so, it might take you two or three attempts to achieve a successful LOAD.

You are recommended to make a backup copy of the software on a 1200 baud cassette. This should cut down on the time it takes to get going; and it's even better to use a disk.

We tried both methods. We followed the procedure in the instruction manual religiously, only to find that every time the program was RUN it produced gibberish on the screen.

Apparently, the problem is caused by some versions of the BBC's operating system. The way round it is to tell the system where to position the final section of code before it is SAVEd. If you experience this kind of problem, you should get in touch with Micronet, which will provide a revised set of instructions.

The next problem we ran into was making a secure connection to Prestel. Not all office telephone handsets are the same, and — just our luck — ours do not fit snugly into the standard Micronet acoustic modem. With a lot of juggling it was possible to get a reasonable fit, but too much extraneous noise produced spurious characters and fascinating effects. Did you know that dropping an ashtray on the desk is an effective replacement for the Prestel # used to turn pages?

Occasionally, the Prestel log-on frame will not appear when you first make connection. To overcome this, simply key ★★★ to force the transmission of the log-on frame. Another tip is to key ★00 to repeat a page if line noise has produced indecipherable text. If this happens continuously, cancel the call and try to get a better connection.

Once you've logged onto Prestel, a whole new world opens up to you. Not only are you able to wander around the 20,000 Micronet pages, but all the rest of the Prestel database is open to you.

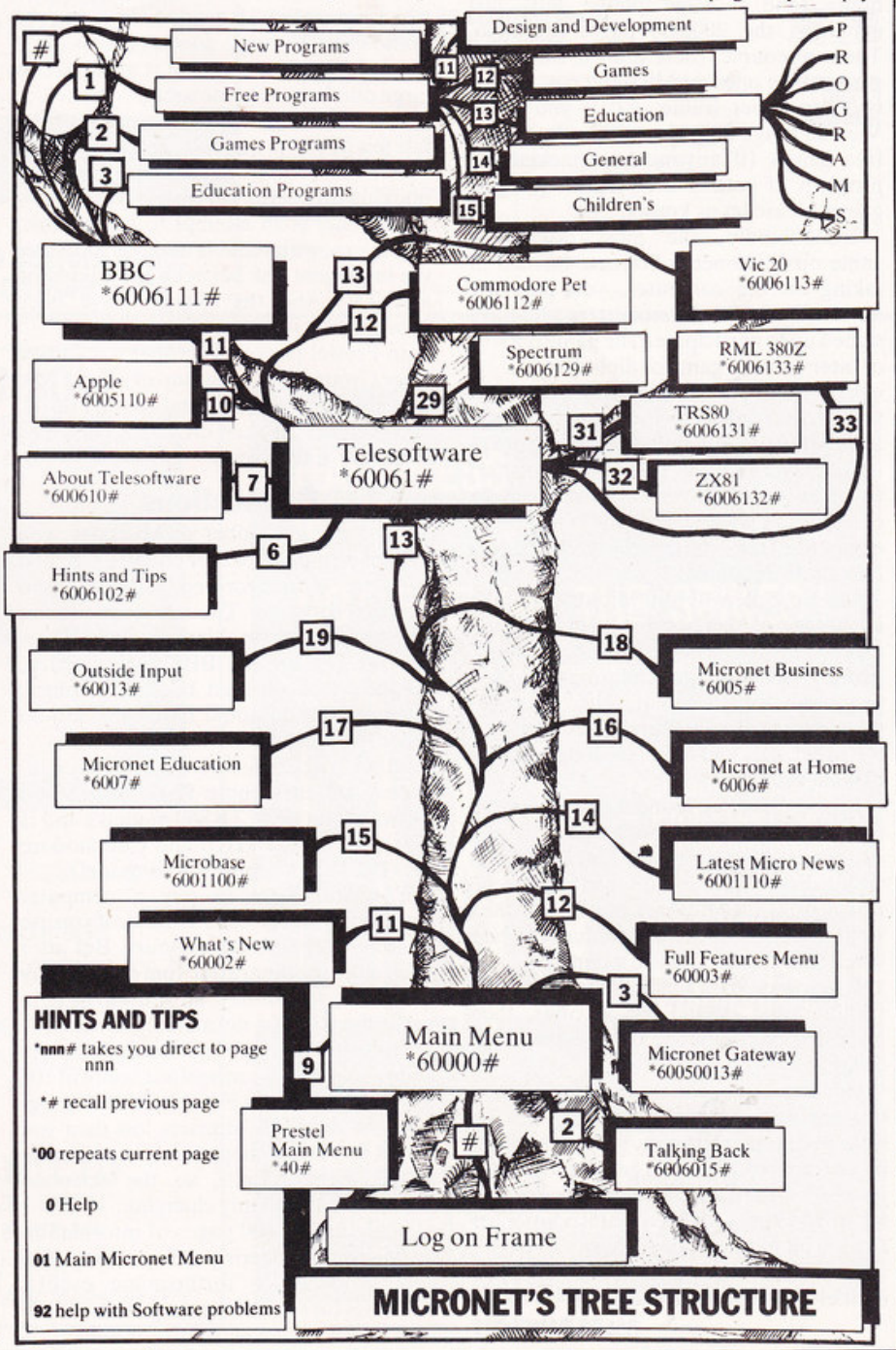
At first it can be confusing. Most computer databases work on the index principle, where an index, or menu, appears on screen giving a series of subject headings. You select one of these, which takes you to another menu or to the file of information you requested. Another simple command takes you back to the original menu.

Prestel uses a tree structure. To get to the information you want you may have to go through several intermediate pages, each of which offers two or more branching options. In theory, when you get to the end of a branch (and the information you want) you should be given an option that takes you back to the last intermediate page. To get back to where you first started from can, therefore, require you to loop back through several pages.

Prestel also has a very slow response time. The result is that you can easily spend more time finding the page you want than reading the information once you have found it.

However, you can jump straight to the page you want providing you can remember the number. You will, therefore, save a lot of time and effort if you keep a check list of the pages you access most frequently. Then, wherever you may be on Prestel, you can access one of these pages by simply

24 ▶



You can now send messages to *PCN* on Micronet. Dial up the Enterprise computer (01-686 0311), go to page 6006015, and follow the instructions. Our Prestel Account Number is 016366890.

◀23

keying '★', then the page number followed by '#'. For example, to get to the newsflash page on Micronet you key '★6001110#'.

A feature you will find on Prestel is the frequent use of response pages (not to be confused with the mailbox facility). They are used for requests for information, competition entries and other instances where the person who wrote the page (the information provider) wants some feedback from the reader. These can be a pain if you find yourself routed into one when you have no particular desire to make a response. One way out is to use the page jump facility described above.

Another solution is to go back to the previous page by keying '★#'. From there you will normally have an option to branch to a different page. It is also a useful solution to the problem of mis-keying and finding yourself on the wrong page.

There is a certain addictive quality about Prestel. You could while away many happy hours (and a large phone bill) just exploring the 200,000 pages available. Then, of course, there are the on-screen games. The ones on Micronet cost one or two pence per frame, but if you go to Viewtel (page 202) there is a selection of free games (if anyone has cracked the problem of getting a birdie on the golf game, please let us know).

Undoubtedly, the most fascinating game on Micronet is Starnet. Instead of taking on the computer, you play the hundreds of other Micronetters who have signed up to participate. The game is a sort of inter-galactic game of diplomacy.

You enter one set of moves a day, and these are sorted out by the organisers. You are invited to send diplomatic messages to other players (if you know who they are) using the mailbox facility on the Enterprise computer. This opens up the possibilities of joint tactics — or treachery, depending on your inclinations.

Most people will join Micronet to take advantage of the free programs that are available. The choice covers utilities, games, education, general programs, and programs for children. The Micronet telesoftware pages will give you the titles of the programs, and also a brief description of what they do.

In operation, we found the procedure of downloading fairly straightforward, and experienced few problems. But BBC users with a disk system should read the special instructions on Micronet carefully if they want to avoid losing the terminal software when they download a program.

If you want to take advantage of all the facilities that Prestel has to offer, then Micronet is one of the cheapest ways of doing it.

However, not every micro user is likely to come to the same conclusion. If you have scrimped and saved to buy your £400 micro in the first place, you would be fully justified in thinking that a minimum entry fee of £57 and a quarterly subscription of £13 is a bit on the pricey side.

But, if you can find the money, you are unlikely to be disappointed.

RALPH BANCROFT

It's dial a file

Prestel is the classic case of a solution looking for a problem. The solution — using your telephone and television to provide cheap access to an abundance of information stored on computers — never realised its early promise.

The reason was one of cost. Early adaptors were expensive, and the GPO compounded the difficulties by operating a ludicrous charging structure.

Apart from the cost of a telephone call, the user also had to pay a timed computer connection charge, and a frame charge for most of the pages of information that were accessed. The result was that the system was used almost exclusively by commercial subscribers.

It was like the chicken and the egg — which comes first? It needed a large base of home users to bring down the cost, or it needed low costs to make it attractive to large numbers of home users.

With the microcomputer boom of the last few years, it was only a matter of time before somebody broke the circle by hooking up micros to Prestel.

Micronet is an attempt to do just this. The micro, with suitable add-ons, provides the intelligent link between the telephone and TV. And the charges have been substantially reduced.

In Prestel jargon, Micronet is a Closed User Group. This is a group of people who have their own private database on Prestel, and this database can only be accessed by members of the group.

Connections

To become a member of Micronet, you pay a subscription of around £50 a year and purchase a networking interface and terminal software. The initial cost varies according to the machine you own. Prices start at £57 for the BBC micro which, because it has in-built teletext graphics, requires no additional hardware add-on other than an acoustic modem.

Other machines that can now be connected are the Apple II (interface and software cost £70), TRS80 models I and II (£61), RML380Z (£63) and Commodore Pet (£82 to £93 depending on model).

You still have to pay a computer connection charge of 5p a minute if you use Micronet during normal hours. But after 6pm in the evening, after 1pm on Saturday and all day on Sunday, all you will have to pay is the cost of a normal phone call.

For your money you get the opportunity to download a guaranteed minimum of 100 free programs from Prestel. Further programs are available at prices less than you would pay in the shop. New programs are added every month, so the selection available is constantly changing.

There are 20,000 pages of information on Micronet, covering news — including new products — forthcoming events, machines for sale, on screen games, details of books and magazines, bench tests and computers in education. There are also special pages devoted to computer clubs.

If you are registered on Prestel's Enterprise computer (01-686 0311) you can also send and receive messages using a mailbox facility. You will be told if there are any messages waiting when you log on.

In theory, using Micronet is simplicity itself. It uses the telephone system to link computers to a central database. At the computer end of the arrangement you require a modem, which converts the digital impulses of the computer into analogue pulses which can be sent down the phone line.

The cost of this converter has traditionally been one of the big problems with these services. Telephone companies the world over are very reluctant to let people connect electrical devices to the system.

Conditions

Traditionally, micro enthusiasts are known to tinker about with the insides of their machines. Should any of these modifications lead to the mains supply being re-routed through one of the computer's output ports and down a telephone line, it could not only do considerable damage to the telephone equipment but endanger the life of someone innocently making a telephone call nearby.

Conditions set by British Telecom are therefore quite stringent. Direct connection to a computer through a modem involves a considerable number of isolating components being included in the design. The cost of engineering these requirements into the modem unfortunately pushes its cost up quite considerably.

It is therefore cheaper to isolate the computer physically through an acoustic coupler instead of simply wiring it to the telephone line. The coupler takes the analog pulses from the modem and puts them through a speaker. They are then picked up by the mouthpiece. Signals are received in the opposite manner — pulses from the earpiece are picked up by a microphone in the coupler. The coupler is, in effect, a reverse telephone handset.

But this system has its problems. It's not ideal for the job, and background noise can cause errors. Up to now it has also been fairly expensive, but economies of scale are changing this.

This is where Micronet has made a considerable coup. A deal with Prism Microproducts made acoustic couplers and modems available at hitherto unbeatable prices.

It's fairly difficult to see where databases like Micronet will go from here. They are very much in their infancy, and still unsure of how to tackle what is, in effect, a whole new medium.

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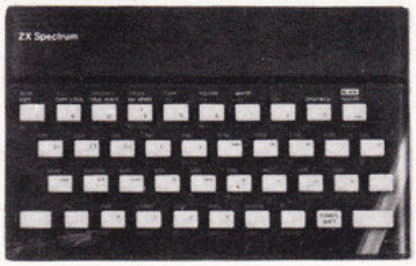

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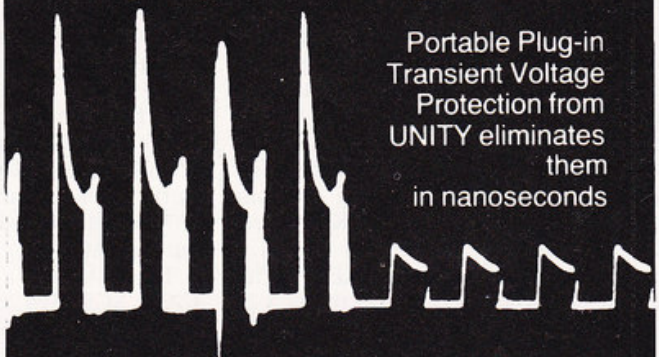

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Everything from Texas is big except the 99/4A memory. Stephen Shaw shows how to save it.

The TI99/4A MEMORY MISER

The Texas Instruments TI99/4A home computer is provided with 16K of RAM with the console. Expansion is quite expensive and it pays to learn memory-saving procedures as soon as possible.

The basic 16K of RAM is not completely available for your programs. The computer uses some of the RAM for the screen display, leaving 14847 bytes for programs. Some of this will be used to store return addresses, variable values and extra character definitions (referred to as value stack, and string space).

When you key a program into your 99/4A, the computer stores each line input in the order you key it in — that is, if you key in line 200 before line 100, line 200 will occupy the first memory area. The computer keeps track of the program lines by means of a line number table.

The line number table uses two bytes to indicate the line number, and two bytes to indicate the memory location of that line — so each line occupies four bytes immediately (and a few bytes more, as will be shown shortly). The line number table *is* in line number order.

In TI Basic your program is in what is known as VDP RAM and occupies memory addresses 1536 to 16383 (hex 0600 to 37FF). If no disk controller is connected, the first line entered begins at 16383.

In Extended Basic with 32K memory expansion connected, your program is in CPU RAM, addresses −1 to −24576 (hex A000 to FFFF). The stack is separated from your program and occupies the VDP RAM. (The other 8K of the 32K expansion is reserved for machine code programs). The first program line entered starts at location −25.

With Extended Basic and 32K RAM, or with TI Basic and the 4K Mini Memory, you may look at the coding or your program using PEEK and PEEKV respectively. It is also possible to amend a program with LOAD and POKEV. (With Extended Basic Version 110, the first 24 bytes of program space are used by the computer, that is why your program starts at −25, not −1).

Interesting — but what about saving memory? To save memory you need to know how the computer actually uses it.

As an example, the TI99/4A is probably the most accurate computer around for mathematical use, partly because of the way it stores numbers. The manual gives information on this — suffice to say that when you use a variable, a full 8 bytes of memory is used to store the value, whatever it is.

MEMORY SAVER 1

Use as few variable as possible — every one used knocks off 8 bytes.

MEMORY SAVER 2

If a number is used frequently, it may be more economic to set a variable and use that instead.

A = 128 as a program line will use 13 bytes for the line plus 8 bytes for the variable value — total 21 bytes.

The number 128 uses 5 bytes every time it is used, the variable A just one byte, so every time you substitute the variable A for the number 128, you save 4 bytes. If the number occurs in your program six times, you save a total of 24 bytes, which you offset against the memory used to set the variable A (21 bytes) for a net saving of 3 bytes.

That isn't much, but some numbers occur many more than six times in a program (*eg* 1,2,28,32 etc). And you do not need to set a variable to zero — just use a Z (not used elsewhere) and the 'overhead' is only 8 bytes, not 21 bytes as previously.

Similar principles apply to strings, which are sometimes quite long. I have seen too many programs setting characters to the same definition using the same string again and again, instead of setting a variable and using that.

MEMORY SAVER 3

Keep variable names short.

MEMORY SAVER 4

LET is not required with the 99/4A: do not use it, it occupies a byte. GO TO uses 2 bytes but GOTO only one byte — use the single word.

A frequent bug I have found is very heavy on memory: using GOSUB and then not using RETURN. Every GOSUB adds to the stack a return address, which can only be cancelled with a RETURN. Watch out for that.

The 99/4A uses a lot of subprograms, *eg* CALL SCREEN, CALL COLOR and so on. Although the command CALL uses only 1 byte, the next word uses up as many bytes as it is long plus one (it is treated as an unquoted string, using the same program format as a number). So a lot of subprogram calls can use up memory.

```
CALL COLOR (1, 1, 1)
CALL COLOR (2, 1, 1)
CALL COLOR (3, 1, 1)
CALL COLOR (4, 1, 1)
```

or

```
FOR I = 1 TO 4
CALL COLOR (I, 1, 1)
NEXT I
```

Which uses the least memory? The second version actually uses 51 bytes less than the first. It may take an odd microsecond longer, but what an easy saving.

If a loop cannot be used, it may sometimes be worthwhile to READ a DATA statement with a loop — for instance:-

```
FOR I =1 TO 4
READ A,B,C
CALL SOUND (A, B, C)
NEXT I
DATA 200,110,0,300,200,4,440,440,2,
  100,-3,2
```

The only trouble with this approach is that the 99/4A is incredibly slow at reading DATA. It is often worth using up memory to increase execution speed.

Programmers quite frequently use the CALL KEY command and follow it with many lines of IF . . . THEN, branching in various directions if a particular key is pressed.

The 99/4A has a much more compact way of tackling this.

In this example, the program is to branch if keys representing the numbers 1,2,3 or 4 are pressed, otherwise to read the keyboard again.

```
100  CALL KEY (O, A, B)
110  IF A = 49 THEN 200
120  IF A = 50 THEN 300
130  IF A = 51 THEN 400
140  IF A = 52 THEN 500 ELSE 100
```

Better, especially if more keys could be pressed:-

```
100  CALL KEY (O, A, B)
110  ON POS ("1234", CHR$ (A), 1) + 1
  GOTO 100,200,300,400,500,
```

Some examples much longer than the one shown here (above) have been seen. The POS function returns a value of 0 if the key pressed is not in the quoted string, so we need to add one to go back to the call key routine (+1 at theend — you did notice it?).

Very often you need to branch to another part of your program if both of two conditions are met or if either is met — this can be done with a great many IF . . . THEN tests, but the programmer does have AND and OR.

In TI Basic it is necessary to use a little logical manipulation, whereby a TRUE statement is evaluated as −1 and a FALSE

statement as 0.

Try PRINT 2=2 and PRINT 2=3 to prove that statement.

The line 'IF X=3 THEN 100' is treated by the computer as 'IF (X=3) THEN 100'.

If (X=3) evaluates as TRUE (−1) the line transfer takes place.

The 99/4A treats any non-zero value as true, so instead of 'IF (A<>O) THEN 100' you could simply use 'IF A THEN 100'.

Remember this — it is useful in Extended Basic when using CALL COINC with sprites, where the return value is −1 if there is a coincidence and O if none.

Where this leads is to:-

To use OR in TI Basic, use the sign + between the tests — which must be in brackets to ensure correct evaluation.

For instance, Extended Basic:-

IF A=3 *or* A= 4 THEN 100

becomes in TI Basic:

IF (A=3) + (A=4) THEN 100.

Similarly, AND can be emulated with a *:-

In Extended Basic:

IF A=3 AND B=4 THEN 100

becomes in TI Basic:

IF (A=3) * (B=4) THEN 100.

Using this form can save a great deal of memory when testing several variables/values.

If you are the lucky owner of an Extended Basic module, ensure you fully utilise the memory-saving devices provided.

Instead of :-

CALL CHAR(33,
"FFFFFFFFFFFFFFFF")

use:-

CALL CHAR(33,RPT$"F", 16))

This uses several bytes less memory.

And on CALL CHAR- in Extended Basic you may define four characters with only one CALL, using up to 64 characters in the defining string to define Character A, A+1, A+2, A+3.

In Extended Basic several of the CALLs can be used for several items at one time — for example, CALL COLOR (1,1,1,2,1,1,3,1,1,4,1,1) and so on. Read the manual very carefully.

CALL PEEK and CALL LOAD are especially powerful as the memory locations need not be consecutive: CALL PEEK (100,A,B,C,"" 200,D,E,F) will return to A,B,C,D,E,F, the values in memory locations 100,101,102,200,201, 202 — I don't think any other computer can do that in one command.

Shorter hints

DIM — If you DIM an array A(3,9,3) how many bytes does that use?

In default the lowest value is A(0,0,0) and each numeric variable occupies 8 bytes, so that's 4 × 10 × 4 × 8 bytes = 1280 bytes.

If you are not using the 0 value of the array, you may reset the lowest value to 1 by using OPTION BASE 1.

This really reduces memory usage — with the SAME dim statement we are now only using 3 × 9 × 3 × 8 bytes = 648 bytes (saving: 632 bytes).

If memory is still scarce, look to see if you can use a string array — numbers can still be used, with use of the VAL function as required. Using option base 1, and single digit numbers, the array A$ (3,9,3) uses: 3 × 9 × 3 × 2 = 162 bytes (saving 1118 bytes on the original).

GOSUB: If you find lines of coding appearing several times, see if you can put them in once and then use GOSUB.

In Extended Basic you may input a line up to five screen lines long, instead of four in TI Basic. Using editing features you can extend some lines to six or even seven screen lines. Sometimes your entry of four and a half lines will return 'Line Too Long'. The reason is that the internal limit on the length of the line is the number of bytes the line occupies — not the number of characters on the screen.

TI Basic plays safe and gives you only four. Extended Basic allows you another line — perhaps. But by bringing the line back onto the screen and using INSERT you can often make it longer.

Make your lines as long as possible; each line less saves at least 6 bytes.

```
100 REM PCN
110 A = B + 2
120 C$ = D$ & "E"
```

This program was keyed in in the order shown, and not edited. When you change a line it is treated as a new entry and drops to the last memory location.

The example program teaches many things about the TI99/4A:

COMMANDS although printed (and entered) in full are tokenised and use only 1 byte each (REM is code 154).

A NUMBER takes up 2 bytes more than it has digits — 1 byte says 'this is a number', the other indicates how many digits. So for strings: 2 bytes more than the number of characters.

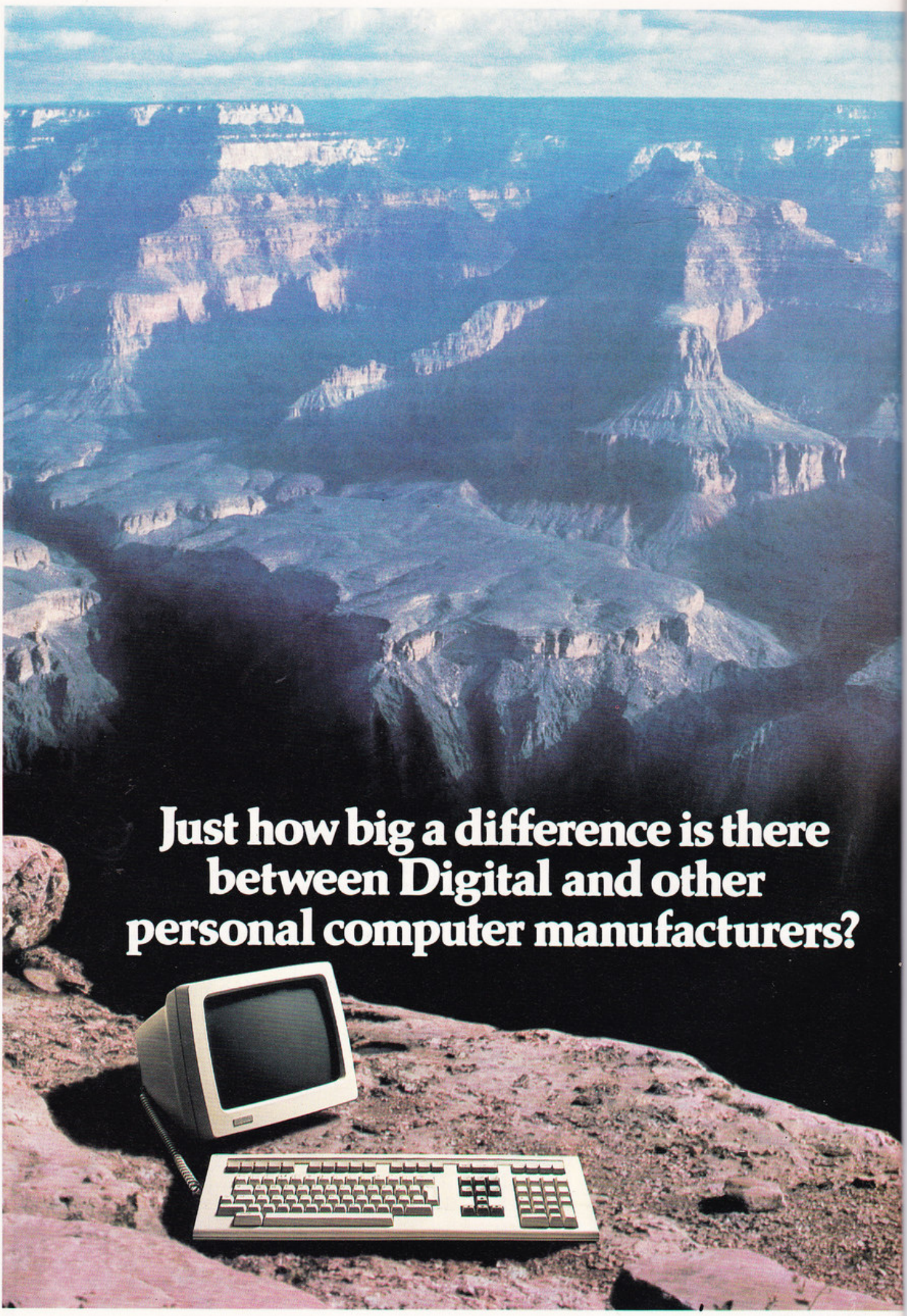
A VARIABLE takes up only as many bytes as it is long — but will also use up stack space.

Note that line 100 occupies locations −31 to −25 and is read in that order. In addition to 4 bytes used in the line index, line 100 uses two more 'null content' bytes — one is a zero to mark end of line, and the other byte indicates to the computer how long the line is (and also sets an absolute limit to line length in memory of 127 bytes).

Line 100 can be found in the line index at locations −55 to −52. The memory location is 255 × 256 + 226 = 65506.

Our memory locations don't go that high. Subtract 65536 (64 × 1024) and the result becomes −30, which is where we can find line 100.

MEM LOCATION:	VALUE:	MEANING
−25	0	End of Line
−26	78	ACII code for N
−27	67	ditto C
−28	80	ditto P
−29	32	ditto SPACE
−30	154	REM
−31	6	Line is 6 bytes long
	LINE 100	
−32	0	End of line
−33	50	ASCII for 2
−34	1	Number has 1 digit
−35	200	Number follows
−36	193	+
−37	66	ASCII for B
−38	190	=
−39	65	ASCII for A
−40	8	Line is 8 bytes long
	LINE 110	
−41	0	End of line
−42	69	ASCII for E
−43	1	String of 1 char.
−44	199	String follows.
−45	184	& (concatenation)
−46	36	ASCII for $
−47	68	ASCII for D
−48	190	=
−49	36	ASCII for $
−50	67	ASCII for C
−51	10	Line 10 bytes long.
	LINE 120	
−52	226	
−53	255	*Line Index for*
−54	100	*Line 100*
−55	0	
−56	217	
−57	255	*Line Index for*
−58	110	*Line 110*
−59	0	
−60	206	
−61	255	*Line Index for*
−62	120	*Line 120*
−63	0	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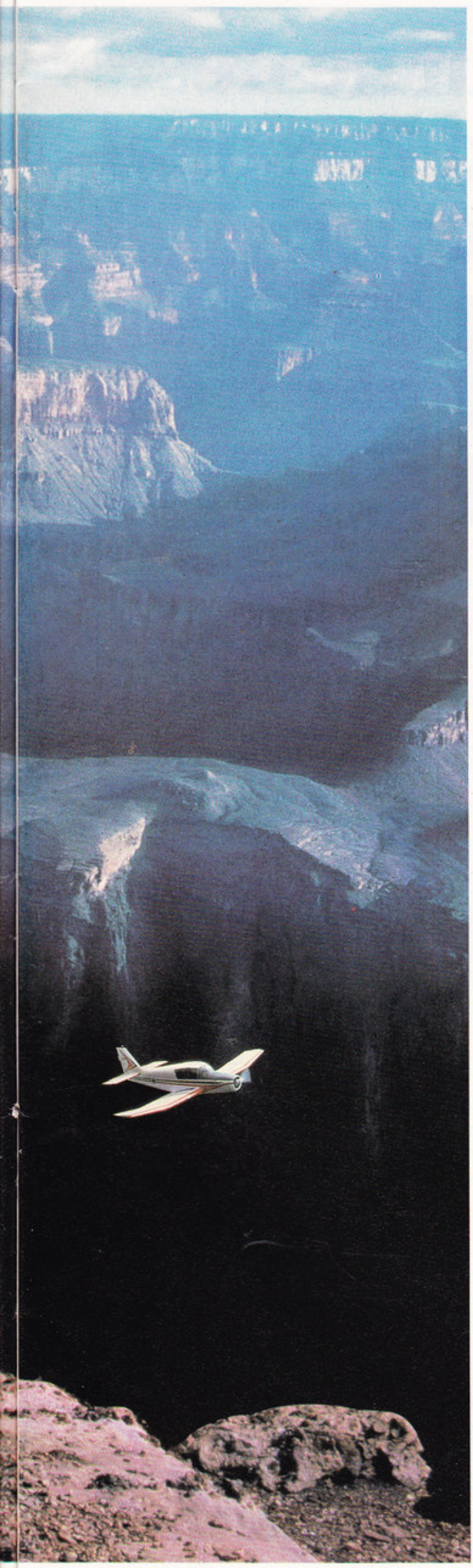
between Digital and other
personal computer manufacturers?



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digital

Atari is promising to replace your card-index. Nigel Cross asks, is this a (home) record?

Foolproof filing

Name Home Filing Manager **Application** Filing system **System** Atari 400/800, 810 disk, 16K RAM **Price** £39.99 **Publisher** Atari **Format** Disk **Language** Machine code **Other versions** none **Outlets** Atari stockists

I'm sure most of you will have seen those smart little plastic boxes containing an alphabetic index and a pack or two of index cards. Well, the Home Filing Manager from Atari is just that — a method of storing data on index cards alphabetically — but it does it on disk.

Features

Home Filing Manager allows you to add cards to the file (up to 13 lines of 36 characters), store them alphabetically by index, copy them, erase them and edit them. It can extract cards from the file by index or by any other phrase or reference held within the cards. If you have access to a printer then extracted cards can be printed in their entirety or as index only.

All in all the facilities offered in this package are exactly what you would expect. It won't actually sort your cards, but its search capabilities are so flexible that you shouldn't need to do so. Just be sure the key you pick when you set up your index — first name, say — is the one you'll want to stick with.

Presentation

True to form HFM gets the full Atari packaging and documentation treatment. It comes in an A4-sized sturdy box containing a pair of clearly labelled disks (the program on one and the other blank) mounted on a stiff card.

The documentation is a well-printed full-colour manual/guide of 24 pages of index-card size — appropriately enough. Within this guide each page contains a double index of all the available functions, so it is very easy to refer to.

Descriptive notes are kept to an absolute minimum by the good use of exact screen copies of whatever you are supposed to be doing at the time in question. By using this technique the guide contains almost none of the normal computer jargon.

During testing I found no screen display that was not included in the guide — that's how thorough it is.

In use

Once up and running, which is easy to accomplish, the program displays a file box in lovely pastel colours. A warning to change from the program disk to a data disk prior to continuing is included on this display.

After inserting a data disk the main menu is displayed offering options for:

LOOK at the first card in your file
FETCH a card by index
MARK AND LOOK for a series of cards by embedded phrase or reference
PREPARE AND FORMAT a data disk
SWITCH to another data disk
QUIT the program

Depending on the status of the data disk inserted either LOOK or PREPARE AND FORMAT is highlighted. To change the option the SELECT key is used: to execute the selected option use the START key.

MARK allows a phrase or reference to be typed in so that cards containing the chosen phrase are marked in the file for later display with a paper-clip attached to the card.

This display, with LOOK and FETCH, shows the index card and another list of options across the top of the screen. These are GET, LIST, FIND, ADD, EDIT, ERASE, COPY and EXIT.

Execution and selection of the options are as before and are self-explanatory. You can un-mark or re-mark the card when it is displayed on the screen. And if the phrase you search for is not there, you are simply shown the first card in the file and the GET command is highlighted.

Speed of operation of this package is quite impressive.

Reliability

This is a really robust package and didn't fail at all during testing. The worst that happened was that if the power was cut off during the adding of a card to the file it was lost — and this is hardly surprising. It's certainly a great deal better than many other packages available and cannot be considered as a drawback.

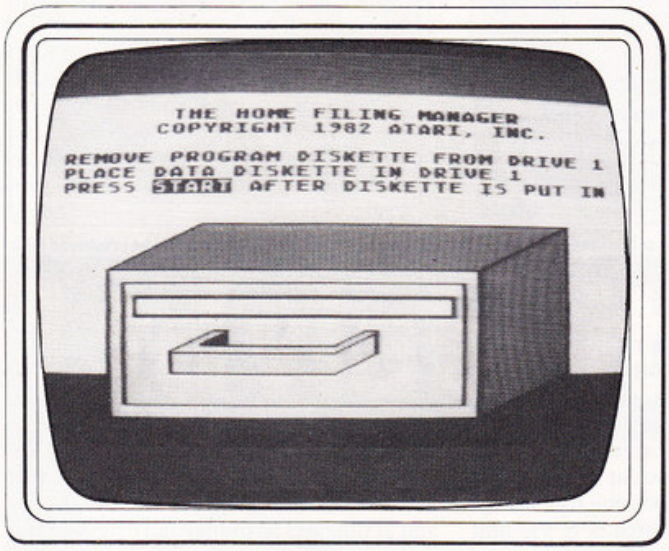
Verdict

This is by far and away the easiest package or program I have tested in 16 years. The package does all it claims to do, and does it efficiently.

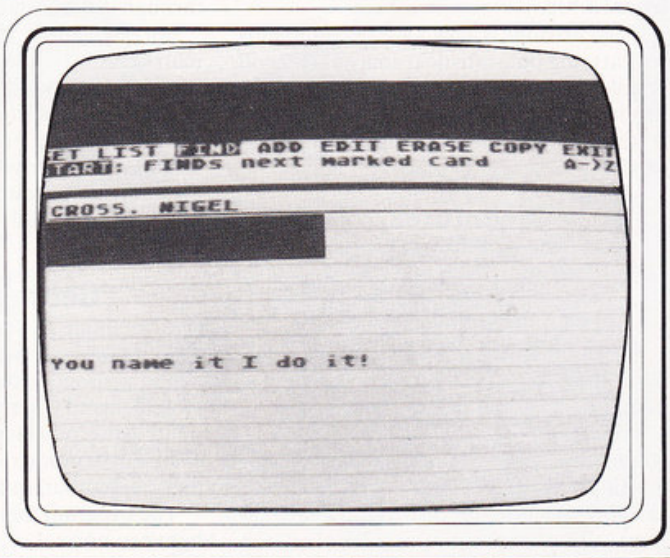
There is, however, a drawback. The price, at about £40, means it can be considered as a viable purchase only if it is intended to keep a large filing system on hand. As it is, each data disk is capable of storing between 115 and 700 index cards, which is quite reasonable.

RATING

Features
Documentation
Performance
Usability
Reliability
Overall value



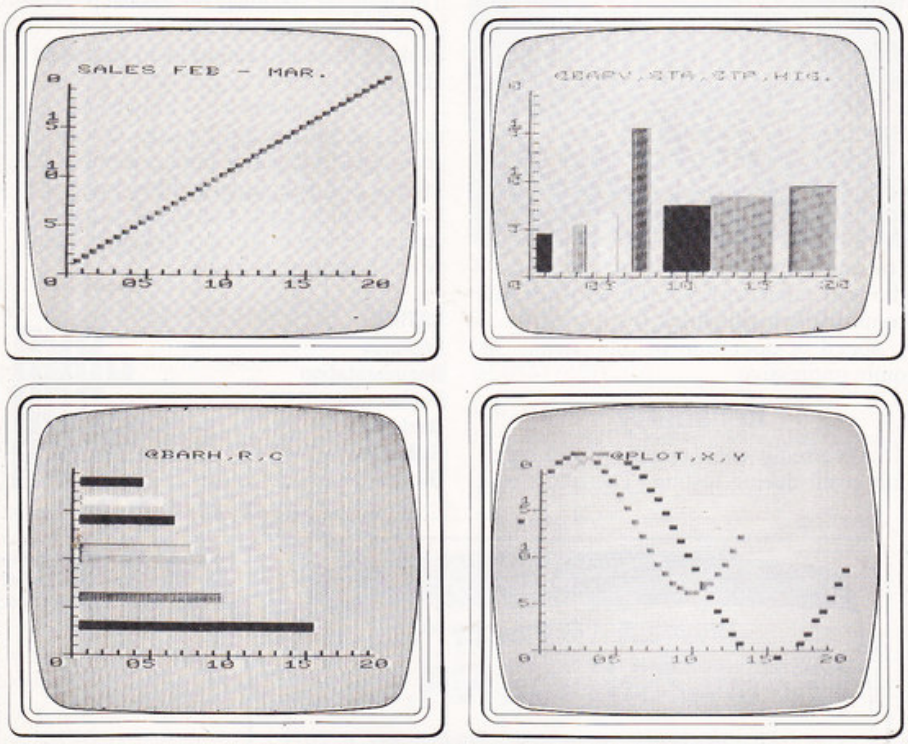
The Home Filing Manager is easy to use, and here shows almost Lisa-like tendencies.



Our reviewer found the program particularly useful as an ego-tripping aid.

The Vic 20 is a great games machine — but Barry Miles has discovered it can also work for a living.

Graphs by the numbers



These are just some examples of the kinds of bar charts and graph plots of functions that can be produced with Vic Stat.

Commodore always made claims for the Vic 20 as both a games and business machine, although it is questionable whether many owners would share that opinion. However, there has been an increasing amount of business-orientated software appearing for the Vic and among the latest batch is is Vic Stat from Kobra.

This cartridge is a package of commands for carrying out statistical analysis and will enable any competent programmer to produce very attractive colour displays of statistical information with the minimum of effort.

Features

The cartridge offers a useful set of additional commands for statistical analysis and graphic creation, and sets aside 11 special variables for the purpose.

The commands can be used in program mode and in direct mode too, which can be helpful for some purposes.

What is not available is a range of commonplace statistical tools such as plotting normal distribution curves, or carrying out Poisson distribution calculations. The package provides for the graphical display of data, not its manipulation.

Presentation

Vic Stat comes in an attractive box and the usual robust cartridge format. The manual is easy to follow, although somewhat brief and at times its Scandinavian origins shine through the translation.

For example, it refers to arrays as matrices, and while experienced users will not find this kind of lapse a problem, beginners may suffer some confusion.

This is a pity because the idea of the package is to provide business users with the ability to produce graphical displays of statistical material with the minimum of effort.

Getting started

The manual is perfectly clear about installation and warns you of possible memory-usage conflicts. Plug in and switch on and you receive a good introduction to the power of the program in an excellent demonstration making full use of the Vic's colour and graphics.

The program then invites you to choose between normal or special commands.

In use

Using the program is straightforward, and the command names are well chosen and easily remembered. The machine responds quickly so that the graphics grow at a satisfying rate.

The simplest set of commands is for plotting coordinates on screen and uses the well understood x,y system used by mathematicians.

The commands are:

PLOT, x,y sets up the screen as 2024 points, that is a 44 × 46 grid.

PLOTD,x,y switches off a specified point.

PLOTC,x,y This checks to see if a point is illuminated and, if so, puts a 1 in location 828.

You can add text to graphics by using the programmable cursor controls.

When you are happy with the plot you may print it on the Vic 1515 printer using the PAPER command. You can choose between printing all or part of the screen.

SCALE puts a scale onto the chart. A default scale will be provided if you do not specify your own.

COLR enables you to change graphics, border and background colours.

STATP will enable you to calculate standard deviation, means, and variance.

LINREG will, as might have been expected, carry out linear regression calculations from your array.

MINMAX will find the lowest and highest items in your array, sorting the data into ascending order into the bargain.

LINKO carries out linear correlation on your array.

SO will sort the first array dimensioned in your program into ascending order, including string arrays.

Program examples in the manual are good if somewhat sparse. There is a useful least squares analysis program, while another example takes input, sorts it, prints maximum and minimum values, followed by mean, standard deviation and variance, and finally draws a vertical bar chart.

Verdict

This is an interesting and powerful package which shows careful choice of mnemonics making it easy to use. All the commands are as reliable as you would hope. It is too limited in the range of applications covered for the professional statistician, but for the average business person it will give considerable useful service.

RATING

Features	
Documentation	
Performance	
User interface	
Reliability	
Value for money	

Name Vic Stat **Application** Statistics and graphs **System** Vic 20 **Price** £25 **Publisher** Kobra, 04912-2512 **Format** Cartridge **Other versions** Commodore 64, £33 **Outlets** Mail order.

David Janda finds there are a few taxing problems with Hestacrest's Accounts for the Spectrum.

Software has been available on cassette for the small businessman and accountant for some time now. Sales ledgers, purchase ledgers, payroll — you name it, you can get it. But it can be a nuisance having to buy a separate program to handle each individual task, then trying to find a way to integrate them into one system. So more and more packages are popping up with a little of everything thrown in.

Accounts is one such package, and it sets out to provide the small businessman and accountant with a system to aid in the preparation of accounts from incomplete records for limited companies.

Features

Since Accounts could be the most expensive piece of software you buy for the Spectrum, it is worth looking in detail at what it has to offer. There are nine main options open to the user: **1** — input initial details, **2** — amend account codes, **3** — prime entry routines, **4** — produce profit and loss account, **5** — produce balance sheet, **6** — produce nominal ledger, **7** — produce trial balance, **8** — SAVE (with data intact), **9** — start new accounting period.

Option 1 is the choice to make when you use the package for the first time, to set up your company name, account date, and specify if you want VAT to be covered. You have the option of entering up to five different VAT rates, and these rates, as well as any of the other information, can be amended at any time.

Altogether, there are 65 account codes, of which 47 can be amended. Codes 1-5 cover sales, 6-10 cost of sales, 11-13 other income such as rent, interest and sundries, while 14-47 are expense codes. These expense codes fall under four headings — Administration, Establishment, Selling, and Financial.

After selecting one of the options — say, cash payments — the account code is entered, together with the VAT code if used. You then enter the amount, and have the option of printing batch and cumulative totals.

The system can produce a profit and loss account and balance sheet, together with supporting schedules, and like any other part of the system, this can be printed out. But neither profit and loss amount nor nominal ledger can be displayed or printed unless the opening balances and journals are zero, and the cash and bank transfers are equal.

After every prime entry routine, the cumulative totals of the transactions are transferred to the nominal ledger accounts — the heart of the system. You can then choose to print out all the accounts, or parts of them selectively.

Quite a few features are missing from this package. You cannot include budget figures alongside the actual figures, and this facility would have been very useful. The package's limited ability to break down entries is more of a problem. If my accountant spotted a dubious looking entry, he would have to trudge through all the printout I had produced. To be able to at least enter the date of an entry would be helpful. And I would have expected to see some security features — say, a user code routine. This is a real weakness.

Presentation

The cassette is clearly marked, and the program LOADS without any trouble — but the documentation lets down this package. All the instructions are printed on the cassette sleeve, with only very brief details on how to LOAD the program and SAVE the data.

The description of the package is almost as brief. All you are given is a description of the facilities and a few notes on how the system works.

In use

When the program is LOADed, you are invited to 'Press any key'. You then get the main menu, where you select your option from the nine on offer. The program works in black and white, and the screen layouts are of a very high quality and really well designed.

I found setting up something of a problem, especially as there are no help files, but the main problem lay with my relative unfamiliarity with accounting rather than with the program itself. More documentation with plenty of examples would have helped here. The menus are short, but cannot be avoided even after you have reached a high level of expertise. You just have to plough through them every time.

The speed of calculations is impressive, and I found them very accurate — this I believe is due to the machine code routines at the beginning of the program.

Verdict

Hestacrest has not made any false claims about this package. It does what it says it will do on the cassette sleeve, and it does it well enough.

The trouble is that I didn't feel that what it does do is sufficient. In truth, I was not all that impressed with it as an accounts package.

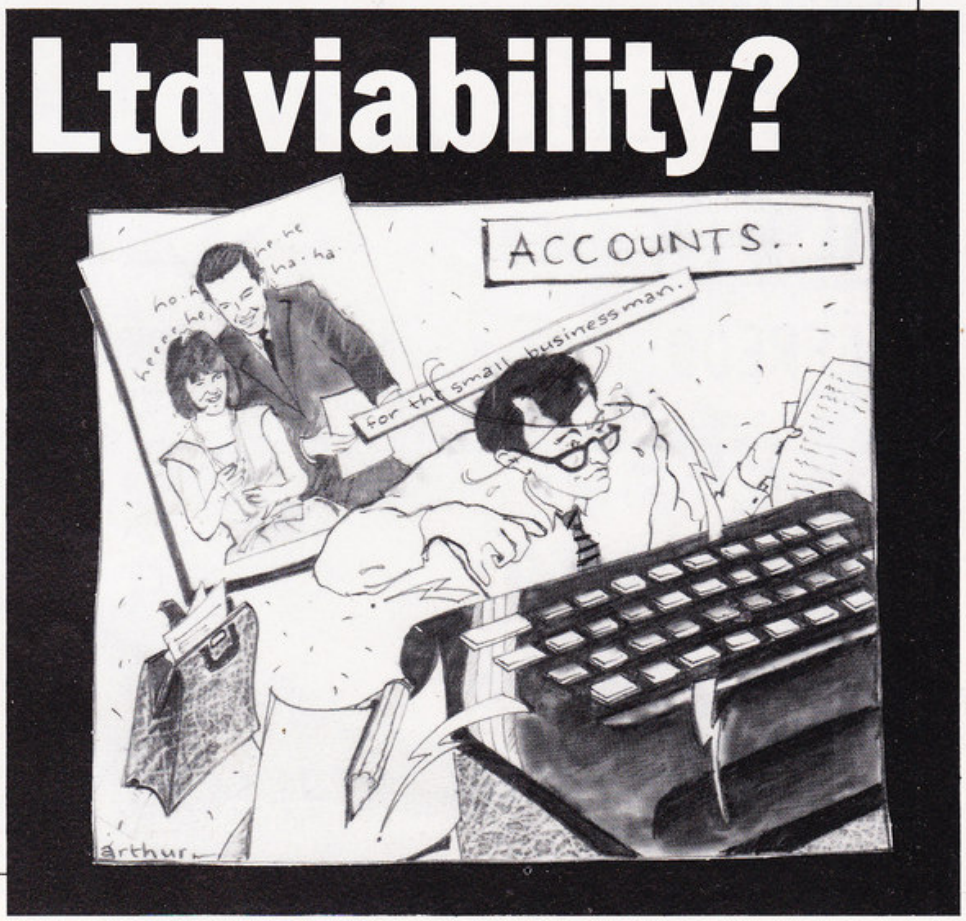
Trying to combine as many features as possible in a single package is Hestacrest's approach, but I don't feel it entirely succeeds. You should also bear in mind that SAVEing all your accounts data on cassette uncoded can be a risky business.

And I must say that the Spectrum was never designed to be used for business applications. Even the best software in the world would not be able to alter that fact.

RATING

Features	▣▣▣▣
Documentation	▣▣
Performance	▣▣▣
User interface	▣▣
Reliability	▣▣▣
Overall value	▣▣

Name Accounts **Application** Preparation of limited company accounts from incomplete records **System** Spectrum, 48K **Price** £35 **Publisher** Hestacrest — 052 523 785 **Format** Cassette **Language** Basic/machine code **Other versions** ZX-81 16K **Outlets** Mail order.



Twelve selectors make the new Epson RX80 printer really versatile. Barry Miles switches it on.

Dot matrix à la mode

A new printer from Epson is an event in itself, particularly if the machine contains new features and is cheaper than the earlier model, the MX80, which has proved a very popular and reliable machine.

I was particularly interested to see how the new RX80 compared with the more up-market FX80, just introduced (*PCN April 29*).

The major difference is that there is a 25 per cent speed improvement over the MX80. The newcomer runs at 100 characters per second, unless you choose the half-speed mode to reduce noise levels. This faster speed will be significant if you are carrying out long print runs.

The RX80 could be intended for business use, but since the paper transport mechanism is tractor, your only way of using the enhanced and double-strike modes — which fill in the spaces between the dots — for correspondence purposes will be to have your letterheads glued temporarily to continuous fanfold stationery.

Anyone using the printer for this purpose will be better off forking out the extra for the FX80, which has a friction feed as well as tractor, and offers proportional spacing as well.

At £250-£300 plus VAT, the RX80 is also aimed fairly and squarely at the hobbyist market, where competition is hotting up all the time. The hobbyist will probably get most out of the machine's many facilities, since it requires some dedication to master the various possible combinations of control codes, and what results from their use.

Setting it up

The packaging is very sturdy, with liberal use of polystyrene. The machine is of the customary cream plastic, and looks almost identical to the old MX80 box.

A row of four clearly labelled lights tells you whether the power is on, whether it is being received properly, whether the printer is ready to receive data, whether you are running out of paper, and whether or not the printer is on-line. The on-line indicator tells you whether you can expect two of the three buttons, form feed and line feed, to work. The third button toggles you on and off-line.

There are no difficulties in getting the machine going. It comes with Centronics parallel interface as standard, and Epson also manufactures an IEEE interface, and

The first three lines show print-out samples from the RX80 printer in different modes, reproduced actual size. Below them are samples enlarged three times to show the structures in detail.

ALFREDO JUST MUST BRING EXCITING
THE PLAZA QUICKLY

!"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr
LFREDO JUST MUST BRING EXCITING NEWS TO THE PLAZA QUICKLY

!"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ALFREDO JUST MUST BRING
TO THE PLAZA QUICKLY

ALFREDO
Normal

ALFREDO
Expanded double-print

ALFREDO
Normal double-strike

ALFREDO
Expanded double-printed overstrike

ALFREDO
Condensed

ALFREDO
Condensed expanded

ALFREDO
Normal double-print

ALFREDO
Condensed expanded double-printed overstrike

ALFREDO
Normal double-printed overstrike

ALFREDO
Condensed expanded italic

ALFREDO
Condensed double-printed overstrike italic

ALFREDO
Expanded italic

;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
Compressed italic

a special IEEE for Commodore machines, together with an RS232 interface. A 16K buffer is also available.

All these add-ons are fitted internally to the machine and — fortunately for loyal Epson owners who upgrade — are interchangeable between machines. But be warned, you can use these devices only one at a time. If you have fitted the buffer, you cannot fit an internal interface, and if you have an extra interface fitted, you cannot use the Centronics interface.

The manual takes you through the fairly simple setting-up procedures without strain. Assembling the printer after getting all the parts out of the carton is simple. The wire separator, which keeps the paper from fouling, is a simple spring fit, and the ribbon cartridge is an easy clip fitting. The ribbon is rather expensive, but this is alleviated by the fact that you can refill the cartridge at a third of the cost.

This is quite comical really. The manufacturer supplies a neat and clean way of inserting a new ribbon, and makes it easy for you to swop ribbons over if you want an almost new ribbon for that high-resolution printout and put it away again: the customer then decides to save a few pounds and refill his own ribbons, trying to avoid getting mucky in the process, using *one* plastic glove!

It is worth remembering that the ribbons dry out over time, so it is not worth stocking too many.

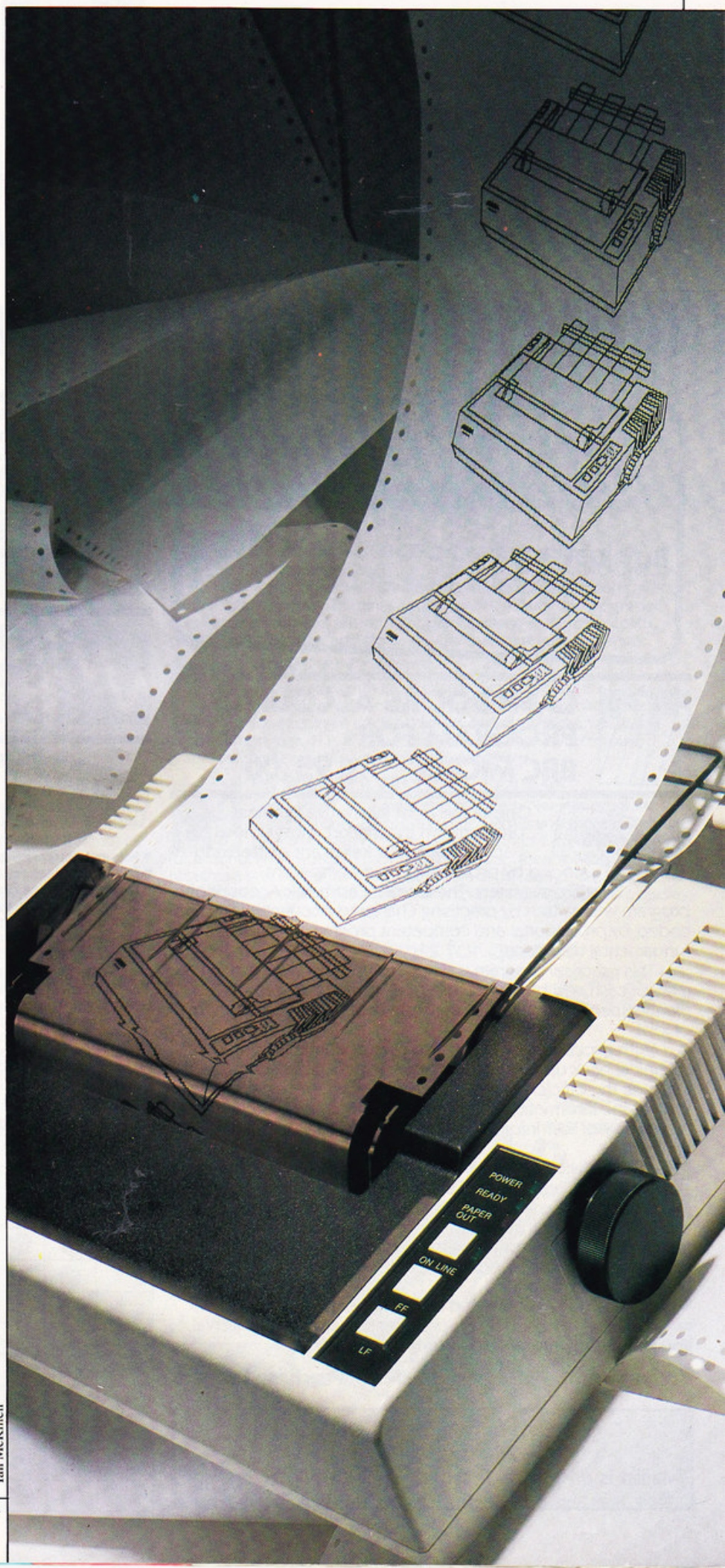
The manual is a luxurious affair, clearly printed on heavy art paper. It is spiral-bound, so it does not tend to close just when you have found the page you want. It is well-written, explaining each command thoroughly, with liberal illustrations of Basic routines to carry out a particular function and photographs of the result. This makes learning about the printer a true pleasure, and is in stark contrast to the tatty little manuals which come with some machines.

The lid of the machine should be handled carefully — it is quite brittle. It doesn't have a serrated edge for easy tearing of the paper, but with reasonable care it's possible to tear it off quite successfully. The widest paper the printer will accommodate is 10in, so if you've gathered in a large stock of 72-line 10¼in word processing paper, bad luck!

The RX80 will print a self-diagnostic test if you swtich it on with the linefeed switch pressed. The machine can be set to power-up in a number of conditions, which will be convenient for various requirements. You can have ten characters to the inch or 16.5; the form-length set at 11in (normal listing paper), or 12in (word processing, pseudo-A4 paper).

There are no fewer than 12 switches available for modifying the printer to become whatever you want, but you cannot get to them without removing the cover. This is a real nuisance.

There is a hatch at the back of the RS through which access is awkward but possible. But you must take the cover off first, removing two screws and pulling off a connector first.



Ian McKinell

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* summary of VAT information to enable you to complete your VAT returns
* cumulative receipts and payments report analysed over the standard profit and loss and balance sheet heading.
* option for departmental analysis of sales and purchases
* print out of all transactions
* journal routine for entering transfers between accounts and year end adjustment for debtors, creditors etc.
* year end trial balance
* profit and loss account and balance sheet.

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"... the systems worked immaculately when tested ..."
"Mailist is a very professional piece of software ..."
(Which Micro & Software Review Feb 83)

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DRAGONCALC £19.95

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Some typical applications:–

* Small business accounting applications, e.g. profit and loss statements and cashflow projections, break-even analyses etc.
* Investment project appraisal – anything from double glazing to oil rigs!
* Comparing rent/lease/buy options
* Processing the results of scientific experiments or field studies
* Engineering calculation models
* In fact, anything that involves repeated re-calculation of results presented in tabular or spreadsheet format.

Program Availability Chart:–

	Database	Stock Control	Mailist	Invoices & Statements	Spread sheet Analysis	Cashbook Accounting	Word processor	Home Accounts	Commercial Accounts
Sinclair Spectrum 16k or 48k	●	●	●					●	●
Dragon 32k or 64k	●				●			●	
VIC20 (16k+)	●	●	●	●				●	●
Sinclair ZX81 (16k+)	●								
Grundy Newbrain	●								
Texas TI99 4A	●								
Osborne 1	●								
Sharp MZ80A	●	●	●	●				●	●
Sharp MZ80K	●	●	●	●				●	●
Sharp MZ80B	●	●	●	●				●	●
BBC micro model A or B 32K	●	●	●	●	●	●	●	●	●

I'S NEW
CE SOFTWARE

ur business at petty cash prices.

INVOICES AND STATEMENTS . . . £19.95

Compatible with most micros. See table. Ideal for the small business. A complete suite of programs together with generated customer file for producing crisp and efficient business invoices and monthly statements on your line printer. All calculations include VAT automatically, and the program allows your own messages on the form produced. This program gives you superb presentation and saves time on one of the most tedious tasks in the office.

COMMERCIAL ACCOUNTS . . . £19.95

Compatible with most micros. See table. A gem of a program, all for cassette, with the following features:– Daily Journal. Credit Sales. Cash Sales. Credit Purchases. Purchases – other. Sales Ledger. Purchase Ledger. Bank Account. Year to date summary. A fully interactive program suitable for all businesses. Files can be saved and loaded and totals from one file carried forward to another on cassette. Particularly useful from a cash flow point of view, with an immediate accessibility to totals for debtors and creditors. Bank totally supported with entries for cheque numbers, credits and, of course, running balance.

MAILING LIST . . . £19.95

Compatible with most micros. See table. A superb dedicated database to allow for manipulations of names and addresses and other data. Gemini's unique 'searchkey' system gives you a further ten 'user-defined parameters' to make your own selections. Features include the facility to find a name or detail when only part of the detail is known, it will print labels in a variety of user specified formats.

DATABASE . . . £19.95

Compatible with most micros. See table. The program that everyone needs, the most valuable and versatile in your collection. Facilities include sort search, list print if required. Can be used in place of any card index application; once purchased you can write your own dedicated database to suit your particular needs with a limitless number of entries on separate cassettes.

STOCK CONTROL . . . £19.95

Compatible with most micros. See table. Dedicated software with all that's necessary to keep control of stock. This program will take the tedium out of stock control and save time and money. Routines include stock set up, user reference number, minimum stock level, financial summary, line print records, quick stock summary, add stock, delete/change record and more.

HOME ACCOUNTS . . . £19.95

Compatible with most micros. See table. Runs a complete home finance package for you with every facility necessary for keeping a track of regular and other expenses, bank account mortgage, H.P. etc. This program also allows you to plot graphically by Listograms your monthly outgoings.

WORD PROCESSOR . . . £19.95

Compatible with most micros. See table. This program features routines found in much larger and more expensive packages with a typical word length of 5-6 letters it allows for around 1000 words in memory at one time. Ideal for the user who requires a simple program to write letters on his computer. Features include, block delete, block insert, search and replace, edit text, display text and more.

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Stock Control	£19.95 ☐	BBC Cash Book disk or tape	£95.00 ☐
Mailing List	£19.95 ☐	BBC Disks – other titles	£23.95 ☐
Invoices and Statements	£19.95 ☐	Osborne Disk Database	£23.95 ☐
Commercial Accounts	£19.95 ☐	Word processor	£19.95 ☐
Home Accounts	£19.95 ☐	Beebcalc	£19.95 ☐
		Dragoncalc	£19.95 ☐

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The ham-fisted would in trouble here!

In particular, it is important to have close at hand the switch which controls whether a carriage return is to generate an automatic linefeed or not. It seems a pity to have to resort to mounting an extra switch outside the case on a cable.

Once you have access to the switches you can define:

- Condensed or pica (10-pitch) characters.
- Control codes as graphic symbols.
- Buzzer on or off.
- Length of form 11 or 12in.
- Paper-end detector, on or off.
- Selection of international character set, one of eight.
- Selection of slashed or unslashed zero; and
- Determine whether the SLCT IN signal is internally fixed or not.
- Whether linefeed is to be automatic or not, on receipt of carriage return; and
- Decide whether a 1in skip-over perforation is to occur.

In use

Tests show that the printer is as fast as other printers rated at 100 characters per second. The noise-level is acceptable for this speed, and in some circumstances you may find the half-speed quieter printout more acceptable, particularly if you are spooling a file to the printer while using the computer for some other purpose.

A good feature of the tractor mechanism is that the paper is no longer inclined to climb off the sprockets, even when you're using heavy paper.

This was a real nuisance on the MX80, and one of the reasons for going for tractor feed in the first place is to be sure that the paper will not drift out of alignment, as it usually does when you friction feed. However, apart from that you have all the familiar facilities of the MX series at your disposal, and these are substantial.

Firstly, there is the character font itself. Because of the rich variety of designs available using the 9 wire head it is sufficiently attractive for it to have been used for illustrations in several volumes of programming and the condensed face has illustrated spreadsheets in a variety of books.

This mode is particularly useful, because it enables your 80-column sheet of 'A4' paper to display 137 columns, as much as a daisy wheel's wide carriage will accommodate in normal 10 characters to the inch mode.

The double-width characters are striking in appearance, and particularly attractive when the elite 12 pitch characters are being doubled in size. These are useful as headings or for notices to be read from a distance.

Bold printing can be accomplished in two ways: by double-striking, with the paper having been moved up by 1/216in, and by enhanced mode, which gives a stronger impression.

To get what the American MX80 manual calls 'Harvey Wallbanger' (very dense print), you have both modes operational at once. It is worth remembering that a backspace is carried out before the second strike occurs in double-strike mode, so this is slower than enhanced mode.

An intermediate-size print is obtained by printing the condensed characters in double-width, so the range of possibilities is wide indeed.

Each control code has a page to itself, and it is intriguing to see that Epson is now modestly approaching the possibility of an error in the minute linefeeds. Escape J is said to produce 'tentative n/216' line-spacing!

You can have italics by calling up the alternative character-set using an escape sequence. This can also be enhanced or double-struck, and in the full range of widths and pitches. Incidentally, all these modes may be turned on and off within a line, almost like changing a daisy-wheel. Various other line-spacing distances are provided.

Really impressive subscripts and superscripts are produced, with tiny letters double-struck so that all dots are merged.

I can't help wondering why Epson doesn't go the whole hog and have a correspondence-quality mode, where the head makes four passes, with the precision of the subscripts and superscripts. This is not quite the same as emphasised and double-strike together, since I visualise each line being built up from two halves of each character, top and bottom, with each half being double-struck.

All the settings which you make via the dip-switches can be overridden by use of control codes.

A special feature of this product is a character font suitable for output from Epson's portable HX20 computer, with a 6 × 8 font.

Horizontal tabulation can be carried out, as can vertical tabulation, but without the extra sophistication available on the FX80, which uses channels to control tabulation on consecutive forms with different layouts.

With refreshing candour, Epson admits that although bi-directional printing produces almost no horizontal dot aberration, use of a pair of special commands which cause printing in a single direction only will produce greater precision.

Bit image graphics are available in a bewildering range of modes: normal density, dual density, double-speed dual density, and quadruple density. This should be sufficient for all graphics enthusiasts. Two versions of screen graphics are provided, with a warning that one of them is better for taking a hard-copy of screen data.

Verdict

This printer has an excellent price/performance ratio, and is backed up by a company which has been widely recognised for years as producing good-quality printers with an excellent, easily readable font. The lack of easy access to the dip-switches is irritating, but provided you don't want to use single sheets of paper, the machine has much to offer.

It is worth considering why you might choose the FX80 instead, bearing in mind the substantial price difference of £150. Speed is the obvious first point. A rate of 160cps can offer significant advantages on long print-runs.

You may want full proportional spacing and the ability to define your own characters, which allows you to close up the line-spacing and print your logo.

You may want bit image graphics for use with a plotter.

You may find the RX control codes somewhat complex, and wish to use the simple extra command in the FX which produces 63 different combinations of print mode.

However, the RX has the following advantages, apart from price: it is smaller, and lighter; at the lowest speed it is quieter; and it will accommodate paper down to a width of 4in, which allows labelling on narrow paper. To date, the promised tractor-feed has not yet emerged for the FX, and in any case it will be an extra.

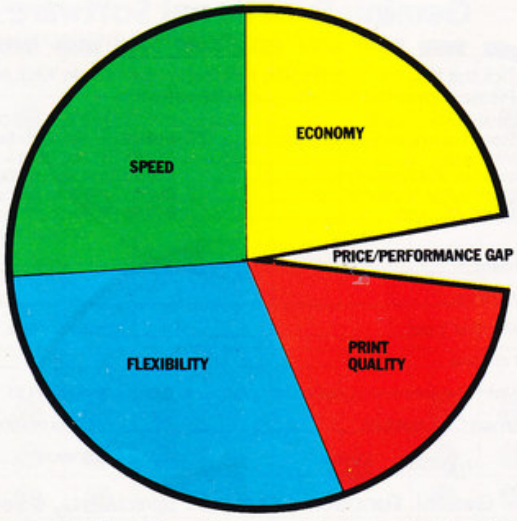
Machine Epson RX80 **Price** £250-£300 plus VAT **Speed** 100 CPS, **Interfaces** Centronics parallel **Contact** Epson, 01-900 0466.

RX80 in the PCN pie stakes

This pie chart represents a rough guide to what we feel is the trade-off between price and capabilities on the Epson RX80, as determined by the PCN Peripheral Pro-Test.

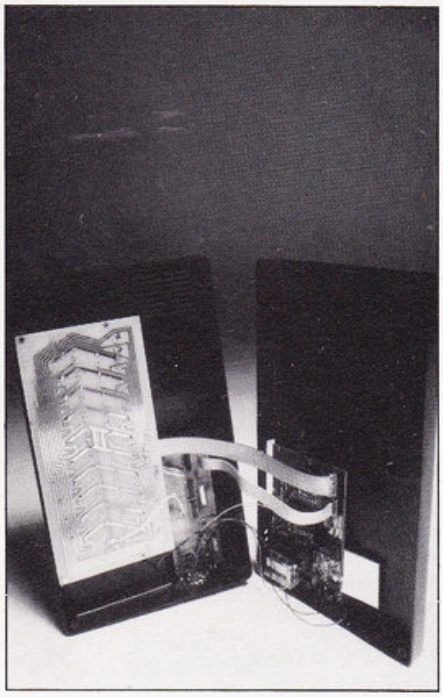
It's based on the premise that a high capability in one direction will cause either a low capability in another or a higher price. For this reason 'economy' is a negative way of expressing price — the cheaper the printer the bigger the economy segment.

If a printer has lots of everything it will close the price/performance gap — obviously a wide gap doesn't represent a good buy, 15 degrees is good and none is excellent.

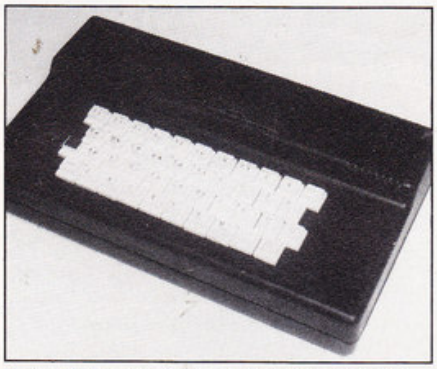


Upgrading your Sinclair can start at the keyboard. Ian Scales gets the feel of TEC's ZX8100.

Left — Full-travel keyboard takes the hit or miss out of the ZX81 but retains its layout.
Below — The TEC ZX8100 says 'Ahhh': tons of room for extra RAM, though the finish is not all it could be.



Finishing touch for your ZX81



Fuller's ZX keyboard adapted by TEC with extra switches.

Many of the motives which compel car enthusiasts to customise can be attributed to micro enthusiasts. With a micro, though, you not only have the satisfaction of configuring a unique system but can also tailor one to fit your needs — the extra costly bits being added if and when they are needed.

The ubiquitous ZX81 is a prime candidate for the add-on approach. One of its attractions is its expansion potential — it's cheap because most of the normal bits and pieces found on its larger brothers have been left off and it's up to you to add-on as required.

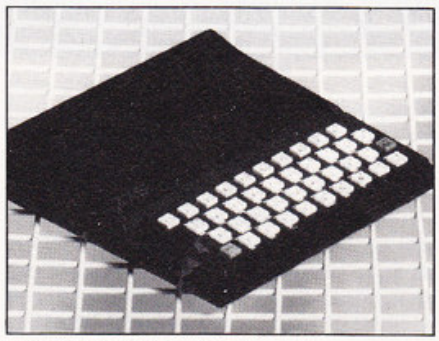
A popular place to start is the keyboard. The TEC ZX8100 is a Fuller keyboard with a 1K ZX81 clipped into it, available from Telford Electronics & Computing, which provides a sales and service operation to ZX81 owners. You simply send off the ZX and Telford fits the board into the case.

The case weighs about 3lb once the ZX81 is inside it, and measures 13½ × 7½in and averages about 2½in deep. The power supply and a 16K RAMpack can also be fitted into the ZX8100's casing.

Unfortunately many of the things which could be included on a full-travel keyboard have been left out of the ZX8100. Instead of taking the opportunity to put on a space bar, for instance, TEC has simply replicated the standard ZX81 layout with a couple of additions.

An extra shift key has been included at the top right and a Repeat key on the left. A reset button and an inverse video switch are also featured.

On the negative side, the black plastic injection-moulded case looks a bit scruffy, especially around the mic, ear, power and TV sockets. There is plenty of room in the plastic cavity — in fact the tiny little ZX81 board with its four lonely chips looks rather comical.



PUSH-BUTTON PAD — The less ambitious might be intestested in a push-button keyboard for the ZX81. It sticks down on the Sinclair and upgrades the touch-sensitive keypad to a calculator-type keyboard. The keys themselves are spring-loaded against a plastic grid. I don't know how many key depressions it will stand but I suspect the laws of plastic fatigue may come into play before the magic million mark.

However, PCN's Databasics editor swears by its capabilities. It doesn't actually make the keys any easier to find but at least the user gets some tactile feedback.

The push-button keyboard costs £10 and is available from Fox Electronics, 0256 20671. IS

As far as enhancing the ZX81 is concerned, the Fuller keyboard does the job well without being particularly classy about it. The feel of the keys is an improvement over the lift-button feel of the ZX81 and it does enable you to move along at a faster pace.

But if you are, or plan to become, a touch-typist you would be well advised to look elsewhere. The fact that there is no space bar would make things difficult — even if you did learn to touch-type on the ZX8100 you would find it difficult to adapt to the space bar on any other keyboard you encountered.

To those whose first encounter with a keyboard of any type was courtesy of Sinclair Research, the unit will be a big help. Quite apart from anything else, its larger size and weight make it less prone to slide about when you're busy trying to enter keystrokes. And, of course, its keys are finger-sized — you have a good chance of hitting the right one.

Fuller itself also supplies the keyboard, a built-up version for the ZX81 minus the special TEC switches. A standard case for the ZX81 cost £29.95 plus £2.50 for postage, and it can be bought in kit for £24.95.

Fuller also offers a similar unit for the Spectrum at the same price and a range of its own RAM upgrades. A 16K RAM card for the ZX81 is available at £24.95 while a 64K card costs £59.95.

Machine TEC ZX8100 full-travel keyboard
Price £39.50 plus p&p and six-month guarantee.
Interface ZX81 **Contact** Telford Electronics & Computing, 0952 46008.

Bernard Wragge-Morley adds up NCR's first personal computer, the Decision Mate V.

NCR's micro debut

Decision Mate V is National Cash Registers' first excursion into the microcomputer market. It will probably be the first of a range of business computers from the NCR stable — although the company itself is being close-mouthed on this — so this one machine is important not just in its own right, but as a guide to the kind of machines NCR intends to produce.

Presentation

The tested system arrived by carrier and was packed in one large, solid, cardboard box, which was full of good packing material. The box itself was not properly secured, and had begun to open. The keyboard and CPU were individually wrapped in plastic, and both the cables needed and their appropriate plugs were supplied.

The basic system is in two parts — the Central Processing Unit, which contains the CRT screen, the processor, and two 5¼in floppy disk drives, and the light, low profile keyboard.

Documentation

The review machine came with two reference books: one called *User Information*, and the other *NCR CP/M*.

The *User Information* manual was clearly set out, with good diagrams and easy-to-read step by step instructions. These take the first time user from setting up the newly unpacked machine, through formatting and copying disks to running simple programs.

Towards the end of the manual is a table listing possible hardware and software problems, along with a selection of possible explanations/cures. This section, naturally enough, also covers NCR's servicing arrangements.

There is also a short section listing CP/M programs that have actually been tested on the Decision Mate V.

I found the manual very useful for the initial setting up of the machine, but it had no quick reference section, and I found this irritating later.

The second manual was a normal CP/M handbook with slight adjustment for the NCR Decision Mate V. Programming examples are given to help the novice discover how to use the editor, assembler and debugging facilities (DDT), and this is a useful addition to the standard format.

Other manuals available from NCR, apart from the usual software manuals, include a system and technical manual and a service manual.

Construction

The CPU is solid and very heavy, weighing in at 24kg. Its outer case is made from ABS foam, and three-quarters of the back panel is in the form of a grid for ventilation, with holes large enough for young children to use as a letter box when no one is looking.

Both the CPU and the keyboard should withstand all the normal household and office treatment.

Everything on the CPU box is clearly labelled. There are, however, only two small sockets on the back panel — a DIN socket for the keyboard, and a standard IEC mains socket — so you can't go far wrong.

The back panel also has a row of eight LEDs used for identifying problems. When you push the bright orange power button on the front, the processor goes through a five-second diagnostic check of its hardware. If it finds any problems one or more of the LEDs will remain on after the check. If all is clear the system will then boot up the disk, if you have remembered to put it in the disk drive. If not, you are politely requested to CR for a re-try.

Keyboard

The keyboard is light, low-profile and made from ABS foam. It connects to the back of the CPU via a coiled cable and a DIN socket.

The keyboard itself arrives with only half the keys fitted, but do not be alarmed — you will find the rest of them, and more, in a separate container, along with keyboard layout diagrams for most European countries.

All you have to do is push the appropriate keys firmly into place, set the three switches on the underside of the keyboard to the correct language code (as shown in the manual) and you should be ready to go.

Unfortunately, life isn't that simple. Our review machine must have come direct from Germany, and the English keys had been omitted. This led to some interesting syntax errors later.

Once you've finished the jigsaw you'll notice the keyboard divides into two areas.

The main block contains the alpha-numeric keys, and if you've got it right, this should be arranged as a normal qwerty keyboard, with a control key on both sides and 15 function keys along the top.

Typists will be reminded that the left-hand shift key is further out than normal, as they keep finding the backslash portrayed on the screen instead.

The smaller block to the right contains 11 numeric keys, including a double zero, five arithmetic keys, five cursor keys and five more programmable function keys, bringing the total of these up to 20.

All the function keys can be programmed easily from 'Config. Com' (which you will find on your system disk), and they can be used for commands under either CP/M or Basic.

There is also provision for a descriptive mask to be placed above the function keys to remind you what you have programmed them to do.

All the keys have an optional short bleep when pressed, and a longer one which sounds if the data is not accepted. This can be turned up or down with the volume knob on the back of the CPU box. The keys themselves are fairly noisy in their own right, with the larger ones rattling whenever they are used.

The Decision Mate V also has an eight character buffer, so you are not penalised for making entries before the program is ready to receive them — I found this particularly useful.

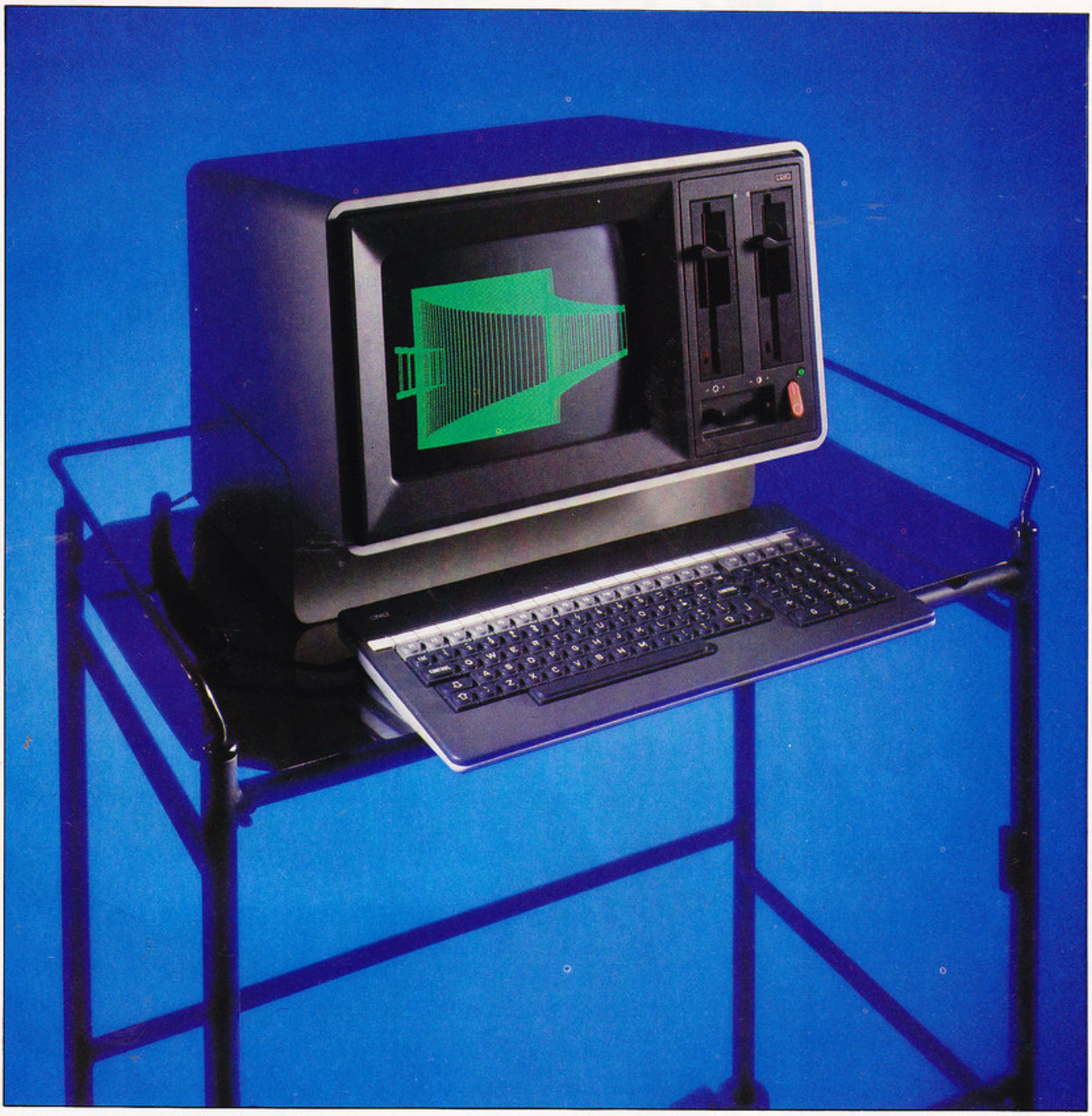
Screen

The monitor screen is clear and easy to read, with adjustable brightness and contrast available from knobs on the front panel. The unit comes with a green-on-black display and a non-reflective screen as standard.

The display is generated by the versatile 7220 CRT controller, which coupled with 342K of screen RAM is used to produce high resolution graphics with a 640 × 400 dot display. Judging by all the extra links on the video board a great deal of work has gone into getting this area of the machine to behave properly.

Storage

The systems storage is two narrow 5¼in floppy-disk drives mounted vertically side



Chris Ryan

by side on the right of the screen. Typing the command STAT DSK: reveals a lot of details about the drives, i.e.:

A: DRIVE CHARACTERISTICS
2464:128 Byte Record Capacity
308: Kilobyte Drive Capacity
128: 32 Byte Directory Entries
128: Checked Directory Entries
256: Records/Extent
16: Records/Block
32: Sectors/Track
3: Reserved Tracks

These figures show that the disk format is 40 tracks per inch, double sided, double density. The B: drive characteristics are listed underneath if it has been logged on, and are identical.

The drives worked perfectly on the review machine, so I had to provoke an error by leaving the drive empty. The machine would then come back with the message B: NOT READY <R>. If R was then pressed it tried again. If a disk had been inserted it would then continue to execute the command which had failed.

If an unformatted disk was inserted the machine tried five times to access it and then gave up with the message B: FATAL ERROR <R/O/X>. If you then press R it Retries; O prints a message Bdos Err on B: Select; and pressing X aborts and warm-boots drive A:

This is about par for CP/M, which as an operating system is uninformative about disk errors. And although some manufacturers have managed to build in status codes, none were found in the handbook, and none could be produced on the screen.

Expansion

There are seven expansion slots in the back. These take I/O modules, which can be either RS232C or Centronics parallel, and other facilities.

The connectors used are 96-way DIN, with sprung steel guides round them.

If all 96 ways are used it should provide for versatile expansion, but I had no hardware manual, and this made checking the expansion facilities difficult.

Operation

The CP/M operating system supplied with the machine is a very standard Version 2.2, which comes with a complete set of normal files including an editor 'ED' and assembler 'ASM'. The assembler supplied was for an 8080, but the processor fitted is a Z80A.

On the face of it this would seem a stupid waste of processing power, but is it really?

NCR has a Z80A/8088 dual processor machine planned for release in May, and the current machine will be directly upgradable to dual processor. To ensure that your programs will be portable up to the 16-bit machine (although NCR has not said so) an assembler which will run on

43 ▶

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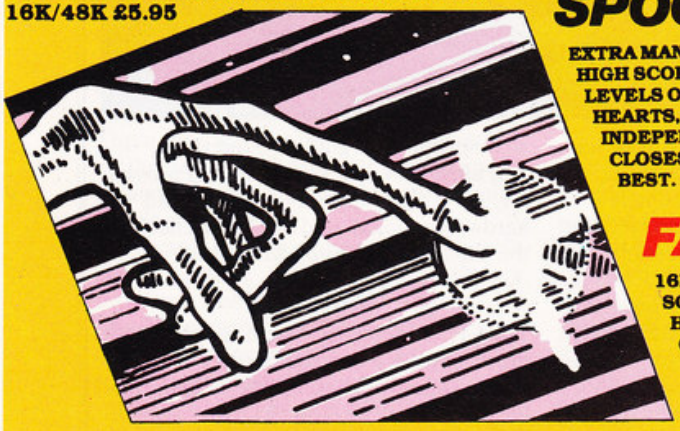

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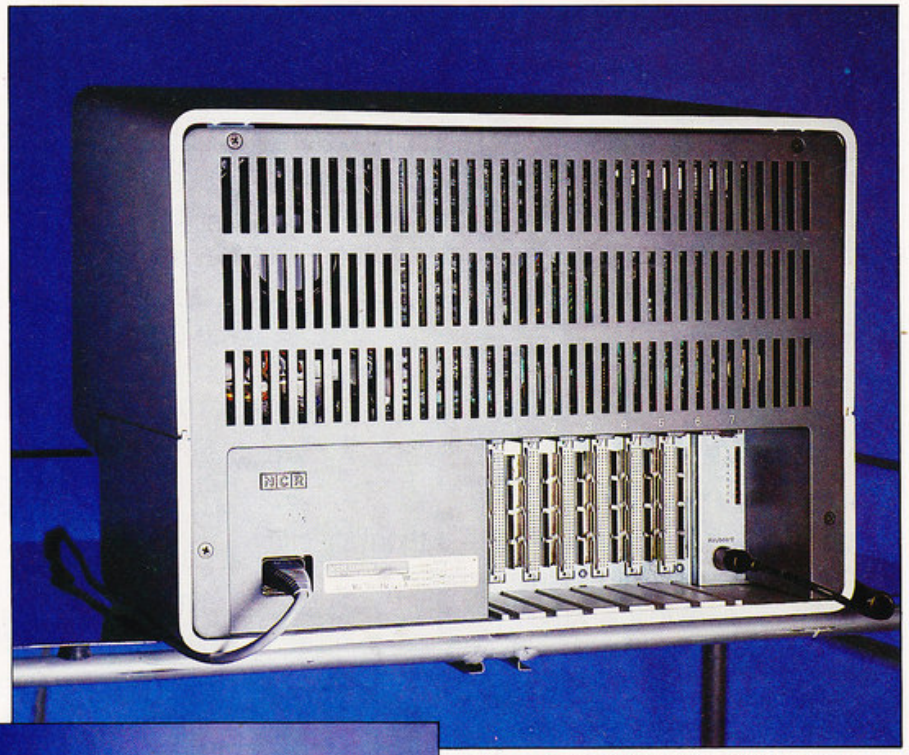
both the Z80 and 8088 machines has been provided.

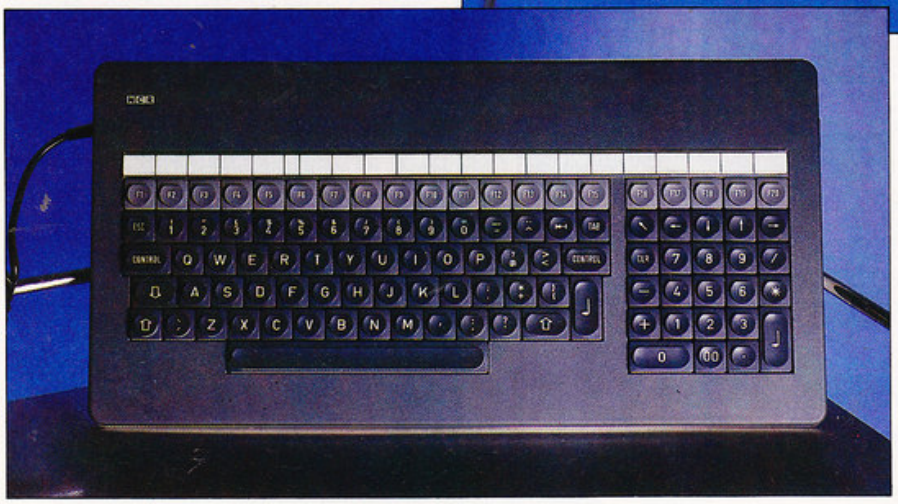
Although the manuals make no mention of it, I can see no reason why the wealth of CP/M software written for a Z80A should not run directly on this machine. Of course, to be able to get at the more advanced commands of the Z80 you would need a different assembler when writing your own programs.

The Basic 5.21 supplied on the review machine would also appear to be an 8080 version, as it runs a simple addition program 10,000 times in 67 seconds as against 56 seconds on the average Z80A machine. Most 8088 systems run it in 43 seconds. GBasic, which is a form of MBasic with some additional machine code routines added to allow access to the graphics facilities, was also supplied.

You get at these routines by calling them *eg*, CALL ZOOM. MBasic allows you to pass values to these routines using VARIABLES. A typical program line would be:

20 A%=10 : B%=390 : C%=88 : D=488 : CALL POINT (C% B%) W1=1 : W2=3 : W3=2 : CALL PAINT (W2)





Top — The uncluttered rear view showing the practicality of recessed easy-access card slots. Left — Clear easy to use keyboard highlighting the large numeric keypad on the right and the row of 20 function keys.

The facilities available can be appreciated from the list of subroutines:

INITialisation: POINT : ZOOM : CIRCLE : DRAW : BOX : RECtangle : GC : PAINT : TEXT : EXIT :

The addresses for these have to be defined in every program which uses the graphics. Unfortunately, as is so often the case with new machines for review, there was no documentation with the graphics package, so any understanding of how to use these facilities had to be gleaned from the Demo program supplied.

This showed some useful charts and drawings as well as the usual pretty kaleidoscope type displays. In high resolution the display is 640 × 400, which could be used to provide very good graphs, pie charts and even engineering drawings.

With the correct software, and the joystick plugged into the side of the keyboard, the average office user could be able to enhance the presentation of reports with little extra cost.

Among the more serious packages was a rather sordid attempt to produce music from the little loudspeaker at the back, which is connected to a digital gate.

The result was an awful grating rendition of the Star Spangled Banner, Silent Night and Greensleeves.

Maintenance

There is no warranty on the Decision Mate V. Instead NCR offers a cheap annual service contract for £120 per annum, or if you prefer you can pay as you go on an hourly basis plus materials. NCR has 40 service centres covering the UK during normal working hours, five days a week.

But, however good and reliable a product is, I would expect to receive a warranty with the unit, and not to have to rely on consumer protection legislation. In fact, the more reliable a piece of equipment is, the less reason a manufacturer can have for not giving a warranty.

Verdict

This first offering from NCR in the personal computer market shows that a great deal of thought went into this computer, and also into a range of upgradable products which will be able to take advantage of software developments as they materialise.

It has CP/M and can therefore use much of the readily available software. It will also be upgradable to CP/M86, and to all the software currently under production for that operating system. Monochrome graphics for the more sophisticated business packages are there, and later models will have colour, although this will not be a direct upgrade.

SPECIFICATION

Price:	£1,825
Processor:	Z80A. 4MHz (Software thinks it's an 8080)
RAM memory:	64K + 34K video RAM
ROM memory:	4K
Text screen:	80 × 24
Graphics screen:	640 × 400 monochrome
Keyboard:	100 full travel keys (20 programmable function keys)
Interfaces:	all extra (RS232C & Centronic parallel available)
Storage:	2 double sided double density drives, 308K per disk
OS/languages:	CP/M, MBasic, GBasic
Distributor:	NCR

Although the NewBrain is conceived as a total system, the unexpanded Processor itself has a great deal to offer. It is available in two forms: Model AD, shown below, with a built-in line display; and Model A, without the line display. Both models can operate with a monitor or a television set.

MEMORY

- 24K bytes of ROM;
- 32 bytes of RAM, at least 28K of which is available to the user.

THE SCREEN DISPLAY

- 40 or 80 characters to the line – without affecting the 28K bytes of RAM at your disposal;
- 24 or 30 lines to the screen;
- well-formed characters, with true descenders;
- a full European character set;
- normal or reverse video, high resolution graphics on screen of controllable size, 256, 320, 512 or 640 horizontal resolution by 250 vertical lines;
- a facility to set up a "page" of up to 255 lines, with the screen acting as a "window" to display it;
- ability to maintain several such pages simultaneously, and to switch rapidly between them;
- text may be used on graphics screen as well as on parts of the video screen not used by graphics.

CHARACTER SET

- 512 characters, including the full ASCII set, all European accented characters, Greek and graphics symbols.

GRAPHICS

- 20 powerful graphics commands;
- all text characters usable on the graphics screen;
- variable-sized graphics screen, with the rest of the screen available for text – for versatility and to save memory.

SOFTWARE

Enhanced ANSI BASIC; screen editor (32 commands); mathematics package (10 significant figures); graphics commands.

- a very friendly screen editor – a delight to use and readily adapted to text processing;
- arithmetic to 10 significant figures;
- very controllable output formatting of numbers – invaluable for accounting, statistics, and scientific applications;
- a powerful, much enhanced BASIC;
- a very flexible operating system, which allows any data stream to be opened to any device.

INTERFACES

- two tape cassette ports built into the processor unit;
- a built-in printer interface;
- a built-in communications interface (V24/RS232);
- a video monitor interface;
- a TV interface;
- an expansion interface for NewBrain system expansion modules.

KEYBOARD

- standard typewriter pitch, action, layout and size, with editing control and graphics keys.

*CP/M IS A REGISTERED TRADE MARK OF DIGITAL RESEARCH INC.

You can get everything in the box on th

If you understand the facts and figures on the left you'll soon realise that NewBrain has to be one of the most powerful micros around.

However, if you find the box on the left a little hard to follow, don't worry.

We've got over 120 dealers nationwide who've got all the answers at their fingertips.

Either way you'll discover that NewBrain is the kind of micro that will stop the competition getting a look in.

At £269 it starts off with twice as much memory as most of its competitors and can expand to over thirty times that amount. So there's no chance of being left behind in the micro race.

It comes with a very powerful language (enhanced ANSI BASIC) and it'll take CP/M; so it'll work on the same system as similar big business micros, giving you the capacity to use an almost limitless variety of tried and tested software.

But most of all NewBrain is a machine that can expand.

It's designed to take disks, printers and memory expansion modules (up to 2M bytes) plus anything else you'd expect a professional business micro to handle.

So, whether you understand the box on the left or not, pay a visit to someone in the know on the right.

They'll answer all your questions and give you a full demonstration.

NewBrain

Grundy Business Systems Ltd., Grundy House, Somerset Road, Teddington.

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left from anyone in the box on the right.

PCN tests the FX20 — Bernard Wragge-Morley has seen the Future — does it work?

FUTURE FX20

Future Computers' new FX20 micro is a light, tough little machine which should be well able to withstand the assault course of office and home handling. PCN tested a pre-production model — no production models are at present available, although Future expects to be making about 1,000 units a month by June.

Presentation

The review model was adequately packaged, although as it was a pre-production model no conclusions can be drawn from this. The test machine came in three separate units: the central processor — which contained the two disk drives — a VDU and a keyboard.

Documentation

The documentation for the FX20 wasn't available at the time of review. Future says that a complete, easy to use manual is currently being prepared, and that this will include a rewritten explanation of the CP/M-86 operating system. The distributor, Encotel, was however very helpful with queries, and this made up for the lack of documentation.

Construction

The central processing unit comes complete with two 5¼in disk drives. The unit is substantially built inside and out, mainly out of painted sheet metal, with an ABS foam front.

Lifting the lid reveals the two drives and power supply firmly fixed to the top of the unit; both being shielded behind metal screens. Cooling is provided by a rather noisy fan, housed in the top with the power supply, which keeps the main heat generating parts above the circuit board.

The circuit board is neatly laid out, and is attached to the base with four supporting pillars. The connecting sockets in the machine I tested were not screwed to the back panel, leaving them very weak, but there is provision for this in the production model.

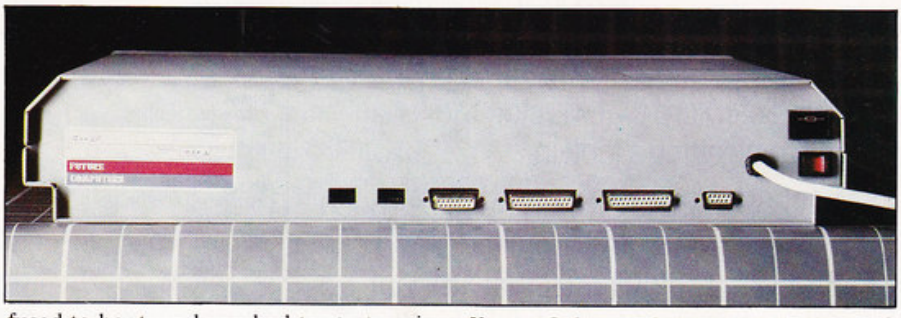
Connecting the system up is simple, even without a manual. The VDU plugs into the back of the CPU with a nine way D socket. There is a choice of destinations for the keyboard's coiled cord, which has a small zero insertion force plug and a rather flimsy retaining clip on the end of it.

For normal use this can be plugged into the side of the CPU, but if you are short of space it can be plugged into the underside of the VDU, leaving the CPU free to be mounted on the side of your desk. This would also make the fan noise less obtrusive.

All the plugs and sockets are keyed to ensure correct use.

Throwing the illuminated mains switch on the back brings the machine to life. It then goes through a very lengthy 15 second self-test before attempting to boot the disk. I only once succeeded in getting it to boot the disk first go.

On the tested system, the disk had to be inserted and locked shut before the end of the self-test, otherwise the machine refused to boot, and you had to start again from scratch.



Above — A glance at the back reveals the standard set of connectors.

Below — The VDU has a neat, limited-movement ball and socket which allows it to tilt forward and rotate. It can also stand free.

Inset — The low-profile keyboard, with three separate blocks, is well-suited to WP use.

Keyboard

The keyboard, which is ABS foam, is solid and well made. This is fortunate, as it seems to be one of the few features that will remain unchanged in the production models. The board is sculptured and low profile, making it comfortable to use for long word processing jobs. All the keys blip quietly when pressed.

It is divided into three blocks. The normal qwerty keyboard has 13 slightly recessed function keys in the top row, with a help key in the top left hand corner.

A block to the right of this contains the cursor keys, including two diagonals, with five editor keys and three more function keys above them.

The final block, on the far right, contains a normal numeric keypad and four more function keys, bringing the total up to 20.

All the function keys can be programmed easily using a file called 'RCONFIG', which is also used to programme the RS232 ports. On the tested system the function keys were already programmed for single key entry of the CP/M commands.

The character set for the FX20 is also programmable using 'CEDIT . BAS', which allows you to turn on or off any pixel within the 16 × 10 character cell. This is a feature of the versatile character generator chip used in this machine.

Screen

The swivel topped VDU of the tested system has a good, easy to read display which uses the Scandinavian standard orange on brown. There is a contrast enhancing mesh on the front of the screen, which gives very little glare or reflection, although the effect was slightly marred by the video synchronisation being incorrectly adjusted. This resulted in slight character (and eye) wobble.

Unfortunately the production models will have a green on black display as standard, and I feel this is not nearly so easy on the eye.

One irritating feature of the display is that the descenders on the lower case characters just overlap with the upper case characters on the following line.

The date and a clock are permanently and faintly displayed at the bottom of the screen, powered from a battery backup in the VDU box.

Only monochrome is available at present, but Future hopes to start developing

colour for the FX20 at a later date.

Storage

Data and program storage is on twin 5¼in floppy disks, giving 800K of storage per drive. The higher models in the range, the FX30/5 and FX30/10, sport five and ten megabyte hard disks instead of one of the two floppies.

The drives supplied with the test system were Hitachi 505s, which have only half the capacity of the production model drives. The manufacturer says the new drives are guaranteed to read IBM disks, but I was, of course, unable to test this claim. The disk controller chip is certainly capable of supporting a wide range of floppy drives, and it should be physically possible to produce an IBM compatible disk on this machine, software willing.

The disk drives are slimline, 5¼in models, with a time-out which turns the drives off if they are not being accessed at regular intervals. This reduces wear on you disks, while not inconveniencing you when handling complex disk operations.

One of the current bugs with the FX20 is that if you attempt to read from a disk drive which has no disk in it, or indeed a faulty disk, there is no way to get back into the system — even if you then put in the missing disk — after the motor has timed out. The only way to restart the system is to power down and up again, thereby losing the contents of the memory. Future says it is modifying the operating system to overcome this.

Expansion

Like the IBM PC, the Future FX20 is designed around the 8088 microprocessor. The necessary signals have been taken to an expansion port which can be used to plug in an adaptor, which in turn will accept two IBM PC bus compatible boards. This expansion port can also be used to plug in Future's own extra boards when available.

There are two 25 way D sockets on the back of the CPU. These are standard RS232C ports. One is for a printer, and the other is a full communications port.

Two RS422 local area network connectors, which were not included in the test system, will also be available. It will be necessary to buy an FX30 to be able to run the network, but it does make the FX20 the basis for a fully expandable office system with any number of masters and slaves.

Software

The software provided with the system as standard will be full CP/M-86, including ASM86 and Edit for machine code programming. You will apparently also receive the source code of the BIOS and full circuit diagrams, so there should be no dark secrets to the professional programmer or engineer.

For the average office user you get Spellbinder, a good and well proven word processing program which makes full use of the extra keys on the keyboard. You will also get a program called Emulate, which enables the system to run software from an 8080 CP/M system.

This naturally runs more slowly, but was efficient enough to be able to play Adventure, a version of the famous role playing game. Emulate will also support MBasic in the equivalent of a 64K environment.

The review machine was also supplied with Basic 86 by Microsoft, Supercalc and D Base II. These all worked smoothly, making good use of the edit function keys.

The programmable function keys 1 to 20, when programmed with Basic commands like FILES <CR> did not produce any effect unless followed manually by <SPACE> and another <CR>. But when used with RUN, SAVE and LOAD they worked well.

It will be possible to add a memory expansion card which will allow you to upgrade the operating system to concurrent CP/M. As an alternative you can have MS-DOS on the basic machine for £50.

A useful feature on the FX20 is the help file, which is selected with its own single key. You are then presented with a menu of all the CP/M-86 commands and Help itself from which to make a choice. Once you've selected the command, a page of instructions is put on the screen, showing the format of the command and explaining its overall function. There are then further choices of sub-topics or examples. On the review machine there were no examples — it just put you back in CP/M-86. I was told this had already been sorted out on one of the other machines.

Support

The FX20 will be covered under warranty for two years. A maintenance agreement has been made with Software Sciences to give a 24-hour response during the working week. This will cover the whole of the UK.

Encotel, the distributor, has been involved with Future from the early stages of the design, and therefore should be able to answer any queries arising with this machine.

Verdict

The Future FX20 has great potential as a networked office machine. It is early days to be able to tell exactly what the software system will be like, but the hardware tested was of good sound design and easy to use. And the CP/M-86 operating system has obviously opened the doors to the large library of office software which is already available.

All this could be yours, provided that by the end of June, Future Computers has brought itself into the present, with all the modifications promised, and with the FX20 being available ex-stock.

SPECIFICATION

Price:	£1,875 with VDU, CPU and twin disk drives, keyboard
Processor type/speed:	8088 at 8MHz
RAM memory:	128K up to 1Mb
ROM memory:	4K bootstrap and self test
Text screen:	80 × 24
Graphics screen:	640 × 250 and 1280 × 500
Keyboard:	Qwerty, 20 functions, keypad
Interfaces:	RS232C Printer Port, RS232C Communications port, X21 port, two RS422 local area network ports
Storage:	Two double sided double density drives. 800K per disk
OS/Language	CP/M-86 — MS-DOS optional
Distributor:	Encotel, 01-686 9687

STRATEGIC ACTION

VIC 20

Thinking drivers

Name Harvester **System** Vic 20 **Price** £7.95 **Publisher** Pixel Productions **Format** Cassette **Language** Basic **Other versions** None **Outlets** Mail order, various dealers.

Here is one of those rare non-violent games, based on strategy rather than zapping the enemy. It also separates the boys from the girls, or so I found among the kids I let loose on it. The girls loved it, but the boys thought it was 'rubbish', probably because it is intriguing rather than exciting, depending on thinking ahead rather than on fast hand-to-eye coordination.

Objectives

Up to four can play, each driving a harvester which gobbles up dots scattered around the screen.

The round ends when a player cannot move in any direction containing dots to be gobbled.

In play

When the game is RUN, the screen fills up with coloured dots — otherwise known as parcels of Boosterpice.

The distinctive harvesters for each player are placed randomly around the screen. At screen right are the simple direction codes, 1 for up, 5 for down, 8 for north east, and so on.

You make a move by typing in your personal code (A-D) and the direction code of your choice; an infinite time is allowed for you to make up your mind in a move. You can use the Delete key to change your mind before hitting RETURN to make the move.

The harvester then trundles off gobbling the dots in your chosen direction as far as it can go, to a pleasing musical accompaniment. It stops when it hits the edge of the screen, meets another harvester, or runs out of dots.

An attempt to move in a direction which is thus barred, without even one dot to be gobbled, ends the round and reduces the player's score to zero. Other players' scores are carried over to the next round.

The strategy, of course consists of trying to munch a line of dots in such a way that your opponent is isolated in as small an area as possible, so that it's not you who has to abort the round and lose all your points.

Verdict

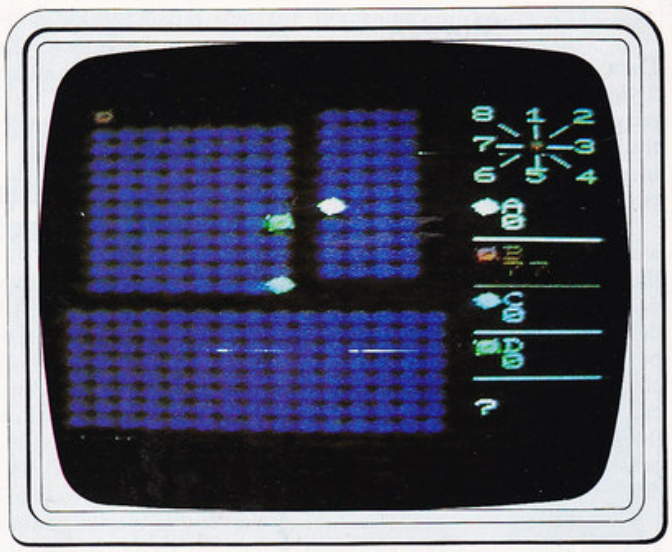
The graphics are simple but effective, including a rather powerful (but increasingly irritating) screen flash routine in the second half if you fail. The sound effects work pretty well, too.

But Harvester's biggest point of appeal is the fact that it is a game that appeals to the intellect rather than to a sublimated desire to zap other entities.

Karl Dallas

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	



DRAGON 32

Tomorrow the world?

Name Strategic Command **System** Dragon 32 (2 joysticks needed) **Price** £9.99 **Publisher** Romik Software (0753-71535) **Format** Cassette **Language** Basic **Other versions** None **Outlets** Mail order and various dealers.

Romik's claim is that they will be introducing at least one new game every month — which is just as well as it would take that long to read the instructions on this one.

Objectives

The aim is nothing less than total world domination, which is achieved by deploying your various forces around the map in an attempt to capture your opponent's capital.

First impressions

Opening the cassette and reading the closely-typed double-sized insert makes you realise that this is not a game to be tackled lightly.

In play

Unfortunately play is delayed by a brief 'Joystick Control' program at the start of the tape, which simply confirms that both joysticks will move in the different directions, and of course this has to be run through in order to find the start of the main program each time. Annoying and unnecessary.

Run the game proper and the map is displayed, the opposing red and yellow forces each having a capital, an army base and a naval base. Task forces can be created from each of these, but only when the particular base is flashing.

Centring the joystick and pressing the fire button makes the bases flash in rotation, till you hit the one you want.

It sounds tricky but soon becomes easy.

Once started, a force will keep moving until the instructions are altered, which means keeping your eye on several things simultaneously, and when forces draw near the battle commences, the computer deciding which side is the stronger and is therefore victorious.

Several skirmishes will take place as each moves towards the other's capital, the grand reward being the painting of your enemy's land mass in your own colour.

This is a simplified version of events, but there is plenty to contend with.

Verdict

If arcade games are the fast-food of the computer world, then this is more your three-course dinner for two, but it occurs to me that with its minimal use of sound (just a few Spectrum-like beeps and buzzes), and its problems with the Dragon's colours, the whole enterprise would work better as a board game.

But if you like this type of strategy battle, and want one to try on your Dragon, then this seems to be the only one around and it is well done.

Mike Gerrard

RATING

Lasting appeal	
Playability	
Use of the machine	
Overall value	

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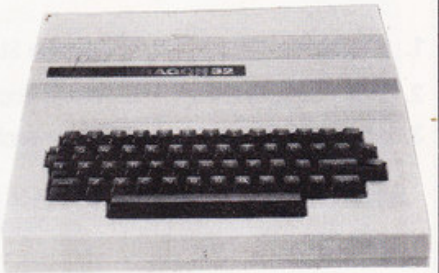

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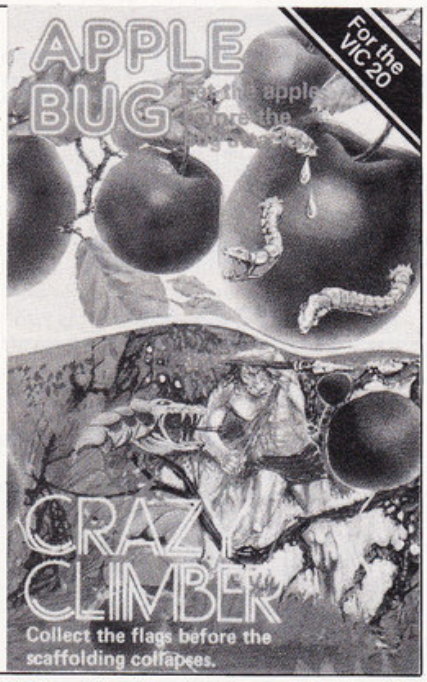

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TINY TOTS

BBC 16K

Watch with micro

Name: A First Book of Micro-Rhymes **System:** BBC 16K **Price:** £4.95 **Publisher:** Peter Gordon, 20 Despard Road, London N19 5NW **Format:** Cassette **Language:** Basic **Outlets:** Mail order

'Are you sitting comfortably?', the BBC micro asks you. 'Then I'll begin. . .' Call this a game, an entertainment or micro-education for the one-to-six year olds, but whatever you call it, A First Book of Micro-rhymes is one program which could leave you competing for your BBC micro with even the very youngest members of the family.

It is simply a set of computer-based nursery rhymes written by a teacher and aimed at the very youngest micro users.

First impressions

This is a self-documenting program, so simple that no instructions are needed. All you need to use are the 'Y', 'N', space bar and ESCAPE keys — all the other keys are disabled.

There's a cheerful picture displayed while the rhymes are loading, then in large and clear lettering comes the very familiar question, 'Are you sitting comfortably?' (If you aren't comfortable and hit 'N' in reply, nothing further will happen. The program will simply wait until you decide you are comfy.)

In play

Hickory Dickory Dock is the first rhyme — with the text nicely centred on the screen as there is a VDU command built into the program to correct the typical off-centre BBC display. A nice touch.

In each of the five rhymes, the text is written line by line, in time with the tune (perhaps a little fast), and with additional sound effects such as the 'dong' when 'the clock struck ONE', or 'Humpty Dumpty had a great FALL'. At the end of each rhyme, it can be repeated with the space bar, or the next rhyme played by hitting ESCAPE.

I tested the rhymes on my four-year-old daughter. After the second rhyme, she had mastered the controls, and after the third, she was reciting the rhymes as each line appeared on the screen; she then explained the controls to her mother. She loved Jack and Jill and said she would like to play it again, often.

Verdict

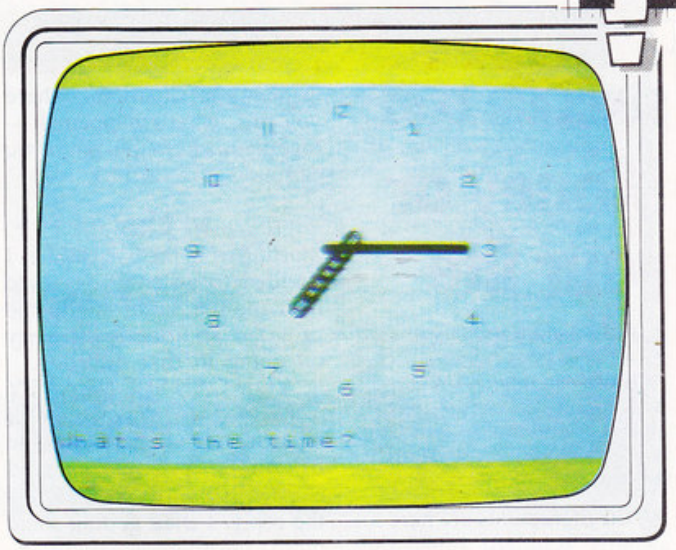
This is the start of a series of programs for pre-school children, written by a teacher with a child, now two-and-a-half, in mind. So far, this is not a market that is well provided for, so Micro-Rhymes makes a welcome addition.

It should provide entertainment for some time, if used intermittently.

Colin Cohen

RATING

Lasting appeal	
Playability	
Use of machine	
Value for money	



SPECTRUM

Clocks and coinage

Name: Telling the Time/Money **System:** ZX Spectrum, 16K **Price:** £5.50 **Publisher:** Poppy Programs 0468 41291 **Format:** Cassette **Language:** Basic **Outlets:** Mail order

Telling the Time and Money are two new educational programs for young children and both come on a single cassette.

I thought I'd try the programs out, then try them on my five-year-old son and his six-year-old friend. Finally I unleashed them on three children aged six, seven and eight who go to a nearby school.

Objective

In Money, several coins are drawn on the screen in various colours, with letters in lower case above them. Then an amount, say £1.58, is written beneath them. The child then has to make up the money by choosing the coins by letter. As coins are chosen different tones sound, pitched according to the coins' values. Different coloured screens also show the child's score for a set of games, from a black up to a gold screen. Telling the Time asks the player to spell out the time shown on a clock face in words, and words only.

In play

I tried out Money first. The coins appeared on the screen, and the amount which I had to make up showed up underneath. So far, so good. Unfortunately, I could not recognise the coins, which were unnumbered, and so I got my sums wrong.

Neither my son nor his friend could do it, except for low amounts like 39p or 65p. Of the other three children, the seven- and eight-year-olds had problems recognising the coins. The youngest, like my son, could do the simpler ones, but was completely foxed by larger sums.

Telling the Time got much the same results. I tried it, I got it wrong. For this lesson, there must be absolutely no use of numbers when spelling out the time, and apparently it's wrong to say 'A quarter to nine'. I should write 'Quarter to nine', or so the computer informed me.

The youngest of my school trio could read, and got some of the words right with his older sister's help, though she got some of the times wrong. The eight-year-old, like me, failed on the computer 'grammar'.

The graphics for Telling the Time were good, but a clock is a clock is a clock, and there's not a lot you can do with it. Maybe it would be better depicted as a cuckoo-clock or Big Ben?

Verdict

Both could do with a number of different levels of play, to suit a wider range of ages and abilities.

These two 'lessons' are not very good value for money at present. But if they were upgraded to 48K with more varied tests, they could make a first-rate teaching aid for junior schools.

A L Quelch

RATING

Lasting appeal	
Playability	
Use of machine	
Value for money	

TREASURE QUESTS

SINCLAIR ZX81

Money or your life

Name Adventure 200 **System** 16K ZX-81 **Price** £5.95 **Publisher** Foilkade, 66 Littledean, Yate, Bristol **Format** Cassette **Language** Machine code **Other versions** BBC A or B, Dragon, 16K Spectrum **Outlets** Mail order

All the ingredients are here for a fairly standard bread-and-butter, meat-and-two-veg, vanilla-flavoured adventure game. There are evil enemy agents, a priceless royal treasure, and a trackless waste which you must explore (disguised of course), to track down the missing valuables — and all this without getting killed.

Objectives

Agents from the evil land of Grunlock have stolen some of the King's treasure. You are the head of palace security, and you're in disgrace. Now you must venture out into Grunlock, disguised as a peasant, to try to get it back.

You start from the west end of the palace, with the knowledge that if you don't get the treasure back, the King will have you killed.

First impressions

The instructions for the game are brief, but to the point. Commands are the simple classics — 'N' for North, 'TAKE', 'DROP', 'THROW', and so on.

After every move, the ZX 81 displays your situation — where you are, what's happened — together with obvious paths you can take.

In play

Starting from the palace gate, I decided to go south. I could hear the sea, according to the program, so I decided to carry on going in that direction.

'YOU CAN SEE NEARBY . . FISH', I was told, along with my whereabouts. So I took the fish with a very brief command of 'T'. 'YOU TAKE FISH' was the reply. I tried getting some more information about it. 'DEF', I entered — short for 'DESCRIBE FISH'. Oh boy. 'A SMALL RED DEAD FISH' was the answer I got for my pains.

Maybe I should have eaten it? Still, after throwing away the dead fish, I moved on, to find myself at the entrance to a large cave. A lamp was on offer, so I took it and went further into the depths of the cave. But just one move later, I fell down a hole in the dark and was killed. Perhaps I should have lit the lamp.

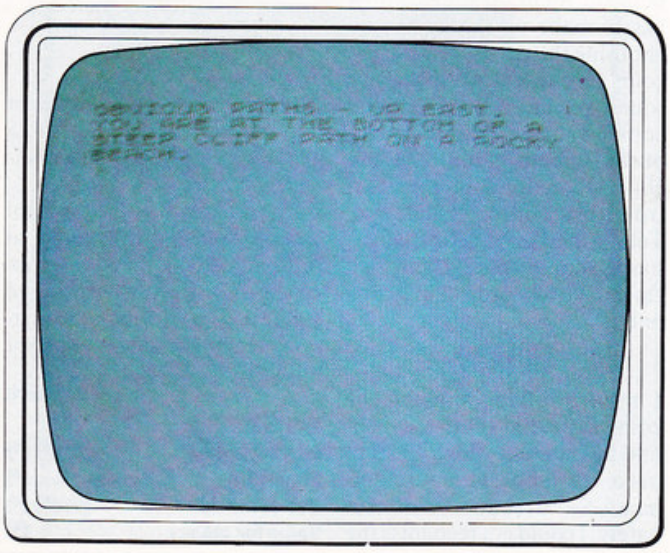
Verdict

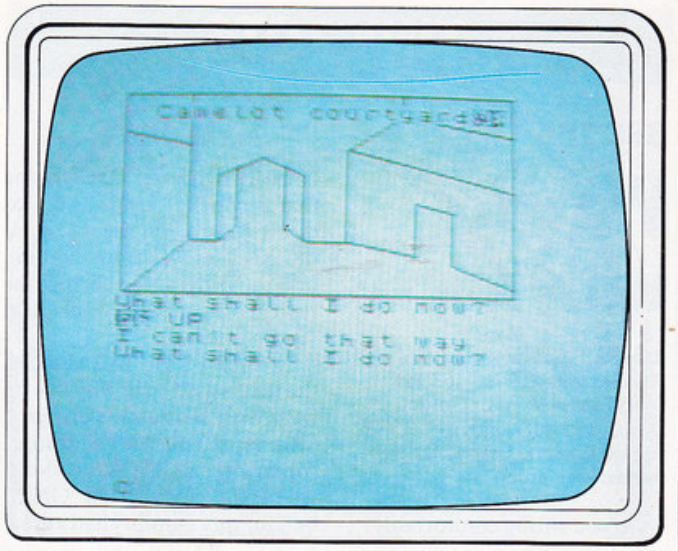
Adventure 200 proved to be very time consuming, not least because it is interesting enough for you to want to complete it, and because you can't SAVE the results on tape. There are no graphics but the messages and descriptions are ample. For ZX81 owners, this is a must.

David Janda

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	





SPECTRUM

Knight shift

Name Knights Quest **System** ZX Spectrum 48K **Price** £5.95 **Publisher** Phipps Associates **Format** Cassette **Language** Basic **Other versions** ZX-81 (£4.95) **Outlets** Mail order and shops

For those of you with the money, there are real-life adventure games run by various societies. The setting is mediaeval times, and brave knights rescue princesses from wicked wizards who have locked them into a tower.

But for those of us who cannot afford to go on these expensive romps, the next best — or perhaps even the best — thing is to put the idea on cassette and call it an adventure game. Such a game is Knights Quest and I tried it out on the 48K Spectrum.

Objectives

You are a knight from the castle of Camelot (where else?) who must search for Merlin's lost treasure and return it — fighting on your way all the dragons, giants, elves and so forth who crop up in your path. Oh, and of course you get to rescue a captive princess.

First impressions

The Knights Quest cassette is well labelled, with a copy of the adventure recorded on both sides of the tape. Instructions are on the tape, but not the cassette sleeve. I found LOADing no problem, but the instructions, which precede the adventure, cannot be bypassed. You just have to sit through them every time. And sadly, they are vague and brief. This led to some confusion as I carried on playing.

In play

The first sight you see is the road to Camelot. The screen is split between graphics and text from time to time, though generally what you get is a description of where you are together with the question, 'What shall I do now?'

After a spot of bother trying to figure out how to use the program's commands, since the instructions are vague and brief, I tried to rescue a helpless dwarf being beaten up by savage elves. But even though I was fully armed, sword and all, I was told, 'You were defenceless and were captured by the elves'.

Well! This sort of thing happened several times, so I finally managed to get into Camelot to pick up some food, a sword and shield. Then I headed off to make my fortune and rescue my princess.

But that was about as far as I was able to get. Bugs, and plenty of them, prevented me from advancing much further into the game.

Verdict

It is a pity that the game's bugs prevented me from getting deep into it, since a look at the program listing showed that there is plenty to this adventure. It would be fun — if only it were working properly.

David Janda

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	

ZX81 16K | **SPECTRUM 16/48** | **DRAGON 32** | **TANDY LEVEL 2** | **BBC A/B**

AWARI

★ The ancient African game of logic. It takes 2 minutes to learn the rules but far longer to master the tactics.

★ Select the 'Goat-herd' level of play and it's an addictive game for children (8+) that exercises their minds – not their laser fingers.

★ Select the 'Witch-doctor' level and it's a threat to your sanity. We haven't beaten it and we wrote it!

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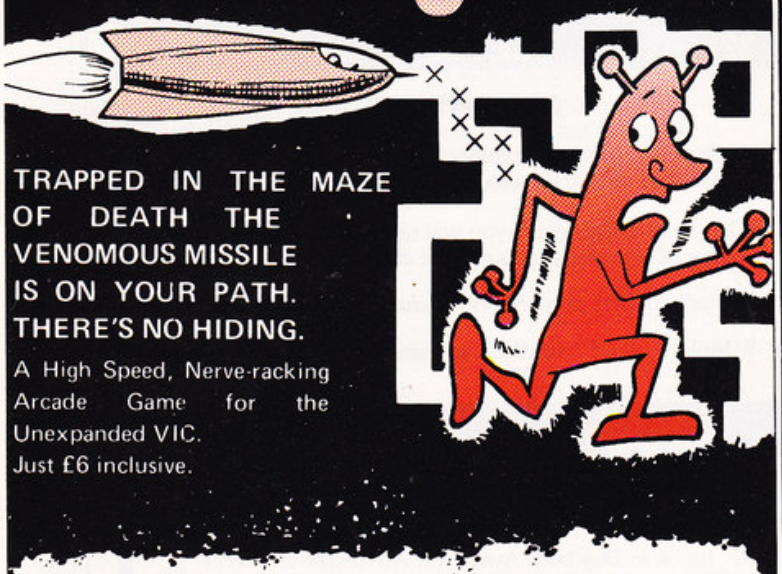

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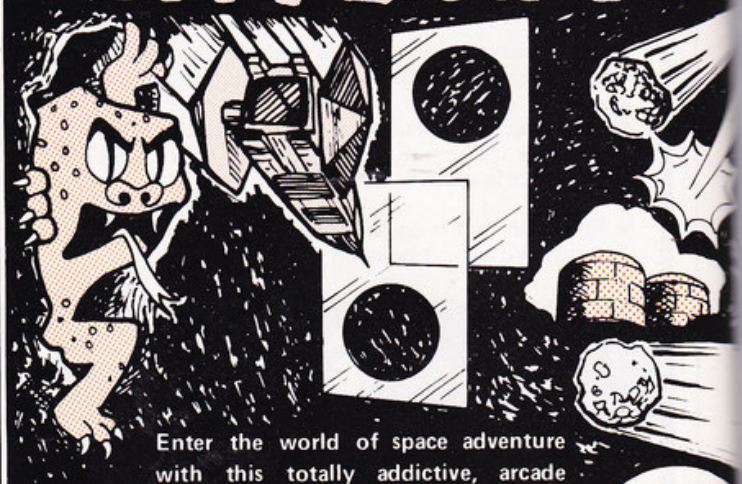

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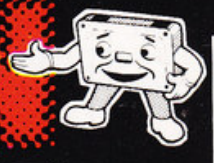

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VISA

Clubnet keeps you in touch with the mirocosm 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 Boyde-Shaw, Nailsea 851337.

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 Bird, 74 High Street, Great Barford, Beds MK44 3LB, tel: 0234-870763.

Chiltern Computer Club. Meets at Five Bells, Eaton Bray, Near Dunstable, Leighton Buzzard on second and fourth Monday of each month (annual subs: £2 senior members, £1 under-14s). Contact Steve Betts, 42 Wallace Road, Eaton Bray, Bedfordshire OU62DF, tel: 0525-220922.

Luton College Computer Club. Contact John Rodger, tel: 0582-3411.

Luton Computer Club. Contact J P Fletcher, 1 Trowbridge Gardens, Luton, Beds LU2 7JY, tel: 0582-450687.

BERKSHIRE

Easthampstead Computer Club. Meets at Easthampstead Park School, Easthampstead Park Mansions, Bracknell, on the first Wednesday in month at 8pm. Contact Brian Poulton, tel: 0344-84423.

BIRMINGHAM

Birmingham Amateur Computer Club. Meets at CBS Consultants, Watery Lane, Small Heath, Birmingham 10, on the first and third Wednesday of each month at 7pm (annual subs: £4.20 adults, £1.50 juniors). Contact Dr M Bayliss, 125 Berryfield Road, Sheldon, Birmingham B26 3UU, tel: 021-743 7197.

BUCKINGHAMSHIRE

Aylesbury Computer Club. Meets at Quarrendon Youth Club every Friday at 7.30pm (annual subs: £5). Members also meet at Mandsville 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 Tibbitts at Ellwood, Deanway, Chalfont St Giles. Buckinghamshire, tel: 024-07 4906.

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

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

CAMBRIDGE

Cambridge Microcomputer Club, meets on the third Wednesday of each month. Contact Derek Tripp at 3 Spurgeons Avenue, Waterbeach, tel: 0223-315662.

Haverhill Microcomputer Club, meets at St Marys' Church Hall, Camps Road, Haverhill, on the second, third and fourth Wednesday of each month at 7.30 to 10.30pm (annual subs: £3 adult: £1 OAP and students: meetings 25p). Contact Andrew Holliman, at 5 Trinity Close, Balsham, Cambridge CB1 6DW, tel: 022 029-583.

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

CHESHIRE

Altrincham Computer Club. Meets at N. Cestrian Grammar School, Durham Road, Altrincham, fortnightly. Contact Martin Hickling at 39 Barrington Road, Altrincham, Cheshire WA14 1H2, tel: 061-941 4547.

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

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

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

Holmes Chapel Micro Club meets at Liesure Centre, Holmes Chapel at 7.30 to 9.30pm on the first and third Tuesday of each month (annual subs: £5 adults: £2.50 children, OAP and students. Or weekly subs: 30p adults, 20p children). Contact Margaret Baker, at 1 Helton Close, Crewe, Cheshire, tel: 0477-34238.

Kinder Peek Computer Club meets at Bew Mills School every Monday, sub: £2 per quarter, £1 members under 11. Contact John Eary, New Mills 43870.

New Mills & District PCC meets at New Mills School, fortnightly on Fridays at 7 to 9.30pm, meetings 35p. Contact Mr G M Flanagan at 11 Sundown Close, New Mills, Stockport, Cheshire SK12 3DH, tel: 0663-44051.

Northwest Computer Club meets fortnightly, meetings 25p. Contact John Lightfoot at 13 Aston Drive, Frodsham, Warrington, Cheshire WA6 7PU, tel: 072 831519.

Northwest Computer Club, weekly meetings. Annual subs: £1: meetings 30p (vistors 50p). Contact Tom Wyatt at 29 Summer Lane, Halton, Runcorn Cheshire WA7 5PG, tel: Runcorn 77545.

Mid-Cheshire Computer Club meets at Winsford Library on the second Friday every month at 7.30pm contact Dave Clare, Winsford 51374.

CLEVELAND

Cleveland Micro Club meets on the second and third Tuesday of each month, under 18s on second of the month, over 21s on third Tuesday of the month. Contact J Telford at 13 Weston Crescent, Norton.

Stockton Amateur Computer Club meets at Stockton YMCA every Monday at 7pm, meetings 20p to be reviewed. Contact P J Cheshire at 60 Croft Road, Eaglescliffe, Stockton-on-Tees, Cleveland. TS16 0DY.

CORNWALL

Cornish Radio Amateur Club — Computing Section. Contact Bob Reason at 24 Mitchell Road, Camborne, Cornwall.

Cornwall Area Computer Club. Contact M F Grove at 35 Causeway Heard, Penzance.

St Austell Computer Club and Computer Town meets at ECIP Labs, Penpewan Road, St Austell, fortnightly on Mondays at 7.30pm. Contact N G Day at 2 Cilendale Close, St Austell, Cornwall PL25 3DD.

DERBYSHIRE

Derby Micro Society meets at Littleover Church Hall, Sheperd 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 Dearn, 2 Spinney Close, Glossop, Derbyshire.

DEVON

Exter & District Computer Club meets at Exeter School, Magdalene Road, Exeter, on the second and fourth Tuesday every month. Annual subs: £7.50 adults, £2.00 for students. Technical library. Contact Ian Hodgeson, 21 Dean Street, Exeter, tel: 0392-50812.

Exeter & District Amateur Computer Club meets second Tuesday every month. Annual subs: £7.50. Contact Doug Bates, Fortescue House, Stoke Cannon, Exeter. Specialist meetings on third and fourth Tuesday.

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 Sub: £5 adults; £2.50 juniors. Contact Peter Hibbs, 54 Runnymede Avenue, Bournemouth, Dorset BH11 9SE, tel: 0202 576547.

TOPIC meets at Canteen English Truck Centre on the second and fourth Wednesday every month at 7pm. Annual subs: £5, reduced fees for students. Contact David Washford, 1 Alexander Road, Bournemouth, Dorset BH6 5JA.

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

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

Genius 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 Wanescot Road, Brentwood, Essex CM15 9HD.

Genius Computer Club, subs: £1 ZX81 members, £1.50 Spectrum members. Contact 30 Webber House, North Street, Barking, Essex.

Springfield Computer Club meets on the first Friday of every month. Contact Stephen Cousines, 1 Aldeburgh Way, Springfield, Chelmford, Essex CM1 5PB, tel: 0245 50155.

Colchester Microprocessor Group meets at University of Essex on the second and fourth Wednesday of every month at 7.30pm. Annual subs: £5. Contact Information Centre, University of Essex, near Colchester.

Stanway School Computing Club, only school members at present. Contact G Floyd, c/o Physics Department, Stanway School, Stanway, Colchester, Essex.

Dragon Independent Owners Association, produces newsletter, gives discount on software, subs: £8. Contact Doug Bourne, School House, Nevern Road, Rayleigh, Essex.

Romford Club, a new club. Contact Mr D Norden, 138c Church Road, Romford, Essex.

South East Essex Computer Society meets at Hockey Club at Roots Hall, near Southend Football Stadium on Wednesday at 7.30pm. Open to members over 14. Contact Robin Knight, 128 Little Wakering Road, Little Wakering, Southend-on-Sea, Essex, tel: 0702-218456.

GLOUCESTERSHIRE

British Amateur Electronics Club. Independent club with newsletter, beginner's section, library, annual exhibition catering for all ages. Contact Mr J Margetts, 3 Bishopstone Close, Golden Valley, Cheltenham.

Cheltenham Amateur Computer Club meets on the third Tuesday of each month at 7.30pm. Contact Mike Pullin on 0242-25617 or Robin Phelps 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, 36 Riverviews Way, Cheltenham, Glouc.s.

HAMPSHIRE

Commodore Computer Club, inaugural meeting at Bury House, Bury Road, Gosport on May 6 at 7.30pm. Contact Brian Cox, Fairham 280530.

HANTS

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

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

Southampton Amateur Computer Club meets at Medical Science Building, Bassett Crescent, East Southampton, on the second Wednesday of every month at 7.30pm. Annual subs £5, £3.50 students & OAPs. Contact P Maddison, 'Gardenways', Chilworth Towers, Chilworth, Southampton SO17 JH.

HEREFORD

Hereford Amateur Computer Club, proposed new club. Contact Stuart Edinborough, 2 Warwick Walk, Bobblestock, Hereford HR4 9TG, tel: 0432-269700.

HERTFORDSHIRE

Harpenden Microcomputer Club meets at

57▶

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.

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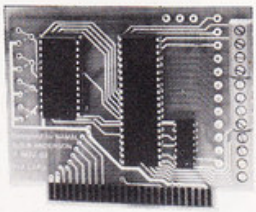

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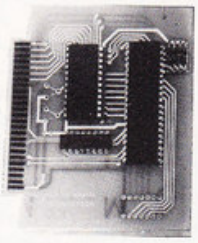

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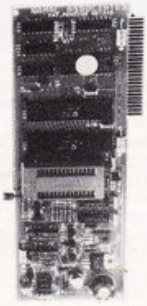

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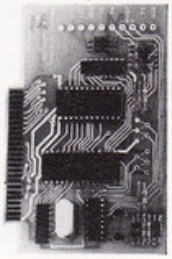

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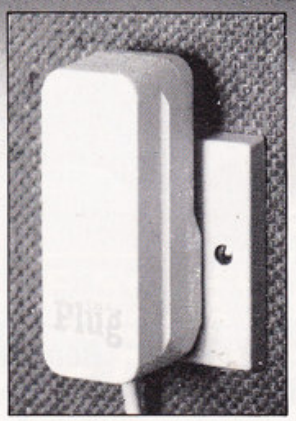

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Silver Cap, Harpenden on alternate Mondays. Annual subs £2.50. Contact David James, 5 Ox Lane, Harpenden, Hertfordshire AL5 4HH.

HUMBERSIDE

Grimsby Computer Club meets at Grimsby Central Library fortnightly on Mondays at 7.30pm. Contact Jenson Lee, 29 Park View, Cleethorpes, tel: 0472-4259.

Scunthorpe & District Microprocessor Society meets at Community Centre, Lindun Street, Scunthorpe, every Tiesdau at 7.30pm. Annual subs £2, families £5. Contact G Hinch, 21 Old Crosby, Scunthorpe, South Humberside DN15 8PU.

KENT

Canterbury ACC proposed new club. Contact L Fisher, 21 Manwood Avenue, St Stephens, Canterbury, Kent CT2 7AH.

Medway Amateur Computer & Robotics Organisation meets on the first Tuesday and third Wednesday of every month. Annual subs £5. Contact Paul Cameron. Small Community Centre, Lordwood Lane, Lordwood, Chatham, Kent, tel: 0634-63036.

North Kent Amateur Computer Club meets at Lecture Theatre, Charles Darwin School, Jail Lane, Biggin Hill, Kent, on the first Thursday of every month at 7.30pm. Annual sub £3, £1 students. Contact Iain House, 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 Pyatt, 23 Arundel Drive, Orpington, Kent BR6 9JF, tel: Orpington 20281.

Amateur Computer Club, annual subs: £4.50 (£2 for under 18s, OAPs). Contact Rupert Steele, St John's College, Oxford OX1 3JP.

National Personal Computer User Association, annual subs £12. Contact Eric Keeley, 11 Spratling Street, Manston, Ramsgate, Kent.

Sevenoaks School Computer Club. Contact G Sommerhoff, Technical Centre, Sevenoaks School, Sevenoaks, Kent, tel: 0732-456340.

Tonbridge & Tunbridge Wells ACC. Contact Ray Szatkowski, 1 Cromer Street, Tonbridge, Kent, tel: 0732-355960.

LANCASHIRE

Blackburn Micro Computer Club. Contact Roger Longworth, 12 Sharp Close, Accrington, Lancs.

Bolton Computer Club meets at E4/24 Bolton Institute of Higher Education, Deane Road, Bolton, on Thursdays. Annual subs: £1. Contact David Atherton, 16 Douglas Street, Asherton, Manchester M29 9FB, tel: 0942-876210.

Burnley Computer Club meets at Carleton Hotel, Standish Street, on Tuesdays 7.30-11pm. Contact Clive Tallon, 27 Basnett Street, Burnley, Lancs BB10 3EQ.

Chorley Computer Club meets at Townley Arms, Chorley, every other Tuesday at 8pm. Contact Chris Hicks, 131 Market Street, Chorley, Lancashire.

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

Lancaster & Morecambe Computer Club. Contact Sarah Blackler, tel: 0524-33553.

South Chadderton Computer Club meets at Turf Lane Centre, Turf Lane, Chadderton, on Thursdays at 7-9.30pm. Contact Mr Jakeman, 26 Mardle 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 Blandings Public House, High Street, Lincoln on the frist and third Wednesday of every month. Contact John Clifford, 448 Newark Road, Lincoln LN6 8RX, tel: 0522 2168.

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 L4 6SH.

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.

Computer Users Club. Contact Tony Latham on 01-304 3910.

East London Amateur Computer Club meets at Harrow Green Library, Cathall Road, E11, on the second and fourth Tuesday of every month at 7-10pm. Annual subs: £5. Contact Fred Linger on 01-554 3288.

Forum-80 London, contact Leon Jay on 01-286 6207.

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 Bazyle Butcher on 01-950 7068.

Imperial College Microcomputer Club meets at room 145, level 1, on Tuesdays at 7.30pm. Contact Tim Panton, c/o I.C. Union Office, Prince Consort Road, London SW7 2BB.

ITN Computer Club meets on Fridays. Contact A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, tel: 0485 62035.

Laserbug, contact 4 Station Bridge, Woodgrange Road, Forest Gate, London E7 0NF.

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

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

North London Hobby Computer Club meets at the Polytechnic of North London, Holloway, London N7 8DB, on every Monday, Tuesday, Wednesday and Thursday during term time and one evening a week during holidays. Annual subs: adults £25, family £40, jobless, pensioners, poly students £5. Contact Robin Bradbeer 01-607 2789.

Paddington Computer Club meets at Paddington College, Paddington Green, London W2 1NB. Contact Peter Hill on 01-723 5762.

Post Office HQ Microcomputer Club meets at room B145, River Plate House, 12-13 South Place, off Moorgate, on the second Thursday of every month. Contact Vernon Quaintance, 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 Forster, 18a The Barons, St6 Margarets, Twickenham, Middlesex, tel: 01-892 1873.

The SOBAT Computer Club meets the first week of every month. Annual subs: £1. Contact T Kayari, 12 Calderon Road, London E11 4EU.

South East London Microcomputer Club meets at Thames Polytechnic, Greens Ends, Woolwich SE18, on alternate Wednesdays at 7pm. Annual subs: £5. Contact Peter Phillipps, 61 Graigerne Road, SE3, tel: 01-853 5829.

Southgate Computer Club, annual subs: £2.50. Contact Panos Koumi, 33 Chandos Avenue, London N14.

Southgate Technical College Computer Club meets at Room W102 Southgate Tech, fortnightly on Thursdays at 7.30pm. Annual subs: £5. Contact Kevin

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Pretorius on 01-882 2282.
West London Personal Computer Club meets at Back room, Fox & Goose pub, Hanger Lane, Alperton, on the first Tuesday of every month at 7.45pm. Annual subs: £5 adults, £2.50 under 16s & pensioners. Contact Graham Brain on 01-997 8986.

MANCHESTER

Manchester Computer Club meets at the Department of Computer Science, Manchester University, Oxford Road, Manchester, on the first and third Thursday of every month at 7.30pm. Contact David Wade, 061-941 2486.
Small Business Computer Users Club. Proposed new club to meet the last Tuesday every month, subs: £7.50. Contact K Wadsworth on 061-740 7232 after 5pm.

MERSEYSIDE

Bolton Computer Club meets Room E4/E24 Bolton Institute of Higher Education, Deene Road, Bolton, on Thursdays. Annual subs: £1. Contact David Atherton, 16 Douglas Street, Atherton, Manchester M29 9FB.
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 Bristone, 28 Weld Road, Southport, Merseyside PR8 2DL, tel: 0704-64524.
Wirral Microcomputer Users Group meets at Birkenhead Technical College every Monday. Contact J Phillips, 14 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 Anderson, 41 Pebworth Road, Harrow, Middlesex.
Richmond Computer Club meets at Richmond Community Centre, Sheen Road, on the second Monday of every month at 8pm. Contact Bob Fisher, 18a The Barons St Margarets, Twickenham, Middlesex, tel: 01-892 1873.
Sunbury Computer Club meets at St Benedicts Hall, Napier Road, Ashford, on the last Tuesday of every month at 8pm. Contact Simon Taylor, 8 Priory Close, Sunbury-on-Thames, Middlesex. Contact Simon Clark, 83 Watling Street, Towcester, Northants NW12 7AG.

NOTTS

Ashfield Computer Club meets at Carsic Junior School, St Mary's Road, Sutton in Ashfield on the first and third Thursday every month. Annual subs £3. Contact Derick Daines, c/o Cuttings Avenue, Sutton in Ashfield, Notts.
Eastwood Town Micro Computer Club meets at Devonshire Drive Junior School every Wednesday at 5.45pm. Annual subs: £5.50 adults, £2.75 juniors, £4.50 OAPs. Contact Ted Ryan, 15 Queens Square, Eastwood, Nottingham NQ16 3BJ.
Nottingham Microcomputer Club meets at Friends Meeting House, Clarendon Street, Nottingham, on the first Tuesday of every month. Annual subs: £5.50 adults, £2.50 juniors, OAPs. Contact Mr E Harvey, 6 Roseleight Avenue, Nottingham NG3 6FH.

NORFOLK

Anglia Computer User Group. Contact Jan Rejzl, 128 Templemere, Sprowton Road, Norwich, tel: 0603-29652.
East Anglian Computer User's Group meets at Crome Community Centre, Telegraph Lane, Norwich. Contact Gill Rijzi, 88 St Benedicts, Norwich.
South Northants Computer Group meets at Anchor House, Moat Lane, Towcester, on Wednesdays at 7.30pm.

OXFORDSHIRE

Association of Computer Clubs. Annual subs: £5, £2.50 under 18s and OAPs. Contact Rupert Steele, St John's College, Oxford OX1 3JP.
Microsoc 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 OX14 4AU.
Ridgeway Computing Club meets at Swan Hotel, East Ilsley, on the second Tueday every month. Contact Mike Magney, Beavers, South Street, Blubury, Didcot, Oxon OX11 0JU.

SHROPSHIRE

Ludlow & District Microcomputer Club meets at Diocesan Education Centre, Lower Galdeford, Ludlow, on the second 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 Brichmore, Brookside, Telford TF3 1TF, tel: 0952-595959.

SOMERSET

Sharp MZ80 Club, contact Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset.
Yeovil Computer Club. Contact D G Carrington, 2 Romsey Road, Yevil, Somerset BA21 5XN.

STAFFORDSHIRE

Alsager Computer Club, meets at Alsager Comprehensive School, Stoke-on-Trent, Staffs, fortnightly on Tuesday. Contact Rex Charlesworth on 09363-77270.
The Amateur Computer Club of North Staffs meets on the third Wednesday every month. Annual subs £3. Contact J Roll, 16 Hill Street, Hednesford, Staffordshire WS12 5DS.
ICL Birmingham Branch Micro Club, c/o WBA Ecclestone, 26 Browns Lane, Tamworth, Staffs.
Tame Valley Computer club, contact Tim Marshall, 32 Milton Avenue, Leyfields, Tamworth, Staffordshire B79 8JG.

SUFFOLK

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

SURREY

Ashtead Computer Club meets on the last Thursday of every month. Contact P Palmer, 8 Corfe Close, Ashtead, Surrey.
Thames Valley Computer Club meets in Griffin Pub, Caversham. Annual subs £1, 50p a meeting. Contact Phil Warn, Reading 594874.
Thames Valley Amateur Computer Club meets at Griffon, Caversham, on the first Tuesday every month. Contact Brian Quarm, 25 Roundway, Camberley, Surrey GU15 1NR, tel: Camberley 22186.
Ewell Micro Club, contact Dave De Silva, 316 Kingston Road, Ewell, Surrey KT19 0SU.
Farnham Computer Club, meets at Farnham 6th Form College, Morley Road, Farnham, Surrey on the second Wednesday every month. Annual subs: £2. Contact Adam Sharp, 14 Thorn Road, Boundstone, Farnham, Surrey.
West Surrey Computer Club meets at Paddock Room, Green Man Public House, Burpham, Guildford, the first Thursday of every month. Annual subs £5. Contact Chris Karney on 0483-68121.
TI Home Group, annual subs: £12. Contact P Dicks, 157 Bishopsford Road, Morden, Surrey.
CBBS London meets on Sundays 4-10pm. Contact P Goldman, PO Box 100a, 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: £6, £4 OAPs, £2 family. Contact Dave Wilkins on 01-642 3102.
Atari Computer Enthusiasts meets at 8 Cosdach Avenue, Wallington, Surrey SM6 9RA, subs: £20. Contact Adrian Miles, tel: 01-647 1713.
Association of London Computer Clubs, contact Len Stuart, 89 Mayfair Avenue, Worcester Park, Surrey KT4 7SJ.
Worthing & District Microcomputer Club meets at Rose Wilmot Youth Centre, Littlehampton Road, Worthing, on alternate Sundays 11am-1pm. Annual subs £4 adults, £2 students, £5 family. Contact B. Thomas, 11 Gannon Road, Worthing, W. Sussex, BN11 2DT, tel: 0903 36785.

SUSSEX

West Sussex Microcomputer Club meets at Room RO6, Robinson Road Annexe, 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 Hayden, 2 Hillary Close, East Grinstead, W Sussex RH19 3XQ.
Micro Enthusiasts, new club proposed. Contact G Diannage, 16 Malvern Street, Hove, Sussex BN3 3YR.
Arun Microcomputer Club meet 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. Anual 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, fortnightly. Annual subs: £3 adults, £1 students. Contact Terry Sale, 20 Redwood Drive, Chase Terrace, Walsall WS7 8AS.
Walsall Computer Club meets at Park Hall Community School on the second and fourth Monday every month 6.45-9.45pm. Annual subs £5 adults, £3.50 students. Contact Alison Hunt, 58 Princes Avenue, Walsall, W Midlands, WS1 2DH, tel: 0922-23875.
National Westminster Personal Computer Society. Contact P Moore 021-236 6176, 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, Love Lane, Stourbridge, on the second and fourth Tuesday every month. Annual subs £4, £3 full-time students. Contact John Tracey, 100 Booth Close, Brierley Hill, Kingswingford, W Midlands, tel: 0384-70097.

WILTSHIRE

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

WORCESTER

Worcester & District Computer Club meets at Old Pheasant Inn, New Street, Worcester, on the second Monday every month at 8pm. Contact D Stanton, 55 Vauxhall Street, Rainbow hill, Worcester WR3 8PA.

YORKSHIRE

Barnsley Co-Operative Computer User Group meets at Co-Op Social Club, Pogmore, Barnsley, on the last Tuesday every month at 7.30pm. Annual subs £1. Contact James Bridson, c/o 39 Kereforth Hall Road, Barnsley, South Yorks S70 6NF, tel: 0226-41753.
Doncaster Amateur Computer Society meets in YMCA, 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: 0535-62828.
Huddersfield Computer Club meets every Monday. Contact Chris Townsend, 760/4 Manchester Road, Linthwaite, Huddersfield, tel: 0484-657299.
Leeds Microcomputer Users Group meets at 8 Regent Street, Chapel Allerton, fortnightly on Thursday at 6pm. Contact David Parsons, 22 Victoria Walk, Horsforth LS18 4PL.
Program Power, contact R Simpson, 5 Wemsley Road, Leeds Ls7 2BX, tel: 0532-683186.
Pennine & District Computer Club meets at 26 Mill Hey, Haworth, W Yorks, on Saturday and Sunday. Contact Douglas Bryant, 26 Mill Hey, Haworth, W Yorkshire, tel: 0535-43007.
Shipley College Computer Group meets on Tuesdays. Contact Paul Channell, tel: 0274-595731.
South Yorkshire Personal Computer Group meets at General Lecture Theatre, St Georges Building, Mappin Street, Sheffield, on second Wednesday every month at 7.30pm. Annual subs: £4. Contact Paul Sanderson, 8 Vernon Road, Tetley, 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 Tudor Street, Thurnscoe East, tel: 0709 893880.
West Yorkshire Microcomputer Group meets on Tuesdays. Contact Phillip Clark, c/o Suite 204, Crown House, Armley 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 Road, Harrogate, North Yorkshire HG1 2BY, tel: 0904-38239.

SCOTLAND

Scotish Amateur Computer Society, contact Mike Anthony, 46 Moredun Park Gardens, Edinburgh EH17 7JR.
Central Scotland Computer Club 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.
Fife 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 junior. Contact Alan Morrison, 21 Beech Road, Westhill, Skene, Aberdeenshire AB36 8WR.
Kemnay Computer Club meets weekly. Contact S Stubbs, 15 The Glebe, Kemnay, Inverurie, Aberdeenshire.
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 PH1 1HA.
Skye and Lockalsh Computer Society, proposed new club. Contact C Manvell, 25 Breacais Isol, Isle of Skye IV42 8QA.
Strathclyde Computer Club meets at Wolfson Centre, 106 Rottenrow, Glasgow, on the third Wednesday of every month. Contact B Duffy, 24 Lomand Drive, Condorrat, Cumbernauld G68 8NW.

WALES

Abergele Computer Club meets at Abergele CI Offices every Thursday at 7.30-10pm. Annual subs: £5 adults, £2.50 juniors. Contact W Jones, 77 Millbank Road, Rhyl, Clwyd, North Wales.
Colwyn Computer club meets at the Greens Hotel, Colwyn Bay, at 7pm. Contact D Bevan, c/o Abergele Road, Colwyn Bay, Clwyd LL29 7PA.
81 Club annual subs: £30 + vat. Contact Mike Hayes, tel: 0222-371732.
Gwent Amateur Computer Club meets at St Mary's Institute, Stow Hill, every Thursday at 7.30pm. Annual subs: £3.50. Contact Rothery Harris, 16 Alanbrook Avenue, Newport, Gwent, Wales NPT 6QJ.
Pontypool Computer Club meets at The Settlement, Roackhill Road, Pontypool, Gwent, on every Friday. Contact Graham Loveridge, on Pontypool 2827.
Swansea & Southwest Wales Amateur Computer Club meets on the last Friday every month. Contact Paul Griffiths, 1 Prescelli Road, Penlan, Swansea SA5 8AF.

EIRE

Cork Amateur Computer Club. Talks and demonstrations. Hardware, programming and games. Contact T Moriarty, Tiger Bay, Rochestown, Douglas, Cork, Eire.

KAYDE

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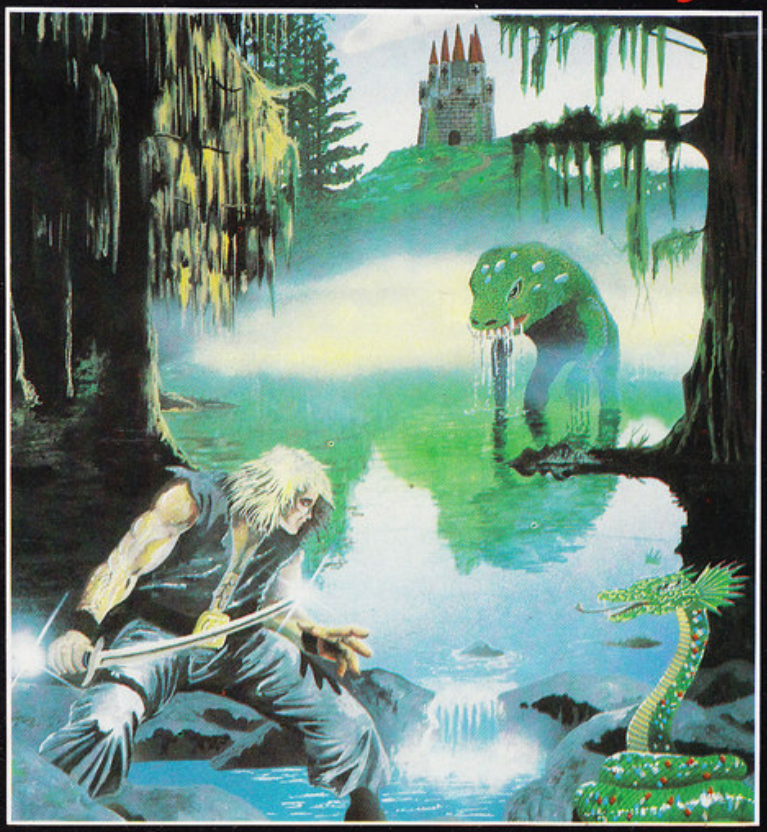

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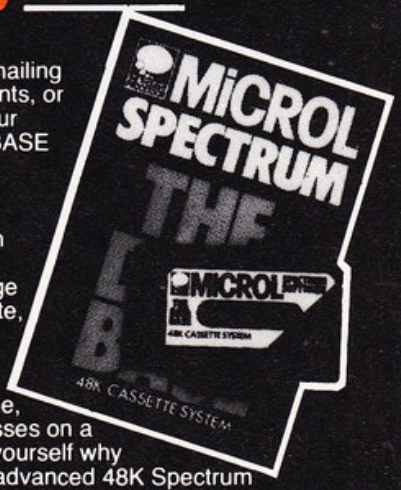

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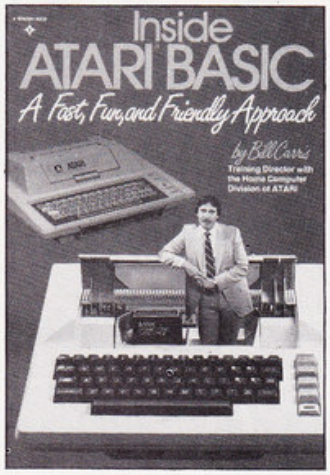


'Inside Atari Basic' by Bill Carris, published by Prentice/Hall at £10.35 (paperback, 183 pages).

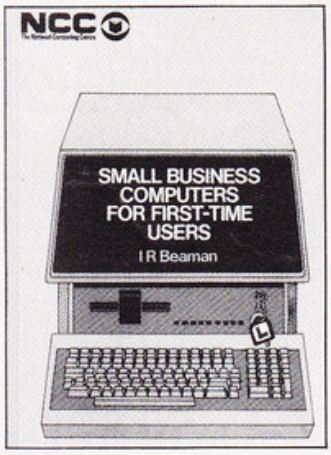
This book really is about as simple as they come. Imagine a guide to the Atari's very own set of Basic quirks which tackles the concept of variables with a drawing of a radish, peas and asparagus stalks, and the words, 'These are *vegetables*, not *variables*'. Then it goes on to list a collection of words such as SUM, MONTH, and ZONK, under the heading, 'These are *variables*, not *vegetables*.'

Yes, *Inside Atari Basic* doesn't miss a single misconception you might be harbouring. It trots you through not only the nitty-gritty of Atari Basic, but also the Atari computer's graphics and sound capabilities, as well as such exotica as how to switch on, and where to put the Basic cartridge in. And as long as you have a taste for the American custard-pie sense of humour, you should find the process both easy and entertaining.

The book is well-peppered with example programs for you to type into your Atari right from the word go, and it's equally lavishly illustrated with cartoons and diagrams. Trickier concepts, such as the computer's internal numbering system, are given a page to themselves with a drawing of a robot waving the sign, 'STRANGE CONCEPTS'.

It's written by Atari's own home computer division training director, and he has obviously designed it to stand alone in place of the Basic manual supplied with the machine — except in the case of really esoteric errors, at least. Simpler error messages are listed in this book, along with diagnoses, and the whole learning process has been really well thought out and intelligently designed in manageable chunks.

For anyone with absolutely no knowledge of computers, or a little experience but some resistance to digging into the intricacies of Basic programming, this book is virtually guaranteed to get you started, if only because it hammers every point home over and over and over and . . . In fact, experienced Basic programmers would do well to skip to the sections on joystick or paddle control and graphics handling, or they'll come out at the other end of this book gibbering. **SF**



'Small Business Computers for First-Time Users'by I R Beaman, published by the National Computing Centre at £9.50 (paperback, 247 pages).

Small Business Computers for First-Time Users takes on the considerable task of paving the new user's way into the wonderful world of computing. This task is the *raison d'être* of the publisher — the National Computing Centre — so it's hardly surprising that the book does the job thoroughly.

This one's bound for the shelves of the person who doesn't want to adopt a computer as a new member of the family, but wants to get some computing power in a business without having to become a computer enthusiast.

Newcomers to computing usually face the problem of how you go about deciding which computer to buy when you have no experience. Even hiring a consultant to do the work for you requires a minimal understanding of the industry, and to get this experience you need a computer.

This book sets out to provide an escape route, not by encouraging people to become do-it-yourself computer experts, but by taking them through the steps involved in evaluating needs and determining solutions.

It looks at some of the more common applications and rounds off with appendices on sample study questionnaires, some study reports, a specimen tender document and a suggested letter to suppliers. **IS**

'The Power of the Dragon' by John Sharp and David Bolton, published by Microsource at £5.95 (paperback, 177 pages).

This one's a goodie — it's designed to take up where the more pedestrian clutch of guides and the user manual leave off — how to get down to some fairly serious programming work once the basics have been mastered.

It contains 30 programs which progressively take the user through programming techniques. Each program is prefaced by one to four pages of explanation under the headings 'Program Type', 'Objectives', 'Summary' and a rundown on the 'Program Structure'.

The listings have been reproduced on the page at 32 columns wide, so they will appear exactly as they do on the screen. As a further neat aid, the last program is called Checksum. This adds up the characters and spaces in the program to give a unique number so the program can be checked to ensure it has been typed in correctly.

Although it would be nice to see some production quality working its way into books of this type, users by now probably expect the daisywheel output for the text and the good old dot matrix on the listings. The book is also spiral bound, so although this always feels rather makeshift the book will outlast the considerable pounding and spine bending it is almost certainly destined to undergo as a micro-side companion. **IS**

'21 Games for the BBC Micro' by Mike James, S M Gee and Kay Ewbank, published by Granada at £5.95 (paperback, 144 pages).

It's been done before, but that's not to say that Mike James, S M Gee and Kay Ewbank shouldn't have done it again.

'It' is the perennial production of 'X number of games for your Y micro.' The key lies in how well the authors stick to the formula.

That formula comprises one part program documentation (so you know how to play the games once you've spent several hours typing them into your micro), one part program explanation (so you know what each part of the program is doing and can debug and modify it) and two parts listing.

Using those as the benchmarks I would give the new BBC book better than average marks. Every program begins with a shot of the screen, so you know what the end product of your typing is supposed to look like before you start. The authors also spend time telling you how to play.

As far as the programs themselves go, they're all pretty standard simple computer games. There's a version of Eliza (also sometimes called Freud) that lets you 'talk' to your computer as a guidance counsellor. Here it's known as Smalltalker.

You also get a fruit machine simulation, a Pong-type squash game, space invaders, asteroids and other video game favourites, also available on disk or cassette.

This isn't a book for experienced BBC users, but if it gives you half the joy my first book of programs for the old Apple gave me, I think it's worth a spoonful or two of this tried and true formula. **GW**

PCN ProgramCards

Another bumper crop of annotated *PCN* ProgramCards for your perusal, edification and use wings its way to you again. Don't forget to cut them out, stick them on card and file in a box so that you can build up a comprehensive library of programs and subroutines to include in your own system.

Remember that this section is both FOR you and BY you, so if you have any suggestions, ideas or submissions, don't hesitate to contact us and we will do everything we can to include them in this section.

This week

Our selection includes an indexing program for cassettes for the BBC micro and the first part of a serialised cassette database program for Commodore equipment, plus our regular subroutine section.

Alastair McLeod of Glasgow has made available to readers all his very useful indexing program. This allows the user to keep track of the contents of cassettes.

The best way to use the program is to assign a length of blank tape at the beginning of the cassettee to be SAVEd to, and by keeping a log of the programs and their length, include this information as DATA statements within this program then SAVE it to the front of the cassette.

By doing this, every cassette used thereafter will contain a fully documented index which can be referenced at any time. An added feature of this program is the automatic CHAINing of a selected program from the index.

From Cheltenham, Ray and Alison Schofield have combined their talents and skills to produce a cassette-based database system that will function on any Commodore computer with 32K or more and also can be used on smaller memory machines with restricted quantities of data.

Features of this database are four-field records (1 alpha, 3 numeric), full editing, sorting on any field, subsidiary field sorts and display or print of selected record(s). For those of you using disk-based systems this program can be easily modified.

The sub-routine and example program contain facilities to sort and extract alphanumeric strings within a user-defined array.

Reward offered

If you want to see your own programs in print send them to the Programs Editor at the address below and we will endeavour to get them onto cards as quickly as possible.

It would be a great help if they were on disk or cassettee with a listing and a note of requirements etc. As if fame were not enough we will even send you real money (a cheque actually) on publication, at our standard rates.

If you are interested in becoming a referee for submitted programs then send details of experience, machines covered etc to: Programs Editor, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

PCN ProgramCards

Program Indexer Card 1 of 3

8308PI1/3

A program to allow the user to set index information into itself so that it can be subsequently saved to the cassette for future reference and also CHAIN selected program(s) for use.

```
 10  ON ERROR MODE 7:END

 20  DIM P$(50),F$(50),C$(50)

 30  N%=0:M%=0:VDU 23,1,0;0;0;0;:CLS
 40  P$(0)="---------------"
 50  READ T$:S%=19-LEN(T$)DIV2
 60  REPEAT
 70      N%=N%+1
 80      READ P$(N%),F$(N%),C$(N%)
 90      IF M%<LEN(P$(N%)) THEN M%=LEN(P$(N%))
100    UNTIL P$(N%)="XXX" OR N%=50
110  P$(N%)="":N%=N%-1:PROClogo

120  IF N%<8 THEN J%=17+N% ELSE IF N%<14 AND M%<16 THEN J%=17+N%DIV2 ELSE J%=2
3
130  PRINT TAB(2,J%);CHR$130;"Select Program";CHR$131;CHR$136;"Letter";CHR$137
;CHR$130;"or ESCAPE"
140  IF N%<8 THEN PROCsingle
150  IF N%>7 AND N%<15 AND M%<16 THEN PROCtwin
160  IF N%>14 OR (N%>7 AND M%>15) THEN PROClist:PROCchain

170  REPEAT:P%=GET:UNTIL (P%>64 AND P%<65+N%) OR (P%>96 AND P%<97+N%)
180  PROCchain
190  END
```

BBC Model B
BBC Basic

Application: Utility
Author: Alastair McLeod

- 10 Sets error trap—used by "ESCape" to terminate program—clears screen and ends
- 20 Declare arrays for program names, file names, counter positions. Maximum of 50 files
- 30 Turn off flashing cursor, clear screen
- 40 Assign end of file indicator to start value
- 50 Read title, calculate *S%* as print position
- 60-100 Loop to read index data until end or limit reached
- 100 Remove end of data indicator, reset *N%* to actual last record number, perform procedure to display screen layout
- 120 Calculate line number for command line
- 130 Display command line
- 140-150 Choice of either single or double column display of program/file list
- 160 Display list of programs/files for selection of CHAIN

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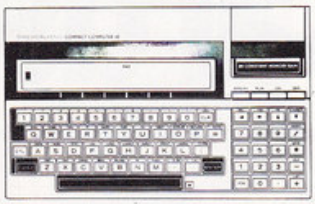

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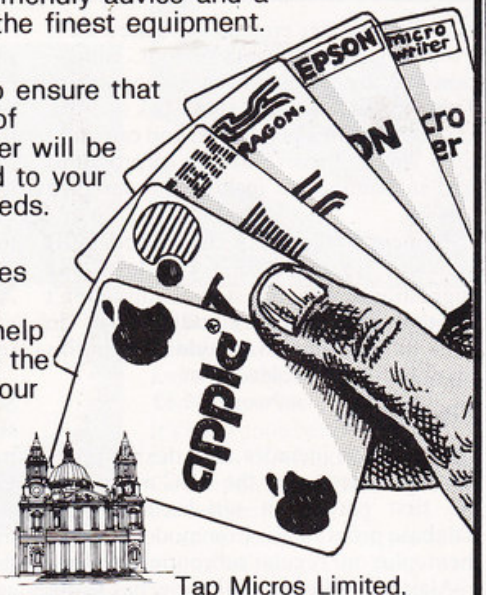

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PCN ProgramCards

Program Indexer Card 2 of 3

8308PI2/3

```
200  DEFPROClogo

210  A$=CHR$55+STRING$(18,"'")+CHR$107:B$=CHR$117+STRING$(18,"p")+CHR$122:PRIN
T
220  FOR I%=0 TO 1:PRINT CHR$141;CHR$130;"ACORN  ";CHR$132;CHR$157;CHR$135;" B
BC   COMPUTER   ";CHR$156;CHR$131;" B B C ":NEXT
230  PRINT TAB(9,3);CHR$129;CHR$157;CHR$151;" ''''''''''''''   ";CHR$156
240  PRINT TAB(9,4);CHR$129;CHR$157;CHR$151;" SOFTWARE INDEX   ";CHR$156
250  PRINT TAB(2,13);CHR$134;"This tape contains the following";TAB(3,14);CHR$
134;"programs:"
260  VDU 31,32,3,147,39,51,40,99,43,31,32,4,147,50,38,112,41,97,31,32,5,147,10
2,100,44,44,07,31,32,6,147,41,57,57,48,106,31,32,7,147,32,34,102,102,110,31,32,8
,147,48,56,113,102,106
270  VDU 31,1,3,146,32,32,112,32,32,31,1,4,146,32,126,63,125,32,31,1,5,146,104
,125,123,63,52,31,1,6,146,106,126,119,119,53,31,1,7,146,108,124,124,124,60,31,1,
8,146,34,43,47,39,33
280  PRINT TAB(9,7);CHR$149;A$
290  PRINT TAB(9,8);CHR$149;CHR$53;CHR$131;" TAPE  TITLE :-";TAB(27,87);CHR$13
7;CHR$149;CHR$106
300  PRINT TAB(0,9);CHR$149;" ppppppppp5                    jppppppppp"
310  FOR I%=0 TO 1:PRINT CHR$141;CHR$149;"5";CHR$129;CHR$136;TAB(S%);T$;TAB(35
);CHR$137;CHR$149;"j":NEXT
320  PRINT CHR$149;" ''''''''''''''''''''''''''''''''''''''''''''''''''''"
330  ENDPROC
340  DEFPROCsingle

350    VDU 31,0,15
360    FOR I%=1 TO N%
370      PRINT TAB(6);CHR$131;CHR$(96+I%);CHR$135;P$(I%)
380    NEXT
390  ENDPROC
400  DEFPROCtwin

410    J%=N% DIV 2:VDU 31,0,15

420    FOR I%=1 TO J%
430      PRINT TAB(2);CHR$131;CHR$(96+I%);CHR$135;P$(I%);TAB(20);CHR$131;CHR
$(96+I%+J%);CHR$135;P$(I%+J%)
440    NEXT
450    IF N%<>2*J% THEN PRINT TAB(20);CHR$131;CHR$(96+N%);CHR$135;P$(N%)

460  ENDPROC
```

200	Procedure to display logo and index page
210	Set up part of screen display
220	First line in double size characters
230-240	Title section
250	Detail for title
260	BBC owl logo
270	Acorn "acorn" logo
280	See line 210
290	Title section again!
300	Box surround
310	Double size surround and tape title flashing
320	Bottom line of surround
330	Return to main line
340	Procedure to list single column — no scroll
350	Set cursor position
360-380	Loop to display selection letter and program data
390	Return to main line
400	Procedure to list double column — no scroll
410	Set *J%* to limit of right column limit. Position cursor
420-440	Loop to display two columns of selection letters and program data
450	Display last selection letter and program data if odd number of programs in list
460	Return to main line

PCN ProgramCards

Program Indexer Card 3 of 3

8308PI3/3

```
470  DEFPROClist

480    D%=-1
490    PRINT TAB(13,14)"(Press RETURN to list)"
500    REPEAT

510      D%=(D%+1)MODN%
520      PROCscroll
530      REPEAT:P%=GET:UNTIL P%=13 OR (P%>64 AND P%<65+N%) OR (P%>96 AND P%<
97+N%)
540    UNTIL P%<>13
550  ENDPROC
560  DEFPROCscroll
570    FOR I%=1 TO 7
580      PRINT TAB(4,15+I%);CHR$131;CHR$(96+(I%+D%)MOD(N%+1));CHR$135;P$((I%
+D%)MOD(N%+1));SPC(25-LEN(P$((I%+D%)MOD(N%+1))))
590    NEXT
600  ENDPROC
610  DEFPROCchain
620    P%=P%-96:IF P%<1 THEN P%=P%+32
630    CLS:LP%=LEN(P$(P%)):LF%=LEN(F$(P%))

640    VDU 23,1,1;0;0;0;
650    PRINT TAB(4,5)"Wind tape to position ";C$(P%);" and PLAY"
660    PRINT TAB(13-LP%/2,8)"Searching for ";P$(P%)
670    PRINT TAB(13-LF%/2,10)"(Filename - ";F$(P%);")"''
680    CHAIN F$(P%)
690  ENDPROC
700  REM        Program Data
710  REM  Collective Title Of Programs On The Tape
720  DATA GAMES TAPE ONE
730  REM  Program Details: Name,Filename(whether different or not),Tape Counte
r Position
740  DATA SNAPPER,SNAPPER,010
750  DATA ROCKET RAID,RAID,052
760  DATA PHILOSOPHERS QUEST,QUEST,087
770  DATA BREAKOUT,BRKOUT,132
780  DATA FROGGER,FROG,185
790  DATA SUPER INVADERS,INVADER,236
800  DATA ARCADIANS,ARCADIANS,254
810  DATA FLASH,FLASH,267
820  DATA METEORS,METEORS,298
830  DATA MONSTERS,MONSTERS,326
840  DATA SPHINX ADVENTURE,SPHINX,378
998  REM   End Of File Flags
999  DATA  XXX,YYY,ZZZ
```

470	Procedure to display single list with scroll
480	Set *D%* to initial value
490	Display prompt in correct place
500	Loop to display list — scrolls with RETURN key (13)
510	Sets selection letter
520	Performs routine to scroll list
530	Loops until single key response
540	Scroll or exit
550	Return to main line
560	Procedure to display scrolled list
570-590	Loop to display appropriate selection letters and program data
600	Return to main line
610	Procedure to CHAIN selected program
620	Set *P%* to correct array index value
630	Clear screen calculate values for positions on display
640	Turn off flashing cursor
650-670	Display prompts
680	Go and get selected program and run
690	Return to main line
700	Data statements for program list etc Last DATA statement must contain end of file/list indicators XXX, YYY, ZZZ

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PCN ProgramCards

CBM Database Card 1 of 12

8308CD1/12

A comprehensive database system for all 32K CBM machines using 4 fields on cassette and printer option

```
3 PRINT"□":POKE 59468,12
5 PRINT:PRINT:FOR I=1TO1000:NEXTI
7 LET N=100:GOSUB 8000
8 DIM A$(N),B(N),C(N),D(N)
9 PRINT:PRINT
10 PRINT "TO END                INPUT 1"
15 PRINT "FOR DATA TO PRINTER  INPUT 2"
20 PRINT "FOR NEXT INPUT LINE  INPUT 3"
25 PRINT "TO INPUT DATA        INPUT 4"
30 PRINT "FOR CASSETTE SAVE    INPUT 5"
35 PRINT "TO LIST ENTRIES      INPUT 6"
40 PRINT "TO FIND AN ENTRY     INPUT 7"
45 PRINT "TO SORT  DATA        INPUT 8"
50 PRINT "USER'S OWN ROUTINE   INPUT 9"
55 INPUT X
60 ON X GOSUB 2000,200,300,400,2500,3000,4000,5000,3500
65 GOTO 9
200 PRINT:PRINT "X=";2;"READY TO PRINT  DATA"
202 PRINT "TO AMEND THE FORM OF PRINT-OUT - LIST 200-299"
204 PRINT "CHANGE THE OUTPUT TO SUIT YOURSELF"
205 PRINT:PRINT "HAVE YOU SWITCHED ON PRINTER- Y/N":INPUT P$
210 IF P$=""THEN  GOTO 210
215 IF LEFT$(P$,1)<>"Y" THEN GOTO 205
220 RESTORE
222 OPEN3,4,2:CMD3
224 OPEN4,4,1:CMD4
226 PRINT#3,"AAAAAAAAAAAA     9999.99      999999     999999"
230 FOR I=1 TO N
240 READ A$(I),B(I),C(I),D(I)
250 IF A$(I)="*" THEN GOTO 270
260 PRINT#4,A$(I)CHR$(29),B(I),C(I),D(I)
265 NEXT I
270 PRINT#4:CLOSE4
275 PRINT#3:CLOSE3
280 FOR J=1TO 2000:NEXTJ:
290 RETURN
300 PRINT:PRINT "X=";3;"READY TO FIND NEXT LINE"
```

CBM machines
Commodore Basic

Requirements: 32K + cassette (printer optional)
Application: Database
Authors: Ray & Alison Schofield

Use PCN ProgramCard ref: 8307CC w/e 29 April 83 for reference to abbreviations used for cursor control symbols etc. Commodore 64 users remove POKE statement on line 3

3	CLH
5	Wait loop
7	Set data table maximum size, perform size change routine
8	Dimension the arrays for the four fields
9-50	Display prompts
55-65	Response to prompts and perform appropriate routine then loop round for other options
200-215	Display prompts and accept response
220	Set read pointer to 1
222-226	Set output to printer and print header line
230-265	Loop to read DATA statements and print until end of data code encountered
270-275	Print extra lines and close printer
280	Wait loop
290	Return to main line
300	Routine to find next line, display prompt

PCN ProgramCards

CBM Database Card 2 of 12

8308CD2/12

```
302 RESTORE
305 Y=0
306 FOR I=1 TO N
310 READ A$(I),B(I),C(I),D(I)
315 Y=Y+1
320 IF A$(I)="*" THEN PRINT "Y=";(Y-1);"ADD MORE DATA AT";(500+Y):PRINT:RETURN
350 NEXT I
399 PRINT:PRINT:RETURN
400 PRINT:PRINT "X=";4;"METHOD OF INPUTTING DATA":PRINT
410 PRINT "INPUT - LINE NUMBER DATA A$,B,C,D"
420 PRINT "TO END - TYPE - RETURN"
425 PRINT "INPUT IN FORM SHOWN
430 PRINT "AAAAAAAAAAAA,9999.99,YYMMDD,999999"
440 PRINT "   SUBJECT    SUM      DATE  CHEQUE "
445 PRINT
450 PRINT"RUN SELECTION 3 TO FIND FIRST AVAILABLE LINE"
499 PRINT:PRINT:RETURN
500 DATA SELF,15.00,830314,255106
501 DATA COMP SHACK,12.00,830127,255095
502 DATA SAINSBURYS,19.44,830222,255101
503 DATA CUT-ABOVE,10.00,830127,255094
504 DATA SAINSBURYS,19.67,830129,255092
506 DATA CHELTPRESS,21.03,830209,255096
507 DATA POST OFFICE,18.00,830206,255098
508 DATA CHEW VET,10.56,830207,255097
509 DATA SAINSBURYS,17.37,830212,255099
510 DATA NATIONAL TR,18.00,830214,255100
511 DATA DOLCIS SHOES,13.09,830118,255093
512 DATA CASH,25.00,830320,255105
513 DATA BELGRAVE,11.44,830228,255103
514 DATA DIXONS,16.00,830223,255104
515 DATA SAINSBURYS,26.99,830226,255102
516 DATA GOD KNOWS,27.10,830129,255091
517 DATA MILEQUIP,87.32,830326,255107
518 DATA MILEQUIP,284.05,830327,255107
519 DATA CASH,45.00,830401,255108
520 DATA CYCOLOGY,6.61,830402,255109
521 DATA GOWERPRESS,7.95,830406,255110
1998 DATA *,0,0,0
1999 PRINT:PRINT:RETURN
```

302	Set read pointer to 1
305	Set line counter to zero
306-350	Loop to count number of extant records and display where to enter new data, return to main line on end
399	If file exhausted then return to main line
400	Routine to show how to enter DATA statements for file information, display prompt
410-450	Display instructions in form of prompts
499	Double line feed, return to main line
500- (max of 1997)	DATA statements for recorded file information
1998	This statement *MUST* be present at this line number
1999	Double line feed, return to main line

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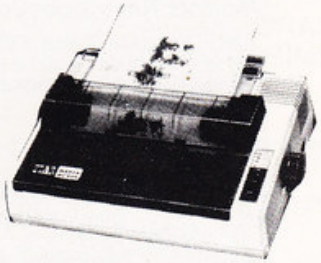

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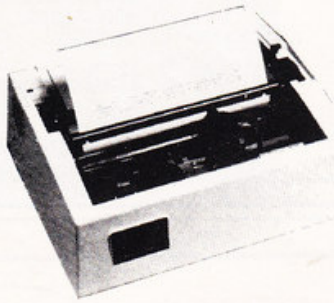

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CBM Database Card 3 of 12

8308CD3/12

```
2000 PRINT:PRINT "X=";1;"END OF ROUTINE"
2010 PRINT "HAVE YOU SAVED ALL YOU WANT?"
2020 PRINT "Y FOR YES - N FOR NO"
2030 INPUT Z$
2040 IF LEFT$(Z$,1)="N" GOTO 10
2050 IF LEFT$(Z$,1)="Y" GOTO 9998
2060 GOTO 2000
2500 PRINT:PRINT "X=5 - TO SAVE TO CASSETTE"
2502 PRINT "IS THE TAPE IN CASSETTE #1?"
2503 PRINT "ARE ALL KEYS UP -- IE IN STOP POSITION?"
2505 PRINT "INPUT SAVE FILE NAME"
2510 INPUT W$
2515 PRINT "FILE WILL BE SAVED AS '";W$;"'"
2520 SAVE W$
2525 PRINT:PRINT:PRINT "FILE SAVED AS '";W$;"'"
2600 PRINT:PRINT:RETURN
3000 PRINT:PRINT "X=6 - TO LIST ALL ENTRIES"
3005 PRINT"DO YOU WANT OUTPUT TO PRINTER Y/N ":INPUT Q5$
3010 IF Q5$="" THEN GOTO 3010
3015 IF Q5$="Y" GOTO9000
3030 FOR I=1TON
3035 READ A$,B,C,D
3040 IF A$="*" THEN PRINT:PRINT:FOR K=1TO2000:NEXT K:RETURN
3045 PRINT A$,TAB(20)B,C,D
3050 NEXT I:FOR J=1TO2000:NEXT J
3499 PRINT:PRINT:RETURN
3500 PRINT:PRINT "X=9 - USER'S OWN ROUTINES"
3505 RESTORE
3510 PRINT"LINES 3520 TO 3990 ARE VACANT FOR"
3515 PRINT"USER'S OWN ROUTINES TO BE INSERTED"
3999 PRINT:PRINT:RETURN
4000 PRINT:PRINT "X=7 - FIND ROUTINE STARTS"
4004 RESTORE
4010 PRINT "IF SEARCH IS FOR SUBJECT  INPUT 1"
4020 PRINT "IF SEARCH IS FOR SUM INPUT 2"
4030 PRINT "IF SEARCH IS FOR DATE INPUT 3"
4040 PRINT "IF SEARCH IS FOR NUM  INPUT 4"
4050 PRINT " INPUT 1 OR 2 OR 3 OR 4 "
4060 INPUT U
4070 ON U GOTO 4100,4200,4300,4400
```

2000-2020	Prompts
2030	Response
2040	Go back to selection
2050	All done!
2060	Try to enter Y or N next time!
2500-2505	Prompts for cassette save routine
2510	Response for file name on cassette
2515	Prompt
2520	SAVE file routine called
2525	Prompt on successful SAVE
2600	Double line feed, return to main line
3000-3005	Prompts and response
3010-3015	Action on appropriate response
3030-3050	Loop to read and display record data then return to main line on end detected
3499	Double line feed, return to main line
4000	Prompt
4004	Set read pointer to 1
4010-4050	Display prompts
4060	Select correct number
4070	Perform appropriate routine

PCN ProgramCards

CBM Database Card 4 of 12

8308CD4/12

```
4090 PRINT "DO YOU WISH TO SEARCH FURTHER? Y FOR YES - N FOR NO"
4092 INPUT M$
4093 IF LEFT$(M$,1)="Y" GOTO 4004
4094 GOTO 10
4095 PRINT:PRINT:RETURN
4100 PRINT:PRINT "U=7.1"
4104 RESTORE
4105 PRINT "INPUT NAME  REQUIRED TO FIND AS A RANGE  OR A SINGLE SUBJECT"
4106 PRINT " AS SAY SA,TZ  OR A,B  FOR A RANGE"
4107 PRINT " AS SAY DIXONS,DIXONS FOR NO RANGE THAT IS FOR A FIXED SUBJECT"
4110 INPUT S$(1),S$(2)
4115 S1=LEN(S$(1)):S2=LEN(S$(2))
4120 PRINT"DO YOU WANT OUTPUT TO PRINTER Y/N ":INPUT PR$
4124 IF PR$="" THEN GOTO 4130
4126 IF PR$="Y" THEN  GOTO8500:PRINT"OUTPUT TO PRINTER"

4130 FOR I= 1 TO N
4140 READ A$,B,C,D
4150 IF A$="*" THEN PRINT "END OF DATA"
4160 IF A$="*" GOTO4090
4170 IF(LEFT$(A$,S1)>=S$(1)ANDLEFT$(A$,S2)<=S$(2))THEN PRINT A$,TAB(20)B,C,D
4180 NEXT I
4190 PRINT:PRINT:RETURN
4200 PRINT:PRINT "U=7.2"
4204 RESTORE
4205 PRINT "INPUT SUM  REQUIRED TO FIND AS A RANGE  OR A SINGLE SUM"
4206 PRINT " AS SAY 45.00,46.00 FOR A RANGE"
4207 PRINT " AS SAY 12.00,12.00 FOR NO RANGE - THAT IS A FIXED SUM"
4210 INPUT F(1),F(2)
4220 PRINT"DO YOU WANT OUTPUT TO PRINTER Y/N ":INPUT PS$
4224 IF PS$="" THEN GOTO 4220
4226 IF PS$="Y" THEN  GOTO8600:PRINT"OUTPUT TO PRINTER"
4230 FOR I= 1 TO N
4235 READ A$,B,C,D
4240 IF A$="*" THEN PRINT "END OF DATA"
4250 IF A$="*" GOTO4090
4260 IF (B)=F(1)) AND (B(=F(2)) THEN PRINT B,A$,TAB(30)C,D
4270 NEXT I
4290 PRINT:PRINT:RETURN
```

4090	Prompt
4092	Response
4093	If yes then round again
4094	Select option again
4095	Double line feed, return to main line
4100	Line feed, prompt
4104	Set read pointer to 1
4105-4107	Prompts
4110	Responses
4115	Store string lengths
4120	Prompt and response
4126	If response is yes then do printer function
4130-4180	Loop to display single or range record(s)
4190	Double line feed, return to main line
4200	Line feed, prompt
4204	Set read pointer to 1
4205-4207	Prompts
4210	Responses
4220-4226	Printer prompt and response. If yes do printer function
4230-4270	Loop to display single or range record(s)
4290	Double line feed, return to main line

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8308SubSE

A pair of subroutines to facilitate an ascending bubble sort and extraction using a binary chop method

```
3200 REM Subroutine BSORT
3300 REM REQUIRES        : NR%    - No records in array to sort
3400 REM                   A$(*)  - Array of records to sort
3500 REM USES            : N,X    - Loop counters
3600 REM                   S$     - Used to store data during exchange
3700 REM RETURNS         : A$(*)  - Array sorted into ascending order
3800 IF NR% = 1 THEN RETURN

3900 FOR N = 0 TO NR% - 1
4000   FOR X = N TO NR% - 1

4100     IF A$(X) < A$(N) THEN S$ = A$(X): A$(X) = A$(N): A$(N) = S$
4200     NEXT X: NEXT N
4300 RETURN
4400 REM Subroutine BEXTRACT
4500 REM REQUIRES        : NR%    - No records in sorted array
4600 REM                   A$(*)  - Array sorted into ascending order
4700 REM                   B$     - String to search on
4800 REM USES            : LO     - Low record number
4900 REM                   HI     - High record number
5000 REM                   MD     - Record number for mid-point comparison
5100 REM                   N      - Loop counter
5200 REM RETURNS         : IX     - No of extracted record in array
5300 LO = 0: HI = NR% - 1
5400 IF B$ <= A$(LO) THEN IX = LO: RETURN
5500 IF B$ >= A$(HI) THEN IX = HI: RETURN
5600 FOR N = 0 TO 1

5700   MD = LO + INT((HI - LO)/2)
5800   IF B$ = A$(MD) THEN IX = MD

5900   IF B$ < A$(MD) THEN HI = MD: N = 0

6000   IF B$ > A$(MD) THEN LO = MD: N = 0

6100   IF (HI - LO) < 2 THEN IX = HI: N = 1
6200   NEXT N
6300 RETURN
```

Written in Microsoft Basic, can be modified to run on all machines

3200	Bubble Sort subroutine
3800	If only one record in array then return to main line
3900	Outer loop for all entries in array
4000	Inner loop from outer position to end of array
4100	Swop data if lower than current base
4200	Continue loops until all data exhausted
4300	Return to main line
4400	Binary chop extract subroutine
5300	Set *LO*, *HI* to limits of sorted data
5400	Check for low order
5500	Check for high order
5600	Simple logic loop to allow selection facility
5700	Calculate *MD* as mid-point value
5800	If values equate then set *IX* and return to main line
5900	If B$ less than current mid-point data set *HI* to *MD*, set *N* to zero for rerun
6000	If B$ greater than current mid-point data set *LO* to *MD*, set *N* to zero for rerun of loop
6100	If *HI* and *LO* equate or are adjacent set *IX*, set *N* to one to exit loop

PCN ProgramCards

Array Utility — Card 1 of 1

8308AU

A program to demonstrate the uses of subroutines BSORT and BEXTRACT using simple data entry and search

```
1000 REM A Program to demonstrate the use of subroutines BSORT, BEXTRACT
1100 M% = 49

1200 DIM A$(M%)
1300 FOR IX = 0 TO M%
1400   PRINT "PLEASE ENTER DATA - BLANK IS END OF DATA INPUT"
1500   NR% = IX

1600   INPUT A$(IX): IF A$(IX) = "" THEN IX = M%
1700   NEXT IX
1800 PRINT "DATA ENTRY COMPLETED - PLEASE WAIT DURING SORT"
1900 IF NR% = 0 THEN PRINT "NO DATA ENTERED": GOTO 1300
2000 GOSUB 3800
2100 PRINT "RECORDS SORTED = "; NR%
2200 IX = 0
2300 REPEAT

2400   PRINT "SELECT DATA FROM ARRAY - BLANK GIVES NEXT RECORD"
2500   PRINT "TO EXIT - TYPE ***"
2600   INPUT B$: IF B$ = "***" THEN PRINT "PROGRAM ENDED": END

2700   IF B$ <> "" THEN GOSUB 5300

2800    PRINT "RECORD "; IX+1;". DATA : "; A$(IX)

2900   IX = IX + 1
3000   IF IX > NR% - 1 THEN IX = 0
3100   UNTIL FALSE
```

BBC Model B
BBC Basic

1100	Set value for size of array *A$(*)* to 50 records
1200	DIMension array *A$(*)*
1300	Data input loop — up to *M%* records
1400	Prompt. Blank line entry ends input
1500	Set *NR%* to actual number of records entered to array
1600	Data entry line. Blank exits loop
1700	Rerun loop
1800	Prompt
1900	If no data then have another attempt
2000	Perform sort routine
2100	Display array information
2200	Set array index to first record
2300	Loop to select, extract and display data records from array
2400	Prompt
2500	Prompt
2600	Input selection criterion. Whole or part string
2700	If input is not blank then perform extract routine
2800	Display record number in array and record data extracted
2900	Increment index for sequential access
3000	Deal with wrap-around
3100	Loop end and rerun

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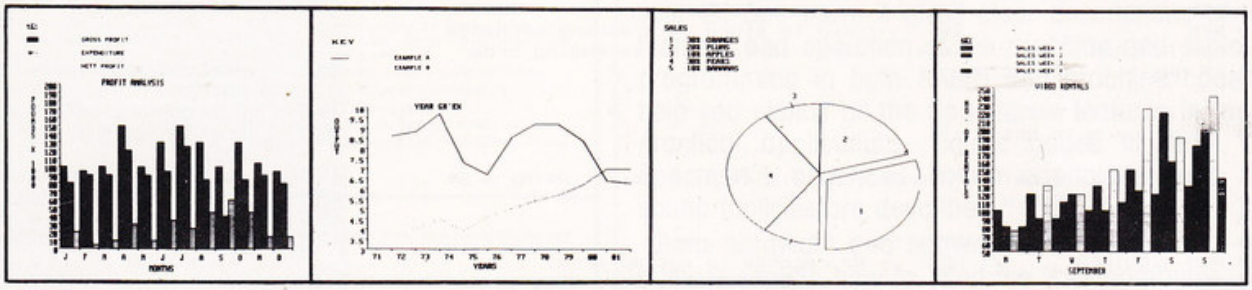

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MAIL ORDER AVAILABLE tells you whether or not the package is available by mail order.

HARDWARE REQUIRED shows the need for special hardware such as disk drive, joystick or printer.

PUBLISHER/DISTRIBUTOR This code refers to the distributor code table at the end of the listings, which will give the name and telephone number of the publisher/distributor.

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SOFTWARE

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Mail order avail.	Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge		Disk drive	Joystick	Other		
BUSINESS														
Accounting	£3,320	Apple II	●	Financial Controller	48K		●			●			S1	Also on Apple IIE. 8 modules (£402.50 each) — sales, purchase, invoicing, etc.
	£339.25	Apple II		General Ledger	48K		●		●	●			C1	Supports 1000 accounts and 100 analyses. Self-balancing, full audit trail.
	£552	Apple II		Informex Integrated Accounting System	48K		●		●	●			I1	Contains nominal, sales, purchase ledger + VAT. Can handle 800 accounts.
	£1,147.70	Apple II		Informex Integrated Business System	48K		●		●	●			I1	Contains accounting system modules plus invoicing + stock.
	£172.50	Apple II	●	Micro-General Ledger	48K		●		●	●			G1	Also on ITT 3030 and Basis 108. Goes through profit/loss + balance sheets.
	£402.50	Apple II	●	Nominal Ledger	64K		●			●		●	J1	Also on Sirius, IBM PC, Apple III + UCSD. Requires 132 column printer.
	£431.25	Apple II		Payroll	48K		●		●	●			C1	Supports weekly, monthly, + per monthly. Up to 350 employees per disk.
	£402.50	Apple II	●	Purchase Accounting & Cost Control	64K		●			●		●	J1	Requires 132 column printer, also Sirius, IBM PC, Apple III, UCSD.
	£402.50	Apple II	●	Sales Accounting System	64K		●			●			J1	Also on Sirius, IBM PC, UCSD. Provides conventional ledger.
	£339.25	Apple II		Sales Ledger	48K		●		●	●			C1	Supports 700 + accounts. Direct posting, credit control & 100 analyses, self balancing
	£1,725	Commodore 8000	●	Auditman	32K		●		●				C4	Also on Commodore 4000. Complete accounts production system.
	£1,552.25	Commodore 8000	●	Businessman	32K		●		●				C4	Also on Commodore 4000. Can be used with Auditman. 5 modules.
	£2,025.75	Commodore 8000		Data Lex	32K		●		●				D1	Designed for solicitors + others who need to separate office & client's accounts.
	£2,070	Commodore 8000	●	Microfacts	32K		●			●			M1	Also on Commodore 700, Victor & Sirius. £345 per module. Integrated accounting.
	£454.25	Commodore 8000	●	Micro-simplex	32K		●			●		●	M2	Also on Commodore 64 (£172.50). Needs printer. For smaller retail business.
	£2,300	Commodore 4000	●	Pegasus Integrated Accounting Suite	32K		●			●			P3	Also on MS-DOS (128K). Contains six stand alone modules.
	£1,437.50	CP/M		Aurora Integrated Accounting Package	64K		●		●	●			G1	Five stand alone modules. Sales, invoicing, purchase, nominal and stock.
	£2,760	CP/M		Boss	64K		●		●				F1	Seven stand alone modules. Can link to Autowriter & Autoindex.
	£805	CP/M	●	Cash Book Accounting	64K		●		●	●			S2	Also on CP/M-86 and MS-DOS. Amalgamation of sales, purchase & nominal ledger.
	£2,300.00	CP/M		dBFlex	48K		●		●	●			E1	Open item six module accounting system, (£575.00) per module. Works with dBase II.
	£402.50	CP/M	●	Exact	64K		●		●	●			S3	Also on MS-DOS. Includes six modules — invoicing, ledgers, stock and payroll.
	£373.75	CP/M	●	Fast Nominal	60K		●		●	●		●	T1	Also on MS-DOS. Needs 132 character printer. Can define up to 99 report layouts.
	£3,059	CP/M		ISBS-W	64K		●		●	●			G2	Comes on hard disk. Contains ISBS functions plus job costing and purchase control.
	£1,840	CP/M	●	ISBS-S	48K		●		●	●			G2	Also on CP/M-86. Contains seven modules.
	£2,271.25	CP/M	●	Multi-Index	64K		●		●	●			B1	Also on MP/M & PC-DOS. Contains five modules. Sales, nominal, VAT & stock control
	£569.25	CP/M	●	Nucleus	64K		●		●	●			C2	Also on MS-DOS. Disk drives of 280K needed. A program generating system.
	£1,431.75	CP/M		Padmede Business Control System	64K		●		●	●			P2	Five modules (£286.35 per module). Nominal, sales, purchase, invoicing, stock.
	£1,380	CP/M	●	Motor Dealers Part Distribution	64K		●		●	●			S2	Also on CP/M 86 & MS-DOS. Combines stock control, order processing ledgers.
	£1,868.75	CP/M	●	Peachtree Basic Accounting Systems	48K		●		●	●			P1	Also on MP/M & MS-DOS. Available on hard disk (£2,156.25). 5 stand alone modules.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Mail order avail.	Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge		Disk drive	Joystick	Other		
	£287.50	CP/M	●	Sales Ledger	64K		●		●	●			S2	Also on CP/M 86 and MS-DOS. Flexible ledger system.
	£45.42	Sharp MZ80A	●	Easy VAT	48K	●			●	●			K1	Also on Sharp M280B & M200K. VAT record system.
Agriculture	£1,150	Apple II		Dairy Package	64K		●			●			F2	Available on floppy or hard disk. Files individual cow production, with herd summaries
	£1,725	Apple II		Financial Management Program	64K		●			●			F2	Available on floppy or hard disk. Accounts for farm/estate management.
	£1,150	Apple II		Management Program	64K		●			●			F2	Available on floppy or hard disk. Monitors individual field activities, budgets, etc.
Bill of Materials	£373.75	CP/M	●	Fastbill	60K		●		●	●			T2	Also on MS-DOS & TRS-DOS. Will give parts explosion at 10 levels, 99 items/level.
Bookeeper	£56.35	Apple II		Apple Bookeeper	48K		●		●	●		●	H1	Needs printer. Keeps petty cash, sales, other business books, sorts, analysis etc.
Building Specifications	£460	Commodore 8000	●	National Building Specifications	32K		●		●	●			C3	Also on Commodore 4000. Used with Wordcraft. Produces building specifications.
Business Graphics	£471.50	16-bit machines		Micro-Graphpower	128		●		●	●		●	I2	Needs plotter. Business graphics which plots business data.
	£120.75	Apple III	●	Business Graphics	48K		●			●			P6	Also on Apple II (£125.35). Supports range of plotters & pie-charts, etc.
	£149.50	IBM PC	●	Graph Magic	96K		●		●	●			F1	Also on Apple II, III. Displays files graphically. Reviewed 18.3.83.
Business Management	£4,140	CP/M		Peach tree Business Management System	48K		●		●	●			P1	Also on MP/M & Unix. Available on hard disk (£6,900). Six modules for single user.
Cataloguing	£46.00	Apple II		Floppy Cat	48K		●		●	●			P4	Enables user to catalogue & store all information.
Estate Agents	£1,092.50	Apple II		Commercial Agency Systems	48K		●		●	●			C7	Matches in both directions with lists, labels and letters.
	£977.50	Apple II	●	Cyderpress Clients Recoverable Costs	48K		●		●	●			C7	Also on Rair Black Box. Designed to keep record of incurred expenditures.
	£1,121.00	Apple II	●	Cyderpress Residential System	48K		●		●	●			C7	Also on Rair Black Box. An applicant & property matching system.
	£419.75	CP/M		Estate Agents Match & Mail	56K		●		●	●			S4	Matches & prints out potential customers for every property.
Financial Accounting	£1,926.25	CP/M	●	Fast Range	60K		●		●	●		●	T1	Also on MS-DOS & TRS-DOS. Needs 132 character printer. 5 modules.
	£569.25	Commodore 8000	●	Finplan	32K		●			●			S5	Also on Commodore 3, 4, & 8000, Vic-20 and Commodore 64. £46.57 on floppy disk.
	£287.50	Commodore 8096		Financial Director	96K		●			●			M3	Also on Hytec & ICL PC. 96K version available. Helps decide on financial strategy.
Financial Planning	£44.85	Commodore Pet		Busicalc	16K	●			●				D1	Designed to handle large & complex planning & financial applications.
	£188.60	Apple II	●	VisiCalc	48K		●		●	●		●	R1	Also on Apple III, Commodore & IBM PC, etc. The classic spreadsheet.
	£345.00	CP/M		Bottom-Line Strategist	48K		●		●	●			P4	A business/project forecasting program. Allows user to test business assumptions.
	£454.25	CP/M		Fastplan	64K		●		●	●			C5	Needs double density disks. A file based modelling system for business planners.
	£281.75	CP/M	●	Master Planner	64K		●		●	●			C5	Also on MS-DOS & CP/M 86. Needs 80 column printer. Upgrade of a spread sheet.
	£396.75	CP/M	●	Micro Plan	64K		●		●	●			B1	Also on MP/M. Spreadsheet financial planner.
	£343.85	CP/M		Minimodel Financial Modelling	48K		●		●	●		●	G1	Needs 80 column screen. Model consolidation facility, colour option.
	£182.85	CP/M	●	Multi-Plan	48K		●		●	●			P4	Also on PC-DOS, Cromix, Fortune, Corvus & Sirius. Second generation spreadsheet.
	£44.85	CP/M		Plannercalc	64K		●		●	●		●	C5	Needs 80 column screen. Entry level system for spreadsheet planning.
	£218.50	CP/M		SP2020	48K		●		●	●			G2	Forecast effects of proposed actions. Aid to management decision-making.
	£172.50	CP/M		Supercalc	128K		●			●			A1	Electronic worksheet, representing a large flexible accounting work pad.
	£212.75	CP/M		Super Calculator	48K		●		●	●			E1	Spreadsheet calculator.
	£178.25	CP/M		T-Maker	48K		●		●	●			L1	Utility for analysis & presentation of numerical data & test material.
	£224.25	MS-DOS		Pulsar Business System	128K		●			●			A1	Consists of eight integrated packages & provides commercial accounting functions.
	£339.25	Osborne	●	PADA/C	64K		●		●	●			P2	Also on CP/M. Two systems. Incomplete records accounting, time/cost recording.
	£632.50	UCSD-P System		Microfinesse	128K		●		●	●			D1	Financial modelling program for businessmen.
	£741.75	UCSD-P System	●	Micro-Modeller	48K		●			●		●	I2	Also on CP/M & MS-DOS. Designed for large corporations.
Industrial Costing	£747.50	Apple II	●	Stock & Production Costing	48K		●		●	●		●	A2	Also on Apple IIE & III & Sirius. Available on hard disk. Needs Pascal system.
Insurance Accounting	£1,380	Commodore 4000	●	Insurance Man	32K		●			●			C4	Also in Commodore 8000, provides insurance broker with sales ledger.
Insurance Broking	£5,462.50	ICL DRS20		HS-100	64K		●		●	●		●	H2	Requires 16 or 27 Mb hard disk to run off. Maintains client & policy records.
Integrated Software	£569.25	IBM PC		Context MBA	256K		●			●			B2	Also on Sirius & Victor. Comprises word processor database management system.
	£908.50	Commodore 8000	●	Silicon Office	256K		●			●			F1	Integrated spreadsheet modelling, graphics, WP, database & communications.
Invoicing	£323.75	CP/M	●	Fast Invoicing	60K		●		●	●			T1	Also on MS-DOS & TRS-DOS. Can link into Fast Sales & Fast Stock.
Linear Programming	£373.75	CP/M	●	Optimiser	48K		●		●	●			C6	Also on Apple. Management tool for optimizing the deployment of scarce resources.
Local Authority	£862.50	Commodore 8000	●	P.U.S.W.A.	96K		●			●			M3	Also on Hytec. Monitors road holes under Public Utilities Street Work Act (1950).
	£569.25	Commodore 8000		Road Register	96K		●			●			M3	D-base network based on road names. Modules (£373.75) on street, lighting etc.
Mailing	£86.25	CP/M		Mailing List	56K		●		●	●			S4	Works with Super file. Prints labels, files, names & addresses. Mail merge facility.
Management	£226.16	CP/M	●	Scratch Pad 3.0	48K		●		●	●			M4	Also on CP/M 86, MS-DOS & PC-DOS. Spreadsheet using virtual memory.
Mathematics	£28.75	Commodore Pet	●	Infinite Arithmetic	16K	●			●				S5	Also on Commodore 3000, 4000 & 8000. Available on floppy disk.
Medical	£517.50	Apple II	●	Medical System	48K		●		●	●			A2	Also on Apple IIE, III & Sirius (£573.85). On hard disk. Age/sex register.

Office Information	£402.50	Apple II	●	Prophet II	48K		●		●	●			A4	Also on IBM PC & Corvus Concept. Information system which acts as a noticeboard.
Payroll	£69.00	Apple II		Payroll	48K		●			●		●	H1	Also available as cassette for Spectrum ZX81 (£25.00). Needs printer.
	£287.50	Apple II	●	Tabs Payroll	48K		●		●	●			T3	Also on CP/M & MS-DOS (64K). Up to 2000 employees, nine pay schemes.
	£977.50	CP/M	●	Powerday	48K		●			●			O2	Also on MP/M and MS-DOS. Integrates with Omicrons nominal ledger. Handles SSP.
Project Management	£747.00	IBM PL	●	Micronet	48K		●			●			T2	Also on ICL PC, Sirius, Superbrain, Apple II, & others. Critical path analysis.
Project Planning	£1,150.00	Commodore 8000		Hornet	32K		●			●			C3	Has eight optional variants (all eight £4,025). Network logic & variety of screen display.
Property Management	£517.50	Apple II	●	Property Management System	48K		●			●			A2	Also on Apple III, Apple IIE & Sirius. Prints rent reminders, demands etc.
Purchase Ledger	£287.50	Apple II	●	Tabs Purchase Ledger	48K		●		●	●			T3	Also on CP/M & MS-DOS (64K). Open item ledger — automatic payment facility, etc.
	£805.00	CP/M	●	Powerbought	48K		●			●			O2	Also on MP/M & MS-DOS. Integrates with Omicron's Nominal Ledger System.
Sales Ledger	£287.50	Apple II	●	Tabs Sales Ledger	48K		●		●	●			T3	Also on CP/M & MS-DOS. Part of integrated system. 300 analysis codes.
	£373.75	CP/M	●	Fast Sales	60K		●		●	●		●	T1	Also on MS-DOS & TRS/DOS. Needs 132 character printer. Part of Fast Range.
	£805.00	CP/M	●	Powersales	48K		●			●			O2	Also on MP/M & MS-DOS. Multi-user system based on mainframe software.
	£325	DEC Rainbow 100	●	Sales Ledger System	64K		●		●	●			D2	Also on DEC Mate II. Invoicing & monthly statement generating system.
Sales Order Processing	£805.00	CP/M	●	Compact Sales Order Processing	64K		●		●	●			C2	Also on CP/M 80, 86 & MS-DOS. Comes on hard disk. Control, stock, ledgers.
Sales, Purchase, Nominal Ledger	£1,207.50	CP/M	●	Compact Sales, Purchase & Nominal Ledger	64K		●		●	●			C2	Also on CP/M 80, 86 & MS-DOS. Follows Standard accounting procedures.
Sick Pay	£80.50	Apple II	●	Statutory Sick Pay (SSP)	48K		●		●	●			H1	Also on Spectrum. Does all SSP calculations.
Statistics	£172.50	Apple II	●	Inter-Stat	48K		●		●	●		●	G1	Also on Basis 108 & ITT 3030. Needs printer.
	£9.20	Sharp MZ80A	●	Statistical Analysis	48K	●			●				K3	Also on MZ80K. Calculates mean & standard deviation for up to 100 items.
	£15.00	Sinclair ZX81	●	Critical Path Analysis (CPA)	8K	●			●				H1	Also on Spectrum (16K). Activities entered from arrow diagram. Finds critical path.
	£977.50	UCSD-P System		Trend Plot	128K		●		●	●		●	P5	Needs Hewlett Packard Plotter. Developed to analyse historical time series data.
Stock Control	£373.75	CP/M	●	Fast Stock	60K		●		●	●		●	T1	Also on MS-DOS & TRS DOS. Needs 132 character printer.
	£3,289	CP/M		M-SIS	48K		●			●			T2	Stock control system for manufacturing industry.
	£33.92	Newbrain		Stock Control 40/4	32K	●			●				E2	Stores large quantities of stock, accumulates new stock levels & checks stock level.
	£25.00	Sinclair Spectrum	●	Stock Control	48K	●			●				H1	Also ZX81. Fast fwd/add/delete item. Prints complete or selective lists & total value.
Word Processing	£228.85	Apple II	●	Format 80	48K		●			●		●	P6	Also Apple IIE. Needs 80 column card. Storage/retrieval of names & addresses.
	£92.00	Apple II		Piewriter	48K		●		●	●		●	M5	Needs 80 column card. Allows entry, editing & print formatting of any text type.
	£125.35	Apple II		Wordhandler	48K		●		●	●			P4	Word processor for the non-professional — minimum Apple system.
	£152.95	Apple III	●	Apple Writer 2	48K		●			●			P6	Also Apple II. Has word wrap, glossary & word processing language.
	£28.50	BBC Model B		Alphabeta	32K	●			●				H3	Also available on disk. Suitable for home & business.
	£10.50	BBC Model B		Word Pro	32K	●			●				I4	Includes DELETE, INSERT, SAVE, Date etc.
	£90.85	Commodore 64		Infomast	64K		●		●	●			R2	Combined programmable word processor, Database and calculator.
	£89.00	Commodore 64	●	Paperclip	64K		●		●	●			A3	Also Commodore 8000. Compatible with WordPro & SpellPro.
	£488.75	Commodore 8000	●	Wordcraft	32K		●			●			D1	Also on SuperPet & Sirius 1. Routine correspondence, mailing, proposals, contracts.
	£51.75	Commodore Pet	●	Papermate +	16K	●			●				S5	Also on Commodore 64, 3, 4, & 8000. Available on floppy (£53.49).
	£125.00	Commodore BK-20	●	Wordcraft 20	8K			●	●			●	A3	Also Commodore 64 — needs printer. Comprehensive word processor.
	£145.00	CP/M	●	Mail Merge	64K		●			●			X1	Also on CP/M 86 and PC-DOS. An optional MERGE, PRINT, extra for Wordstar.
	287.50	CP/M	●	Peachtext	48K		●			●		●	P1	Also MP/M & MS-DOS. Needs high quality printer. Contains proof reader.
	£339.00	CP/M	●	Perfect Writer/Speller	64K		●		●	●			S3	Also MS-DOS & Apple DOS. Contains quick reference card.
	£431.25	CP/M	●	Select Word Processing System	64K		●		●	●			B1	Also MP/M & PC/DOS. Screen-oriented system.
	£316.25	CP/M	●	Spellbinder	48K		●		●	●			E1	Also on Oasis. Word processing & office management system.
	£333.50	CP/M		WP2020	48K		●		●	●			G2	Menu-driven, machine independent. Set of key-tops provided.
	£225.00	IBM PC		Easywriter II	64K		●			●			X1	Bold face & underscoring on screen. 80,000 word spell checker extra (£43.15).
	£340.40	IBM PC		VisiWord	64K		●			●		●	R6	Mail merge facility with Visi file.
	£339.25	MS-DOS	●	WordStar	128K		●			●		●	A1	Also on CP/M. Needs printer. Complete screen-based WP.
	£40.25	Newbrain		Word Processor 40/12	32K	●			●				E2	Automatic word wrap, editing, saving paragraphs, deleting.
	£325.00	OS9		Stylograph	32K		●			●			S6	Expandable system with modular design.
	£45.42	Sharp MZ804	●	Wordpro	48K	●			●				K1	Also on MZ80B+K. Available on disk (£91.94). One of few WP packages for Sharp.
	£49.95	Tandy TRS 80 I	●	AJ Edit	32K		●		●	●		●	M6	Also on Genie I & II. Needs printer.
EDUCATION														
Basic Course	£9.95	Texas Instruments 99/4A		Beginners Basic Tutor	16K	●			●				T5	Gives explanations and examples of TI Basic — lets the user try.
	£13.95	Texas Instruments 99/4A		Teach Yourself Extended Basic	16K	●			●				T5	Needs extended Basic module.
Business Game	£9.95	BBC Model A	●	Business Game	16K	●			●				W1	Also on Model B. Two games for economics, business & general studies, teaching.
	£6.84	BBC Model A	●	Inkosi	32K	●			●				C9	Also on Model B. Rule for ten years, overcoming obstacles, e.g. famines.
Chemistry	£14.38	Research Machine 380Z	●	Symbols To Moles	31K		●		●	●			H4	Also on Apple II. Practise using chemical symbols, writing & mole concept.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Mail order avail.	Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge		Disk drive	Joystick	Other		
Children	£37.89	Apple II		Bumble Plot	48K		●		●	●			P4	A set of five programs for developing graphics and maths skills. For children 8 to 13.
	£29.84	Apple II	●	Face Hanger	48K		●		●	●			P4	Also on IBM PC. Designed for children to learn computer keyboard by building up face.
	£37.89	Apple II		Gertrude's Secret	48K		●		●	●			P4	An educational game to teach logical thinking & planning. For children aged 6-9.
	£9.80	Atari 400	●	Jigsaw Puzzles	16K	●							T4	Also on Atari 800. Has 16 puzzles and optional difficulty.
	£11.40	BBC Model B		Letters	32K	●			●				C9	Designed for children aged 4-6 & for dyslexic & remedial children.
	£11.40	BBC Model B	●	Metrics	32K	●			●				C9	Also on Vic-20. Vocabulary and structure of metric system, for children aged 10-15.
	£6.84	BBC Model B	●	Pascal	32K	●			●				C9	Also on Vic-20. Shows construction of Pascal Triangle and tests on it.
	£6.84	BBC Model B	●	Sequences	32K	●			●				C9	Also on Vic-20. Demonstrates number patterns.
	£6.50	BBC Model B		The Early Stages	32K	●			●				H3	Reading aid. Plays nursery rhymes. Available on disk.
	£4.50	BBC Model B		Super Hangman	32K	●			●				I4	Version of famous game. High resolution graphics. 800 words or enter own choice.
	£9.95	BBC Model B		Tree of Knowledge	32K	●			●				A9	Interactive program teaching categorisation. Simplified information retrieval.
	£4.95	Sharp MZ80A	●	Giant Maths	32K	●			●				S8	Also on MZ80K. Big screen figures & humorous error messages. 5 to 11 years.
	£4.95	Sharp MZ80A	●	Rocket	3K	●			●				S8	Also on MZ80A. Four difficulty levels. For five to 11 year olds.
	£9.20	Sharp MZ80A	●	Teach Tables	48K	●			●				K3	Also on MZ80K. Plays like game but motivates children to improve their ability.
	£4.95	Sharp MZ80K	●	Master Builder	48K	●			●				S8	Also on MZ80A. Repair a wall using random blocks. Teaches spacing.
Classroom Monitor	£322.00	UCSD-P	●	Classroom Monitor	64K		●		●	●			K4	Also on Apple II. Provides demonstration facilities & monitors student's progress.
Economics	£28.75	Sharp MZ80K	●	Broadwater Economics Simulation	16K	●			●				W1	Also on Commodore Pet & BBC. Simulates micro & macro economics.
French	£14.38	Research Machine 380Z	●	Repondez	31K		●		●	●			H4	Also on Apple II. Practising French verb formation (present tense).
	£9.20	Sharp MZ80A	●	French Conjugate	48K	●			●				K1	Also on MZ80K. Automatically conjugates regular verbs into tenses.
	£9.20	Sharp MZ80A	●	French Verbs	48K	●			●				K1	Also on MZ80K. Allows user to impart up to 20 verbs & eight tenses at a time.
Graphics	£8.00	BBC Model B	●	Painter	32K	●			●				A5	Also on Spectrum (£5.75), Atom (£6.90) & on disk.
	£9.95	BBC Model B		Creative Graphics	16K	●			●				A9	Book available (£7.50). Designed to illustrate BBC graphics.
History	£20.13	Sharp MZ80A	●	Kings & Queens	48K	●			●				K1	Also on MZ80K. Facts & figures on English monarchs since 1066.
Languages	£7.95	Sharp MZ80A	●	Multilinguist	3K	●			●				S8	Also on MZ80K. A language tutor to suit all European languages.
Mathematics	£10.30	BBC Model B		Angle	32K	●			●				C9	Includes four programes designed to teach simple geometry.
	£9.95	BBC Model A	●	Algerbraic Manipulations	16K	●			●				W1	Also on Model B. Includes four programs designed for use in maths teaching.
	£82.80	IBM PC		Fact Track	64K		●			●			I3	Learning basic arithmetic. Presents simple two-line sums in random order.
	£46.00	Sharp MZ80A	●	Curve Fitting	48K	●			●				K3	Also on MZ80K. Calculates, intercepts & plots power curve.
	£9.20	Sharp MZ80A		Directed Numbers	48K	●			●				K3	Also on MZ80K. Teaches difficult mathematical functions.
	£9.20	Sharp MZ80A	●	Divisor Advisor	48K	●			●				K3	Also on MZ80K. Teaches division at a variety of skill levels.
	£27.60	Sharp MZ80A	●	Numerical Integration	48K	●			●				K3	Also on MZ80K & B. Teaches Simpson's Rule.
Meteorology	£23.00	Research Machines 380Z	●	Weather	31K		●		●	●			H4	Also on Apple II. Gives synoptic charts. Teaches elementary meteorology.
Morse Code	£9.20	Sharp MZ80A	●	Morse Tutor	48K	●			●				K3	Also on MZ80K. Used to teach morse code by sight and sound. At seven levels.
Physics	£14.38	Research Machines 380Z	●	Lenses	31K		●		●	●			H4	Also on Apple II. Illustrates formation of images by lenses using ray diagrams.
	£9.20	Sharp MZ80A	●	Casino Chips	48K	●			●				K3	Also on MZ80K. Uses radioactive chips to teach half-life concept.
Typing	£28.75	CP/M	●	Touch'n'Go	48K		●		●	●			C6	Also on MS-DOS. Typing tutor for mastering numeric pad & Qwerty keyboard.
	£31.05	IBM PC		Typing Tutor	64K		●			●			I3	Presents exercises for learning touch typing or for improving existing skills.
GAMES														
Adventure	£17.95	Atari	●	Arrow of Death	16K	●			●				C8	Also runs on TRS-80, BBC, Vic-20. A 'classic text adventure'.
	£7.99	BBC Model B	●	Adventure	16K	●			●				M7	Also runs on Atom. 'Many rooms to explore and many hazards to overcome'.
	£9.95	BBC Model B		Philosopher's Quest	16K	●			●				W1	'Progress through a world of fiendish puzzles.'
	£9.95	BBC Model B		Sphinx	16K	●			●				W1	'A classic adventure, moving through caves avoiding hazards to collect treasure'.
	£13.80	Commodore Pet	●	Hitch-Hikers Guide to the Galaxy	32K	●			●				S5	Also runs on Commodore 64, Vic-20, 3000, 4000, 8000. 'Involved, textual game'.
	£18.40	Commodore Pet		Pythonesque	32K	●			●				S5	'Increasingly difficult textual game based on Monty Python'. Disk available (£20.12).
	£24.99	Commodore Vic-20		River Rescue	8K			●			●		T4	Needs joystick. 'Captain boat through treacherous rivers to rescue explorers'.
	£8.00	Dragon 32		Escape	32K	●			●		●		M16	Needs joystick. 'A 3D maze game. Get clues from 15 rooms for code of elevator'.
	£8.00	Dragon 32		Flipper	32K	●			●				M16	'A game of intrigue and strategy. Requires an agile mind and a lot of fore-thought'.
	£8.00	Dragon 32		Mansion Adventure	32K	●			●				M16	'Wind your way through an old mansion picking up clues to find the diamond',
	£7.95	Dragon 32		Wizard War	32K	●			●		●		S7	Needs joystick. 'Magical combat for two to nine players; interactive duel'.
	£35.00	IBM PC		Adventure in Serema	64K		●					●	I3	Needs colour graphics adaptor and direct drive colour monitor for use.

	£6.90	Oric	●	Zodiac	16K	●			●				A5	Also runs on Atom. 'A thinking persons adventure game'.
	£12.07	Sharp MZ80A	●	Adventure	48K	●			●				K1	Also runs on Sharp MZ80B and MZ80K. 'An interactive adventure game'.
	£12.07	Sharp MZ80A	●	Quest	48K	●			●				K1	Also runs on Sharp MZ80B and MZ80K. 'Dungeons & Dragons type game'.
	£7.95	Sharp MZ80K	●	Nightmare Park	48K	●			●				S8	Also runs on MZ80A. 'Cross Nightmare Park. Every few steps play game or task'.
	£7.95	Sharp MZ80K	●	Tombs of Karnak	48K	●			●				S8	Also runs on MZ80A. 'Bargain for items required before entering tombs'.
	£5.95	Spectrum		Faust Folly	16K	●			●				A6	'A 16K adventure with the same traps, magic, fiends, treasure as the 48K game'.
	£14.95	Spectrum		The Hobbit	48K	●			●				M8	'Object is to get treasure. For one player. Can instruct computer in ordinary English'.
	£5.00	Spectrum	●	Orb	16K	●			●				I5	Also runs on Dragon 32 and Commodore Vic-20. 'Explore labyrinth and destroy Orb'.
	£10.00	Spectrum	●	Pimania	48K	●			●				A7	Also runs on Sinclair ZX81, BBC 13, Dragon 32. Reviewed 18.3.83.
	£5.00	Spectrum	●	The Quest	48K	●			●				I5	Also runs on Dragon 32. 'Fighting adventure game'.
	£5.00	Spectrum	●	Star Trek	48K		●		●	●			I5	Also runs on Dragon 32 and Commodore Vic-20. 'Hunt down the Klingon in space'.
	£5.95	Spectrum		Slippery Sid	16K	●			●		●	●	S9	Needs joystic and keyboard to use. 'Snake type game'.
	£10.06	Tandy TRS-80 I	●	Mysterious Adventurer	16K	●			●				M6	Also runs on Tandy TRS-80 III, Genie I, II, Colour Genie and BBC B.
	£4.95	Texas Instruments 99/4A		Forbidden City	16K	●			●				A8	'You have to explore a deserted alien city with many hazards on the way'.
	£3.95	Texas Instruments 99/4A		Sorcerers' Castle	16K	●			●				A8	'You are trying to rescue the captured princess'.
	£7.50	BBC Model B		Atlantis	32K	●			●				I4	'Guide submarine through caverns & destroy enemy'.
Arcade type	£9.99	Commodore Vic-20		Night Crawler	5K	●			●				R2	'A Centipede style game. Fast action, graphics and sound effects'.
	£5.50	Spectrum	●	Arcadia	16K	●			●				I6	Also on Commodore Vic-20. '12 levels of aliens attacking in different ways'.
	£5.95	Spectrum		Ground Attack	16K	●			●				S9	'Variable speeds allows this game to be played by everyone'.
	£3.95	Texas Instruments 99/4A		Bomber	16K	●			●				A8	'Must land plane & bomb skyscrapers'.
	£5.95	Spectrum		Cyber Rats	16K	●			●		●	●	S9	Needs joystick and keyboard to run.
Asteroids type	£4.95	Spectrum		Meteor Storm	16K	●							Q1	'Progressive difficulty, variety of controls'.
	£6.95	Spectrum		Time-Gate	48K	●			●				Q1	'Time travel, 3D graphics, colour, cockpit view and instrument display'.
	£4.95	ZX81		Asteroids	4K	●			●				S9	'Fast moving, suitable for all ages'.
Centipede type	£7.99	Dragon 32		Caterpillar	32K	●			●		●		M16	'A new generation munching game'.
Chess type	£7.99	BBC Model B		Chess	16K	●			●				M7	'Machine code, high resolution graphics with many play options'.
	£24.95	Dragon 32		Cyrus Chess	32K			●					D3	'Won European microcomputer chess championship 1981. Nine levels of difficulty'.
	£14.50	Sharp MZ80A	●	Chess	48K		●	●					K1	Also on Sharp MZ80B & MZ80K. '14 levels of difficulty'.
	£42.95	Texas Instruments 99/4A		Chess	16K		●	●					T5	'Different difficulty levels. Will solve problems. Can teach chess'.
Darts	£19.99	Atari 400	●	Darts	8K	●					●		T4	Also on 800. 'Aim & throw — the computer does the arithmetic'.
Defender type	£22.80	Atari 400/800	●	Submarine Commander	16K			●		●			T4	'One player. Nine levels of difficulty. Destroy shipping. Oxygen levels, fuel etc'.
	£9.95	BBC Model B		Planetoid	32K	●			●				A9	'A game of speed & skill'. Available on floppy disk (£11.50).
	£7.95	Commodore Vic-20		Alien Blitz	5K	●			●		●		A3	Needs joystick to run. 'Difficulty levels, colour & sound'.
	£9.99	Commodore Vic-20		Annihilator	3K	●			●		●		R2	'Based on Defender'.
	£6.95	Spectrum		Penetrator	48K	●			●				M8	'Two levels of difficulty difficulty'.
	£21.95	TI 99/4A		Parsec	16K			●	●				T5	'Increasingly difficult. After four onslaughts pass through to next stage'.
Flight Simulator	£22.80	Atari 400	●	Jumbo Jet Pilot	16K	●					●		T4	Also Atari 800. 'Ten difficulty levels. View through cockpit with flight instrumentation'.
	£7.95	Spectrum	●	Flight Simulation	48K	●			●				S10	Also on ZX81 (£5.95). 'Shows control panel & control view'.
	£17.20	Tandy TRS-80	●	Jumbo	16K	●			●				M6	Also on Genie I, II & BBC Model B. 'Simulation of piloting a Jumbo'.
Football	£29.99	Atari 400	●	Kick Back	8K			●			●		T4	Also available on Atari 800. Needs joystick to run. 'Beat the high score'.
	£19.55	Atari 400	●	Soccer	8K			●					T4	Also on Atari 800. 'Aerial view of field.' Reviewed 11.3.83.
Frogger type	£5.50	Commodore Vic-20		Wacky Waiters	3.5K	●			●				I6	'Waiter serving drinks in hotel. Has to hop from lift to lift'.
	£9.99	Commodore Vic-20		Hopper	3K	●			●		●		R2	'A version of Frogger'.
	£5.95	Spectrum		Horace Goes Ski-ing	16K	●			●				S10	'Sequel to Hungry Horace. He must cross busy road, fetch skis & ski down slope'.
Golf	£7.95	Dragon 32		Golf	32K	●			●				S7	'For one or two players. Full handicapping system'.
	£3.75	Spectrum		Golf	16K	●			●		●		R3	'For one or two players. Choice of nine or 13 holes'.
	£3.75	Sinclair ZX81		Golf	16K	●			●		●		R3	'Similar to other golf games, in black and white'.
Helicopter	£24.95	Commodore Vic-20	●	Chop Lifter	8K			●	●		●		A3	Also on Commodore 64. Needs joystick to run. 'Vic version of USA's best-seller'.
Jigsaw	£14.99	Atari 400	●	British Heritage Jigsaw Puzzle	8K	●							T4	Also on Atari 800. 'Educational game with selective difficulty'.
Kong type	£7.95	Commodore Vic-20		Bonzo	8K	●			●		●		A3	'Workman dodges robots on split-level. Sound & full graphics.
	£8.00	Dragon 32		Donkey King	32K	●			●		●		M16	'Popular arcade game'.
	£9.95	BBC Model B		Monsters	32K			●					W1	'The player has to run up & down ladders & along walls, pursued by monsters'.
Maze type	£24.95	Dragon 32		Ghost Attack	N/A			●			●		D3	'The aim is to avoid & eliminate ghosts which roam a maze'.
	£8.00	Dragon 32		Jerusalem Adventure	32K	●			●				M16	'Aim is to get treasure & avoid being eaten'.
	£5.95	Spectrum		Hungry Horace	16K	●			●				S10	'Animated maze game with sound & full graphics'.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Mail order avail.	Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge		Disk drive	Joystick	Other		
	£5.95	Spectrum		Muncher	16K	●					●		S9	'A monster munching marathon'.
	£8.00	Spectrum		Spectres	16K	●							B3	'An increasingly difficult maze game. The object is to fit light bulbs & destroy ghosts'.
	£10.00	Sinclair ZX81		Mazogs	16K	●							B3	'Three levels. Find & collect treasure in a maze & escape'.
Pacman Type	£9.95	BBC Model B		Snapper	16K	●			●		●		W1	'Based on Pacman'.
	£9.50	Colour Genie		Chomper	16K	●							K2	'Based on Pacman'.
	£8.00	Dragon 32		Scarfman	32K	●			●				M16	'Based on Pacman'.
	£4.95	Spectrum		Gnasher	16K	●			●				R3	Joystick optional. 'Based on Pacman using Beano characters'.
Pool	£8.50	BBC Model B		Billiards	32K	●			●				H3	Available on disk. 'A game for all ages'.
Racing	£7.95	Dragon 32		Grand Prix	32K	●			●		●		S7	'For one or two players, features eight Grand Prix tracks & 10 levels of difficulty'.
	£21.95	TI 99/4A		Car Wars	16K			●	●				T5	'Race through maze whilst avoiding computer controlled car'.
Shooting	£29.95	Atari 400	●	Claim Jumper	16K			●	●		●		C8	Also on Atari 800. 'A two player shoot-out over gold nuggets & cash'.
	£29.95	Atari 400		Shamus	16K			●	●		●		C8	'Player has to move through lair avoiding hazards'.
	£6.84	BBC Model B	●	Invisible Man	32K	●			●				C9	Also on Commodore Vic-20. 'Aim is to shoot man who keeps disappearing'.
	£9.99	Commodore Vic-20		Quacker	3K	●			●		●		R2	'Aim is to shoot down ducks & rabbits on shooting gallery'.
	£19.95	Commodore Vic-20	●	Spiders of Mars	N/A			●	●				A3	'Popular game for the Vic-20'. Also on Commodore 64.
	£5.95	Spectrum		High Noon	16K	●			●		●		A6	'Clean up chaos & disorder in town'.
Space	£9.95	Dragon 32		Dragon Trek	32K	●			●		●		S7	'A version of Star Trek with ten levels of difficulty'.
	£5.95	Spectrum		Android Run	16K	●			●		●		A6	'Control android to shoot walls, kill mutants & reach central complex'.
	£5.95	Spectrum		Cosmos	16K	●			●		●		A6	'Defend space convoy from aliens & asteroids'.
	£5.50	Spectrum		Schizoids	16K	●			●				I6	'Space bull-dozer nudges shapes into black hole'.
	£5.95	Spectrum		Starship Enterprise	48K	●			●				S9	'Based on the classic Star Trek. Includes arcade action'.
	£4.95	Spectrum	●	Star Trek	48K	●			●				R3	Also on ZX81 (£3.95). 'One player, sound & full colour graphics strategy game .
Space Invader type	£7.99	BBC Model B		Swoop	32K	●			●				M7	'Written in machine code with full colour & high resolution graphics'.
	£7.50	BBC Model B		Model B Invaders	32K	●			●				I4	'A Space Invaders game with high resolution & colour graphics'.
	£9.99	Commodore Vic-20		Orbis	3K	●			●		●		R2	'Based on Missile Command. Fast & colour'.
	£19.95	Dragon 32		Cosmic Invaders	N/A			●					D3	Joystick optional. '15 levels of difficulty'.
	£6.50	Spectrum		Destroyer	16K	●			●				I5	'Destroy the varying alien invaders'.
	£4.95	Spectrum		Intruders	16K	●			●				Q1	'Includes mutants, random saucers, bonus base & 14 different aliens. Sound & colour'.
	£5.00	Spectrum		Spectral Invaders	16K	●							B3	'For one or two players. Increasingly difficult, high resolution colour graphics'.
	£21.95	TI 99/4A		Invaders	16K			●	●				T5	'Based on Space Invaders. After every two screens a new character appears'.
	£3.95	Sinclair ZX81		Invaders	4K	●			●				S9	'Based on Space Invaders'.
Sport	£33.35	IBM PC		Decathlon	64K		●			●		●	I3	Needs colour graphics adaptor & direct drive colour monitor. 'For up to six players'.
Variety	£5.95	Commodore Vic-20		Innovation Cassette	48K	●			●				M8	'One tape containing seven games'.
	£5.95	Spectrum		Over the Spectrum	16K	●			●				M8	'One tape with 10 games. Defender to geometry, beginners to advanced'.
Various	£29.95	Atari 400	●	Picnic Paranoia	16K			●	●		●		C8	Also on Atari 800. Needs joystick to run. 'A graphics game based on picnic site'.
	£4.95	Colour Genie		Breakout	16K	●			●		●		M9	'Different levels of skill'.
	£6.95	Commodore Vic-20		Amok	5K	●			●				A3	'Chased by robots in enclosed room. Different levels of difficulty'.
	£9.95	Commodore Vic-20		Black Squid	3K	●			●		●		C8	'Get men to shore in shortest time'.
	£24.95	Commodore Vic-20		Mutant Herd	8K			●			●		T4	'Protect a powerhouse from mutants. Enter their burrows & destroy eggs'.
	£6.90	Dragon 32		Dead Wood	32K	●			●				A5	'A game for all the family'.
	£3.95	Texas Instruments 99/4A		Chalice of Kalmar	16K	●			●				A8	'The aim is to retrieve a chalice from a temple'.
HOME														
Clubs and Sports	£78.00	Sharp MZ80A		Clubman	48K	●			●				S8	Golf handicapping and competition results system complying with 1983 regulations.
	£575.00	Apple II	●	Tabs Golf Package	48K		●		●	●			T3	Alsom on MS/DOS (64K). Maintains members handicaps including 1983 regulations.
	£28.18	Epson HX20	●	Horse Race Forecast	48K	●			●				K1	Also on Newbrain and Sharp. A punters aid to betting.
	£28.69	Sharp MZ80A	●	Navex	48K	●			●				K1	Also on MZ80K. Simulations of navigating a yacht on the English Channel.
Diary	£9.95	BBC Model A	●	Desk Diary	16K	●			●				W1	Also on BBC Model B. Consists of address book & diary planner (plus instructions).
Home budget	£19.99	Atari 400	●	Home Financial Management	8K	●						●	T4	Also on Atari 800. Needs Atari Basic cartridge. Aids money management.
	£19.95	Epson HX20	●	Home Budget	16K	●			●				K1	Also on Sharp, MZ80 & Osborne. Keeps records of home finances with graphics.
	£14.95	Sharp MZ80A	●	Sam Analysis	3K	●			●				S8	Designed for balancing home debits & credits.
Music composition	£24.99	Commodore Vic-20		Vic Music Composer	8K			●					T4	Aids to aspiring composer. Also for entertainment and education.

Stock control	£10.00	Spectrum		Spec File	48K	●			●				A5	Stock control program useful in home, e.g. record collection, etc.
Various	£12.95	Commodore Vic-20		Home Office	5K	●			●				A3	Comprises VicPro (word processor) & VicData (A database program).
UTILITIES														
Basic	£201.25	CP/M		Basic 80	48K		●		●	●			L1	Industry standard Basic.
	£235.70	CP/M		Basic Compiler	48K		●		●	●			L1	Companion to Basic 80. Allows programs to run faster.
	£80.50	CP/M		BDS C Compiler	48K		●		●	●			L1	A subset of 'C' that enables its implementation. Includes symbolic debuggers.
	£121.90	CP/M	●	C Basic	64K		●			●			X1	Commercial Basic. Also on CP/M86 (£265.65).
	£213	Any Z80		X-Basic	48K		●			●			X1	Built-in matrix functions. Supports MP/M record locking. Graphics option.
Basic Upgrader	74.75	Commodore 64	●	VicTree	64K	●			●				S5	Also Commodore Vic-20. Also on floppy (£92.00). Adds 50 commands to Basic.
Card Index System	£215.05	Apple II	●	Visidex	48K		●			●		●	R1	Also on IBM PC. Needs printer. One record/screen designed for cross-referencing.
	£178.25	CP/M	●	Cardbox	48K		●		●	●		●	C6	Also on MS-DOS. Needs 24×80 VDU & 100K disk storage.
Communications	£102.35	Apple II		ASCII Express — The Professional	48K		●		●	●		●	P4	Needs RS232. Asynchronous serial communications package.
	£448.50	Apple II		Editel	48K		●		●	●		●	O1	Needs modem. A Viewdata frame word processor designed to aid data editing.
	£626.75	Apple II		Owlsync 3780	48K		●		●	●			O1	A full IBM 3780 emulator package allowing communication up to 2400 Baud.
	£454.25	Apple II		Owltel	48K		●		●	●		●	O1	Needs modem. Allows access to Prestel & private viewdata systems.
	£149.50	Apple II	●	Terminal Utilities	48K		●		●	●			C1	Also on Apple IIE. Converts Apple II to intelligent terminal. Speeds of up to 9600 BPS.
	£57.50	CP/M		Xcopy 1.0	64K		●		●	●			X1	Disk copy utility for Cromemco machines. Copies 8" or 5¼" single/double sided.
	£454.25	CP/M	●	Micro-Linkline	64K		●		●	●			I2	Also on UCSD-P. Teletype comms for transferring datafiles.
	£575	CP/M	●	Bisync AC-3780	64K		●		●	●			E1	Also on MP/M & CP/M86. Micro to mainframe comms through IBM terminal emulation.
	£41.40	IBM PC		Asynchronous Communications	64K		●			●		●	I3	Needs asynchronous comms adaptor. Makes PC act as asyncs comms terminal.
	£117.30	IBM PC		IBM 3101 Emulation Program	64K		●			●			I3	Makes PC act as 3101 terminal provides 3270 emulations when connected to host.
	£638.25	IBM PC		PC SNA 3270 Emulation	128K		●			●		●	I3	Needs SDLL adaptor card makes PC act as IBM 3270 terminal.
	£22.43	Sharp MZ80A	●	Zen	48K	●			●				K1	Also MZ80K & B. Full Z80 editor/assembler.
	£115.00	IBM PC	●	Interlink	48K		●			●			T2	Also on Sirius, Apple II, Xerox, Osborne etc. Connects processors for downloading.
Database	£132.25	Apple II		DB Master	48K		●		●	●			M5	Available on hard disk. Allows 1K records over 100 fields. Report generation, etc.
	£224.25	Apple II		Informex Database System	48K		●		●	●			I1	Database system which can be used to & update info on any type of record.
	£402.50	Apple II	●	Mailist	48K		●		●	●		●	A4	Also for IBM PC & Corvus Concept. Requires hard disk. A networking product.
	£96.60	Apple III	●	PFS: File	48K		●			●			P6	Also for Apple II (£135.70). Used in tandem with PFS (£96.60).
	£215.05	Apple II	●	VisiFile	48K		●			●			R1	Also on IBM PC (£273.70; 64K). A database program suitable for up to 500 entries.
	£217.35	Apple IIE		VisiTrend + VisiPlot	64K		●		●	●			R6	Also for CP/M. Graphic representation of data. Compatible with VisiCalc.
	£10.30	BBC Model B		Filer	16K	●			●				M7	Allows searching, sorting, saving & recovery of data.
	£201.25	CP/M	●	Dataflow II	56K		●		●	●			G1	Also on CP/M 86. Needs 160K disk space. Extract files to link with other systems.
	£201.25	CP/M		Datastaff	64K		●			●			X1	Data entry & retrieval system. Interfaces with WordStar.
	£499.74	CP/M		dBase II	48K		●		●	●			E1	Micro DBMS. Can be used for high level programming for a range of applications.
	£557.50	CP/M		Superfile	56K		●		●	●			S4	Multi-file database giving application package information.
	£166.75	CP/M		Supersort I16	64K		●		●	●			M10	A sort utility for handling various forms of data files. Mainframe-like additions.
	£1,840	CP/M	●	MDBS II	64K		●						T2	Also on CPIM86, MS-DOS, Turbo DOS, Unix and Xenix. Mainframe — like facilities.
	£68.42	Newbrain		Invoice & Credit Program	32K	●			●				E2	The invoice program allows you to put in your own information and design invoice.
	£29.32	Newbrain		Database 40/S	32K	●			●				E2	Information gatherer, stores large quantity of information & can be interrogated at will.
Debugger	£258.75	CP/M	●	Animator	64K		●		●	●			M11	Also on UNIX & MS100S, interactive source level debugging tool for CIS-Cobol.
File Transfer	£132.25	CP/M		BSTAM	16K		●		●	●		●	L1	Needs common interface ports or modem access. Utility for transfering CP/M files.
Graphics	£34.50	Apple II	●	Graphic Utilities	48K		●		●	●			C1	Also for Apple IIE. Parameter driven machine code programs' high res graphics.
	£24.95	Atari		Constructor	48K		●		●	●	●		C8	Less experienced & new programmers can design animated sequences.
	£9.95	BBC Model A	●	Creative Graphics	16K	●			●				W1	Also for BBC model B.30 programs on cassette produce range of pictures & patterns.
	£24.95	BBC Model B		EDG Graphics Package	32K	●			●				S7	Computer aided design package. Reviewed 11.3.83.
	£50.60	CP/M		CP/M Graphics	64K		●			●			D4	Range goes up to £421.70 & conforms to GKS Graphics Standard.
Language	£488.75	CP/M	●	CIS Cobol	64K		●		●	●			M11	Also on Unix. Compact, interactive ANSI 74 standard implementation of Cobol.
	£1,109.75	CP/M	●	Level II Cobol	96K		●		●	●			M11	Also on Unix & MS-DOS. High level ANSI 74. Compiler, mainframe-compat code.
	£396.00	CP/M		Fortran 80	48K		●			●			T2	Useful for scientific applications, where Pascal is inefficient.
	£285.20	CP/M	●	Pascal — MT+	64K		●			●			X1	ANSI standard Pascal for Z80 processors. Also on CP/M 86 (£484-90).
	£210	CP/M	●	Supersoft C Compiler	48K		●		●	●			M4	Also on CP/M86, MS/DOS, PC. DOS. Fast implementation of C.
	£16.85	BBC Model A	●	Lisp on the BBC	16K	●			●				W1	Also on BBC Model B. Book available £7.50. Lisp is artifical intelligence language.
	£253.00	CP/M	●	ProPascal	56K		●		●	●			E1	Also on CDOS. Needs two disk drives. Native code Pascal.
	£40.19	Sharp MZ80A	●	Forth	48K	●			●				K1	Also on MZ80K & Osborne. Allows implementation of full fig Forth.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Mail order avail.	Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge		Disk drive	Joystick	Other		
	£421.70	Any 8 or 16 bit machine		PL/1	48K		●			●			D4	A compact implementation based on Ansi standard general purpose subset of PL/1.
	£350.75	IBM PC	●	Lattice-C	64K		●		●	●			L1	Also on MS/DOS. C Compiler for 16 bit machines — full implementation & execution.
Linker	£224.25	CP/M		Plink 2	48K		●		●	●			L1	Up to 8 megabytes.
Operations	£59.80	CP/M		Operating Guide	48K		●		●	●			E1	Works by putting CP/M to sleep & replacing it with operating environment.
Operating system	£22.94	Apple II		Fasdos	48K	●			●				P4	Disk operating system for Apples which speeds up location of binary & Applesoft files.
	£277	8086 micro		Concurrent CP/M 86	48K		●			●			T2	Enables four separate tasks to run in a single user station.
	£295.20	Any 8-bit micro		CP/M+	128K		●			●			D4	Upward compatible from CP/M enhanced eight-bit micro. O/S.
	£126.50	Any 8-bit micro		CP/M 2.2	64K		●			●			D4	O/S for eight-bit micros with over 1.5 million users.
	£379.50	Any 8-bit micro		MP/M	64K		●			●			D4	Multiuser, multitasking. Features record & file locking, date & time stamping etc.
	£210.80	Any 16-bit micro		CP/M 86	64K		●			●			D4	Manages up to one megabyte of RAM & allows up to 128 megabytes of on-line storage.
	£548.20	Any 16-bit micro		MP/M 86	64K		●			●			D4	Multi-user. Multi-tasking. Multi-user capability with multi-programming for each user.
	£168.70	Any 8 or 16 bit machine		CP/Net	64K		●			●			D4	A CP/M compatible O/S designed to access. Local & networked resources.
	£295.20	Motorola MC68000		CP/M 68K	64K		●			●			D4	Extends CP/M to Motorola MC6800 microprocessors. Single user, single tasking.
Program Generator	£228.85	Apple II	●	Quickcode	64K		●		●	●			P4	Also on IBM PC. Program generator for dBase II.
	£126.50	CP/M	●	Forms-2	64K		●		●	●			M11	Also for Unix & MS-DOS. Programming tool, for generating Cobol code.
	£379.50	CP/M	●	Last One	64K		●		●	●			S3	Also on MS-DOS and Apple DOS.
Programming Tool	£2,500	Apple II	●	Pascal Isam/Pascal Form	48K		●		●	●			A4	Also on IBM PC & Corvus Concept. Needs Corvus hard disk. Pascal prog tool.
	£287.50	CP/M	●	Fileshare	48K		●		●	●			M11	Also on MP/M. Bank-switched memory or CP/M Network.
	£7.95	Dragon 32		Dragon Selection 2	32K	●							D3	Four utility programs which can be listed to see how the program works.
Telex	£2,113.70	Superbrain	●	Micro Telex	64K		●		●	●			E1	Also on Televideo 802. Enables automatic sending — releiving or telex by micro.
Testing Tool	£95.82	CP/M 80	●	Diagnostics II	32K		●		●	●			M4	Also on CP/M86 and MS/DOS. Tests systems.
Time Recording	£862.50	Commodore 8000	●	Minuteman	32K		●			●			C4	Also on Commodore 4000. Time recording system. Can produce range or reports.
	£402.50	CP/M86	●	Time Recording System	64K		●		●	●			D2	Also on CP/M 80. Control over man/hour expenditure by job or account number.
Utilities	£23.00	Apple II	●	Computech Utilities Disk II	48K		●		●	●			C1	Also on Apple IIE. Error checking, copying. Single disk copy. Label disk.
	£115.00	IBM PC		C-Food Smorgasbord	64K		●		●	●			L1	Decimal arithmetic, low level & terminal independent input & output.

DISTRIBUTORS

A **A1** ACT Pulsar, 021-454 8585 **A2** Advanced Quality Software, Norwich 21117 **A3** Audiogenic, Reading 595647 **A4** Atlantic Software, Nottingham 412777 **A5** A & F Software, 061-223 6206 **A6** Abbex Electronics, 01-203 1465 **A7** Automata UK, Portsmouth 735242 **A8** Apex Trading, Brighton 36894 **A9** Acornsoft, Cambridge 316039

B **B1** Bonsai, 01-580 0902 **B2** Bristol Software Factory, Bristol 23430 **B3** Bug-Byte, 051-227 2299

C **C1** Computech Systems, 01-794 0202 **C2** Compact Accounting, Dorking 887373 **C3** Claremont Controls, Rothbury 21081 **C4** Computer Services Midlands, 021-382 4171 **C5** Comshare, 01-222 5665 **C6** Caxton Software, 01-379 6502 **C7** Cyderpress, Wallingford 37769 **C8** Channel 8 Software, Preston 53057 **C9** Chalksoft, Wellington 7117

D **D1** Dataview, Colchester 869414 **D2** DEC, Basingstoke 59200 **D3** Dragon Data, Kenfig Hill 744700 **D4** Digital Research, Newbury 35304

E **E1** Encotel Systems, 01-686 9687 **E2** Elstree Computer Centre, 01-953 6921

F **F1** Ferrari, 01-751 5791 **F2** Farmplan Computer Systems, Ross-on-Wye 64321

G **G1** Great Northern, Leeds 589980 **G2** Graffcom Systems, 01-727 5561

H **H1** Hilderbey, 01-485 1059 **H2** Hartford Software Northwich, 781156 **H3** H & H Software, Runcorn 65566 **H4** Heinemann, 01-637 3311

I **I1** Informex, 01-318 4213 **I2** Intelligence (UK), 01-543 3711 **I3** IBM UK Product Services, Basingstoke 56144 **I4** IJK Software, Blackpool 21555 **I5** Impact Software, 031-441 4257 **I6** Imagine Software, 051-236 6849

J **J1** Jarman Systems, Tring 6841

K **K1** Kuma Computers, Maidenhead 71778 **K2** Kansas City Systems, Chesterfield 850357 **K3** Knights, Aberdeen 630526 **K4** Keen Computers, Nottingham 412777

L **L1** Lifeboat, 01-836 9028

M **M1** MMS, Bedford 40601 **M2** Microsimplex, Macclesfield 615000 **M3** McDowell Knaggs & Associates, Worcester 612261 **M4** Micro Technology, Tunbridge Wells 45433 **M5** Micromedia, 01-843 9457 **M6** Molimerx, Bexhill-on-Sea 223636 **M7** Micro Power, Leeds 683186 **M8** Melbourne House, 01-977 9160 **M16** Microdeal, St Austell 67676

O **O1** Owl Microcommunications, Bishops Stortford 723848 **O2** Omicron, 01-636 6575

P **P1** Peachtree Software International, Maidenhead 32711 **P2** Padmede, Fleet 21892 **P3** Pegasus, Kettering 522822 **P4** Pete & Pam Computers, 01-769 1022 **P5** PE Consulting Group, Egham 34411 **P6** Personal Computers, 01-377 1200

Q **Q1** Quicksilva, Southampton 20169

R **R1** Rapid Terminals, High Wycombe 26271 **R2** Rabbit Software, 01-863 0833 **R3** R & R Software, Gloucester 502819

S **S1** Systematics international Microsystems, Haverhill 61121 **S2** SGS Software Products, 01-486 7498 **S3** Silicon Valley Trade, 01-242 2807 **S4** Southdata, 01-994 6477 **S5** Supersoft, 01-861 1166 **S6** Seed, Brownhills 378151 **S7** Salamander, Brighton 771942 **S8** Solo Software, Worcester 424152 **S9** Silversoft, 01-748 4125 **S10** Sinclair Research, Cambridge 353204

T **T1** Tridata Micros, 021-622 6085 **T2** Tamsys, Windsor 56747 **T3** Tabs, Andover 5893 **T4** Thorn EMI, 01-836 2444 **T5** Texas Instruments, Bedford 63211

W **W1** John Wiley & Sons, Chichester 784531

X **X1** Xitan Systems, Southampton 334711

PCN Billboard

Software for Apple II — Applewriter II, VisiCalc, DOS Toolkit, Tasc Basic Compiler, general utilities package, also 34 games, all Disk, offers, Hardacre, 24 Southernhay East, Exeter, Devon.

1K ZX81 plus four 16K cassettes and one book. £50. Steve NG, Mount Pleasant, Sherwood Street, Warsop, Mansfield, Nottinghamshire NG20 0JT.

My Spectrum 48K, boxed, as new, with over £250 worth of software including Pascal, Hobbit, Compiler, Penetrator, Horace, Vu-Calc, Masterfile, Pimania, Toolkits, Monopoly, Timegate, etc. For your Lynx. Kegworth (05097) 2807.

Pet 3032/32K new ROM; Hampshire's Pet Revealed, manuals, programs-assembler/disassembler, word processor, games; £300 or any offer. Bob, 17 Aled Drive, Colwyn Bay, 0492 40780. Could deliver from Liverpool.

Wanted ZX81 16K optional plus any other useful items for the first time computer enthusiast. Price up to £65. Write — R Skinner, 9 Grenville Way, Eaton Socon, Cambridgeshire, 0480 214020.

Apple II software for sale or exchange for other Apple software. Includes Adventures 1, 4, 5, 6, Alien Rain, Rasterblaster, VisiCalc 3.2, and many more. Paul, Potters Bar 52294 any time after 4pm.

100 Programs for MZ80K including eight M/C arcade games, five different versions of Basic and many other expensive adventure, educational and game programs. Market value £700, can have for £25. 0376 511973.

Vic 20 Adventure cartridges for sale. Mission Impossible and Voodoo Castle. Both in excellent condition, still boxed with all instructions. Might consider a swap. Adam, 01-660 9796 any time.

Spectrum Software, unwanted items: Hisoft Pascal 4T compiler plus manual, £15. Forth compiler plus manual, £10. Machine Code Synthesiser, £5. Super C Basic Compiler, £10. Header Reader, £5. M. Lamb, Scarborough, Yorkshire YO12 4AQ.

UK101 Expanded super machine, excellent machine code and Basic, 2 MHz, 600 baud, Toolkit II, upgraded Basic, Basic 5, seven 8-bit ports, sound boards, programmable graphics, Stuart Colour, 16K RAM, RSH23, £195. Details — 0272 832547.

ZX81 Plus professional keyboard, plus 16K RAM, manual, leads, cassettes, including: Invaders, Flight Simulation, Labyrinth, Scramble, Centipede, Chess, Breakout, Defender, Snakebite and more. £90 ono or in part exchange for VIC20. Swansea 71340.

Commodore 64+ disk drive VIC 1541, 10 flexy disks plus C2N, cassette unit plus tapes, Seikosha GP100VC printer plus paper, unwanted gift. All boxed, as new, one month old, £775 ovno. Edna — Orpington 70924.

Sinclair ZX81, 16K memory plus button set, (adhesive keyboard) plus Bi-Pak, ZON X-81 sound unit plus £85 software. Cost £200, sell £100 ono. Bodfari 425 (after 5pm).

Scripta ES100KSR daisywheel printer, excellent condition, £595. Easywriter 80 col professional word processing package (Apple II), £69. Biggin Hill 73385.

Atari 400 16K plus Basic, cartridge, manual, and joystick. Ideal for beginner, only six months old, still under two year guarantee. Must sell, offers around £150 ono. Cheshire 061-436 4426 (after 5pm).

Video Genie 16K, integral cassette, over £125 of software (Arcade games plus others), and books. All manuals included. Offers around £225. 031-661 1417.

Vic20 boxed and complete. C2N tape recorder. Programs on tapes and introduction to Basic Part I, four months old, £130 ono. 01-500 8608.

Newbrain word processor, options include SAVE/LOAD to tape, paged organisation, uncrashable, directory look-up, all normal wp functions, manual, cassette, £5. Could pay 10 times! K. Polston, 9 Boucheir Walk, Rainham, Essex RM13 7HL.

ZX81 printer wanted. Send details to Michael Tew, 21 Wellis Gardens, Westbrook, Margate, Kent CT9 5RG.

Will Swap a large Hornby layout, worth over £200 for a 16K Spectrum and printer. James Main, 0427 880116.

Acorn Atom 12K RAM, 12K ROM, PSU, manual, software, floating points ROM, under a year old, must sell. Bargain at £200. Offers considered. 01-730 3248.

Sinclair ZX81 tapes Sorcerer's Island, £3. Flight Simulation, £3.50. 3D Defender, £3. Star Trail, £2.55. Star Trek, £3. Starfighter Pyramid Artist gamestape, £2.25. Prices include postage, 2 Fontmell Court, Stockwood, Bristol, Avon.

Vic20, 16K RAM, cassette recorder, joystick, Sargon II Chess, four game cassettes, programmer's reference guide, three books, dust covers, magazines, £180. 031-339 1584.

Sharp MZ80K 48K with Extended Basic, Pascal Compiler, Forth, assembler, lots of software, 43 tapes. Delivery within 30 miles possible, I/O expansion box, £400 ono. Ash Green 872150 (near Dartford, Kent).

Unwanted Commodore 64 software, Hitch Hikers Guide and Monopole, £25. Also Data Base, £10. 0787 60148.

ZX81 + 16K DK Tronics graphics ROM giving 1024 extra graphics, DK Tronics keyboard plus mother board, software including Invaders, Krazy Kong, lots of mags, worth £205. Accept £130 ono. 0522 751685.

ZX81 games for sale including Space Raiders, Breakout and ZXGals. Also on sale is a mother board and joystick. Banff 5160 on Monday and Sunday nights after 6pm only.

Tuscan Transam, S100 computer, built by Tuscan. Software and hardware manuals, 10in monitor, cassette and mains cables, £295. Langreath (0503) 20545.

Acorn Atom computer, 12K RAM, L2K ROM plus 4K 'Toolbox' Eprom, leads, manuals, software and magazines. Worth £300. Bargain at £140. Harlow (0279) 415409 (after 6pm).

ZX81 PLUS 16K RAM, cassette recorder and software including Flight Simulation and Avenger. Mint condition, all items boxed. Bargain at £100 for quick sale. Brighton 414064.

Vic20 with Arfon motherboard, 16K cartridge, Super Expander, machine code monitor, adventure cartridge and wads of software, books and manuals, joystick, etc. Best offer in region of £350. Wolverhampton 896678 (evenings).

Spectrum Software (moving onto Apple) Psion Simulator, Masterchess, Timegate, Penetrator, Hobbit, £15 the lot. Machine code copying tape (back up copies of any program), £5. M Lamb, 6 Park Street, Scarborough, Yorks YO12 4AQ.

Pet 3032, two cassette units, 4022 printer, all leads plus keychip, tapes, sound box, manuals, dust cover, very good condition, £700 ono. Also Centronics 779 printer for sale. Offers — South Benfleet (03745) 4066 (evenings only).

Sinclair QS Character Generator, QS-2 slot mother board plus connector, QS Defender, QS Invaders, ICL tapes five and six, Sinclair one, three and four, Arctic ZX Galaxians, 3D Monster Maze, 3D Defender, JP Gibbons Banking System, Sinclair 16K RAMpack, £65. Will sell separately. J. Ball, 01-928 4563 (after 6pm or weekends).

Vic20 with 16K and 3K RAM packs, cassette unit, joystick, £50 of software. Worth over £400. Sell for £295 ono. Erith 49750 (any time).

Sharp PC1500, powerful pocket computer, perfect working order. Cost £170, selling for £125 or will swap for ZX Spectrum or similar. 15 Bredon Close, Lytham, Lancs. Lytham 733926.

Spectrum Software for sale or swap. Arcadia, Schizoids, Cyber Rats and 3D Tunnel, £3 each or swap for other 16K/48K software. Rayleigh (0268) 779645 — ask for Ray.

Pet 4032 8050 disk unit, cassette plus all leads and manuals, lots of software, games and business. Also lots of extras and parts, £875. 0908 677931 (after 7pm).

Wanted Apple or BBC B, also printer-Hardacre, 24 Southernhay East, Exeter, Devon.

Computer Wanted in exchange for my 40CH FM CB rig, mobile or home base use, will add cash for Spectrum. Southend (0702) 335916.

Atari Games console, £65. Eight cartridges including: Asteroids, Adventure, Missile Command, £10 each, or whole lot with console, £120. 01-462 6439 (after 5pm).

Acorn Atom, 12 + 12 + VIA + BBC Basic board, several books, some games, £200 ono. Hastings (0424) 51961.

TI-99/4A home computer, complete with compatible tape recorder and leads, extended basic, mini memory, Tombstone City, extra manuals and user magazines, £290 ono. 0942 604434 (after 4pm).

Atari 400, 3 months old, still guaranteed and boxed, unwanted gift, complete with two joysticks, Basic, manuals, recorder and three games, Preppie, Miner 2049'er, Baja Buggies, £275. Hexham 604294 (after 6pm).

Atari Video computer TV game, £60. Cartridges: Chess, £15. Asteroids, £15. All as new. Helensburgh 0436 2517 (after 5.30pm).

Atari 400/800 Missile Command cartridge, £20 or swap for other cartridge or good cassettes. 04446 41198 (after 4pm).

Unwanted Atari software, very reasonable prices. SAE for list. Hepburn, 4 Cardinal Avenue, Kingston, Surrey KT2 5SB.

Video Genie EG3003 16K, integral cassette, colour board added at factory, some books and software, will accept £180 ono. 0842 61073 ask for Mick.

For Sale 16K ZX81, £80 worth of software, including Scramble, 3D Defender and Monster Maze, plus magazines and books. A bargain at £80. Stonehenge 43343.

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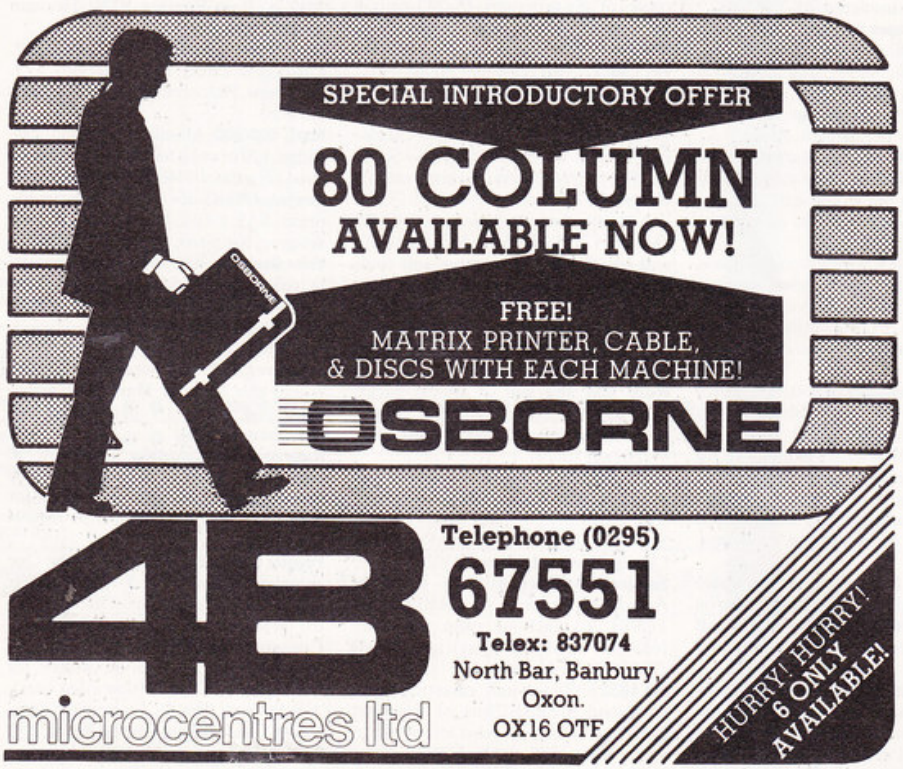

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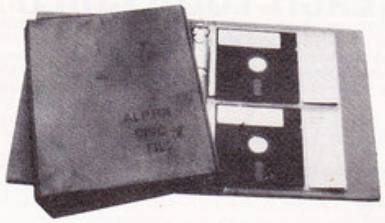

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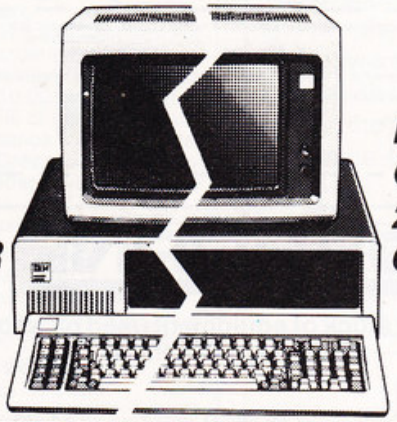

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Sell doubt

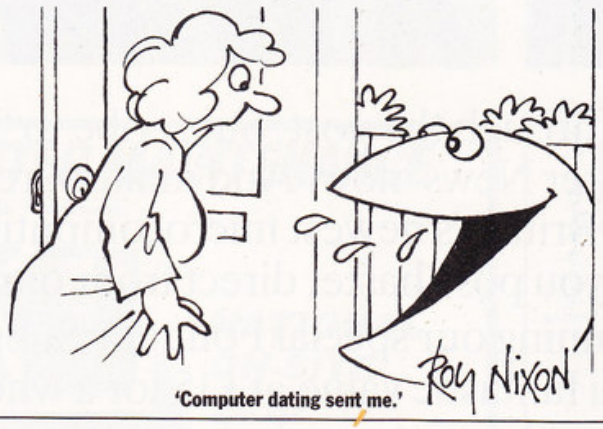
Would you buy a used car from a man who knew next to nothing about cars? Well, perhaps not. But how do you know how much the salesman knows?

In the US an advertising company carried out a survey to determine how well clued-up personal computer salesman are. The results are not encouraging.

Of the 300 advertising and marketing executives polled, 60 per cent had little experience of computers. How little is little? Well, 36 per cent had clocked up less than two years in the industry; 75 per cent had five years or less experience.

And the number of them practising what they preach is even less impressive. Eighty-two per cent owned a personal computer for two years or less. Half of them have barely logged a year's ownership.

What can we conclude from this? That things are different in the US, with any luck.



'Computer dating sent me.'

```
2  INPUT "PLEASE ENTER AN INTEGER (1-99)";A%
4  IF A% < 1 OR A% > 99 THEN  PRINT "INTEGER OUT OF RANGE - RERUN": END

6  FOR N = 0 TO 10 STEP 2:CC% = CC% + A% * N: NEXT N
8 CC% = CC% / A%
9  PRINT "CALCULATED NUMBER = ";CC%
10 A$ = "ABCDEFGHIJKLMNOPQRSTUVWXYZ -12345678 90"
12 P$ = P$ +  MID$ (A$,5,1):P$ = P$ +  MID$ (A$,12,2)
14 P$ = P$ +  MID$ (A$,27,1):P$ = P$ +  MID$ (A$,23,1)
16 P$ = P$ +  MID$ (A$,15,1):P$ = P$ +  MID$ (A$,18,1)
18 P$ = P$ +  MID$ (A$,11,1):P$ = P$ +  MID$ (A$,9,1)
20 P$ = P$ +  MID$ (A$,14,1):P$ = P$ +  MID$ (A$,7,1)
22 P$ = P$ +  MID$ (A$,28,1):P$ = P$ +  MID$ (A$,6,1)
24 P$ = P$ +  MID$ (A$,1,1):P$ = P$ +  MID$ (A$,3,1)
26 P$ = P$ +  MID$ (A$,20,1):P$ = P$ +  MID$ (A$,19,1)
30  PRINT "PHRASE = ";P$
100 PR$ = "":A$ =  MID$ (P$,5,3) +  MID$ (P$,11,1)
110 A$ = A$ +  MID$ (P$,4,1):A$ = A$ +  MID$ (P$,17,1)
120 A$ = A$ +  MID$ (P$,12,1):A$ = A$ +  MID$ (P$,4,1)
130 A$ = A$ +  MID$ (P$,1,2):A$ = A$ +  MID$ (P$,16,1)
140 A$ = A$ +  MID$ (P$,16,1):A$ = A$ +  MID$ (P$,9,1)
150 A$ = A$ +  MID$ (P$,2,1):A$ = A$ +  MID$ (P$,4,1)
160 A$ = A$ +  MID$ (P$,3,1):A$ = A$ +  MID$ (P$,6,2)
170 A$ = A$ +  MID$ (P$,13,1):A$ = A$ +  MID$ (P$,4,1)
180 A$ = A$ +  MID$ (P$,17,1):A$ = A$ +  MID$ (P$,8,1)
190 A$ = A$ +  MID$ (P$,14,1):A$ = A$ +  MID$ (P$,6,1)
200 A$ = A$ +  MID$ (P$,4,1):A$ = A$ +  MID$ (P$,16,1)
210 A$ = A$ +  MID$ (P$,14,1):A$ = A$ +  MID$ (P$,1,1)
220 A$ = A$ +  MID$ (P$,7,1):A$ = A$ +  MID$ (P$,11,1)
250  FOR C = 1 TO CC%:PR$ =  MID$ (A$,C,1) + PR$: NEXT C
300  PRINT "PROVERB = ";PR$: END

 RUN
PLEASE ENTER AN INTEGER (1-99)5
CALCULATED NUMBER = 30
PHRASE = ELM WORKING-FACTS
PROVERB = GREAT OAKS FROM LITTLE -S GROW
```

SYNTAX ERRORS

Note the numbers

Missed out in Databasics (*PCN April 29*) were a couple of telephone numbers. **D8** Dacom Systems Ltd, Milton Keynes 676797, and **M6** Microtech Leeds Ltd, Leeds 679964.

. . . and the chase goes on

If you thought Paperchase was dead and gone, you're wrong. It goes on . . . we blundered.

Last week we printed an incorrect version of the listing, one that didn't give the correct solution — Great oaks from little acorns grow.

I'd like to say we did it for fun, for a test, for a spot-the-difference joke. But, the fact is, we made a mistake. Sorry.

The listing here really *is* the correct solution but until it's printed I'll not be walking under any ladders — Ed.

PCN DATELINES

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

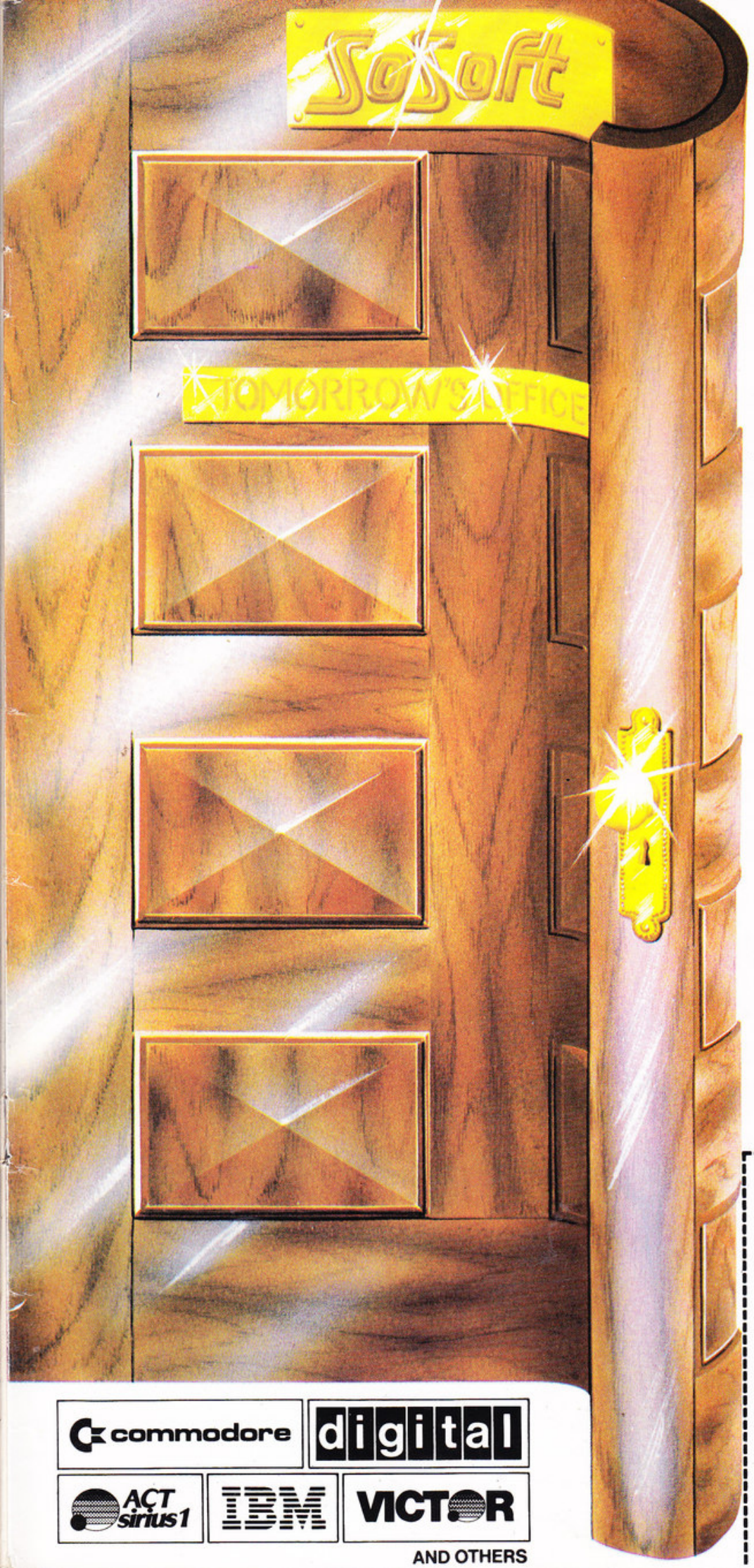
Organisers who would like details of coming events included in PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

UK EVENTS

Event	Dates	Venue	Organisers
Midland Computer Show	April 28-30	Bingley Hall, Birmingham	Roy Bratt, Reed Exhibitions, 01-643 8040
RIBA Computer Conference & Micro City '83	May 10-12 May 10-12	Bloomsbury Crest Hotel, London Bristol Exhibition Complex	Joe Hunting, RIBA Services Ltd, 01-637 8991 Stephen Hybs, Tomorrow's World Exhibition, 0272 292156
Computer Open Day Exhibition	May 12	The Post House, Southampton	Tony Kaminiski, Couchmead Communications, 01-778 1101
Compec Scotland	May 17-19	Kelvin Hall, Glasgow	Tracey Cannon, Reed Exhibitions, 01-643 8040
International Word Processing Exhibition	May 24-27	Wembley Conference Centre, Wembley	Philip Le Masurier, BETA, 01-405 6233
Computers In The City	May 24-26	Barbican, London	Mario Meoli, Online Conferences, 09274 28211
Computer Open Day	May 26	Strathmore Kotel, Luton	Tony Kaminiski, Couchmead Communications, 01-778 1101
Apple '83	June 3-5	Fulcrum Centre, Slough	John Riding, Database Publications, 061-405 8500
Office Automation Show & Conference	June 7-9	Barbican Centre, London	Clapp & Polliak, 01-747 3131
4th Commodore Computer Show	June 9-11	Cunard International Hotel, London	Commodore Business Machines UK, 75 74111, Ext 220

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Compec Europe Exhibition	May 3-5	Centre Rogier, Brussels	Tracey Cannon, Reed Exhibitions, 01-643 8040
National Computer Conference & Exhibition	May 16-19	Anaheim, USA	American Federation of Information Processing Societies, 1815 N Lynn Street, Arlington, VA 22209
Computers, Communications & Electronic Technology Exhibition & Conference	May 31-June 3	Melbourne, Australia	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



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