40p EVERY WEEK·No 86·NOV 10 1984

PERSONAL Computer NEWS

ONLY 40P

EXCLUSIVE REVIEW

3D chess on the QL

COMMODORE TALK
Teach your 64 to converse - p39

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A powerful language under Pro-Test - p20

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Add new commands to your Model B - p12

BUSINESS PICK-UP
Zenith unveils its PC-like portable - p32

WIN AN APPLE IIc-FREE

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See the pack – see the screen – see the game. See the difference the moment you pick up one of the games from Firebird's new Silver Range.

The difference is that our packs show the high quality you'll see on the screen when you play, so you know exactly what you're buying.

The same high standard applies to all twenty games in the range and all are available at the remarkably low price of

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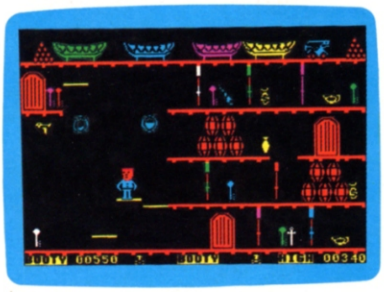
FIREBIRD

SOFTWARE

Here's a sneak look at three of the NEW games:



BOOTY

Feast yer eyes on the BOOTY-ful treasure stored in 20 holds.
There be pirates, parrots and fun galore!!!

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Can you survive life on the run in this Wild West adventure???

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Dodge the planes and shoot the pigeons to complete the tune–
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Look out for these games in the FIREBIRD silver range at selected high street stores.

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COMMODORE 64: BOOTY · MR. FREEZE · EXODUS · HEADACHE · ZULU. **BBC MICRO B:** BIRD STRIKE · GOLD DIGGER · ACID DROPS · DUCK!

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MONITOR

Win an Apple II See page 16

QL to get disk interface

QL users standby to throw away your Microdrive cassettes. A 'semi-official' disk interface should be available in December.

The interface has been developed by Cambridge Systems Technology with the cooperation of Sinclair's technical staff.

Unlike the disk system announced by Quest (issue 85), the CST interface has been designed to work with QDOS.

Although the interface won't be carrying a Sinclair label, the involvement of the company in the design will ensure support for the proposed disk data format.

The interface will support 5.25in disk drives but will be sold mainly as a package with Teac 3.5in microfloppy drives.

CST refused to comment officially about the product or its price on the grounds that it does not want to make a formal announcement until the product is ready to be delivered to the shops.

But the company will be giving a sneak preview of the interface at this weekend's Independent QL Users Group meeting in Swindon. (Further details of the meeting can be obtained from Leon Heller on 0908-613004).

Apple offers 'test-drive' on Macintosh

For all those people who think a computer could run their business and their lives but are still frightened by the prospect, Apple has launched its Test-Drive-a-Macintosh.

The scheme, which will run until the end of December, allows Apple dealers to have up to four Macintoshes to be lent out overnight to anyone interested in purchasing one.

The test-drive Macintosh comes with a cassette tape which guides you through the computers facilities and a suite of programs. For the more adventurous, a booklet is provided which guides the user through the development of a new baby food marketing operation down to the company logo using MacPaint.

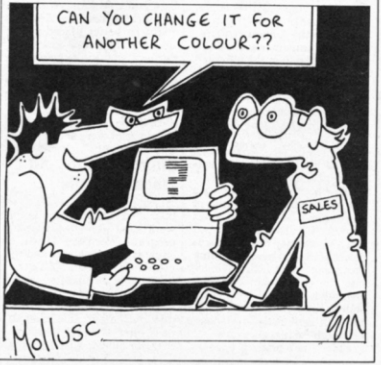
You can explore how you'd make contact with potential backers using MacWrite, and impress them by producing forecasts of costs (Microsoft's Multiplan) and a graphical representation (Microsoft's Chart).

Apple is also expected to launch a laser printer early next year. Apple claims that this printer will offer full graphic facilities and produce a full page of text quicker than a photo copier.

There's no indication of the price yet, but looking at Apple's past performance it should cost considerably less than those already available.

Meanwhile, Apple remains coy about speculation that it will launch a colour version of the Macintosh early next year. Apple traditionally uses its shareholders meeting in January to make new product announcements. At this year's meeting it was the Macintosh and rumours are rife that a colour version, a logical next step, could be revealed soon.

If all Apple announces at the meeting is a laser printer there'll be some glum faces.



MONITOR

Acorn plugs in Beeb music synthesiser

Acorn is all set to launch itself into the music business. It is due to unveil a music synthesiser at COMPEC next week.

The Music 500 is a plain box that plugs into the 1MHz bus on the Beeb and can send its stereo sound output to a hi-fi system.

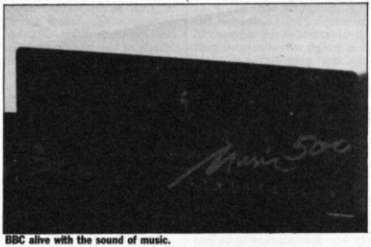
At £199, it consists of a 16-voice polyphonic sound generator that can be controlled from the Beeb's keyboard.

With the device comes a high-level structured language called AMPLE which allows you to control wave forms, pitch and volume envelopes and use cross modulation techniques.

You can also create octaves, cords and simulate a variety of musical instruments.

Conspicuous by their absence from the system are a Midi interface to link it to other synthesisers and musical equipment and a music keyboard.

Acorn says the facility to plug in a keyboard will be offered as an add-on 'at a later date'.



BBC alive with the sound of music.

IBM wants change of gear in Advance

It looks as though Advance will have to go into reverse, if IBM has its way. Advance's £1,500 PC compatible has been selling in W H Smith for some time, but now IBM has issued a statement claiming that part of the Advance's ROM is an unauthorised copy of a program from the IBM PC's BIOS.

Last Friday Advance replied to IBM. An IBM spokeswoman told *PCN* that having been informed of the infringement Advance, Ferranti and W H Smith have agreed to cease the infringement.' As the infringement is in the Advance's ROM, this can only mean that the current version of the machine is being withdrawn.

As it now seems that Smith's entire stock will have to be withdrawn in any case, things must be looking bleak for Advance.

Meanwhile Advance's friends are showing a suspicious lack of enthusiasm. Ferranti, which manufactures the machine, admits to being in discussion with IBM, but won't say what it's discussing. We put it to a spokesman that there was a possibility of Ferranti ending its arrangement with Advance, but the spokesman wouldn't comment. W H Smith is still selling the Advance for £1,499, in its in-store computer shops, although Advance has dropped the machine's price. It appears the price of the 86b has dropped by £300, although an Advance spokesman told us he didn't think it was that much.

Sales of the machine in W H Smith have been 'satisfactory', according to a Smiths spokesman, but while elaborating on this he made a curious distinction. W H Smith has a business computer sales arm in addition to its in-store shops, and while Advance sales have been good by the lights of the business section, they have been 'disappointing' by the standards of the in-store shops, where they're displayed alongside Spectrums, QLs and Acorns.

Logically then, the Advance might be better placed alongside the business machines, rather than taking up valuable floor space in high street stores. While W H Smith says it hasn't withdrawn the Advance, it won't comment on the possibility of the machine being moved out of the in-store shops.

Micropro gives old stager new life

Micropro has announced an upgraded version of its old workhorse word processing program, Wordstar. It will be shipped in by January and will retail at £440 (plus VAT).

Managing director Robin Oliver insists it is not a replacement for the widely used Wordstar, although the company does offer a direct swap plus £200 for all who wish to change their current version for the update (this offer holds for originals only!).

Wordstar 2000 will be available only for the IBM PC, XT, and AT. Micropro says it will be converted for other machines but couldn't say when.

Micropro claims for Wordstar 2000 that 'it will redefine the state-of-the-art for microcomputer applications software'.

Special features, or as Micropro calls them, the 'bells and whistles of the new package'include on-screen windows, so that you look at several documents at the same time and transfer sections from one document to another, a built-in arithmetic calculator and spelling corrector, so you don't have to leave the current document each time you wish to carry out a calculation or spelling check, and a typewriter mode which means you can type directly to the printer.

Micropro seems confident that this time its product is fully protected with a software protection algorithm which will allow only up to three backup copies, so any one trying to avoid the rather hefty sum of £400 is likely to be unlucky!

Prestel hacker may force ID change

It was egg-on-face time for Prestel at the end of last week after a computer hacker broke into Prestel and ran amok through the system.

As a result Prestel is considering changing all Prestel users' identity numbers and advising them to change their passwords.

The major security breach occurred after the personal ID and password of a Prestel system manager was printed on a frame on one of Prestel's development computers.

Armed with the ID and password any hacker could have access to any part of the Prestel system.

In the break-in last week the hacker was able to read the mailbox belonging to the Duke of Edinburgh and private pages belonging to a firm of stockbrokers.

He also put a frame up on the pages belonging to the *Financial Times* that announced the pound was worth $50.

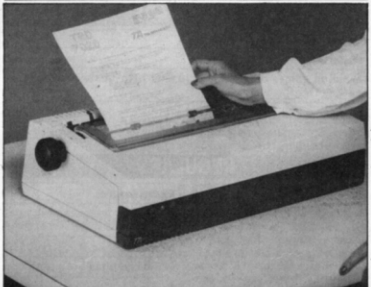
The break-in was organised as a stunt by the *Daily Mail* to prove how vulnerable Prestel is.

In the story in Friday's *Daily Mail*, Peter Sheridan, who wrote the article, claimed: 'I ensured that all erroneous messages were removed from Prestel screens after proving what could be done'.

In fact, the fake *Financial Times* frame was still in place when *PCN* checked, suggesting that some of the other efforts of the hacker also remained.

Prestel refused to comment on the extent of the break-in, apart from saying that it was carrying out a full investigation.

'It is a very complicated matter which Prestel is taking very seriously,' a spokesman said. 'The investigation will be a thorough look into the allegations made in the *Daily Mail*.'



TECHNOLOGY TRIUMPH — Triumph Adler is taking on the Japanese with this new low-cost daisywheel. The 7020 is £375 plus VAT and comes with serial and parallel interfaces. It's not particularly fast at 20cps but it does give you 10, 12 and 15 characters per inch and proportional spacing. More details from the distributor, Westrex, on 01-578 0957.

MONITOR

Coleco Adam is cut to a remainder

Coleco Adam, the machine that looked as though it would be a trend-setter, is now remaindered at £299 from Silica Shop, London (01-309 1111).

Originally the Adam sold for £700, then it came down to £499 and now another £200 has been knocked off. As well as buying the machine, you may want the games machine adapter which is now selling at £49.

The Z80-based machine, which comes with a daisywheel printer, digital tape drive and a built-in word processor called Smart Writer, has had some troubled times.

The system was plagued with reliability problems last year due to its word processing system which slowed sales down of the machine. This could be one of the reasons why Coleco Industries in the US last week slashed the price of the Adam from $650 to $475.

Speculators in the US are saying that this drop in price is a sign of Coleco abandoning the system after Christmas and withdrawing from the home computer market (see below).

However, CBS Electronics, sole distributor of the Adam in Britain has no plans to abandon it.

Philip Gibbs, marketing manager said: 'The Adam has been badly affected by earlier technical problems and the lack of software. 'Now software for it is beginning to emerge and it's doing moderately well. And as far as we're concerned we'll go on supporting it.'

Einstein gets a boost with more capacity

Einstein users who want to boost their computer to a full one Mb disk capacity can now do so with a second disk drive unit.

The TK01, which comes in kit form, costs £149 and can be fitted inside the Einstein's housing. The Einstein, with its 3in floppy disk drive holding 500K, 64K of memory and a separate 16K for graphics was designed from the outset with a view to expanding its storage considerably.

British manufacturer Tatung has cut down its production costs and has passed this saving on to the user. The unit is available now from retail shops.

PICTURE FRAMES — Do you think you could produce a picture better than this? If so, you could win a colour monitor for your efforts. Compunet (01-637 0942) has organised a competition for young artists to put their ideas on screen. First prize of a Commodore 1701 monitor will go to the entrant who designs the most original frame to introduce one of the many services available or planned for Compunet.

To get an idea of what you can create call up the Compunet advertisment page, design your own picture and when you've finished your masterpiece simply upload it. The competition, which is open to anyone who has access to a Commodore 64 and modem, closes on 14th December.

IN BRIEF

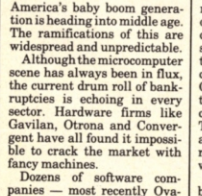
As *PCN* predicted, Osborne (0908-615274) has cut the price of the Osborne 1 from £695 to £499 (plus VAT) for the 52 column screen version (issue 85). The 80 column screen version is also down in price. It costs £695 (plus VAT) instead of £870.

No need to wear out your feet queuing up for those theatre tickets. Edwards & Edwards (01-734 6767), the London ticket agency, has just launched a theatre ticket booking service on Prestel. With no less than 52 different productions to choose from you can now book, and pay for, tickets from the comfort of your home. It also provides details of theatre times and ticket availability.

What can be worse than to be separated from your beloved micro while it is down at your local computer shop waiting to be repaired? Enter stage right Thorn EMI's Computeraid Services (0252-548888). It is now guaranteeing a three-day turnaround service.

Faster execution and significant new facilities are promised in Prolog-2 from Expert Systems (0865-242206). Running on an IBM PC or Sirius, the company says that this new version 'is believed to be the world's most sophisticated implementation of the AI language'.

VIEW FROM AMERICA



Baby boomers cause consumer chaos

America's baby boom generation is heading into middle age. The ramifications of this are widespread and unpredictable.

Although the microcomputer scene has always been in flux, the current drum roll of bankruptcies is echoing in every sector. Hardware firms like Gavilan, Otrona and Convergent have all found it impossible to crack the market with fancy machines.

Dozens of software companies — most recently Ovation — have folded their wings in the past months. Others are holding back products developed for the promised boomtime in the fall. Suddenly no-one is sure what the people want.

In addition we are in an odd kind of economic boom. Canny US consumers (the Baby Boomers are the pickiest of all) have slowed spending to a trickle. For micro manufacturers this showed up as a 30 per cent drop in sales in one month (from June to July). Nor was this just the summer time blahs.

The fact is that the US micro market has hardened in terms of market share. A survey of 654 computer stores (which don't sell Commodore 64s) found things split thus: Apple 45 per cent, IBM 34 per cent and Compaq 9 per cent. Still out in the cold are all those IBM compatibles from the likes of Texas Instruments and AT&T, as well as the Japanese and remnants of the 8-bit CP/M world.

IBM has a good lock on the US business market and Compaq has developed a portable compatible that IBM can't kill.

Meanwhile Apple demonstrated that, yes indeed, it has bounced back from the dark days of autumn 1983. For the quarter ending September 28, Apple sales jumped 75 per cent over last year to $477.4 million. Earnings climbed to $30.8 million. John Scully, Apple's chief, said 'Apple has chosen the industry role of innovator and survived the shakeout as an industry leader.'

And for next year? Well, one option that Apple is considering involves the 65816 true 16-bit, which is compatible with the venerable 6502. The 65816 can address more than 16Mb — even the IBM PC AT can only address 3Mb.

Elsewhere Commodore posted a 14 per cent increase in profits and net income rose to $27.7 million on sales of $244.2 million in the last quarter. This Christmas is likely to bring further confirmation of the Commodore 64's position.

Coleco effectively slashed the price of the Adam system to $475. Analysts believe no more than 250,000 Adams have been built and that Coleco is trying to cut its inventory on its way out of the risky microcomputer market. They also note that although Coleco's profits surged 65 per cent in the last year, 85 per cent of the company's sales were from Cabbage Patch dolls.

The story of Amiga Corporation is a good example of the state of the market. Amiga spent two years developing a powerful graphics computer based on the 68000 chip.

Amiga planned to market the machine with 128K RAM (expandable to 512K), one double density disk drive, built-in modem and software for about $1500. It also planned to make it compatible to a certain degree with existing IBM software. It thought venture capital firms would be impressed, especially with the support it had lined up with outside software firms.

But venture capitalists have learned a thing or two about microcomputers and after months of fruitless searching Amiga finally sold out to Commodore.

Chris Rowley

MONITOR

Aries patent drama continues to simmer

While the patent drama simmers between Aries Computers, Watford Electronics and Raven Micro Products (*PCN*, issue 85), the threat of more legal action is in the air.

In a statement Aries said: 'We are certainly going to take legal action against infringements of our patent. Damages mount up from the publication date of a patent, not from when it is finally granted. So, Watford and Raven are already in trouble. . . . Raven and Watford's boards are both covered by the patent, despite variations of detail.'

According to a spokesman from the London Patent Office, Aries' case is questionable. The spokesman said: 'After publication of the patent application, the applicant then has to file a request for examination.

'It can take up to a year or more after the application has been published before a patent is granted. During this time the applicant has no rights whatsoever in saying his product has been patented.

'However, if the applicant feels that his rights have been infringed by the time he has been granted the patent — it can be backdated.'

SPEED OF LIGHT — All right, we know it is expensive at around £3,000 but wouldn't you just like to own a laser printer like this. The EPS LaserJet prints at eight A4 pages per minute, can mix up to four typefaces on a single page and has a print resolution of 300 dots per inch. Prices of laser printers are starting to tumble, so who knows, it may not be long before you can buy one for £1,000. Meanwhile carry on with your dot matrix and dream.

W H Smith homes in on good prices

If you're hunting around for good deals on home computers, W H Smith has a couple of attractive offers.

For £149.95 you can buy a 48K Spectrum, a Kempston Pro joystick interface and a Pro 5000 joystick in one package.

In addition the Beeb's baby brother, the Electron, is being sold with £46 worth of free software.

The Electron costs £199 and comes with the five-game Electron Playmate Pack. There is a choice of two packs and the offer is open while stocks last.

Opus Christmas offer tempts at Boots

Disk drive supplier Opus has some pleasant surprises in store for Christmas.

Boots has agreed to sell the Opus 100K 5.25in disk drive at a tempting £119.95. And Opus' disk operating system, D-DOS, has been rewritten so it can run Acornsoft's Elite mega-game.

An Opus spokesman said the disk drives should appear in Boots' high street shops 'within seven days'. They come with an exceptional two-year guarantee, user manual and utilities on disk.

The rewriting of D-DOS was done in conjunction with Acorn to ensure full compatibility with all of Acornsoft's latest software, including Elite.

The D-DOS interface kit costs £129.95 but Opus dealers will sell you D-DOS and a single drive for £299.95.

This is something of a major turnaround by Acorn. It has traditionally followed a policy of non-cooperation with suppliers of alternative operating systems.

And Acornsoft has included in its up-market disk software routines that check whether a pukka Acorn DFS is fitted. No Acorn DFS and the software hangs up on the user.

HOMEFRONT

Games image suffers hit parade hype

With its budget labels, compilation cassettes, hyping of new products and continuous complaints about piracy and counterfeiting, the games software business is becoming more and more like the pop record industry. It began when record companies like Virgin set up their own software houses.

Virgin's first foray in games publishing came when it hired the Rainbow Room at the top of the old Derry and Toms building in Kensington High Street for a launch overflowing with razzamataz, free drinks and waitresses dressed up as spacemen.

The software industry had not seen anything like it but it set a trend.

Then along came Mastertronic. Its budget label and £1.99 price tag was a straight rip-off of the budget album idea that helped sell classical music to thousands.

There was nothing classical about Mastertronic's original offerings but they certainly set the Pac-man among the ghosts.

The initial standard was rather low, but has improved and the ranks of budget games have been joined by the big names such as Software Projects, publishers of *Manic Miner* and *Jet Set Willy*, both chart toppers.

And respectability has been given to pocket money games by British Telecom whose Firebird label leapt into life with games selling at £2.50.

It was only a matter of time before someone published K-tel — like compilations of old hits.

Beau Jolly was one of the first to wade in with bargain six-packs of old Imagine numbers. It has been joined by Alligata with its own-brand Chartbuster offering five games for £9.95. And then there is Select 1 which contains a dozen best sellers from top names such as Ocean and Bug-Byte for £12.95, and is marketed in conjunction with Tel-Star Records.

There is no doubt that the borrowing of ideas like these from the record industry has benefited the consumer. Unfortunately, other ideas have been borrowed as well.

The worst of these is undoubtedly hype — expensive advertising campaigns and promotional ploys to keep the name of a game in the public's mind. The aim is to create such a following that no self-respecting punter can walk into a shop and not come out with a copy.

Some software houses go to incredible lengths to promote a run-of-the-mill game. Calling it a 'megagame' is no longer enough. A favoured technique is to offer a prize of unbelievable value or beauty. It started with *Pimania*, and the golden sundial that has yet to be won.

Since then we have had the original Golden Hare of Kit Pedlar fame, and a golden sceptre on offer from the Edge for solving the riddle of *Quo Vadis* (the latter also comes with £30,000 in cash).

Another promotional ploy is the pseudo-award winner. A recent press release from a software house told *PCN* about a programmer being presented with a 'gold cassette' for 50,000 sales of the program he wrote. To add credence to the event a well-known personality was hired to present the award.

But the real prize in this category is chart-rigging. It is a fact of life in the pop business and is making itself felt in the games charts.

PCN pioneered software charts and we like to think that our weekly list is the most objective assessment of over-the-counter sales. But no chart can be immune.

In the course of a casual conversation in a pub, a director of a software house (which shall stay nameless) offered to prove the point. 'Give me £2,500 and I guarantee to get any game into your charts,' he said.

The moral of this story is: 'let the buyer beware'.

Ralph Bancroft

MONITOR

Pirates face banknote challenge

Software houses are turning to advanced printing technology in a bid to reverse the tide of piracy.

Dataview Wordcraft is making a welcome switch from the use of dongles and taking the lead.

Dataview, which publishes the Wordcraft word processing package for Commodore micros, has been among the keenest advocates of dongles as a means of combating illegal copying.

It has now switched to a printing system called The Beewee used by banknote printers Bradbury, Wilkinson.

'A not insignificant factor is that The Beewee is 20 times cheaper than the dongle,' said Paul Handover, Dataview's chairman.

'In addition, it does not entail any inconvenience to our customers in terms of having to adapt their hardware to this security device. It also allows them to change programs without having to disconnect or reconnect anything,' he added.

The Beewee system consists of a set of self-adhesive labels. One goes on the disk, one on the manual, one on the licence agreement and one for a spare disk.

The labels are produced by a process similar to that used for printing banknotes, including a latent image and individual numbering.

The latent image can be seen only when viewed from a particular angle, which makes it easy to spot forgeries.

From a legal point of view, The Beewee has full protection against copying.

● Another printing company to jump on the anti-piracy bandwagon has been set up by ex-Imagine marketing manager, Michael Crofton.

The company, Leisure Art Productions, uses a number of techniques to foil counterfeiters, including printing in a fifth metallic colour.

Once Imagine adopted this technique the company claims, it suffered from no further professional large-scale counterfeiting.

PRECISION CONTROL — The Mach III joystick from Hayes is a deluxe joystick for Apple and IBM users. It includes a fine trim adjustment along with a self-centering mechanism. A boon to users who find that when the joystick is centred, the cursor on the screen is not. Just twiddle the rotary controls to tune the joystick in. The Mach III is distributed by P&P Micro Distributors on 01-677 7631 at £46.95 plus VAT.

Sinclair seeks out new horizons

Sinclair is spreading its wings in an attempt to increase overseas sales of the ZX81 and Spectrum.

The company is setting up subsidiaries in France and Italy and has appointed a business development manager for Eastern Europe.

Sinclair products already sell well in France and Italy and the new companies, set up in conjunction with Sinclair's local distributors are aimed, as Sinclair puts it, to 'further reinforce Sinclair's position as Europe's number one supplier of personal computers'.

There are probably other companies which would challenge that claim but there can be no doubt that increasing sales abroad can only be healthy for Sinclair users in the UK.

The sales push in Eastern Europe follows on from the lifting of the US government's restrictions on high technology exports to communist countries.

CHARTS

As featured on Radio 1's Saturday morning Chip Shop.

GAMES

TW	LW	TITLE	PUBLISHER	MACHINE	PRICE
1	2	Jet Set Willy	Soft Projects	SP, C64	£5.95
2	1	Daley's Decathlon	Ocean	SP, C64	£7.90
3	4	Elite	Acornsoft	AC	£15.00
4	9	Combat Lynx	Durell	SP, C64	£7.95
5	6	Pyjamerama	Microgen	SP, C64, AM	£6.95
6	5	Sherlock Holmes	Melbourne	SP, C64	£14.95
7	8	Avalon	Hewson	SP	£7.95
8	3	Beach-Head	US Gold	SP, C64, AT	£9.99
9	7	Zaxxon	US Gold	C64, AT	£9.95
10	—	Kentilla	Micromega	SP	£6.95
11	15	Dark Star	Design	SP	£7.50
12	20	Delta Wing	Creative Sparks	SP	£7.95
13	10	Kokotoni Wilf	Elite	SP, C64	£6.95
14	11	Full Thottle	Micromega	SP	£6.95
15	13	Lords of Midnight	Beyond	SP	£9.95
16	14	Intl Soccer	Commodore	C64	£9.99
17	—	TLL	Vortex/Ocean	SP, C64	£5.95
18	—	River Raid	Activision	SP, C64	£9.95
19	16	Battle Cars	Games Worksh	SP	£7.95
20	—	Havoc	Dynavision	C64	£9.95

SPECTRUM

TW	TITLE	PRICE
1	Combat Lynx	£7.95
2	Pyjamerama	£6.95
3	Daley's Decathlon	£7.90
4	Sherlock Holmes	£14.95
5	Avalon	£7.95
6	Beach-Head	£9.99
7	Kentilla	£6.95
8	Dark Star	£7.50
9	Delta Wing	£7.95
10	Full Throttle	£6.95

COMMODORE

TW	TITLE	PRICE
1	Jet Set Willy	£6.95
2	Daley's Decathlon	£9.90
3	Zaxxon	£9.95
4	Intl Soccer	£9.90
5	Sherlock	£14.95
6	Havoc	£9.95
7	Falcon Patrol II	£6.95
8	Pitfall II	£9.99
9	Kokotoni Wilf	£6.95
10	Summer Games	£9.95

MICROS

BELOW £1,000

TW	MACHINE	PRICE
1	Commodore 64	£199
2	Sinclair Spectrum	£125
3	BBC B	£399
4	Amstrad	£330
5	Electron	£199
6	Vic 20	£140
7	Atari 800 XL	£169
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9	Memotech	£199
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5	Televideo TS1603	£2,640
6	Wang Pro	£3,076
7	NCR Dec Mate V	£1,984
8	Apple 3	£2,755
9	HP 85	£1,917
10	Dec Rainbow	£2,359

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the week up to **November 1**. The games chart is updated every week. The prices quoted are for the no-frills model and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month. PCN Charts are compiled exclusively for us by RAM C, who can be contacted on 01-892 6596.

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RANDOM ACCESS

Has anything we said struck you as outrageous or worth fulsome praise? Let us know how you feel about the issues covered in *PCN*. Air your views in this column — and you could earn £15 for the best letter of the week. Don't hesitate — send your words of wisdom to: Random Access, *Personal Computer News*, Evelyn House, 62 Oxford Street, London W1A 2HG.

Easy answer to a pointed query

In answer to John Lettice's problem with *Flight Path* (issue 82), the chances will depend on the cross sectional area of the back of the dart. Then, assuming that the darts do not hit the board at an angle the chances equate to:

pi (radius of the dartboard)^2

to 1. area of the back of the dart
Mark Dunn
Bingley, W Yorks

PS — If the dart could only stick in the hole for the flights, the 'area of the back of the dart' will be replaced by the cross sectional area of the hole.

Time Warp heading causes confusion

We have been selling a Real-Time clock/calender unit for the last year, called *Time Warp*. We were surprised when prospective customers began to ask whether it was just software and not hardware.

I have traced the source of confusion to a small program that you published (issue 81). This program is a simple clock needing the program permanently in the computer, and assuming that the edit keys are not pressed.

We are upset that *Time Warp* has been used as a name for this program. Technomatic has been using this name for its own hardware unit since the beginning of the year — this unit has been widely advertised in most computer magazines. While we are sure that you have used the name inadvertently, we are certain that the writer of the article has 'borrowed' the name for this own use.

I therfore feel that it would be fair for *PCN* to print some comment regretting the accidental use of the name *Time-Warp*, and possibly including brief details of our unit.
Michael Lernor,
Technomatic, London NW 10

Happy to clear up any misunderstanding. Time Warp was not a name given by the author of the article, but a headline written by us. We were unaware of the existence of Technomatic's product — Ed.

Lack of support will mean Oric's decline

Mr Bolter (issue 84) seems to have missed the real thread of my argument and I think criticises me unfairly. First, I am mad keen on my Oric and use it avidly. Second, I too attempt to write programs for it and crude as they are, I enjoy doing so. Third, he is naive to consider software support to be so unimportant.

It is a fact (sad, maybe) that many judge a micro's success largely on the quality and quantity of software available for it. In this respect Oric lags behind. At least three prominent computer outlets in my town have either dumped the Oric/Atmos and software, have chosen to ignore it completely, or treat it with little or no enthusiasm.

As shops continue to ignore it, fewer people will buy Oric/Atmos, less money will return to Oric Products and future investment will decline. Software houses will probably withdraw support and the hardware development put into production will drop. Servicing and repairs of the machine could also be difficult, and Oric owners will be left with a lame duck.

How many prominent adverts do you see for Oric add-ons and software? I don't see many and I look constantly. Without enthusiasm and active support from the professionals, Oric faces a tough time in a cut-throat industry. If Oric succumbs, we amateurs will pay the price. My letters are intended as a spur to Oric products. This machine *deserves* support.
Matthew Hisbent,
Kirkcaldy.

Why BT goes after pirate modems

C Haine's letter (issue 82) has prompted me to write to you on the subject of modems. In principle I would agree with the ideal offered by Mr Haine. However, it is evident that there is a lack of appreciation of communications among computer operators — demonstrated by this letter and others which appear from time to time in computer magazines. I would like to bring to your attention the reasons why British Telecom is so keen to search out illegal modems.

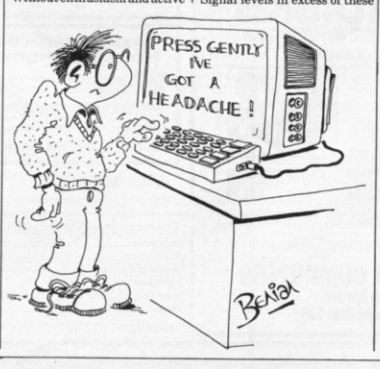
Safety: Any modem operated from the public electricity supply must be checked to ensure that in the event of an electrical fault in the power supply the 220 volts mains cannot be accidentally connected to the BT line.

Transmission: British Telecom has its own transmission standards, *ie* the level at which signals may be transmitted. Signal levels in excess of these may cause interference with other channels.

A further aspect to this problem is that the number of channels in a given system carrying telegraph and data signals must be limited to prevent intermodulation or over loading of the modulators. As the telephone network uses its channels for telephones in a random manner, carrying signals from different parts of the system, it is necessary to control the quantity of data users.

This is also why large computer systems perform their data transfers over the Public Switched Network during the night.

In Germany a system such as Mr Haine suggests *is* available. But the data signal is separated from the telephone networks and passed over high speed data channels.
D Herring,
Shape BFP 026.



Spectrum Plus — too little too late

Sinclair's new Spectrum Plus is a case of too little too late. It was released because of the Spectrum's falling sales and at £180 is *not* good value for money. The only difference from the 'old' Spectrum is a QL-type keyboard. You can get a much superior keyboard for £50!

The launch of the Spectrum Plus is merely a sign of Sinclair's panic over new machines (such as the Amstrad) pinching its share of the market.
Neil Olner
Doncaster, S Yorks

Whether Sinclair has cause to panic remains to be seen. Perhaps it just want a slice of the add-on keyboard market? — Ed.

Help for the Aquarius user

Brett Emms of Rainhay complains he is unable to obtain programs and equipment for his Aquarius. We carry the range of add-ons and tapes and so can supply anyone with similar problems. A phone call on Ryde (Isle of Wight) 63437 is the best approach.
Bill Stock,
The Children's Shop and Tackle Box

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Where can I obtain supplies for my Adam?

Q Recently I bought the Adam expansion module for the family's Colecovision TV system. I was assured that the formatted blank tapes would be readily available but I can't find any. Can you give me the address of a supplier?
R Hammond,
Great Linford, Milton Keynes

A Try Silica Shop which is supporting the Adam like crazy. You'll find them at 1-4 The Mews, Hatherley Road, Sidcup, Kent. You might give them a call first to make sure on 01-309 1111.

Choosing a modem for the 64

Q I am thinking of buying a modem for my Commodore 64. Can you give me some information?
S Cash,
Alwaston, Derby

A Your first choice should be Commodore's own modem which requires no special interfaces and, for the moment, comes with a free year's subscription to Compunet, Commodore's own bulletin board and database.

The problem is that it is somewhat limited compared to other products and runs only 1200/75 baud. Independent products offer multi-rate communication which you'll need for full use of the equipment.

The catch is that these modems generally require an RS232 interface since the 64 does not fully support that standard. Although there are a number of interfaces around they can cost up to about £60.

Also watch out for suppliers selling non-approved equipment. While it is not against the law to sell modems which have not been approved by British Telecom, it is an offence to use them (cute, huh?)

The best solution would be to find a good computer dealer and discuss what you need. Then buy the equipment there.

How can I make the connection?

Q I took delivery of my QL in August during a trip to England and also treated myself to a super, high-resolution colour monitor. Do you know of anyone making a cheap RGB socket/plug/interface or whatever so I can connect my Spectrum to the monitor too?
If you have room perhaps you could print my address so anyone who makes them could contact me?
Dane Kurthe,
Langgasse 51, 3292 Busswil,
Switzerland

A Funny things people. They go splashing out on an RGB monitor then start asking for information about cheap interfaces . . . There are actually a number of these about, most of them fairly expensive but there is one cheap one from Adapt Electronics.

This checks in at just under £30, and you can get more information on 01-589 5111 extension 5027.

The Spectrum is a very open machine in that practically every line you're likely to need comes out of the edge connector. It isn't that simple with RGB because, although you can get a composite signal out of the back with no trouble, you've got to do a certain amount of signal decoding to produce RGB, and this means money and/or clever electronics.

Adapt also makes a composite interface for the Spectrum, should you ever feel skint enough to have to hock your RGB monitor. As it's also possible to get a composite signal out of the QL (QV and video in the diagram in the manual), it's relatively easy for most people to achieve monitor compatability between the QL and the Spectrum.

Take care when clearing out

Q I've written a program for my Spectrum, but I can't get it to work, and it always stops with a variable not found error.
I've checked repeatedly but all the variables I use are defined. Can you help?
Andy Traff,
London E16

A The most common cause of the problem you describe is so obvious you'll probably kick yourself.

If you habitually define your variables in the first line then CLEAR, you'll find you're clearing out your variables too. It's a pity not everything is so simple.

Slick shortcuts tell age of BBC

Q I own a BBC B without disk or any extras fitted. I recently bought *Elite* and have hit trouble.
The program loads all right but the machine immediately goes to a hard reset. My other tapes work fine. The *Elite* tape loaded on the retailer's BBC. At this rate, I think I will remain 'hardware . . . no, it's your software' loop. Breaking out can be tougher than taking on a pack of Thargoids.
E Waller,
Harlow, Essex

A Loops are familiar to all computer users but the hardest one of all is the 'it's your hardware . . . no, it's your software' loop. Breaking out can be tougher than taking on a pack of Thargoids.

However . . . just because the program loaded on the shop's BBC doesn't mean the tape is blameless.

Suspicion then falls on your BBC and the first suspect is the operating system ROM. You don't say how old the machine is, but if you've got one of the original ROMs, that might be the cause of the trouble. *Elite* uses some slick shortcuts and corner-cutting which may be incompatible with older versions of the operating systems.

If we're wrong we're stumped. Get in touch with Acorn and go for the jugular . . .

Commodore 64 communications

Q I have a Commodore 64, disk drive and printer and intend to buy Dacon's Buzz Box modem. Is there a 'telephone book' of public computers available? Is there a book which will tell me how to use the more advanced disk commands? Is it true that Softsel has converted the Microsoft flight simulator for the 64? Can I re-ink my ribbon cartridges?
S Lock,
Northfleet, Kent

A Working from the back, you can re-ink ribbons if they're of the fabric type but we suggest you'll need an old sou'wester, wellies and an expanse of open space . . . or cough up for a new one.

The flight simulator you mean is published by SubLogic (Microsoft licensed it for the IBM PC) and Softsel is the wholesale distributor. The 64 version is available now and your local software specialist should be able to order it from Softsel. Price varies between £30 and £40.

We'd recommend the Commodore Disk Companion (£7.95 from Sunshine Books) as an excellent all-round guide to using disks with the 64.

As a starting point for communications get hold of a recent copy of Computer Answers (*PCN*'s sister magazine) where you'll find a list of public bulletin boards and other useful information.

Back copies are available from Back Issues Service, VNU, 53 Frith Street, London W1.

Should I wait for a better machine?

Q I have been considering buying a BBC Micro but am put off by a couple of points. first, the amount of RAM available is small compared with other systems; second, I would like to continue with Fortran and other high level languages.
The cost of expanding the BBC with the graduate costs more than a real 16-bit machine such as the Sanyo MBE. I am prepared to wait a couple of years for the production of an 8088 micro aimed at the home user, but am I wasting my time? Should I rush out and buy a BBC?
Neville White,
Portsmouth

A You don't sound like the kind of man to do anything in a rush. But your hesitation is due to one of the great traps of computing — the 'real soon now' syndrome.

You can wait around for ever for better products and in your case assuming an 8088 micro at a low price does materialise, even more incredibly fantastic 32-bit machines will be waiting for release.

So the answer is: yes, you are wasting your time. Buy a machine now, learn and enjoy, then sell it and upgrade when you find a better machine has come onto the market.

Micro versions of Fortran are a bit thin on the ground but you'll probably be able to track one down running under CP/M (possible on a Beeb with either a Torch disk pack or Acorn's Z80 second processor).

As to the memory problems, we would suggest you check out Acorn's 6502 second processor which comes with an extra 64K of RAM.

MICROWAVES

Tips from readers to make programming easier or open up new avenues of possibility. A new look to *PCN*'s pages means a new look to the payments too. Now £10 for every hint in print, and a hefty £50 for the *Microwave of the Month*. Send your hot tips to *Microwaves, PCN, Evelyn House, 62 Oxford Street, London W1A 2HG.*

Amstrad screen read routine

This routine adds a new command |GET,X,Y,CA% to Locomotive Basic. It positions the cursor at X, Y and places the character at that location into A%. It will then print CHR$ (A%). The program is presented as hex dump and as an assembly listing.

M Hankins, Southampton.

```
10 REM ********SCREEN READ********
20 REM SYNTAX IS "|GET ,X,Y,@A%"
30 REM THIS WILL READ CHAR AT X,Y
40 REM AND PLACE THE RESULT IN A%
50 REM ***************************
60 CLS
1000 MEMORY 39999
1010 FOR f=40000 TO 40065:READ a:POKE f,a:NEXT
1020 CALL 40000
1030 a%=0
1040 LOCATE 10,10:PRINT"HELLO"
1050 |GET ,10,10,@A%
1060 LOCATE 1,23:PRINT CHR$(A%)
1070 END
1080 DATA &01,&4A,&9C,&21,&7F,&9C,&CD,&D1,&BC,&C9,&4F,&9C,&C
3,&53,&9C,&47,&45,&D4,&00,&CD,&78,&BB,&7C,&32,&7E,&9C,&7D,&3
2,&7D,&9C,&DD,&66,&04,&DD,&6E,&02,&CD,&75,&BB,&CD,&60,&BB,&D
D,&6E,&00,&DD,&66,&01,&77,&3A,&7E,&9C,&67,&3A,&7D,&9C,&6F,&C
D,&75,&BB,&C9
1090 DATA 0,0,0,0,0
1100         ORG  40000
1110         ENT  $
1120 SETCUR: EQU  &BB75
1130 GETCHR: EQU  &BB60
1140 GETCUR: EQU  &BB78
1150         LD   BC,COMTAB 'SET UP RSX
1160         LD   HL,BUFF
1170         CALL &BCD1
1180         RET
1190 COMTAB: DEFW NMETAB
1200         JP   GET
1210 NMETAB: DEFM "GE"
1220         DEFB "T"+&80
1230         DEFB 00
1240 GET:
1250         CALL GETCUR 'GET CURSOR POSITION
1260         LD   A,H
1270         LD   (COL),A 'SAVE COLUMN
1280         LD   A,L
1290         LD   (ROW),A 'SAVE ROW
1300         LD   H,(IX+4) 'GET NEW COLUMN
1310         LD   L,(IX+2) 'GET NEW ROW
1320         CALL SETCUR 'POSITION CURSOR
1330         CALL GETCHR 'SEE WHAT'S THERE
1340         LD   L,(IX+0) 'GET LOW BYTE
1350         LD   H,(IX+1) 'AND HIGH BYTE
1360         LD   (HL),A 'OF VARIABLE & SAVE
1370         LD   A,(COL) 'GET OLD COLUMN
1380         LD   H,A
1390         LD   A,(ROW) 'GET OLD ROW
1400         LD   L,A
1410         CALL SETCUR 'RESTORE CURSOR
1420         RET 'AND REST.....
1430 ROW:    DEFB 00
1440 COL:    DEFB 00
1450 BUFF:   DEFW 0
1460         DEFW 0
```

More colours for BBC Modes

One drawback to BBC screen Modes 0, 3, 5 and 6 is that they allow only a single foreground or background colour on the screen at one time.

Here's a program that provides a simple way of getting around this and allows the screen to be split into two colours.

Using the screen update event (*FX14, 4), the interrupt routine changes the logical colours of the foreground or the background. Locations &72 and &73 specify the lower and upper colours respectively. &71 specifies the physical colour to be split *ie* in Mode 0, ?&71=1 splits the foreground, and ?&71=0 does the background. The position of the split is set with the value in &70. Note that if this value is too large, the screen is updated twice before the colour is changed, causing it to flash.

This routine plays havoc with the editing cursor and clear screen commands but you can turn it off with *FX 13,3.

Kenn Garroch, Peripherals editor.

```
  10 MODE 0
  20DIM C 100
  30FOR T=0 TO 3 STEP 3
  40P%=C
  50[.C OPT T
  60PHP:PHA:TXA:PHA:TYA:PHA
  70LDX &73 ; GET UPPER COLOUR
  80LDY &71 ; COLOUR NO TO CHANGE
  90JSR SCR ; PUT IT ONTO SCREEN
 100 \ DO DELAY USING COUNTER VALUE IN
&70
 110LDX &70:.LP1 LDY £255:.LP2 DEY:BNE
LP2:DEX:BNE LP1
 120 \
 130LDX &72 ; GET LOWER COLOUR
 140LDY &71 ; COLOUR NO TO CHANGE
 150JSR SCR ; PUT ONTO SCREEN
 160PLA:TAY:PLA:TAX:PLA:PLP
 170RTS
 190LDA £19:JSR &FFEE
 200TYA:JSR &FFEE
 210TXA:JSR &FFEE
 220LDA £0:JSR &FFEE
 230LDA £0:JSR &FFEE
 240LDA £0:JSR &FFEE
 250LDA £0:JSR &FFEE
 260RTS
 270]
 280NEXT
 290?&72=1:REM LOWER COLOUR RED
 300?&71=1:REM FOREGROUND
 310?&70=15:REM SCREEN POSITION
 320?&73=4:REM UPPER COLOUR BLUE
 330?&220=C MOD 256
 340?&221=C DIV 256
 350*FX 14,4
```

A tidy QL screen for clear editing

Debugging a program on the QL can be awkward if it redefines the screen windows. This short routine initialises the screen to the start-up format with borders to keep the output on the screen.

Save it as a separate procedure and merge it with the program you are working on. When the screen is full of windows scrolling all over the place, you simply type: is [enter]. Note: all £ signs should be typed in as # (hashes).

Alan Wharton, Earlsdon, Coventry.

```
10000 DEF PROC is
10010 WINDOW £0,512,50,0,206
10020 BORDER £0,8,0
10030 PAPER £0,0: CLS £0
10040 INK £0,7
10050 WINDOW 256,206,256,0
10060 BORDER 8,3
10070 PAPER 3 : CLS
10080 INK 7
10090 WINDOW £2,256,206,0,0
10100 BORDER £2,8,7
10110 PAPER £2,7 : CLS £2
10120 INK £2,0
10130 END DEF
```

How to write for Personal Computer News

PCN WANTS YOU!

Whatever you want *PCN* will try to bring you . . . but we need your help. You tell us you want more programs, more features to help you get the most from your machine. Well, we've listened and we're offering more programs, projects and useful information than any other magazine. But if your machine isn't featured you've only yourselves to blame.

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What we want

We're looking for programs and articles on any aspect of using personal computers — including games, graphics, utilities, and applications.

If you're sending a written contribution we require it in typed form (dot matrix printout is fine), with double spacing on one side of the paper only. Where possible include short, example programs to illustrate the article.

If you've written a program we require a working version, on tape for any machine, or on disk if you prefer for Commodore 64, Atari, BBC or Apple. We'd also like notes on how the program works, what it does, and any special features that you've included. A printed listing would be nice but isn't essential — on the other hand we can't consider listings without a working copy on tape or disk.

If you would prefer to make preliminary enquiries before submitting material, you should write — don't phone — to *Personal Computer News*, Evelyn House, 62 Oxford Street, London W1A 2HG. Questions about articles should be addressed to John Lettice, Features Editor; program queries should go to Nickie Robinson, Programs Editor.

If we decide not to use you contribution it will be returned to you if you enclose a stamped, self-addressed envelope but give us at least six weeks. You should receive payment four weeks after publication.

If you want to enclose photographs and screen shots, feel free to do so but make sure they are of good quality and make them colour transparencies or black and white prints. Do not send colour prints.

So, get cracking. Just think . . . two articles could pay for that printer, disk drive, or even a new machine.

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GRANADA-COLLINS
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COMMANDING PERFORMANCE

Your BBC gets three useful extra commands with Stephen Grigg's program. It uses Basic II and takes up 1K of memory, and there is a commentary on how the program does its stuff.

Have you ever wanted to have extra commands at your disposal and found you couldn't afford expensive utility ROMs? Well, this utility program for a BBC computer with Basic II adds three new commands to the Beeb's repertoire.

The extra commands which are available are as follows:

*APPEND <fsp>
*TAB
*GDUMP

The commands may be abbreviated and used as if they were part of the resident star commands and stay resident until the power is turned off. The new commands take up 1K of memory.

The commands

***APPEND<fsp>**

The file following this command is joined on to the end of the program currently resident in memory. Care should be taken that the two files can be APPENDed together in memory without overwriting the screen. The file to be appended should also have higher line numbers than the program in memory. However if problems occur RENUMBER might take care of the resulting mix up.

***TAB**

This command expects a line to be input, and all non-space characters are regarded as tab-stops. On pressing Return this line is remembered. When Tab is pressed the cursor will im-

mediately move along to the next nearest tab-stop. A maximum of thirty-two characters between tab-stops is allowed.

*GDUMP

This command will dump any Mode 1 screen out to an Epson printer. It also works on other printers that use the Epson control character format.

How it works

Lines 100 to 110 store the location of the star command for future reference.

Lines 130 to 170 find where the start of the text of the command is. If the command is being passed through the Basic II OSCLI command no star is needed.

Lines 200 to 240 compare the command being interpreted with the one stored in the data table. If a complete match is found, *ie* it is the same all the way along, a branch is made to the MATCH label at line 460. If, however, the command is not a match then the routine goes to line 250 and checks whether it is the end of the look-up table. If this is true the command is turned over to OSCLI to deal with at lines 390 to 450.

If it has not found the end of the table the program continues on to lines 280 to 310. Here the program jumps over the rest of the command in the table and finds if there is a full stop present in the command entered at the keyboard. If so, it jumps to the routine pointed to by the look-up table. It does this by getting the two address bytes held after the command. This happens at lines 460 to 520.

The command table follows the following format:

<command string> <&OD> <absolute address>

so it should be easy to add your own commands, but remember to change line 920 and line 3990.

These lines move PAGE up to the new value specified. The star command itself starts at the two byte address pointed to by &F2 and &F3. The parameters after the command may be accessed by indexing the value held at location &80 with the command start location.

Also, remember there has to be a &FF byte at the end of the table so the program knows when to finish searching for a particular command. You can also put your command in the *HELP interception table, which is located at lines 3860 to 3920. The format of the table is:

<command string> <&OD>

The table is terminated with a &FF byte. To invoke the *HELP command just type *HELP EXTENSIONS.

The standard operating system calls are used, though you might be puzzled by the &DF8D call that appears a few times in the program. This is only OSCLI in disguise, as it is a direct call (shock, horror). This is used because OSCLI stores the X and Y registers at location &F2 and &F3. These locations should not be corrupted as they are used already within the program to store the location of the star command.

To use the program first set the Basic variable PAGE to equal &1DOO. This is most important because the program overwrites the standard disk Basic program area. Then type in the program as shown in the listing. I advise you to save it immediately.

Once you have saved it type RUN, and providing you have set PAGE properly the program will save two files to disk or tape. The first program in the listing contains the utility routines themselves. The second is the initialisation program. This loads up the main program and runs it. To run the tape version type *RUN!BOOT, or on disk Shift-Break.

There will be no noticeable change when the program has loaded, so when the computer returns from loading do a Break or Ctrl Break. You will see the usual display except for the word EXTENSIONS which will appear after the BBC Computer 32K message. The only change you might have to make in the program itself is at line 60. If you have a disk system the line does not have to be changed. If yours is a tape system line 60 has to be changed to:

```
60 PAGE%=&E00
```

This ensures that the minimum of memory is taken up by the program. In fact disk users could set the PAGE% variable to &1100, and save the program to tape. It would ensure maximum memory conservation, although I do not think APPEND would work. But then you would have more memory to do Mode 1 dumps in if the graphics were generated by Basic.

Listing 1

```
  10REM STAR COMMAND EXTENSIONS
  20REM (C) STEPHEN GRIGG 1984
  30REM THIS PROGRAM GIVES THREE NEW
  40REM COMMANDS: APPEND,GDUMP,TAB
  50REM AND *HELP INTERSEPTION
  60page%=&1900
  70FOR NC=0TO3 STEP3
  80P%=page%
  90[OPT NC
 100.oscli STX &F2
 110STY &F3 ¢SAVE START OF *COMMAND
 120LDX #255
 130.RESET LDY #0
 140LDA (&F2),Y
 150CMP #ASC"*"
 160BEQ L9
 170DEY
 180.L9 INY
 190INX ¢START OFF Y AT ONE TO MISS *
 200LDA TABLE,X
 210CMP #13
 220BEQ MATCH
 230CMP (&F2),Y
 240BEQ L9
 250¢ COMMAND HAS NOT MATCHED
 260CMP #255
 270BEQ listend
 280.L2 INX
 290LDA TABLE,X
 300CMP #13
 310BNE L2 ¢FIND END OF COMMAND
 320LDA (&F2),Y
 330INY
 340CMP #ASC"."
 350BEQ MATCH
 360INX
 370INX
 380JMP RESET ¢SKIP ADDRESS BYTES AND L
OOK AT NEXT COMMAND
 390.listend LDA #13
 400LDY #2
 410JSR &FFF4 ¢KILL KEYBOARD EVENT SO C
OMMANDS USING TAB WORK
 420JSR &DF8D
 430LDA #14
 440LDX #2
 450JMP &FFF4
 460.MATCH STY &80 ¢STORE INDEX SO OTHE
R ROUTINES CAN FIND REST OF COMMAND
 470¢GET ADDRESS BYTE AND JUMP TO IT
 480LDA TABLE+1,X
 490STA &70
 500LDA TABLE+2,X
 510STA &71
 520JMP (&70)
 530¢THIS IS THE TABLE WITH COMMAND
 540¢TERMINATED WITH &00
 550¢FOLLOWED BY ADDRESS
 560¢WITH &FF BYTE AT END OF TABLE
 570.TABLE EQUS "APPEND"
 580EQUB 13
 590EQUW APPEND
 600EQUS "GDUMP"
 610EQUB 13
 620EQUW GDUMP
 630EQUS "TAB"
 640EQUB 13
 650EQUW TAB
 660EQUS "HELP"
 670EQUB 13
 680EQUW HELP
 690EQUB 255
 700.BREAK BCC first
 710LDY #255
 720.MELP INY
 730LDA MESS,Y
 740JSR &FFEE
 750CMP #13
 760BNE MELP
 770LDA #10
 780JSR &FFEE
 790JSR &FFEE
 800LDA #oscli MOD 256
 810STA &208
 820LDA #oscli DIV 256
 830STA &209
 840LDA #EVENTV MOD 256
 850STA &220
 860LDA #EVENTV DIV 256
 870STA &221
 880LDA #WRCH MOD 256
 890STA &20E
 900LDA #WRCH DIV 256
 910STA &20F
 920LDX #(page%+1024) DIV 256
 930LDY #0
 940LDA #180
 950JSR &FFF4
 960LDA #14
 970LDX #2
 980JMP &FFF4
 990.first RTS
1000.MESS EQUS "EXTENSIONS"
1010EQUB 13
1020.APPEND LDA &F2
1030STA &72
1040LDA &F3
1050STA &73
1060CLC
1070LDA &72
1080ADC &80
1090STA &72 ¢ADD INDEX TO GET TO FILENA
ME
1100BCC CARRES
1110INC &73
1120¢CHECK FOR SPACES BEFORE FILENAME
1130.CARRES LDY #0
1140.L1 LDA (&72),Y
1150CMP #13
1160BEQ NULL
1170CMP #32
1180BNE FINDPAGE
1190INY
1200JMP L1
1210.NULL BRK
1220EQUB 220
1230EQUS "Syntax: APPEND <fsp>"
1240EQUB 0
1250.FINDPAGE LDA &13
1260STA &71
1270LDA &12
1280STA &70
1290DEC
1300SBC #2
1310STA &78
1320BCS NOCARRY2
1330DEC &71
1340.NOCARRY2
1350¢ SET UP CONTROL BLOCK FOR LOAD
1360LDA &70
1370STA &74 ¢STORE
```

▶ 15

Is the Information Revolution Passing You By?

If you use an Apple, IBM, BBC or ACT micro then you could be missing out on the information revolution of the decade. Today there are literally hundreds of databases worldwide, which can be accessed by a microcomputer fitted with a Nightingale modem and using appropriate software. These data bases include Prestel, Micronet, Homelink, Telecom Gold, various 'Bulletin Boards' and massive American Databases such as 'DIALOG' and 'The Source'. Micros can also be used to send telex messages.

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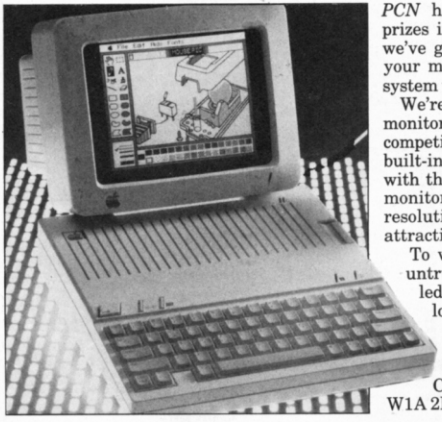
Listing 2

```
13◀
1380LDA &71
1390STA &75 ¢TOP IN DATA BLOCK
1400LDA #0
1410STA &76
1420STA &77 ¢RESET OTHER DATA BYTES SO
1430STA &78
1440STA &79 ¢RELOAD ADDRESS IS TAKEN FR
OM DATA BLOCK
1450LDX #&72
1460LDY #0 ¢TELL *LOAD WHERE DATA BLOCK
IS
1470LDA #255
1480JMP &FFDD ¢CALL *LOAD
1490.GDUMP LDA #2
1500JSR &FFEE
1510JSR SETUP
1520LDA #0
1530STA &75
1540LDA #0
1550STA &70
1560LDA #0
1570STA &71
1580LDA #1080MOD256
1590STA &72
1600LDA #1080DIV256
1610STA &73
1620.read LDY #0
1630.LOOP TYA
1640PHA
1650LDX #&70
1660LDY #0
1670LDA #9
1680JSR &FFF1
1690LDA &74
1700CMP #255
1710BEQ XZERO
1720CMP #0
1730CLC
1740BEQ NO_PIXEL
1750SEC
1760.NO_PIXEL ROR &75
1770PLA
1780TAY
1790JSR INCY
1800DEY
1810BNE LOOP
1820BIT 255
1830BMI ESCAPE
1840LDX #3
1850.SIZE LDA #1
1860JSR &FFEE
1870LDA &75
1880JSR &FFEE
1890DEX
1900BNE SIZE
1910JSR DECY16
1920JSR INCX
1930JMP read
1940.XZERO PLA
1950JSR lineup
1960LDA #0
1970STA &70
1980STA &71
1990JSR DECY16
2000LDA &73
2010CMP #255
2020BNE read
2030.ESCAPE LDA #1
2040JSR &FFEE
2050LDA #27
2060JSR &FFEE
2070LDA #1
2080JSR &FFEE
2090LDA #65
2100JSR &FFEE
2110LDA #1
2120JSR &FFEE
2130LDA #12
2140JSR &FFEE
2150LDA #3
2160JMP &FFEE
2170.DECY16 SEC
2180LDA &72
2190SBC #16
2200STA &72
2210BCC C2
2220RTS
2230.C2 DEC &73
2240RTS
2250.INCY CLC
2260LDA &72
2270ADC #2
2280STA &72
2290BCS L3
2300RTS
2310.L3 INC &73
2320RTS
2330.INCX CLC
2340LDA &70
2350ADC #4
2360STA &70
2370BCS L4
2380RTS
2390.L4 INC &71.
2400RTS
2410.SETUP LDX #0
2420.SELP LDA UPDAT,X
2430TAY
2440LDA #1
2450JSR &FFEE
2460TYA
2470JSR &FFEE
2480INX
2490CPX #3
2500BNE SELP
2510.lineup LDX #0
2520.LILP LDA LIDAT,X
2530TAY
2540LDA #1
2550JSR &FFEE
2560TYA
2570JSR &FFEE
2580INX
2590CPX #5
2600BNE LILP
2610RTS
2620.UPDAT EQUB 27
2630EQUB 65
2640EQUB 8
2650.LIDAT EQUB 10
2660EQUB 27
2670EQUB 76
2680EQUB 192
2690EQUB 3
2700.TAB LDA #BUF MOD 256
2710STA &70
2720LDA #BUF DIV 256
2730STA &71
2740LDY &355
2750.LOA &C3EF,Y
2760STA &72
2770LDY #0
2780.LOOP STA BUF,Y
2790INY
2800CPY &72
2810BNE LOOP
2820LDA #32
2830STA &73
2840LDA #127
2850STA &74
2860LDX #&70
2870LDY #0
2880JSR &FFF1
2890.LOA #BUF DIV 256
2900STA BUF,Y
2910LDA #32
2920STA BUF,Y
2930.EVENTV CPY #9
2940BEQ TABCODE
2950RTS
2960.TABCODE PHA
2970TYA
2980PHA
2990TXA
3000PHA
3010PHP
3020LDA #138
3030LDX #0
3040LDY #32
3050JSR &FFF4
3060LDY &355
3070LDA &C3EF,Y
3080STA &72
3090LDX &310
3100CPX &72
3110BEQ ret
3120INX
3130STX &70
3140.TB2 LDA BUF,X
3150CMP #32
3160BNE TB2
3170LDA #138
3180LDX #0
3190LDY #32
3200JSR &FFF4
3210SEI
3220INC &70
3230LDX &70
3240CPX &72
3250BNE TB2
3260.ret LDA #1
3270STA &81
3280PLP
3290PLA
3300TAX
3310PLA
3320TAY
3330PLA
3340RTS
3350.WRCH CMP #9
3360BNE DOIT
3370LDA &81
3380CMP #0
3390BEQ DOIT2
3400LDA #0
3410STA &81
3420RTS
3430.DOIT2 LDA #9
3440.DOIT JMP 57508
3450.HELP LDY &00
3460LDA (&F2),Y
3470CMP #13
3480BEQ HELP2
3490LDY &00
3500.HLP2 LDA (&F2),Y
3510CMP "ASC"E"
3520BEQ YES
3530INY
3540CMP #13
3550BNE HLP2
3560JMP &DF8D
3570.YES JSR ID
3580LDY #0
3590.HLP3 LDA #10
3600JSR &FFEE
3610LDA #32
3620JSR &FFEE
3630JSR &FFEE
3640.HLP4 LDA HLPMES,Y
3650CMP #255
3660BEQ EXIT
3670JSR &FFEE
3680INY
3690CMP #13
3700BNE HLP4
3710JMP HLP3
3720.EXIT JMP &DF8D
3730.ID LDA #10
3740JSR &FFEE
3750LDY #0
3760.MLP LDA MESS,Y
3770JSR &FFEE
3780INY
3790CMP #13
3800BNE MLP
3810RTS
3820.HELP2 JSR ID
3830LDA #10
3840JSR &FFEE
3850JMP &DF8D
3860.HLPMES EQUS "APPEND (fsp)"
3870EQUB 13
3880EQUS "GDUMP"
3890EQUB 13
3900EQUS "TAB"
3910EQUB 13
3920EQUB 255
3930.BUF
3940]
3950NEXT
3960FOR NX=0TO3 STEP3
3970P%=&900
3980[OPT NX
3990LDX #(page%+1024) DIV 256
4000LDY #0
4010LDA #100
4020JSR &FFF4
4030LDA #EVENTV MOD 256
4040STA &220
4050LDA #EVENTV DIV 256
4060STA &221
4070LDA #&4C
4080STA &227
4090LDA #BREAK MOD 256
4100STA &220
4110LDA #BREAK DIV 256
4120STA &221
4130¢ SET UP CONTROL BLOCK FOR LOAD
4140LDA #14
4150LDX #2
4160JSR &FFF4
4170LDA #FILE MOD 256
4180STA &72
4190LDA #FILE DIV 256
4200STA &73
4210LDA #page% MOD 256
4220STA &74
4230LDA #page% DIV 256
4240STA &75
4250LDA #0
4260STA &76
4270STA &77 ¢RESET OTHER DATA BYTES SO
4280STA &78
4290STA &79 ¢RELOAD ADDRESS IS TAKEN FR
OM DATA BLOCK
4300LDX #&72
4310LDY #0 ¢TELL *LOAD WHERE DATA BLOCK
IS
4320LDA #255
4330JMP &FFDD
4340.FILE EQUS "EXTEND"
4350EQUB 13
4360]
4370NEXT
4380*S. !BOOT 900 955
4390OSCLI"S. EXTEND "+STR$~page%+" "+ST
R$~(page%+1024)
4400IF page%<>&1900 THEN END
4410*OPT 4 2
4420*A. !BOOT L
4430*A. EXTEND L
```

COMPETITION

TAKE A BITE OF THIS APPLE!



PCN has offered some great competition prizes in the last few weeks, but this time we've got something that will really make your mouth water — a complete Apple IIc system worth more than £1,000.

We're giving away a IIc, monitor and monitor stand to the winner of this free competition. The IIc features 128K of RAM, a built-in 5.25in disk drive and is compatible with the wide range of Apple software. The monitor is a green screen, 80-column high-resolution unit and the whole set-up forms an attractive and compact system.

To win, all you have to do is prove the untruth of that old adage, a little knowledge is a dangerous thing. All we're looking for is a little knowledge of Apple Computer. Just answer the questions below and send off the entry form to: Personal Computer News, Apple Competition, 62 Oxford Street, London W1A 2HG to reach us by Friday, December 7.

Entry Form

1 Name the two Steves who founded Apple Computer .....

2 Name the little brother of Apple's innovative Lisa .....

3 Which main processor is used in Apple's II series .....

4 The 'e' in IIe stood for enhanced. What does the 'c' in IIc stand for? .....

Name .....

Address .....

.....

Current machine owned .....

I do/do not wish my name to be included on mailing lists.

The competition is not open to employees of VNU, Quickset, Chase, or Apple Computers. The judges' decision is final. No correspondence will be entered in to.

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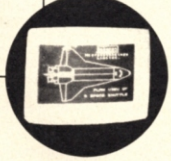

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CHECKMATE

The Chess column is a new feature of Output for all you dedicated pawn movers. Once a month we shall tune to the latest moves in the chess world. Our expert Tony Harrington begins with an exclusive review of Psion's 3-D chess microdrive cartridge for the QL.

For some time now we've all grown used to see even the best home computer chess programs trailing helplessly behind dedicated machines in competitions. But now Psion has produced a chess program for the QL that looks as though it could close the gap.

The *Psion Chess* program (running on an 8MHZ Sage computer) shared joint first place with three dedicated chess computers at this year's World Microcomputer Championship, in Glasgow, in September. But how could a program designed for a home computer compete with the best of the dedicated chess machines?

Dedicated machine manufacturers like Fidelity, Hegener and Glazer not only have the advantage of being able to build their hardware specifically to suit their programs, they also have the financial muscle to spend on research and development.

Richard Lang, the author of *Psion Chess*, has several programs for both the Spectrum and the Dragon to his credit, but it was still a puzzle how he managed to produce a program that was so much stronger than Bryant's colossus.

The answer became obvious when I stepped inside Psion's workshop and saw Lang sitting in front of three screens and an open QL with an interface card to a VAX 11780 coming out one end of it. The old amateurish approach to program development where the programmer spends weeks hunched over his home computer patiently hunting down bugs in his algorithms are over.

3-D approach

The 3-D approach to the board takes a while to get used to but the effect is great. The Psion design team reckon that they spent hours at a chess board checking it out.

Replaying a completed game on Psion Chess is a treat. You can replay a game as often as you please without worrying about misreading a move off the scoresheet.

Performance

Because they don't have a purpose-built piece of hardware at their disposal, Lang and Psion have to fit in with the QL's usual way of doing things, and there is a price to be paid for this. Although it has the same clock speed as the Sage, Lang's program is slower by a factor of three on the QL.

So just how good is Psion Chess as marketed? Someone of a cynical turn of mind might point out that while running on the Sage at Glasgow, the program had extremely lucky escapes from lost positions: one notable instance being when it was hopelessly down against the Fidelity Elegance.

On the other hand, Psion scored a very good victory over the Conchess machine Princhess, which didn't lose to any of its rival dedicated machines in the tournament and ended up with five points, a share of first place and the title of World Champion commercial machine. Beating the 1984 World Champion DCM can't be bad.

Our review copy was a pre-release version and testing is still going on but the results so far are encouraging. I tend to believe that people who buy chess programs don't want to sit around for long periods wating for the program to move. So competition performances at two minutes a move are not really the key issue.

Psion's chess program in action. It stood up well against its competitors.

Up until the last month or so, during which Conchess, SciSys, Fidelity, Hegener and Glazer all revealed new, more powerful machines, the machine which played the best lightning chess was undoubtedly the Novag Super Constellation. This machine has taken the scalps of several players of International Master standard during blitz competitions, and the other DCMs still have to prove themselves against it. So it seemed logical to pit Psion against the Novag machine. The first point to make is that the Super C has very little difficulty whipping Psion at the blitz level (Psion's level three, which at six seconds a move is actually four seconds a move too fast for blitz chess). The Super C won five games in a row quite convincingly and looked like it would keep doing so for ever. So I experimented by taking Psion up through some of the other levels while still keeping the Super C on its blitz level.

If that sounds unfair, remember that very few casual chess players can beat the Novag machine at this level, no matter how long they ponder. You have to be at least a strong club player to have a chance. On level seven, which is theoretically a move a minute, but in practise seems to be a bit faster than that, Psion began to achieve drawn positions against the Super C, a fact which speaks very well for its playing strength.

As to its features, it has almost all the standard facilities that one expects from a chess program. There are fourteen 'levels' going from novice to infinite time, and eight problems solving levels, with mate in eight being the absolute upper limit.

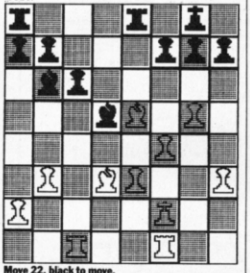
The QL printer can be used to dump board positions or to print out a running (or complete) game score, and there are the usual analysis, hint, takeback and replay facilities. The expected market price will be £19.95, and the program comes with a good well written manual.

The North American Computer Chess Championship has produced an astonishing result. Fidelity achieved second place with a souped up version of its Elegance program, behind the Cray Blitz. This is the best result ever by a microcomputer based program. David Levy's game this month comes from this event.

Annotated by John Nunn

'The ability to play the endgame well distinguishes the master from the amateur' is an old chess aphorism. Until recently chess programs have suffered from poor endgame play, even while their middlegame play has been improving rapidly.

Judging from the Glasgow World Microcomputer Championships, this problem is now well on the way to being solved. There were several interesting endgames which were constructively played by both sides. Here is one of the best.



Move 22, black to move.

Psion Chess is White and Princhess X is Black. We take up the story with Black about to make his 22nd move.

22	...	**Bb6xe3+?**

Black's well placed bishop at d5 gives him an edge, which could have been maintained by 22 . . . Ra8–d8, but he is lured into a tempting combination which misfires.

23	**Kf2xe3**	**f7–f6**
24	**g5xf6**	**g7xf6**
25	**Rf1–g1+**	**Kg8–h8!**

The best move. 25 . . . Kg8–f7 26 Bd3xh7 f6xe5 27 Bh7–g6+ would have lost at once, while 25 . . . Kg8–f8 26 Rc1–f1! f6xe5 27 f4xe5+ Kf8–e7 28 Bd3xh7 gives White a useful extra pawn.

26	**Rg1–g5!**	

There is a bewildering array of pins on the lines e8–e3 and e5–h8, but White finds the best move.

26	...	**Re8xe5+**

26 . . . f6xe5 27 f4xe5 is worse since White's rook remains in command of the g-file.

27	**Rg5xe5**	**f6xe5**
28	**f4xe5**	

The dust has cleared and we can see that White's problems are behind him; indeed Black must take care lest the passed e-pawn becomes a real menace to him.

28	...	**Ra8–g8!**
29	**Bd3–f5**	**a7–a5**
30	**h3–h4**	**Rg8–g3+**
31	**Ke3–f4**	**Rg3–f3+**
32	**Kf4–g5**	**a5–a4?**

A very poor move. After 32...Kh8–g7! bringing the king into the game Black can draw with ease.

33	**b3xa4**	**Bd5xa2**
34	**h4–h5**	

Over the next few moves neither program appreciates the importance of allowing the White king to reach f6, supporting the advance of the e-pawn. Here 34 Kg5–f6 Ba2–d5 35 Rc1–d1 would have won immediately.

34	...	**Rf3–g3+**

Black misses his last chance to bring the king to g7.

35	**Kg5–f6**	**Rg3–g8**
36	**h5–h6?**	

36 e5–e6 Rg8–f8+ 37 Kf6–e5 would have won. Now Black gets a new lease of life.

36	...	**Rg8–f8+**
37	**Kf6–g5**	**Rf8–g8+**
38	**Kg5–f4**	**Rg8–a8?**

38...Rg8–f8! pinning the bishop and threatening 39...Ba2–e6 might have drawn. Now all is well again for White and Psion Chess winds up efficiently.

39	**Bf5–c2**	**c6–c5**
40	**Bc2–e4**	**Ra8–a5**
41	**Kf4–f5**	**b7–b6**
42	**Rc1–d1**	**Ba2–g8**
43	**Rd1–d8**	**c5–c4**
44	**Bd5–c6**	**c4–c3**
45	**Bc6–b5**	**Ra5xb5**

Forced, as 45...c3–c2 46 Bb5–c4 c2–c1=Q 47 Rc8xg8 is mate. The game concluded **46 a4xb5 c3–c2 47 Rd8–c8 c2–c1=Q 48 Rc8xc1 Bg8–f7 49 Rc1–c7 Bf7–e8 50 Rc7–c8 Kh8–g8 51 Kf5–f6 Kg8–f8 52 e5–e6 Kf8–g8 53 Rc8xe8 mate.**

Annotated by David Levy

The following game was played at the 1984 North American Computer Championship in San Francisco. White, 'Intelligent Software Experimental' was running on an Apple II, Black, 'Ostrich' on a system of eight Data General Nova computers. The game illustrates two of the significant problems facing chess programmers.

White	Black
1 Ng1–f3	**e7–e6**
2 d2–d4	**d7–d5**
3 Bc1–f4	**Bf8–d6**
4 Bf4xd6	**Qd8xd6**
5 Nb1–c3	**Nb8–c6**
6 e2–e3	**a7–a6**
7 Bf1–e2	**Ng8–f6**
8 a2–a3	**0–0**
9 Qd1–d3	**Ra8–b8**
10 0–0	**Bc8–d7**
11 Rf1–d1	**b7–b5**
12 Kg1–f1	

A strange move, but one which is typical of a syndrome seen in many computer games. White thinks that it cannot improve on the positions of its Knights, Bishops, Rooks or Queen and it does not have any useful play. So it moves the King!

12	...	**Rb8–e8?!**

(Better was **12**... **Rf8–e8**)

13	**h2–h3**	**e6–e5**

This move loses a pawn, but it requires a 14-ply search to discover this fact. After Black's move White's next two moves are virtually forced, as Black replies, and in the position arising after 15 . . . Re8xe5, it is possible also for White to see the win of the pawn, which is then only 9-ply deep.

I would argue, however, that an intelligent chess program could avoid such 'bad luck' by analysing moves deeply in variations that are forced. This technique would encourage a detailed study of the position arising after 15 . . . Re8xe5.

14	**d4xe5**	**Nc6xe5**
15	**Nf3xe5**	**Re8xe5**

(If 15 . . . Qe6xe5 then 16 Nc3xd5 Nf6xd5, 17 Qd3xd5 Qe5xd5, 18 Rd1xd5)

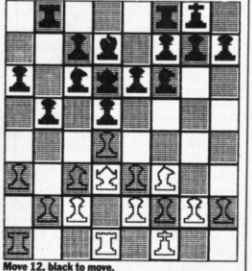
16	**f2–f4!**	**Re5–e6**

Black can try to hold onto the pawn only at the cost of losing even more material.

16	...	**Re5–f5, 17 g2–g4**
17	**Nc3xd5**	**Nf6xd5**
18	**Qd3xd5**	**Re6xe3**
19	**Qd5xd6**	**c7xd6**
20	**Rd1xd6**	**Rf8–e8**
21	**Be2–d3**	**Bd7–c8**
22	**a2–a4!**	

A fine move, emphasising the vulnerability of Black's a–pawn.

22	...	**b5xa4**
23	**Ra1xa4**	**Re3–e6**
24	**Rd6xe6**	**Bc8xe6**
25	**Ra4xa6**	**g7–g6**
26	**c2–c3**	**Re8–b8**
27	**b2–b4**	**Rb8–c8**
28	**Ra6–a3**	**Be6–c4**
29	**Bd3xc4**	**Rc8xc4**
30	**g2–g3**	**Kg8–g7**
31	**Kf1–e2**	**Rc4–e4+**
32	**Ke2–d3**	**Re4–e1**
33	**c3–c4**	**Re1–g1**



Move 12, black to move.

34	**Kd3–d4**	**Rg1–g2**
35	**b4–b5**	**Rg2–h2**
36	**Kd4–e5**	**Rh2–c2**
37	**Ke5–d5**	**Rc2–h2**
38	**g3–g4**	**Kg7–f6**
39	**Ra3–a6+**	**Kf6–g7**
40	**b5–b6**	**Rh2–b3**
41	**h3–h4**	**h7–h5**
42	**g4–g5**	**Rb3–d3+**
43	**Kd5–c5**	**resigns**

Black cannot stop the white queen side pawns from promoting.

GOING IN CIRCLES

If the thought of drawing circles on your Amstrad puts your head in a spin, try these programs from Kenn Garroch and Bryan Skinner.

A Circle command is sadly absent from the Amstrad CPC 464's Locomotive basic. It's easy to write your own simple circle drawing routines in Basic, but most are very slow if you need much detail. However, you can use mathematical principles to produce some really fast Basic circle sub-routines.

Simple circles

Each point of a circle's perimeter can be calculated by the formulae:

x = radius *sin (angle)
y = radius *cos (angle)

Where 'angle' takes on values between 0 and 360, see figure 1. If your micro doesn't support the DEG command, you must convert the angle in degrees to its radian form using angle/57.2957795. For circles whose centre is not at the origin (coordinates (0,0)), an offset must be added to each point:

x = x origin + radius *sin (angle)
y = y origin + radius *cos (angle)

This rather slow basic method of calculating perimeter points can be speeded up by using integer variables. Listing 1 gives a complete simple circle listing.

Faster circles

Circles have certain unique properties which we can exploit to speed up the drawing process. The compass points N, S, E and W don't have to be calculated — they're obvious:

North — (x origin,y origin − radius)
South — (x origin, y origin + radius)
East — (x origin + radius,y origin)
West — (x origin — radius,y origin)

Knowing this saves eight calculations involving SIN and COS, and these functions are time-expensive.

Of more importance here is the fact that a circle can be defined in terms of a single quadrant (quater segment). Once this is done, the other segements are merely reflections of other transitions of the original segment. Figure 2 shows how the calculated coordinates of a point on the perimeter in segment A can be translated to create points in segments B, C and D. Listing 2 is the modified circle drawing routine using this principle, and takes less time than Listing 1.

Even faster

The latest method is the most complex, but allows you to use an extremely fast method of drawing the perimeter. The trade-off is memory — this is a very long program just to draw circles. If your application is time-critical, however, and you're not concerned with memory overheads, you'll want this algorithm.

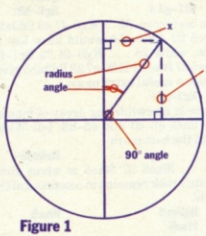


Figure 1

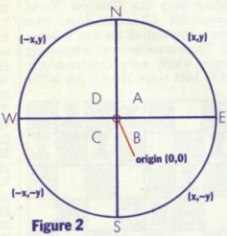


Figure 2

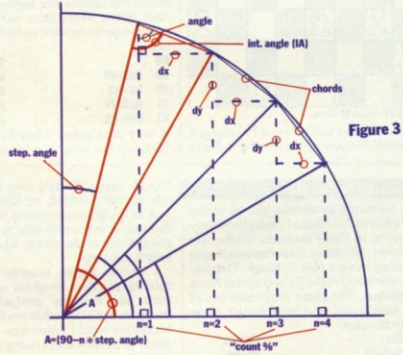


Figure 3

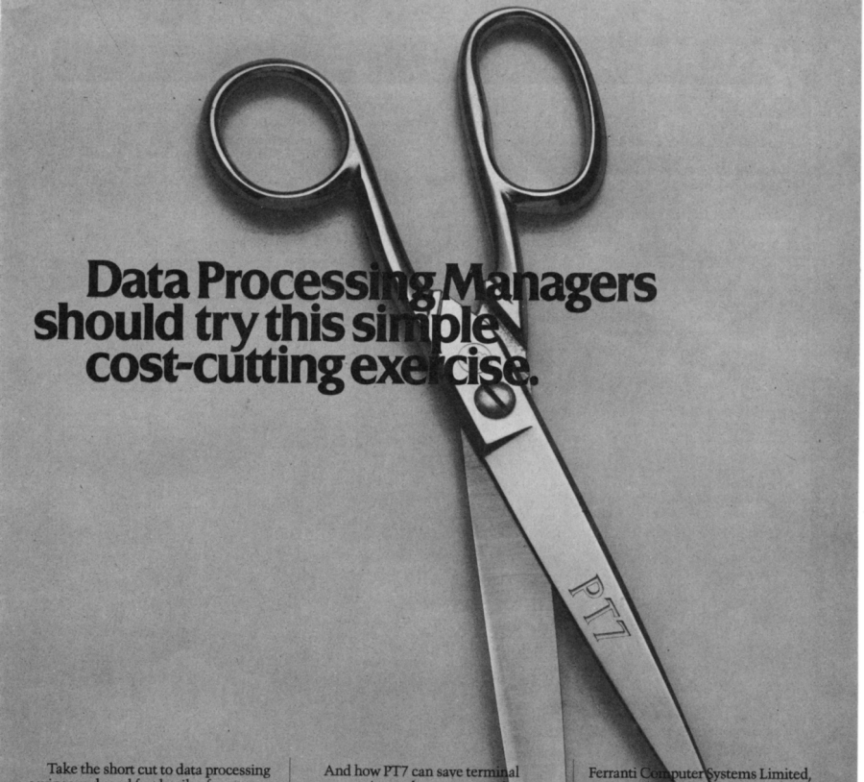
The method doesn't calculate absolute points around a centre like the first two. Given a starting point and a radius, it calculates the set of differential movements required to get from one point on the perimeter to the next, over an arc of 45 degrees. Just as we used the symmetry principle in the second program to generate seven, 45 degree segments, from one.

The algorithm uses the fact that a circle can be considered as a series of straight lines drawn between two points on the perimeter and at right angles to the radius through their mid-point. Provided the number of steps in each segment is large, reasonable circles are drawn. However, as the ratio of the radius to the number of steps increases, so the accuarcy of the shape is reduced.

To use the program as a subroutine you must define a radius as 'radius%', as well as the number of steps to be used in each 90 degree quadrant. This information is held in the integer variable 'no.steps%'. Multiply by four to find out how many steps are used to draw the whole circle. To adapt the routine for use in your own programs you must set the values of 'x origin%' and 'y origin%' too.

Figure 3 shows how the variables used in the routine are calculated. The angle at the base of the segment (marked IA in the figure, represented by 'int.angle' in the program) is given by (18-step.angle)/2. Starting from 0 degrees, the large angle A is given by 90-step.angle. Dropping a perpendicular from the current point on the perimeter to the x-axis allows us to calculate the angle at the top of the triangle ('angle' in the diagram) as 90-n*step.angle, where 'n' is the segment count, 'count%' in the listing.

We can then calculate the relative movement required to reach the next ▶



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point (dx and dy in the diagram), using SIN and COS ad the hypotenuse. The hypotenuse is in fact the chord of the segment, calculated in lines 80 and 90 as (2*PI*radius)/(360/step.angle).

We need only repeat this for angles up to 45 degrees, because after this the dx and dy values are the same for each subsequent segment, though they must be transformed (by swapping dx for dy, or negating dx of dy when plotting).

If your computer doesn't use a relative DRAW command you should be able to adapt the routine to PLOT points, as long as you up date the peri-meter points, as in:

```
FOR count% = 1 TO no.units
xpoint = xpoint + dx%(count%)
ypoint = ypoint + dy%(count%)
PLOT xpoint,ypoint
NEXT
```

Other uses

By changing some of the definitions and calculations, other interesting shapes can be generated by the routine. For example, in lines 160 and 170, where the arrays dx and dy are filled, try swapping the SIN and COS statements. Changing line 140 to angle = step.angle produces a four-point star. Leaving out the minus sign in line 170 also changes the effect.

You should find you can generate many interesting shapes simply by playing around with the basic code. It should be possible to adapt it to produce many polygons other than circles and curved shapes.

Listing 1

```
10 REM Simple circle
20 MODE 1
30 xorig% = 320:yorig% = 200
40 radius% = 100
50 GOSUB 1000
60 END
70 '
1000 DEG
1010 FOR angle% = 1 TO 360
1020 xpoint%=xorig%+radius%*SIN(angle%)
1030 ypoint%=yorig%+radius%*COS(angle%)
1040 PLOT xpoint%,ypoint%
1050 NEXT
```

Listing 2

```
10 DEG:MODE 1:xorig = 320:yorig = 200
20 radius% = 100
30 PLOT xorigin,yorigin - radius%
40 PLOT xorigin,yorigin + radius%
50 PLOT xorigin + radius%,yorigin
60 FOR angle% = 1 TO 89
70 xpoint = radius% * SIN(angle%)
80 ypoint = radius% * COS(angle%)
90 PLOT xorigin+xpoint,yorigin+ypoint
100 PLOT xorigin-xpoint,yorigin+ypoint
110 PLOT xorigin+xpoint,yorigin-ypoint
120 PLOT xorigin-xpoint,yorigin-ypoint
130 NEXT
```

Listing 3

```
10 'Really fast circles
20 'Using eight segments
30 DEG:CLS
40 radius% = 150
50 xorigin% = 320:yorigin% = 200
60 no.steps% = 16
70 step.angle = 90 / no.steps%
80 chord = (radius% * 2 * PI)
90 chord = chord / (360 / step.angle)
100 int.angle = (180 - step.angle) / 2
110 no.units = no.steps% / 2
120 DIM dx(no.units),dy(no.units)
130 FOR count% = 0 TO no.units
140 angle = 90 - count% * step.angle
150 angle = int.angle - angle
160 dx(count%) = chord * COS(angle)
170 dy(count%) = -(chord * SIN(angle))
180 NEXT
190 xpoint = xorigin%
200 ypoint = yorigin% + radius%
210 PLOT xpoint,ypoint
220 ' 0 to 45 degrees
230 FOR count% = 0 TO no.units
240 DRAWR dx(count%),dy(count%)
250 NEXT
260 ' 45 to 90 degrees
270 FOR count% = no.units TO 0 STEP -1
280 DRAWR -dy(count%),-dx(count%)
290 NEXT
300 '90 to 135 degrees
310 FOR count% = 0 TO no.units
320 DRAWR dy(count%),-dx(count%)
330 NEXT
340 '135 to 180 degrees
350 FOR count% = no.units TO 0 STEP -1
360 DRAWR -dx(count%),dy(count%)
370 NEXT
380 '180 to 225 degrees
390 FOR count% = 0 TO no.units
400 DRAWR -dx(count%),-dy(count%)
410 NEXT
420 '225 to 270 degrees
430 FOR count% = no.units TO 0 STEP -1
440 DRAWR dy(count%),dx(count%)
450 NEXT
460 '270 to 315 degrees
470 FOR count% = 0 TO no.units
480 DRAWR -dy(count%),dx(count%)
490 NEXT
500 '315 to 360 degrees
510 FOR count% = no.units TO 0 STEP -1
520 DRAWR dx(count%),-dy(count%)
530 NEXT
540 END
```

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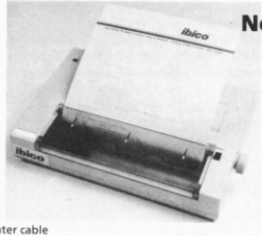

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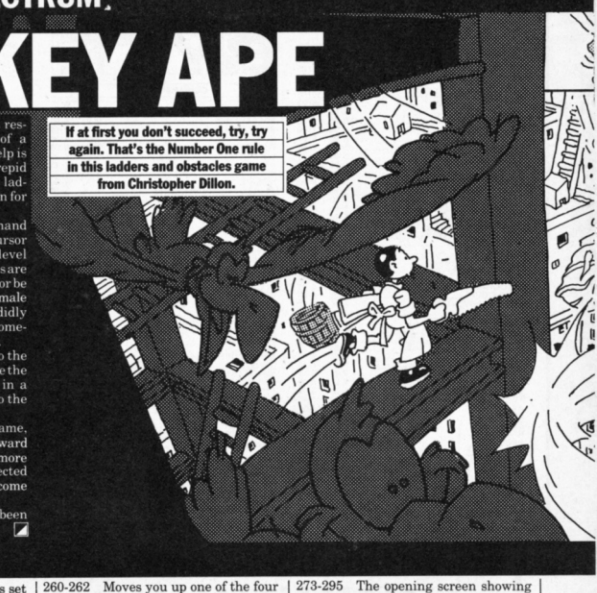
DONKEY APE

If at first you don't succeed, try, try again. That's the Number One rule in this ladders and obstacles game from Christopher Dillon.



A fair damsel urgently requires rescue from the hairy clutch of a barrel-rolling ape. Happily, help is at hand in the form of an intrepid carpenter who climbs girders and ladders to rescue the unwilling stand-in for Fay Wray.

You start off in the bottom left-hand corner of the screen and use the cursor keys to wend your way along each level to the ladders. As you proceed barrels are rolled along the floor — avoid these or be flattened. At the top the hapless female awaits you guarded by a very splendidly coloured ape who obviously has something to do with the rolling barrels.

You bravely struggle your way to the top level only to discover that you are the unfortunate dupe of the ape, and in a flash you are whisked back down to the first level.

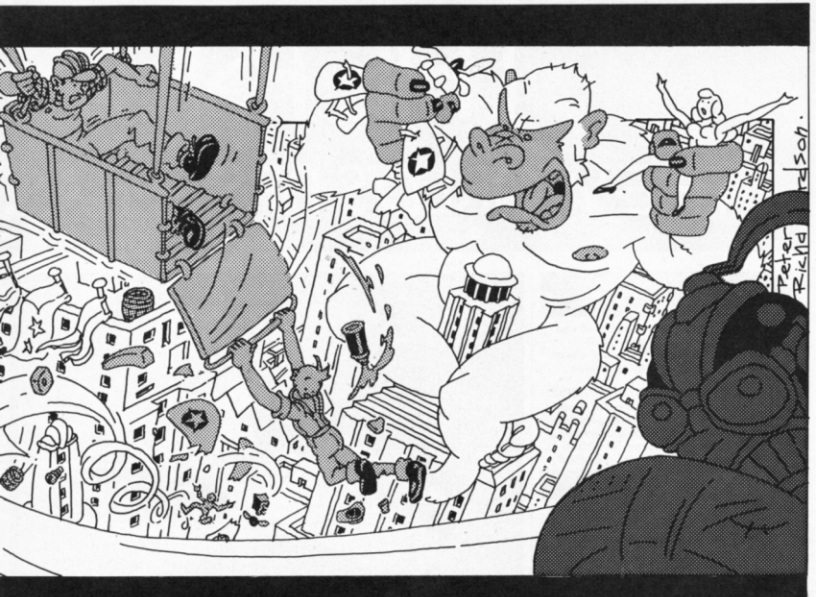
Perseverence is the name of the game, so up you go again. Now your upward manoeuvres have become even more tricky as the ape must have collected fresh ammunition, and the barrels come thick and fast.

A downward cursor key has been omitted for a faster running game.

Program notes

80-150	Set up all variables, a$ is set for the number of barrels	260-262	Moves you up one of the four ladders	273-295	The opening screen showing the cursor controls
200-272	Main game loop	263-264	You hit a barrel	296-402	Data for user defined graphics
254-257	Move the barrels along the different levels	265-268	Make you jump up	405-700	Introduction screen showing the ape
258	Moves you to the right	269	The final jump — you have made it to the fair damsel's position	405-410	Prints ape
259	Moves you to the left			598-700	Data for introduction tune

```
  80 LET s=0: LET l=4
  81 LET a$="
     []
     []
                    "
  90 GO TO 280
 105 LET k=0: LET i=0: LET kk=20
 110 LET uu=20
 115 LET wait=0: LET count=4: LE
T ss=16
 120 LET u=5: LET p=0: LET g=1
 125 LET x=5: LET m=20
 130 LET b$="H": LET c$="I"
 135 LET z$="O": LET g$="P"
 140 LET v=0
 145 LET t$=b$: LET u$=c$
 150 LET vv=12
 160 RESTORE 230
 200 REM ### MAIN LOOP ###
 245 FOR n=1 TO 30
 246 IF m=4 THEN LET uu=4
 249 IF m=8 THEN LET uu=8

 250 IF m=12 THEN LET uu=12
 251 INK 2: IF m=16 THEN LET uu=
16
 252 IF m=12 THEN LET ss=8
 253 IF m=8 THEN LET vv=4
 254 PAPER 0: PRINT AT 4,3;a$(n
TO n+21);AT 8,2;a$((61-n) TO 61+
26-n)
 255 PRINT AT 12,3;a$(n TO n+26)
 256 PRINT AT 16,2;a$((61-n) TO
61+26-n);AT 20,3;a$(n TO 25+n)
 257 BEEP 0.000036,60
 258 IF INKEY$="8" AND x(28 AND
m=kk AND m=uu THEN LET x=x+1: LE
T t$=b$: LET u$=c$: PRINT AT m-1
,x-3;" ": LET s=s+1
 259 IF INKEY$="5" AND x>3 AND m
=kk AND m=uu THEN LET x=x-1: LE
T t$=z$: LET u$=g$: PRINT AT m-1
,x+1;" ": LET s=s+1
 260 INK 1: PRINT AT m,x;u$; INK
5;AT m-1,x;t$

 261 IF x=3 AND INKEY$="7" AND m
>vv THEN LET m=m-1: INK 4: PRINT
 AT m+1,x;"E": LET kk=kk-1
 262 IF x=28 AND INKEY$="7" AND
m>ss THEN LET m=m-1: INK 4: PRIN
T AT m+1,x;"E": LET kk=kk-1
 263 IF SCREEN$ (m,x+1)="]" THEN
 GO TO 3010
 264 IF SCREEN$ (m,x-1)="[" THEN
 GO TO 3010
 265 IF INKEY$="0" AND wait=0 TH
EN LET m=m-1: LET wait=1: BEEP 0
.002,30
 266 IF wait>1 THEN LET count=co
unt-1
 267 IF count<1 THEN LET m=m+1:
LET count=4: LET wait=0: PRINT A
T m-2,x-1;"
 268 IF wait=1 THEN PRINT AT m,x
-1;"
 269 IF SCREEN$ (m-2,x+1)="E" TH
EN GO TO 9000

 270 PRINT AT 0,5;s
 271 NEXT n
 272 GO TO 240
 273 REM ** OPEN SCREEN **
 280 PAPER 0: BORDER 0: INK 7: C
LS
 281 PRINT AT 0,1;"####  #### ##
## ## # #### ## #"
 282 PRINT AT 1,1;"##  # #### ##
## ## # ##  ### #"
 283 PRINT AT 2,1;"##  # ## # ##
# ####  #### ####"
 284 PRINT AT 3,1;"##  # ## # ##
# ###  ##  ## "
 285 PRINT AT 4,1;"####  #### ##
# ## # ####  ##"
 286 PRINT AT 6,9;"#### #### ###
#"
 287 PRINT AT 7,9;"#### #### ##
"
 288 PRINT AT 8,9;"## # ## # ###
#"

 289 PRINT AT 9,9;"#### #### ##"
 290 PRINT AT 10,9;"## # ##   ##
#"
 291 INK 5: PRINT AT 14,8;"[5]LI
FT [8]RIGHT"
 292 PRINT AT 16,9;"[7]UP [9]JUM
P"
 293 INK 4: PRINT AT 21,0;"
    ANY KEY TO START"
 294 PAUSE 0
 295 BEEP 0.05,-10: BEEP 0.01,5:
BEEP 0.01,-5
 296 REM ## USER  GRAPHICS ##
 300 LET e=PEEK 23675+256*PEEK 2
3676
 305 FOR f=e TO e+159
 310 READ c: POKE f,c: NEXT f
 320 DATA 0,1,7,15,31,63,127,255
 330 DATA 60,255,255,255,255,255
,255,255
 340 DATA 0,128,224,240,248,252,
254,255

 350 DATA 145,140,136,128,224,23
1,232,232
 360 DATA 129,129,255,129,129,12
9,255,129
 370 DATA 153,0,60,36,0,255,0,0
 380 DATA 137,49,17,1,7,231,23,2
3
 390 DATA 252,255,252,246,255,25
2,48,120
 391 DATA 124,127,124,196,22,246
,246,135
 392 DATA 224,240,240,248,254,25
5,255,255
```



1000-3000	The screen for the game
1000-1010	The four different levels
1070-1095	The four ladders
1096	Your starting position
2000	Data for the positions of the ladders
2020-2040	Plot the coloured ape in the top right-hand side of the game screen
2045-2087	Draws maiden trapped in her cage
2088-3000	Prints the scores at the top of the screen
3010-4020	You loose a life till you have none left
9000-9140	The game is made harder after reaching the maiden by introducing more barrels

```
 393 DATA 7,15,15,31,127,255,255
,255
 394 DATA 0,197,53,9,201,45,93,2
55
 395 DATA 255,128,140,146,146,14
6,140,128,255,1,145,145,145,145,
157,1
 397 DATA 63,255,63,111,255,63,1
2,30
 398›DATA 62,254,62,125,104,111,
111,225
 399 DATA 255,66,36,24,36,66,255
,0
 400 DATA 0,0,0,0,24,24,60,255
 401 DATA 248,240,192,192,192,22
4,240,248
 402 DATA 31,15,3,3,3,7,15,31
 404 FOR n=12 TO 21: PRINT AT n,
0;"
  ": NEXT n
 405 INK 3: PAPER 0: PRINT AT 12
,15;"ABC"; PAPER 6;AT 13,15;"DFG
"; PAPER 0;AT 14,14;"A"; PAPER 6
;"  K"; PAPER 0;"C";AT 15,13;"A"
; PAPER 6;"S.R.T"; PAPER 0;"C";
PAPER 3; INK 6;AT 16,13;"O"; PAP
ER 0; INK 3;"  "; PAPER 6;"5 T";
PAPER 0;"  "; PAPER 3; INK 6;"O"
 406 PRINT AT 17,14;"P  C"
 410 INK 7: PAPER 0: PRINT AT 18
,6;"HOW HIGH CAN YOU GET ?"

 598 RESTORE 610
 599 FOR x=1 TO 30
 600 READ e,r: BEEP e,r: NEXT x
 601 NEXT x
 610 DATA 0.1,-6,0.1,-5,0.1,-4,0
.1,-3,0.1,-2,0.1,-6,0.1,-5,0.1,-
4,0.1,-3,0.1,-10,0.1,-11,0.1,-12
,0.1,-13,0.1,-12,0.1,-11,0.1,-10
,0.1,-6,0.1,-5,0.1,-4,0.1,-3,0.1
,-3,0.1,-6,0.1,-5,0.1,-4,0.1,-3
 611 DATA 0.1,-12,0.1,-14,0.1,-1
6,0.1,-14,0.1,-12,0.1,-10,0.1,-6
,0.1,-5,0.1,-5,0.1,-4,0.1,-3
 614 PAUSE 10
 700 CLS
1000 REM ### DRAU SCREEN ###
1005 LET v$="000000000000000000000
0000000000000"
1010 FOR n=5 TO 21 STEP 4: PRINT
 AT n,0;v$: NEXT n
1070 RESTORE 2000
1071 INK 4

1075 FOR d=1 TO 4: READ y,x
1080 FOR n=y TO y+2
1085 PRINT AT n,x;"E"
1090 NEXT n
1095 NEXT d
1096 PRINT AT 20,0;"MN";AT 21,0;
"  "; INK 2;AT 19,0;"LL"
2000 DATA 17,26,13,3,9,26,5,3
2010 INK 3: PRINT AT 0,27;"ABC";
AT 4,26;"  ";
2015 PAPER 6: PRINT AT 1,27;"DFG
"
2020 PAPER 0: PRINT AT 2,26;"A";
 PAPER 6;"  K"; PAPER 0;"C"
2025 PLOT 208,152: DRAU 38,0
2030 PAPER 6: PRINT AT 3,26;"  "
;"  "
2035 PLOT 220,150
2040 PLOT 235,150
2045 PAPER 0: INK 7: PRINT AT 3,
19;"000000";AT 2,19;"  ";AT
1,19;"  "

2050 INK 3
2065 PLOT 218,147: DRAU 18,0: PL
OT 218,146: DRAU 18,0: PLOT 218,
145: DRAU 18,0
2070 PLOT 218,144: DRAU 18,0: PL
OT 218,143: DRAU 18,0
2075 PLOT 207,136: DRAU 10,0: PL
OT 207,137: DRAU 10,0: PLOT 209,
136: DRAU 8,0: PLOT 213,139: DRA
U 4,0
2080 PLOT 238,136: DRAU 10,0: PL
OT 238,137: DRAU 10,0: PLOT 238,
138: DRAU 8,0: PLOT 238,139: DRA
U 4,0
2085 INK 2: PAPER 6: PRINT AT 0,
22;"  "; PAPER 0;"  "; INK 6;AT 1,
21;"  "; PAPER 6; INK 0;"  "; INK
2; PAPER 0;"  "; INK 5;AT 2,22;"
  "; INK 0: PLOT 178,167
2086 PAPER 0: INK 2
2087 PLOT 176,161: DRAU 2,0: INK
 7

2088 PRINT AT 0,0;"SCORE";AT 0,5
;AT 0,5;AT 0,13;"  HELP"
2089 PRINT AT 1,0;"LIVES:";AT 1,
6;l
2090 GO TO 95
3010 LET l=l-1
3015 IF l=0 THEN GO TO 4000
3020 CLS : GO TO 405
4000 CLS : INK 7: PRINT AT 10,12
;"GAME OVER"
4010 PAUSE 100
4020 GO TO 80
9000 INK 7: FOR n=0 TO 20: BEEP
0.1,n: LET s=s+10: PRINT AT 0,5;
s: NEXT n
9025 LET a$="                "
                []          []
          []          []
     []          []
[]          []
9030 GO TO 405
9100 REM ## UDC ###
9110 REM A=A B=B C=C D=D E=E F=F

9120›REM G=G H=H I=I J=J K=K L=L
9130 REM M=M N=N O=O P=P Q=Q R=R
9140 REM S=S T=T
```

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Polynomials – solutions of equations
Matrices – solution of matrix equations
Eigenvalues
Integration – under a curve
Curve-fitting – least squares
Statistics – mean
standard deviation
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SOLE SURVIVOR

Key in part two of E H Wilson's dramatic adventure game and see if you have got what it takes to survive in the jungle. Despite injuries and a damaged plane and although help is on the way, our hero is still keen to find the source of that mysterious light . . .

Program notes

380-382 Wave routine. Not a lot of good in this game!

384-404 Cut routine

406-420 Chop routine. A subtle difference between this and cut. This assumes heavy handedness whereas cut implies a degree of skill

422-476 Light routine. Meaning "to set fire to". The command is accepted only when certain conditions are met

478-526 Climb routine

528-538 Attack routine

540-548 Kill routine

550-564 Hit routine

566-626 Make routine. Once your object is made, its position is noted, the raw materials are decremented or hidden and flags are set to ensure that only so many articles are made from the one basic ingredient

628-634 Oil routine. A stuck door may need some lubrication.

636-644 Stab routine

646-664 Throw routine. If the object is neither 4 or 10, it is assumed you are dropping it and flow goes to line 146

666-676 Rub routine

678-688 Read routine

690-724 Examine routine

726-736 Jump routine. Must be in location 29

738-754 Break routine. Boat must be broken to obtain wood

756-764 Posh routine

766-808 Save and Load routine. These call subroutine at 78 to obtain the device number and on the basis of this, open the relevant files to tape or disk. Save prints to the device all object positions, flags, counters, player positions, etc, and Load reads these back in

810-828 Insert routine. In one location, money must inserted in slot and in another a hollow in a stone wall must be jammed with something

830-844 Launch routine

846-854 Say routine

856-874 These sort out any repetitions (which LADder, which COMPass). Judge each input on the basis of position

876 Dimensions all arrays on basis of 84 locations, 39 verbs, and 93 nouns

878-1116 Location descriptions

1118-1134 Data statements holding all directional information.

Listing

```
E   LINE, BUT NO FURTHER UPWARD."
940 P8(20)=P8(19)
942 P8(21)="STANDING NEXT TO THE BUILDIN
G,  WHICH HAS NO VISIBLE JOINTS."
944 P8(21)=P8(21)+" [a T]HE LIGHT  YOU S
AW COMES FROM THE SUN REFLECTING"
946 P8(21)=P8(21)+"   OFF THE SHEER, POL
ISHED SIDES"
948 P8(22)="STANDING NEXT TO A DEEP PIT.
    [a A] RUSTY LADDER DESCENDS INTO THE
 "
950 P8(22)=P8(22)+" GLOOM  OF THE EARTH'
S BOWELS."
952 P8(23)="STANDING AT THE BOTTOM OF TH
E   PIT. [a A] FAINT LIGHT FILTERS DOWN"
954 P8(23)=P8(23)+" FROM THEOPENING FAR
ABOVE."
956 P8(24)="IN A ROOM SMELLING STRONGLY
OF  OIL."
958 P8(25)="AT THE NORTH OF AN EERILY-
LIT CAVERN; THERE IS NO SIGN OF ANY "
960 P8(25)=P8(25)+"FORM OF NORMAL LIGHTI
NG, BUT EVERY DETAIL OF "
962 P8(25)=P8(25)+" THEROUGH-HEWN WALLS
IS STARTLINGLY VISIBLE."
964 P8(26)="ON THE EAST SIDE OF THE CAVE
RN.  [a YOU CAN JUST MAKE OUT A SMALL"
966 P8(26)=P8(26)+" BOX FIXED TO THE WAL
L."
968 P8(27)="ON THE WEST SIDE OF THE CAVE
RN. "
970 P8(28)="AT THE SOUTH END OF THE CAVE
RN. [a A] SIGN ABOVE A SMALL SLOT IN THE
 "
972 P8(28)=P8(28)+" WALL   SAYS[DOWN]
   [PURPLE]Ic O]Ic N]Ic E] Ic F]Ic A]Ic R
 ]Ic T]Ic H]Ic I]Ic N]Ic G] Ic P]Ic L]Ic
 E]Ic A]Ic S]Ic E] Ic 2] "
974 P8(29)="STANDING IN FRONT OF A VAST
   CHASM. [a A] THICK, IMPENETRABLE MIS
T."
976 P8(29)=P8(29)+" BOILS OVER THE RIM O
NTO THE FLOOR AROUND YOUR FEET."
978 P8(30)="ON THE EAST SIDE OF THE CHAS
M."
980 P8(31)="IN A COMPLEX OF TWISTING, NA
RROWTUNNELS."
982 P8(32)=P8(31)
984 P8(33)=P8(31)
986 P8(34)=P8(31)
988 P8(35)=P8(31)
990 P8(36)="AT THE END OF A VAST CORRIDO
R.  [a T]O THE WEST THE EXIT IS OBSCURED
 "
992 P8(36)=P8(36)+"BY A   PLUME OF THIN,
   WHITE MIST RISING OUT OF THE FLOOR."
994 P8(37)="DOWN THE CORRIDOR! THE MIST
   FILLS THE WHOLE WESTERN END."
996 P8(38)="DIRECTLY BEFORE THE PLUME OF
   MIST, AND ARE VERY COLD."
998 P8(39)="AT THE END OF THE CORRIDOR.
[a A]   FLIGHT OF STONE STEPS LEADS DOWN
 "
1000 P8(40)="ABOUT HALFWAY DOWN THE FLIG
HT OFSTAIRS; THE STEPS ARE NOTICABLY "
1002 P8(40)=P8(40)+"WARM.   [DOWN][a A]
CRUDE NOTE IS SCRAWLED ON THE WALL."
1004 P8(41)="AT THE BOTTOM OF THE STEPS.
    [a T]HE WALLS ARE VERY HOT."
1006 P8(42)="IN A CORRIDOR, WITH TUNNELS
   LEADING OFF IN ALL DIRECTIONS."
1008 P8(43)="IN A NARROW CULVERT. [a T]H
E SOUND  OF RUNNING WATER IS JUST DISCER
N"
1010 P8(43)=P8(43)+"ABLE IN THE DISTANCE
 "
1012 P8(44)="IN A VERY NARROW SQUEEZE. [
a T]HE   WALLS ARE TOO HOT TO TOUCH, AND
 "
1014 P8(44)=P8(44)+" THE    WATER RUNNI
NG OVER THEM BOILS AWAY    BEFORE"
1016 P8(44)=P8(44)+" HITTING THE FLOOR."
1018 P8(48)="FACED BY A WIDE LAKE OF BOI
LING WATER. [a I]N THE FAR DISTANCE THE"
1020 P8(48)=P8(48)+" WATER    OVERFLOWS
THROUGH A MASSIVE IRON GRATING"
1022 P8(45)="TO A WIDER CORRIDOR. [a T]O
 THE    SOUTH THE"
1024 P8(45)=P8(45)+" WAY IS BLOCKED BY A
 SOLID WALL."
1026 P8(46)="IN A HUGE STORE-ROOM."
1028 P8(47)="IN A SMALL SIDE ROOM, USED
AT  ONE TIME TO STORE TOOLS."
1030 P8(49)="IN A ROOM ONCE USED TO STOR
E   IRONMONGERY. [a A]LL THE BOXES"
1032 P8(49)=P8(49)+" HAVE ROTTED.
1034 P8(50)="FLOATING NEXT TO THE LAKE'S
   OUTFALL."
1036 P8(51)="EAST OF THE GRATING. [a T]H
E AIR   SEEMS QUITE CHILL HERE."
1038 P8(52)="FLOATING ALONG A NARROW TUN
NEL; SEVERAL PASSAGES LEAD OFF."
1040 P8(56)="STANDING ON A SANDBANK. [a
A] FAINT LIGHT IS JUST VISIBLE IN THE"
1042 P8(56)=P8(56)+" DISTANCE,  AND THE
WATER SHOALS TOWARDS THE NORTH."
1044 P8(57)="STANDING ON A LEDGE OVERLOO
KING A SHEER 1000 FT. DROP. "
1046 P8(55)="AGROUND ON STAGNANT MUD. [a
A]ROUND YOU ARE SHEER ROCK WALLS."
1048 P8(53)="INCREASING SPEED TOWARDS TH
E   SOUND OF RUSHING WATER."
1050 P8(54)="IN THE MIDDLE OF FAST RAPID
S.  [a A]LL AROUND YOU ARE JAGGED ROCKS
 ."
1052 P8(54)=P8(54)+"ANY ONEOF WHICH COUL
D RIP YOUR FRAIL CRAFT TO  SPLINTERS."
1054 P8(58)="AT THE END OF THE LEDGE, WH
ICH HAS PETERED OUT TO NOTHING."
1056 P8(59)=P8(58)
1058 P8(60)="AT THE TOP OF THE CLIFF, ON
   SMOOTH, LEVEL GROUND. [a T]O EITHER
 "
1060 P8(60)=P8(60)+"SIDE THELAND SLOPES
GENTLY AWAY TO THE FOREST   BELOW. "
1062 P8(60)=P8(60)+"[a B]EHIND YOU A THI
N PLUME OF SMOKE RISES FROM A LOW HILL."
1064 P8(61)="STANDING ON THE RIM OF AN A
CTIVEVOLCANO. [a N]O DANGER IS PRESENT,
 "
1066 P8(61)=P8(61)+"BUT IT    WOULD BE UN
WISE TO CONTINUE FURTHER    FORWARD."
1068 P8(62)="[LEFT][LEFT]LEFT][LEFT][LEFT]HAV
E SLIPPED DOWN THE ASH CONE INTO THE VOL
CANO'S MOUTH."
1070 P8(62)=P8(62)+" [a T]HERE IS NO ESC
APE,AND YOU MUST DIE OF STARVATION."
1072 P8(63)="AT THE WEST END OF THE CLIF
F,   WHICH EXTENDS AWAY TO YOUR RIGHT."
1074 P8(64)="AT THE EAST END OF THE CLIF
F,   WHICH EXTENDS AWAY TO YOUR LEFT."
1076 P8(71)=P8(8)
1078 P8(72)=P8(8)
1080 P8(65)="COMPLETELY LOST. [a A] FAIN
T CHINK- ING SOUND IS JUST DISCERNABLE."
1082 P8(66)=P8(65)
1084 P8(67)=P8(65)
1086 P8(68)=P8(65)
1088 P8(69)=P8(65)
1090 P8(73)=P8(65)
1091 P8(74)=P8(65)
1092 P8(75)=P8(8)
1093 P8(78)="IN A SMALL CLEARING. [a A]
```

OUTPUT: COMMODORE 64

The numbers are in pours and represent the locations to which you can travel.

1136-1158 Data statements holding the elements of the array ob$()

1160-1162 Data statements holding the locations of the objects to be read into ob%()

1164-1166 Read data statements

1168-1180 Data statements for the short descriptions of the nouns/objects held in no$()

1182-1188 Data statements for the verbs held in vb$()

1190-1284 Various messages not included in the main body of the program as they would require too many flags and conditional statements

1286-1288 Subroutine which deals with an encounter with object 37

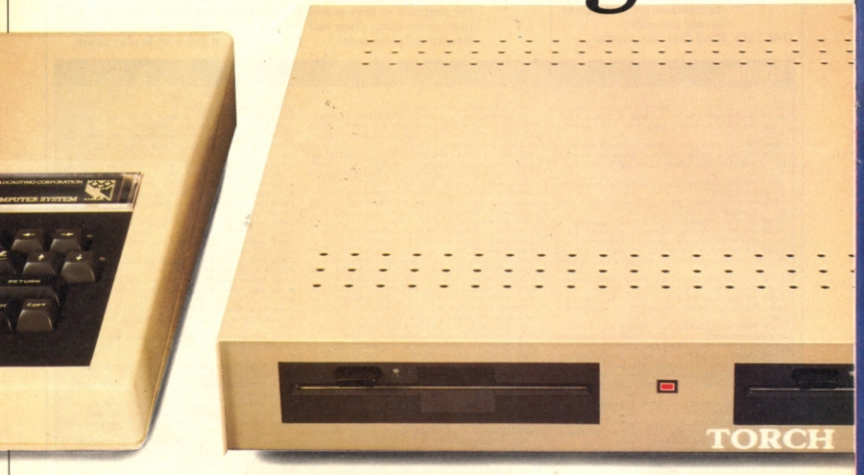
1290-1304 Routine to see if the odds are in your favour and if so, reduces the odds by 10% for the next encounter

1306-1320 The death sequence. Tells you how far you got and asks if you wish to play again

Listing

```
GOLDEN   GRIFFIN IS SEATED TO ONE SIDE,"
1094 P$(78)=P$(78)+" BEHIND A TABLE. In
TIHE SOUND YOU HEARD WAS THE      GRIFFI
N."
1095 P$(78)=P$(78)+"COUNTING HIS MONEY."
1096 P$(76)="LYING ON THE BANK OF A SMAL
L    STREAM. (a YJOUR LUCK HELD OUT AND
."
1097 P$(76)=P$(76)+"YOU WERE ONLY KNOCKE
D UNCONCIOUS."
1098 P$(77)="DOWN BY THE RIVER, ON A WID
E    STRAND OF GOLDEN BEACH."
1099 P$(78)="CONFRONTED BY QUICKSAND."
1100 P$(79)="BOGGED DOWN IN A REEDY MARS
H    WITH NO WAY OUT EXCEPT BACK."
1101 P$(80)="IN AN OPEN, GRASSY PLAIN. (
s TJO THEEAST LIES THE FOREST, WHILE IN
."
1102 P$(80)=P$(80)+"ALL OTHERDIRECTIONS
THE GRASSLAND STRETCHES TO      THE "
1103 P$(80)=P$(80)+"FAR HORIZON. (s AJ T
HIN PLUME OF SMOKE   RISES OVER THE FORES
T."
1104 P$(81)="COMPLETELY ALONE IN A VAST
GRASSLANDSCAPE. (m YJOUR COMPASS APPEARS
."
1105 P$(81)=P$(81)+"TO BE    AFFECTED BY
A NEARBY, RUST-COLOURED HILLAND."
1106 P$(81)=P$(81)+"YOU WANDER AIMLESSLY
. (m OJNLY PURE      CHANCE CAN HELP NOW,
AG
1107 P$(81)=P$(81)+" YOUR STRENGTH   RAP
IDLY DIMINISHES."
1108 P$(82)=P$(81)
1109 P$(83)="BACK IN THE FOREST, MIRACUL
OUSLYSTANDING IN FRONT OF THE."
1110 P$(83)=P$(83)+"BURNT-OUT GAP   IN TH
E HEDGE."
1112 P$(84)="BACK IN THE CLEARING IN WHI
CH    YOU FIRST ARRIVED. "
1113 P$(84)=P$(84)+"CE. (s AJ SALUTORY LE
SSON (s I)'M SURE, AND ONE    WHICH (s
I) THINK "
1114 P$(84)=P$(84)+"YOU'LL NOT EASILY FO
RGET. (s PIERHAPS NEXT TIME YOU'LL BE "
1115 P$(84)=P$(84)+"MORE CAREFUL "+C$+"(
s AINYWAY, HERE'S THE HELICOPTER. "
1116 P$(84)=P$(84)+"                (s CIONGRAT
ULATIONS AND GOODBYE."
1118 DATA,2,4,3,1,,4,3,1,2,4,,,1,2,,3,2,6
,,,9,11,7,8,,18,12,6,,7,6,
1119 DATA8,,11,,7,11,12,11,6,,18,9,7,14,
13,18,,,,12,10,,12,,13,17,,16
1120 DATA,18,15,,,15,,,19,20,16,,,,,18,20
,,,18,19,19,20,18,22,,,
1121 DATA,,,,,,24,,,23,25,24,28,26,27,25,
29,,27,25,29,26,,25,,26,27
1122 DATA,,,,29,,,31,,,30,31,32,31,33,31,3
1,31,31,31,31,34,31,35,31,31
1123 DATA31,,31,31,36,,,,35,37,,,,36,38,,,3
7,,,38,40,,,39,41,,,40,42
1124 DATA43,45,41,,,44,42,,,48,43,,,42,,,
,45,,,47,,,,,46,,,44,,,
1125 DATA51,,,,,,,,,48,,,,52,50,53,55,56,51
,54,52,,,,,,,,52,,,
1126 DATA57,52,,,,56,59,58,,,,57,,,,,57,,,
41,44,43,,60,62,,,,,,,,,
```

The best thing next



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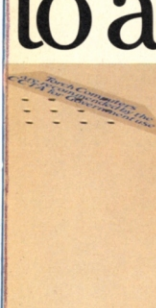

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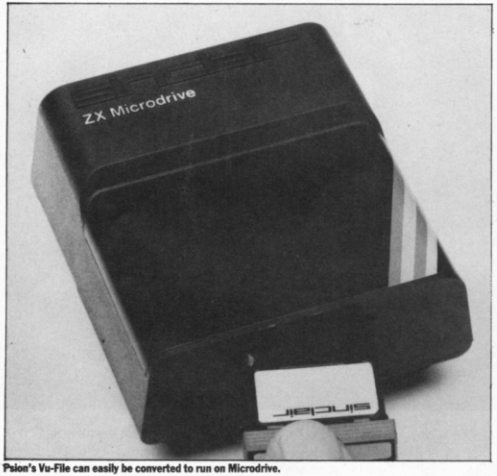
VU FILE UNCHAINED

Getting Vu-File to run with the Sinclair Microdrive is not all that difficult. Carl Lawrenson unlocks the mysteries of this simple conversion that will enable you to run programs at no extra cost.



Psion's Vu-File can easily be converted to run on Microdrive.

Listing 1

```
  50 BORDER 1: PAPER 1: INK 7: CLEAR 25087: LOAD *"m";1;"VU-CODE MD"CODE
 100 DIM f$(32): LET a=29785: GO TO USR 29721
1000 CLS : GO SUB 6000: GO TO USR a
1005 SAVE *"m";1;g$CODE a,l
1100 VERIFY *"m";1;g$CODE
1200 GO TO USR a
2000 CLS : GO SUB 6000
2020 LOAD *"m";1;g$CODE a: GO TO USR a
3000 LPRINT f$( TO 32): GO TO USR a
6000 INPUT g$: LET f$( TO 10)=g$: LET a=CODE f$(11)+256*CODE f$(12): LET l=CODE
f$(13)+256*CODE f$(14): RETURN
```

Listing 2

This is for Kempston Interface S

```
   1 OUT 58303,129: OUT 58303,15: LET a=PEEK 23631: LET b=PEEK 23632: LET c=a+2
56*b+15: POKE c,0: POKE c+1,91
   2 LOAD *"m";1;"hi res"CODE : LOAD *"m";1;"VU-FILE"
```

A growing number of small ads in various micro magazines, *PCN* included, offer programs that allow Psion's Vu-File to operate with the Microdrive. It is actually very easy to convert Vu-File to Microdrive without spending any money. Here's how.

The problem is that the Basic part of Vu-File is too large to fit between the end of the channel area set up by the Microdrive and the start of the machine code.

Fortunately much of the Vu-File Basic contains unnecessary 'frills'. If we remove them, the Basic and one Microdrive channel will sit below the machine code and thus allow Vu-File to use one Microdrive.

Place your bytes

Take a blank Microdrive cartridge and FORMAT it in Drive #1. Now load the Basic part of Vu-File, type MERGE "", which will load it but prevent it from auto-running. LIST the program, and amend it in accordance with listing #1. You must do this exactly as we are grabbing every spare byte here. Note that the normal prompts for loading and saving will not now appear when the program is in use, but you know what you're doing anyway don't you?

Having changed the Basic, you now need to save it to Microdrive. Type:

```
SAVE *"M";1;"RUN"LINE 50
```

and hit ENTER. Now for the machine code, we can forget about the SCREEN$, so wind the cassette past it.

Type LOAD "" CODE to load the code from cassette. When this has loaded, all that remains is to save it to Microdrive. To do this type:

```
SAVE*"M";1;"VU-CODEMD"CODE25088,5640
```

and hit ENTER.

You now have Vu-File on Microdrive. To use it reset the Spectrum, insert the cartridge in drive 1 and press RUN and ENTER.

Kempston interface

If, like me, you use a plain paper printer connected by a Kempston Centronics interface (or similar) then it is a good idea to save the interface software on the same cartridge so that it boots up with Vu-File. Don't incorporate the interface software loading instructions in the Vu-File Basic as it will use up too much memory. Instead write a small loader (call it 'run') which loads the interface software and is then overwritten by Vu-File Basic. My loader is given in listing #2.

If you use this, then remember to save Vu-File Basic as "Vu-File" rather than 'run'.

I hope you find this information useful. But remember, this is intended for you to produce your own Microdrive version of Vu-File. Needless to say, you should not infringe the copyright laws by passing copies to other people.

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SLIPPERY SLOPES

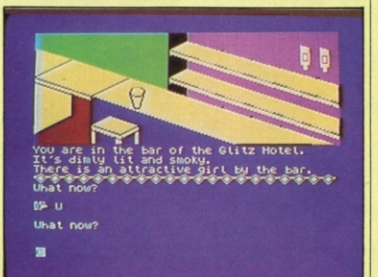
Nasty Nazis are why the Dungeon Master is stuck atop of a ski run. But Mike Gerrard is by no means off the piste.

Valkyrie 17 is the name of the adventure, the RamJam Corporation's first release, in which 'The red kipper flies at midnight' — a phrase whose meaning may be revealed at some point. Valkyrie 17 is a group of ex-Nazis with the simple aim of taking over the world.

They plan to achieve this by manufacturing a super-weapon, to help re-establish the Third Reich. Or will it be the Fourth? Time enough for such questions afterwards. For now you must concentrate on stopping them, bearing in mind that they have already murdered one of yur colleagues.

You have no idea how you hope to foil the fanatics, but some clues are given in an ingenious idea — side one of the cassette contains the program (Spectrum 48K at the moment, Commodore 64 soon), and when this is loaded you flip the tape which then becomes the cassette you find in your Answerphone when you get home. You listen to several breathless messages from a contact, read the accompanying dossier and set off, maybe even wearing the metal badge to get you into the spirit of the game.

If you hadn't spent £9.95 on the adventure, you might have had some cash for a drink in the first location, the bar of the Glitz Hotel. A remark to the woman seated there produces the response 'Id lof a trink, dollink. Unfortunately, trinks cost cash and you have no Grotniks, as the barman reminds you. This location has accompanying graphics in the top half of the screen, as do about half the places you visit: those that don't, have reasonably lengthy text descriptions about the locations.



The bar of the Glitz Hotel: but drinks cost cash.

The graphics are nicely done, although slowly drawn, and the option to switch them off would have been welcome. In some places where you can open things (safes, windows) the picture is redrawn to illustrate this, and altogether there are over 100 places to visit.

Roaming the hotel you find the manager is also after your Grotniks, for he won't let you leave without paying your bill. In the reception area there's a telephone, which sometimes rings with a pleasing double-trill from the Spectrum. Sound is also added to the responses, which scroll up the bottom half of the screen, in the form of a mini-chord which plays to tell you the 'What now?' prompt has appeared.

The responses are rather slow, unfortunately, and a little tidying-up could have been done here, too.

Get knotted

More tidying-up needed in the broom cupboard, where your clothes get covered in dust. Happily, a solicitous chambermaid appears to ask if you've been standing in a broom cupboard, and dusts you off. Could this be one of your mysterious contacts? Sadly, she disappears before you can talk to her. And what of the voices you can hear through the ventilation grille in the laundry room? And what's this . . . sheets in the laundry room? Not allowed out of the front door of the hotel? Looks like the old knotted sheets routine has been programmed into this one.

A full exploration of the hotel is necessary before attempting to flee. However, escaping isn't exactly straightforward. Entering one of the bedrooms reveals a blonde wig and a black silk dress. Can you wear them? Yes, of course, and very fetching you are, too. But I'm not sure that the manager is convinced, for the next time he sees you he offers you his lipstick. And he still won't let you leave.

The adventure has a healthy helping of humour, and I especially liked the swear-word routine, but I'll leave you to discover what that one is. Some of the responses definitely raise a smile, such as the one you get if you try wearing skis and snowshoes at the same time. Skis suggest a ski run, and outside the hotel, if you make it, there is indeed a ski run, but marked 'For experts only.' I'd read the book hidden in the hotel and believed I knew everything about skiing. Skis donned, I issued the fearless command DOWN (having cautiously SAVED first, of course) only to be told my footwear needed attention. This is where I remain, too, after exploring every location in the hotel I could, spoken to everyone I've met, and unsure what it is about my footwear that's wrong. I've donned my show-shoes and tramped across the ravine to the little hut, but that is firmly padlocked.

Most commands are of two words, but you can enter brief sentences, and as well as saving the game to tape you can transfer it to Microdrive. It loads quite quickly from tape, and the loading screen includes a lightning flash effect. RamJam is evidently concerned about software copying, as when the game is loaded you're asked, strictly for their files, if you're using a pirated copy. I'm not sure how many people will be taken in by this and type 'Yes,' but if you do, you get what you get for swearing at the program. My only advice: don't pirate it, buy it.

MOVABLE FEAST

The Zenith Z160 enters the portable-weight class of IBM compatible. From his ring-side seat, Brendin Lewis weighs up the chances of a possible prize-fighter.

The IBM-compatible market is becoming increasingly crowded as more and more companies release new machines. One of the latest is the Zenith Z160, a portable version of the popular Z150 PC. The system boasts 100 per cent IBM compatability and offers twin 5¼in half-height floppy disk drives, four IBM compatible expansion slots, a built-in amber screen, colour graphics, two serial and one parallel ports and up to 640K or RAM. So how does it measure up?

First impressions

My suspicions were first aroused when I set eyes on the package. Too large for a portable, I thought. These suspicions were confirmed as soon as I opened the box and removed the packing material. Grasping the bull by the horns (as it were), I grabbed the large metal handle. I braced myself and heaved the system onto the desk.

Someone really should redefine the word 'portable'. This system is not so much portable as 'movable'. In appearance, it resembles a large 'ghetto blaster', mainly because of the carrying handle (which also doubles up as a tilt support for the whole unit once it's on the desk).

As usual with this type of system, nothing is visible from outside except the rear-mounted connectors and, of course, the clips. This machine has six; the two on the front disengage the keyboard while the two on top don't seem to do very much except act as a dust cover for the gap between the disk drive assembly and the rest of the unit. Flicking the final two clips gives the best surprise of all — the disk assembly pops up almost toaster fashion to reveal the two drives. These spring loaded drives are held down, (yes down), by two pegs. When the assembly is up it can be further raised, for removal, by releasing them. Also inside are two small compartments which house the keyboard and mains cables. One of these is just a gap beside the disk drives; the other is on the front, covered by a sliding door which also hides the brightness control for the monitor.

The keyboard has the standard 84 key IBM layout. This includes ten function keys, alphanumeric keys and the dual mode numeric keypad which also doubles up as a set of cursor and text movement keys. The swap from one to another is carried out by the use of a key marked 'Num Lck'.

One possible problem is the large gap between the keys and the case. All sorts of things could get lodged inside. The keyboard is connected to the rest of the unit by a spiral cable with five pin DIN plugs at each end. Incidentally, it's the highest quality keyboard cable I've come across.

The Zenith Z160 is more of a movable desk top machine than a portable. Note the brown screen which is comfortable to use for long periods.

The disk drives 'pop-up' from the top of the machine and are supported by two 'bed springs'.

Documentation

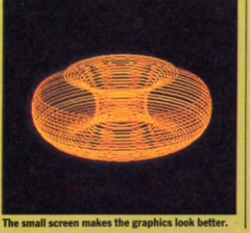
Though not as voluminous as the manuals supplied with the Z100 system (which consisted of seven ring-bound volumes), the two boxed manuals included with this system are of the same high quality. The first, and larger of the two, is the standard MSDOS v.20 documentation. This covers all aspects of the operating system including both the built-in and the disk-based utilities.

The second, and initially the more important, is the operators manual. It has three main headings: hardware, operation, and general service. The hardware section contains specifications, internal switch settings, motherboard and expansion slot information, and a small section on both floppy and hard disks. Operations takes you through the commonly used MSDOS commands, plus basic information on system set-up and configuration of the various I/O ports. The final section, general service, discusses internal diagnostics and diagrams on how to open the system up for PC board replacement. Another nice feature is a table of simple questions and answers for the user to work through when the system fails.

Only two other points dealing with documentation are worthy of a mention — the tiny manual dealing with the differences between Z160 (movable) and the Z150 (standard) PC designs. Last, but by no means least, are the all important licence agreements.

Hardware

Opening up the system is simplicity



The small screen makes the graphics look better.

itself. Simply remove the disk drive assembly, undo four screws and the top of the case lifts off revealing the interior. The unit is split into three main sections: monitor and video driver board; power supply with an built-in cooling fan; and the mother board and main printed circuit boards (PCBs). Access to all sections is good, except to the video driver board, which is mounted horizontally below the monitor tube. It could have been mounted vertically to one side of the tube, as there appears to be enough space.

The power supply, which looks very safe, is totally enclosed in a metal case. The mains socket, switch and voltage selector are mounted directly into the power supply which again increases safety.

The 'business end' of the system is the main PCBs which plug directly into the mother board. The eight sockets on the mother board are all IBM PC XT compatible and may be extended by fitting an expansion chassis. Four boards make up the basic system — the floppy disk controller, the video controller, the cpu board, and one memory board.

The standard ststem comes with 128K of RAM, but the review model had the full complement of 640K on two boards. One connector is mounted to each of the memory boards. These, like all the rear mounted connectors, are unmarked, unfortunately. They are 25-way D-type connectors, configured as a standard Centronics parallel printer port. If the machine can drive two separate parallel printers (one from each board), it has definite word processing applications. A fast draft printer could be connected to one port, while a slower letter quality printer would be connected to the other.

The cpu board contains the 8088 microprocessor with an empty socket beside it for the 8087 coprocessor. An interesting feature is the six diagnostic LEDs mounted on it. These would be used when system failure prevents built-in diagnostics from operating. The LEDs, when lit, indicate a failure in one or more of the following sections: cpu, ROM, RAM, interrupts, and disks. The final LED is the ready or working indicator. The connectors mounted on this board are externally, a five pin DIN socket for the keyboard and internally, the 2in 8Ohm speaker.

The video board uses the ubiquitous 6845 video chip offering a versatile video interface for any user. Seven video modes are available, four are text and three are graphics offering different colour/monochrome/resolution combinations. The graphics modes, as so often is the case, correspond with the pixel resolution of the text in a given mode. For example, medium would be =40*25=320*200 and in high it is 80*25=640*200.

The keyboard cable and the controls for the screen are hidden behind a sliding panel.

Text on the screen conforms with the IBM character set, though this can be altered by changing the position of a jumper on the board. Other characteristics of the video can also be changed by swapping around another set of jumpers. These include syncronisation signals for both external video monitors and for the light pen strobe. Three connectors are mounted to this board. Internally, there is the signal lead to the built-in monitor. The two rear mounted sockets are both for external monitors. A phono-type socket carries the monochrome output while a nine pin D-type carries the RGBI (red, green, blue, intensity) output. Both are designed for Zenith monitors, so their characteristics may need to be altered if using a different monitor.

The final board is the floppy disk controller, capable of controlling up to four disk drives, each of 360K capacity. Strangely enough, the two serial ports ►

◀ 33

are also connected via this board. Both are standard RS232 ports capable of driving serial devices at up to 96500 baud including printers, plotters, modems and the Microsoft mouse.

The hard disk and its controller, although not on the review system, is available and the documentation contains a section on its use. The controller board would sit in one of the expansion slots, leaving three slots on the standard system for any of the plethora of IBM expansion boards available.

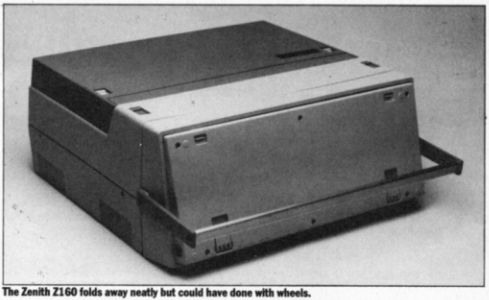
In use

When powered up the system attempts to read a disk in drive A. It spends about 30 seconds doing this, giving adequate time to put a disk in. If at the end of this time no disk is found, a 'drive not ready' message is displayed on the monitor. At this point you can jump to the system monitor program by pressing escape. When in monitor mode, the screen clears and a version number and the memory size are displayed.

The program allows various commands to be typed without the need of an operating system. Facilities include read or write to an I/O port, display, examine, fill and search memory, execute from a memory location, run diagnostic tests and display a colour bar. All command syntax is shown on the help screen, making it quite simple to use. This is quite a useful tool but its effectiveness is hampered by the lack of one important facility, a hardware test reset button.

If a problem occurs during execution of a program, the reset button can normally be pressed as a last resort. At that point the monitor would be invoked and various tests could be run to isolate the fault. The Z160, on the other hand, uses a software reset (alt, ctrl and del keys together). If the software locks out the keyboard, all you can do is power down/power up, and, of course, all stored data is lost.

The system automatically tries to boot from drive A, though drive B can be selected from the monitor. The operating system loads very quickly (about five secs) when using MSDOS v1, which is a huge improvement on some systems. MSDOS v2.0, on the other hand, takes quite a while longer to finish the task.



The Zenith Z160 folds away neatly but could have done with wheels.

Software

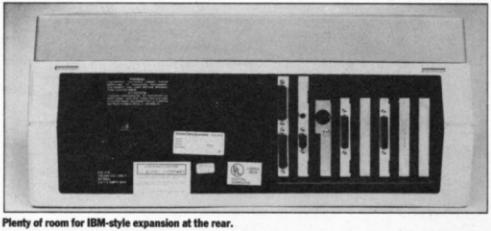
Four disks arrived with the review system, three marked MSDOS 2.0 demo disks and the other marked user demo disk. Why one of the disks is marked MSDOS 2.0, I don't know because it is simply a v1 system disk.

The user demo disk offers help and information on graphics and software. A features and graphics demo are also included. The graphics demo, because of the small screen size, looks better than it really is. One thing Zenith shouldn't have bothered showing was the smooth scroll — it's pretty awful.

The others were an MSODS v2.0 system disk, an MSDOS v1.19 system disk, and a hard disk utilities disk which takes care of formatting, detecting bad sectors, partitioning and restoring a hard disk unit. A utility for moving the heads over an unused track for shipping purposes is also included.

Applications software for any IBM compatible covers a vast range, and this is no exception. Zenith produces a list of available software obtainable from any Zenith dealer. The list is updated bi-monthly and all the software has been tested by Zenith.

The only piece of software I had was a copy of Microsoft Word, the word processing package. My main criticism of it is the persistent reference to press cancel (for example) when no key is marked cancel. I found out later that this is the escape key. Software should be documented to be consistent with the hardware it's being used on, or at least come with a mask.



Plenty of room for IBM-style expansion at the rear.

Verdict

Apart from this so-called portable being built like a tank and weighing almost as much, I liked it. Once it was on the desk it was a joy to work with. The disk drives are serenely quiet, the monitor clearly readable for long periods, and I especially liked the pop-up disk drive assembly.

There is little one can say about the IBM standard that has not been said before. When it comes down to the nitty gritty, it is the quality of the software packages running on the IBM that wins in the end. With the number of packages available for the IBM the Z160 can't fail although it will be a close finish.

SPECIFICATIONS

System	Zenith Z160
Price	£2360
Processor	8088
ROM	32K
RAM	128K to 640K
Screen	80 × 25 or 40 × 25, 320 × 200, 640 × 200
Keyboard	84 keys including function, cursor
Interfaces	Any IBM compatible
Operating system	MSDOS v 2.0
Software included	None
Distributor	Zenith Data Systems 0452-29451

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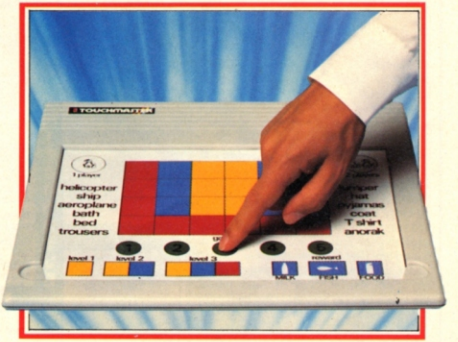

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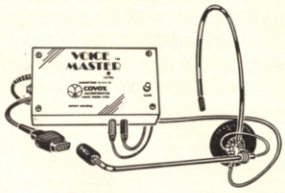

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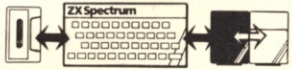

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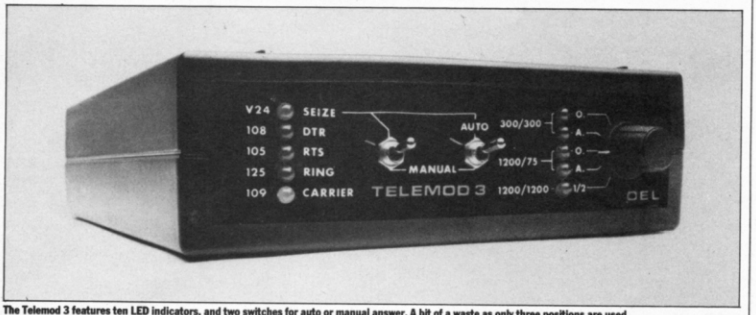
DIAL STRAITS

Brendin Lewis hooks up the Telemod 3 modem and places a few calls.



The Telemod 3 features ten LED indicators, and two switches for auto or manual answer. A bit of a waste as only three positions are used.

Multi-mode modems for micros are not a new idea but only a small number have been given the all important British Telecom seal of approval. The Telemod 3 from OEL, is one of the lucky ones. It offers multiple speeds (1200/1200 half duplex, 300/300 full duplex and 1200/75) with answer (both auto and manual) or originate modes.

First impressions

After wading through the usual cardboard and polystyrene packing I found, to my surprise, a very neat and attractive black plastic-cased modem. Gone, it seems, are the days when such equipment looked as though it was made by the average soldering iron-wielding hobbyist.

All controls and cables are located on the front and rear of the case. The front panel contains all LED indicators, of which there are ten. There is one for each of the speed settings — not entirely neccessary — but a nice feature nonetheless. The other five indicators deal with the line conditions, seize, DTR (data terminal ready), RTS (ready to send), ring and carrier. The latter four are also marked with their relevant CCITT V24 circuit numbers, for example 108 = DTR. Next to these indicators are two switches which are used for auto or manual answer. The use of two switches seems wasteful to me, as only three position combinations are used. They could be replaced by a single three position switch.

At the rear can be found the mains cable (no plug), switch and fuse, a 25-way D-type serial connector and a British Telecom-type 600 phone socket. The use of this type of socket is quite a recent innovation. Previously BT, which used them itself, deemed that they were unsuitable for mounting on the modem. Now the installation is much neater, because the phone can plug directly into the back of the modem and the modem directly into the line (for which a cable is built in).

Whether it is becoming a trend or not, I don't know but the documentation available with modems seems rather meagre. This one is no exception. All is revealed on six sides of A5 paper. This comes down to five and a half sheets if you already know how to put on a mains plug. What there is, however, is brief though understandable.

Providing everything works first time there should be no problems. If, on the other hand, they don't you'll be using your phone to talk to OEL and not to Prestel.

One of the problems concerning BT approval is that a modem must not produce the dialling tones for the Bell telephone network used in America. This is not the fault of OEL because it uses a standard modem chip which can supply both of these tones. Hopefully BT will look into this matter in the near future, as it prevents users dialling the US.

In use

Installing the modem looked a simple task and proved to be just a case of plugging the bits together and powering up. Nothing ever goes wrong until a unit is powered up, which is just what happened with this one. The manual states that on power up one of the speed indicators should light up if all is well. It didn't. Power down/up and there was still no change. I changed the position of the switch and hey presto! It was fine. Apparently there are five speed indicators but six switch positions — so beware.

Another strange thing happens with the other set of indicators involving DTR and CTS. They were both illuminated, indicating that the terminal and modem are ready for communication, but the terminal wasn't switched on. These two pins should be asserted by the local terminal or micro and therefore should not light until the DTE is ready.

Leaving these problems aside, I reached for the phone, unable to test all modes (my fault, not the machine's). I decided to call the local mainframe at 300 baud. After wrangling with the different buttons on both phone and modem, I finally got the log-on message.

Verdict

It seems the only thing the Telemod 3 has to offer over other modems is BT approval, which is a shame. Though the specifications sound good, there are a few obvious omissions. The most basic is the lack of a local loopback switch for test purposes. Also missing is an auto-dial facility, which would be far more useful than auto-answer. However, these drawbacks with the Telemod 3 can easily be ironed out, and I look forward to seeing Telemod 4.

REPORT CARD: 1 TO 5

Features	●●●
Documentation	●●●
Performance	●●●
Overall value	●●●

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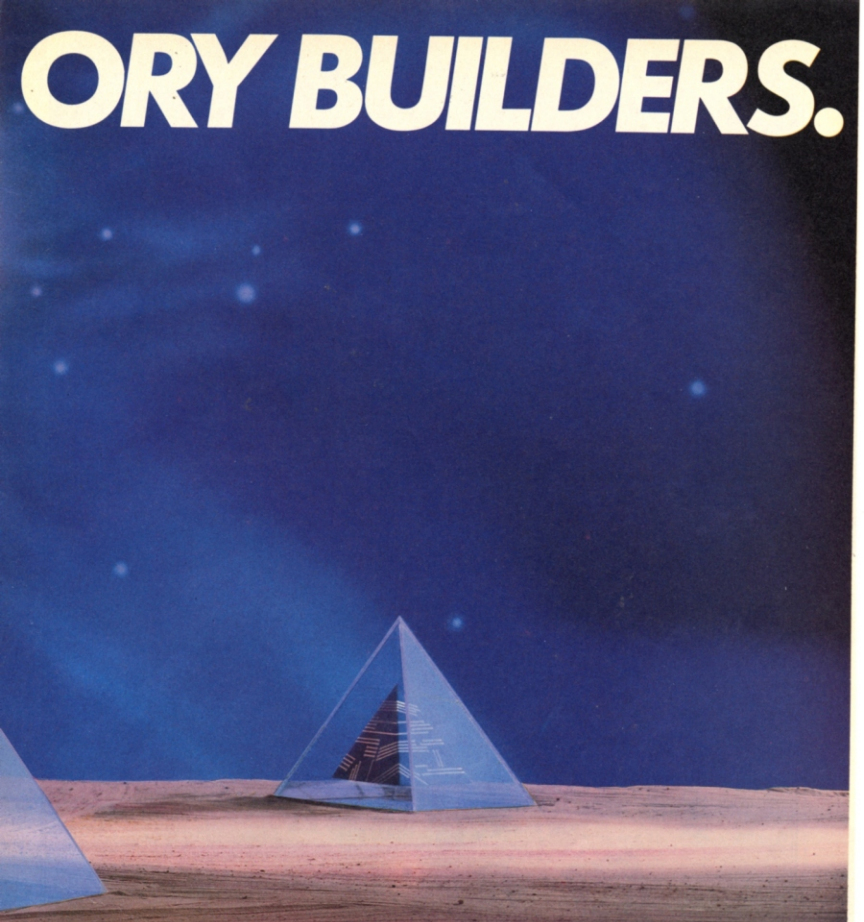

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SPEAKING UP

Your 64 can be made to speak volumes with this American gadget, The Voicemaster. Kenn Garroch linked it up to his machine for a test conversation.

One of the good things about the Commodore 64 is its sound synthesis chip (SID). Many games are beginning to use this for speech synthesis, to make the games a little more interesting. One thing that may be puzzling a few people is how the speech is coded and set up for use.

The Voicemaster from Covox can be used to input speech, via a microphone, store it in files, and modify it to a certain extent. The gadget is American and can be ordered only from the US.

Presentation

The device itself consists of a small, flashy-looking, brushed aluminium box (10cm x 6cm), a disk or cassette, an electric condenser microphone, and a manual. This comes all wrapped up in a box about the size of a 'ten pack' of disks.

Setting up

The main box plugs into the user port on the back of the 64 (make sure the machine is switched off. The microphone goes into a 3.5mm jack socket on the left side, and the 64 can then be switched on.

The review model came with its software on disk and was loaded from Basic with the command LOAD "VOICEMASTER", 8 and then RUN. As well as loading the machine code and initialising it, it also asks you whether you want to turn off the SID filter. To the innocents among you, the SID chip contains a set of tone generators to produce the sound, some envelope generators to alter the volume with time, and some filters to alter the shapes of the waveform (effectively giving the different vowel sounds of 'ee' and 'ooo' but with shades in between). Also included are a few other features and FX to make the SID a bit more flexible.

Turning the filter on or off didn't seem to make a great deal of difference, although the 64 I was using was fairly new and the Covox manual vaguely mentions something about older machines not having the same SID as the newer versions. Anyhow, with an ordinary everyday television the speech was more or less intelligible.

After selecting the filter off option, another disk access is performed and the computer speaks.

In use

The whole idea of the Covox is that you can input speech, save it, and then be able to reproduce it without add-ons.

There are a number of programs on the disk — Demo, Calculataor, and Clock.

Demo is a simple program that allows you to input speech and then play it back.

The flashy Covox showing the manuals and software. Unfortunately, we can't reproduce the sound.

It also allows some of the added effects to be demonstrated, such as altering the speed of the playback, which changes the pitch of the sound rather like speeding up, or slowing down a record player. The calculator turns your Commodore into a speaking adding machine and Clock is more or less the same as dialling the speaking clock.

After you have become fed up with the demo programs, you can try writing your own. This is very easily achieved from Basic, since the software gives you a whole new set of commands to use. These are:

SPEAK N, where N is the word number previously placed into memory, with LEARN N which analyses the voice input from the microphone and stores it in memory

PUT "filename", 8 stores the current vocabulary onto disk

FIND "filename", 8 loads a vocabulary from disk.

SCREEN N selects whether the screen is on (N +ve or true) or off during voice playback. When the screen is on, the speech is slowed down a little but this can be offset somewhat by using SPEED. CLEAR deletes the current vocabulary, unlike the command NEW (normal Basic) which leaves it intact. It also resets all current settings such as speed and volume

SPEED N changes the speed of playback where N is in the range 0 to 9, with 5 being the norm. The highest speed makes the voice playback sound like Pinky and Perky (remember them?), while the slowest is like the belt slipping on a record deck.

VOLUME N sets the volume in the range 0 to 15 with 15 being the loudest.

RATE N changes the sampling rate at which the voice or sounds are recorded. So the sound quality improves the faster it is sampled.

The Covox can incorporate up to 64 (familiar number) sounds in memory. These can be brought back, at will, with the SPEAK command. Incorporating speech into your programs is simply a matter of executing a SPEAK at the appropriate time.

Verdict

The Covox is a pretty good gadget. If you can think of a good use for it. I really could not think of a great deal of use for a computer that talks, unless you can talk to it and hold a conversation.

REPORT CARD: 1 TO 5

Features	●●●●
Documentation	●●●
Performance	●●●
Overall Value	●●●

Product Covox Voicemaster **Price** $89.95 **Availability** Covox, 675-D Conger St, Eugene, Oregon 97402, Tel USA 5032-342 1271. Mail order add $4.00 pp.

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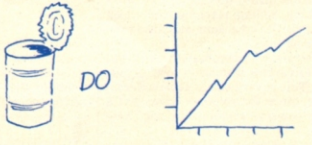

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EPSON

READOUT

'Sinclair QL User Guide' by Lionel Fleetwood, published by Sigma Technical Press at £7.50 (paperback, 211 pages).

QL books aplenty are about to hit the streets. Or at least that's one way I could deal with the mountain cluttering my desk. But at the back of my mind there's always been the voice of responsibility, telling me first that these are good, honest authors out there, and second that I'd better review a couple before the pile gets any bigger.

Putting them in order of complexity you come to Lionel Fleetwood's Sinclair QL User Guide first. This is one of the better value QL books, as it is mostly for the first time user who wants an explanation of the applications packages. It does a quick overview of Super-Basic in the first forty-odd pages, and for the rest of the distance concentrates on the applications packages that come with the machine.

These later sections aren't bad, but there are cavernous gaps. Say you've just gone down to the shops, bought a QL and Mr Fleetwood's user guide. Boot up the Quill, type some stuff, then you want to print it out. You tear through the index of the book, which refers you to page 17, which tells you how to choose a printer.

Undaunted, you head for the section on the Quill, which tells you: 'Once you've designed your document with headers and footers, you're ready to print: this you do by (a) making sure you have a printer and (b) hitting F3 P.'

With RS232 — pull the other one, Lionel!

A couple of other points might make you doubtful — the cover picture is an enhanced version of an early Sinclair PR shot, complete with non-existent RAMpack, and there's a particularly woeful paragraph on the jacket which refers to 'the technical section on the 68010 processor, the Motorola instruction set and the QDOS operating system.' None of these things are actually in the book (we reckon the 68010 is a 68000 with a 16-bit data bus) and there's a sticker over the paragraph, or there was. Memo to Sigma — send books to reviewers with bitten fingernails. . .

JL

'QL SuperBasic' by Dr A Berk, published by Granada at £6.95 (paperback, 165 pages).

QL SuperBasic, by Dr A Berk, is a sort of combination guide to SuperBasic and introduction to computers. As far as the latter is concerned it's no worse than some, but as a guide to SuperBasic it might as well be a guide to the ZX81.

Get this for an introduction to loops:

```
10 LET N=0 PRINT 12*N: LET
N=N+: GOTO 10
```

Fine as it goes, perhaps, but Dr Berk sees fit to spin this one out to 17 lines including REM statements. He makes a virtue of this soon after by introducing multi-statement lines, but I suspect many people will have nodded off by then.

But my major objection is that the book seems upside down to me. Dr Berk approaches the QL just as you'd approach a 'normal' machine, and the most important thing about the QL is that it isn't normal. QL SuperBasic is radically different from most dialects of Basic, and is surely an opportunity to teach newcomers more about structured programming. I'd say it's a grave mistake to start out teaching boring old Basic, and not introduce the structures until later. **JL**

'The Computer Dictionary' by Jon Wedge, published by Adam & Charles Black at £3.95 (paperback, 128 pages).

Somebody — either the author or his publishers — has a damned odd idea about what computers are. You and I know what computers are. . . they are relatively small things that sit on a desk or the dining table. If you've used one for more than a few weeks you'll have picked up on most of the jargon you'll ever need.

On the other hand, you may be a complete newcomer, in which case you may find this book a godsend. Or you may not.

Consider the following: 'MICR stands for Magnetic Ink Character recognition. The most common use of magentic ink is on the bottom line of bank cheques. . .' Not exactly the kind of thing to bring enlightenment as you struggle with your Spectrum.

You see, Mr Wedge sees no difference between your kind of computer and the Ministry of Defence's kind of computer, so you'll find lots of references to things like punched cards, batch processing, something called fallback, switched packet networks and other terms relating to the near-extinct dinosaurs of yesteryear.

This is a pity since the book is amusing — downright funny in parts — and worth buying for the single reference: 'Jackson, Michael — see structured programming.'

PW

'Personal Computers & Special Needs' by F Bowe, published by Sybex Computer Books at £6.95 (paperback, 171 pages).

Although low cost personal computers have been around for a while, little has been done to exploit the technology to assist the disabled. This book is therefore a welcome addition to the bookshelves.

As a US import it has its limitations for a UK audience. It often refers, for instance, to specific pieces of equipment not available over here.

However, Frank Bowe does have a deep insight into this field as he has written widely about the disabled and using technology to meet their special needs.

It's a relatively brief book with chapters on employment, education and independent living. Further chapters deal with vision impairments, hearing losses, mobility limitations and learning disabilities.

The book can be recommended to those seeking an introduction to the subject or wishing to benefit from American experience in this important field.

It is also a valuable source book of ideas for those wanting to use micro to assist the diabled. **RB**

'Expert Systems — Principles and Case Studies' edited by Richard Forsyth, published by Chapman and Hall at £9.95 (paperback, 231 pages).

Tales of sales of millions of home micros occasionally lead you to suppose that computers are no longer strange intelligences understood only by a highly trained priesthood. But the next step is always there to be taken, and the pioneers will invent a new line in gibberish for it.

So it is with the fifth generation, artificial intelligence, and expert systems. This particular volume is written in English but draws on so many terms from earlier work that a new vocabulary is necessary.

The text isn't unreadable, rather it is accidentally obscure in the best traditions of computer literature. But this is a book for the committed student of computer sciences, a reference-work to be read for its value to a course of study. If you want to create your own expert system the book might provide a first step but it won't take you all the way — it may even deter you.

The book is in four parts — background, inference, knowledge engineering, and learning. Various distinguished contributors address themselves to specific topics within these sections, and if you make it to the end you'll emerge with the feeling that there can't be much left to know about the subject. But will you be able to make use of your knowledge? You may need an expert system to help you out. . .

DG

'A Practical Guide to Designing Expert Systems' by Weiss & Kulikowski, published by Chapman and Hall at £15 (hardback, 174 pages).

With a sigh of relief you'll note that crucial word 'practical' in the title and sharpen your coding pencil to get stuck into some expert designing. Sharpen your wits first. There are scene-setting chapters and enough contextual information to sink a ship before you reach the practical work.

Don't be put off by the assertion early on that 'this is an engineer's book'. An engineer in this field means a software engineer, which is just a fancy word for a programmer who takes the work seriously.

The greater part of the book, though, concentrates on the practical aspect, using the authors' own general system called innocently Expert. There is a touch of old-world academic charm about this, but nothing so patronising as a listing. The expert system you create will be your own — Expert is used merely to point the way. The authors then illustrate the lesson with several applications, and finally look ahead to the implications of the kind of research area in which by now you should count yourself a co-worker.

This is not the best book on expert system design, nor the most accessible, nor the most direct. But it is a serious attempt at a serious subject and you're unlikely to consider your money wasted.

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SOFTWARE PRE-VIEW

We take a peek at the new software packages, and give you a taste of things to come. Note to software publishers: If you wish your company's product to be included, please send only the very latest releases to *Bryan Skinner, Software editor*, PCN, *62 Oxford Street, London W1A 2HG.*
Don't forget to include prices and telephones numbers.

SPECTRUM

Ocean's latest new release, *Chinese Juggler* is a real test of skill and strategy as you try to balance the eight plates on rods.

Cylon Attack did quite well on the BBC, and now A&F has converted it for the Spectrum. Improvements include better graphics and faster and smoother movement.

Spectrum games are getting larger and larger. *Xavior* claims some 4096 rooms, 256 different creatures, 32 room designs etc, etc. Your task is to collect as many DNA fragments as possible to ensure the survival of your species. Due for release on November 19, we'll carry a review as soon as we can.

The Staff of Zaranol isn't the Martian version of *Upstairs, Downstairs*. It's an adventure which could have been called the Sorcerer's Apprentice. That's the part you play. Your task is to banish the demon you've accidentally released.

The aim of *Plummet* is to save a mayor, stranded in the lift shaft of a New York skyscraper. To do this you have to carry lengths of rope to the top of the shaft. Needless to say the journey is fraught with perils.

CCS continues to expand its Charlie Charlie Sugar budget range. *Nuke Lear* involves deflecting barrels of radioactive material into the correct locations. Too many in the wrong place and the situation gets critical. Fair at the price, but not quite up to the standard of other budget games — like those from Firebird or Software Projects.

For those tackling machine code, *Gener-80* looks handy. It's an editor assembler with some unusual features. For one it processes input immediately, syntax-error checking just like Sinclair Basic.

There's a 40-column full-screen editor and string search, block move and the like. Microdrives are supported and source, text and object code can be located at will in memory, allowing the use of a co-resident monitor.

New Cylon Attack	**£5.75**	**A&F 0706-341111**
Xavior	**£5.95**	**PSS 0203-667556**
Air Defence	**£5.95**	**CCS 01-858 0763**
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Nuke Lear	**£2.99**	**CCS 01-858 0763**
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Chinese Juggler	**£5.90**	**Ocean 061-832 6633**
Merry Xmas Santa	**£7.95**	**Icon Software 091-2846966**
Gener-80	**£7.95**	**Seven Stars 01-485 7775**
Plummet	**£7.00**	**Interceptor Micros 07356-71145**

BBC

Funny how the games market often borrows from media events like the Olympics, even if accidentally. One such is *Mineshaft*, and it's nice to see the BBC version on one side of the cassette and one for the Electron on the other. Your aim is to collect all the lumps of coal in the 20 rooms in the pit. The rooms have unlikely names such as The Derelict Place, Ghosties Revenge and The Junkhouse Mk II. You only have a limited air supply, so time is of the essence and you can move to the next screen at will. The screens are a bit bare, but the graphics and the animation are among the best.

Only seven weeks to Xmas, and the theme games are rolling in. Latest is *Merry Xmas Santa*. Your festive task is to help him make safe deliveries, avoiding marauding snowmen, jumping over snowballs and dodging falling icicles. Bonus points are available for collecting plum pudding and sherry.

Wongo's unusual scenario is the Great Wall of China, with a bouncing Chinaman defusing bombs along its length, evading arrows, gremlins and boulders.

Holy Horrors	**£6.99**	**Romik 0753-71535**
Mineshaft	**£6.95**	**Durrell 0823-54489**
Merry Xmas Santa	**£7.95**	**Icon Software 091-2846966**
Ultron	**£7.95**	**Icon Software**
Wongo	**£7.95**	**Icon Software**

AMSTRAD

It's a pity that the standard of Amstrad games released to date simply hasn't done justice to the machine's capabilities. Particularly so when you consider their high price.

Unfortunately, the latest Amsoft releases do nothing to improve the situation. True there are some good graphic touches in *Astro Attack*, but the space ships which travel round the maze are rather chunky, and the game is too simple in concept. *Bridge It* has better graphics, but that's about all. Software Projects is shortly to release *Jet Set Willy* on the machine, and let's hope that will show just what can be done.

Bridge It	**£8.95**	**Amsoft 0277-230222**
Astro Attack	**£8.95**	**Amsoft 0277-230222**

COMMODORE

Yet another space attack game — this one, *Invaders*, from Live Wire is in the usual style. Earth is threatened by alien invaders and you must destroy them with your laser.

On paper at least, the *Expert Sprite Editor* looks very good indeed. Features include sprite attribute data compression, moving and stationary animation, sprite layering, 224 sprites available from Basic or machine code, as well as all the editing commands you could want.

That the 64 is being seriously considered as suitable for a small business is shown by Kuma's latest spreadsheet. The model can support up to 26 columns by 50 rows — rather limited, but the package costs only £14.99 and uses colour coding for totals, sub-totals, formulae etc, which makes it easier to use than some.

Expert Sprite Editor	**£8.95**	**Android Dreams 021-458 4475**
Spreadsheet	**£14.99**	**Kuma 07357-4335**
Stunt Bike	**£6.95**	**Ocean 061-832 6633**
Nuclear War Games	**£8.50**	**Severn Software 0594-43352**
Quango	**£7.00**	**Interceptor Micros 07356-71145**
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Time Zone	**£6.95**	**Channel 8 0772-53057**
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Aliard's Tome	**£6.99**	**Romik 0753-71535**
Animal Magic	**£6.99**	**Romik 0753-71535**
Titans	**£6.99**	**Romik 0753-71535**
Blaze	**£6.99**	**Romik 0753-71535**

DRAGON

The *Z1 Grafix System* allows you to control the micro's display via joystick and single key presses. It also allows mixing text and graphics as well as saving and loading images.

The Soft Sell is a display generator which allows you to page through up to 17 colour graphics screens, with the lower part showing scrolling messages in large characters.

Snow Queen	**£5.95**	**Cambrian 07456-7121**
The Soft Sell	**£17.25**	**Micro Sign, Woking 67847**
Z1 Grafix System	**£5.00**	**Zircon Software 01-641 7102**

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FINANCE MANAGER is a powerful, flexible and fast MENU DRIVEN general purpose program carefully designed to handle up to 255 separate accounts for domestic and business accounting applications. The magic of MACHINE CODE has enabled us to produce the very latest "on the page" presentation which lets you enter and edit data naturally, as if with a pencil and paper. That's not all, not by a long way. This program automatically raises a corresponding debit or credit for every entry, and will even open up a new account if an entry features an unrecorded account name.

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SPECTRUM

DELTA WING

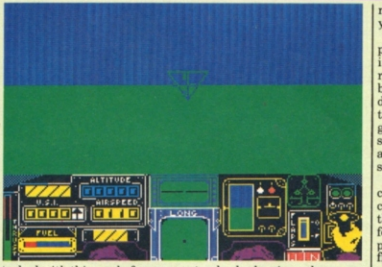
Naturally they called me when they heard. A hush-hush new high-performance jet fighter from Thorn EMI was parked on the tarmac, and as the only *PCN* operative with F15 experience I was ideal for the job.

Not that this was going to help much. For a start the cockpit was oddly-shaped — no matter where I looked my knees always seemed to be poking up into the windscreen, and as I moved the joystick I could see my right hand trembling on it. Odd really, especially when you consider I'm left-handed.

The basic mission's easy enough to grasp. You have to take your jet-powered fighter-bomber into the air and perform a small miracle that combines using bombs to destroy all the enemy bases and shooting down the enemy intruders trying to bomb your bases.

In common with most of the other new jet-powered flight simulators the weapons technology is fairly old hat, and you have to mess around with boring old conventional bombs and cannons. We're still waiting for a software house to come up with Sidewinder missiles and napalm, but when it does it's certainly got my vote.

In *Delta Wing* you start off ready for take off, with an enemy aircraft fairly close to your airfield, so it's important



to deal with this one before you go waltzing off on bombing raids. My first try wasn't a great success. While taking off I spotted an alien shape of some sort at the end of the runway, so instead of pulling the stick back and getting airborne I started pumping bullets into it. It was only when I crashed into it that I realised this was in fact some kind of end of runway marker.

Nothing daunted I had another bash at reaching for the skies, this time with a little more success. Normally you get a representation of the control panel, complete with the aforementioned knees and hands. The top of the screen is taken up by a view out of the cockpit, although you can switch to a radar map of the whole playing area.

The combat radar screen in the centre of the console is fairly standard, showing where you are and the nearest base or intruder in relation to you in terms of angle and height. You can switch this between short and long range.

Once you're in the air it's a matter of getting to the same height as the intruder then engaging it. The ensuing dogfight, provided you can stay alive for long enough, is an entertaining affair. Part of its charm is that, unlike the enemy in *Fighter Pilot*, this one will try to stay with you, so your spells of twisting and turning are liable to be a lot more prolonged.

I'm not sure how accurate the simulation is, but is does a fair impersonation of a full dogfight. Unfortunately you need to hit the beggars seven times before they go down, and either I didn't hit them at all or there's no way to tell how many times you've hit them.

My precision bombing experiment was also a flop. I went in at 200 feet, dropped the bomb right over the airfield and . . . blew myself up. Apparently you do this if you bomb from lower than 250 feet, even if you're going at twice the speed of sound. Anyone sending me an algorithm proving this is nonsense will be lightly rewarded.

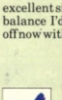
All in all I found Delta Wing curiously unsatisfying. The controls are more leaden than those of Fighter Pilot, and I found the lack of a rudder particularly annoying in dogfights.

It's also possible to fly off the screen, and if you can't remember where you left from you're in big trouble.

Finally, bombing. I find it difficult to believe that in this day and age the cream of Strike Command is being sent into action without a proper bomb sight. Peering over the side may have been OK in 1914, but at 1,400 knots it isn't really an option.

Delta Wing would have been excellent six months ago, but on balance I'd say you'd be better off now with Fighter Pilot.

John Lettice



Rating 7/10
Price £6.95 **Publisher** Creative Sparks/ Thorn EMI Computer Software, 142 Wardour Street, London W1

SPECTRUM

ALL OR NOTHING

All or Nothing looks promising from the cassette cover, but playing it — well, that's another story.

You're an enemy spy whose mission is to obtain the plans of a secret matter transporter, held somewhere on your competitor's industrial site. As you approach the landing patch on the site by parachute, your watch loosens and falls to the ground.

Your first task is to find the watch before you can continue your mission. To control your SAS-type character you can use the keyboard, define your own keys or use a joystick.

The instructions are pretty lengthy and you'll need about 1Mb of brainpower to remember what key does what and how to play the game. You've got to digest a number of screens of text before you can get stuck in — a demo game gives a few tips.

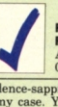
Playing the game proved to be a killer. On starting, out of the sky drops the hero hanging from a parachute. It's the next bit that gets difficult. Controlling him to go in the direction I wanted to took a lot of practice.

To the patter of running feet off he goes to find the key that gives access to the secret documents. It took several attempts to find the key before my man was either shot, bitten by snarling dogs or caught. Quite often he was running aimlessly avoiding his pursuers.

The idea of this game is pretty good and the 3D graphics are an added bonus. You can also use a Currah Speech add-on, although the sound is poor.

I found this strategy/adventure game a bit hard to play and it wasn't long before I got bored.

Sandra Grandison



Rating 7/10
Price £6.95 **Publisher** Abbey Electronics 01-289 2377

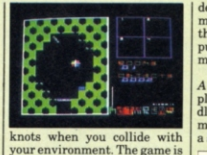
COMMODORE 64

ANKH

This game is something else but exactly what I'm not sure. Put at its simplest (and this game is anything but simple), *Ankh* is a series of logic puzzles, some unbelievably tough.

The game environment is described as the 'Metareal world of Ankh where logic works but doesn't rule'. The idea is to find your way through 64 connecting rooms, each of which is different and holds a puzzle. Sometimes you can pass through a room's doorway with no trouble but mostly you need to find a way to open up the exit before you can pass.

Each room must be prodded, poked and probed to yield up its secrets. Solving a room's puzzle may bring forth a treasure, a tool or (groan) yet a further puzzle. You control a spherical object, your Mindprobe. It can be moved around and fire missiles. You gain power by performing certain actions (gaining access to a new room, for example) and lose it at a rate of



knots when you collide with your environment. The game is over when you lose all power — or when you solve. it.

At start-up you have the opportunity to experiment on an abstract set-up — a confidence-sapping experience in my case. You may also select the level of perplexity of the puzzles (from mindboggling to mindshattering).

A real headache inducer, *Ankh* is like nothing you've played before. There's no middle way — you either love it madly or stick it straight under a steamhammer.

Bob Chappell

Rating 8/10
Price £8.95 **Publisher** Beyond 01-837 3699

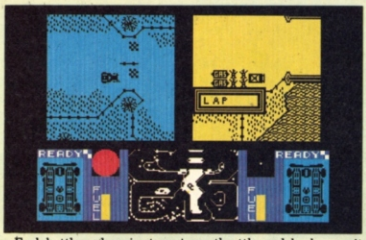
SPECTRUM

BATTLECARS

Death Race 2000 on a micro — that's the excellent *Battlecars*. You know you've got a winner the instant you open the package — two keyboard overlays and a hefty instruction booklet to make your mouth water and your fingers twitch.

Set in the year 2081, with the *Highway Code* flung in the gutter, it's down to you to equip your battlecar and duel to the death with fellow gladiators. Numerous options mean you must take some time over the manual before getting started. The main menu gives you five choices. First up is *Solo Practice* (mastering these monster vehicles takes more than a few spins with BSM) in which you take a few leisurely turns round the track, alone or racing against the computer.

Or you can check out your lap speeds in timed trials. Then there's *Autodrome* for some solo combat against the computer, a simple two-player game and, best of all *Slug City*.



Each battlecar has six steering functions, turning through 45 or 90 degrees to left or right and drifting — handy for corners. There are four fire controls, one for projectile devices like shells, guns, flames and lasers, the others for the 'passive' weapons systems housed in the left, right and rear pods, containing goodies like oil, spikes, mines and smokes.

Firing isn't as simple as it looks, due partly to a limited quantity of ammo, and partly because shots are accurate only to 15 degrees (unless you've a gunnery computer aboard which brings this down to 10 degrees). And of course there are throttle and brakes — it takes a long time to get used to all this lot.

The display during an *Autodrome* duel comprises five main sections; at bottom left and right the two cars are shown from above, and damaged areas flash orange. To the side of these are fuel gauges, and just above is a speed indicator. Aerial views of each car take up most of the screen which changes colour to give a rough idea of speed. Turning too quickly damages the tyres which further reduces your safe cornering speed. At bottom centre the two cars are shown as moving white dots, so you can plan engagements ahead of an encounter. When you're hit, the damage display becomes a weapon display of what weaponry is still active, and the damage points to each car. You can stop a bout at any point, such as when your car stops moving and there's an orange blob in the centre of the car — you're dead.

There are eight cars set up, but you have money to invest in a really hot rod, so you can select chassis size, engine type, armament and armour, and even save car specifications to tape for use in later games. And there's some crazy kit — for instance, the auto-steer which increases your safe cornering speed by 10mph.

The *Slug City*, where you battle with an opponent in the streets, take time out for refuelling and repairs (if you can find the pit stops, that is). The graphics and action are tremendous.

It's about time someone came out with an original idea for a computer game. Go out and buy it today, there's so much in it.

Bryan Skinner

Price £7.95
Publisher Games Workshop, 27-28 Sunbeam Rd, London NW10.

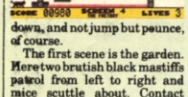
SPECTRUM

CAT WALK

Spectrum games are getting better by leaps and bounds. This one makes the Spectrum look like a Commodore 64, its graphics are so good.

If I say that you start the game with nine lives you'd probably guess that there's a cat about and you'd be dead right.

Your task is to take Snooky out for his nightly prowl, gobbling mice and birds, looking out for tins of cat-food, and steering clear of dogs and humans. Control is configurable, left and right, up and down, and not jump but pounce, of course.



The first scene is the garden. Here two brutish black mastiffs patrol from left to right and mice scuttle about. Contact with the mice is what Snooky's after, but the dogs are best left alone. You also have to dodge a veritable hail of domestic debris that flies out of the windows of the red-brick houses at the back of the picture. Take out all the mice and it's on to the building site and a different diet.

Here we're into a lift and platform scenario. The construction work is shown as a system of girders, and some cleverly animated brown birds flap and strut about. Watch out for the workmen. They climb rapidly from one level to the next and take strolls about each level.

At the centre is the hoist, and Snooky has to leap onto this to get at the tasty morsels in the upper reaches of the building. Don't fall too far or it's curtains for you.

The graphics are fairly simple, but incredibly well done — very clear, good choice of colours and very well animated indeed.

The only criticism I have is that when Snooky pops his clogs and floats to that great feline rest-home in the sky, much of him seems to get left behind — still I guess it's his spirit ascending, complete with catty halo.

Still, it's not a bad game for the money.

Bryan Skinner

Rating 8/10
Price £5.95 **Publisher** Power Software 0384-370811

COMMODORE 64

HERO

Could Roderick Hero be the man to let the miners live to fight another day? It seems there is trouble at the old mine. A group of miners have been trapped in the labyrinthine mineshafts of Mount Leone by the lava and debris of a hyperactive volcano and super-hero Roderick plans to live up to his name by coming to their rescue.

The trouble is Roderick Hero is a bit like a fish out of water . . . all his special gear is close by but he needs your guiding hand to point him in the right direction. So plug in the joystick and away he'll go on his search.

To assist his movement in the vertical shafts and cavernous voids, Roderick has a propeller pack strapped to his back turning him instantly into a human helicopter and enabling him to step into any abyss without hesitation. But this is not all. There's his microlaser beam which he uses to blast his way, although somewhat slowly, through any obstructive walls in the mine, as well as dispose of the 'vile vermin' liberally scattered in the passages and intent on bringing his rescue mission to a premature end.

And there is dynamite, too. Six sticks of it which can be placed at the base of any wall to effect a much quicker demolition job. But be careful. Roderick, too, can be blown away by the blast and there are only three of him in the game.

A further advantage comes in the shape of heat resistant rafts. These are there to help Roderick effect a safe passage on the white hot lava rivers.

But let's not forget the object of the game — the miners. Roderick has to locate one on every level before being allowed to move deeper into the mine. The quicker he does it, the more points there are to be had and at every 20,000ft there's an extra Roderick.

A nice touch is that the instruction leaflet contains six tips for playing the game.

Hero isn't particularly brilliant and lacks that addictive quality necessary for a chart-topper, but it's quite nicely done.

Keith Mason

Rating 7/10
Price £9.99 **Publisher** Activision 0628-72448

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ABC: A writing tool designed for young writers aged seven and upwards. It is easily operated and quickly understood and before they realise it children will be creating and reshaping their words and ideas.

TALKBACK: Both entertaining and demanding. It allows children to create their own computer 'characters' capable of holding simple conversations on the screen and provides valuable lessons in both English and computer literacy. For ages ten and over.

All four programs are available for the BBC Micro computer on either cassette (£9.95) or disc (£11.50). Talkback and Workshop are also available for the Electron on cassette (£9.20).

For your local Acornsoft stockist or to order by credit card simply ring 0933 79300 during office hours. Alternatively you can order the programs by writing to Acornsoft, c/o Vector Marketing, London Road, Wellingborough, Northants. NN8 2RL, enclosing a cheque or postal order. Please allow 21 days for delivery.

ACORNSOFT

GAMEPLAY

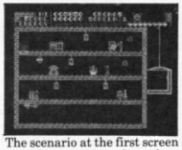
SPECTRUM

BILLY BLUEBOTTLE

Power Software is a new company, and if *Billy Bluebottle* is representative of the standard of the company's games, you'd do well to ask Santa for a sackful.

The game boots up with keyboard/joystick options, but not just a simple menu — the keyboard and stick are drawn, so there's no confusion. Above these icons are three flags, you can select English, French or German, each of which changes the prompts.

Into the game then, with you operating the flying hero, Billy.



The scenario at the first screen is a cross-section through a house and in the basement is a fly, trapped by a rising tide of water. Your first task is to rescue the winged beastie from death by drowning.

You start on the third floor, brick walls terminate the corridor, fly paper hangs between the green telephone and the yellow vase of flowers, and to cap it all there's a bloke strolling up and down spraying fly spray.

Being supernatural you can push the fixtures and fittings around and temporarily disable the pest control officer, which is just as well as his spray tends to hang around for ages.

On the top floor there's a blue desk, a green kettle and a pot of mouldy old food — just the job to keep a fly's strength up. The trouble is, landing on it skips it down to the third level, so it leads you a merry dance in search of sustenance.

The graphics are extremely well done — no attribute problems here — and the action's smooth, with the exception of the lift which is a bit jerky. Pity the sound's limited to beeps and chirrups. There are several neat touches — like Billy's colour cycling through the rainbow when he bites the dust, which in my case was every few minutes. It's a very tricky little number, frustrating and so well done that I think I'll just have one more go. . .

Bryan Skinner

Rating 9/10
Price £5.95
Publisher Power Software 0384-370811

SPECTRUM

JASPER

If you've mastered the jungle and platform-type game, you'll feel at home with this one.

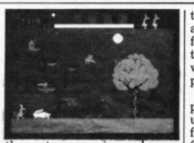
Jasper is a jungle rat who goes on a wild adventure through the swamps avoiding all the beasts of the land, in a bid to find his way back home.

In this cartoon adventure you have 22 screens to plough through — each with its own dangers and problems. The scenery of the first screen is quite good. Bees flutter, spiders bob up and down and a killer rabbit bounces towards Jasper ready to pounce on him. At the top of the screen is the number of lives you have (you start with three) and there's also a timer.

Controlling Jasper needs clever planning, quick thinking and good keyboard control. There's no single way of getting through the dangers as some screens need to be visited more than once.

To save Jasper from the manic rabbit I pressed S to go right, and then Y to jump over the rabbit. But then I ran into trouble: my friendly rat collided with a deadly spider and a wasp, and lost his three precious lives.

I tried another strategy — this time Jasper went left on to the next screen — jumped over a leopard and skilfully grabbed an apple and traversed towards the riverbank. With the leopard pacing up and down I didn't have a lot of time to get Jasper across.



So I adopted some long-jump tactics. Going quickly up to the riverbank, I pressed Y for jump then grabbed a rope dangling above the river and pressed B for hold. Then H to climb down the rope, A and S to swing it and when the time was right, I pressed Y to let go and land.

Along Jasper's journey he picks up objects which he can use later. But he can carry only five objects at once. I never got further than the third screen — but there's certainly plenty to keep you going.

Sandra Grandison

Rating 8/10
Price £6.95**Publisher** Micromega 01-223 7672

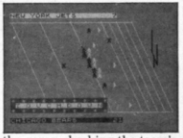
SPECTRUM

AMERICAN FOOTBALL

American Football is quite in vogue, and this version of the game from Softstone isn't half bad. It's very like *Football Manager*, and almost as good.

You can select from five levels of play. The lowest is novice, through group level of the team, coach, and finally the team itself. And don't they have great names — The Huston Oilers are my favourites, with the LA Rams a close second.

There are many options in the game, checking the team's statistics, changing players' names and so on. Sooner or later you'll want to play a match, and it's here that games like this come into their own. The view is from the side and slightly above the pitch. On a green backdrop, the yard lines marked out in white, the players get to work. The figures are small and a bit stick-like, but move quite well across the pitch. All the action's here as you pray for your team to make touchdown.



The aim of the game is to coach your chosen team to the Superbowl — the peak of the game, like the FA cup. That could take you some time and careful strategy is needed to keep your team ahead of the competition.

You don't need to have any knowledge of the game because all the action's automatic though it would have been an improvement to have information about the game rules, as well as some background — the only instructions on the inlay cover loading the game.

I'm not partial to this type of game, where all the choices are menu selection, or name and price entry, but if that's your bag then you should check this game out. You might even win a sovereign should you come across a hidden message.

Bryan Skinner

Rating 8/10
Price £6.95
Publisher Softstone 01-486 5266

COMMODORE 64

ANCIPITAL

Oh, weird! Like, this game from Jeff Minter, the *Lord of the Llamas*, is really heavy, man. Let me lay it on you — this one is megafreaky with a capital M. When you play, shake off the sand from your Polaroid shades and put 'em on; the strobe effects make *Top of The Pops* look like dinner by candlelight.

Ancipital is the name of the goat/human creature that first appeared in *Sheep in Space*. Beautifully animated, it roams a number of chambers, blasting away at the bizarre inhabitants. As befits the way-out nature of the game, Ancipital can fly skywards to walk upside down on the ceiling as well as up walls and (dullsville) along the floor.

Music and messages are broadcast while the game loads and a demo mode hints at the lunacy to come. While you battle with the forces of freak, a steady drum beat thumps and the screen is filled with light, colour and action.

Each screen-sized chamber has walls that pulse, glow and do alarming things. A host of unique weirdos occupies each room. Forget about your boring old bomb-dropping aliens, these creatures are far out. The first room has malicious flying Granny Smiths and I'm not talking about OAPs: apples are the enemy, turning into cores when shot . . . with bananas.

It gets heavier. There are furious floppy disks that must be bombarded with cassettes. Guinea pigs savage your ankles when fired upon. There are army boots, tube station signs, guitars, camels (of course), skulls and crossbones, rats, nuts (but not bolts), pyramids, pound signs, goats and all manner of other Minteresque oddities.

Weird and wacky, this latest piece of psychedelia from Llamasoft will have you goggling.

It's a hit, man.

Bob Chappell

Rating 9/10
Price £7.50 **Publisher** Llamasoft 07356-4478

BIG GAME HUNTER

You've had a brainwave for a great game. But, there's one slight problem — you haven't got the programming skills to put it into action. Stuart Cooke says Games Creator will put you on the right track.

You've just thought of a great idea for a new game, you can already hear the tinkle of the money falling into your bank account. It's then you realise your programming isn't up to the standard needed to produce the game yourself. Well, help is at hand in the form of Mirrorsoft's latest release, *Games Creator*.

All the drudgery associated with programming has been removed and through this menu driven program you can define your own background, sprites, music and even the type of game.

With some other games creators you are extremely limited in the type of game you can produce. This is not so with Mirrorsoft's designer, as the demonstration programs show.

First impressions

The best way to evaluate a product such as this is to see some of the games that have been developed using it.

When the *Games Creator* has been loaded into the machine a game called *Bouncer* is present in memory. *Bouncer* is a fairly standard platform game in which our hero Hoppy has to collect keys while jumping over aliens and obstacles. In this game the aliens consist of an elephant, a dalek and a boot, all of which are well animated and colourful. Movement is quick and as smooth as you have come to expect from a Commodore game.

Two other games are included in the package. *Hawk Patrol* is one of those space games that has a scrolling landscape. Harry the hero can move backwards, forwards, up and down in order to rid the skies of the gun ships which appear from the left and right-hand edges of the screen.

The second game is *Snake Pit*, a standard maze game where you must avoid the monsters while trying to reach the exit. The background scenery is particularly impressive — the walls have a 3D aspect to them. All of the games are accompanied by jingles and impressive sound effects.

You wouldn't want to pay a fiver for any of these games but they do demonstrate exactly what it is possible to produce with a little thought and effort.

Documentation

Unfortunately, the documentation supplied with the package is sparse. The 28-page manual is clear and every option provided has a section to itself. It doesn't, however, go into enough detail and there are no examples. This is fine if you know a little about how your Commodore 64 works but if you are new to computing then you may struggle. A games designer should enable everyone to produce games easily.

In use

Once you understand what's needed to set up in order to play your game then design is easy. Choosing scenery from the main menu allows characters to be designed that will make up the background pieces.

There are three sets of characters: characters that you move over; those that block your way, and those nasty ones that kill you. The Sprite option allows you to design the sprites for the missiles, the monsters and your player. For this you simply select a colour for the relevant squares on your sprite.

The music menu allows you to type in your tunes and select from a number of predefined instruments, such as piano and guitar. The tune will play during the game or just when you finish it.

The movement and rules menu are what actually set up the game. From these menus you place your sprites on screen, define how they move and their movement boundaries.

Again, this is easy once you understand what is needed, otherwise you'll probably find yourself going round in circles.

The manual suggests you alter the provided games before developing your own — a good idea as it will demonstrate exactly how all the options work.

Verdict

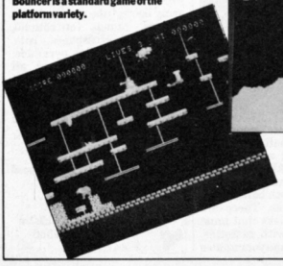
Games Creator is a very good product. You're not limited to one type of game and you can very quickly produce a good quality one.

If you think there's a budding games designer in you then go out and buy this and find out for sure.

REPORT CARD: 1 TO 5

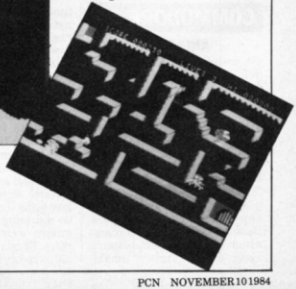
Features	●●●●●
Documentation	●●
Performance	●●●●
Overall value	●●●●●

Product Games Creator **Price** £12.95 **Publisher** Mirrorsoft 01-822 3800



Bouncer is a standard game of the platform variety.

A scrolling landscape is the backdrop for Hawk Patrol.



Snake Pit — a maze game where you dodge monsters.

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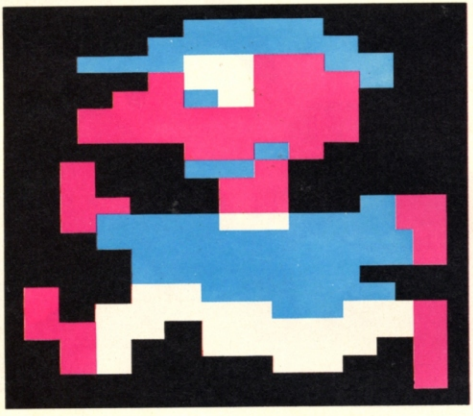
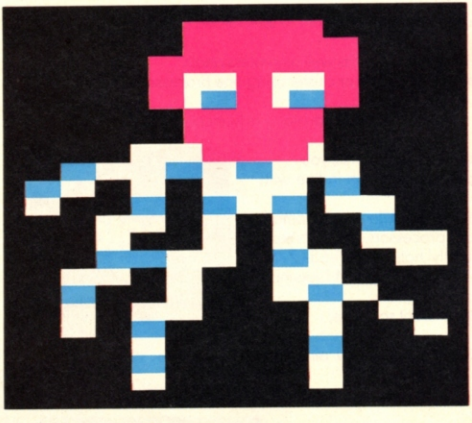


and enemies.



With Mirrorsoft games, you can make loads of new friends like Mr. Bounce and Ceasar the Cat. Or, now, like Dr. Frankenstein, you can create your very own monsters and aliens. As well as friends and heroes to defeat them.

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HIGH C

David Janda hits the high notes with Hisoft's version of C language for the Spectrum.

The language of the '80s is C. At least, that's what the pundits would have us believe, and judging by the amount of publicity it's getting, this could well be the case.

C is usually associated with minicomputers and micros running CP/M, CP/M86 or MSDOS. But now Hisoft, which produces an excellent Pascal for the Spectrum, has released a version of Spectrum C.

The C language is a general purpose, high-level programming language that can be used for a wide variety of programming tasks. Many software houses use C instead of assembly language, because C object code is fast and saves costs.

The other attraction is its portability — a program written in C on one machine can be run on another, providing both machines use compatible Cs (there are dialects of C but the differences are often unimportant). Hisoft's C conforms closely with the definition given in the C programmer's bible — Kernighan & Ritchie's *The C Programming Language* (often abbreviated to K&R). After learning C with Hisoft's version it would be possible to progress to a Unix-based system without too much trouble, and you could run programs written on your Spectrum on a DEC VAX, or vice versa.

Features

The package consists of a tape and manual. On one side of the tape is the C compiler/editor and a front-end program which allows a backup to be made. On the flip side is a standard C function library containing functions for dealing with I/O string, store management and so on.

While Hisoft's implementation is very close to the K&R standard, there are exceptions. The two most notable are that there is no floating point feature, and you can't use indentifiers.

Included in the package is the line editor used in Hisoft's Pascal and Devpac. Source code can be entered and amended, saved to tape or Microdrive, printed and so on.

Although the compiler and editor are separate, they're loaded into the Spectrum's RAM together. This means that program development is quicker because the two are always resident. Error messages are abundant, and for each an error number is displayed with a brief description. A neat feature is that the error messages can be cleared from memory, just leaving the number; this frees about 2K, and it's easy enough to look up the error meaning in the manual.

Version 1.0 does not allow object code to be run independently of the compiler, but this will be possible in the next version. This will also feature identifiers, and floating point routines are being considered.

In use

The best method of getting to grips with this package is to keep a copy of K&R close to hand. It's a bit pricey at £16.95, but it's essential because Hisoft's manual is written with dozens of references to it. Cross referencing between the two isn't difficult.

The first thing I did was to make a working copy of C on Microdrive. Once the compiler/editor is loaded from tape you're asked whether you wish to make a backup and a single key press will do the job. Unfortunately, this process doesn't also backup the library and I hope Hisoft includes this in future versions.

Entering source code using the line editor is straightforward. It's comprehensive and includes a full set of useful functions, such as search and replace. Source code can be entered directly, but is not recommended for large programs because mistakes cannot be rectified.

One non-standard feature I took a liking to was the ability to use commands in an immediate mode, similar to that of Basic, which allows you to 'test the water' without diving in.

What is C?

The C programming language was developed by Dennis Ritchie on a Unix system running on a DEC PDP-11. It is very much a 'bare bones' language with no inbuilt I/O, string handling or array functions. These are achieved by using routines from function libraries. This system might seem odd, but it has the advantage of making the language compact and due to the minimal set of commands and functions it can be learned quickly.

Fundamental data objects are provided by integers, characters and floating point. Control constructs include IF, WHILE, FOR and DO and there's a case-like statement called SWITCH.

C promotes the use of memory pointers, and address arithmetic is allowed. The result is that although C is not very strongly typed, it is possible to create data types quite easily.

Verdict

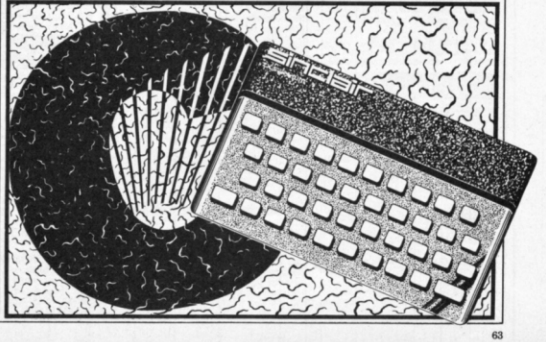
Hisoft C is an excellent tool for learning the language, and an important product for the Spectrum. The lack of floating point and identifiers is no hassle if you're learning the language, but I hope floating point will be included in later versions as integer maths is restrictive.

C is a mega-product for the Spectrum, but £25 is quite costly. Ten pounds less and more would buy it. However, to learn C on another machine you'd have to lash out somewhere in the region of a thousand pounds for the kit and a decent compiler.

REPORT CARD: 1 TO 5

Features	●●●●
Documentation	●●●●
Performance	●●●●●
Overall value	●●●●

Name Hisoft C V1.0 **System** 48K ZX-Spectrum (Microdrive compatible) **Publisher** Hisoft, 180 High Street North, Dunstable, Beds LU6 1AT 0582-696421 **Price** £25 **Availability** Mail order only



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Acorn

BBC B wanted, good condition, plenty of software, all offers considered under £300. Tel: Middlesbrough (0642) 597597.

Wanted BBC B O/S 1.2, Basic II +DFS and disk drive if possible. Other extras considered. Tel: John on Redcar (0642) 484785 after 5pm.

Acorn Electron plus 1 as new in box, plus books and 26 software titles. Worth £530 sale £399. Also please collect. Tel: 0272 839926.

Assembly Language Programming for the BBC micro computer (book), £5 ono. Tel: 01-291 2327 after 6pm.

For Sale: BBC software. Hobbit, Fortress, Elevator, Battlezone 2000, Roman, Empire, Micro Olympics, Desk Diary, The Synth, Football Manager, Confrontation, 3D Tank Zone, etc. Tel: (0962) 883671.

Electron box guarantee. Quick Shot 1, games, 6 books, joystick, interface, all leads, mags. All for £250 ono. Tel: Leon, 01-870 1884.

BBC B, 1.2 Cumana disk drive, Solidisk 32K, sideways RAM fitted. Five months' old, £575. Tel: Basingstoke 51623.

BBC Prism acoustic modem + ROM software for sale, £35 ono. Tel: Giuseppe, 01-672 4212.

BBC B software 10, swap or sell, including Micro Olympics and Overdrive. Tel: Trevor, Stevenage (0438) 313797.

BBC Soft sell, Hobbit – £7.50. Space Shuttle, Pinball Arcade, Five Spheres – £6.50. Incredible Hulk – £6. Zalaga, Starship Command, Secret Mission – £4.50. Tel: Chris, 01-550 0806.

BBC Microcomputer 32K RAM, Watford electronics disk interface, 100K disk drive, 14 inch colour monitor and software. £750. Tel: Brighton (0273) 501150.

BBC disk software — Gemini wordprocessor, £14. Rocket Raid, £7. On tape — Philosophers Quest, £6. Snapper, £5. Twin Kingdom Valley, £6. Hunchback, £4. Swoop, £4. Also Acorn Atom software. All original. Tel: Mark, 0656 870264.

Acorn Electron. As new, all leads, user guide, cover etc, in original box, £160. Tel: Reading (0734) 864070 (evenings).

BBC software cassettes (original titles), Acornsoft, £2.50 each. Micro Power, Software Invasion + others at £2 each. All 19 only £35. Tel: Richard, 01-236 6640.

BBC originals to swap inc Cylon Attack, Chukkie Egg, Daredevil Denis, Twin Kingdom, Scott Adams Adventures, Snapper, Painter, Fortress (disk). Tel: Julian, Harrogate (0423) 68383.

Wanted: BBC B O/S 1.2. Must be good condition, plenty of software, around £300. Tel: Middlesbrough (0642) 597597.

Wanted urgently: Acorn Electron for cash or swap for Spectrum 48K with loads of software for sale at £105. Tel: Bolton (0204) 31658.

Wanted, Sinclair ZX Microdrive(s), no interface I needed. Tel: 029-575-627 or 029-575 8231 any time after 4.15pm.

Wanted Sharp MZ-80B with discs, please state price and condition. Irvine 101, Petunia Crescent, Chelmsford, Essex

Amstrad

Swap Adventure Quest for any other Level 9 adventure for Amstrad. Also Roland in the Caves or sell for £5. Mr A Hagger, 60A Hartoft Rd, Hull HU5 4LJ

Amstrad CPC464 computer 64K (see all reviews) plus Toshiba music centre, 25 watts per channel. Both fairly new,. exchange for BBC computer. Tel: 0900 65614 or 71 Senhouse St, Workington, Cumbria.

Amstrad CPC464, one month old with colour monitor and software. Will sell for £290. Tel: 01-558 3646 after 7pm.

Amstrad CPC464, colour monitor, Hunter Killer, Codename Matt. All boxed, only one month old. £280 ono. Tel: 01-958 6769.

Wanted: Amstrad GT64, green screen monitor. Will arrange for collection. Tel: 0400 61075.

Apple

Apple Macintosh, 3 months' old with Macwrite/Macpaint. Offers? Tel: Alan, Coventry (0203) 78649 (evenings and weekends).

Apple II. Complete 64K RAM system. Diskdrive, PAL encorder, CP/M software, 10 software + manuals. 1-year-old. Offer £550. Excellent condition. Write, Luke, 56 Park House, Seven Sisters Rd, London N4 2LS.

Apple, Softstar/Mailmerge, Multiplan, Visidex, Information Master, Database, Artist Designer. Also MX80 and Anadex printer ribbons, Apple books. Tel: David Bromley, 0734 866372.

Atari

Wanted Atari 800. Tel: 0904 791067 after 6pm.

Atari 400, 48K, cassette drive. £500 worth of best games including Buck Rogers. Also magazines, joystick. Worth £700. Bargain £200. Tel: Alan, 04427 5434.

Atari 1050 disk drive for sale. Only £150. Tel: 061-792 6766 after 8pm.

Atari 48K 400 computer plus 1050 disk drive. £250. Or swap for good condition BBC Model B computer. Tel: 061-792 6766 after 8pm.

Atari 400 48K, 410 recorder, joystick, games, basic, manuals, £140. Tel: Chelmsford (0245) 69030.

Atari 600 XL colour computer plus Atari 1010 tape deck. As new with packaging and full instructions. Ideal Christmas gift. Tel: 0933 673414.

Atari ROMs disks and tapes to swap, very good collection. Especially wanted: new-style Atari paperclip and Track Ball. Tel: Bedford 44060 after 7pm.

Atari software for sale or swap. Encounter £5. Bruce Lee £7.50. Tel: C. P. Jones, Herne Bay 67603 anytime.

Atari software for sale. Duelling Droids, Airstrike, £4. Crossfire, £6. Zaxxon, Wizard of Wor £7.50 each. Also swap disk software. Tel: Scunthorpe 845252. Ask for Stephen.

Atari software for sale. Disk, Necromancer, Zaxxon, Pooyan cartridges, Miner 2049er, Dig Dug, Don Kong, Pole Pos, Choplifter, Centipede, Pacman, £10 each. Basic language, £15. Tel: 0727 23109.

Atari software for sale. Star Warrior, Star Trek, Galactic Chase, Preppie, Caves of Death, £5 each or the lot for £20. Tel: Canvey Island 696601.

Atari software to sell and swap. Hundreds of the very best programs available. Tel: Tamworth 51394 and ask for Foz.

Atari VCS. Boxed in excellent condition (three months new). Four cartridges, including Pitfall II, Space Shuttle, Frostbite. Only £50. Tel: 01-724 2240 after 7pm.

Atari Analog and Antic magazines wanted. Pay £1 each. Selling: Atari 400 16K, cassette recorder, Basic cartridge, books, software, joystick. £120 ono. Tel: Brighton 513671.

Atari software for sale. Combat Leader, £10. Paris in Danger, £10. War in Russia, £25. Carrier Force, £20. All ono. Tel: 01-941 6163 after 6pm.

Atari VCS for sale. 17 top games including Defender, Indy 500, joysticks, paddles, keyboards and driving controllers. £95 ono. Tel: Weybridge (0932) 55203 (evenings and weekends).

Atari 400, 32K, 1010 Data Recorder typewriter-style keyboard. Five cartridges including Basic, Pole Position, Star Raiders, lots of tape software. £150 ono. Tel: 0272 45958 after 6pm.

Atari VCS for sale. Includes 17 games including Defender, Indy 500 etc. Also includes joysticks, paddles, driving, keyboard controllers (complete set). £90 ono. Tel: Weybridge (0932) 55203 (evenings).

Commodore

CBM 8250 dual disk drive, £490 or will swap for a good CD player + cash. Tel: 021-440 2124.

Commodore 8032 business software: Visicalc, Wordcraft 80, Oz (database), all as new with manuals etc. £400 or split. Tel: 0272 567916.

Vic 20 computer software, 32K RAM cartridge, £20. Tapes, £2. Magazines. Tel: Uxbridge 56891 (Middx).

Vic 20 starters kit, 16K rampack, 2 cartridges, chess, Adventureland, 62 games inc Jetpac. Maths I plus joystick. Sell £130. Tel: 01-671 0768.

Vic 20 16K Quickshot, joystick, Basic intro (1), C2N cassette, books, manuals, games tapes, games cartridges. Total £250. Tel: 061-620 2183.

Vic 20 software for sale, new Vicgraf cartridge. Excellent for studying complicated equations and functions by their graphs. Only £17. Tel: 061-881 8091 after 6pm.

Vic 20 C2N cassette, guaranteed, 16K switchable RAM, educational software, games, books, £220. Tel: B. Bains, 021-551 6769.

Bargain! Vic-20, 16K, super expander, C2N tape deck, joystick, programmers reference guide. Jet-pac, Gridrunner, Chariot Race, Skyhawk. Five cartridges 6 months' old. £120. Tel: 01-267 0465.

CBM 64 Commodore printer, C2N cassette, printer, paper, joystick, PEG, m/c book, m/c tutor, assembler, Hobbit, International Soccer and more + mags. £380. Tel: Luton 424715 after 5pm.

Vic 20 software for sale. Various adventure and strategic games for unexpanded and expanded computer including top names like Anirog. Tel: 3780290. Ask for Daniel.

CBM 64 software. To sell or swap. Includes many American titles. Tel: 0633 850575 after 4pm and ask for Steve or Julian.

Vic 20 games, £4 each. Crazy Kong by Anirog, Galactic Abductors, Andes Attack, Skramble by Anirog. Tel: Northill 477.

Vic 20, games. Trader £5. Colonel's House Rabbit £2. Gorf £5. Krazy Kong (Software City) £2. Pharoah's Tomb £3. Panic £2. Tel: Northill 477.

Vic 20 games. Race Run (Rabbit) £3. Terraform £2. The Lair £2. Spiders of Mars (Audiogenic) cartridge £5. The Dungeons £3. Tel: Northill 477.

Vic 20 games. Outback, £2. 3-slot Motherboard, £15. Stack light rifle and three games, £15. Reference guide, £5. Tel: Gary, Northill 477.

Vic 20, 3-slot Motherboard, £15. Stack light rifle plus 3 games, £15. Reference guide, £5. Mission Impossible, £5. Mastermind, £5. Tel: Northill 477.

CBM 64. Want to swap tapes with Sweden? Many turbo-loaded games. Send list to: Bo Iseborn, Hedhamsvagatan 10d, S-82100 Bollnas, Sweden.

CBM 64 boxed little used, under guarantee, C2N recorder, manuals, Spectravideo, joystick, games including Hobbit, Camels, Falcon Patrol, Grandmaster. Sell for £275. Tel: Stephen, 01-589 0071.

Wanted Vic programmers ref guide, £3. Vic 8K software, ½rd list paid. Intro to Basic 2, ½rd list. Tel: 01-262 7856 (evenings).

Vic 20 games. All originals. Trax £4. Jetpack £4. Wacky Waiters £2. Catcha Snatcha £2. Mission Mercury £4. Alien (cartridge) £5. Blitz £1.75. Tel: Doncaster (0302) 845025.

CBM 64 software to swap. Pitfall, Decathlon, Beach-head. Any two for the Quill. Snowball for any other level nine adventure. Tel: F. Brown, Glosop (04574) 66125.

CBM 64, d/drive, CP/M (Z80), Imprex Centronics interface, two cassette decks, back-up copier box, RS232C interface, Modem software, books, tapes, disks, cartridges, £500. Tel: P. Lee, 061-789 5445.

Commodore 1525 dot-matrix printer for use with Commodore 64. Cost £230. Excellent condition. Best offer accepted. Tel: 01-444 5499.

Commodore 1525 dot-matrix printer fro use with Commodore 64. Cost £230. Excellent condition. Best offer accepted. Tel: 01-444 5499.

Commodore 64 with data recorder and over £100 worth of software and Quickshot II joystick and an extended two-year guarantee. £310 ono. Tel: 061-881 1144.

Commodore 64 C2N cassette recorder, joystick, 4 games, 'O' level physics, Laser Zone, Space Pilot, Chinese Juggler, magazines, all £180. Tel: 01-272 9822.

Vic-20 16K Super Expander, C2N Deck, five cartridges, brilliant games: Jet-Pac, Chariot Race, Gridrunner + loads of others. All this £120. Tel: 01-267 0465.

32K 4000 Series Pet 12" screen computer, with cassette CBM 4022 printer, IEEE cable. £545. Tel: Waterlooville 267189.

Vic-20 16K, cassette recorder, joystick, £120. Software, Programmers Aid, Introduction to Basic, books, all in original boxes. Tel: 021-454 0234, 4.30pm to 7.00pm. Hurry!

Vic-20 plus cassette recorder, 8K RAM pack, cartridges, cassettes, books, etc. £80 ono. Tel: Basingstoke (0256) 59336 evenings.

Vic-20 Data Recorder, Intro to Basic, various manuals and games tapes, must sell, may split. Offers around £80. Tel: 0632 665780.

2001 PET with lots of software and sound-box for sale. Tel: (0271) 870125, after 6pm.

CBM 64 programs to swap of sell. Many titles including American. Write to Stephen Kearon, 22 Westminster Lawns, Foxrock, Dublin 18, Ireland. Tel: Dublin 895634.

CBM 64 software to sell of swap: over 100 American titles including Hessgames, Arcade, Duels or tapes. Send lists; 60 Minerva Close, Latchford, Warrington, Cheshire.

CBM 64 C2N + 2JS load of software and books. Bargain at £200 ono. No haggling. Tel: 021-553 6141 ext 261 Tony, daytime.

Vic-20 C2N cassette unit, battery backed 8K, 3 slot motherboard, can save ROM on tape. Gorth + Forth cartidges etc. Offers over £100. Tel: Hawkhurst 3689.

32K Vic-20 cassette recorder, Honeyfold assembler/monitor, Intro to Basic, joystick, dustcover, £85. Software, £25. Books, dozens of magazines, accept £185. Tel: Peter. Mogador 832479.

Lynx

LYNX48K c/w cassette deck, games, books, user mags and newletters, £100. Tel: (0454) 414361 evenings.

Lynx software for sale. Many original tapes at half price. Also Lynx joystick and joystick interface for £15. Tel 0323 24921 ask for Gavin.

Lynx 96K computer, perfect condition includes Monster Mine and Power Blaster games. £170 ovno. Tel: Maidstone 0622 65635.

Dragon

Dragon 32 excellent condition, over £100 software, dustcover, joysticks, magazines, books, cartridge. One careful owner. £200 ono. Tel: Oakamoor 0538-702857.

Dragon software for sale. Sprite Magic £7, Games creator cartridge £8, Ugh, 8 ball, Skramble Pettigrews Diary £3 each. Pair Microdeal Joysticks £8. Mr A Hagger, 60A Hartoft Road, Bricknell Avenue, Hull HU5 4LJ.

DRAGON 32 2 joysticks, premier microsyst. sprite graphics board (16 colours). Books, software. £170 ono. Tel: Honington (03596) 218.

DRAGON 32 with voice synthsiser, still boxed with manual. 48 games, two joysticks, 3 books, dustcover, Dragon user magazines. All £200. Tel: 01-946 1434.

FOR SALE Buzzard Bait for the Dragon 32/64. Unwanted prize, brand new. £7. Tel: Chris, Ludlow (0584) 4291.

Dragon 32, disk drive, 2 joysticks, spare disks, software including telewriter WIP. All leads and cassette recorder. £320 ono. Tel: Nigel on 01-485 1383 will split package.

Dragon 32, with joystick, Compusense hi-res cartridge, software and books. £80 ono. Tel: Stoke-on-Trent 0782 721491.

Dragon 32 Dragon disk joysticks books tapes. Also TI99/4A with speech many books tapes and cartridges including parsec speech editor 0203 443062 after 6pm.

Lynx 48K in good condition with: manual, user and computer magazines, software, leads, power supply and introductory cassette. £130. Tel: after 5pm. (0761) 412668.

Lynx 48K complete with manuals, introductory cassette, plus eight games as new all for £75. Tel: Billericay (02774) 57485 anytime.

Lynx 48M manual handbook all leads, tapes, and magazines £130. Tel: 0904 37690 after 5pm.

48K Lynx with books, manual, leads, joystick interface and over £60 software including Snowball, Invaders, Spannerman. Sell for £150. Tel: Keith, Chichester 528596 (evenings).

Lynx 96K, parallel printer interface and serial printer lead, compatible cassette recorder, manuals and user magazines, plus software, £200 ono. Tel: Sheffield (0742) 306319.

Lynx 96K in excellent condition. Boxed with leads, manual etc, and £25 worth of software. £200 only Tel: 01-303 2483 (eves).

Oric

Orik 16K, Oric printer, cassette recorder, all leads, also Mushroom Mania and The Ultra. Sell for £110 ono. Tel: 01-368 8468.

Oric-1 48K, compatible cassette recorder, this manual 6502, machine code book, The Ultra and Zorgon's Revenge. Cost £195, sell for £90. Tel: 0204 852431 (Bolton).

Oric software, for sale. Grail, dinky Kong, Loki, Orical, Back Gammon, Oricmunch, £4 each. Xenon 1, Zorgons Revenge, £5 each. Lot £25. Tel: Leigh Sinton 33224.

48K Oric Atmos — boxed, excellent condition + Sanyo cassette player + lots of software worth £60+. Only £280, will sell for £125. Tel: (01)-876 4332 (eves).

Oric1/Atmos games for sale or swap: Hopper, Ultra, Electro-Strom, Two-Gun Turtle and Frigate, £3.50 to £4 each. Tel: (0242) 527210, ask for Matthew.

Oric 1 48K plus manual, leads, 20 games including Zorgons Revenge Xenion 1, bargain at £100 worth over £250. Tel: Bolton 597136.

For Sale, 48K Oric/Atmos micro, Hi Quality tape recorder, magazines & £50 worth of software. All for £165. Tel: Taunton 73588.

ORIC ATMOS 48K, over £100 software, several books, £120 ono. Tel: 01-399 5523 after 6.00 pm.

Oric 1 48K excellent condition plus £140 software including Zorgons, Xenon, Hunchback, Wimpy etc. Manual and books included in price of £140. Tel: Cannock (Staffs) 78633.

Sharp

Sharp MZ80K, WP, Visicals, etc, matrix printer, cost, £875 as new, accept £475. Tel: 0480 57371 Julia Mejer daytime.

Pocket Computer, Sharp PC-1211 plus CE-121 cassette interface plus much software, books and information. Includes games, utilities, application only, £60 inclusive! Tel: 01-654-2582 (Paul).

Sharp PC1245 computer CE1245 printer/micro — cassette (built-in) interface, machine code manual, software, instruction tapes. Boxed excellent condition, £130. Tel: 01-521 1058.

Spectrum

Spectrum 48K, Quickshot 2 joystick plus interface, 22 original games, Valhalla, Hobbit, plus 5 Spectrum books, worth £320, sell £209. Tel: (0425) 57409 after 5pm.

Spectrum software 5 games + original keyboard + new power pack swap for Currah Speech. Tel: Penrhyn 77322, McHugh, 44 Namur Road, Penicuik, Midlothian.

Spectrum 48K Cheetah keyboard, Cambridge programmable interface, Kempston Sinclair joystick interface, Fullerbox software, £230 or will swap for Commodore or Amstrad. Tel: Bedford 44060.

Swap VTX5000 Modem for Spectrum keyboard also software to sell/swap (originals). 36 The Riggs, Avchtermuchyh, Fife, FY14 7DX.

QL first offer over £350 secures must sell soon, also parallel interface £40. Tel: Tony 01-578-7704 after 7pm.

Spectrum games Arcadia, Escape, Ghost Town, Kong, Meteor Storm, Orbiter, Roman Empire, Eye of Star Warrior, Flix, £20. RA Kidd, 20 Buckfast Close, Ipswich, Suffolk.

Spectrum software for sale all originals at half price. Send sae for list. Wanted Alphacom Printer. Ann Woods, 73 Alcester Road, Moseley, Birmingham.

Spectrum software to swap/sell Valhalla, £8, Doomsday Castle, £3.50, Avenger £2.50, Braxx Bluff, £4.50 ono. Robert Alberici, 5 Wentworth Close, Finchley London N30.

If you want to swap software information, hints and tips for the Spectrum or Vic 20 write to: John Farkes, 22 Chichester Close, Grantham, Lincs NG31 8AG.

Spectrum 48K ZX printer Kempston joystick, software, blank tapes, floppy records, £180 ono. 33 Plumtree Rd, Thorngumbald Nr Hull. Tel: Keyingham (0964) 6038.

16K ZX81 complete with typewriter style keyboard, manual, books, and software including 3D Monster Maze and Mazogs. Only £50. Tel: Basildon 27254 after 6pm.

Sinclair QL complete with software and manual. Unused, 3 months old, offers? Tel: Ian Ferguson 01-641 3500 Ext32.

SPECTRUM 48K, (mint condition, +28 chart games worth £250, + joystick-Interface, yours £160. No offers. Tel: 01-370 5042 eves and weekends.

48K SPECTRUM, Saga keyboard, Spectra sound, ZX printer + paper, Interface 2, tape recorder, handbooks, software, books all as new, bargain, £160. Tel: Luton (0582) 38018.

Spectrum Software — Warlock plus book £6, Valhala £10, Hurg £10, Trans Am £3, Hunchback £4.50, Chess 2, Flight £3, Tel: Watford 43114 (4-10pm) Mon-Sat.

16K Spectrum with over £100 worth of software, plus lots of mags and couple of books for £85. Tel: Matthew, East Grinstead 25245.

Spectrum 48K, 6 months old vgc, some software included, £100 ono. Tel: Wendover 623497.

Spectrum 48K with interface one, RS232 lead, ZX printer, Hi-Soft Pascal and Devpac, B/W TV, £155. Tel: 0274-873935.

ZX Microdrive and Interface, 1 plus four cartridges and Microdrive book, cost, £125 will sell for £75. Tel: 01-556 1841 (London E10).

Swap my Spectrum 48K, tape-recorder, joystick — interface, over 50 games, dust-cover, board for a Commodore 64+ C2N-cassette or sell for £240ono. Tel: Slough 70288 after 4pm.

ZX 81, 16K, £30 of games, manual + mags, adaptor, leads, blank tapes, boxed as new, £60 ono. Tel: Glasgow 041-649 8099.

48K Spectrum, Interface 1, Microdrive, six cartridges, Kempston interface, Quickshot II joystick, ZX printer + paper, lots of software, some on Microdrive, offers? Tel: Plymouth 0752 262838.

ZX81 16K Still leads manual plenty of tapes plus blank ones. Buyer must collect, bargain £35. Tel: Brighton 503549 after 6pm, ask for Penny.

Spectrum, Artic Forth, Scope II, Fifth, Code Name Mat, Fighter Pilot, Lords of Midnight, Doomsday Castle, JSW, Valhalla, Hobbit, all half-price. Tel: Sheffield 460004.

Spectrum Currah Microspeech, Kempston/Protek joystick interface plus Quickshot II joystick. Will swap for Alphacom or ZX printer. Tel: 01-853 1179 Steve (eves).

Spectrum 48K Tronics keyboard, Interface one, two Microdrives, ZX printer, ZXL print III interface. Software including Tasword 2 word-processor, Masterfile book, manuals vgc, £270. Tel: 01-898 0482.

Spectrum Games inc . . . Robotron, Kokotoni Wilf, Tir-Na Nog, Beach Head, Strip Poker, Wthas Tec Steve 0703 767580. Also CBM64 software from 80p a game.

48K Spectrum Interface 1, Microdrive sound AMP DK Tronics keyboard cassette recorder lots of software disk + mags might deliver, £160. Write N Eagles 20, Wheatley St, W. Bromwich, W. Midlands, B70 9TY.

Texas

TI 99 MOD 1, 48K, twin disks, video monitor, 300 Baud modem. NEW-DOS-80, business progs, assemblers, disassems, montors, EPROM programmer, owned by enthusiast, £700. Tel: 02302-4606.

TI 99/4A computer plus expansion unit with two disk drives, 32KRAM, RS232 and full assembler cartridge, will sell separately, Offers? Tel: 01-625 8455 (eves).

TRS80 Level II 16K Tandy tape recorder leads games and business software manuals and books, £75. Ideal first micro. Tel: Ruislip 38267.

TI 99/4A computer plus expansion unit with two disk drives, 32KRAM, RS232 and full assembler cartridge, will sell separately, Offers? Tel: 01-625 8455 (eves).

Peripherals

Seikosha GP100A printer, BBC cable, 5 spare ribbons, paper perfect condition, £135. Tel: Richard, anytime 01-236-6640.

Skywave multi tasking Forth Eprom for BBC micros, £40 ono. FM Smith, 44 Sackville Road, Hove East Sussex.

Tech Z80 second processor for BBC complete with 'Perfect' software cost £340 sell for £210. Tel: 0761-71675 after 6pm.

Brother EP22 printer/typewriter, 16 character correction, 2K memory, simple editing functions, portable mains/battery, RS232 interface, thermal/plain paper, £110 ono. Tel: Cooper 01-998 0354.

Swap President Homebase CB K40 power mike, silver rod aerial, coax cable, and SWR meter, for Interface 1 and Microdrive. Tel: Gerrards Cross 888857.

Centronics compatible printerface for any Atari computer. Works with Epson, Star, Juki etc. All cables included, £30. Tel: Portsmouth 731039.

ED+ASM + assembler/monitor for Tandy color computer with manual and Zak's 6809 book. Cost £50+, sell for £30. Tel: Tyneside 091 2761031 after 6pm.

Two modems both direct connect, one Prestel 1000 for Prestel with BBC ROM software, £60, other 300 baud answer/orionate FDUP, £35. Tel: 01-567-2232.

Phoenix Green monitor, 24MHZ, composite sync, RGB adaptor lead, boxed as new, two months old, £90. London NW4. Tel: 01-202-4184 eves.

Line Printer VII with parallel and RS232 interface, dot matrix, with cable for BBC B £120. Tel: Gosport 581040.

DKTronics lightpen for Alphacom printer or software (Spectrum) especially Quill. Sell for £15. Ross Harris 36, The Riggs, Auchtermuchty, Fife, KY14 7DX.

Wanted Microvitec monitor for QL. Also Qume printer. Tel: Mendlesham 7130 eves.

Mushroom Printer userport interface for Electron, cost, £39.95 only £29.99. Also BBC and Electron books For sale, machine code, assembly etc. Tel: Andy 01-986 5495.

Alphacom 42 printer for Commodore 64. Also 10 rolls of paper £70. Write A. Forester, Sunnyside, Agincourt Rd, London NW3.

Others

Newbrain Ad, PSU, all cables including printer, technical manual, £60 of software, all as new, £95. Tel: Jim 0202 518828.

Colour Genie 16K, new Basic ROMs, technical manual, monitor lead, game tape, £75 ono. Tel: Herne Bay 69108 after 5pm, weekdays, anytime during weekends.

Wizard 320 Gem Electronic organ £200 ono or swap for computer plus extras and software. Spectrum or Commodore preferred. Tel: 01-595-8275.

MZ711 good condition plus £100 software, plus tape deck, will allow to go for, £250. Tel: Rickmansworth 770216.

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Commodore

Comodore 64 games for sale. Panic, Frogrun, Labyrinth, £2.50 each. All three for £7.00. Ring Basingstoke 25795, ask for Keith after 4.30pm on weekdays.

CBM 64 software 8 titles all originals. Worth more than £50. Sell for £35 or split for £5 each. Phone Leeds 812094 after 7pm.

Commodore 64 with disk drive iand printer. Software-easyscript, Super Base 64 advanced Calc-Result Assembler. £350. Tel: Saffron Walden (0799) 24244 evenings.

Vic 20 16K World Cup Manager pick your own team only £5.50 to C. Wright 3 Rushall Court, West Road, Hamstead Great Barr, Birmingham B43 SPD.

Commodore 64 Games: Ancipitai, Zaxxon, Pole, Position, QUO Vadis. Your list for mine. Steve, 12, Windsor Close, Tamworth, Staffs, B79 8UH.

Commodore 64 Computer unused in original box. £140 ono for quick sale. Ring 01-244 9900, day or evening, Earls Court. Will deliver Central London.

CBM 64, cassette, coverm, programmers manuals software including Hobbit and book, all boxed. Plus lots of mags. Bargain at £200. Tel: 01-582 1158 eves. (6-8).

Commodore 64 with lotsa extras for sale. Reference guide, tapes, games, tutorirdges, assembler tutor course, etc. £150 takes all. Copthorne 0342-712263.

Commodore 1701 monitor. Unused and still boxed and under warranty. New £200. I'll sell for £150. Copthorn 0342-712263.

CBM64 software for sale, original, China Miner £4, Solo £6.50, Grandmaster £5, Hobbit £6, Revenge £3, Underwurlde £3, Cyclon £1, all for £20. Tel: Albert 0865-54084 (after 7.30pm).

Commodore Pet wanted series 2000 or 4000 in working order. Must have Tim or other monitor. Will pay up to £80 Mike 051-639 4516.

Commodore 64 games for sale. Panic, Frogrun, Labyrinth £2.50 each. All three for £7. Ring Basingstoke 25795 ask for Keith after 4.30pm on weekdays.

Commodore Vic 20 and cassette unit plus super expander cartridge and books and magazines £75 ono. Tel: Nailsea 0272-852598.

Wanted Commodore 64. Will swop my 48K Spectrum. Fuller box, Cheetah keyboard, Kempston and programmable interface, tape recorder. Loads of games. Ring Bedford 44060.

Software for C64 Twenty original games for sale or part-swap for Pentax Spotmatic camera body or complete. Tel: Stephen 01-589 0071.

Commodore 64 software for sale. Beach Head Decathlon Spitfire Ace Turbo 64, Hulk etc. Also some Spectrum. Ring 01-731 3194.

Wanted Music Composer cartridge for Commodore 64. Will pay good price. Contact Mick 146 Andover Road Bestwood Nottingham NG8-5GA.

Commodore 64 software wanted to swap. Many titles available. Write with program list to Mick 146 Andover Road,Bestwood Nottingham NG5-5GA.

Vic 20 software for sale. Star Battle £4.50; Crazy Kong £2.50, Grand Master £2, etc. All less than half price. Tel: 031-339 3076 evenings.

CBM 64 software (original). Sell or swap Solo £7; Flight Path, Hunchback, Falcon Patrol, Ceasar, Revenge, Cyclon, Manic Miner (disk); Grandmaster, Jumping Jack. All less than half-price. Ring (Albert) 0865-54084 evening.

CBM 64 tapes. Valhalla, Hobbit, Lordsof Time, Galaxy, Astrochase; Arabian Nights, Falcon Patrol, Neoclyps; Revenge, Mutant Camels. All half price. Tel: 0332-752567.

CBM64 C2N cassette. Simons basic cartridge, InternationalSoccer cartridge, light pen, joystick, plus £80 of software £220 the lot. Ring 0532-524755.

Wanted Commodore 64 disk software. Anything considered. Send list to: Mark Lednor, Mansfield Hall, Kenderick Road, Reading, RG1 5DX.

Commodore 64 and tape deck, joystick and manuals £170. Disk drive £180. Software and books at various prices. Tel: 01-934 5962 daytime, Fleet 4655 even.

Vic 20 C2N 3 slot motherboard and 8K 16K RAM super expander. Machine code monitor, Eprom programer, joystick, books software games £150. 01-650 2788 eves.

Vic 20 games £2 each. Bargon II Chess£3. 30 games. Total worth over £200. £60 the lot or swap Tandy TP-10 printer Tel: (0294) 56449.

Vic 20, 16K Ram, cassette deck, 2 joysticks, 4 cartridges, 30 games, 5 books, magazines, dust cover, history 'O' level cost over £450, only £250 ono. Andrew, Denbigh 4394.

CBM 64 software intro to Basic, Practical, Monopole, Ship of the Line. All on cassette. CBM64/Vic 20 cover, and working commodore 64 book. Tel: Bedworth 316599.

64 games, sell or swap. Titles include: Beachhead Dash, Cavern, Starwars, Jungle Hunt. Plus many more. Tel: 052785-2518. Ask for Lee, after 5pm.

Vic 1540 disk drive including games and utility disks £190. Tel: 01-959 2245.

Vic 20 Computer 32K RAM in Arfon Motherboard with switched slots and games toolkit/, expander, cartridges and C2N. Data corder with books and magazine £200. Tel: 01-959 2245.

CBM 64 software for sale: Revenge £5, Attack £4, Gaurdian £6, Annihilator £3, Falcon Patrol £4, BMX £1. Available together £20. All originals. Tel: (0245) 442509.

Commodore 4032 and 4040. Dual disc drives, manual, cables and large selection of educational software. Only £550 ono. Tel: 0235 24795 (office hours).

Amazing value C64 Easyfile information handling system only £35 (RRP £50). Also introduction to Basic Part 1, only £7 (RRP £14.95). Both £40. Tel: 0558 822509.

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CBM64 plus cassette recorder, two joysticks, books, prog. ref. guide, magazines, software, Hobbit Leve 9 adventures, Grid Runner etc. The Quill. Cost over £370 sell £2.30. Tel: 021 786 2751.

Vic 20 +3K super expander, tape recorder, joystick, eight tape games, manuals. All fully boxed. £100. Tel: 0359-40207 after 6pm.

Atari

Atari 6000XL + cassette recorder + two joysticks, 20games, large amount of listings, 4 books on the Atari 6502 machine code book, £190 ono. Tel: 0705 734434.

Atari software wanted. Will buy anything not available. Will also sell/ swap any software you need. Tel: Farnworth 0627-51394 and ask for Foz.

Atari 400 16K + 410 recorder + joystick + 23 cartridges, games including Zaxxon, Diamonds, Preppie 1+2, Shamus, Airstrike + adventures. Worth £500, sell for £110 ono. Tel: Burscough (0704) 894885 after 6pm.

Atari 400 computer for sale without Basic. One month old. Unwanted gift £40 ono. Tel: (021) 358 1010.

Atari cassette recorder and some software. Offers? Tel: Chris, 01-550 0806 after 6pm.

Atari software for sale. Caves of Death, Star Warrior, Preppie, Star Trek, Galactic Chase, £5 each or £20 lot, original. Tel: Canvey Island 696601.

Atari software for sale: originals with instructions: Scram, Leggit, Airstrike 2, Lander, Donkey Kong, Jumbo Jet Pilot, Macro Assembler Editor. Tel: 0424 421942.

Atari owner with disc drive has some software to swap. Tel: Bedford 44060 after 7. Also 20 ROMs for sale, Popeye, Tennis, Q Bert, Astrochase.

Atari 800, 48K + Basic + assembler + five cartridges + Bluemax, Solofight, Overmind, Temple, Apshai, Baja Buggies, Computer war tapes + joystick, £140.. Tel: (01) 602 0472 after 7pm.

Atari 400 plus cassette recorder. Basic, manuals, joysticks and lots of software, including Pole Position, Star Raiders, Zaxxon, Darts, Snooker, £150 ono. Tel: 01-530 2768.

Atari 600XLcomputer with £160 worth of software. Unused and in perfect condition. Cost £220. Sell for £120 ono. Tel: 01-863 5113.

Atari 800XL, cassette deck, £200 plus software, joysticks, £300. Atari VCS, 17 games, £150. Grifter Mkl, £30. All excellent condition. Sell all for £400. Tel: 01-253 8395.

Atari 800, wanted. Tel: 0904 791067.

Atari VCS, six cartridges, £60. Or swap for Spectrum 48K plus all leads or Atari 600XL with all leads. Tel: Wolverhampton 782386.

Atari disks for sale. Dallas Quest and Solo Flight, £9 each, as new. Also Eastern Front cassette, £5. Tel: Dick, Tiverton 257064 (evenings).

Atari 600XL, 1010 Atari, tape recorder. Brand new Donkey Kong, cartridge, two joysticks and manuals. Tel: 061-442 0373 or 432 3514, want £110.

Atari 600XL +1010 recorder + joysticks + software including Donkey Kong. All excellent condition, £160 ono. Tel: 0928 33697 (Frodsham) Great Xmas gift.

Wanted Atari VCS cartridges: Starpath supercharger, plus cassettes: Prefer cartridge not by Atari. Letter replies sae's helpful: Charles Trager, 7 Grantley Street, Glasgow, Scotland, G41 3PT.

Atari 400 48K full stroke keyboard, dust cover, Hyperblast, Space Shuttle, Myriapede, Computer Cube. Tapeclone invitation to programing, and basic £125. Tel: Sheering (02799) 509.

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Wanted Atari 600 48K computer or Atari 400 with real keyboard. Tel: Crowborough (08926) 2059.

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Acorn Electron, plus BBC data recorder. Both as new. Acorn User magazines, books, etc, £180 ono. Tel: 0408 21870 (eves please).

Brand new BBC B £310 ovon. Tel: Phil, 0249 654922 (weekends), 02273 61017 (weekdays).

Acorn Z80 second processor for BBC micro. Unsuitable for my needs. £275 ovno. Tel: Reigate 41033.

Acorn Electron software for sale. Bandits at 3 o'clock, Felix in the Factory, £3 each. David Roberts, 25 Oxwich Road, Mochdre, Colwyn Bay, Clwyd.

Acorn Electron Software. Pettigrew Library, Escape From Moonbase Alpha. All originals, £3 each. David Roberts, 25, Oxwich Rd, Mochdre, Colwyn Bay, Clwyd.

BBC model B plus Basic and assembly code books, £250, games included. Cassette recorder, £10. Tel: Epsom 22439 after 7pm.

Electron A/Dconverter built from Electronic and Computing Monthly Dec '83 with instructions, £15. Tel: 0408 21870 (eves please).

Could I borrow somebody's Acorn Atom circuit diagram — mine's in bad condition. Will photocopy, return, pay for postage. Tel: Russell, evenings/weekends 0707-54385.

BBC games for sale. All originals, Elite, Zelaga etc. Tel: Chris, 01-550 0806 after 6pm. Also Atari software and cassette recorder.

Acorn Electron first byte interface with joystick, excellent condition, only £30. Tel: Write, The Rookery, Barning, Kent ME16 9NA. Tel: (0622) 26263 after 5pm.

Acorn DFS ROM original but no manual. £15 ono. Tel: Mr Barret, Leeds 647483.

Acorn Electron software to swap. Send lists of haves and wants. Micro Power games and some Acornsoft ones. 4, Osprey Gdns, Sheffield S2 5GE.

Electron software for sale: Micro Olympics, Pool, Killer Gorilla, Blagger, Bugblaster, Football Champions, and Quest for Holy Grail. £4 each. Tel: 0233 2746 after 6pm.

BBC B software for sale. Gunsmoke, Cosmic Cruiser, Hunchback, Ingruders. All original. £3 each. Write to Justin Hawkins, 109 King St, Tremawr, Gwent, S Wales NP3 4SU.

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BBC model B micro wanted, preferably OSI.2. Will pay up to £150. Soft and hardwares considered. Tel: Thorne, (Doncaster, S. Yorks) (0405) 814412.

BBC-B track double sided drive, cassette recorder, double density interface, disks advanced user guide, joystick + £520 software. Excellent condition. £700 ono. Tel: Robert, (0255) 507717.

Electron Books for sale brand new. Easy programming for Electron manual, machine code for Electron all £2 each plus postage. Tel: Kingswinford 271187.

Acorn Electron boxed, nearly new guaranteed, leads, £75 of software plus books, worth £280, only £165 ono. Tel: 01-689 4234 (William after 6pm).

Electron recorder + games (inc Aviator, Chucky Egg) plus two extra books and many mags. Worth over £20. Full boxed, offers please. Tel: Billingham 551049 after 4pm.

Electron plus Atari recorder + games, inc Aviator, Chucky Egg) plus extra books, many mags. Worth over £320. Offers please, boxed. Tel: Billingham 551049 after 4pm.

Amstrad

Amstrad CPC 464 with colour monitor for sale. Offers? Tel: (021) 358 1010.

Wanted: Amstrad with or without monitor. Also Epson PX80 or Canon printer in good condition. Contact Jack, 209 Castle Cliff, St. Andrews, Fife KY16 9AJ.

Swap Amstrad 901 CB power pack, manual, power Mike, SWR meter, extension speaker, books, mags, for Centronics printer or sell. Tel: Peterborough (0733) 241354.

Amstrad CPC 464 (b/w monitor) plus colour modulator for sale £160. Any evening after 6pm, Mr C Tubb, 18 Farmers Court, Westlands, Droitwich, Worcs, WR9 9EL.

Amstrad CPC 464 Colour monitor including joystick, software, magazines. As new, £295. Also introduction to Basic Part 1, £12. Tel: Bradford (0274) 881896.

Dragon

Dragon 32 guarantee, boxed, all leads, manual, 2 joysticks, £100 of software, users magazines. Basic tutorial, worth £300, sell for £130. Tel: Medway 405981.

PCN Billboard

Dragon 32, 3 joysticks, £250 software, various books, manuals, subscription to user mags, cost £550, just £220 ono. Tel: Elaine 0227 69694 (after 6pm).

Dragon 32 still in box complete with cassette recorder, joystick, lots of software £60. Tel: Tewkesbury 0684 295348.

Dragon 32, 1 joystick, £90 of original software and dustcover, £140. Tel: St Albans 62082.

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Dragon 32 boxed, as new, joysticks and lots of software. Exchange for Spectrum peripherals or £80 cash. Tel: Rugeley 6677.

Tandy

Tandy PTC-64 printer controller, boxed and unused with printer cable. £190. ono. Tel: 01-720 0469.

Tandy Monitor, 12in, Green screen £35. Tel: 0294 64144 (Ayrshire) after 6pm.

Tandy Models I/III cassette software (originals) Script including manual and Trainer £15. Jumbo Simulator, Database, VAT Register £8 each. Tel: Welwyn Garden City 24591.

TRS-80 Model 1 16K, Level II, cassette recorder, Modulator, much software inc. Games, assembler, monitors, utilities. Bargain £110. Tel: Oakley (02302) 4420.

TRS-80 Model 1, Level 2, 16K, video disply unit, recorder, printer interface (Centronic), manuals. Games and business software. Also extra books £75. Tel: 04024 44413 eves only.

TRS 80 model 1, 48K internal memory, monitor, cassette, £300+ software plus books, lower case, £125 ono. Tel: Nigel 0494 716686 after 6pm.

Tandy CGP-115 colour, graphics printer + Dragon lead. Cost £167, sell for £90. Boxed as new. Tel: 01-360 3443.

Peripherals

Printer, Tandy LPIII dot matrix, Centronics interface, business quality with 140 CPS Bi-directional printing. Immaculate condition £180. Tel: Welwyn Garden City 24591 after 6pm.

Yamaha CS-01' synth £50. Sharp PC1211 + tape interface £20. CGL M5 Basic-G Fale 8 games £200 ono or w.h.y. Contact S Rima Kylemore, Connemara, Co Galway.

Wanted Desperately! Spectrum lightpen and/or White Lighting. Also; for sale, original software, electronic games and equipment, and 6 × 60 telescope. Tel: (0425) 57409.

Epson FX-80 printer with BBC cable, screen dump ROM and character definer, software. Excellent condition £335 ono. Prism modem 1000 + RS423 cable. £55 ono. Tel: 0227 751100.

Wanted 1541 disk drive plus Serious software for 64. Tel: 0484 29990 after 19.00 hrs. E.G. Multiplam The Last One Easyscript etc.

Prism VTX 5000 modem for use with Sinclair Spectrum. Excellent condition, as new with operating instructions £65. Tel: 0793 611525.

Saga Emperor keyboard for Spectrum. Brand new unopened duplicated, gift! First £45. Can deliver in Midlands. Tel: 06845 68095 after 6pm.

Wanted! Centronics printer, good condition and under £100. Tel: (0622) 842823 after 6pm. Ask for Matthew.

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Seikosha GP-100A printer with Kempston interface for Spectrum £135. Tel: Hinds (0792) 69688.

Quickshot joystick/Sureshot, programmeable interface for Spectrum. Original Hobbit and Jetpac Software. All as new. half price at £30 the lot. Tel: 051 523 9217.

Brother EP22 printer typewriter. Will interface with Atari, Commodore, TI99, Epson, Nec, Sharp, Sord. Mint condition. Cost £145, bargain £80. Tel: Macclesfield 26571.

MCP40 printer/plotter, never used, full pens with manual and box, unwanted gift, half price £55. Tel: Martyn, 01-670 1984.

Spectrum peripherals: Prism VTX5000 modem £60. Currah 'U-speech' £19. Frel programmable joystick interface + Quickshot joystick £19. All boxed, mint. Tel: 0742 460004.

Sharp

Sharp MZ80K computer with twin disk drives and printer. Software including interpreted/compiled Basic. FDOS. Forth. Disk assembler. £495. Tel: Brighton 556668.

Sharp MX80A, excellent condition, hardly used, original packaging, various software worth £100. Offers around £250. Tel: Teresa on Bristol 642132 daytime or 712467 evenings.

Swap Sharp PC-1245, brand new, still under guarantee for ZX 87 expanded or not as long as its in good condition. Tel: Paul 01-804 3229.

Sharp MZ700, 64K, built in recorder assembler/disassembler database. Chess, manual, books on machine code. 3 months old £160 ono. Tel: 01-749 1165.

Sharp MZ 80K, integral tape recorder monitor, high res graphics board, lots of software, books. £200 ono. Tel: 0702 348109 evenings.

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TI99/4A with cassette lead, soccer module and all manuals. In original box. £60 ono. Buyer collects (Humberside) or pays delivery. Tel: 0401-50154 after 6pm.

TI99/4A + 5 cartridges including ex/basic, Parsec and cass/leads plus cassette, software. All with manuals. All good condition £120. Tel: (0283) 860489 after 6.30pm.

TI99/4A microcomputer £50. Extended basic £35. Both together £75. Also modules £7 each, 99'ER magazines £2 each, speech synthesiser £25. Tel: 01-904 7884 evens/w.e.

TI99/4A, console, extended basic, manuals, speech synthesiser plus editor, 4 cartridges, joysticks, 9 cassettes, vgc £150 or will split. Tel: 0423 886353 after 6pm.

TI99/4A microcomputer £50, minimemory module. £30, games modules £7 each. 99'ER magazines modules £7 each. 99'ER magazines £2 each, speech synthesiser £25. Original programmes on tape £2. Tel: 01-904 7884 evens/w.e.

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48K Spectrum, Kempston joystick and interface, leads, books, ten programs, Penetrator Vu-3D, Hurg, Trans-am, Lunar, Jetman, Pssst, Thrusta, Transylvanian Tower, Spectrum Computing, Horizons. £138. Tel: Ipswich 0473 49025.

16K for sale £350 ono. includes IQLUG newsletters and RS232 lead, also parallel interface £40 ono. Tel: Tony, 01-578 7704 after 7pm.

Spectrum software for swap or sale. Come on I can't be the only ZX addict in Ireland! Write to Brian, 5 Almeida Terrace, Dublin 6.

Spectrum, CBM-64 Dragon, original software for sale. These are originals not copies. Tel: 061 881 3651 for list. Ask for Tony.

48K Spectrum tape recorder programmable Kempsten Quickshoot II joystick, all p.w.o. plus mags, books, boxes and games £140 ono. Tel: 0703 891723, ask for Matthew.

Spectrum 48K + joystick, interface for sale. Unwanted gift. (Brand new). £100 ono. Tel: Dartford 331597, or write H. Coe, 24 Craydene Road, Slade Green, Kent.

Interface 1 and microdrive for Spectrum. Unwanted gift, £90 ono. Also ZX printer and paper £30 ono. Tel: 331597 or write H. Coe, 24 Craydene Road, Slade Green, Kent.

ZX81 plus 16K RAM pack and power supply, only £20. Will separate. Write to Darren Walshe, 76, Rayside, Basildon, Essex SS141NB.

Wanted: ZX81 RAM pack, not Sinclair and technical books. Tel: (0625) 72988 after 6pm.

48K Spectrum, software originals including Monty Mole, Koko, Toni Wilf. Also magazines and books £140. Tel: Ian Vatcher, 0202 721010. 49 Belmont Road, Parkstone, Poole.

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Help!! I'm after a 16K RAM pack for my ZX80 and any other ZX80 info/ software/hardware etc. Please tel Mike 0558 822509.

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QUIT

There was an interesting item in *PCN*'s mailbag recently — a copy of the Conservative Computer Forum's newspaper.

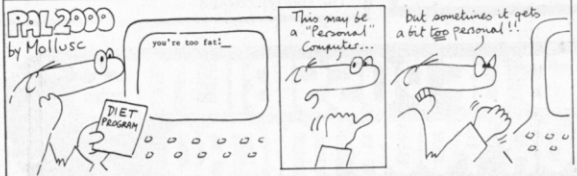
The most intriguing bit was tucked away inside the newspaper. Welcoming Geoffrey Pattie as Kenneth Baker's replacement as Minister for Information Technology, the paper says: 'His experience at the Ministry of Defence where he has spearheaded the military application of new technology will serve him well . . .'

Why? What's the Government planning . . . missile guidance for A-level? O-level counter espionage?

Amstrad owners will be interested in the lastest issue of Your Computer which carries a round-up of software for their machine. Among the products is Amsoft's version of MikroGen's Master Chess which is highly praised for its book openings and other qualities. Unmentioned, but apparent in the photograph, is the fact that the board is the wrong way round so crucial pieces are on the wrong-coloured squares. A case of no check, mate?

BEEFY NUMBER — We receive a lot of press releases here at *PCN* and most are mundane at best. The one accompanying this photograph grabbed our attention for obvious reasons. Less obvious is the fact that it is not promoting a new package for cattle farmers but a version of Unix from Root Computers running on Comcen's 68000-based system.

So where does the friendly bovine come in? Simply to back up the headline 'Comcen beefs up Unix'. But as Comcen itself admits, it adds a entirely new meaning to the expression 'a load of bull'.



SYNTAX ERROR

Either we're perfect or you're not reading the magazine carefully enough, but there were no syntax errors in last week's issue.

NEXT WEEK

BBC Upgrade
Looking for a second processor for your Beeb? Upgrade Technologies has one that is as good as Acorn's and costs less. We test it out.

Digital Debut
Don't miss our world exclusive on th latest desktop system from Digital.

Professional words on the Spectrum
Turn your Spectrum into a word processor with our listing.

Splitting the 64
Divide your Commodore 64 screen in two by exploiting rasters.

Memotech extras
Make your Memotech more versatile by adding extra routines.

Floating Atari
Atari programmers who miss the ability to use floating numbers, take heart — we provide a series or routines for you to key in.

Peripherals
How does Oasis Electronics' EPROM programmer measure up? Why are we in a fizz over Smith Corona's D200 printed?

Software
As well as a bumper crop of games, we get down to business with a graphics package for the Spectrum and verbalise on two word processing packages for the Amstrad.

PCN DATELINES

Event	Dates	Venue	Organisers
Scottish Home Computer and Electronics Show	November 9-11	Anderston Centre, Glasgow	Trade Exhibitions Scotland, 0764-4204
COMPEC	November 13-16	Olympia, London	Reed Exhibitions 01-643 8040
Schools Computer Fair	November 14-15	Pembroke Halls, Manchester	EPC, 01-580 6321
COMDEX	November 14-18	Las Vagas, USA	Interface Group Inc, 300 First Ave, Needham, MA, 02194, USA
6809 Show	November 17-18	Royal Horticultural Halls, London SW1	Computer Marketplace Exhibitions, 01-930 1612
Artificial Intelligence Seminar	November 17-18	Middlesex Poly, London	Intellect Seminars, Steve Torrance, 01-801 3434
ZX Mircrofair	November 17-18	Alexandra Palace, London N22	Mike Johnstone, 01-801 9172
Humberside Computerfair	November 18	Winter Gardens, Cleethorpes	Grimsby Computer Club, 0472-694047
Videotex Europe Exhbn & Conf	November 20-22	Amsterdam, Holland	Online Conferences, 01-868 4466
Penwith Computer Club Exhibition	November 24	St Pauls Old School, Penzance	Jeremy Hewitt, 0736-787159
Computer China	Nov 25-Dec 1	Xiamen, China	Beta Exhibitions, 01-405 6233
Intl Exposition for Technology Transfer	Nov 27-30	Metropole Hotel, Brighton	Concorde Services, 01-749 6171

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