

**P E R S O N A L**

# COMPUTER

THE COMPLETE COMPUTING WEEKLY

**NEWS**

APRIL 29-MAY 6, 1983 Vol 1 No 8

**35p**

## Exclusive!

**Epson's RX80 offers professional printing at a personal price.**

**Full Pro-Test, page 34**



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35p  
WEEK**

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# 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 Blum-

stein 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 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 stores 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 extra 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 five 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 prob-

lem this device won't get 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.

## 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 man-

aging director John Ash.

When it is released into 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 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

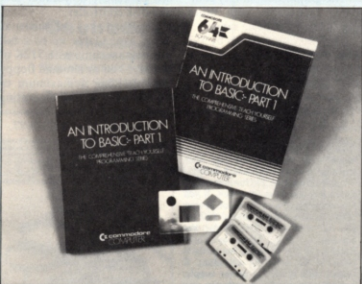


The Kaypro II portable, now being sold in the UK.

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.



**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 VHSof, Slough 74111.

## 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 Micro-soft-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 com-

mands 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 £89.50 for the assembled turtle. Made by Colno 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 Z81 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.

## 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



The Winchester-equipped dual processor Cifer Club micro. 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.

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.



**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.

## 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 T199	£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 I	£2,754	(ACT)
▶ 2 (2)	Osborne I	£1,581	(OS)
▶ 3 (3)	Olivetti M20	£2,754	(OL)
▲ 4 (5)	HP 86A	£1,541	(HP)
▲ 5 (6)	IBM PC	£2,392	(IBM)
▼ 6 (4)	Commodore 8032	£1,029	(CO)
▲ 7 (9)	Apple III	£2,780	(AP)
▶ 8 (8)	Micro-Mimi 803	£1,720	(BM)
▼ 9 (7)	Sanyo MBC 1000	£1,195	(SA)
▶ 10 (10)	Xerox 820	£2,415	(RX)

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

# Paper snags Micronet

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

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



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

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.

The specially designed adaptors will have a 'modern 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 off-line, 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 Lampas has produced a desk-top console for the BBC micro. The console measures a whopping 27 1/2" x 31 1/2" in, and is claimed to organise all the peripherals — monitor, tapes, drives and cassette recorder — into a manageable configuration. Lampas 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 x 235 pixels and the higher performance 1302-2

has 580 x 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 Electronics, 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.

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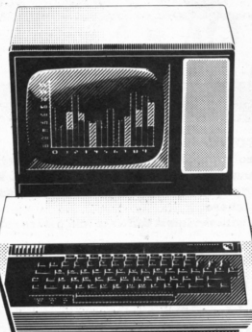
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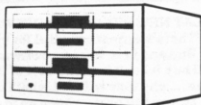
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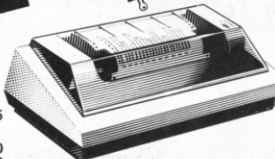
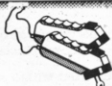
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We have got off to a flying start, and it is great to see that so many people have responded to the idea so warmly. In fact, the response has been so good that we have been almost overwhelmed.

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.

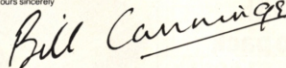
Both the enormous response and temporary delivery delays have meant that some postal and telephoned orders have not been fulfilled within our normal 14 day limit. However, we have pulled out all stops to dispose of the back-log. If your order has been delayed, please accept my personal apology ... we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

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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.

Autocore, made by London-based software house Stembos, 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 Stembos, said: 'Autocore 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 Stembos 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 Calcrest for a total of £1,140.

Calcrest 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.

Calcrest 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' 3127 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 course, 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 Com-

## PCN £10 Star Letter



plete 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 nesting 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 an 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

## English as she is processed

My particular interest at the moment is in word processing, so I am pleased 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 WPs 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 disension 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 func-

tion 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 'blood-thirsty' 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 distributed 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 as £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.

David 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 screen 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.

It'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 Computers 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 Laser 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, Reford, Norfolk*

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 get 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.

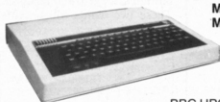
The Laser appears to be a 4K Textet TX8000, priced around £70, so you should get a good impression of it from PCN's Textet review in the March 18 issue.

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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*((I=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 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

ALPHA	0	1	2	3	4	5	6	7	8	9	0	DEL
0	1	1	3	1	2	5	1	6	7	9	0	1
1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1
0	1	1	1	1	1	1	1	1	1	1	1	1
DEL	1	1	1	1	1	1	1	1	1	1	1	1

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

1	127	191	223	239	247	251	253
127	1	1	1	1	1	1	1
191	1	1	1	1	1	1	1
223	1	1	1	1	1	1	1
239	1	1	1	1	1	1	1
247	1	1	1	1	1	1	1
251	1	1	1	1	1	1	1
253	1	1	1	1	1	1	1

Lynx key input — see *Keys unlock your Lynx*

- Cursor on
- VDU enabled
- printer on
- keylock silent
- print next character as an escape character
- print across a 40 column line
- 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 suppressing 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, POKING 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.
```

```
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 @ I,101"High scores" :H
1061 IF I=0 OR (H=180 AND X=108) THEN GOTO 1069
1063 PRINT @ 40,1101"Your score" :S
1065 IF S>H THEN PRINT TAB B(CHR$(18)):"You've got the High
Score" :H=CHR$(18)
1067 IF S=H THEN H=S
1068 PAUSE 20000
1069 CLS
```

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

## 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.

```
1 * 2" 1 SWAP ?DOT
IF
0
DO
2 *
LOOP
THEN
1
1 ?DOT
2 /MOD 22 SWAP - ROT
2 /MOD ROT SWAP AT
0= SWAP @= 2 * + 2"
15388 @ CA SWAP OVER AND
0= SWAP 128 AND 0= XOR
1
```

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 tricks to make it into a complete game. Add these lines to the program to give you a score, high score and repeat games.

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Happy bombing!  
Thomas Griffiths,  
Teddington,  
Middlesex.

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SINCLAIR USER FEBRUARY 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

**P**CN 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.

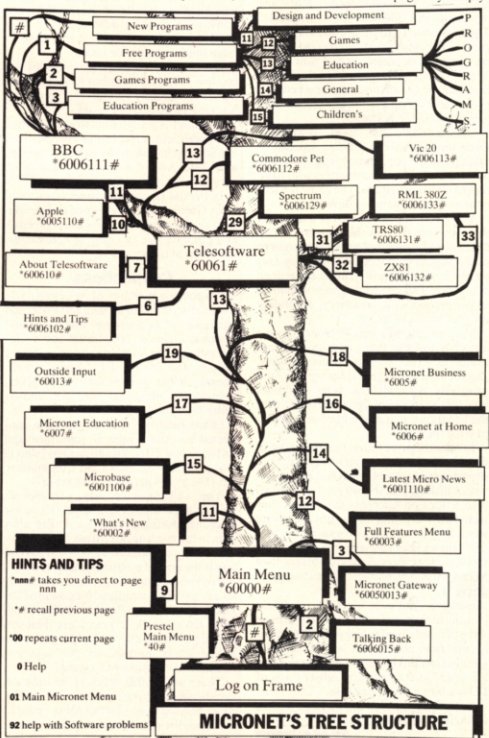
At first it can be confusing. Most computer databases work on the index principle, where an index, or menu, appears on screen giving a series of subject headings. You select one of these, which takes you to another menu or to the file of information you requested. Another simple command takes you back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



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.

keying '\*#', then the page number followed by '#'. For example, to get to the newflash 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 analogue 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.

IAN SCALES

# Price Breakthrough in Microcomputing

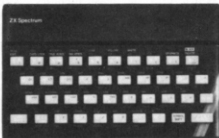
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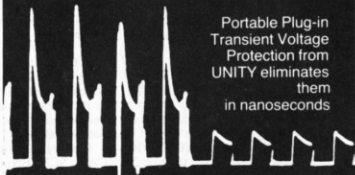
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Everything from Texas is big except the 99/4A memory. Stephen Shaw shows how to save it.

# 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 variables 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 quote 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 the end—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

## COMPACT PROGRAMMING

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<>0) 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 0 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,  
"FFFFFFFFFFFFFF")

use:-  
CALL CHAR(33,RPTS"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  $4 \times 10 \times 4 \times 8$  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  $3 \times 9 \times 3 \times 8$  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 AS (3,9,3) uses:  $3 \times 9 \times 3 \times 2 = 162$  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 CS = DS + "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.

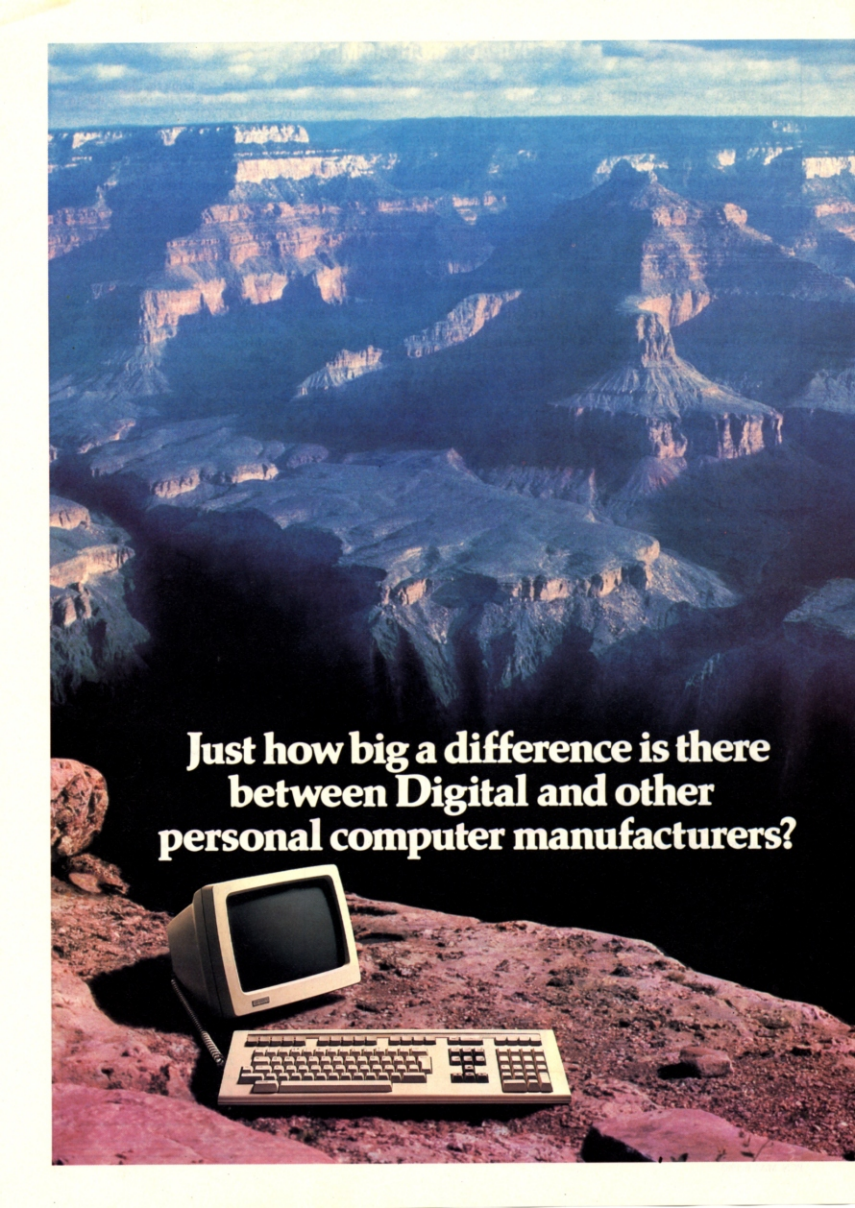
**AVARIABLE** takes up only as many bytes as it is long — but will also use up stack space.

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  $255 \times 256 + 226 = 65506$ .

Our memory locations don't go that high. Subtract  $65536 (64 \times 1024)$  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           | 7      | 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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Tel: 01-373 6607.

(Opticians & Ophthalmologists)\*  
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London EC4. Tel: 01-621 1122.

Personal Computers Ltd, 220-226 Bishopsgate,  
London EC2M 4J5. Tel: 01-377 1200.

Planning Consultancy Ltd, 46/47 Pall Mall,  
London SW1Y 5JG. Tel: 01-839 3143.

Rank Xerox (UK) Ltd, The Xerox Store,  
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Tel: 01-629 0694/5.

The Xerox Store, 110 Moorgate,  
London EC2M 6SU. Tel: 01-588 1531/2.

The Xerox Store, 76-77 Holborn,  
London WC1V 6LS. Tel: 01-242 9596/7.

Software Sciences, Thorn (EMI) House,  
14 Old Park Lane, London W1. Tel: 01-499 7099.

Software Sciences, 88 Old Street,  
London EC1. Tel: 01-253 1480.

Sunlock Bondain Ltd, 263-269 City Road,  
London EC1V 1JX. Tel: 01-250 0505.

Sytec Products Ltd,  
25 Bruton Lane, London W1. Tel: 01-409 1244.  
(Pressure Vessel Design, Surveying,  
Structural Analysis)\*

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Dalaview Ltd, Portreeves House, East Bay,  
Colchester, Essex CO1 2XB. Tel: 0206 865835.

Ferrari Software Ltd, 683 Armadale Road,  
Feltham, Middlesex. Tel: 01-751 5791.

GSJ Ltd, Stanhope Road, Camberley, Surrey,  
Tel: 0276 62282.  
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Key Computer Centres, Enterprise House,  
Terrace Road, Walton-on-Thames, Surrey,  
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Micro Business Systems PLC,  
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Tel: 07535 55211.

Microfacilities Ltd, 7-9 Church Road,  
Egham, Surrey. Tel: 0784 31333.

Rank Xerox (UK) Ltd, The Xerox Store,  
314 William Street, Slough, Berkshire SL1 1XY.  
Tel: 0753 76957.



STC Micros, West Road, Harlow,  
Essex CM20 2BP. Tel: 0279 443421.

Sytec Products Ltd, Cord House,  
The Causeway, Staines, Middlesex.  
Tel: 0784 63911.

## SOUTH/SOUTH EAST

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Southampton. Tel: 0703 39571.

Software Sciences, Abbey House,  
282-292 Farnborough Road, Farnborough,  
Hants. Tel: 0252 544321.

South East Computers Ltd, 15 Castle Street,  
Hastings, Sussex. Tel: 0424 426844.

South East Computers Ltd, 31 Watling Street,  
Canterbury, Kent. Tel: 0227 59917.

South East Computers Ltd, 29 High Street,  
Maidstone, Kent. Tel: 0622 681263

## SOUTH WEST

Computacenter, Theatre Square, Swindon,  
Wiltshire SN1 1GN. Tel: 0793 612341/2.

Rank Xerox (UK) Ltd, The Xerox Store,  
Bristol & West House, Broad Quay,  
Bristol BS99 7AX. Tel: 0272 277628.

Software Sciences, Unit 39, Southfield Road,  
Nailsea, Nr. Bristol. Tel: 0272 851462/3.

South Coast Computers Ltd,  
South Coast House, Wimbourne Road,  
Ferndown, Dorset. Tel: 0202 893040.

Whyrnark Computing, 20 Milford Street,  
Salisbury, Wiltshire SP1 2AP.  
Tel: 0722 331269.

## MIDLANDS

4B Microcentres Ltd, 13/14 North Bar, Banbury,  
Oxon OX16 0TE. Tel: 0295 66555/50796.

Micro Business Systems PLC, Wirksworth,  
Derbyshire. Tel: 062-9823120.

MMS Ltd, Ketwell House,  
75-79 Tavistock Street, Bedford MK40 2RR.  
Tel: 0234 40601.

Zygal Dynamics PLC, Zygal House,  
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Tel: 08692 3361.

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Microware Computers Ltd, Diamond House,  
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Microware Computers Ltd, Priory House,  
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Whessoe Technical & Computing Systems Ltd,  
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Co. Durham DL3 6DS. Tel: 0325 60188.

## NORTH WEST

Cytek (UK) Ltd, Sandringham House,  
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Micro Business Systems PLC,  
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Tel: 0925 822261.

Rank Xerox (UK) Ltd, The Xerox Store,  
Pearl Assurance House, Derby Square,  
Liverpool L2 9QR. Tel: 051-236 7512.

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Rank Xerox (UK) Ltd, The Xerox Store,  
South Gate House, Wood Street,  
Cardiff CF1 1EW. Tel: 0222 40118.

Sigma Systems Ltd, 266 North Road,  
Cardiff CF4 3BL. Tel: 0222 34865/69.

## SCOTLAND

Micro-Centre (Complete Microsystems) Ltd,  
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Tel: 031-556 7354.

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Tel: 031-333 1000.

Pilgrim Business Machines Ltd,  
28 Walker Street, Edinburgh.  
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(Solicitors)\*

Pilgrim Business Machines Ltd,  
Northfield Place, Aberdeen. Tel: 0224 645104.  
Rank Xerox (UK) Ltd, The Xerox Store,  
166 Hope Street, Glasgow G2 2TG.  
Tel: 041-333 0495.

## NORTHERN IRELAND

Systems Plus Ltd, 19 Glengormley Park,  
Newtownabbey, Northern Ireland.  
Tel: 023-134 2117.

## DIGITAL UK HEADQUARTERS

Digital Equipment Co. Limited, P.O. Box 110,  
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\*Vertical market application speciality.

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

**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

# Foolproof filing

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

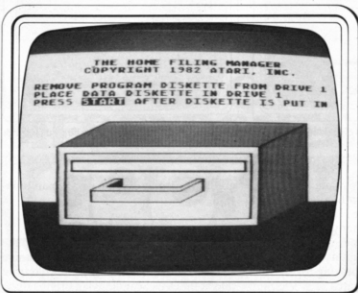
happened was that if the power was cut off during the adding of a card to the file it was lost — and this is hardly surprising. It's certainly a great deal better than many other packages available and cannot be considered as a drawback.

## 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.

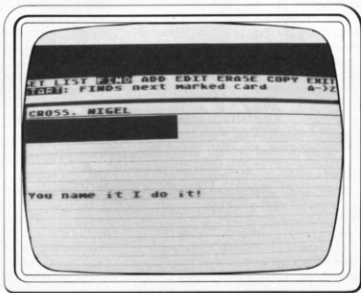
There is, however, a drawback. The price, at about £40, means it can be considered as a viable purchase only if it is intended to keep a large filing system on hand. As it is, each data disk is capable of storing between 115 and 700 index cards, which is quite reasonable.

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



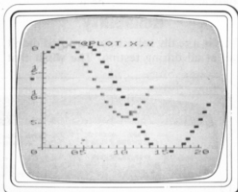
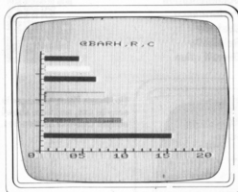
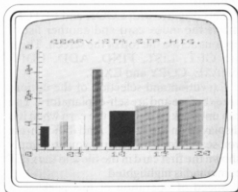
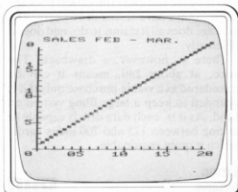
The Home Filing Manager is easy to use, and here shows almost Lisa-like tendencies.

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 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.

**PLOT0, 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.

**LINEG** 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.

# Ltd viability?



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

! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 : ; ( = ) ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r  
LFREDO JUST MUST BRING EXCITING NEWS TO THE PLAZA QUICKLY

! " # \$ % & ' ( ) \* + , - . / 0 1 2 3 4 5 6 7 8 9 : ; ( = ) ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ \_ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ \*  
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

; ( = ) ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^

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 swap 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.

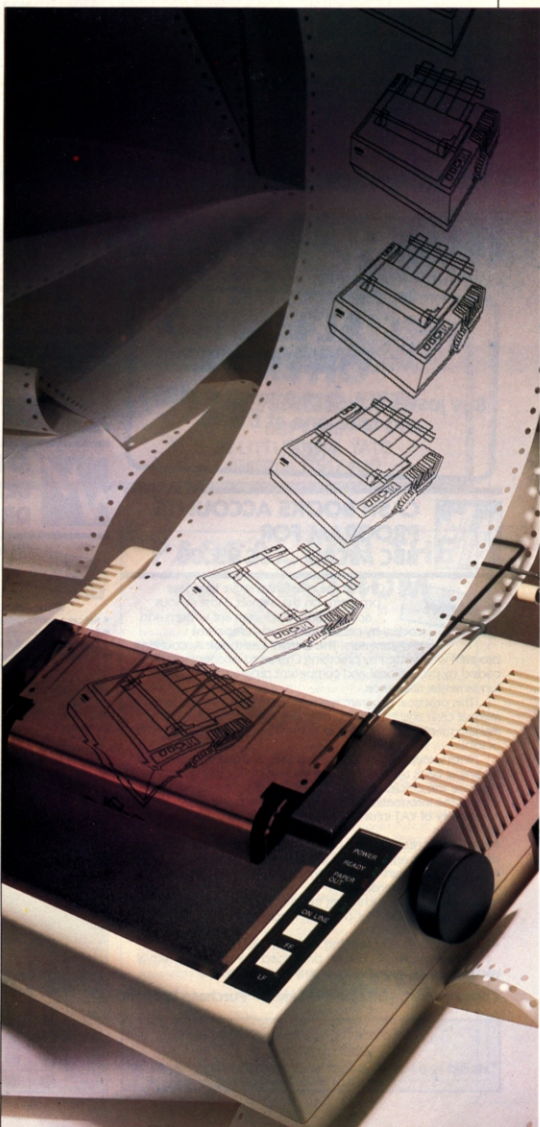
The lid of the machine should be handled carefully — it is quite brittle. It doesn't have a serrated edge for easy tearing of the paper, but with reasonable care it's possible to tear it off quite successfully. The widest paper the printer will accommodate is 10in, so if you've gathered in a large stock of 72-line 10<sup>1</sup>/<sub>4</sub>in word processing paper, bad luck!

The RX80 will print a self-diagnostic test if you switch 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 McKinnell



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\* option for departmental analysis of sales and purchases

\* print out of all transactions

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\* year end trial balance

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when tested ..."

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(Which Micro & Software Review Feb 83)

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(Which Micro and Software Review)



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- \* 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 | Matrix | Invoices & Statements | Spread sheet Analysis | Cashbook Accounting | Word processor | Home Accounts | Commercial Accounts |
|------------------------------|----------|---------------|--------|-----------------------|-----------------------|---------------------|----------------|---------------|---------------------|
| Sinclair Spectrum 128 or 64k | ●        | ●             | ●      |                       |                       |                     |                | ●             | ●                   |
| Dragon 32k or 64k            | ●        |               |        |                       | ●                     |                     |                | ●             |                     |
| BBC (128k+)                  | ●        |               |        | ●                     |                       |                     |                | ●             |                     |
| Sinclair 256 (128k+)         | ●        |               |        |                       |                       |                     |                |               |                     |
| Grundy Newton                | ●        |               |        |                       |                       |                     |                |               |                     |
| Texas TI994A                 | ●        |               |        |                       |                       |                     |                |               |                     |
| Osborne 1                    | ●        |               |        |                       |                       |                     |                |               |                     |
| Sharp M280A                  | ●        | ●             | ●      | ●                     |                       |                     |                | ●             | ●                   |
| Sharp M280K                  | ●        | ●             | ●      | ●                     |                       |                     |                | ●             | ●                   |
| Sharp M280B                  | ●        | ●             | ●      | ●                     |                       |                     |                | ●             | ●                   |
| BBC micro Model A or B 32k   | ●        | ●             | ●      | ●                     | ●                     | ●                   |                | ●             | ●                   |

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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.



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|-------------------------|--------|--------------------------|-----------------------------|--------|--------------------------|
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| Stock Control           | £19.95 | <input type="checkbox"/> | BBC Cash Book (see or hear) | £95.00 | <input type="checkbox"/> |
| Mailing List            | £19.95 | <input type="checkbox"/> | BBC Disks — other titles    | £83.95 | <input type="checkbox"/> |
| Invoices and Statements | £19.95 | <input type="checkbox"/> | Osborne Disk Database       | £83.95 | <input type="checkbox"/> |
| Commercial Accounts     | £19.95 | <input type="checkbox"/> | Word processor              | £19.95 | <input type="checkbox"/> |
| Home Accounts           | £19.95 | <input type="checkbox"/> | Beebecalc                   | £19.95 | <input type="checkbox"/> |
|                         |        |                          | Dragoncalc                  | £19.95 | <input type="checkbox"/> |

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PC 5/83

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The ham-fisted would in trouble here!

In particular, it is important to have close hand at 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 lin 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 x 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.

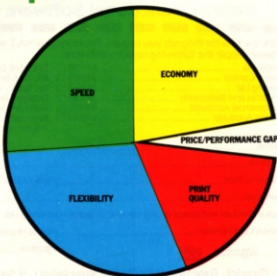
**Machine** Epson RX80 **Price** £250-£300 plus VAT **Speed** 100 CPS, **Interfaces** Centronics parallel **Contact** Epson, 01-900 0466.

**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.



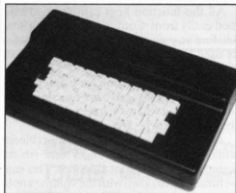
Upgrading your Sinclair can start at the keyboard. Ian Scales gets the feel of TEC's ZX8100.



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.

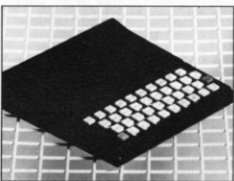
The case weighs about 3lb once the ZX81 is inside it, and measures 13½ × 7½in and averages about 2½in deep. The power supply and a 16K RAMpack can

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



**PUSH-BUTTON PAD** — The less ambitious might be interested 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

plastic cavity — in fact the tiny little ZX81 board with its four lonely chips looks rather comical.

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

**D**ecision 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 5 $\frac{1}{4}$ in 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 alphanumeric 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.

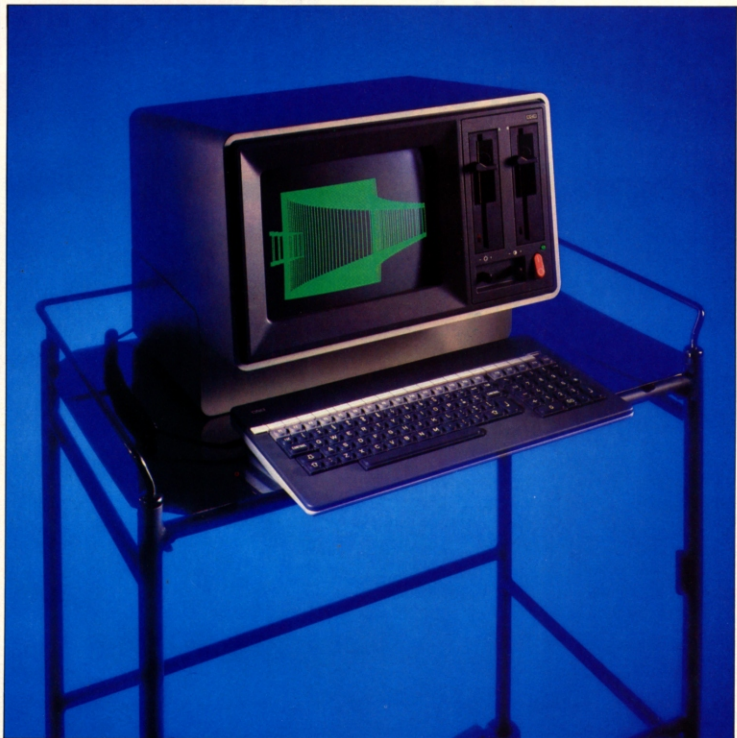
## Screen

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 x 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 5 $\frac{1}{4}$ in 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 warms-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

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41 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 :



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.

D=488 : CALL POINT (C% B%)  
W1=1 : W2=3 : W3=2 : CALL PAINT (W2)

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 x 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

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

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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.

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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.

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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?

**F**uture 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.

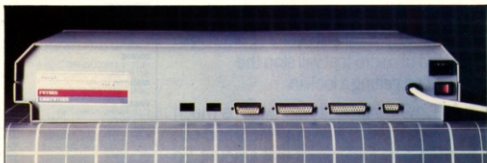
For normal use this can be plugged into the side of the CPU, but if you are short of space it can be plugged into the underside of the VDU, leaving the CPU free to be mounted on the side of your desk. This would also make the fan noise less obtrusive.

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 re-

# FUTURE FX20



fused to boot, and you had to start again from scratch.

### 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 x 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.

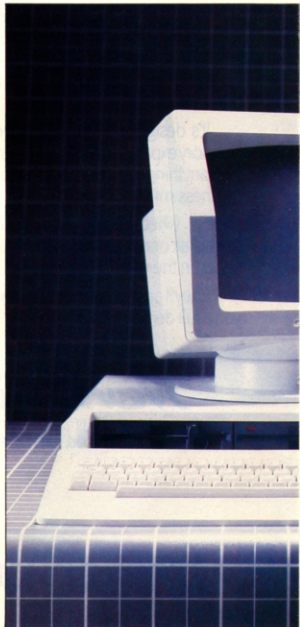
The date and a clock are permanently and faintly displayed at the bottom of the screen, powered from a battery backup in the VDU box.

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

**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.**



colour for the FX20 at a later date.

### Storage

Data and program storage is on twin 5 1/4in 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, 5 1/4in models, with a time-out which turns the drives off if they are not being accessed at regular intervals. This reduces wear on your 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 command 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

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

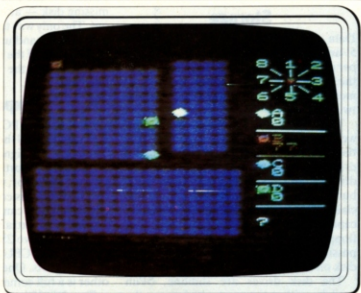
## Verdict

The graphics are simple but effective, including a rather powerful (but increasingly irritating) screen flash you 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.

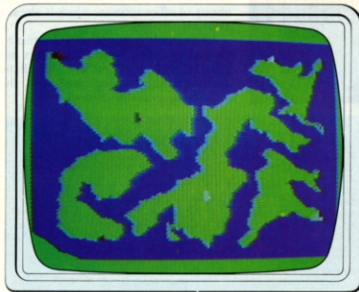
## Verdict

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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## 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.

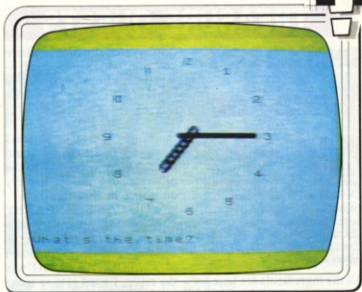
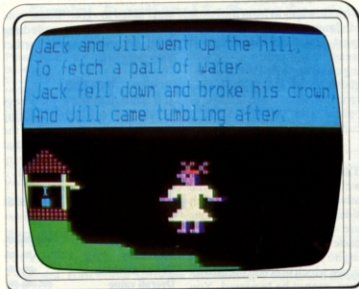
## Verdict

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

|                        |      |
|------------------------|------|
| <b>RATING</b>          |      |
| <b>Lasting appeal</b>  | ☆☆☆☆ |
| <b>Playability</b>     | ☆☆☆☆ |
| <b>Use of machine</b>  | ☆☆☆☆ |
| <b>Value for money</b> | ☆☆☆☆ |



## 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 myself 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 Quetch

|                        |      |
|------------------------|------|
| <b>RATING</b>          |      |
| <b>Lasting appeal</b>  | ☆☆☆☆ |
| <b>Playability</b>     | ☆☆☆☆ |
| <b>Use of machine</b>  | ☆☆☆☆ |
| <b>Value for money</b> | ☆☆☆☆ |

# TREASURE QUESTS

## SINCLAIR ZX81

### Money or your life

**Name** Adventure 200 **System** 16K ZX-81 **Price** £5.95 **Publisher** Folkade, 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.

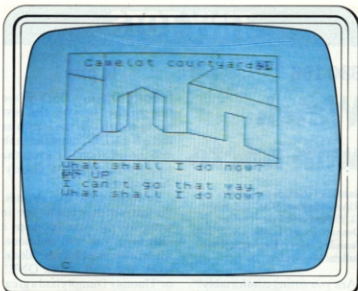
#### Verdict

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.

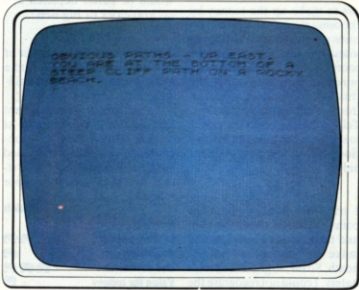
#### Verdict

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!

**ADVENTURE**

- ★ Over 200 places to explore in this machine code game using advanced data compression techniques.
- ★ No random elements - you will need skill, cunning and a sense of humour as you explore caves, forest and castles.
- ★ Evade ruthless pursuers and overcome a host of obstacles.
- ★ Multiple word commands and single letter abbreviations!

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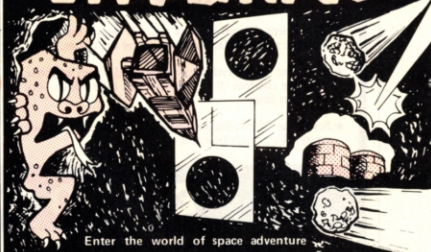
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Clubnet keeps you in touch with the microcosm of personal computer enthusiasts throughout UK. It is divided into two sections — clubs and user groups.

We publish a list of each section on alternate weeks. This week it's the turn of clubs, which are listed alphabetically by county then by town.

From time to time we will be reporting on the activities of an

individual club or user group. If you've just started a micro club or if your club is planning something special, then drop us a line and we'll spread the word.

Write to Clubnet, Personal Computer News, VNU, 62 Oxford Street, London W1A 2HG.

The listings are based on information supplied by the Amateur Computer Club.

## CLUBS

### AVON

**Multi-User Club** produces bi-monthly magazine, subs: £7.50. Contact Valerie Boyde-Shaw, Nailsea 851337.

**Worle** Computer Club. Meets at Woodsprings Inn Functions Rooms on alternate Mondays at 7-10.30p (annual subs: £12). Contact S W Rabone, 18 Castle Road, Worle, Weston-super-Mare, Avon, tel: 0934-513066

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

**Chilvers** Computer Club. Meets at Five Belles, Eaton Bray, Near Dunstable. Lighten Buzzard on second and fourth Monday of each month (annual subs: £2 senior members, £1 under-14). Contact Steve Betts, 42 Wallace Road, Eaton Bray, Bedfordshire LU6 2DF, tel: 0252-220922.

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

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

### BERKSHIRE

**Easthamstead** Computer Club. Meets at Easthamstead Park School, Easthamstead Park Mansions, Bracknell, on the first Wednesday of each 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 3JU, 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 Mandeville county Secondary School the first Thursday of each month at 7pm. Contact Ken Knight, 22 Mount Street, Aylesbury, tel: 0296-5181.

**Chiltern** Microcomputer Club. Meets at the Garden Centre, School Lane, Chalfont St Giles, on the first Wednesday of each month (annual subs: £4 for six months). Contact Mrs W Tibbatts at Ellwood, Deanway, Chalfont St Giles, Buckinghamshire, tel: 024-07 4906.

**Iver** Computer Club. Contact P A Sealat 1 Ormonde Flats, Church Road, Iver, Herts, tel: 0753-452792.

**Iver** Computer Society meets at Huntsmoor room, Iver Village Hall on

the second and fourth Thursday every month at 7.30. Contact John Haigh, 41 Leas Drive, Iver Bucks, SL0 9RP.

### CAMBRIDGE

**Cambridge** Microcomputer Club, meets on the third Wednesday of each month. Contact Derek Tripp at 3 Spangrove 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 Crossfield Electronics Social Club, fortnightly on Mondays. Contact Andrew Pike, tel: 0773-44342 after 5pm.

### CHESHIRE

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

**Brumel** Computer Club. Meets at St Werburgh Community Centre on alternate Wednesdays at 10pm. Contact Mr R Simpson at 4 The Coats, Stockwood, Cheshire.

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

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

**Holmes Chapel** Micro Club meets at Leisure Centre, Holmes Chapel 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, Crew, Cheshire, tel: 0477-34238.

**Kinder Peak** Computer Club meets at Bewl Mills School every Monday, subs: £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 7.10.30pm, meetings 35p. Contact Mr G Flanagan at 11 Sundown Close, New Mill, Warrington, Cheshire SK12 3DH, tel: 0663-446511.

**Northwest** Computer Club meets fortnightly, meetings 25p. Contact John Lightfoot at 13 Aston Drive, Frodsham, Warrington, Cheshire WA6 7PU, tel: 0728-31519.

**Northwest** Computer Club, weekly meetings. Annual subs: £1; meetings 30p (visitors 50p). Contact Tom Wyatt at 29 Summer Lane, Halton, Runcorn Cheshire WA7 5PJ, tel: Runcorn 7754.

**West 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, over 18a 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 Chesbire at 66 Croft Road, Eaglescliffe, Stockton-on-Tees, Cleveland, TS16 0DY.

### CORNWALL

**Cornish Radio** Amateur Club — Computing Section. Contact Bob Reason at 24 Mitchell Close, Camborne, Cornwall.

**Cornwall** Area Computer Club. Contact M F Grove at 35 Causeway Head, Penzance.

**St Austell** Computer Club and Computer Town meets at ECIPL Labs, Penwepan Road, St Austell, fortnightly on Mondays at 7.30pm. Contact N G Day at 2 Clendene Close, St Austell, Cornwall PL25 3DD.

### DERBYSHIRE

**Derby** Micro Society meets at Littleover Church Hall, Shepherd Street, on every other Thursday at 7pm, annual subs: £5, £2.50 for families, £0.50 for non-members. Contact Mike Riordan, tel: 0332-769440.

**Glossop** Computer Club. Contact John Dean, 3 Spinney Close, Glossop, Derbyshire.

### DEVON

**Exeter & 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 Hodgson, 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 Tuesdays.

**Torbay** Users Computer Club meets at Devon Computer Services, 96 Dartmouth Road, Paignton on Mondays every fortnight. Annual subs: £2.00 juniors, £5.00 adults, meetings 20p, children welcome. Technical library available.

### DORSET

**Bournemouth Area** Computer Club meets at Kinson Community Centre on the third Wednesday every month. Annual subs: £5 adults, £2.50 juniors. Contact Peter Hibbs, 34 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 J Washford, 1 Alexander Road, Bournemouth, Dorset BH6 5JA.

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

### DURHAM

**Durham** 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, £3.00 Webber House, North Street, Barking, Essex.

**Brentwood Amateur** Computer club, proposed new club. Contact R Sadler, 18 Wanscot 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 Cousins, 1 Aldridge Way, Springfield, Chelmsford, Essex CM1 2AS, tel: 0246-501555.

**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 Springfield on software clubs. £8. Contact Doug Bourne, School House, Nevers Road, Rayleigh, Essex.

**Romford** Club, a new club. Contact Mr D Norden, 138c Church Road, Romford, Essex.

**South East Essex** Computer Society meets at Hockley Club at Rooks Hill, near Southminster, on the first Friday on Wednesday at 7.30pm. Open to members over 14. Contact Robin Knight, 128 Little Waking Road, Little Waking, Southend-on-Sea, Essex, tel: 0702-218496.

**Loughborough** Computer Club, a new club. Contact Mr D Norden, 138c Church Road, Romford, Essex.

**British Amateur Electronics Club.** Independent club with newsletter, beginner's section, library, annual exhibition catering for all ages. Contact M J Margets, 33 Hopstone 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, Presbury, Cheltenham.

**Cheltenham Amateur** Computer Club meets at Presbury Scout Headquarters, on the third Tuesday of every month at 7.30pm. Annual subs: £3. Contact M Huggins, 16 Riverways Way, Cheltenham, Glos.

**HAMPSHIRE**

**Commodore** Computer Club, inaugural meeting at Bury House, Bury Road, Gosport, on May 6 at 7.30pm. Contact Brian Cox, Fairham 280550.

### HANTS

**Reading and Portsmouth** Amateur Computer Club. Contact Alan Smith, c/o Francis Close, Lee-on-the-Solent, Gosport, Hants PO1 3RH, tel: 0705-529000.

**RAF Odham** Computer Club. Contact o/R Officer, Royal Air Force, Odham, 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, £5.00 students & O.A.P. Contact P Maddison, 'Gardenways', Chilworth Towers, Chilworth, Southampton SO1 7JH.

**HEREFORD**

**Hereford** Amateur Computer Club, proposed new club. Contact Stuart Edinborough, 23 Wardour Street, Bobblestock, Hereford HR4 9TG, tel: 0432-269700.

### HERTFORDSHIRE

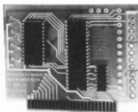
**Harpden** Microcomputer Club meets at

**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.

# APPLE FAMILY from Namal

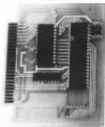
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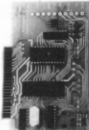
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# Preventative Medicine

**COST EFFECTIVE COMPUTER HEALTH CARE\***

## Symptom

Unexplained software errors and apparently intermittent hardware malfunctions.

## Diagnosis

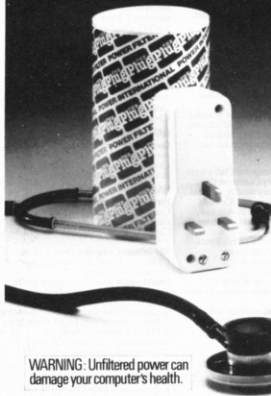
The computer system is being subjected to unsuppressed mains borne electrical noise and transients - Dirty Power.

## Treatment

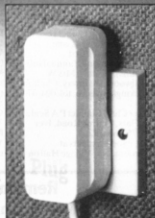
Filter the mains power supply by replacing the existing 13 amp plugs with Power International's "THE PLUG", a mains borne noise and transient suppression device incorporated within a modified 13 amp plug case. (Available from

Dealers or direct from the manufacturer). Should this treatment provide only limited relief, you should seek specialist advice from:-

**Power International Limited** 2A Isambard Brunel Road, Portsmouth, Hampshire. PO1 2DU. Tel: (0705) 756715



**WARNING:** Unfiltered power can damage your computer's health.



\* R.R.P. £15.50 including p.p.

Silver Cap, Harpenden on alternate Mondays. Annual subs £2.50. Contact David James, 5 Ox Lane, Harpenden, Hertfordshire AL5 4HH.

**HUMBERSIDE**

**Grimsey Computer Club** meets at Grimsey Central Library fortnightly on Mondays at 7.30pm. Contact Jennie Lee, 29 Park View, Cleethorpes, tel: 0472-4259.

**Scunthorpe & District** Microprocessor Society meets at Community Centre, Lindun Street, Scunthorpe, every Tuesday at 7.30pm. Annual subs £2, families £5. Contact G Hinch, 21 Old Crosby, Scunthorpe, South Humberside DN15 8PL.

**KENT**

**Canterbury AC** proposed new club. Contact I. 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, Jall Lane, Biggin Hill, Kent, on the first Tuesday of every month at 7.30pm. Annual subs £3, £1 students. Contact Iain Howe, 28 Canadian Avenue, Catford SE6 3AS, tel: 01-690 5441.

**Orpington** Computer Club meets at The Large Hall, Christ Church, Chaterhouse Road, Orpington, Kent, every Friday at 8pm-10.30pm. Insurance cover for all members' equipment while on club premises. Contact Mr R 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 Spralling Street, Manston, Ramsgate, Kent.

**Sevenoaks School** Computer Club. Contact G Semmerhoff, Technical Centre, Sevenoaks School, Sevenoaks, Kent, tel: 0732-456340.

**Tonbridge & Tonbridge Wells** ACC.

Contact Ray Szatkowski, 1 Cromer Street, Tonbridge, Kent, tel: 0732-359960.

**LANCASHIRE**

**Blackburn** Micro Computer Club. Contact Roger Longworth, 12 Sharnap 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 M20 9FB, tel: 0942-876210.

**Burnley** Computer Club meets at Carleton Hotel, Standish Street, on Tuesdays 7.30-11pm. Contact Clive Tallon, 27 Bassett Street, Burnley, Lancs BB10 3EQ.

**Chorley** Computer Clubs 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-Bryant, 25 Southfield Drive, West Bradford, Chalfont, 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 Mardie 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 Blaudes Public House, High Street, Lincoln on the first 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 L14 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 2542.

**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 Finton, 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 6205.

**Lasering**, contact 4 Station Bridge, Woodgrange Road, Forest Gate, London E7 7NF.

**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 Quittance, 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 Foster, 186 The Barons, 516 Margaret, Twickenham, Middlesex, tel: 01-892 1873.

**The SOBAT** Computer Club meets the first week of every month. Annual subs: £1. Contact T Kavari, 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 Phillips, 61 Grainger Road, SE3, tel: 01-453 5829.

**Southgate** Computer Club, annual subs: £2.50. Contact Panos Koumi, 33 Chandos Avenue, London N14.

**Southgate Technical College** Computer Club meets at Room 3102, Southgate Tech, fortnightly on Thursdays at 7.30pm. Annual subs: £5. Contact Kevin

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**West London Personal Computer Club** meets at Black room, Fox & Goose pub, Hanger Lane, Alpertown, on the first Tuesday of every month at 7.45pm. Annual subs: £5 adults, £2.50 under 16s and pensioners. Contact Graham Brin on 01-997 8986.

### MANCHESTER

**Manchester Computer Club** meets at the Department of Computer Sciences, Manchester University, Oxford Road, Manchester, on the first and third Thursdays of every month at 7.30pm. Contact David Wadley on 061 246 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, Deane Road, Bolton, on Thursdays. Annual subs: £1. Contact Dick Altherton, 16 Douglas Street, Atherton, Manchester M29 9FB.

**Merseyside Microcomputer Group** meets at Merchant Taylor's School, Crosby, on the first Thursday of every month. Contact Mr F Shaw, 14 Albany Avenue, Eccleston Park, Prescot, tel: 051-426 5336.

**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 Microcomp** meets at Regents Park, London, Robert Street, NW1, on the first Tuesday of every month at 7.30pm. Annual subs: £5. Contact Jim Anderson, 41 Peabworth 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, Towstower, Northants NN12 7AG.

### NOTTS

**Ashfield Computer Club** meets at Casric Junior School, St Mary's Road, Sutton in Ashfield on the first and third Thursdays of every month. Annual subs £3. Contact Derek Daines, c/o Cuttings Avenue, Sutton in Ashfield, Notts.

**Eastwood Town Micro Computer Club** meets at Devonshire Drive Junior School every Wednesday at 7.45pm. Annual subs: £5 adults, £2.75 juniors, £0.50 O.A.P.s. 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. O.A.P.s. Contact Mr T Harvey, 6 Roseleigh Avenue, Nottingham NG3 6FH.

### NORFOLK

**Anglia Computer User Group**, Contact Jan Rejzl, 128 Templemeare, Sprowton Park, Norwich, tel: 0603-29652.

**East Anglian Computer User's Group** meets at Cromer Community Centre, Telegraph Lane, Norwich. Contact Gill Rijzi, 88 St Benedicts, Norwich.

**South Norfolk Computer Group** meets at Priory House, Mount Lane, Towstower, on Wednesdays at 7.30pm.

### OXFORDSHIRE

**Association of Computer Clubs**, Annual subs: £5. £2.50 under 18s and O.A.P.s. Contact Rupert Stead, St John's Church, Oxford OX1 3JP. **Microcote** meets at Clarendon Lab, Parks Road, Oxford, every week during term. Contact Rupert Stead, St John's College, Oxford OX1 3JP.

**Oxford Personal Computer Club**, Annual subs: £8. Contact Len Phelps, Southport College, Sutton Courtenay, Nr Abingdon, Oxon OX14 4AU. **Ridgeway Computing Club** meets at Swan Hotel, East Isley, on the second Tuesday of every month at 8pm. Contact Mike Magrey, Beavers, South Street, Blunbury, Didcot, Oxon OX11 01U.

### SHROPSHIRE

**Ludlow & Diocesan Microcomputer Club** meets at Diocese Education Centre, Lower Galdefeld, Ludlow, on the second Tuesday of every month at 7.30pm. Annual subs: £7.50 family, £5 adult, £2.50 student.

**Telford Computer Club** meets at Telford ITI, on every Monday 6-9pm. Annual subs: £3.50, £1.50 unemployed. Contact John Murphy, 10 Bromichore, Brookside, Telford TF3 1TF, tel: 0952-959599.

### SOMERSET

**Yeovil Computer Club**, contact Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset. **Yeovil Computer Club**, Contact D G Carrington, 2 Romsey Road, Yeovil, Somerset BA21 5XN.

### STAFFORDSHIRE

**Alsager Computer Club**, meets at Alsager Comprehensive School, Stoke-on-Trent, Staffs, fortnightly on Tuesday. Contact Rex Charlesworth on 09463-7273.

**The Amateur Computer Club** of North Staffs meets on the third Wednesday every month. Annual subs £3. Contact J Riddell, 1111 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 The Station, 15 Lower Brook Street, Ipswich, Suffolk.

### SURREY

**Ashted Computer Club** meets on the last Thursday of every month. Contact P Palmer, 8 Corle Close, Ashted, Surrey. **Griffin Valley Computer Club** meets in Griffin Pub, Caversham. Annual subs £1.50 a meeting. Contact Phil Ward, Reading, 594874.

**Thames Valley Amateur Computer Club** meets at Griffin, Caversham, on the first Tuesday every month. Contact Brian Quarm, 25 Roundway, Camberley, Surrey GU15 1NR, tel: Camberley 21186.

**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, Guildford, Surrey on the first Thursday of every month. Annual subs: £5. Contact Chris Karner on 0483-68121.

**TH 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, Colchester, Surrey KT5 8BH.

**Putney 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 O.A.P.s, £2 family. Contact Dave Wilkins on 01-642 3102.

**Adair Computer Enthusiasts** meets at 8 Hatched Avenue, Wokingham, Surrey SM6 9RA, subs: £20. Contact Adrian Miles, tel: 01-647 1713.

**Association of London Computer Clubs**, Day Parties, 89 Market Avenue, Worcester Park, Surrey KT7 5JZ. **Worthing & District Microcomputer Club** meets at Rose Wilmot Youth Centre, Littlehampton Road, Worthing, on

alternate Sundays 11am-1pm. Annual subs: £5 family, £3 adults, £1 family. Contact B. Thomas, 11 Gannon Road, Worthing, W Sussex, BN11 2DT, tel: 0903 36785.

### SUSSEX

**West Sussex Microcomputer Club** meets at Room 100, The Priory Road, Amies, Crawley, on the first and third Monday every month. Annual subs: £6 adults, £3 students. Contact J Clarke, 31 Hyde Health Court, Pound Hill, Crawley, W Sussex, tel: 0293-884207.

**Mid-Sussex Microcomputer Club**, Contact Jeff Hayden, 2 Hillary Close, East Grinstead, W Sussex RH19 3XQ.

**Micro Enthusiasts**, club proposed. Contact G Diannage, 16 Malvern Street, Hove, Sussex BN3 3YR.

**Arum Microcomputer Club** meet at Wick Anemity 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: £3.48 months, £1 joining fee. Contact P Cherriman, 7 Talbot Road, Littlehampton, West Sussex DN17 7BL.

### TYNE & WEAR

**Newcastle upon Tyne Personal Computer Society** meets at Room D103, Newcastle Polytechnic, on the first Tuesday of every month. Annual subs £6. Contact Pete Scargill, 21 Percy Park, Tyneworth, 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, Walsall, Walsall WS7 8AS.

**Walsall Computer Club** meets at Park Hall Community School on the second and fourth Monday of 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.

**North Westminster Personal Computer Club**, contact P Moore (021-2366176, ext 382).

**Central Program Exchange**, annual subs: full membership £25 Europe, small users £10 Europe. Contact Mrs Judith, tel: Wolverhampton 28521.

**West Midlands Amateur Computer Society** meets at Enfield School, Low Lane, Stourbridge, West Midlands, on the second and fourth Tuesday every month. Annual subs £4, £3 full-time students. Contact John Tracey, 100 Booth Close, Brierley Hill, Kingswinford, W Midlands, tel: 0384-7024.

### 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 'a' Ashburton, Worcester, tel: 0939-116, Worcester WR3 6AP.

### 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 Brindley, c/o 39 Kerforth Hall Road, Barnsley, South Yorks S70 6NF, tel: 0226-41753.

**Doncaster Amateur Computer Society** meets in YMKCA, Wood Street, on the first Wednesday every month. Contact John W Wilkinson, 316 Bawtry Road, Doncaster, S. Yorkshire, tel: 0302-868379.

**Greenham Grammar School Computer Club**, Contact Brian Smith, Greenhead Road, Greenham, West Yorks BD20 6EB, tel: 0353-62828.

**Huddersfield Computer Club** meets every Monday. Contact Chris Townsend, 760/4 Manchester Road, Lintwhistle, Huddersfield, W Yorkshire, tel: 0484-75299.

**Leeds Microcomputer Users Group** meets at 88 Regent Street, Chapel Allerton, fortnightly on Thursday at 6pm. Contact Dave Partaud, 89 Victoria Walk, Horsforth LS18 4PL. **Program Power**, contact R Simpson, 5 Wemsley Road, Leeds LS7 2BX, tel: 0532-685186.

**Pennine & District Computer Club** meets at 26 Mill Hill, Haworth, W Yorks, on Saturday and Sunday. Contact Douglas Bryant, 26 Mill Hill, Haworth, W Yorkshire, tel: 0535-43007.

**Shipley College Computer Group** meets at Shipley College, Shipley, W Yorkshire, tel: 0274-595731.

**South Yorkshire Personal Computer Society** 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 Terrace, Sheffield S10 2QE.

**Thurmscoe & District Micro Users' Club** meets at Thurmscoe Comprehensive School, Physics Lab, Clayton Lane, Thurmscoe, on Wednesday at 7.30pm during school term. Contact Mr James Davis, 62 Tudor Street, Thurmscoe East, tel: 0709 893880.

**West Yorkshire Microcomputer Group** meets on Tuesdays. Contact Phillip Clark, c/o Suite 204, Crown House, Arlsey Road, Leeds LS12 2ES, tel: 0532-625252.

**Enterprise Computer Club** meets at the Enterprise Club every Monday at 8pm. Contact K Thomas, Green Lea, Ripon Road, Harrogate, North Yorkshire HG1 2JH, tel: 0904-38239.

### SCOTLAND

**Highland Amateur Computer Society**, contact Mike Anthony, 46 Moreound Park Gardens, Edinburgh EH17 7JR.

**Central Scotland Computer Club** meets at Glasgow City Council, Glasgow, tel: 0437-Grangemouth Road, Falkirk, on the first and third Thursday of every month.

Contact James Lyon, 78 Slamannan Road, Falkirk FK10 1SR.

**File Computer Users Club**, Contact Murray Simpson, 31 Tom Steward Lane, St Andrews, Fife, Scotland KY16 8BY.

**Glasgow 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 Horrie, 215 North Collieston, Leith, Skene, Aberdeen AB3 6WR.

**Kemnay Computer Club** meets weekly. Contact S Stubbs, 15 The Glebe, Aberdeen, tel: 0476-2112.

**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 Lochalsh Computer Society**, proposed new club. Contact J Manwell, 15 Breacans Islet, Isle of Skye IV42 8QA. **Strathclyde Computer Club** meets at Wolfson Centre, 106 Rottenrow, Glasgow, on the first Tuesday of every month. Contact B Duffy, 24 Lomand Drive, Condorrail, Cumbernauld G4 8NW.

### WALES

**Abergele Computer Club** meets at Abergele CI Offices every Thursday at 7.30-10pm. Annual subs: £5 adults, £2.50 juniors. Contact W Jones, 77 Millbank Road, Rhyl, Clwyd, North Wales.

**Coleby Computer Club** meets at the Greens Hotel, Colwyn Bay, at 7pm. Contact D Bevan, c/o Abergele Road, Colwyn Bay, Clwyd LL29 7PA. **ICL Club** annual subs: £5 + vat. Contact Mike Hayes, tel: 0222-371732.

**Gwent Amateur Computer Club** meets at St Mary's Institute, Slow Hill, every Thursday at 7.30pm. Annual subs: £3.50. Contact Rodney Harris, 16 Alnbrook Avenue, Newport, Gwent, Wales NP23 6QJ.

**Penarth Computer Club** meets at The Settlement, Roachhill Road, Pontypool, Gwent, on every Friday. Contact Graham Lovridge, on Pontypool 2827.

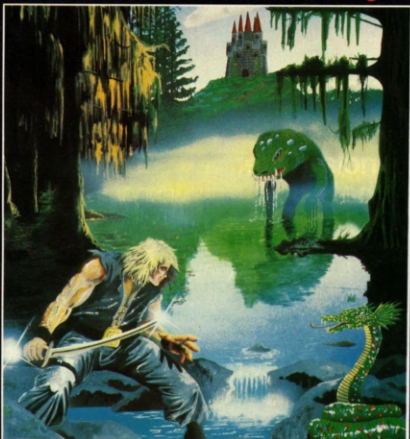
**Southern South Wales Amateur Computer Club** meets on the last Friday every month. Contact Paul Griffiths, 11 Prescelly Road, Penlan, Swansea SA5 4AF.

### IRE

**Cork Amateur Computer Club**, Talks and demonstrations. Hardware, programming and games. Contact T Moriarty, Tiger Bay, Rochestown, Douglas, Cork, Eire.

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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



MIKE JAMES, S.M.GEE AND KAY EW BANK

**'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's 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 cassette 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 cassette 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

8308P11/3

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:SZ=19-LEN(T):DIV2
60 REPEAT
70   N%:=N%+1
80   READ P*(N%),F*(N%),C*(N%)
90   IF N%>LEN(P*(N%)) THEN M%:=F*(N%)
100  UNTIL P*(N%)="XXX" OR N%>50
110 P*(N%)="" : N%:=N%-1:PROClog
120 IF N%>0 THEN J%:=17+N% ELSE IF N%<14 AND M%<16 THEN J%:=17+N%:DIV2 ELSE J%:=2
130 PRINT TAB(2,J%);CHR$(130);"Select Program";CHR$(131);CHR$(136);"Letter";CHR$(137);CHR$(130);" or ESCAPE"
140 IF N%>0 THEN PROCsingle
150 IF N%>7 AND N%<15 AND M%<16 THEN PROCwin
160 IF N%<14 OR (N%>7 AND M%>15) THEN PROCint:PROCchain
170 REPEAT:P%:=GET:UNTIL (P%>64 AND P%<65+N%) OR (P%>96 AND P%<97+N%)
180 PROCchain
190 END
```

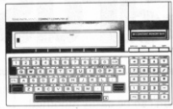
## BBC Model B BBC Basic

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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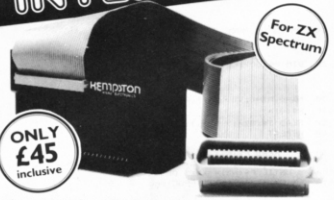
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## Program Indexer Card 2 of 3

8308P12/3

|                                                                                  |                                                                           |         |                                                                                  |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------|----------------------------------------------------------------------------------|
| 200                                                                              | DEFFROCl logo                                                             | 200     | Procedure to display logo and index page                                         |
| 210                                                                              | A#CHR#55+STRING(10,"") +CHR#107;B#CHR#117+STRING(10,"p") +CHR#122;PRIN    | 210     | Set up part of screen display                                                    |
| T                                                                                |                                                                           | 220     | First line in double size characters                                             |
| 220                                                                              | FOR IX=0 TO 1:PRINT CHR#141;CHR#130;"ACORN " ;CHR#132;CHR#157;CHR#135;" B | 230-240 | Title section                                                                    |
| BC                                                                               | COMPUTER " ;CHR#156;CHR#131;" B B C " ;NEXT                               | 250     | Detail for title                                                                 |
| 230                                                                              | PRINT TAB(9,3);CHR#129;CHR#157;CHR#151;" ..... " ;CHR#156                 | 260     | BBC owl logo                                                                     |
| 240                                                                              | PRINT TAB(9,4);CHR#129;CHR#157;CHR#151;" SOFTWARE INDEX " ;CHR#156        | 270     | Acorn "acorn" logo                                                               |
| 250                                                                              | PRINT TAB(2,13);CHR#134;"This tape contains the following";TAB(3,14);CHR# | 280     | See line 210                                                                     |
| 134;"Programs:1                                                                  |                                                                           | 290     | Title section again!                                                             |
| 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 | 300     | Box surround                                                                     |
| 2,100,44,44,07,31,32,6,147,41,57,57,40,100,31,32,7,147,32,34,102,102,110,31,32,8 |                                                                           | 310     | Double size surround and tape title flashing                                     |
| ,147,40,56,113,102,100                                                           |                                                                           | 320     | Bottom line of surround                                                          |
| 270                                                                              | VDU 31,3,146,32,32,112,32,32,31,1,4,146,32,126,63,125,32,31,1,5,146,104   | 330     | Return to main line                                                              |
| ,125,123,63,52,31,1,6,146,106,126,119,119,53,31,1,7,146,108,124,124,124,60,31,1, |                                                                           | 340     | Procedure to list single column — no scroll                                      |
| 8,146,34,43,47,39,33                                                             |                                                                           | 350     | Set cursor position                                                              |
| 280                                                                              | PRINT TAB(9,7);CHR#149;A#                                                 | 360-380 | Loop to display selection letter and program data                                |
| 290                                                                              | PRINT TAB(9,8);CHR#149;CHR#53;CHR#131;" TAPE TITLE " ;TAB(27,07);CHR#13   | 390     | Return to main line                                                              |
| 7;CHR#149;CHR#106                                                                |                                                                           | 400     | Procedure to list double column — no scroll                                      |
| 300                                                                              | PRINT TAB(0,9);CHR#149;" pppppppp5 jppppppppp                             | 410     | Set J% to limit of right column limit.                                           |
| 310                                                                              | FOR IX=0 TO 1:PRINT CHR#141;CHR#149;"5";CHR#129;CHR#136;TAB(9%);TAB(35    | 420-440 | Loop to display two columns of selection letters and program data                |
| );CHR#137;CHR#149;" ;" ;NEXT                                                     |                                                                           | 450     | Display last selection letter and program data if odd number of programs in list |
| 320                                                                              | PRINT CHR#149;" ;" ;NEXT                                                  | 460     | Return to main line                                                              |
| 330                                                                              | ENDPROC                                                                   |         |                                                                                  |
| 340                                                                              | DEFFROClngle                                                              |         |                                                                                  |
| 350                                                                              | VDU 31,0,15                                                               |         |                                                                                  |
| 360                                                                              | FOR IX=1 TO N%                                                            |         |                                                                                  |
| 370                                                                              | PRINT TAB(6);CHR#131;CHR#(96+IX);CHR#135;P#(IX)                           |         |                                                                                  |
| 380                                                                              | NEXT                                                                      |         |                                                                                  |
| 390                                                                              | ENDPROC                                                                   |         |                                                                                  |
| 400                                                                              | DEFFROClwin                                                               |         |                                                                                  |
| 410                                                                              | J% = N% DIV 2; VDU 31,0,15                                                |         |                                                                                  |
| 420                                                                              | FOR IX=1 TO J%                                                            |         |                                                                                  |
| 430                                                                              | PRINT TAB(2);CHR#131;CHR#(96+IX);CHR#135;P#(IX);TAB(20);CHR#131;CHR       |         |                                                                                  |
| #(96+IX+J%);CHR#135;P#(IX+J%)                                                    |                                                                           |         |                                                                                  |
| 440                                                                              | NEXT                                                                      |         |                                                                                  |
| 450                                                                              | IF N% < 2 * J% THEN PRINT TAB(20);CHR#131;CHR#(96+N%);CHR#135;P#(N%)      |         |                                                                                  |
| 460                                                                              | ENDPROC                                                                   |         |                                                                                  |

## Program Indexer Card 3 of 3

8308P13/3

|                                                 |                                                                                   |         |                                                                            |
|-------------------------------------------------|-----------------------------------------------------------------------------------|---------|----------------------------------------------------------------------------|
| 470                                             | DEFFROCl1st                                                                       | 470     | Procedure to display single list with scroll                               |
| 480                                             | D% = 1                                                                            | 480     | Set D% to initial value                                                    |
| 490                                             | PRINT TAB(13,14)"(Press RETURN to 1st)"                                           | 490     | Display prompt in correct place                                            |
| 500                                             | REPEAT                                                                            | 500     | Loop to display list — scrolls with RETURN key (13)                        |
| 510                                             | D% = (D% + 1) MOD N%                                                              | 510     | Sets selection letter                                                      |
| 520                                             | PROC=roll                                                                         | 520     | Performs routine to scroll list                                            |
| 530                                             | REPEAT P% = GET; UNTIL P% = 13 OR (P% > 64 AND P% < 65 + N%) OR (P% > 96 AND P% < | 530     | Loops until single key response                                            |
| 97 + N%)                                        |                                                                                   | 540     | Scroll or exit                                                             |
| 540                                             | UNTIL P% < 13                                                                     | 550     | Return to main line                                                        |
| 550                                             | ENDPROC                                                                           | 560     | Procedure to display scrolled list                                         |
| 560                                             | DEFFROClscroll                                                                    | 570-590 | Loop to display appropriate selection letters and program data             |
| 570                                             | FOR IX=1 TO 7                                                                     | 600     | Return to main line                                                        |
| 580                                             | PRINT TAB(4,15-IX);CHR#131;CHR#(96+IX+D%);MOD(N%+1);CHR#135;P#(IX                 | 610     | Procedure to CHAIN selected program                                        |
| +D%);MOD(N%+1);SPC(25-LEN(P#(IX+D%);MOD(N%+1))) |                                                                                   | 620     | Set P% to correct array index value                                        |
| 590                                             | NEXT                                                                              | 630     | Clear screen calculate values for positions on display                     |
| 600                                             | ENDPROC                                                                           | 640     | Turn off flashing cursor                                                   |
| 610                                             | DEFFROClchain                                                                     | 650-670 | Display prompts                                                            |
| 620                                             | P% = P% - 96; IF P% < 1 THEN P% = P% + 32                                         | 680     | Go and get selected program and run                                        |
| 630                                             | CLS; LFX = LEN(P#(P%)); LFX = LEN(P#(P%))                                         | 690     | Return to main line                                                        |
| 640                                             | VDU 23,1,101010101                                                                | 700     | Data statements for program list etc                                       |
| 650                                             | PRINT TAB(4,5)"Mind tape to position " ;CHR#(P%)" and PLAY"                       |         | Last DATA statement must contain end of file/list indicators XXX, YYY, ZZZ |
| 660                                             | PRINT TAB(13-LFX/2,8)"Searching for " ;P#(P%)                                     |         |                                                                            |
| 670                                             | PRINT TAB(13-LFX/2,10)"(Filename - " ;P#(P%)" ;)"                                 |         |                                                                            |
| 680                                             | CHAIN P#(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          |         |                                                                            |
| F                                               | Position                                                                          |         |                                                                            |
| 740                                             | DATA SNAPPER,SNAPPER,010                                                          |         |                                                                            |
| 750                                             | DATA ROCKET RAID,RAID,052                                                         |         |                                                                            |
| 760                                             | DATA PHILDOPHERS,QUEST,QUEST,087                                                  |         |                                                                            |
| 770                                             | DATA BREAKOUT,BROUT,132                                                           |         |                                                                            |
| 780                                             | DATA FROGGER,FROG,105                                                             |         |                                                                            |
| 790                                             | DATA SUPER INVADERS,INVADER,236                                                   |         |                                                                            |
| 800                                             | DATA ARCADIAN,ARCADIAN,254                                                        |         |                                                                            |
| 810                                             | DATA FLASH,FLASH,267                                                              |         |                                                                            |
| 820                                             | DATA METEORS,METEORS,298                                                          |         |                                                                            |
| 830                                             | DATA MONSTERS,MONSTERS,326                                                        |         |                                                                            |
| 840                                             | DATA SPHINX ADVENTURE,SPHINX,378                                                  |         |                                                                            |
| 999                                             | REM End Of File Flags                                                             |         |                                                                            |
| 999                                             | DATA XXX,YYY,ZZZ                                                                  |         |                                                                            |

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## CBM Database Card 1 of 12

8308CD1/12

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```

3 PRINT "I" POKE 59468,12
5 PRINT PRINT:FOR I=101000:NEXT I
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=";I;"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$,1)="" THEN GOTO 205
220 RESTORE
222 OPEN# 4,2:CMD3
224 OPEN# 4,1:CMD4
226 PRINT#3,"AAAAAAAAAAAA 9999.99 999999 999999"
230 FOR I=1 TO N
240 READ A$(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 FOR I=1 TO 2000:NEXT I:
290 RETURN
300 PRINT:PRINT "X=";I;"READY TO FIND NEXT LINE"

```

CBM machines  
Commodore Basic

Requirements: 32K + cassette (printer option)

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                                             |

## 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$(I)="*" THEN PRINT "V=";Y-1;"ADD MORE DATA AT";(500+Y):PRINT:RETURN
350 NEXT I
399 PRINT PRINT:RETURN
400 PRINT PRINT "X=";I;"METHOD OF INPUTTING DATA":PRINT
410 PRINT "INPUT - LINE NUMBER DATA A$,B,C,D"
420 PRINT "TO END - TYPE - RETURN"
425 PRINT "INPUT IN FORM SHOW"
430 PRINT "AAAAAAAAAAAAA,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
505 DATA CHELTPRESS,21.00,830209,255096
506 DATA POST OFFICE,10.00,830206,255098
507 DATA CHEW VET,10.56,830207,255097
508 DATA SAINSBURYS,17.37,830212,255099
509 DATA NATIONAL TR,10.00,830214,255100
510 DATA DOLCIS SHOES,13.00,830118,255093
511 DATA CASH,25.00,830320,255105
512 DATA BELORAVE,11.44,830220,255103
513 DATA DIXONS,16.00,830223,255104
514 DATA SAINSBURYS,26.99,830226,255102
515 DATA GOD KNOWS,27.10,830129,255091
516 DATA MILEQUIP,87.32,830325,255107
517 DATA MILEQUIP,294.05,830327,255107
518 DATA CASH,45.00,830401,255108
519 DATA CYCLOGY,6.61,830402,255109
520 DATA GOMERPRESS,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 <i>MUST</i> be present at this line number                                              |
| 1999               | Double line feed, return to main line                                                                  |

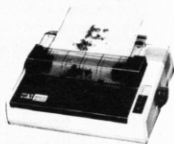
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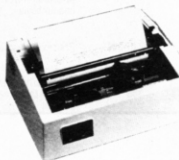
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## PCNProgramCards

## CBM Database Card 3 of 12

8308CD3/12

|                                                              |           |                                                                               |
|--------------------------------------------------------------|-----------|-------------------------------------------------------------------------------|
| 2000 PRINT:PRINT "X=1:1:END OF ROUTINE"                      | 2000-2020 | Prompts                                                                       |
| 2010 PRINT "HAVE YOU SAVED ALL YOU WANT?"                    |           |                                                                               |
| 2020 PRINT "Y FOR YES - N FOR NO"                            |           |                                                                               |
| 2030 INPUT Z#                                                | 2030      | Response                                                                      |
| 2040 IF LEFT\$(Z#,1)="N" GOTO 10                             | 2040      | Go back to selection                                                          |
| 2050 IF LEFT\$(Z#,1)="Y" GOTO 9990                           | 2050      | All done!                                                                     |
| 2060 GOTO 2000                                               | 2060      | Try to enter Y or N next time!                                                |
| 2500 PRINT:PRINT "X=5 - TO SAVE TO CASSETTE"                 | 2500-2505 | Prompts for cassette save routine                                             |
| 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#                                                | 2510      | Response for file name on cassette                                            |
| 2515 PRINT "FILE WILL BE SAVED AS '":W#;"'"                  | 2515      | Prompt                                                                        |
| 2520 SAVE W#                                                 | 2520      | SAVE file routine called                                                      |
| 2525 PRINT:PRINT:PRINT "FILE SAVED AS '":W#;"'"              | 2525      | Prompt on successful SAVE                                                     |
| 2600 PRINT:PRINT:RETURN                                      | 2600      | Double line feed, return to main line                                         |
| 3000 PRINT:PRINT "X=6 - TO LIST ALL ENTRIES"                 | 3000-3005 | Prompts and response                                                          |
| 3005 PRINT"DO YOU WANT OUTPUT TO PRINTER Y/N ":INPUT O\$#    |           |                                                                               |
| 3010 IF O\$#="" THEN GOTO 3010                               | 3010-3015 | Action on appropriate response                                                |
| 3015 IF O\$#="Y" GOTO9000                                    |           |                                                                               |
| 3030 FOR I=1 TO N                                            | 3030-3050 | Loop to read and display record data then return to main line on end detected |
| 3035 READ A#,B,C,D                                           |           |                                                                               |
| 3040 IF A#="" THEN PRINT:PRINT:FOR K=1 TO 2000:NEXT K:RETURN |           |                                                                               |
| 3045 PRINT A#,TAB(20);B,C,D                                  |           |                                                                               |
| 3050 NEXT I:FOR J=1 TO 2000:NEXT J                           |           |                                                                               |
| 3499 PRINT:PRINT:RETURN                                      | 3499      | Double line feed, return to main line                                         |
| 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"                 | 4000      | Prompt                                                                        |
| 4004 RESTORE                                                 | 4004      | Set read pointer to 1                                                         |
| 4010 PRINT "IF SEARCH IS FOR SUBJECT INPUT 1"                | 4010-4050 | Display prompts                                                               |
| 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                                                 | 4060      | Select correct number                                                         |
| 4070 ON U GOTO 4100,4200,4300,4400                           | 4070      | Perform appropriate routine                                                   |

## PCNProgramCards

## CBM Database Card 4 of 12

8308CD4/12

|                                                                                  |           |                                                         |
|----------------------------------------------------------------------------------|-----------|---------------------------------------------------------|
| 4090 PRINT "DO YOU WISH TO SEARCH FURTHER? Y FOR YES - N FOR NO"                 | 4090      | Prompt                                                  |
| 4092 INPUT M#                                                                    | 4092      | Response                                                |
| 4093 IF LEFT\$(M#,1)="Y" GOTO 4004                                               | 4093      | If yes then round again                                 |
| 4094 GOTO 10                                                                     | 4094      | Select option again                                     |
| 4095 PRINT:PRINT:RETURN                                                          | 4095      | Double line feed, return to main line                   |
| 4100 PRINT:PRINT "U=7.1"                                                         | 4100      | Line feed, prompt                                       |
| 4104 RESTORE                                                                     | 4104      | Set read pointer to 1                                   |
| 4105 PRINT "INPUT NAME REQUIRED TO FIND AS A RANGE OR A SINGLE SUBJECT"          | 4105-4107 | Prompts                                                 |
| 4106 PRINT " AS SAV SA,TZ OR A,B FOR A RANGE"                                    |           |                                                         |
| 4107 PRINT " AS SAV DIXONS,DIXONS FOR NO RANGE THAT IS FOR A FIXED SUBJECT"      |           |                                                         |
| 4110 INPUT S\$(1),S\$(2)                                                         | 4110      | Responses                                               |
| 4115 S1=LEN(S\$(1)):S2=LEN(S\$(2))                                               | 4115      | Store string lengths                                    |
| 4120 PRINT"DO YOU WANT OUTPUT TO PRINTER Y/N ":INPUT PR#                         | 4120      | Prompt and response                                     |
| 4124 IF PR#="" THEN GOTO 4130                                                    |           |                                                         |
| 4126 IF PR#="Y" THEN GOTO0800:PRINT"OUTPUT TO PRINTER"                           | 4126      | If response is yes then do printer function             |
| 4130 FOR I= 1 TO N                                                               | 4130-4180 | Loop to display single or range record(s)               |
| 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                                                          | 4190      | Double line feed, return to main line                   |
| 4200 PRINT:PRINT "U=7.2"                                                         | 4200      | Line feed, prompt                                       |
| 4204 RESTORE                                                                     | 4204      | Set read pointer to 1                                   |
| 4205 PRINT "INPUT SUM REQUIRED TO FIND AS A RANGE OR A SINGLE SUM"               | 4205-4207 | Prompts                                                 |
| 4206 PRINT " AS SAV 45.00,46.00 FOR A RANGE"                                     |           |                                                         |
| 4207 PRINT " AS SAV 12.00,12.00 FOR NO RANGE - THAT IS A FIXED SUM"              |           |                                                         |
| 4210 INPUT F(1),F(2)                                                             | 4210      | Responses                                               |
| 4220 PRINT"DO YOU WANT OUTPUT TO PRINTER Y/N ":INPUT PS#                         | 4220-4226 | Printer prompt and response. If yes do printer function |
| 4224 IF PS#="" THEN GOTO 4220                                                    |           |                                                         |
| 4226 IF PS#="Y" THEN GOTO0800:PRINT"OUTPUT TO PRINTER"                           |           |                                                         |
| 4230 FOR I= 1 TO N                                                               | 4230-4270 | Loop to display single or range record(s)               |
| 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                                                          | 4290      | Double line feed, return to main line                   |

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## Sort/Extract

## Card 1 of 1

8308SubSE

A pair of subroutines to facilitate an ascending bubble sort and extraction using a binary chop method

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 Swap 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 *BS* less than current mid-point data set *HI* to *MD*, set *N* to zero for rerun  
6000 If *BS* 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

```
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$(*) - Array sorted into ascending order
4700 REM USES          : B% - String to search on
4800 REM               : LO - Low record number
4900 REM               : HI - High record number
5000 REM               : MD - Record number for mid-point comparison
5100 REM               : N - Loop counter
5200 REM RETURNS      : IX - No of extracted record in array
5300 LO = 0 : HI = NR% - 1
5400 IF B% <= A$(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$(MD) THEN IX = LO : MD = N + 0
6000   IF B% > A$(MD) THEN HI = MD : MD = N + 0

6100   IF (HI - LO) < 2 THEN IX = HI : N = 1
6200   NEXT N
6300 RETURN
```

## Array Utility

## Card 1 of 1

8308AU

A program to demonstrate the uses of subroutines BSORT and BEXTRACT using simple data entry and search

BBC Model B  
BBC Basic

1100 Set value for size of array *AS*(\*) to 50 records  
1200 DIMENSION array *AS*(\*)  
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

```
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

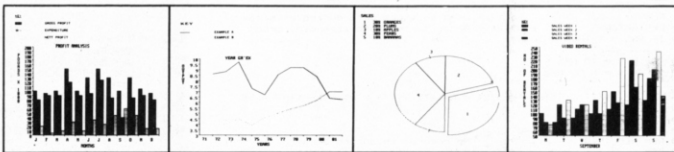
2400   PRINT "SELECT DATA FROM ARRAY - BLANK GIVES NEXT RECORD"
2500   PRINT "TO EXIT - TYPE ***"
2600   INPUT B% : IF B% = "***" THEN PRINT "PROGRAM ENDED" : END

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
```

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- ... delete word
- move and copy
- ... menu of
- ... tabulation
- ... index
- ... count
- ... imaginati
- ... with
- ... delete character ...
- ... bloc move and ...
- ... tape, disc and Econet ...
- ... delete section ...
- ... tabulation ...
- ... variable indents ...
- ... running heading ...
- ... variable page length ...
- ... automatic page ...
- ... delete section ...
- ... margin posi



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**COMMENTS** — any other points of interest.

## SOFTWARE

### BUSINESS

|            | Price inc/vat | Machine/Operating System | Other versions | Title                                 | Memory required | Media Supplied |      |           | Hardware Required |            |          | Publisher/Distributor | Comments                                                                                |
|------------|---------------|--------------------------|----------------|---------------------------------------|-----------------|----------------|------|-----------|-------------------|------------|----------|-----------------------|-----------------------------------------------------------------------------------------|
|            |               |                          |                |                                       |                 | Cassette       | Disk | Cartridge | Mail order avail. | Disk drive | Joystick |                       |                                                                                         |
| 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 & Autindex.                           |
|            | £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, (£375.00) per module. Works with dBase II.      |
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|            | £373.75       | CP/M                     | ●              | Fast Nominal                          | 50K             | ●              | ●    | ●         | ●                 |            |          | 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/<br>Operating<br>System | Other versions | Title                                 | Memory<br>required | Media<br>Supplied |      | Mail order avail. | Hardware<br>Required |          | Publisher/<br>Distributor | Comments                                                                               |
|-------------------------|---------------|---------------------------------|----------------|---------------------------------------|--------------------|-------------------|------|-------------------|----------------------|----------|---------------------------|----------------------------------------------------------------------------------------|
|                         |               |                                 |                |                                       |                    | Cassette          | Disk |                   | Disk drive           | Joystick |                           |                                                                                        |
|                         | £287.50       | CP/M                            | ●              | Sales Ledger                          | 64K                | ●                 | ●    | ●                 | ●                    | ●        | S2                        | Also on CP/M 86 and MS-DOS. Flexible ledger system.                                    |
|                         | £45.42        | Sharp M280A                     | ●              | 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.      |
| Bookkeeper              | £56.35        | Apple II                        | ●              | Apple Bookkeeper                      | 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                        | ●              | Cydepress Clients Recoverable Costs   | 48K                | ●                 | ●    | ●                 | ●                    | ●        | C7                        | Also on Rair Black Box. Designed to keep record of incurred expenditures.              |
|                         | £1,121.00     | Apple II                        | ●              | Cydepress 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                   | ●              | Buiscalc                              | 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 spreadsheet.           |
|                         | £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 on 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.             |



| Children     | Price   | Machine/Operating System | Other versions | Title                            | Memory required | Media supported   | Reviews required                | Reviews               | Comments                                                                               |
|--------------|---------|--------------------------|----------------|----------------------------------|-----------------|-------------------|---------------------------------|-----------------------|----------------------------------------------------------------------------------------|
|              |         |                          |                |                                  |                 | Cartridge<br>Disk | Other<br>Disk drive<br>Joystick | Publisher/Distributor |                                                                                        |
|              | £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.                     |
|              | £6.84   | 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 lists on it.                 |
|              | £6.84   | BBC Model B              | ●              | Sequences                        | 32K             | ●                 | ●                               | C9                    | Also on Vic-20. Demonstrates number patterns.                                          |
|              | £4.50   | 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 M260A              | ●              | Giant Maths                      | 32K             | ●                 | ●                               | S8                    | Also on M260K. Big screen figures & humorous error messages. 5 to 11 years.            |
|              | £4.95   | Sharp M260A              | ●              | Rocket                           | 3K              | ●                 | ●                               | S8                    | Also on M260K. Four difficulty levels. For five to 11 year olds.                       |
|              | £9.20   | Sharp M260K              | ●              | Teach Tables                     | 48K             | ●                 | ●                               | K3                    | Also on M260K. Plays like game but motivates children to improve their ability.        |
|              | £4.95   | Sharp M260K              | ●              | Master Builder                   | 48K             | ●                 | ●                               | S8                    | Also on M260A. Repair a wall using random blocks. Teaches spacing.                     |
|              | £322.00 | UCSD-P                   | ●              | Classroom Monitor                | 64K             | ●                 | ●                               | K4                    | Also on Apple II. Provides demonstration facilities & monitors student's progress.     |
|              | £28.75  | Research Machines 380Z   | ●              | Broadwater Economics Simulation  | 16K             | ●                 | ●                               | H1                    | Also on Commodore Pet & BBC. Simulates micro & macro economics.                        |
|              | £14.38  | Sharp M260A              | ●              | Repondez                         | 31K             | ●                 | ●                               | H4                    | Also on Apple II. Practising French verb formation (present tense).                    |
|              | £9.20   | Sharp M260A              | ●              | French Conjugate                 | 48K             | ●                 | ●                               | K1                    | Also on M260K. Automatically conjugates regular verbs into tenses.                     |
|              | £9.20   | Sharp M260A              | ●              | French Verbs                     | 48K             | ●                 | ●                               | K1                    | Also on M260K. Allows user to import up to 20 verbs & eight tenses at a time.          |
|              | £6.00   | BBC Model B              | ●              | Painter                          | 32K             | ●                 | ●                               | A5                    | Also on Spectrum (£3.75). Atom (£6.90) & on disk.                                      |
|              | £9.95   | BBC Model B              | ●              | Creative Graphics                | 16K             | ●                 | ●                               | A9                    | Book available (£7.50). Designed to illustrate BBC graphics.                           |
|              | £20.13  | Sharp M260A              | ●              | Kings & Queens                   | 48K             | ●                 | ●                               | K1                    | Also on M260K. Facts & figures on English monarchs since 1066.                         |
|              | £7.95   | Sharp M260A              | ●              | Mullinguit                       | 3K              | ●                 | ●                               | S8                    | Also on M260K. A language tutor to suit all European languages.                        |
|              | £10.30  | BBC Model B              | ●              | Angle                            | 32K             | ●                 | ●                               | C9                    | Includes four programs designed to teach simple geometry.                              |
|              | £9.95   | BBC Model A              | ●              | Algebraic Manipulations          | 16K             | ●                 | ●                               | W1                    | Also on Model B. Includes four programs designed for use in maths teaching.            |
|              | £92.80  | IBM PC                   | ●              | Fact Track                       | 64K             | ●                 | ●                               | I3                    | Learning basic arithmetic. Presents simple two-line sums in random order.              |
|              | £46.00  | Sharp M260A              | ●              | Curve Fitting                    | 48K             | ●                 | ●                               | K3                    | Also on M260K. Calculates, intercepts & plots power curve.                             |
|              | £9.20   | Sharp M260A              | ●              | Directed Numbers                 | 48K             | ●                 | ●                               | K3                    | Also on M260K. Teaches difficult mathematical functions.                               |
|              | £9.20   | Sharp M260A              | ●              | Divisor Advisor                  | 48K             | ●                 | ●                               | K3                    | Also on M260K. Teaches division at a variety of skill levels.                          |
|              | £27.60  | Sharp M260A              | ●              | Numerical Integration            | 48K             | ●                 | ●                               | K3                    | Also on M260K & B. Teaches Simpson's Rule.                                             |
|              | £23.00  | Research Machines 380Z   | ●              | Weather                          | 31K             | ●                 | ●                               | H4                    | Also on Apple II. Gives synthetic charts. Teaches elementary meteorology.              |
|              | £9.20   | Sharp M260A              | ●              | Morse Tutor                      | 48K             | ●                 | ●                               | K3                    | Also on M260K. Used to teach morse code by sight and sound. At seven levels.           |
|              | £14.38  | Research Machines 380Z   | ●              | Lenses                           | 31K             | ●                 | ●                               | H4                    | Also on Apple II. Illustrates formation of images by lenses using ray diagrams.        |
|              | £9.20   | Sharp M260A              | ●              | Casino Chips                     | 48K             | ●                 | ●                               | K3                    | Also on M260K. Uses radioactive chips to teach half-life concept.                      |
|              | £29.75  | CP M                     | ●              | Touch 'n Go                      | 48K             | ●                 | ●                               | C6                    | Also on MS-DOS. Typing tutor for mastering numeric pad & Query keyboard.               |
|              | £31.05  | IBM PC                   | ●              | Typing Tutor                     | 64K             | ●                 | ●                               | I3                    | Presents exercises for learning touch typing or for improving existing skills.         |
| <b>GAMES</b> |         |                          |                |                                  |                 |                   |                                 |                       |                                                                                        |
| Adventure    | £17.95  | Atari                    | ●              | Arrow of Death                   | 16K             | ●                 | ●                               | C6                    | 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 fenshyn 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, 8000. 'Involved' textual game.                |
|              | £18.40  | Commodore Pet            | ●              | Pythonique                       | 32K             | ●                 | ●                               | S5                    | Increasingly difficult textual game based on Monty Python. Disk available (£20.12).    |
|              | £24.99  | Commodore Vic-20         | ●              | River Rescue                     | 8K              | ●                 | ●                               | S5                    | Increasingly difficult textual game based on Monty Python. Disk available (£20.12).    |
|              | £9.00   | Dragon 32                | ●              | Escape                           | 32K             | ●                 | ●                               | T4                    | Needs joystick. Captain boat through treacherous rivers to rescue explorers.           |
|              | £9.00   | Dragon 32                | ●              | Flipper                          | 32K             | ●                 | ●                               | M16                   | Needs joystick. A 3D maze game. Get clues from 15 rooms for code of elevator.          |
|              | £9.00   | Dragon 32                | ●              | Mansion Adventure                | 32K             | ●                 | ●                               | M16                   | A game of intrigue and strategy. Requires an apple mind and a lot of fore-thought.     |
|              | £7.95   | Dragon 32                | ●              | Wizard War                       | 32K             | ●                 | ●                               | M16                   | 'Wind your way through an old mansion picking up clues to find the diamond'.           |
|              | £35.00  | IBM PC                   | ●              | Adventure in Serenia             | 64K             | ●                 | ●                               | S7                    | Needs joystick. 'Magical combat for two to nine players, interactive duel'.            |
|              |         |                          |                |                                  |                 | ●                 | ●                               | 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                | ● | Pirmania                       | 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 joystick 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 Centpede 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  | Spectrum                | ● | Asteroids                      | 4K   | ● | ● | ● | ● | S9  | 'Fast moving, suitable for all ages'.                                                      |
| Centpede 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        | ● | Annihilator                    | 5K   | ● | ● | ● | ● | A3  | Needs joystick to run. 'Difficulty levels, colour & sound'.                                |
|                  | £9.99  | Commodore Vic-20        | ● | Penetrator                     | 3K   | ● | ● | ● | ● | R2  | 'Based on Defender'.                                                                       |
|                  | £6.95  | Spectrum                | ● | Penetrator                     | 48K  | ● | ● | ● | ● | M8  | 'Two levels of difficulty difficulty'.                                                     |
| Flight Simulator | £21.95 | TI 99-4A                | ● | Parsec                         | 16K  | ● | ● | ● | ● | T5  | 'Increasingly difficult. After four onslaughts pass through to next stage'.                |
|                  | £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<br>inc. vat | Machine/<br>Operating<br>System | Other versions | Title               | Memory<br>required | Media<br>Supplied |      |           | Hardware<br>Required |            |          | Publisher/<br>Distributor | Comments                                                                                 |
|--------------------|-------------------|---------------------------------|----------------|---------------------|--------------------|-------------------|------|-----------|----------------------|------------|----------|---------------------------|------------------------------------------------------------------------------------------|
|                    |                   |                                 |                |                     |                    | Cassette          | Disk | Cartridge | Main control avail.  | Disk drive | Joystick |                           |                                                                                          |
|                    | £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' |
| Pacman Type        | £10.00            | Sinclair ZX81                   |                | Mazogs              | 16K                | ●                 |      |           |                      |            |          | B3                        | 'Three levels. Find & collect treasure in a maze & escape'                               |
|                    | £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                       |                | Scarfan             | 32K                | ●                 |      |           |                      |            |          | M16                       | 'Based on Pacman'.                                                                       |
| Pool               | £4.95             | Spectrum                        |                | Gnasher             | 16K                | ●                 |      |           |                      |            |          | R3                        | Joystick optional. 'Based on Pacman using Beano characters'.                             |
|                    | £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'.                                     |
| Space              | £5.95             | Spectrum                        |                | High Noon           | 16K                | ●                 |      |           | ●                    | ●          |          | A6                        | 'Clean up chaos & disorder in town'.                                                     |
|                    | £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'.                                |
| Space Invader type | £4.95             | Spectrum                        | ●              | Star Trek           | 48K                | ●                 |      |           |                      |            |          | R3                        | Also on ZX81 (£3.95). 'One player, sound & full colour graphics strategy game'.          |
|                    | £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'.    |
|                    | £5.95             | Commodore Vic-20                |                | Innovation Cassette | 48K                | ●                 |      |           |                      |            |          | M8                        | 'One tape containing seven games'.                                                       |
| Variety            | £5.95             | Spectrum                        |                | Over the Spectrum   | 16K                | ●                 |      |           |                      |            |          | M8                        | 'One tape with 10 games. Defender to geometry, beginners to advanced'.                   |
|                    | £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 Kalmir   | 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 | Also 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).                         |
| <b>UTILITIES</b>  |           |                  |                                  |      |   |   |   |   |   |     |                                                                                           |
| 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 x 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         | Owitel                           | 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 5 1/4" single double sided.         |
|                   | £454.25   | CP/M             | Micro-Linkline                   | 64K  | ● | ● | ● | ● | ● | I2  | Also on UCSD-P. Teletype comms for transferring databases.                                |
|                   | £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 async 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 & Conus 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      | File                             | 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 116                    | 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 CP/M86, 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 transferring 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 artificial 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/<br>Operating<br>System | Other versions | Title                       | Memory<br>required | Media<br>Supplied |      | Hardware<br>Required |            |          | Publisher/<br>Distributor | Comments                                                                               |
|-------------------|---------------|---------------------------------|----------------|-----------------------------|--------------------|-------------------|------|----------------------|------------|----------|---------------------------|----------------------------------------------------------------------------------------|
|                   |               |                                 |                |                             |                    | Cassette          | Disk | Main order with      | Disk drive | Joystick |                           |                                                                                        |
|                   | £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 MC68000 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  | £2.50         | 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 — relieving 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.              |
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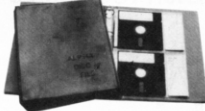
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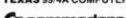
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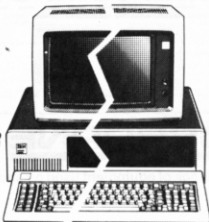
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# Sell doubt

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?

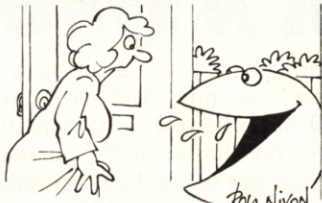
In the US an advertising company carried out a survey to determine how well clued-up personal computer salesman are. The results are not encouraging.

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.

QUIT



'Computer dating sent me.'

```

2 INPUT "PLEASE ENTER AN INTEGER (1-99):" IAS
4 IF IAS < 1 OR IAS > 99 THEN PRINT "INTEGER OUT OF RANGE - RETURN" END
6 FOR N = 0 TO 10 STEP 2:CCCL = CCL + AS * N: NEXT N
8 CCL = CCL / AS
9 PRINT "CALCULATED NUMBER = " CCCL
10 AS = "ABCDEFGHIJKLMNPOQRSTUVWXYZ1234567890"
12 PB = PB + MID$(AS,5,1)PB = PB + MID$(AS,12,1)
14 PB = PB + MID$(AS,27,1)PB = PB + MID$(AS,23,1)
16 PB = PB + MID$(AS,13,1)PB = PB + MID$(AS,10,1)
18 PB = PB + MID$(AS,11,1)PB = PB + MID$(AS,16,1)
20 PB = PB + MID$(AS,14,1)PB = PB + MID$(AS,17,1)
22 PB = PB + MID$(AS,20,1)PB = PB + MID$(AS,10,1)
24 PB = PB + MID$(AS,1,1)PB = PB + MID$(AS,3,1)
26 PB = PB + MID$(AS,20,1)PB = PB + MID$(AS,19,1)
28 PRINT "PHRASE = " PB
100 PPR = "" : AS = MID$(AS,5,1) + MID$(AS,11,1)
110 AS = AS + MID$(AS,12,1)AS = AS + MID$(AS,17,1)
120 AS = AS + MID$(AS,23,1)AS = AS + MID$(AS,4,1)
130 AS = AS + MID$(AS,21)AS = AS + MID$(AS,10,1)
140 AS = AS + MID$(AS,26,1)AS = AS + MID$(AS,9,1)
150 AS = AS + MID$(AS,2,1)AS = AS + MID$(AS,4,1)
160 AS = AS + MID$(AS,2,1)AS = AS + MID$(AS,2,2)
170 AS = AS + MID$(AS,17,1)AS = AS + MID$(AS,4,1)
180 AS = AS + MID$(AS,17,1)AS = AS + MID$(AS,0,1)
190 AS = AS + MID$(AS,16,1)AS = AS + MID$(AS,0,1)
200 AS = AS + MID$(AS,4,1)AS = AS + MID$(AS,10,1)
210 AS = AS + MID$(AS,16,1)AS = AS + MID$(AS,1,1)
220 AS = AS + MID$(AS,7,1)AS = AS + MID$(AS,11,1)
230 FOR C = 1 TO CCL:PPR = MID$(AS,C,1) + PPR: NEXT C
250 PRINT "PROVERB = " PPR: END
    
```

```

RUN
PLEASE ENTER AN INTEGER (1-99):5
CALCULATED NUMBER = 30
PHRASE = ELM MORNING-FACTS
PROVERB = GREAT GAINS FROM LITTLE -B GROW
    
```

# SLANTAX ERRORS

## Note the numbers

Missed out in Databasics (PCN April 29) were a couple of telephone numbers. **DB** 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                              |
|-------------------------------------------|-------------|------------------------------------|
| Midland Computer Show                     | April 28-30 | Bingley Hall, Birmingham           |
| RIBA Computer Conference & Micro City '83 | May 10-12   | Bloomsbury Crest Hotel, London     |
|                                           | May 10-12   | Bristol Exhibition Complex         |
| Computer Open Day Exhibition              | May 12      | The Post House, Southampton        |
| Compec Scotland                           | May 17-19   | Kelvin Hall, Glasgow               |
| International Word Processing Exhibition  | May 24-27   | Wembley Conference Centre, Wembley |
| Computers In The City                     | May 24-26   | Barbican, London                   |
| Computer Open Day                         | May 26      | Strathmore Hotel, Luton            |
| Apple '83                                 | June 3-5    | Fulcrum Centre, Slough             |
| Office Automation Show & Conference       | June 7-9    | Barbican Centre, London            |
| 4th Commodore Computer Show               | June 9-11   | Cunard International Hotel, London |

| Organisers                                             |
|--------------------------------------------------------|
| Roy Bratt, Reed Exhibitions, 01-643 8040               |
| Joe Hunting, RIBA Services Ltd, 01-637 8991            |
| Stephen Hybs, Tomorrow's World Exhibition, 0272 292156 |
| Tony Kaminski, Couchmead Communications, 01-778 1101   |
| Tracey Cannon, Reed Exhibitions, 01-643 8040           |
| Philip Le Masurier, BETA, 01-405 6233                  |
| Mario Meoli, Online Conferences, 09274 28211           |
| Tony Kaminski, Couchmead Communications, 01-778 1101   |
| John Riding, Database Publications, 061-405 8500       |
| Clapp & Polliak, 01-747 3131                           |
| 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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