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PERSONAL Computer NEWS

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COMMODORE'S PLUS/4

121 colours and shades of integration

64 EXCLUSIVE
Free game from the author of Monty Mole - p12

PANORAMIC SPECTRUM
64-column screen utility to type in - p18

BIGGER BEEB
32K and hi-res on one board - p38

BIG GAME HUNTING
New releases for 64, Spectrum and BBC - p47

FREE COMPETITION

JOIN THE ELITE

An Electron computer, and 30 copies of Acornsoft's megagame must be won!

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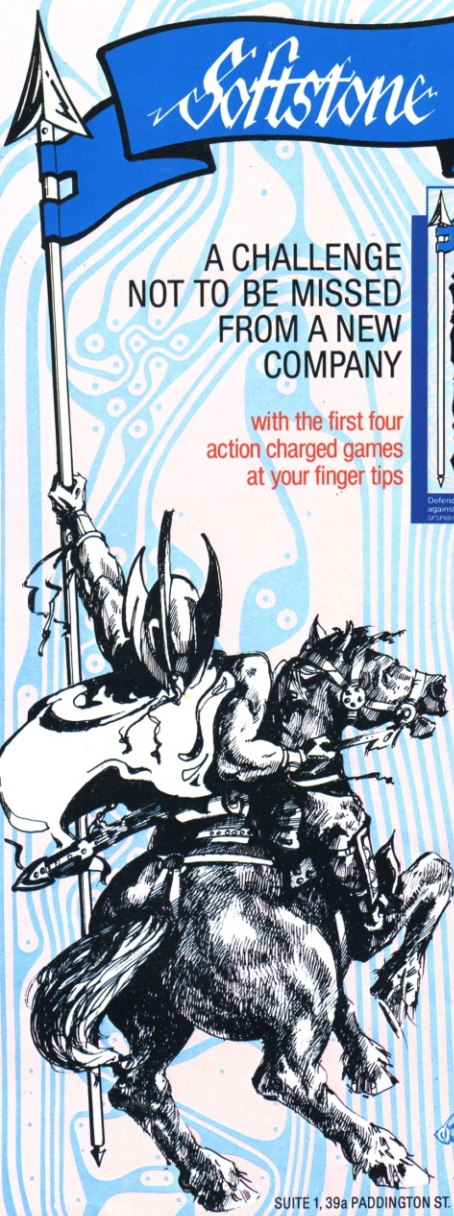

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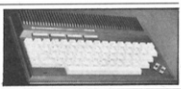
Has Commodore come up with a new block-buster? With the bundling of applications software in a low-cost 64K micro it should give buyers pause for thought.



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Rumours, gossip, Mollusc and more — plus forthcoming computer events.

MONITOR

Spectrum gets a facelift

Sinclair has dropped the veil of secrecy surrounding its home micro plans and will launch the Spectrum Plus this week.

The machine works like a Spectrum, looks like a QL and is likely to cost about £50 more than the current model. It is a 48K system said to be completely compatible with existing Spectrum software and with the Interfaces 1 and 2.

Maybe with the MSX machines in mind, Sinclair is equipping the Spectrum Plus with a 'professional' keyboard. It hasn't had to look too far to find one — the Spectrum Plus's case is in effect a cut-down QL shorn of the Microdrives.

Sinclair has gone overboard on the number of new keys wired in, possibly to make sure the Spectrum Plus outclasses any of the existing third party add-on keyboards.

The keys are full-travel, using a membrane beneath similar to that used by the QL. There is a full space-bar, with cursor keys either side of it, QL-fashion, and punctuation, E Mode, Edit, Delete, Graphics, Break and True and Inverse Video keys have also been added.

The machine also has twin Symbol and Caps Shift keys. Sinclair wouldn't comment on internal modifications, but unless the company has done something clever the ULA may have had to be changed. Manufacturers of add-on keyboards have repeatedly run into crashing problems when they've tried to wire too many keys in.

Only two weeks ago Sinclair was denying point blank that it had any plans for a new version of the Spectrum (issue 82). Either the company has done very well to keep it a secret or it has knocked the Spectrum Plus together over a weekend to take advantage of the late MSX.

As a further sweetener the Plus will include a number of free software packages.

Prices reach new low on Eighth Day

Nervous software suppliers around the country will be reaching for the panic button as the price of games plummets again.

The first six products from a company called Eighth Day will cost a penny-pinching £1.75. They are Quill-designed adventures called collectively Games Without Frontiers; this just happens to be the translation of Jeux Sans Frontières but there's no joke intended.

'We hope we've produced £7 games for £1.75,' said Mike White, one of the two directors of Eighth Day. We'll pass judgement on how successful they've been in a forthcoming issue, but the games are available now via mail order from Eighth Day at 18 Flaxhill, Moreton, Wirral.

When Mastertronic made the £1.99 breakthrough earlier this year some established software suppliers scoffed. They said confidently that there weren't enough micros in the country to make possible the kind of turnover that Mastertronic would need. But the company has gone from strength to strength and has forced its competitors to look again at the prices they've been charging.

MONITOR

New support gives flagging Ace a boost

The Jupiter Ace, that rare and endangered species, is still alive and kicking with a number of new add-ons and software coming out for it.

A new company called MegaTechnic Computing has produced three packages for the 16K Forth veteran. Jupiter Jumpman and Paint 'n' Run are arcade style games. Ex-Forth 84 is a utility program that has new Forth words.

A spokeswoman for the company said: 'Initially we're testing the response to these packages, before we go into a big launch. But we think there'll be some demand.'

The software costs £5.50 and is available by mail order from MegaTechnic, 8 East Langham Road, Raunds, Wellingborough, Northants NN9 6LG.

In terms of support, Ace users can still count on Boldfield (0487-840740) which rescued the machine from deep waters earlier this year (issue 73). The company says that demand is still going strong for its £29.90 micro — and Boldfield has even crossed the Channel into France to buy up Aces and reconfigure them for English buyers.

Paul Downham of Boldfield said: 'We've got a full commitment to the Jupiter Ace and have produced a number of new products for users.'

On the list is a sound box with three-sound channel generator at £39, a 'professional' keyboard at £39, a joystick interface at £19.55, a video monitor connector at £12.65 and an adaptor kit at £5.98.

Buy now, pay later micros at Woolworth

If it's shortage of cash that's stopping you buying a new micro, Woolworth is out to lure you with an interest-free credit scheme.

The Woolies chain has been trying to live down the dime store tag for years, but it's still somehow appropriate that the inventor of Mix 'n Match sweets should lead the way with Spectrums on the never-never.

Woolies' computer deals apply to a range of home micros including the Electron, Amstrad, Spectrum, BBC, Vic 20, Commodore 64 and Atari 600XL. In addition there are the Atari 2600 and Colecovision games machines.

If you buy a 48K Spectrum, for instance, you'll get £58 worth of software in the £129.95 package. Initially, you'd have to put down a deposit of £13.95, then 11 monthly payments of £9.66 and a final payment of £9.74 to bring you to the total credit price.

The offer is available from most Woolworth stores throughout the country and will last indefinitely. Other big retail stores such as WH Smith and Boots have no plans to follow in Woolies footsteps.

MSX software prices hit the roof

Confirming fears that MSX software will be overpriced, Micro Peripherals has announced that the games cartridges it is importing from Japan will cost £18.95.

'Well, they are 64K cartridges. That's as much memory as there is in an MSX micro,' said a company spokesman.

All this memory is swallowed up by some of the games which include a version of the arcade hit Track and Field. Actually, this game comes on two cartridges so it will cost you £37.90 if you want to enjoy it in the seclusion of your living room.

Other titles include Athletic Land ('fun and games in the park'), Time Pilot, Hyper Sports, Super Cobra, Monkey Academy, Antartic Adventure, Comic Bakery and Circus Charlie.

Micro Peripherals reckons that all this action can be very taxing on your average joystick so it is also selling a 'HyperShot' special controller for the athletic games.

Money-laden MXS users can contact the company on Basingstoke 0256-473232.

Competition winners get Commodore 64s

At last the results of *PCN*'s Commodore 64 competition, which closed a few weeks ago. The response was overwhelming but after much digging in the hat, we've pulled out five winners.

They are: Mrs NA Junik, of Peebles; HC Li, of London SW7; Andrew Carson, of Harborne, Birmingham; AG Pereira, of London E3; and JD Gorse, of BFPO 35. Commodore 64s will be on their way shortly.

Most entrants had most of the right answers but all-correct entries were a bit on the thin side. Here's what we were looking for: **1** The Kernal operating system; **2** Vic chip; **3** SID chip; **4** Institute of Electrical and Electronics Engineers; **5** 5K; **6** Personal Electronic Transactor.

Acorn dampens conversion hopes

It's official. Elite will not be available for micros other than the BBC and Electron for the foreseeable future.

So says David Johnson Davies, Acornsoft's managing director. Replying to *PCN*'s request, nay demand, that this addictive mega-game should be converted to run on other machines (see last week's rave review), DJD stated: 'We don't have any definite plans.

'It would take time to convert and no work is being done in that connection. But we haven't ruled the possibility out.'

'By the end of last week we had sold 13,000 copies,' DJD said. That means within a couple of weeks it will become Acornsoft's best selling title ever.

This cuts no ice with the staff at *PCN* who are still queuing up to take turns at playing the game.

● Acornsoft will shortly be announcing the first monthly winner of its Elite competition. *PCN* can exclusively reveal that the as yet un-named winner has managed a score of 106,764.9 credits and achieved a 'dangerous' rating.

Software Projects wraps up pirates

Beauty is most definitely in the eye of the beholder as far as Software Projects is concerned and it's preparing a poke in the eye for any unlawful beholders.

The attractive packaging of all Software Projects games that may seem to the user as a little extra decoration should present a big headache to any would be pirates.

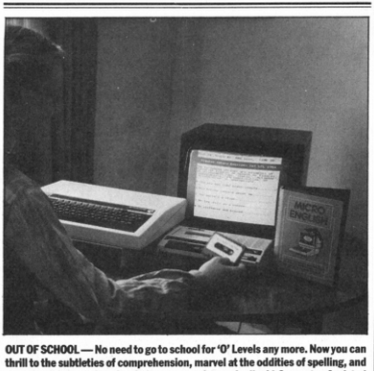
The new light blue cassette, which is probably more in keeping with the nature of the contents than the dowdy grey and black that we are used to for software, is non-standard — and must be specially ordered. In short, anybody who wishes to purchase similar blanks must buy at least 250,000. A transparent leader section on each tape has the name Software Projects printed on it.

The real deterrent, though, should be the simple security tape that binds the cellophane wrapper together, similar to those found on cigarette packets. Each tape has the company's name and logo and costs very little to produce. The sole manufacturer ensures that no one besides the original client can order duplicates.

Software Projects already holds copyright on its name and the names of all its games. It hopes to further disadvantage the pirates by introducing holograms on to the packaging. It would be impossible to make realistic copies of these without the original artwork.

Software pirates have shown themselves to be both resourceful and enterprising but these new features may require a little too much enterprise. As managing director Allan Maton says: 'If they are prepared to put all that effort into pirating why don't they make their own software.'

So keep your eyes open for features like these — if you buy a Software Projects tape that doesn't have them, the company isn't going to bale you out if anything goes wrong.



OUT OF SCHOOL — No need to go to school for 'O' Levels any more. Now you can thrill to the subtleties of comprehension, marvel at the oddities of spelling, and grapple with irregular plurals in your own home. Ludinski Computer-Assisted Learning (0784-58771) has released Micro English, which it claims is a full 'O' Level course that covers all your favourites on a pair of disks or several tapes. For the BBC, it also features a speech synthesiser to warble through the course with you. It costs £24.50 but might prove to be priceless.

MONITOR

Chip Shop serves up MSX Basicode

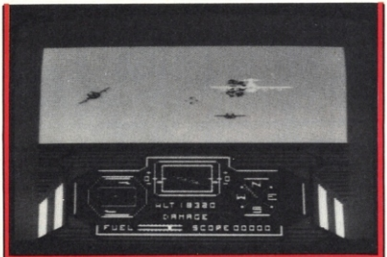
A gap left in the specifications of Basicode 2+, the universal interpreter used by the BBC's Chip Shop, has been filled. In addition to Dragon, Electron, Oric and Spectrum, MSX machines can now run Basicode 2+ software.

The BBC is rubbing its hands over the provision that Kuma (07357-4335) has made for MSX. 'This is the first time we have been able to offer the Basicode facility for hardware in advance of it appearing in the shops,' said Trevor Taylor, producer of the Chip Shop series.

Unlike other MSX software, Basicode programs are as free as air — the BBC broadcasts them for users to download, provided they can see straight to plug their micros in at the transmission time — 5.55 am.

Commodore, BBC, Apple and Tandy owners were already catered for in the original Basicode. The translation program for Basicode 2× comes on a tape with a manual, which costs £4.95 from BBC Broadcasting Support Services.

Some readers reported difficulty contacting Broadcasting Support Services after our article on the new Chip Shop season, so here's the address again: 2 Cater Road, Bristol BS13 7TW. Telephone 0272-279494.



HIGH FLYER — Flyer Fox, which was shown along with Gandalf by Tymac at the *PCW* show, will be available soon at £9.95. The range is subtitled Tymac Talkies because the games use the 64's sound to synthesis speech. The programs load with Novaload and the graphics are of above average quality — we'll be reviewing them both shortly. Tymac is set to import more games for the 64 and the Atari, Vic 20 and IBM PC. Tymac also imports peripherals such as Expand-O-RAM for the Vic and The Connection, a Centronics interface for the Commodore 64. Details on 021-643 8899.

Speedy Amstrad runs dot matrix printer

Amstrad has rounded off its line of micro products by launching a dot-matrix printer for the CPC464 and DDI-1 disk units.

The printer should go on sale almost immediately at £200. If there are no hitches, Amstrad will deserve another pat on the back for the pace at which it is producing add-ons for the CPC464 — look at how long it took Oric, Sinclair and others to come up with storage systems and printer for their respective micros.

Called the DMP-1, the printer is a 50 cps 80-column dot-matrix unit. Amstrad has opted for a standard Centronics interface but the DMP-1 has instruction extensions to cope with the Amstrad micro's dot-assembler graphics.

It's characters are formed from a 5 by 7 matrix, and in graphics mode the pitch is 60 dots an inch.

IN BRIEF

The chequered career of the Bytec Hyperion has finally ended with the decision by Anderson Jacobson to drop the portable IBM clone from its list. AJ launched the Canadian micro last year, calling it the Ajile. AJ will continue to support dealers 'as long as the spares situation will permit'.

Logo is due to get its very own trade early year, on London. The event is being organised by the London New Technology Network. There's still time to get involved if you want to help plan it — LNTN (01-482 3816) wants to hear from you.

Graftel has launched a follow-up to the VP200 series of video processors that have proved such a handy add-on to IBM PC users. The new VP 201/2 dumps a colour graphics display from the PC's screen to a printer and costs £560. Telephone 0252-510200.

For a limited period Apple is knocking hundreds of pounds off the prices it charges schools and colleges. If you can twist somebody's arm before December 31 your school could pick up a Lisa for £3,099 (usual price £4,135), a IIe plus disk drive for £595 (£795 to anybody else) or a 128K Macintosh for £1,349 (down from £1,795).

HOMEFRONT

Twilight hour of the micros we know

The nearest star (apart from the sun) is more than four light years away. And, as anybody who watches Top of the Pops will know, stars come and go. When you look at the night sky and see the twinkling pinpricks of light, it's sobering to realise that the celestial body emitting that light could well have popped its clogs years ago. It's a romantic thought, in a way. The star dies but its final flickerings struggle across infinity for years to give NASA, Patrick Moore, and lovers everywhere something to swoon over.

The Enterprise 64 has a lot in common with stars.

Putting a brave face on matters, the Enterprise has flickered intermittently — at the *PCW* Show last year, at a Scottish trade fair this summer, and again at the *PCW* Show this autumn. When it finally gets into the hands of whoever is still intent on buying it, something will have died. The smart money at the moment says that the casualty will be the market that the crippled Starship Enterprise was intended to serve. Home computers as we know them are on the way out.

Says who? Says Sinclair, Acorn, Commodore, and Market Assessment Information Services.

The big three home computer makers seem to regard Christmas 1984 as a shoot-out in the UK corral. There will be a final apocalyptic blaze of activity and the survivors will head for Re-Boot Hill as the market for home computers leaves the traditional offerings behind.

The systems that are expected to take their place will be more serious and useful, reflecting a view that has been gathering strength all year. Market Assessment Information Services, in a survey published last week, predicts that 'as a home work station, with a link to the place of employment, computers in the home have a strong future.'

This sounds about as exciting as watching grass grow but if it's what the suppliers think, it's probably what you'll have to get used to. The survey doesn't say that home micros will be swept away overnight, but it does conclude that 'a reduction in the number of models available seems inevitable'.

Frivolity is finished — games have no future. By linking home computers to places of work, the manufacturers are putting a premium on the kind of features that haven't been prominent in the past — reliability for one.

Don't panic just yet. The leading machines will carry on and the kind of things you do with them will be hard for the old sober-sides in high places to stamp out. But they will become a side-show. You'll be on the point of annihilating the Thyroid Empire or discovering the all-important Key of Fleet Wood when a message will take over the screen: 'Pardon me while I take time out to activate the curtain closing mechanism in your office by means of the miracles of telecommunications.'

Or is the prediction just so much precious nonsense? What lies behind it is the suggestion that next year sales of home computers are going to start falling.

When all the home micros that can be sold have been sold, the manufacturers have to find something else to offer. It will probably be the same machines doing the same thing.

This being the case, there's no reason for astronomers to start re-drawing their charts. If an occasional star drops out, another is sure to take its place.

MONITOR

Imagine's game rises again on the QL

At last, proof that there is life after death in the microcomputer business.

Bandersnatch, the 'mega-game' that was Imagine's final undoing, has risen phoenix-like from the ashes with a Sinclair label and aimed at the QL.

And the architects behind this revival are none other than David Lawson and Ian Hetherington — former Imagine directors.

Lawson and Hetherington have bought an off-the-shelf company called Fireiron, bought the game from Imagine's liquidator and sold it to Sinclair.

Also involved with Fireiron is latter-day whizz kid Eugene Evans, the lead programmer on Bandersnatch before Imagine crashed.

What is not clear is when the game will hit the streets and how much it will cost.

In the Imagine days the suggested price-tag was around £40. The expense arises from the need to include a hardware dongle to improve the capabilities of the Spectrum and Commodore 64 micros it was originally written for.

Unfortunately, the game was only 80 per cent complete when Imagine went under.

Bandersnatch existed only in prototype form on a Sage development system.

It just happens that the Sage uses a 68000 processor chip, similar to the QL 68008.

64 connections get a sight more style

Access Computer Company (061-477 6013) hopes to appeal to your sense of style with its serial printer interface and cable for Commodore micros.

Until now, the company says, 'the method of connecting an RS232 serial printer to either the Commodore 64 or Vic 20 has been both unsightly and expensive.'

We'd dispute this. Unsightly or expensive, perhaps, but rarely both.

Either way, there's no doubt that the Access interface and cable is a sightly piece of equipment. It costs £34.95 and hooks up to most serial printers equipment. It costs £34.95 and hooks up to most serial printers.

Access interface — serial with style.

Rodime aims to double disk store

A tasty glimpse of the future is offered in reports of disk manufacturer Rodime's blossoming profits.

The Silicon Glen firm was the world's first manufacturer of 3½in Winchester disk drives (issue 1) and says it will be reporting a 56 per cent increase in its profits this year.

The company also says it is working on a 20Mb hard disk and expects to release a 40Mb version in 1985-86.

Which can only be good news for Apricot owners and others who find the current 10Mb capacity of Rodime's existing drives just a little limiting.

TURNING 64 — Micromega is going 64. The company used to focus exclusively on Spectrum games, many of them best sellers such as Full Throttle, Codename Mat and Deathchase. The authors of these games, Derek Brewster and Mervyn Estcourt, are likely to produce software for the 64 shortly but the company's first 64 release, Jinn Genie, was written by Hanan Samara — could she be the first female programmer of a chart-topper? This screen shot is a still from Jasper!, Derek Brewster's latest and the two games are due to be released on October 22. Jasper! will cost £6.95.

VIEW FROM JAPAN

Brits lose their way on road to Japan

As I've often written (or complained) in this column, so far as computers go, there's more smoke than fire to the myth of superior Japanese technology (excluding the technology required for manufacturing and assembly). When you stop to think, all they've really managed to come up with (or in some cases steal) are our cpus, our languages and our operating systems. So it should come as no surprise to discover they've even borrowed some of our people. Equipped with my new toy (an acoustic coupler) and the logic of electronic mail, I conducted an electronic interview with on such person.

My choice was fortunate. Steve Bellamy is not only foreign, but British, from Sheffield, with creditable credentials.

Doctorate in computer science. Research posts for both IBM and ICL. Holder of 26 patents in the computer field. Lecturer at four major universities.

Since then, he's managed to get his finger into a lot of other interesting pies. Director Mugen Associates (Computer Consultants). Director International Apple Core. Lecturer in Computer Science. Consultant to the Foreign Correspondents Club of Japan. Technical consultant to Fujitsu Research Centre. Contributing editor Byte, Infoworld. Author of books on Japan and computing.

With this background, I thought he might be able to offer some insight into how Britain's hard and software companies might get a foothold in Japan.

'British efforts in Japan have never got beyond the token representation stage. British software is good, in many ways superior to that of both American and Japanese manufacturers but the marketing is all wrong. On the one hand we have the hi-tech approach, all light and power. Good heavens, this is the land of hi-tech, nobody's going to notice another bell-and-whistle company. Then we have the so-called joint venture company which usually means British ideas packaged with Japanese wrapping. Wrong! Wrong! Wrong! We need some defined purpose to our efforts.

'One good way would be a hardware and software blend coupled with strategic pricing to take into account the Japanese penchant for high-ticket foreign goods.

'A well-supported item, plenty of documentation, quality finish and a good marketing ploy such as IBM did with their 5550 (for which Mugen Associates can take a little credit) would really establish the UK as a viable entity over here.' Any takers?

I also suggested that with MSX Basic about to burst on the scene in Britain Steve might give us an idea of what to expect. His answer was hardly encouraging.

'Frankly MSX is a dud that just doesn't want to go away. It's not a programmer's environment at all, more a packaging of a few general concepts. Unix is where we are seeing some real advances — in about two years it will just have blown away all this non-compatible, non-expandable nonsense we have now. Alan Kay was right when he said the IBM PC was beneath comment. I can't believe that it is going to be around for another five years. Candidly, neither can IBM. Programmers have got to move up and away from this one machine, one user concept.'

Japan stands on the threshold of a breakthrough in hardware that will really stand the Americans on their heads but it's a case of so near, yet so far.

'Artificial Intelligence is all I hear recently. The software is really weak, just souped up CP/M and Cobol. It's when the hardware guys deliver: that will be the time to stand back — w-a-y back. I like what Sony has done with its disk drives, more for less and the laser storage technology of Toshiba is awesome. Pretty soon we are going to wake up one morning and find all our much beloved equipment obsolete. That's RSN — Real Soon Now. Anyone want to buy my IBM AT?'

Now, if I can just figure out how to use this modem to avoid going to the office... ***Serge Powell***

MONITOR

Nutcracker Suite on the programme

'A sledgehammer to crack a nut' is how Lutterworth Software describes the popular word processing systems. So it calls its own the Nutcracker Suite and charges just under £50 for it.

'I've been lumbered with Perfect Writer,' said Lutterworth's John Everett, 'and it's fine for producing a manual but you try writing a four-line address with it. It can become very frustrating. And Wordstar is fine, but it's very difficult to remember all the things you need to remember.'

His verdict is that these systems are 'over-powerful' for many jobs and that they need a simple side-kick to take on the menial jobs. In the old days this would have been a typewriter, and the Nutcracker Suite is intended to give you old technology with on-screen editing.

The version due to be released on November 1 is for the IBM PC. Everett says the next target machine is the Sirius, and later on the Epson QX-10 and the Wren portable may be cracked.

The suite — three separate programs — is supposed to operate alongside other word processing software and is designed to integrate with them. Its own text files have no control codes and so can go straight into other systems, and it can read and unscramble Wordstar document files.

It can be learnt in five minutes, says Everett. This may not be as extravagant a claim as it sounds, since all the operator needs (apart from some typing ability) is an idea of how to use cursor control keys.

The system will be available through IBM dealers.

M21 COMPLETE — Olivetti's IBM-compatible luggable, the M21, is now starting to be delivered to UK dealers and a price has been fixed for it at last. When we Pro-Tested it (issue 81) the company was still hedging its bets but it announced last week that the starting price will be £1,550, and a configuration with 128K and twin 320-360K floppies will set you back £1,889. *PCN*'s verdict? 'If you want a smaller than usual unit, and if considerations of software and hardware support loom fairly large, it's certainly a machine to consider.'

STC slashes Xtra prices and range

One of the more highly fancied IBM-compatibles has come down in price but there's a hint of the way the wind is blowing in a second move from STC Business Systems.

STC, which sells the ITT Xtra in the UK, has cut the 256K Xtra 130 by just over £700 to £3,063 — this price also includes a 10Mb hard disk. At the same time it has withdrawn the 128K model, called the Xtra 125.

The reason is that the kind of software you're likely to run on an IBM-compatible business machine usually needs more than 128K. 'Hard disk systems with only 128K of memory are rapidly becoming redundant,' said STC's Stewart Goldberg ominously.

Xtra for less — but less choice of Xtras from STC.

CHARTS

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

GAMES

TW	LW	TITLE	PUBLISHER	MACHINE	PRICE
1	1	Daley's Decathlon	Ocean	SP, C64	£7.90
2	2	Sherlock Holmes	Melbourne	SP, C64	£14.95
3	7	Elite	Acornsoft	AC	£15.00
4	3	Beach Head	US Gold	SP, C64	£9.99
5	4	Kokotoni Wilf	Elite	SP, C64	£6.95
6	7	Avalon	Hewson	SP	£7.95
7	5	Monty Mole	Gremlin	SP, C64	£7.95
8	6	Full Throttle	Micromega	SP	£6.95
9	13	Int Soccer	Commodore	C64	£9.99
10	10	Lords of Midnight	Beyond	SP	£9.95
11	9	Sabre Wulf	Ultimate	SP	£9.95
12	11	Decathlon	Activision	C64	£9.99
13	12	Jet Set Willy	Soft Projects	SP	£5.95
14	—	Summer Games	Quicksilva	C64,	£14.95
15	16	Scrabble	Leisure Games	SP, C64, AC	£14.95
16	14	Match Point	Psion	SP	£7.95 *
17	20	Zim Sala Bim	Melbourne	C64	£9.95
18	—	Zaxxon	US Gold	C64, AT	£9.95
19	—	Havoc	Dynavision	C64	£9.95
20	—	Pyjamarama	Microgen	SP	£6.95

SPECTRUM

TW	TITLE	PRICE
1	Daley's Decathlon	£7.90
2	Sherlock Holmes	£14.95
3	Beach-Head	£9.95
4	Avalon	£7.95
5	Monty Mole	£7.95
6	Kokotoni Wilf	£6.95
7	Full Throttle	£6.95
8	Lords of Midnight	£9.95
9	Sabre Wulf	£7.95
10	Jet Set Willy	£5.95

COMMODORE

TW	TITLE	PRICE
1	Daley's Decathlon	£7.90
2	Int Soccer	£9.99
3	Decathlon	£9.99
4	Beach Head	£9.95
5	Monty Mole	£7.95
6	Summer Games	£14.95
7	Kokotoni Wilf	£6.95
8	Zim Sala Bim	£9.95
9	Zaxxon	£9.95
10	Havoc	£9.95

MICROS

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TW	MACHINE	PRICE
1	IBM PC	£2,390
2	Apricot	£1,760
3	Televideo TS1603	£2,640
4	Compaq	£1,795
5	Apple III	£2,755
6	Sirius	£2,525
7	Wang Professional	£3,076
8	HP 85	£1,917
9	NCR Dec. Mate V	£1,984
10	Kaypro	£1,604

UP TO £1,000

TW	MACHINE	PRICE
1	Spectrum	£99
2	Commodore 64	£199
3	Electron	£199
4	Amstrad	£349
5	BBC B	£399
6	Vic 20	£140
7	Amstrad	£299
8	Atari 800XL	£199
9	Memotech	£199
10	Oric	£99

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 **October 11**. 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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If something we've said has outraged, amused or impressed you, this is your chance to answer back. To celebrate the new-look *PCN* we decided to give our 'star' contributors a pay rise — the best letter of the week will now earn you £15. So send in your contributions to: Random Access, *Personal Computer News*, Evelyn House, 62 Oxford Street, London W1A 2HG.

Why Memotech came out on top

In issue 81, J Waller noted that the Memotech gets little magazine support. My own experiences may help to emphasise the injustice of this 'Catch-22' situation.

I decided to spend £300-£400 on a computer. I spent months looking and reading round; eventually shortlisting four machines: Electron, BBC B, CPC 464 and MTX 512. After isolating the strengths and weaknesses of each in relation to my own needs, I wrote to Acorn, Amstrad and Memotech.

Acorn did not reply. Amstrad was helpful, but sent me promotional literature printed in French. Memotech was equally helpful, and also supplied a list of local dealers.

After further research, and a visit to MEP in Manchester, I reduced my shortlist to two machines: CPC464 and MTX512. I was then able to be much more specific about my requirements and queries.

Consequently I wrote once again to Amstrad and Memotech, and also to Kuma whose Logo package for the CPC464 looked interesting. I also asked Amstrad for an English version of its leaflets.

Neither Amstrad or Kuma replied. Memotech replied promptly (this time my queries were answered by its technical advisor) and put me in touch with a local user group.

Memotech is clearly committed to supporting its products with an effective before and after sales service. Dealerships — although rather too thin on the ground — appear to be well informed and expert.

PCN is right: it is a 'chicken and egg' situation. But don't ignore Memotech just because of weak support in magazines. It's largely up to *you*. Send in those listings.

Alan Sturgess,
Keighley, Yorks.

Dongling a solution to piracy . . .

The most popular topic of discussion in *PCN* — right from issue one has without doubt been software piracy; in fact, I was one of the first people to correspond on the subject. However, although I condemn software piracy in all its manifestations, I have recently had much less sympathy with the software companies.

What is the only sure method to prevent both commercial and home software piracy, and yet allow the user to make back-up copies of his own software? The answer is, of course, the fabled 'dongle', which — for the uninitiated — is a small piece of hardware attached to your computer, without which software is unable to run.

'Aha!' argue the software companies, 'dongles are much too expensive to produce — they would increase the price of software and thus reduce the amount sold.' But I thought Nick Alexander said in issue 80 that 'all forms of piracy cost the industry £100 million last year'.

If this were the case, surely this money could be saved by 'dongling' all software, (which would cost only a fraction of the 'lost' £100 million).

James Mortleman
South Woodford, London E18.

. . . but slapped wrists to us

After reading the article in *PCN* (issue 80), regarding software piracy, I was somewhat amazed to see a blatant advert in the classified columns for pirated software. The advert in question:

BBC B, radio cassette, b/w TV, 150 games (mostly copies), m/c book vgc £600 . . . etc.

It does not take any intelligence to see that this person is openly offering pirated software for sale. I often see adverts for copied software in your magazine and I object to paying for a magazine that carries this sort of advertising. I am fed up with reading about loss of revenue due to piracy but to read about it and then to see an advert in the same magazine is a little too much.

Perhaps I am a little unusual in not having any copied software, but I believe that if I want a program badly enough I will pay for it. I object to paying inflated prices for my sofware due to piracy etc and feel that it should be stopped. Your magazine could help by not allowing ANY adverts of this kind to appear in *PCN*.

Ian White,
Reigate, Surrey.

Dear Angry of Reigate, we try to stop that kind of thing appearing in Billboard but they do occasionally slip through. You're absolutely right, however . . . you are a little unusual — Ed.

Auction prices were not high — Crocker

We object to Mr Phillips' comments (issue 82) that the reserves at our recent auction, were '. . . ridiculously high'.

In the first place, the majority of lots were sold. Second, we know what prices the equipment should make. If there was no-one among the bidders who could find £800 for a brand new Macintosh sealed in the maker's box, with MacPaint and MacWrite, the fault is not with the reserve prices.

If a lot is entered as brand new, and it is still sealed, we do not open it. If we did, it would have to be classed as a demo/second-hand unit. This is why we issue a technician's report on most items that are not new. This goes further than any other caution that we know of to help the would-be buyer.

We are glad to note that Mr Phillips intends to come to our next sale, at the Bonnington Hotel on November 27 — (entries still being accepted).

R E Nicklin
Crocker Computer Auctions,
London W1.

Are you a forgotten Star winner?

Due to an administrative slip-up, we have cheques outstanding to the following winners of the Star Letter award. If the authors would send us their addresses, we'll be happy to send off the cheques immediately. The same applies to contributors to other sections of the magazine, particularly Microwaves.

Roy Tipping, of Blunham, Bedford; J Skidmore, of Trowell, Notts; R K Nicholls, of Sevenoaks, Kent; G K Mallinson, of Maesteg, Glamorgan; B Reid, of Newport-on-Tay, Fife; and M Jeanes, of Formby, Merseyside.

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Don't blame the equipment- it's most likely the mains!

In a perfect world, with a perfect power supply you'd have a right to expect perfect results from your computer, word processor, VDU or other electronically controlled equipment. Sadly, this is not always the case, due to mains borne interference. Even a dedicated line is only a partial solution because interference is generated by other equipment being used around you, typewriters, copiers, fluorescent lights and even the office 'fridge.

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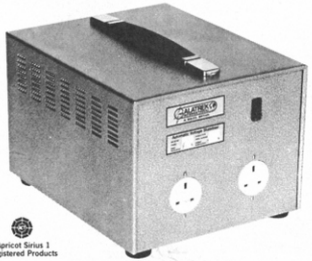

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ROUTINE ENQUIRIES

If something we've said has outraged, amused or impressed you, this is your chance to answer back. To celebrate the new-look *PCN* we decided to give our 'star' contributors a pay rise — the best letter of the week will now earn you £15. So send in your contributions to: Random Access, *Personal Computer News*, Evelyn House, 62 Oxford Street, London W1A 2HG.

Poor connection is at root of problem

Q I have a slight problem with my 48K Spectrum. It's to do with the power supply — every time I move the connection at the back of the computer the whole thing crashes.

I would have taken the computer back to where I bought it from but the guarantee is void as I fixed a 'real keyboard' to it. I phoned Sinclair and it will cost £30 to repair that small item.

Could you tell me first where I can get insurance against my computer going wrong, and second, where I can get it fixed locally?

J Mayo,
Great Yarmouth.

A Getting someone else to repair it may not be necessary, as from the sound of it you've only got a very small problem. If it's only crashing when you move the jack plug then it's the connection that's wrong.

This could be one of two things. If you look inside the power input, you'll see a little spring which holds it in place, and if this has worn out you'll get a bit of wobble, cutting the power at inopportune moments. It might be worth your while soldering it in (making sure you don't short out the two terminals on the jack plug) and just using the wall switch to cut out the power.

Alternatively, the jack itself could be malfunctioning (if it still fits snugly this is probably your problem). This is cured by putting a new jack plug onto the end, and again you don't need a degree in electronics to fit it.

If you're wary of doing any of this, a local electrical shop might help you out if you explained the problem. We don't know of any repair services in you area, but you could try phoning the Hemel Computer Centre on Hemel Hempstead 212436, Trident Enterprises on Slough 48785, or Mancomp on 061-224 1888.

We reckon it's difficult to justify insurance for a micro as cheap as the Spectrum. The Micro Repair Club on 01-946 7777 will guarantee you repairs for £24.95 for the first year and £14.95 a year thereafter, and cover for more expensive machines can be arranged by Geoffrey Hoodless & Associates, Woking 61082.

Searching for the elusive Aquarius

Q Please could you tell me my nearest stockist of Aquarius Software, as I've been searching everywhere for a shop with no luck.

Brett Emms,
Rainham, Essex.

A Your chances of finding someone who regularly stocks anything from Aquarius, never mind software, are strictly limited. The machine's never been a big enough hit to appear in many shops, and even with the launch of the Aquarius 2 that's unlikely to change.

Fortunately, Radofin, the manufacturer of the machine, seems to be doing the decent thing. The company is handling support by organising an Aquarius User Group. If you want to make the most of your Aquarius your only option is to contact it on 01-205 0044.

Meanwhile, if there are any dealers out there who support the Aquarius on a regular basis *PCN* would be pleased to hear from them.

The business of winning the pools

Q I am thinking of buying a Commodore 64 for business use, and I'd like it to assist me in doing football pools. Can you tell me what I would need to use for this?

P Bush,
Lyndhurst, Hants.

A There are football pools programs available for most of the major micros, but as it's not really mass-market, you're unlikely to find a major manufacturer doing them. All you really need is a tape of the program, and you should find ads for these in the back pages of most micro magazines.

But a word of warning. The general idea is that the programs should come with an up-to-date database covering the form of the various teams in all the divisions. What you have to do, each week of the season, is sit down and hack in the results of all the matches.

This will take a long time, and unless you're prepared to do it every week (and bring it up to date, as we're well into the season already) it'll be worthless.

Dutch choices for home computer

Q I'm very interested in buying a home computer. I want to do my correspondence and my home finances on it, and in the future I'd like to extend it with a modem. Considering that in Holland the software market isn't as huge as in the UK, I'm thinking of three machines: the Enterprise; the Sony Hit Bit HB75; and the Spectravideo 328 MkII.

I can't get any information about the first two in Holland, so could you tell me a little about them? Do you know if Enterprise is planning to join the MSX market, and is there a particular data recorder for the machine?

R Vermond,
Holland.

A The Enterprise's launch has been put back until next spring. Apparently there are a couple of nearly finished prototypes doing the rounds, but in light of the number of changes that have been made to its specifications since the first announcement in autumn, 1983, *PCN* won't be reviewing it until we're sure it's the finished product.

We'll answer your other two queries when we see it.

As for the Sony, it's an MSX machine of a sort. And with any MSX we'd advise you to buy the cheapest machine you can find with a good keyboard and 64K RAM. Best bids so far are the Goldstar (reviewed in next week's issue) and the Spectravideo 728.

Now our question. What's a Spectravideo 328 MkII? If it's a 728 then that's OK, but if it's a 328 with the legendary MSX adaptor installed, please write.

Mail order house is out of stock

Q In January 1984 my wife bought a Biztec Pad electronic diary/computer via a mail-order catalogue. In the instructions a 'print out' machine is mentioned, and the mail order people put me in touch with the distributors, Domicrest.

I have written to them four times and phoned once, and they have not as yet replied to my enquiry about purchasing this printer.

Can you help me? Does the printer exist?

Gary French,
Clacton-on-Sea, Essex

A The way the mail order trade works — excluding Sir Clive — means that it isn't usually a very good idea to try to buy a range of compatible items by mail order at different times.

In the main, the way these firms operate is to buy in a quantity of cheap and quite often little known products and sell them at a good price. They don't usually sell a set range of products for any length of time, so if you're trying to get add-ons for a specific product you'll all too often find yourself on a wild goose chase.

In the case of the Biztec you may be luckier than most. Domicrest tells us that it should be in stock by the beginning of next year, so if you sit tight, all should be well.

64 or Plus/4 which is the better machine?

Q I was on the verge of buying a Commodore 64. Now after reading several reviews of the Plus/4, I find it suitable for my needs. However, I am worried by the fact that the Plus/4 has dropped the sprite and sound capabilities of the 64, making it a less likely choice for games software.

Will the popular games be converted to run on the Plus/4 and will the 64 die out as a direct consequence?

Vincent Tuckwood,
Watford, Herts.

A You'll have Commodore eating its words, Mr Tuckwood. The company has always claimed that the machines are aimed at different markets. Sounds like it missed.

You're right about one thing, though. The Plus/4 isn't half the games machine the 64 is . . . or to put it another way, it isn't half the music machine.

Many of the best games around run on machines that don't offer sprites, so that isn't a big problem. However, it takes a while for any machine to attract a range of software and peripherals, so you won't see much for the Plus/4 this side of spring '85.

The only valid reason for preferring the Plus/4 over the 64 is if you think you can make real use of the former's integrated word processor and database, as opposed to buying similar or better independent programs for the 64.

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.*

Scrolling up an Amstrad window

A feature absent from Amstrad Basic is a SCROLL command. In Issue 77 one article featured a machine code routine producing upward or down ward scrolls of the entire screen by a simple ROM call. Since the entire screen is scrolled any windows are ignored, and what one would often like to be able to do is to simply scroll an individual window.

A simple means of achieving an upward scroll is to locate the cursor at the bottom line of the window involved (remembering that within windows the Amstrad requires the cursor location to be the disposition from the top left corner of that window and not from the top left of the screen) and then issue empty print instructions.

The required format is LOCATE #x,y,z:PRINT#x:PRINT#x where x is the window number and y and z are the necessary cursor locations. The number of print statements must be one greater than the number of SCROLL commands required.

Where you wish to scroll up several lines, a FOR/NEXT loop is more economical. Note that making the window which will most often be scrolled WINDOW#0 can also save memory since the window number can be omitted from the location and print commands will default to it.

This program is an illustration of the general technique.

K Denham,
Wimborne, Dorset

```
10 MODE 1:WINDOW#0,1,40,1,10:WINDOW#1,1,20,11,15:WINDOW#2,21,40,11,15:WINDOW#3,1
,40,16,25:ZONE 20
20 INK 0,0:INK 1,23:INK 2,6:INK 3,24:BORDER 9:SPEED INK 45,20
30 PEN 0:PAPER 1:CLS#0:LOCATE#0,1,10:PRINT#0,"BOTTOM OF WINDOW#0 - WILL NOT MOVE
"
40 PEN#0,0:PAPER#0,1: CLS#2:PRINT#2,"TOP OF WINDOW#2 - WILL NOT MOVE"
50 PEN#2,1:PAPER#2,0:CLS#2:PRINT#2,"LEFT","OR","WINDOW#2","NON'T","MOVE"
60 PEN#1,2:PAPER#1,3:CLS#1:PRINT#1,"WINDOW#1, IN A FEW  MOMENTS THIS WINDOW WILL
 SCROLL UP ONE  LINE AND SMOATLY  AFTER ANOTHER PUSH"
70 FOR X=1 TO 10000:NEXT
80 LOCATE#1,1,5:PRINT#1:PRINT#1
90 FOR X=1 TO 3000:NEXT
100 LOCATE#1,1:5:FOR X=1 TO 5:PRINT#1:NEXT MEM AS NU PRINT OR LOCATE SINCE LINE
 60 LOMCATE NOT ACTUALLY NEEDED IN THIS LINE
110 IN# 2,6,23: PEN#2,2:LOCATE#2,1,5:PRINT#2,"ESC ESC TO EXIT"
120 GOTO 120'MEM USED TO SUPRESS Ready WHICH WOULD DISRUPT DISPLAY
```

Amstrad's strength of character

The Amstrad's 100-character limit on function key expansions can be changed to a much greater value by allocating a new buffer using the firmware entry KM—EXP—BUFFER. The following program sets up a 1000-character buffer — the 1000 figure could be changed to any other value in the range 12 to 32,000 or more.

Since the patch to invoke KM—EXP—BUFFER is overwritten by the buffer itself you can only run this code once. The function keys are reset to their default state, but it is now possible to store up to 1000 characters on them, though you'll find each expansion token is limited to 255 characters — which should be enough for anyone.

Note that the program is meant for incorporation into an existing program and doesn't generally affect the behaviour of commercial programs loaded into your CPC 464 because the loading process resets the machine into an intitial state which discards patches such as the ones given above. Also, since the program alters HIMEM, care must be taken to alter SYMBOL AFTER first if it is necessary.

Locomotive Software Ltd,
Dorking, Surrey

```
100 length= 1000+32              'length allows for red tape
110 MEMORY HIMEM-length          'allocate space for buffer
120 POKE HIMEM+1, &21            'LD HL, length
130 POKE HIMEM+2, &FF AND length
140 POKE HIMEM+3, INT(length/256)
150 POKE HIMEM+4, &11            'LD DE, HIMEM+1
160 POKE HIMEM+5, &FF AND UNT(HIMEM+1)
170 POKE HIMEM+6, INT((HIMEM+1)/256)
180 POKE HIMEM+7, &C3            'JP KM_EXP_BUFFER
190 POKE HIMEM+8, &15
200 POKE HIMEM+9, &BB
210 CALL HIMEM+1
```

Flash a message on Vic 20 screen

This routine will allow you to have two messages simultaneously scrolling across the top and bottom of your Vic 20 screen. The top message scrolls from right to left and the bottom from left to right.

The messages are contained in data statements at the end of the routine. Any messages that will not fit in one data statement can be contained in several and concatenated (as seen in the example) as long as the overall message does not exceed 211 characters.

The routine can be used to display instructions at the start of a game, or maybe adapted to flash up messages during a game.

David Walker,
Ellesmere Port, South Wirral

```
10 PRINT CHR$(147):POKE 36879,8
20 FOR I=7168 TO 7679: POKE I,PEEK(I+25600):NEXT
30 FOR I=7168 TO 7175: READ A:POKE I,A: NEXT
40 DATA 24,24,24,231,231,24,24,24
50 POKE 36869,255
60 FOR I=7680 TO 8185:POKE I,0:POKEI+30720,2:NEXT
65 I=7168
70 A=PEEK(I):B=PEEK(I+1):C=PEEK(I+2):D=PEEK(I+3)
75 E=PEEK(I+4):F=PEEK(I+5):G=PEEK(I+6):H=PEEK(I+7)
80 POKE I+1,A: POKE I+2,B: POKE I+3,C: POKE I+4,D
85 POKE I+5,E: POKE I+6,F: POKE I+7,G: POKE I,H
90 GOTO 70
```

Vic 20 in scroll mode

The following routine prints a grid on the screen and then scrolls it down pixel by pixel in a downward direction.

This is achieved by swapping the bytes around in the user defined character to create a constantly inverting character, thus giving the illusion of scrolling. Note this does not have to be used with a grid but can be altered to be used with any rectangular character.

Jamie Ketskemety,
Heron Grange, Worcester

```
10 READ A$,B$,C$ : A$=A$+B$+C$
15 READ D$
20 B$="*.*.*.*.*.*.*.*.":A$=B$+A$+B$
25 D$=B$+D$+B$
26 A=1 : C=LEN(D$)-22
30 PRINT "{CLR/HOME}{CD "
40 PRINT "{HOME}{CD}"
50 PRINT "{RVS ON}{RED}"MID$(A$,A,22);"{RVS OFF}{BLUE}"
51 PRINT "{HOME}{CD *21}";
53 PRINT "{RVS ON}{PURPLE}" MID$(D$,C,22);"{RVS OFF}{BLUE}:
55 GET Z$
56 IF Z$<>""THEN 150
57 FOR D=1 TO 25: NEXT D
60 A=A+1 : IF A>=LEN(A$)-20 THEN A=1
65 C=C-1:IF C<1 THEN C=LEN(D$)-22
70 GOTO 40
100 DATA "TO MAKE A MESSAGE SCROLL FROM RIGHT TO LEFT
    ACROSS THE TOP OF THE SCREEN
110 DATA "SEPARATE IT INTO SMALL SECTIONS AND PUT IT
    IN
120 DATA "DATA STATEMENTS.  INCLUDE IN LINE100 1
    STRING VARIABLE FOR EACH DATA STATEMENT.
130 DATA "211 CHARACTERS MAXIMUM!"
150 PRINT "{CLR/HOME}{GREEN}FINISHED!{BLUE}"
```

Earth-shaking Atari display

A handy visual effect for use in games programs is a shaking screen to simulate an earthquake or large explosion. An obvious way of achieving this effect would be to use the Atari's scroll registers.

However, the following program demonstrates a much simpler method. The first byte of the Display List holds an '8 blank lines' instruction (decimal 112).

By POKEing different 'blank lines' instructions (*eg* 0,16,32,48,64,80,96) into this location, the screen's vertical position may be shifted by up to 7 scan lines.

Nick Pearce,
St Leonards-on-Sea, Sussex

```
10 DL=PEEK(560)
+256*PEEK(561)
20 SOUND 0,34,0,14
30 FOR I=0 TO 40
40 POKE DL, INT (RND(0)*8)*16
50 NEXT I
60 POKE DL,112
70 SOUND 0,0,0,0
```

READOUT

'Getting the most from your BBC Micro' by Clive Williamson, published by Penguin at £5.95 (paperback, 208 pages).

A committed user with a journalist's training should be an ideal choice to write something that is intended to go with an official User Guide. With this book you might find it replacing the User Guide rather than sitting alongside it on your shelf.

Rightly deciding that there is no point covering BBC Basic with the thoroughness of Acorn's publication, Mr Williamson concentrates on the subjects that the BBC User Guide leaves alone.

The book makes a stuttering start; there is some lip service to The People's Friend, Sir Clive, and a series of drawings to show you what you've bought and how it fits together. The first notes on programming aren't encouraging either — if anybody ever patented the flowcharts for making a cup of tea or starting a car they'd have made a fortune by now.

But at least it offers more on programming than merely listing and explaining the commands. The book also delves inside the machine to explain exactly what it is doing, laying the groundwork for later chapters on advanced techniques.

From this point, Mr Williamson assumes more computer expertise than you'll have picked up from the opening chapters — not that his writing is jargon-ridden or obscure, but the concepts introduced could easily deter anyone not fully committed to making the most of their BBC micro. **DG**

'Commodore 64 Data Files' by David Miller, published by Prentice/Hall at £8.95 (paperback, 428 pages).

You never thought anyone could come up with more than 400 pages of things to say about file-handling on the 64, did you? Well, neither did I. We were wrong — Mr Miller has done just that, and without a trace of padding anywhere.

Everything you ever wanted to know about files and data handling is here . . . program files, sequential files, those tricky little random access files, even more tricky bits of sequential filing, even a chapter on DIF files (you didn't know about DIF files? Then this is the book for you).

Of course, not every right-thinking 64 owner is going to want this much detail on planning and creating a database, but those who do are not going to find a better guide. **PW**

'The Wordstar User's Reference Manual' by Valerie Hancorn, published by Duckworth at £12.50 (paperback, 204).

It is truly remarkable how a piece of software can continue to sell in large quantities long after the technology it was designed to work on has been superceded.

Wordstar was the among the first, full-function word processing programs for microcomputers.

It has gone through its own transformations and is now available on a wide range of machines including 16-bit machines like the IBM PC.

This reference guide is aimed squarely at the IBM PC user with only passing reference to CP/M machines. Thus the screen illustrations feature the bottom status line, detailing the purpose of the IBM's function keys — a luxury not available to most owners of 8-bit CP/M micros.

It is difficult to assess the real value of the book. In places it is patronising and seems to be directed at the absolute beginner who knows nothing about micros and has to be told what a byte is.

As a reference manual, I have my doubts. There is little in the book that is not also in Micro-Pro's comprehensive Wordstar manual. And the layout and structure of the book is little better.

As a regular Wordstar user I would find little time for this book and would suggest that most users would be better off sticking with their Wordstar manuals. At least they come free with the program! **RB**

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GREMLIN'S GARDEN

Tony Crowther's latest game is a challenging variation of an old favourite.

Here's something you can't afford not to type in — a game for the Commodore 64 by Tony Crowther, author of such best-sellers as *Monty Mole*, *Potty Pigeon* and *Suicide Express*.

Gremlin's Garden features some brilliant sprite animation and user defined graphics, and the action is machine code controlled for speed and smooth motion.

It's an update of an old favourite, *Snake*— in which you guide a caterpillar round a garden, collecting butterflies and avoiding mushrooms. To complicate matters, every time you pick up a butterfly, another mushroom grows and if that isn't tough enough, you have the option of adding an extra hazard in the form of a bird which sets after you in non-stop pursuit.

Average scores should be around 4,000 points — high scorers should look for 8-10,000 points.

How it works

0 Sets screen and border colours to blue, sets up four user defined graphics for the mushrooms. Calls set-up routine at line 3050.

1-9 Switch to user defined graphics, set volume to maximum, select multicolour sprites and set sprite pointers.

10 Sets all sprite positions to 0, calls title screen.

11-16 Set initial positions.

18 Prints mushroom and updates score

20 Calls machine code routine for movement.

30 If nothing happens then loop.

35 If butterfly collected then update score, print another mushroom.

40-110 Print collision message, check for high score and update, restart game.

500-711 Data for redefined characters and sprites.

800-853 Data for machine code routines.

1000-1004 Define screen and colour strings and take a slice for random positions.

2110-2130 Get input for bird option and check joystick for start.

3000-4001 Set up sprites and machine code.

Program listing

```
 0 POKE53280,6:POKE53281,6:FORI=0TO31:REA
DA:POKE12288+192*B+I,A:NEXT:GOTO3050
 1 SYS49152:POKE5324B+24,29:POKE53275,255
 2 PRINT"{CLR}":POKE54296,15
 3 POKE53286,0:POKE53285,1
 4 POKE2040,201:FORI=0TO4:POKE2041+I,200:
NEXT:POKE2047,210
 5 POKE53248+21,255
 6 POKE53264,0
 7 POKE53248+28,255
 8 POKE53288,3:POKE53289,5:POKE53290,3:PO
KE53291,5:POKE53292,3
 9 POKE53287,2
 10 SYS49225:FORI=0TO11:POKE53248+I,0:NEX
T:GOSUB2000
 11 POKE53262,150:POKE53263,150
 15 A=RND(1)*200+40:POKE2046,209:POKE5329
3,2
 16 B=RND(1)*170+50:POKE53260,A:POKE53261
,B
 17 FORI=1TO10:A=PEEK(53278):A=PEEK(53279
):NEXT
 18 GOSUB1000
 20 SYS49253
 30 IFPEEK(1022)=0THEN20
 35 IFPEEK(1022)=2THENGOSUB150:GOTO15
 40 PRINT"{HOME}{CUR DN}{CUR DN}{CUR DN}{
CUR DN}{BLK}                YOU ARE HIT"
 50 FORI=0TO100:POKE54276,0:POKE54273,I:P
OKE54277,2:POKE54276,33:NEXT
 60 GOTO100
 100 IFSC>HITHENHI=SC
 105 PRINT"{HOME}{CUR DN}{WHT}{CUR DN}{CU
R DN}{CUR DN}{CUR DN}{CUR DN}{CUR DN}{CU
R DN}{CUR DN}"TAB(31)HI
 110 GOTO9
 150 POKE54276,0:POKE54273,200:POKE54277,
27+32:POKE54276,17:RETURN
 500 DATA3,15,15,31,31,63,63
 501 DATA192,240,240,248,248,248,252,252
 502 DATA29,1,1,3,3,7,28,0
 503 DATA184,128,128,192,192,96,184,0
 600 DATA0,0,0,2,160,0,10,168
 601 DATA0,10,168,0,42,170,0,42
 602 DATA170,0,42,170,0,42,170,0
 603 DATA10,168,0,10,168,0,2,160
 604 DATA0,0,0,0,0,0,0,0
 605 DATA0,0,0,0,0,0,0,0
 606 DATA0,0,0,0,0,0,0,0
 607 DATA0,0,0,0,0,0,0,0
 608 DATA0,0,0,48,3,0,14,172
 609 DATA0,11,184,0,42,170,0,42
 610 DATA170,0,42,170,0,37,150,0
 611 DATA41,154,0,10,168,0,2,32
 612 DATA0,0,0,0,0,0,0,0
 613 DATA0,0,0,0,0,0,0,0
 614 DATA0,0,0,0,0,0,0,0
 615 DATA0,0,0,0,0,0,0,0
 616 DATA0,48,0,2,176,0,10,176
 617 DATA0,38,184,0,41,170,0,38
 618 DATA175,192,42,154,0,10,102,0
 619 DATA42,168,0,2,160,0,2,0
 620 DATA0,0,0,0,0,0,0,0
 621 DATA0,0,0,0,0,0,0,0
```

```
622 DATA0,0,0,0,0,0,0,0
623 DATA0,0,0,0,0,0,0,0
624 DATA0,0,0,2,160,0,10,168
625 DATA192,10,107,0,41,110,0,10
626 DATA170,0,10,170,0,41,110,0
627 DATA10,107,0,10,168,192,2,160
628 DATA0,0,0,0,0,0,0,0
629 DATA0,0,0,0,0,0,0,0
630 DATA0,0,0,0,0,0,0,0
631 DATA0,0,0,0,0,0,0,0
632 DATA0,0,0,2,0,0,2,160
633 DATA0,42,168,0,10,102,0,42
634 DATA154,0,38,175,192,41,170,0
635 DATA38,184,0,10,176,0,2,176
636 DATA0,0,48,0,0,0,0,0
637 DATA0,0,0,0,0,0,0,0
638 DATA0,0,0,0,0,0,0,0
639 DATA0,0,0,0,0,0,0,0
640 DATA0,0,0,2,32,0,10,168
641 DATA0,41,154,0,37,150,0,42
642 DATA170,0,42,170,0,42,170,0
643 DATA11,184,0,14,172,0,48,3
644 DATA0,0,0,0,0,0,0,0
645 DATA0,0,0,0,0,0,0,0
646 DATA0,0,0,0,0,0,0,0
647 DATA0,0,0,0,0,0,0,0
648 DATA0,0,0,0,32,0,2,160
649 DATA0,10,170,0,38,104,0,41
650 DATA170,0,254,166,0,42,154,0
651 DATA11,166,0,3,168,0,3,160
652 DATA0,3,0,0,0,0,0,0
653 DATA0,0,0,0,0,0,0,0
654 DATA0,0,0,0,0,0,0,0
655 DATA0,0,0,0,0,0,0,0
656 DATA0,0,0,2,160,0,202,168
657 DATA0,58,104,0,46,90,0,42
658 DATA168,0,42,168,0,46,90,0
659 DATA58,104,0,202,168,0,2,160
660 DATA0,0,0,0,0,0,0,0
661 DATA0,0,0,0,0,0,0,0
662 DATA0,0,0,0,0,0,0,0
663 DATA0,0,0,0,0,0,0,0
664 DATA3,0,0,3,160,0,3,168
665 DATA0,11,166,0,42,154,0,254
666 DATA166,0,41,170,0,38,104,0
667 DATA10,170,0,2,160,0,0,32
668 DATA0,0,0,0,0,0,0,0
669 DATA0,0,0,0,0,0,0,0
670 DATA0,0,0,0,0,0,0,0
671 DATA0,0,0,0,0,0,0,0
672 DATA0,0,0,12,12,0,43,58
673 DATA0,150,229,128,149,149,128,149
674 DATA149,128,37,150,0,37,150,0
675 DATA9,152,0,37,150,0,150,37
676 DATA128,150,37,128,40,10,0,0
677 DATA0,0,0,0,0,0,0,0
678 DATA0,0,0,0,0,0,0,0
679 DATA0,0,0,0,0,0,0,0
680 DATA0,0,0,0,0,0,0,0
681 DATA0,0,32,0,0,32,0,0
682 DATA84,0,4,84,64,21,17,80
683 DATA21,85,80,85,85,84,85,85
684 DATA84,81,85,20,64,84,4,0
685 DATA84,0,0,16,0,0,16,0
```

15 ▶

How to write for Personal Computer News

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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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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.

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Program listing continued

◀13

```
686 DATA0,84,0,0,84,0,0,68
687 DATA0,0,0,0,0,0,0,0
688 DATA0,0,0,0,0,0,0,0
689 DATA0,0,32,0,0,32,0,0
690 DATA84,0,0,4,84,64,5,17,64
691 DATA21,85,80,21,85,80,21,85
692 DATA80,17,85,16,16,84,16,0
693 DATA84,0,0,16,0,0,16,0
694 DATA0,84,0,0,84,0,0,68
695 DATA0,0,0,0,0,0,0,0
696 DATA0,0,0,0,0,0,0,0
697 DATA0,0,32,0,0,32,0,0
698 DATA84,0,0,4,84,64,5,17,64
699 DATA5,85,64,5,85,64,5,85
700 DATA64,5,85,64,4,84,64,4
701 DATA84,64,0,16,0,0,16,0
702 DATA0,84,0,0,84,0,0,68
703 DATA0,0,0,0,0,0,0,0
704 DATA0,0,0,0,0,0,0,0
705 DATA0,0,32,0,0,32,0,0
706 DATA84,0,0,84,0,1,17,0
707 DATA5,85,64,5,85,64,21,85
708 DATA80,17,85,16,16,84,16,0
709 DATA84,0,0,16,0,0,16,0
710 DATA0,84,0,0,84,0,0,68
711 DATA0,0,0,0,0,0,0,0
800 DATA120,169,51,133,1,169,0,133
801 DATA250,169,204,133,251,169,0,133
802 DATA252,169,44,133,253,160,0,152
803 DATA41,7,201,5,144,8,177,250
804 DATA10,145,252,76,54,192,201,2
805 DATA176,8,177,250,74,145,252,76
806 DATA54,192,177,250,145,252,200,208
807 DATA222,230,251,230,253,165,253,201
808 DATA50,208,210,169,55,133,1,88
809 DATA96,162,0,169,50,157,80,195
810 DATA169,150,157,81,195,232,232,224
811 DATA100,208,240,96,1,2,4,8
811 DATA100,208,240,96,1,2,4,8
812 DATA16,32,64,128,173,173,0,220
813 DATA41,2,240,3,206,80,195,173
814 DATA0,220,41,1,240,3,238,80
815 DATA195,173,0,220,41,4,240,3
816 DATA238,81,195,173,0,220,41,8
817 DATA240,3,206,81,195,173,0,220
818 DATA73,127,24,141,255,3,234,234
819 DATA234,162,100,189,79,195,157,81
820 DATA195,202,208,247,162,0,160,0
821 DATA185,80,195,157,1,208,185,81
822 DATA195,157,0,208,232,232,152,24
823 DATA105,12,168,224,12,208,233,173
824 DATA255,3,240,40,160,201,201,2
825 DATA240,31,200,201,6,240,26,200
826 DATA201,4,240,21,200,201,5,240
827 DATA16,200,201,1,240,11,200,201
828 DATA9,240,6,200,201,8,240,1
829 DATA200,140,248,7,76,241,192,0
830 DATA234,238,239,192,173,239,192,201
831 DATA3,144,54,162,0,142,239,192
832 DATA173,0,208,56,237,14,208,141
833 DATA252,3,173,1,208,56,237,15
834 DATA208,141,253,3,201,128,144,6
835 DATA206,15,208,76,33,193,238,15
836 DATA208,173,252,3,201,128,144,6
837 DATA206,14,208,76,49,193,238,14
838 DATA208,173,239,192,201,1,208,15
839 DATA238,255,7,173,255,7,201,214
840 DATA144,5,169,210,141,255,7,169
841 DATA0,141,254,3,173,30,208,141
842 DATA251,3,41,128,240,13,173,251
843 DATA3,41,64,208,6,169,1,141
844 DATA254,3,96,162,200,160,230,200
845 DATA208,253,232,208,248,173,251,3
846 DATA41,64,240,13,173,251,3,41
847 DATA128,208,6,169,2,141,254,3
848 DATA96,173,31,208,141,249,3,41
849 DATA128,240,9,173,249,3,56,233
850 DATA128,141,249,3,173,249,3,41
851 DATA64,240,9,173,249,3,56,233
852 DATA64,141,249,3,173,249,3,240
853 DATA6,169,1,141,254,3,96,76,101,192
1000 A$="{RVS ON}{^*}{^A}{CUR DN}{CUR L}
{CUR L}{^B}{^C}":B$="{CUR RT}{CUR RT}{CU
R RT}{CUR RT}{CUR RT}{CUR RT}{CUR RT}{CU
R RT}{CUR RT}{CUR RT}{CUR RT}{CUR RT}{CU
R RT}{CUR RT}{CUR RT}{CUR RT}{CUR RT}{CU
R RT}{CUR RT}{CUR RT}{CUR RT}{CUR RT}{CU
R RT}{CUR RT}{CUR RT}"
1001 D$="{HOME}{CUR DN}{CUR DN}{CUR DN}{
CUR DN}{CUR DN}{CUR DN}{CUR DN}{CUR DN}{
CUR DN}{CUR DN}{CUR DN}{CUR DN}{CUR DN}{
CUR DN}{CUR DN}{CUR DN}{CUR DN}{CUR DN}{
CUR DN}{CUR DN}{CUR DN}{CUR DN}{CUR DN}"
1002 C$="{OR}{BRN}{LT RED}{GY 1}{GY 2}{L
T GRN}{GY 3}{LT BLU}{BLK}{WHT}{RED}{CYN}
{PUR}{GRN}{YEL}":A=INT(RND(1)*14)+1:PRIN
TMID$(C$,A,1)
1003 A=INT(RND(1)*12)*2:PRINTLEFT$(D$,A+
1);
1004 A=INT(RND(1)*14)*2:PRINTLEFT$(B$,A+
1);A$"{HOME}"
1005 SC=SC+(L*10):L=L+1
1006 PRINT"{HOME}{CUR DN}{CUR DN}{CUR DN
}{CUR DN}{CUR DN}{CUR DN}{WHT}"TAB(31)SC
1010 RETURN
2000 POKE53269,0:GOSUB3000:L=0:SC=0:POKE
198,0
2010 PRINT" {GRN}       GREMLIN'S GARDEN
2020 PRINT"{CUR DN} {WHT}   WRITTEN BY A
.CROWTHER
2030 PRINT"{CUR DN}{CUR DN}{CUR DN}{YEL}
     COLLECT BUTTERFLIES
2040 PRINT"   AVIOD MUSHROOMS AND BIRD
2050 PRINT"{CUR DN}{LT BLU}     OPTIONS
  'A'   'B'
2060 PRINT"       BIRD      YES    NO"
2065 PRINT"{CUR DN}{CUR DN}{CUR DN}{CYN}
     JOYSTICK PORT 2{"
2070 PRINT"{HOME}{CUR DN}{CUR DN}{CUR DN
}{CUR DN}{CUR DN}TAB(32)"{BLK}SCORE"
2080 PRINTTAB(31)SC"{CUR L}  "
2090 PRINTTAB(32)"{CUR DN}HISCORE"
2100 PRINTTAB(31)HI
2110 GETA$
2111 IF(PEEK(56320)AND16)=0THENA$="A"
2120 IFA$="A"THENPOKE53269,255:L=20:GOTO
3000
2130 IFA$="B"THENPOKE53269,127:GOTO3000
2135 GOTO 2110
3000 PRINT"{HOME}";
3001 A$="                                "
3002 FORI=1TO24:PRINTA$:NEXT:PRINTA$"{HO
ME}"
3003 RETURN
3050 PRINT"{CLR}LOADING DATA FOR PROGRAM
"
3060 PRINT"PLEASE WAIT!!"
4000 FORI=0TO895:READA:POKE12800+I,A:NEX
T
4001 FORI=0TO433:READA:POKE49152+I,A:NEX
T:GOTO 1

READY.
```

ADDING MORE TO YOUR BASIC

In the final part of our series, Keith Hook gives the two remaining listings which will enable you to get more from your Amstrad Basic.

In the last two parts, Keith Hook showed you how to create your own Basic Extension and take the first steps to creating your own real-time game. Here he completes the process.

It is essential for a sprite to move around the screen without destroying the background design, and as it is more or less impossible to PEEK the 464's screen, a routine must be devised to overcome this. With the help of the new Basic commands (*PCN*, issue 81) you should be able to find many new ways of using your Amstrad. Here we show you just one possibility. Simply type in listing 2 and save it to tape. Then type in listing 3, save it, and then run the program.

Listing 1

```
1  *** LISTING TWO ***
2 'Sprite_loader.Bas
5 SYMBOL AFTER 32
10 MEMORY &9C39
20 FOR ADD = &9C40 TO &9E19
30 READ VL:POKE ADD,VL
40 NEXT
50 CALL &9C40
100 DATA &01,&49,&9C,&21,&AE,&9D,&CD,&D1,&BC
110 DATA &54,&9C,&C3,&63,&9C,&C3,&5E,&9D,&C3,&8E,&9D
120 DATA &50,&55,&04,&43,&52,&53,&50,&D2,&53,&43,&52
130 DATA &CE,&00,&00,&00,&DD,&7E,&02,&32,&B2,&9D,&CD,&4D,&9D
140 DATA &FD,&7E,&00,&FE,&FF,&C8,&DD,&7E,&00,&FE,&00
150 DATA &CA,&F4,&9D,&FE,&09,&D0,&FD,&77,&02,&CD,&7B,&BB
160 DATA &22,&AB,&9D,&FD,&6E,&00,&FD,&66,&01,&E5,&CD,&75,&BB
170 DATA &FD,&7E,&04,&FE,&00,&20,&18,&3E,&FE,&FD,&77,&04
180 DATA &CD,&9F,&BB,&CD,&93,&BB,&32,&AD,&9D,&FD,&7E,&03
190 DATA &CD,&90,&BB,&E1,&C3,&1D,&9D,&FD,&7E,&05,&CD,&5D,&BB
200 DATA &3E,&FE,&CD,&9F,&BB,&CD,&93,&BB,&32,&AD,&9D
210 DATA &FD,&7E,&03,&CD,&90,&BB,&E1,&FD,&7E,&02,&FE,&01
220 DATA &28,&1D,&FE,&02,&28,&25,&FE,&03,&28,&18,&FE,&04
230 DATA &28,&25,&FE,&05,&28,&10,&FE,&06,&28,&21,&FE,&07
240 DATA &28,&0E,&FE,&08,&28,&11,&C9,&25,&18,&17,&24
250 DATA &18,&14,&2D,&18,&11,&2C,&18,&0E,&2D,&25,&18,&0A
260 DATA &2C,&25,&18,&06,&2D,&24,&18,&02,&2C,&24,&7C,&FE,&01
270 DATA &38,&22,&FE,&29,&30,&1E,&7D,&FE,&01,&38,&19
280 DATA &FE,&1A,&30,&15,&FD,&75,&00,&FD,&74,&01
290 DATA &FD,&66,&01,&FD,&6E,&00,&CD,&75,&BB,&CD,&60,&BB
300 DATA &FD,&77,&05,&FD,&66,&01,&FD,&6E,&00,&CD,&75,&BB
310 DATA &FD,&7E,&06,&CD,&5D,&BB,&2A,&AB,&9D,&CD,&75,&BB
320 DATA &3E,&00,&CD,&9F,&BB,&3A,&AD,&9D,&CD,&90,&BB
330 DATA &C9,&3A,&B2,&9D,&3D,&07,&07,&07,&4F,&06,&00
340 DATA &FD,&21,&B3,&9D,&FD,&09,&C9,&CD,&7E,&00,&FE,&09
350 DATA &D0,&32,&B2,&9D,&CD,&4D,&9D,&CD,&7E,&02,&FD,&77
360 DATA &00,&DD,&7E,&04,&FD,&77,&01,&DD,&7E,&00
370 DATA &FD,&77,&03,&DD,&7E,&06,&FD,&77,&06,&3A,&B2,&9D
380 DATA &FD,&77,&07,&3E,&00,&FD,&77,&04,&C9,&DD,&7E,&00
390 DATA &6F,&DD,&7E,&02,&67,&7C,&FE,&01,&D8,&FE,&29,&D0
400 DATA &7D,&FE,&01,&D8,&CD,&75,&BB,&CD,&60,&BB
410 DATA &32,&F3,&9D,&C9,&00,&00,&00,&00,&00,&00,&00
420 DATA &00,00,00,00,00,00,00,00,00
430 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00
440 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00
450 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00
460 DATA 00,00,00,00,00,00,00,00,00
465 DATA &FD,&77,&00,&FD,&77,&01,&DD,&6E,&00,&FD,&66,&01
480 DATA &CD,&75,&BB,&FD,&7E,&05,&CD,&5D,&BB,&3E,&FF
490 DATA &FD,&77,&00,&AF,&FD,&77,&04,&2A,&AB,&9D,&CD,&75
500 DATA &BB,&C9,&00
```

Listing 2

```
1 '*** LISTING 3 ****
5 ' Demo_Pros.Bas
6 ' Omit all REM statements.....
15 'SET UP PARAMETERS ************
25 RANDOMIZE TIME:CLS:BORDER 9,9: ADD = &9DB3 ' Start Of SPRTBLE
35 INK 3,19
45 PK = &9DF3
55 FOR I =0 TO 56 STEP 8
65 POKE ADD+I,&FF
75 POKE ADD+I+4,0
85 NEXT
95 BUL =0:INUB =0:LIVES = 3:SCRE = 0
105 'DEFINE CHARACTERS ***************
1 SYMBOL 249,681,642,&3C,&5A,&66,&3C,&42,&81
120 SYMBOL 250,&3C,&3C,&3C,&3C,&7E,&7E,&FF,&FF
135 SYMBOL 251,&10,&10,&10,&10,&10,&10,&10
145 SYMBOL 252,&10,&10,&8,&8,&10,&10,&8,&8
155 FEN :I= FOR I = 3 TO 23
165 FOR J = 1 TO 2:X = INT(RND*39+1)
175 LOCATE X,I
185 PRINT "."
195 NEXT:NEXT
205 !CRSPR:1,249,10,2,3
215 !CRSPR:2,249,16,2,3
225 !CRSPR:3,249,23,2,3
235 !CRSPR:4,249,30,2,3
245 !CRSPR:5,250,20,24,2
255 FOR I = 1 TO 5:!PUT,I,1:NEXT ' Display cannon & invaders
265 GOSUB 855:GOSUB 865
275 'Main Program Loop **************
285  POKE PK,0:FL = INT(RND*20+1)
295 IF FL =11 THEN GOSUB 775:GOTO 315
305 IF FL = 13 THEN GOSUB 815:GOTO 315
315 IF INKEY(&9) = 0 THEN 365
325 IF INKEY(1) = 0 THEN 375
335 IF BUL <> 0 THEN 385
345 IF INKEY(47) = 0 THEN 725
355 GOTO 385
365 !PUT.5,1:GOTO 385
375 !PUT.5,51:GOTO 385
385 IF INUB <> 0 THEN 455
395 B = INT(RND*4+1)
405 B=B-1: B=ADD+(B*8)+1 ' Align to correct sprtble reference
415 A = PEEK(B):IF PEEK(B-1)=&FF THEN 565' Horizontal pos of inv
425 !CRSPR,6,252,A,7,1:!PUT,6,7
435 'Check human bullet
445 INUB = 1:GOTO 565
455 CHK=PEEK(&9DDB):CHK1=PEEK(&9DDC)+!IF CHK >=25 THEN !PUT,6,0:INUB =0: GOTO 565
465 CHK = CHK+1
475 !SCRN,CHK1,CHK:IF PEEK(PK)=250 THEN 505 ELSE IF PEEK(PK)=251 GOTO 495
485 !PUT,6,71:GOTO 565
495 !PUT,7,0:!PUT,6,0:INUB=0:BUL =0:GOTO  285
505 !PUT,5,0:!PUT,7,0
515 INUB =0:BUL=0:!PUT,6,0
525 LVES = LVES -1:GOSUB 855:IF LVES =0 THEN GOTO 875
535 !CRSPR,5,250,20,24,2:!PUT,5,1
555 GOTO 285
565 POSL =PEEK(&9DE3)+POSH=PEEK(&9DE4):IF POSL=1 THEN BUL=0:!PUT,7,0:GOTO 285
575 !SCRN,POSH,POSL
585 IF PEEK(PK)>249 THEN 645 ELSE IF PEEK(PK)> 252 THEN 635
595 POSL = POSL -1
605 !SCRN,POSH,POSL
615 IF PEEK(PK)>249 THEN 645 ELSE IF PEEK(PK)> 252 THEN 635
625 !PUT,7,3:GOTO 285
635 !PUT,7,0:!PUT,6,0:BUL=0:INUB=0:GOTO 285
645 FOR I = 0 TO 40 STEP 8
652  IF PEEK(&9DE4)+1 <> PEEK(&9DE4) THEN NEXT:GOTO 285
665 TMP = ADD+I+7
675 INV =PEEK(TMP)
685 !PUT,7,0:!PUT,INV,0
695 SCRE=SCRE+20:GOSUB 865
705 IF SCRE = 80 THEN 875
715 BUL=0:GOTO 285
725 BUL =I1X+0
735 X=0
745 X=PEEK(&9DD3)-1:V=PEEK(&9DD4)
755 !CRSPR,7,251,V,X,2:!PUT,7,3
765 GOTO 285
775  FOR I= 1 TO 4
785 !PUT,I,5
795 NEXT
805 RETURN
815  FOR I= 4 TO 1 STEP -1
825 !PUT,I,1
835 NEXT
845 RETURN
855 LOCATE 1,25:PRINT "LIVES:-";LVES:RETURN
865 LOCATE 30,25:PRINT "SCORE:-";SCRE:RETURN
875 BORDER 5,6:FOR I= 1 TO 100:NEXT
885 BORDER 3,17
895 CLS
905 LOCATE 2,13:PRINT "PRESS 'Enter' for a new game.."!
915 INPUT X
925 B = INT(RND*23+1):BORDER B,B
935 RUN
```

Choosing a printer is a lot easier than choosing a computer.

THERE are dozens of quality printers from which to choose. With quality price tags of around £250.

The Brother M-1009, however, breaks all the rules.

Stays defiantly below the £200 barrier.

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Providing bi-directional and logic seeking printing for normal characters and uni-directional printing for super and sub script and graphics.

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ADDING COLUMNS

A 64-column ZX Spectrum without an Interface 1? Follow this program by Stuart Nicholls to achieve this.

With this machine code routine you can use the Basic PRINT, LIST, LPRINT and LLIST commands in the normal way to produce 64 characters per line, which in the case of the PRINT and LIST commands allows all 24 screen lines to be used.

There are also several extra commands that are not normally available to Basic programmers. What is more, it works on a standard 48K Spectrum without the Interface 1 shadow ROM, does not use interrupts or PLOT the characters, but POKEs each character onto the screen using an 8 byte form held in a new character generator as in the normal ROM PRINT routine.

The routine works, without the need to access it with a USR call, by diverting the ROM from its own PRINT routine to mine.

To enter the Machine code use your favourite hexloader and enter the hex-dump as in LIST 1 which starts at address 65301 and is 2035 bytes long. Remember to CLEAR 65300 before entering the machine code, as failure to do so will result in the machine stack being overwritten, causing a crash. Once entered then SAVE the code using SAVE "Specwide" CODE 63501, 2035.

Instructions

To switch to 64 character printing enter the following lines as direct commands or at the start of your Basic program:

```
LET AA=PEEK 23631+256*PEEK 23632
POKE AA+5,244:POKE AA+6,251
```

To revert back to the Spectrum 32 character mode simply use the Enter key to obtain an automatic listing or enter CLS, both of which will switch to the normal print mode. If you wish to switch to normal printing use:

```
POKE AA+5,244:POKE AA+6,9
```

To switch the 64 character mode on again use:

```
POKE AA+5,244:POKE AA+6,251
```

The ZX Printer is switched to 64 column mode using:

```
POKE AA+15,244:POKE AA+16,251
```

and will stay on until switched off by using `POKE AA+15,244:POKE AA+16,9`

Print commands

CLS: Because you cannot use this command in the 64 character mode I have incorporated a CLS routine which clears all 24 lines: PRINT CHR$3,; this also resets the PRINT position to 0,0;

PRINT CHR$ 4; = scrolls down the whole screen (note semicolon)

PRINT CHR$ 5; = scrolls up the whole screen (note semicolon)

PRINT CHR$ 6 or PRINT, = print at next tab position

Tabs may be set up in Basic to give 2, 4, 8, 16 and 32 tab column. The initial setting is 4.

To alter the setting use this table:

```
TAB  POKE 64661,
  2   31
  4   15
  8    7
 16    3
 32    1
```

You may experiment with other values to give uneven tab spacing.

PRINT CHR$ 7; = no print (ignores this

```
Specwide DEK CHARACTER SET. Printed using variable tab settings
 0   1   2   3   4   5   6   7   8   9   A   B   C   D   E   F
 !   "   #   $   %   &   '   (   )   *   +   ,   -   .   /
 0   1   2   3   4   5   6   7   8   9   :   ;   <   =   >   ?
 @   A   B   C   D   E   F   G   H   I   J   K   L   M   N   O
 P   Q   R   S   T   U   V   W   X   Y   Z   [   \   ]   ^   _
 `   a   b   c   d   e   f   g   h   i   j   k   l   m   n   o
 p   q   r   s   t   u   v   w   x   y   z   {   |   }   ~   ©
 £   ↑   ↓   ←   →   ▒   ▓   ▀   ▄   ▌   ▐   ▖   ▗   ▘   ▙   ▚
 ▛   ▜   ▝   ▞   ▟   ■   ¦   ¬   ±   ×   ÷   ²   ³   ¼   ½   ¾
 FOR  FN  PEEK SCREEN$ ATTR  AT  TAB  VAL$
 NEXT VAL  DPEEK STR$  CODE  VAL  LEN  SCR$
 STEP LET  DPOKE CHR$  LEN   SIN  ASN  ATTR
 TO   SAVE DPOKE MOVE  SIN   COS  ACS  POINT
 THEN DIM  LEN   ERASE COS   TAN  ATN  SCREEN$
 ELSE COPY POKE  OPEN  TAN   ASN  LN   ATTR
 LINE OPEN INPUT CLOSE ATN   ACS  EXP  POINT
 DEF FN CLOSE OUT  MERGE LN   ATN  INT  SCREEN$
 FN   CAT  VERIFY VAL$  EXP   LN   SQR  ATTR
 =    MOVE DRAW   CODE  INT   EXP  SGN  POINT
 <=   ERASE CAT   PEEK  SQR   INT  ABS  SCREEN$
 <>   POINT CLEAR IN    SGN   SQR  PEEK ATTR
 AND  CAT  FORMAT CHR$  ABS   SGN  IN   USR
 OR   DRAW NEW    STR$  PEEK  ABS  OUT  IN
 NOT  CLEAR RUN   USR   IN    PEEK OUT  OUT
 BIN  CIRCLE INK   VAL   OUT   IN   USR  USR
 ,    INK   PAPER  CODE  USR   OUT  OUT  STR$
 ;    PAPER FLASH  STR$  STR$  USR  STR$ CHR$
 "    FLASH BRIGHT CHR$  CHR$  STR$ CHR$ CODE
 GO TO BRIGHT INVERSE LIST  LIST  CHR$ PAUSE VAL$
 GO SUB INVERSE OVER  LLIST LLIST PAUSE USR$
 PRINT PAUSE BEEP  LPRINT LPRINT RANDOMIZE IF
 CLS   BEEP  CLEAR RETURN COPY
                ©1984 Stuart Nicholls
```

Listing one

```
ZX Spectrum 48K HEXDUMP
Spec wide : CODE 63501,2035
F800  AA 55 AA 55 AA 55 AA 55 = FC
F815  AA 55 AA 55 00 00 00 00 = FE
F81D  00 00 00 00 AA 55 AA 55 = FE
F825  FF 99 99 99 99 99 99 FF = 94
F82D  00 66 66 66 66 66 66 00 = 64
F835  00 00 FF 99 99 FF 00 00 = 30
F83D  00 00 00 66 66 00 00 00 = CC
F845  00 00 66 FF FF 66 00 00 = CA
F84D  00 00 00 00 00 00 00 00 = 00
F855  00 22 22 22 22 00 22 00 = AA
F85D  00 55 55 00 00 00 00 00 = AA
F865  00 00 55 77 55 77 55 00 = ED
F86D  00 22 77 66 33 77 22 00 = CB
F875  00 CC DD 22 44 BB 33 00 = FD
F87D  00 66 AA 44 BB AA DD 00 = 96
F885  00 22 22 00 00 00 00 00 = 44
F88D  00 22 44 44 44 44 22 00 = 54
F895  00 22 11 11 11 11 22 00 = 88
F89D  00 00 55 22 77 22 55 00 = 65
F8A5  00 00 22 22 77 22 22 00 = FF
F8AD  00 00 00 00 00 22 44 00 = 66
F8B5  00 00 00 00 77 00 00 00 = 77
F8BD  00 00 00 00 00 00 22 00 = 22
F8C5  00 11 11 22 22 44 44 00 = EE
F8CD  00 33 55 55 55 55 66 00 = ED
F8D5  00 66 22 22 22 22 22 00 = 10
F8DD  00 22 55 11 22 44 77 00 = 65
F8E5  00 77 11 22 11 11 66 00 = 32
F8ED  00 44 55 55 77 11 11 00 = 87
F8F5  00 77 44 66 11 11 66 00 = A9
F8FD  00 33 44 66 55 55 22 00 = A9
F905  00 77 11 11 22 44 44 00 = 43
F90D  00 33 55 22 55 55 66 00 = BA
F915  00 22 55 55 33 11 66 00 = 76
F91D  00 00 00 22 00 22 00 00 = 44
F925  00 00 00 22 00 22 44 00 = 88
F92D  00 00 11 22 44 22 11 00 = AA
F935  00 00 00 77 00 77 00 00 = EE
F93D  00 00 44 22 11 22 44 00 = 80
F945  00 22 55 11 22 00 22 00 = CC
F94D  00 66 DD DD BB 88 77 00 = DA
F955  00 22 55 55 77 55 55 00 = ED
F95D  00 66 55 66 55 55 66 00 = 31
F965  00 33 44 44 44 44 33 00 = 76
F96D  00 66 55 55 55 55 66 00 = 28
F975  00 77 44 66 44 44 77 00 = 28
F97D  00 77 44 66 44 44 44 00 = ED
F985  00 33 44 44 55 55 33 00 = 98
F98D  00 55 55 77 55 55 55 00 = 28
F995  00 77 22 22 22 22 77 00 = 76
F99D  00 11 11 11 11 11 66 00 = BB
F9A5  00 55 55 66 55 55 55 00 = 0F
F9AD  00 44 44 44 44 44 77 00 = CB
F9B5  00 55 77 77 55 55 55 00 = 42
F9BD  00 66 55 55 55 55 55 00 = 0F
F9C5  00 22 55 55 55 55 22 00 = 98
F9CD  00 66 55 55 66 44 44 00 = FE
F9D5  00 22 55 55 55 77 33 00 = CB
F9DD  00 66 55 55 66 55 55 00 = 28
F9E5  00 33 44 22 11 11 66 00 = 21
F9ED  00 77 22 22 22 22 22 00 = 21
F9F5  00 55 55 55 55 55 33 00 = DC
F9FD  00 55 55 55 55 55 22 00 = CB
FA05  00 55 55 55 77 77 55 00 = 42
FA0D  00 55 55 22 22 55 55 00 = 98
FA15  00 55 55 55 22 22 22 00 = 65
FA1D  00 77 11 22 22 44 77 00 = 87
FA25  00 66 44 44 44 44 66 00 = DC
FA2D  00 44 44 22 22 11 11 00 = EE
FA35  00 33 11 11 11 11 33 00 = AA
FA3D  00 22 77 22 22 22 22 00 = 21
FA45  00 00 00 00 00 00 FF 00 = FF
FA4D  00 33 44 66 22 44 77 00 = BA
FA55  00 00 66 11 77 55 77 00 = BA
FA5D  00 44 66 55 55 55 66 00 = 0F
FA65  00 00 33 44 44 44 33 00 = 32
FA6D  00 11 33 55 55 55 33 00 = 76
FA75  00 00 22 55 77 44 33 00 = 65
FA7D  00 11 22 77 22 22 22 00 = 10
FA85  00 00 33 55 55 55 33 66 = CB
FA8D  00 44 66 55 55 55 55 00 = FE
FA95  00 22 00 22 22 22 11 00 = 99
FA9D  00 22 00 22 22 22 22 44 = EE
FAA5  00 44 55 66 66 55 55 00 = 0F
FAAD  00 22 22 22 22 22 11 00 = BB
FAB5  00 00 55 77 77 55 55 00 = ED
FABD  00 00 66 55 55 55 55 00 = BA
FAC5  00 22 22 55 55 55 22 00 = 43
FACD  00 00 66 55 55 55 66 44 = 0F
FAD5  00 00 33 55 55 55 33 11 = 76
FADD  00 00 33 44 44 44 44 00 = 43
FAE5  00 00 33 44 22 11 66 00 = 10
FAED  00 22 77 22 22 22 11 00 = 10
FAF5  00 00 55 55 55 55 33 00 = 87
FAFD  00 00 55 55 55 55 22 00 = 76
FB05  00 00 55 55 55 77 55 00 = ED
FB0D  00 00 55 55 22 55 55 00 = 76
FB15  00 55 55 55 55 55 33 66 = ED
FB1D  00 00 77 11 22 44 77 00 = 65
FB25  11 22 22 44 22 22 11 00 = EE
FB2D  00 22 22 22 22 22 22 00 = CC
FB35  44 22 22 11 22 22 44 00 = 21
FB3D  00 55 AA 00 00 00 00 00 = FF
FB45  66 99 FF DD FF 99 66 00 = D9
FB4D  00 00 00 00 00 00 00 00 = 00
FB55  33 33 33 33 00 00 00 00 = CC
FB5D  CC CC CC CC 00 00 00 00 = 3F
FB65  FF FF FF FF 00 00 00 00 = FC
FB6D  00 00 00 00 33 33 33 33 = CC
FB75  33 33 33 33 33 33 33 33 = 98
FB7D  CC CC CC CC 33 33 33 33 = FC
FB85  FF FF FF FF 33 33 33 33 = C8
FB8D  00 00 00 00 CC CC CC CC = 30
FB95  33 33 33 33 CC CC CC CC = FC
FB9D  CC CC CC CC CC CC CC CC = 60
FBA5  FF FF FF FF CC CC CC CC = 2C
FBAD  00 00 00 00 FF FF FF FF = FC
FBB5  33 33 33 33 FF FF FF FF = C8
FBBD  CC CC CC CC FF FF FF FF = 2C
FBC5  FF FF FF FF FF FF FF FF = F8
FBCD  00 00 00 00 00 00 00 00 = 00
FBD5  00 00 FD CB 01 6E 28 FA = 59
FBDD  FD CB 01 AE 06 00 3A 00 = BF
FBE5  5C 4F FE 06 C0 3A 6A 5C = 6F
FBED  EE 08 32 6A 5C 18 E3 FE = E7
FBF5  01 CA C9 FE FE 03 CA FE = 5B
FBFD  FE FE 04 CA 7C FE FE 05 = 47
```

CHR. *ie* no '?' as in the normal Spectrum PRINT)

PRINT CHR$ 8; = cursor left (with corrected backspace to top line error that occurs in the normal print mode). If at position, 0,0; this will scroll the whole screen down and print at 0,63;

PRINT CHR$ 9; = cursor right. If at position 23,63; then the screen scrolls up and printing will continue at 23,0;

PRINT CHR$ 10; = cursor down. If on line 23 the screen will scroll up.

PRINT CHR$ 11; = cursor up. If on line 0 the screen will scroll down.

PRINT CHR$ 12; = delete character behind the present print position and it will scroll down if at 0,0;

PRINT CHR$ 13; = new line.

PRINT CHR$ 14 and 15 = no print

PRINT CHR$ 16 TO 21 as the Spectrum codes *ie* INK TO OVER. But note that INVERSE has no effect.

PRINT AT (CHR$22) line, col; allows line, col values of 0 to 255, but line values greater than 23 and column values greater than 63 will wrap around the screen *ie* PRINT AT 25,70; = PRINT AT 1,6;

PRINT TAB (CHR$23); allows values of 0 to 255 but see above for 63.

PRINT CHR$ 24 TO 31 : new graphics characters (not available from the keyboard).

All Spectrum characters will PRINT including graphics, UDGs and keywords. Also embedded print control codes are acceptable.

INPUT will use the normal edit lines and print 32 characters per line.

ERROR messages will print on line 22 in 32 character mode. Programs can be edited normally.

Lprint commands

COPY: this will work in the normal way, copying the first 22 lines. However a new routine is included to copy all 24 lines or a block of screen lines:

LPRINT CHR$ 1;CHR$ line start; CHR$ line end;

Line start and end must be in the range 0 to 23. For example, to copy lines 3 to 10 inclusive use LPRINT CHR$ 1;CHR$ 3;CHR$ 10; note the semicolons must be used.

PRINT CHR$ 3; = clear printer buffer without printing and set the LPRINT tab to 0.

PRINT CHR$ 6 or LPRINT, as the PRINT, command.

PRINT CHR$ 8; as PRINT CHR$ 8; if at tab 0 this will be ignored.

PRINT CHR$ 9; as PRINT CHR$ 9; If at tab 63 this will cause a printout of the buffer and the new tab will be 0.

PRINT CHR$ 12; as PRINT CHR$ 12; (but see LPRINT CHR$ 8;)

PRINT CHR$ 13; = LPRINT contents of the buffer then empty the buffer and set tab to 0.

PRINT CHR$ 14 TO 20 = NO LPRINT

PRINT CHR$ 21; = LPRINT OVER (either 0 or 1 as the PRINT command)

PRINT AT/TAB (both have the same effect) see PRINT AT/TAB for range and wrap-around effect.

All characters will LPRINT including graphics, UDGs, however the new CHRS 24 TO 31.

LLIST will produce a printout of 64 characters per line of a Basic program on the ZX printer.

You may wish to redefine characters. The new character generator starts at address 63501 with CODE 24 and continues to CODE 164.

The start address of a particular character form can be found using ((CODE-24)*8) + 63501. Each character is made up of 8 bytes and comprises a left and right character, for examples 'A' appears as:

and starts at address ((65-24)* + 63501 + 63829.

Figure 1 is a screen dump showing all the characters from code 24 to code 255.

Listing 2, for the Assembly language programmers among you, is my assembly listing. Note that the code is from FBF4 TO FF40 the character generator and UDGs occupying the rest of the code.

```
FC05  CA 2B FE D8 CD 29 FD FE = BC
FC0D  18 D2 10 FD 21 18 FC 5F = 8B
FC15  16 00 19 5E 19 E5 C3 29 = 77
FC1D  FD 73 11 2B 48 4A 5A D4 = 6C
FC25  0C 0A 09 7E 7D 7C 7B 7A = 8B
FC2D  79 73 72 C9 FD CB 01 4E = 3E
FC35  28 0B CD CD 0E 0E 43 21 = 4D
FC3D  00 5B C3 21 FD 0E 43 CD = 5A
FC45  1F FE 05 C3 F2 FD 0C 3E = 1E
FC4D  44 B9 20 15 FD CB 01 4E = 49
FC55  28 04 0E 43 18 0B 04 0E = B2
FC5D  04 3E 19 B8 20 03 CD 7C = 7F
FC65  FE C3 F2 FD C3 DE FD FD = 4B
FC6D  CB 01 4E C0 05 20 06 C5 = CA
FC75  CD 2B FE C1 04 C3 F2 FD = 6D
FC7D  FD CB 01 4E C0 04 3E 19 = 32
FC85  B8 20 06 C5 CD 7C FE C1 = AB
FC8D  05 C3 F2 FD 79 D6 03 E6 = EF
FC95  0F C3 EF FC 11 B3 FC 32 = AF
FC9D  0F 5C 18 0B 11 99 FC 18 = 4C
FCA5  03 11 B3 FC 32 0E 5C 2A = 89
FCAD  51 5C 73 23 72 C9 11 F4 = 83
FCB5  FB CD AC FC 2A 0E 5C 57 = 5B
FCBD  7D FE 16 DA 11 22 20 21 = DF
FCC5  7A E6 3F 4F 3E 3F 91 C6 = C2
FCCD  04 4F FD CB 01 4E 20 0E = 98
FCD5  7C D6 18 30 FC 28 02 C6 = 86
FCDD  18 47 3E 18 90 47 C3 F2 = 41
FCE5  FD 7C CD 29 FD 81 D6 03 = C6
FCED  E6 3F C8 57 CD DE FD 15 = 01
FCF5  20 FA C9 D9 3A 91 5C F5 = D8
FCFD  FD 36 57 00 3E 08 D7 3E = E5
FD05  20 D7 3E 00 D7 F1 32 91 = C8
FD0D  5C D9 C9 CD 3F FD FD CB = CF
FD15  01 4E 20 08 ED 43 7A FE = 1F
FD1D  22 78 FE C9 ED 43 3D FF = CD
FD25  22 3F FF C9 FD CB 01 4E = 40
FD2D  20 08 ED 4B 7A FE 2A 78 = 7A
FD35  FE C9 ED 4B 3D FF 2A 3F = A4
FD3D  FF C9 FE 90 38 12 D6 A5 = 1B
FD45  38 05 CD 10 0C 18 DD C6 = E1
FD4D  15 C5 ED 4B 7B 5C 18 04 = 05
FD55  C5 01 4D F7 EB 26 00 6F = 9A
FD5D  29 29 29 09 C1 EB 79 D6 = 7F
FD65  03 3E 43 20 10 05 4F FD = 05
FD6D  CB 01 4E 28 08 D5 CD 31 = 1D
FD75  FC D1 79 18 06 B9 D5 CC = BE
FD7D  1F FE D1 C5 E5 FD CB 01 = 61
FD85  4E 20 05 3A 7A FE 18 03 = 40
FD8D  3A 3D FF 86 F8 0E 0F CB = 54
FD95  47 20 03 41 0E F0 3A 91 = 74
FD9D  5C CB 47 28 02 0E FF 3E = E3
FDA5  00 A7 FD CB 01 4E 28 05 = F3
FDAD  FD CB 30 CE 37 08 1A A0 = BF
FDB5  F5 7E A1 77 F1 AE 77 08 = A9
FDBD  38 17 24 13 3D 20 EE 25 = F6
FDC5  FD CB 01 4E 28 03 CD DB = E2
FDCD  0B E1 C1 0D CB 41 CB 23 = B1
FDD5  C9 08 3E 20 85 6F 08 18 = 43
FDDD  E2 D5 D9 3A 91 5C F5 3E = EA
FDE5  20 FD 36 57 01 D7 F1 32 = A5
FDED  91 5C D9 D1 C9 FD CB 01 = 29
FDF5  4E 28 05 21 00 5B 18 05 = 14
FDFD  C5 CD 0E FE C1 3E 43 91 = 71
FE05  CB 3F 5F 16 00 19 C3 13 = 4E
FE0D  FD 3E 18 90 57 0F 0F 0F = 67
FE15  E6 E0 6F 7A E6 18 F6 40 = E3
FE1D  67 C9 FD CB 01 4E C8 11 = 18
FE25  F2 FD D5 78 A7 C0 FD CB = 6B
FE2D  01 4E C0 21 20 40 06 08 = 9E
FE35  E5 0E 03 C5 EB 21 E0 FF = A6
FE3D  19 EB 01 20 00 ED B0 7D = 3F
FE45  A7 20 F1 21 20 07 19 C1 = DA
FE4D  0D C5 20 EE AF 06 20 12 = C7
FE55  13 10 FC C1 E1 24 10 DB = CD
FE5D  21 20 58 11 00 58 01 E0 = E3
FE65  02 ED B0 3A 8D 5C 06 20 = E8
FE6D  12 13 10 FC 21 00 40 01 = 93
FE75  43 01 C9 60 50 43 05 FD = 02
FE7D  CB 01 4E C0 21 DF 57 06 = 37
FE85  08 E5 0E 03 C5 EB 21 20 = EF
FE8D  00 19 EB 01 20 00 ED B8 = CA
FE95  7D 3C 20 F1 7C D6 07 67 = 8A
FE9D  C1 0D C5 20 EE AF 06 20 = 7E
FEA5  12 1B 10 FC C1 E1 25 10 = 1B
FEAD  D8 21 DF 5A 11 FF 5A 01 = 9D
FEB5  E0 02 ED B8 3A 8D 5C 06 = B0
FEBD  20 12 1B 10 FC 21 1F 40 = D9
FEC5  01 04 18 C9 FD CB 01 4E = FD
FECD  C8 11 D4 FE C3 AC FC 11 = 27
FED5  DD FE 32 0E 5C C3 AC FC = E2
FEDD  11 F4 FB CD AC FC 4F 3A = FE
FEE5  0E 5C 47 FE 18 D0 79 90 = A0
FEED  D8 F5 78 CD 11 FE F1 3C = 4E
FEF5  A7 17 17 17 47 F3 C3 B2 = 9B
FEFD  0E FD CB 01 4E 20 21 21 = B7
FF05  00 40 11 01 40 01 FF 17 = A9
FF0D  36 00 ED B0 23 13 01 FF = 09
FF15  02 3A 8D 5C 77 ED B0 01 = 3A
FF1D  43 18 21 00 40 C3 F2 FD = 6E
FF25  21 00 5B 22 3F FF AF 47 = D2
FF2D  77 23 10 FC FD CB 30 0E = 2C
FF35  01 43 00 ED 43 3D FF C9 = 79
FF3D  43 00 00 5B 52 0C 02 5C = 5A
FF45  0E C0 57 71 0E F3 0D 21 = C5
FF4D  17 C6 1E 0C F8 76 1B 03 = 93
FF55  13 00 3E 00 22 55 55 77 = 94
FF5D  44 33 00 00 66 55 66 55 = 20
FF65  55 66 00 00 33 44 44 44 = BA
FF6D  44 33 00 00 66 55 55 55 = DC
FF75  55 66 00 00 77 44 66 44 = 20
FF7D  44 77 00 00 77 44 66 44 = 20
FF85  44 44 00 00 33 44 44 55 = 98
FF8D  55 33 00 00 55 55 77 55 = FE
FF95  55 55 00 00 77 22 22 22 = 87
FF9D  22 77 00 00 11 11 11 11 = DD
FFA5  11 66 00 00 55 55 66 55 = DC
FFAD  55 55 00 00 44 44 44 44 = BA
FFB5  44 77 00 00 55 77 77 77 = 75
FFBD  55 55 00 00 66 55 55 55 = 0F
FFC5  55 55 00 00 22 55 55 55 = CB
FFCD  55 22 00 00 66 55 55 66 = EB
FFD5  44 44 00 00 22 55 55 55 = A9
FFDD  77 33 00 00 66 55 55 66 = 28
FFE5  55 55 00 00 33 44 22 11 = 54
FFED  11 66 00 00 77 22 22 22 = 54
FFF5  22 22 00 00 55 55 55 55 = 98
FFFD  55 33 00 = 88
```

21▶

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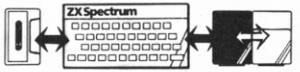

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Listing two

```
0001 TVDTA EQU  23566
0002 CURCH EQU  23633
0003 TEMPS EQU  2211H
0004 FLAGS EQU  23611
0005 PFLAG EQU  23697
0006 UDG   EQU  23675
0007 ATTRT EQU  23695
0008 MASK  EQU  23694
0009 ; ****************
0010 ; *  SpecWIDE   *'
0011 ; *    c 1984   *'
0012 ; *             *'
0013 ; *             *'
0014 ; *  written by  *'
0015 ; *    Stuart   *'
0016 ; *   Nicholls  *'
0017 ; ****************'
0018 ;
0019         ORG  64500
0020 ;
0025 PRINT CP   1
0030       JP   Z,COPY
0040       CP   3
0050       JP   Z,CLS
0080       CP   4
0090       JP   Z,SCRDW
0100       CP   5
0110       JP   Z,SCR
0115       RET  C
0120       CALL FPOSN
0130       CP   24
0140       JP   NC,PNTIT
0170       LD   HL,C6-6
0180       LD   E,A
0190       LD   D,0
0200       ADD  HL,DE
0210       LD   E,(HL)
0220       ADD  HL,DE
0230       PUSH HL
0240       JP   FPOSN
0250 C6    DEFB 115
0260 C7    DEFB 17
0270 C8    DEFB 43
0280 C9    DEFB 72
0290 C10   DEFB 74
0300 C11   DEFB 90
0310 C12   DEFB 212
0320 C13   DEFB 12
0330 C14   DEFB 10
0340 C15   DEFB 8
0350 C16   DEFB 126
0360 C17   DEFB 125
0370 C18   DEFB 124
0380 C19   DEFB 123
0390 C20   DEFB 122
0400 C21   DEFB 121
0410 C22   DEFB 115
0420 C23   DEFB 114
0430 NPNT  RET
0440 NEWLN BIT  1,(IY+1)
0450       JR   Z,NL1
0460       CALL @ECDH
0470       LD   C,67
0480       LD   HL,5B00H
0490       JP   STR1
0500 NL1   LD   C,67
0510       CALL SCHRI
0520       DEC  B
0530       JP   SETCL
0550 LEFT  INC  C
0560       LD   A,68
0570       CP   C
0580       JR   NZ,L1
0590       BIT  1,(IY+1)
0600       JR   Z,L2
0610       LD   C,67
0620       JR   L1
0630 L2    INC  B
0640       LD   C,4
0650       LD   A,25
0660       CP   B
0670       JR   NZ,L1
0680       CALL SCRDW
0690 L1    JP   SETCL
0700 RIGHT JP   PSPC
0710 DOWN  BIT  1,(IY+1)
0720       RET  NZ
0730       DEC  B
0740       JR   NZ,D1
0750       PUSH BC
0760       CALL SCRDW
0770       POP  BC
0780       INC  B
0790 D1    JP   SETCL
0800 UP    BIT  1,(IY+1)
0810       RET  NZ
0820       INC  B
0830       LD   A,25
0840       CP   B
0850       JR   NZ,U1
0860       PUSH BC
0870       CALL SCRDW
0880       POP  BC
0890       DEC  B
0900 U1    JP   SETCL
0910 INTAB LD   A,C
0920       SUB  3
0940       AND  15
0950       JP   FILL1
0960 TV2   LD   DE,CONT
0970       LD   (TVDTA+1),A
0980       JR   CHNGE
0990 TABAT LD   DE,TV2
1000       JR   TV1

1010 INKOV LD   DE,CONT
1020 TV1   LD   (TVDTA),A
1030 CHNGE LD   HL,(CURCH)
1040       LD   (),E
1050       INC  HL
1060       LD   (),D
1070       RET
1080 CONT  LD   DE,PRINT
1090       CALL CHNGE
1100       LD   HL,(TVDTA)
1110       LD   B,A
1120       LD   A,L
1130       CP   22
1140       JP   Z,TEMPS
1150       JR   NZ,TAB
1160 AT    LD   A,B
1170       AND  63
1180       LD   C,A
1190       LD   A,63
1200       SUB  C
1210       ADD  4
1220       LD   C,A
1230       BIT  1,(IY+1)
1240       JR   NZ,AT3
1250       LD   A,H
1260 AT1   SUB  8
1270       JR   NC,AT1
1280       JR   Z,AT2
1290       ADD  2
1300 AT2   LD   B,A
1310       LD   A,24
1320       SUB  B
1330       LD   B,A
1340 AT3   LD   (),BC
1350 TAB   LD   A,H
1360 FILL  CALL FPOSN
1370       ADD  C
1380       SUB  3
1390       CPL  63
1400 FILL1 RET  C
1410       LD   B,A
1420 SPACE CALL PSPC
1430       DEC  D
1440       JR   NZ,SPACE
1450       RET
1460 RBOUT EXX
1470       LD   A,(PFLAG)
1480       PUSH AF
1490       LD   (),@7F,@
1500       LD   A,@
1510       RST  16
1520       LD   A,32
1530       RST  16
1540       LD   A,@
1550       RST  16
1560       POP  AF
1570       LD   (PFLAG),A
1580       EXX
1590       RET
1610 PNTIT CALL PTALL
1620 STORE BIT  1,(IY+1)
1630       JR   NZ,STR1
1640       LD   (SPOSN),BC
1650       LD   (DFCC),HL
1660       RET
1670 STR1  LD   (PPOSN),BC
1680       LD   (DFCC),HL
1690       RET
1700 PSPC  RST  1,(IY+1)
1710       JR   NZ,FPOSI
1720       LD   (PPOSN),BC
1730       LD   HL,(DFCC)
1740       RET
1750 FPOSI LD   BC,(PPOSN)
1760       LD   (DFCC),HL
1770       RET
1780 PTALL CP   144
1790       JR   C,CHAR
1800 CKUDG SUB  165
1820       JR   C,(CH)
1830       CALL @C1EC
1840       JR   ?POSN
1850 CK1   ADD  @8
1860       PUSH BC
1870       LD   BC,(UDG)
1880       JR   CHARI
1890 CHAR  PUSH BC<Char.Gen-152
1895 ;     LD   BC,@3D00
1910 CHARI EX   DE,HL
1920       LD   L,A
1930       LD   H,@
1940       ADD  HL,HL
1950       ADD  HL,HL
1960       ADD  HL,BC
1970       POP  BC
1980       EX   DE,HL
2000 ALL   LD   A,C
2010       SUB  32
2020       LD   A,@2
2030       JR   NZ,ALL2
2040       DEC  B
2050       LD   C,A
2060       BIT  1,(IY+1)
2070       JR   Z,ALL2
2080       PUSH DE
2090       CALL @C1EC
2100       POP  DE
2110       LD   A,C
2115       JR   ALL3
2120 ALL2  CP   128
2130       PUSH DE
2140       CALL ?SCROLL
2150       POP  DE
2160 ALL3  PUSH BC
2170       PUSH HL
2180       BIT  1,(IY+1)
2190       JR   Z,ALL4
2200       LD   (SPOSN),
2210       JR   ALL5
2220 ALL4  LD   A,(PPOSN)
2230 ALL5  LD   B,240
2240       CP   175
2250       BIT  0,A
2260       JR   NZ,#1
2270       LD   B,2
2280       LD   B,240
2290 #1    LD   A,(PFLAG)

2300       BIT  0,A
2310       JR   Z,#2
2320       LD   C,255
2330 #2    LD   A,@
2335       AND  A
2336       BIT  1,(IY+1)
2337       JR   Z,#3
2338       SET  1,(IY+48)
2339       SCF
2340 #3    EX   AF,A'F'
2350       LD   A,(DE)
2360       AND  B

2370       PUSH AF
2380       LD   A,(HL)
2390       AND  C
2400       LD   (HL),A
2410       POP  AF
2420       XOR  (HL)
2430       LD   (HL),A
2440       EX   AF,A'F'
2445       JR   C,#5
2450       INC  H
2460 #6    INC  DE
2470       DEC  A
2480       JR   NZ,#3
2490       DEC  H
2500       BIT  1,(IY+1)
2510       JR   NZ,#4
2520       CALL @BDBH
2530 #4    POP  HL
2540       POP  BC
2550       DEC  C
2560       BIT  @,C
2570       RET  Z
2580       INC  HL
2590       RET
2600 #5    EX   AF,A'F'
2610       LD   A,32
2620       ADD  L
2630       LD   L,A
2640       EX   AF,A'F'
2650       JR   #6
2860 PSPC  PUSH DE
2870       EXX
2880       LD   A,(PFLAG)
2890       PUSH AF
2900       LD   A,32
2910       LD   (IY+87),1
2920       RST  16
2930       POP  AF
2940       LD   (PFLAG),A
2950       EXX
2960       POP  DE
2970       RET
2980 SETCL BIT  1,(IY+1)
2990       JR   Z,SET1
3000       LD   HL,5B00H
3010       JR   SET2
3020 SET1  PUSH BC
3030       CALL ADDR
3040       POP  BC
3050 SET2  LD   A,67
3060       SUB  C
3070       SRL  A
3080       LD   E,A
3090       LD   D,@
3100       ADD  HL,DE
3110       JP   STORE
3120 ADDR  LD   A,24
3130       SUB  B
3140 ADDR1 LD   D,A
3150       RRCA
3160       RRCA
3170       RRCA
3180       AND  224
3190       LD   L,A
3200       LD   A,D
3210       AND  24
3220       OR   64
3230       LD   H,A
3240       RET
3242 SCRLL BIT  1,(IY+1)
3244       RET  NZ
3246       LD   DE,SETCL
3260       PUSH DE
3270       LD   A,B
3280       AND  A
3290       RET  NZ
3293 SCR   BIT  1,(IY+1)
3295       RET  NZ
3300       LD   HL,4020H
3310       LD   B,8
3320 SCR1  PUSH HL
3340       LD   C,3
3350       PUSH BC
3360 SCR2  EX   DE,HL
3370       LD   HL,@FFE0H
3380       ADD  HL,DE
3390       EX   DE,HL
3400 SCR3  LD   BC,32
3410       LDIR
3420       LD   A,L
3430       AND  A
3440       JR   NZ,SCR2
3450       LD   HL,@720H
3460       ADD  HL,DE
3470       POP  BC
3480       DEC  C
3490       PUSH BC
3500       JR   NZ,SCR3
3510       XOR  A
3520       LD   B,32
3530 CLN1  LD   (DE),A
3540       INC  DE
3550       DJNZ CLN1
3560       POP  BC
3570       POP  HL
3580       INC  H
3590       DJNZ SCR1
3600 SCRAT LD   HL,5820H
3610       LD   DE,5800H
3620       LD   BC,736
3630       LDIR
3640       LD   A,(ATTRP)
3650       LD   B,32
3660 CLN2  LD   (DE),A
3670       INC  DE
3680       DJNZ CLN2
3690       LD   HL,4000H
3700       LD   BC,@143H
3705       RET
3710 DFCC  DEFB @0H
3720       DEFB 40H
3730 SPOSN DEFB 43H
3740       DEFB 10H
3750 SCRDW BIT  1,(IY+1)

3760       RET  NZ
3780       LD   HL,57DFH
3790       LD   B,8
3800 DWN1  PUSH HL
3810       LD   C,3
3820       PUSH BC
3830 DWN2  EX   DE,HL
3840       LD   HL,32
3850       ADD  HL,DE
3860       EX   DE,HL
3870 DWN3  LD   BC,32
3880       LDDR
3890       LD   A,L
3900       INC  A
3910       JR   NZ,DWN2
3920       LD   A,H
3930       SUB  7
3940       LD   H,A
3950       POP  BC
3960       DEC  C
3970       PUSH BC
3980       JR   NZ,DWN3
3990       XOR  A
4000       LD   B,32
4010 DWN4  LD   (DE),A
4030       DEC  DE
4040       DJNZ DWN4
4050       POP  BC
4060       POP  HL
4070       DEC  H
4080       DJNZ DWN1
4090 DWNAT LD   HL,5ADFH
4100       LD   DE,5AFFH
4110       LD   BC,736
4120       LDDR
4130       LD   A,(ATTRP)
4140       LD   B,32
4150 DWN5  LD   (DE),A
4160       DEC  DE
4170       DJNZ DWN5
4180       LD   HL,401FH
4190       LD   BC,1804H
4210       RET
4220 COPY  BIT  1,(IY+1)
4230       RET  Z
4240       LD   DE,CP1
4250       JP   CHNGE
4260 CP1   LD   DE,CP2
4270       LD   (TVDTA),A
4280       JP   CHNGE
4290 CP2   LD   DE,PRINT
4300       CALL CHNGE
4310       LD   C,A
4320       LD   A,(TVDTA)
4330       LD   A
4340       CP   24
4350       RET  NC
4360       LD   A,C
4370       SUB  B
4380       RET  C
4390       PUSH AF
4395       LD   A,B
4400       CALL ADDR1
4410       POP  AF
4420       INC  A
4430       AND  A
4440       RLA
4450       RLA
4460       RLA
4470       LD   B,A
4480       DI
4490       JP   @EB2H
4500 CLS   BIT  1,(IY+1)
4510       JR   NZ,CLBUF
4520       LD   HL,16384
4530       LD   DE,16385
4540       LD   BC,6143
4550       LD   (HL),@
4580       LDIR
4590       INC  HL
4600       INC  DE
4610       LD   BC,767
4620       LD   A,(ATTRP)
4630       LD   (HL),A
4640       LDIR
4650       LD   BC,1843H
4660       LD   HL,16384
4670       JP   SETCL
4680 CLBUF LD   HL,5B00H
4690       LD   (PRCC),HL
4700       XOR  A
4710       LD   B,A
4720 CL1   LD   (HL),A
4730       INC  HL
4740       DJNZ CL1
4750       RES  1,(IY+48)
4760       LD   BC,67
4770       LD   (PPOSN),BC
4780       RET
4790 PPOSN DEFB 67
4800       DEFB @
4810 PRCC  DEFB @
4820       DEFB 5BH
4830       END
```

DIRECTORY ENQUIRIES

Disks without tears: access the Commodore 64 directory easily with Peter Worlock's programs.

The Commodore 1541 disk drive is a vast improvement on using cassettes for storage, but it's not without problems. Despite having its own built-in DOS the operating system lacks a few of the niceties that users of other disk systems enjoy. Not least of these is a DIR or CAT command to read the directory.

You can load the directory into memory but the 64 treats it as any program file with the disconcerting side-effect of obliterating whatever program you had in memory at the time. To get round this Commodore now supplies a DOS utility disk free with every drive and this features a DIR emulator. However, this solves only part of the problem; you can't incorporate the routine into your own programs, nor can you store the directory for manipulation later.

These two utilities solve both problems. Program 1 can be incorporated into your own programs. It reads the directory and prints it to the screen. Program 2 is a utility program in its own right, and uses a modified version of the routine to read and store a disk directory in an array. The directory is then available for manipulation in two ways: you can scratch a file, or load and auto-run another program.

How it works

Directory Enquiries is made up of a number of routines, with the directory-read at its heart. This starts at 1115 with a call to the disk command channel to initialise the drive. Though the repeated GET# commands look like sloppy programming, it's the simplest way to get past data on the disk that you don't want.

Lines 1145 to 1195 do the work of reading in the directory data character by character. They actually compile three separate sets of information, stored in the two arrays set up in line 1000. FL() is the file length, while FL$() holds the file name in FL$(x,0) and the file type — program, sequential, relative etc — in FL$(x,1).

ST is the system 'status' variable, used to check for end-of-file markers on the disk.

With the directory read into the arrays, the program lists them to the screen. If there are more entries than will fit on one screen, you can pause the listing by hitting the space bar.

The Repeat command begins the directory listing from the beginning. Scratch wipes out a file from the disk, while Load lets you read in a new program which auto-runs.

The auto-run uses the dynamic keyboard feature of Commodore computers. Lines 1220 to 1230 print the LOAD and RUN commands on screen, then POKE a number of carriage returns to the keyboard buffer.

Program 1 : £ = #

```
50000 OPEN15,8,15,"I0":CLOSE15
50005 PRINTCHR$(147)
50010 OPEN1,8,0,"$"
50015 GET#1,A$,B$
50020 GET#1,A$,B$
50025 GET#1,A$,B$
50030 C=0:IFA$<>""THENC=ASC(A$)
50035 IFB$<>""THENC=C+ASC(B$)*256
50040 PRINTC;TAB(5);:IN$="":
50045 GET#1,B$:IFST<>0THEN50080
50050 IFB$<>CHR$(34)THEN50045
50055 GET#1,B$:IFB$<>CHR$(34)THENIN$=IN$+B$:GOTO50055
50060 C$="":GET#1,B$:IFB$<>CHR$(34)THENIN$=IN$+C$:GOTO50060
50065 C$=C$+B$:GET#1,B$:IFB$=CHR$(32)THEN50065
50070 PRINTIN$;TAB(22)C$
50075 IFST=0THEN50020
50080 PRINT"BLOCKS FREE"
50085 CLOSE1
```

Program 2

```
1000 DIMFL(145),FL$(145,1)
1005 PRINTCHR$(147)CHR$(30):POKE53280,0:POKE53281,0
1010 PRINTTAB(10)CHR$(18)"DIRECTORY ENQUIRIES"
1015 PRINT:PRINTTAB(5)"PRESS <SPACE> TO STOP LISTING"
1020 PRINT:PRINTTAB(8)"THEN <F7> FOR COMMANDS"
1025 PRINT:PRINTTAB(8)"OR <SPACE> TO CONTINUE"
1030 PRINT:PRINT:PRINT"READING DIRECTORY...PLEASE WAIT..."
1035 GOSUB1115:PRINTCHR$(147)
1040 FORI=1TOFP-1
1045 PRINTI;TAB(5)FL$(I,0)TAB(22)FL$(I,1)TAB(33)FL(I)
1050 GETA$:IFA$<>" "THEN1070
1055 GETA$:IFA$=""THEN1055
1060 IFA$=" "THEN1070
1065 IFA$=CHR$(136)THENI=DP-1
1070 NEXT
1075 PRINTTAB(4)FL(FP)" BLOCKS FREE"
1080 PRINT:PRINT"L: LOAD"TAB(9)"S: SCRATCH"TAB(21)"R: REPEAT"TAB(32)"Q: QUIT"
1085 GETA$:IFA$=""THEN1085
1090 IFA$="R"THENPRINTCHR$(147):GOTO1040
1095 IFA$="Q"THENPRINTCHR$(147):END
1100 IFA$="L"THEN1200
1105 IFA$="S"THENGOSUB1235:GOTO1035
1110 END
1115 OPEN15,8,15,"I0":CLOSE15
1120 FP=0
1125 OPEN1,8,0,"$"
1130 GET#1,A$,B$
1135 GET#1,A$,B$
1140 GET#1,A$,B$
1145 C=0:IFA$<>""THENC=ASC(A$)
1150 IFB$<>""THENC=C+ASC(B$)*256
1155 FL(FP)=C:IN$=""
1160 GET#1,B$:IFST<>0THEN1195
1165 IFB$<>CHR$(34)THEN1160
1170 GET#1,B$:IFB$<>CHR$(34)THENIN$=IN$+B$:GOTO1170
1175 C$="":GET#1,B$:IFB$=CHR$(32)THEN1175
1180 C$=C$+B$:GET#1,B$:IFB$<>""THEN1180
1185 FL$(FP,0)=IN$:FL$(FP,1)=C$:FP=FP+1
1190 IFST=0THEN1135
1195 CLOSE1:RETURN
1200 PRINTCHR$(147)
1205 INPUT"LOAD WHICH FILE NO.";N$
1210 N=VAL(N$)
1215 IFN>FP-1THENPRINT:PRINT"LAST FILE = ";FP-1:PRINT:GOTO1205
1220 PRINTCHR$(147)CHR$(17)CHR$(17)"LOAD"CHR$(34)FL$(N,0)CHR$(34)",8
1225 FORI=1TO4:PRINTCHR$(17):NEXT:PRINTCHR$(17);"RUN"CHR$(19);
1230 POKE631,13:POKE632,13:POKE198,2:END
1235 PRINTCHR$(147)
1240 INPUT"SCRATCH WHICH FILE NO.";N$
1245 N=VAL(N$)
1250 IFN>FP-1THENPRINT:PRINT"LAST FILE = ";FP-1:PRINT:GOTO1240
1255 PRINT:PRINT"SCRATCHING ";FL$(N,0)
1260 OPEN15,8,15
1265 PRINT#15,"S0:";FL$(N,0)
1270 CLOSE15:RETURN

READY.
```

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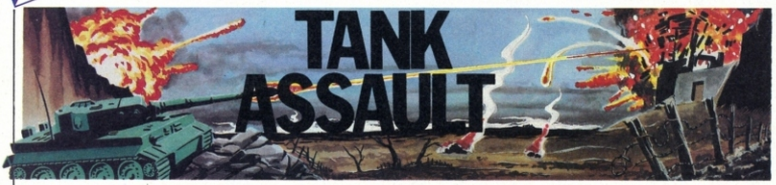


Program notes and listings: (all £ signs should be # signs.)

0	Sets cursor speed to normal	70	Sets width of maze	440-480	Tune for lost life
1	Initialises hi-score	80-100	Draw borders of maze	490	Decrements lives?
5	Subroutine to start game	105-200	Draw maze	510-515	Display the number of lives you have left
6	Speeds up the computer	210	Tank coordinates	520	Branches back if you have any lives left
10	Sets hires mode	220-280	Count down	521-535	Signal that you have lost all your lives
20-30	Define the tank character	400-430	Main loop to move tank		
35-50	Initialise variables	435	Have you completed the screen?		
60	Sets up hires screen				

```
0 HIMEM£97FF:POKE775,39
1 HS$="ORIC-1":HS=500
5 RESTORE:GOSUB2000
6 POKE775,255
10 HIRES
20 FORN=39928TO39935:READD:POKEN,D:NEXT
30 DATA0,31,28,62,63,30,0,0
35 SC=0:LI=3
40 LX=120
50 LY=100
60 HIRES:FILL200,1,0
70 SX=18-(SK*40):SY=SX
80 PRINT:PRINTCHR$(27)"N                SETTIN
G UP MAZE"
90 CURSET6,0,3:FILL8,39,21:FILL184,1,146
:FILL8,39,21
100 CURSET234,8,3:FILL184,1,21
105 FORM=8TO199-SYSTEPSY
110 FORN=18TO233-SXSTEPSX
115 CURSETN,M,3
120 R=INT(RND(1)*3)
130 IFR=0THENDRAWSX,SY,1
140 IFR=1THENCURMOV0,SY,1:DRAWSX,-SY,1
200 NEXT N,M
205 CALL£E807
210 X=12:Y=104
220 A$="JCOUNT-DOWN COMMENCING":GOSUB900
221 PLAY3,0,0,0
225 FORC=INT((5-SK)*10)TO0STEP-1
230 SOUND1,C,10:SOUND2,200-C,10
240 CURSET X,Y,3:CHAR 127,0,1:K=PEEK(735
)AND127
250 CHAR127,0,2:Y=Y+(K=11)-(K=10)
260 NEXTC
270 PLAY0,0,0,0
280 CLS
400 REPEAT:SC=SC+1:IFRND(1)<SKTHENGOSUB1
000
410 CURSET X,Y,3:CHAR 127,0,1:K=PEEK(735
)AND127:IFK<90RK>11THENK=9
430 CHAR127,0,2:X=X-(K=9):Y=Y+(K=11)-(K=
10):UNTILPOINT(X+5,Y+1)ORPO
INT(X+5,Y+5)
435 IF X>228 THEN GOTO 3000
440 PLAY1,0,0,0
450 FORM=3TO5
460 FORN=-PITO0STEP.13:SOUND1,INT(SIN(N)
*25+25)+M*50,9
470 NEXTN,M
480 WAIT100:PLAY0,0,0,0
490 LI=LI-1
510 A$="J          YOU HAVE "+STR$(LI)+" L
I"
512 IFLI=1THENA$=A$+"FE"ELSEA$=A$+"VES"
513 A$=A$+" LEFT"
515 GOSUB900:WAIT150
520 IF LI<>0 THEN 210
521 PLAY3,0,0,0
525 FORN=500TO2000STEP50:SOUND1,N,9:SOUN
D2,N+1,9
530 CURSET0,0,3:FILL200,1,RND(1)*8
535 NEXT
540 A$="J        YOUR SCORE IS "+STR$(SC)
+" POINTS"
550 GOSUB900
560 IFSC<HSTHEN700
570 A$="N              THAT'S A NEW HI-SCORE!"
580 GOSUB900
590 A$="J  PLEASE ENTER YOUR NAME :"
595 GOSUB900
600 LH=0:HS$=""
610 REPEAT
620 GETK$
640 IF K$>=" "THENHS$=HS$+K$:LH=LH+1
650 PRINTK$:PLAY0,7,1,200
660 UNTIL K$=CHR$(13) OR LH=6
670 HS=SC
680 GOTO740
700 A$="J          THE HI-SCORE IS "+STR$
(HS)
710 GOSUB900
720 A$="J        AND IS HELD BY "+HS$
730 GOSUB900
740 A$="J          ANOTHER GAME (Y/N)"
744 K$=KEY$
745 GOSUB900:GETK$
750 IF K$="Y" THEN 5
760 TEXT:PAPER7:INK0:PRINTCHR$(4);
765 POKE775,39
770 END
899 REM MESSAGES
900 CLS:PRINT:PRINTCHR$(27);
910 SOUND1,0,0:SOUND2,0,0:SOUND6,29,0
930 FORN=1TOLEN(A$)
940 PRINTMID$(A$,N,1);
950 PLAY0,7,1,200
960 WAIT8
970 NEXT
980 WAIT120
990 RETURN
999 STOP
1000 R=INT(RND(1)*2):EXPLODE
```

On a routine mission in the country-side you are suddenly confronted with an electrified maze which stands between you and your objective.

Tempted to turn and flee, you find that your tank has been damaged and the reverse gear is not operating so you have no choice but to take a chance on this tortuous route.

You must drive extremely carefully as touching the electrified walls with the front of your tank will destroy the tank and you with it. The maze is rather complex and you will find that some clever manoeuvring is necessary.

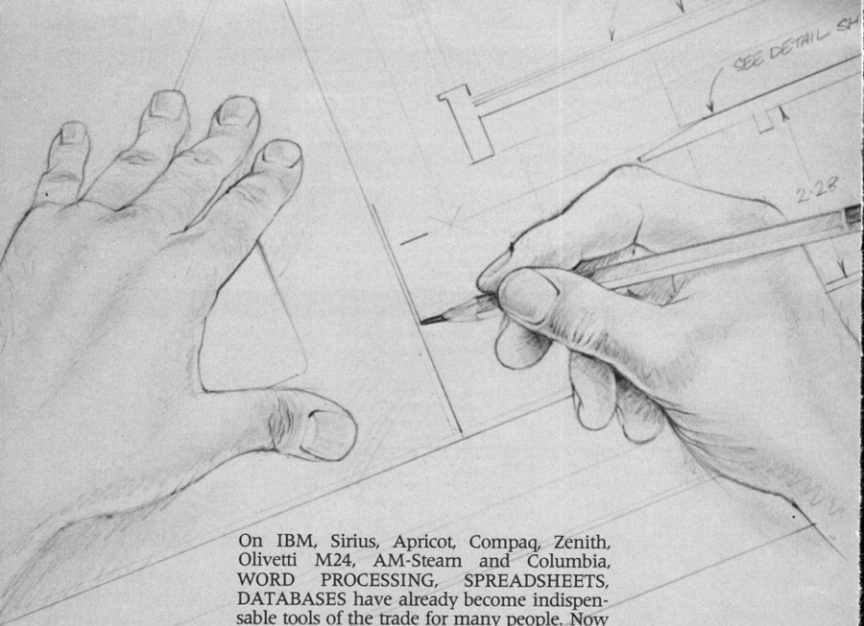
As if this isn't problem enough you are also being fired at from an enemy above. The bombs dropped are creating giant craters in the maze and if you don't avoid these you will crash into them and will be unable to recover your tank. The bombs do also make an occasional direct hit but there is little you can do to avoid this so all you can do is hope for the best as you dodge between the electrified walls and the craters.

This game for the Oric 1 written by Paul Emms from Tonbridge in Kent has some rather nice finishing touches. All the prompts and scores are printed out letter by letter with a sound like a machine gun and there is a terrifying wailing noise when your tank is hit.

The tank is moved using the cursor keys and your objective is to reach the right-hand side of the screen without losing one of your three lives. There are four skill levels. The hardest is a more complex maze with more bombs.

540-550	Display your score
570-680	If high score, enter name and record new high score
700-730	Display hi-score and holder
740-770	Option of a new game
900	Subroutine to display double height characters one at a time
1000	Random bomb or bombs near tank
1005	Bombs to destroy tank or maze
1020-1110	Display bomb
1120	Record last position of tank
1130	Return from subroutine
2000-2100	Title screen
2300-2365	Play opening tune
2380-2400	Ask for instructions
2410-2610	Display instructions
2900-2940	Ask for skill level
3000-3010	Display 'bonus 200'
3020	Add to skill level
3050	Add bonus to score
3060	Go back to main loop

```
1005 F=INT(RND(1)*3)+1:IF F>1 THENF=0
1020 CURSET LX+(RND(1)*10-5),RND(1)*159+
20,F
1030 IF R=1 THEN 1110
1090 CURSET(219-X)*RND(1)+X,RND(1)*159+2
0,F
1110 CIRCLE1,F:CIRCLE2,F:CIRCLE3,F:CIRCL
E4,F:CIRCLE5,F:CIRCLE6,F:CI
RCLE7,F
1120 LX=X:LY=Y
1130 RETURN
2000 TEXT:PAPER0:INK5:CLS
2005 POKE£26A,10
2010 FORN=1TO4:PRINT:NEXT
2020 FORN=1TO4
2040 PRINTSPC(10)CHR$(147)CHR$(132)SPC(1
6)CHR$(144)
2050 NEXT
2060 PLOT0,5,4:PLOT0,6,4:PLOT12,5,14:PLO
T12,6,14
2070 PLOT14,6,"TANK ASSAULT"
2080 PLOT14,5,"TANK ASSAULT"
2090 PRINT:PRINTSPC(8)CHR$(96)" PAUL & S
TEPHEN EMMS"
2100 PRINT:PRINT:PRINT" USE CURSOR KEYS
TO MOVE UP,DOWN AND
      TO THE RIGHT"
2300 REM TUNE
2310 T$="2352354664662352354664667676746
6466"
2320 PLAY7,0,0,0
2330 FORN=1TOLEN(T$)
2340 NT=ASC(MID$(T$,N,1))-48
2350 SOUND1,NT*40,10:SOUND2,NT*40+1,10:S
OUND3,NT*40+2,10
2355 WAIT13
2360 NEXTN
2365 PLAY0,0,0,0
2370 PRINT:PRINT:PRINT:PRINT
2380 PRINTSPC(7)"DO YOU WANT INSTRUCTION
S?"
2390 GETK$
2400 IFK$="N"THEN2790
2410 CLS:PAPER0:INK2
2420 PRINT:PRINTCHR$(4)CHR$(27)"S"SPC(10
)CHR$(27)"A";
2430 PRINTCHR$(27)"J INSTRUCTIONS"CHR$(4
)
2440 PRINT:PRINT:PRINT:PRINT:PRINT
2450 PRINT"   While roaming the country-
side in "
2460 PRINT"your tank you come across a c
omplex  "
2470 PRINT"electrified maze,which stands
 between"
2480 PRINT"you and your objective."
2490 PRINT
2500 PRINT" Unfortunately your tank is d
amaged  "
2510 PRINT"and you cannot reverse or tou
ch the  "
2520 PRINT"maze with the front of your t
ank."
2530 PRINT
2540 PRINT" However,the enemy has spotte
d you and";
2550 PRINT"are bombarding the maze.Some
bombs   "
2560 PRINT"will destroy you ,others will
 destroy"
2570 PRINT"the maze.You have 3 lives and
 a choice";
2580 PRINT"of 4 skill levels."
2590 PRINT:PRINT:PRINT:PRINT
2600 PRINTCHR$(27)"T"CHR$(27)"L"SPC(6)"P
RESS ANY KEY TO CONTINUE"
2610 GETK$
2790 PRINTCHR$(30)::PLAY3,0,0,0
2800 FORN=0TO26
2805 WAIT7
2810 PRINTCHR$(14)
2820 SOUND1,N*30+20,9 :SOUND2,N*30+21,9
2830 NEXT
2835 PRINTCHR$(4);
2840 PLAY0,0,0,0
2850 INK6:CLS
2860 FORN=0TO10:PRINT:NEXT
2900 PRINTCHR$(27)"J  ENTER SKILL LEVEL
(0-3) 3 HARDEST"
2910 GETK$
2920 IFK$<"0"ORK$>"3"THENSOUND1,3000,0:P
LAY1,0,1,500:GOTO2850
2930 SK=(ASC(K$)-48)/20
2940 RETURN
3000 A$="N                BONUS 200"
3010 GOSUB900
3020 SK=SK+.05
3030 A$="J WELL IT WON'T BE THAT EASY TH
IS TIME"
3040 GOSUB900
3050 SC=SC+200
3060 GOTO60
```



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DEALER ENQUIRIES WELCOME

HAPPY MEMORIES

This Memory Monitor by Stephen Pate allows BBC and Electron users to view the 64K RAM and ROM.

Those of you who've used the earlier Commodore machines will be familiar with the machine language monitor (TIM), and will have mourned its loss on today's machines (even the Commodore 64). The Memory Monitor presented here allows BBC and Electron users to view their machines, 64K RAM and ROM.

The display is similar to TIM's, but the method used to alter the contents of memory is somewhat different. Once you've typed the program in and saved it, type O, which will display the monitor options as follows:

M displays the contents memory. Type in the start address either in decimal or in hex (preceeded by & and four digits long). Input must be in the range 0-65536 (&FFFF). After each screenful press the space bar to continue scrolling, or one of the other option keys. If you press M at this point you will be asked for another address.

The I option allows you to insert hex digits into memory. First type the address (four digits and in hex) followed by a space, then type in the data as follows:

&81DF 1F-2013-10

All digits are in hex. In the example I've typed, the address 81DF followed by a space, then followed by the relevant data.

Pressing return places 1F in location 81DF, location 81E0 is left unchanged, 20 is placed in 81E1, and so on.

You can insert around 170 bytes at any one time.

X exits from the program and returns to Basic.

To save and load blocks of memory you should exit from the program and use *SAVE and *LOAD cammands. To re-run simply type RUN.

Example screen dump

```
.C000  00 00 00 00 00 00 00 00
.C008  18 18 18 18 18 00 18 00
.C010  6C 6C 6C 00 00 00 00 00
.C018  36 36 7F 36 7F 36 36 00
.C020  0C 3F 68 3E 0B 7E 18 00
.C028  60 66 0C 18 30 66 06 00
.C030  38 6C 6C 38 6D 66 3B 00
.C038  0C 18 30 00 00 00 00 00
.C040  0C 18 30 30 30 18 0C 00
.C048  30 18 0C 0C 0C 18 30 00
.C050  00 18 7E 3C 7E 18 00 00
.C058  00 18 18 7E 18 18 00 00
.C060  00 00 00 00 00 18 18 30
.C068  00 00 00 7E 00 00 00 00
.C070  00 00 00 00 00 18 18 00
.C078  00 06 0C 18 30 60 00 00
.C080  3C 66 6E 7E 76 66 3C 00
.C088  18 38 18 18 18 18 7E 00
.C090  3C 66 06 0C 18 30 7E 00
.C098  3C 66 06 1C 06 66 3C 00
.C0A0  0C 1C 3C 6C 7E 0C 0C 00
.C0A8  7E 60 7C 06 06 66 3C 00
.C0B0  1C 30 60 7C 66 66 3C 00
.C0B8  7E 06 0C 18 30 30 30 00
.8000  C9 01 F0 1F 60 EA 60 0E
.8008  01 42 41 53 49 43 00 28
.8010  43 29 31 39 38 32 20 41
.8018  63 6F 72 6E 0A 0D 00 00
.8020  B0 00 00 A9 84 20 F4 FF
.8028  B6 06 84 07 A9 83 20 F4
.8030  FF 84 18 A2 00 86 1F 8E
.8038  02 04 8E 03 04 CA B6 23
.8040  A2 0A 8E 00 04 CA 8E 01
.8048  04 A9 01 25 11 05 0D 05
.8050  0E 05 0F 05 10 D0 0C A9
.8058  41 85 0D A9 52 85 0E A9
.8060  57 85 0F A9 02 8D 02 02
.8068  A9 B4 8D 03 02 58 4C DD
.8070  BA 41 4E 44 80 00 41 42
.8078  53 94 00 41 43 53 95 00
.8080  41 44 56 41 4C 96 00 41
.8088  53 43 97 00 41 53 4E 98
.8090  00 41 54 4E 99 00 41 55
.8098  54 4F C6 10 42 47 45 54
.80A0  9A 01 42 50 55 54 D5 03
.80A8  43 4F 4C 4F 55 52 FB 02
.80B0  43 41 4C 4C D6 02 43 48
.80B8  41 49 4E D7 02 43 48 52
```

Listing

```
   10 REM**************************************
   20 MODE 6:OUX=0:CLS:PRINT'"Electron M
onitor"''"S.D.Pate 1984":GOTO 720
   30 REM**************************************
   40 PRINT '"Invalid entry !":GOTO 720
   50 EX=0:AX=0:BX=0:CX=0:VDU 15
   60 PROCf1:INPUT''"Start Address (DEC.
or &HEX) ":A$
   70 IF LEFT$(A$,1)="-" GOTO 40
   80 IF A$="0" AX=0:GOTO 140
   90 IF VAL A$=0 AND LEFT$(A$,1)<>"&" G
OTO 40 ELSE IF LEFT$(A$,1)="&" AND LEN A
$<5 GOTO 40
  100 IF VAL(A$<>0 AND LEN(STR$(VAL(A$)) <
>LEN A$ GOTO 40 ELSE IF VAL(A$<>0 THEN AX
= VAL(A$):GOTO 140
  110 EX=2:EDX%=&1W$=A$:PROChex_calc
  120 IF VLX=99999 GOTO 40 ELSE AX=VLX
  130 REM**************************************
  140 PRINT'
  150 CX=0
  160 PROCnf1
  170 REPEAT
  180 IF AX>65530 PRINT '"Out of range !
":OUX=0:GOTO 720
  190 PROCdata_line:CX=CX+1
  200 UNTIL CX=24
  210 REM**************************************
  220 *FX21,0
  230 A$=GET$
  240 IF A$="M" OUX=1:GOTO 50
  250 IF A$="X" THEN PRINT '"Program Exi
t"'':PROCf1:END
  260 IF A$="I" OUX=0:GOTO 500
  270 IF A$="O" OUX=0:PROCoptions:GOTO 7
20
  280 IF OUX=1 GOTO 150 ELSE GOTO 220
  290 REM**************************************
  300 DEF PROCdata_line
  310 IF AX<16 TX=3 ELSE IF AX<256 TX=2
ELSE TX=1
  320 IF AX<4096 PRINT "."STR$(~AX)"  "
;:ELSE PRINT "."~AX" "
  330 LOCAL CX:CX=1
  340 REPEAT
  350 SEX=?AX
  360 IF SEX<16 PRINT " 0"~SEX; ELSE PR
INT " "~SEX;
  370 AX=AX+1:CX=CX+1
  380 UNTIL CX=9
  390 PRINT''
  400 ENDPROC
  410 REM**************************************
  420 DEF PROChex_calc
  430 DX=1
  440 B$="0123456789ABCDEF":VLX=0
  450 PSX=INSTR(B$,MID$(W$,EX,1),1)
  460 IF PSX=0 VLX=99999:GOTO 490
  470 VLX=VLX+(PSX-1)*(65536/((16^DX)))
  480 EX=EX+1:EX=EX+1:IF EX <>EDX GOTO 4
50
  490 ENDPROC
  500 REM**************************************
  510 PROCf1:INPUT ''"Insertion (address-
first)"''"&"A$
  520 IF MID$(A$,5,1)<>" " GOTO 610
  530 W$=A$:EX=1:EDX%=5:PROChex_calc
  540 IF VLX>99999 PRINT''"Incorrect hex
!":GOTO 510
  550 PST%=6
  560 IF PST%>LEN#$ GOTO 720
  570 IF MID$(W$,PST%,1)="-" GOTO 600
  580 IF INSTR(B$,MID$(W$,PST%,1),1)=0 O
R INSTR(B$,MID$(W$,PST%+1,1),1)=0 GOTO 6
10
  590 ?VLX=16*(INSTR(B$,MID$(W$,PST%,1),
1)-1)+(INSTR(B$,MID$(W$,PST%+1,1)))-1:PS
TX=PST%+1
  600 VLX=VLX+1:PST%=PST%+1:GOTO 560
  610 PRINT''"Invalid data !":GOTO 720
  620 REM**************************************
  630 DEF PROCoptions
  640 PRINT''"ELECTRON MONITOR OPTIONS"
  650 PRINT''"-------- ------- -------"
  660 PRINT"M - monitor memory"
  670 PRINT"I - insert bytes"
  680 PRINT"X - exit from program"
  690 PRINT"O - display options"
  700 ENDPROC
  710 REM**************************************
  720 OUX=0:PROCnf1
  730 PRINT''"Option ?";:GOTO 220
  740 DEF PROCf1
  750 VDU 23,1,1,0;0;0;
  760 ENDPROC
  770 DEF PROCnf1
  780 VDU 23,1,0;0;0;0;
  790 ENDPROC
```

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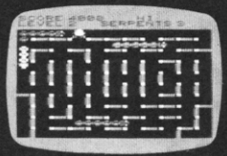

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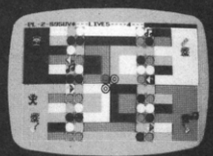

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MERRIE ENGLAND

Mike Gerrard takes a time trip back to 13th century England and becomes emmeshed in the world of Robyn Hode, Maid Marion and the evil Sheriff of Nottingham. Now read on . . .

Adventures are becoming as well-researched as thrillers these days. After visiting the Holy Land in *Jericho Road*, you can now take a time trip to the 13th century of *Robyn Hode*, complete with 13th century spellings, but done courtesy of the very 20th century *Quill* adventure generating program, and the people at Runesoft deserve to be called survey knaves for not acknowledging the fact anywhere in the program or accompanying leaflet.

Ye storye so farre is that the Sherryffe of Notyingham has imprisoned Maid Marion in Notyingham Castle and charged her with treason for aiding an enemy of King John . . . that's you, Robyn Hode himself, and very fetching you look in your suit of Lincoln green, which is all that you have when you start this adventure. If you find the authentic spellings a little off-putting, don't panic (to borrow a well-known 13th century expression) as they don't appear very much in the program itself, apart from the proper names. The spellings and geographical facts have been thoroughly researched, with thanks being given to everyone from the Robin Hood Society to the Doomsday Book.

The adventure is text-only, though rumour has it that a graphics version of *Quill* is on the way. The historical accuracy of the descriptions adds to the game, and there is at least some attempt to give atmosphere to the text. But don't expect a screen full of purple, or even Linclon green prose, as there are about 200 locations in each part of this adventure: reach the end of the first part successfully and you will be given a code to enable you to commence part two, which is on the other side of the cassette. This allows you to enter the castle, through Nottingham's famous caves, find Maid Marion and escape.

Marion's arrest

First things first. You begin outside the inn where news of Marion's arrest has just been brought to you by Much, the Miller's son: 'To the Southeast, the North road runs almost straight to Newerc. Bernesdale forest stretches to the South, towards Scherwode and Notyingham.' It won't be long before you meet a rich nobleman, and you don't need a degree in Medieval History to know what Robin Hood would do to him . . . or what he would do with the proceeds.

The tasks do get a little harder, which is just as well, but the hundreds of locations aren't exactly littered with objects. It's difficult to strike a good balance in an adventure between having the player trip over axes, dwarfs and dragons every time they make a move, and travelling endlessly without ever finding anything. *Robyn Hode* is towards the travelling endlessly side of the scale. You spend a lot of time wandering round forests, and the traditional maze isn't exactly difficult.

Nevertheless there are some perplexing problems. In several locations you are attacked by the Sherryffe's soldiers, sometimes being mortally wounded (when Lytell John arrives to carry you to Kirkless Priory, where you fire your last arrow to mark your burial place), and sometimes thrown into a damp, dark, smelly dungeon. You can sleep here in the comfortable straw, and the guard brings you a hearty breakfast regularly, but I haven't yet found a way of overcoming the guard and obtaining a key which will open the locked cell door.

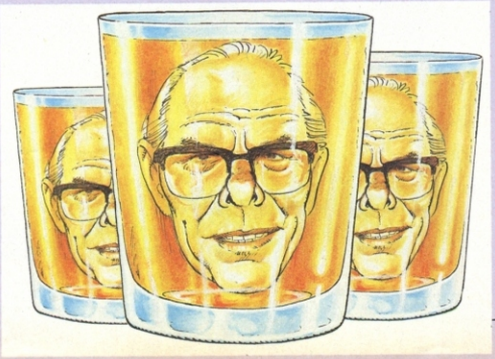
There are also plenty of natural hazards, with holes, wells and cliffs to fall down if you're not careful, and apart from being pounced on by the soldiers (you soon learn where this happens, as it isn't done randomly), I like the way you're usually given sufficient warning of any situation where your life may be at risk. It's not the kind of game where inexplicable holes appear in the middle of the street or rocks fall out of the sky.

Robyn Hode's an enjoyable adventure, but hardly one you need to rush out and buy this very instant, particularly as it is rather highly priced at £9.95: although there are, in effect, two adventures, both written using *Quill* and only occupying one cassette. Spectrum software pricing is very competitive, and it has to be an adventure that's something special to justify charging almost twice the price.

Making progress

Runesoft is one of the smaller software houses, and I'd also like to quickly mention its adventure *Paradox*, which came out a few months ago. There's definitely a vivid imagination at work here. You don't even know what your quest is, apart from progress and survival. Progress is through four different but connected divisions of the realm of Dream, the first being The Tunnel. As you leave your comfortable cottage behind you and enter into the network of tunnels, you become thirsty. It transpires that you have just 17 moves in which to find a drink (shades of *Dennis Through the Drinking Glass*, though in this case water will be quite sufficient). You find a pool of water, but if you drink from it direct you are poisoned. Just beyond is a flask, but as you take this way back to the pool is cut off.

Paradox is also Quill-generated, but shows how different you can make adventures using this system if you try. After The Tunnel comes The Gamesboard, made up of 56 squares which you have to cross to reach the Palace, each square having its own vivid description and many of them containing riddles that you have to solve in order to move on. Not that you've much idea which way you're moving, or which way you ought to be moving. Several hours of play later I'm still stuck there, and intrigued. Worth watching out for in the shops, or from Runesoft at 67 Lower Parliament Street, Nottingham NG1 3BB.



PLUS 4 ON THE SPOT

Commodore is set to aim its Plus/4 at first-time buyers for serious home and introductory business use. Barry Miles reports on the moves behind this release.

Offering fundamentally the same operating system as the Commodore 16 (recently reviewed in *PCN*), the Plus/4 is aimed at the first-time buyer, for serious home use and introductory business use. Priced at £299.95, it competes on price with the Commodore 64 (£199 in most places), MSX machines at around £200 and the Sinclair QL at £400.

The Commodore 16, which has the same operating system, but one quarter of the memory, is bundled with a cassette unit (retail £44), Introduction to Basic Part I (£13.95) and four games.

For serious use, you need at least the cassette unit, making the Plus/4 look rather expensive at £350. Clearly Commodore is following its usual pattern of high prices to begin with, and progressive reductions over time.

This is a marketing method proven by its profits and the world-wide sales, currently said to be two million Vics, already; a similar number of 64s is expected to be sold by the end of 1984.

A design approach, similarly tried and tested by Commodore, is to say in effect: 'We are the volume producers, so our design is the standard.' Accordingly we have non-standard cassette connections, and cassette units, non-standard joystick connections, and serial disk connection.

A whole range of peripherals, including a fast disk drive and a new monitor is planned for the machine, all in the same tasteful shade of charcoal grey, and rather attractive too, according to the photographs.

So will it sell, at the price quoted? I think so. The sales of the Vic are against the natural law of the market. It is astounding that a machine with under 4K of memory has continued to sell, against a market background of 16-bit, and perhaps 32-bit machines, with memories of 128K and 256K becoming commonplace. But is it so strange really? Now salesmen are told, 'sell benefits, not features'.

Persistent but unconfirmed rumours allege that a 128K version of the 64, capable of full 64 emulation, and with 128K addressable from Basic, with switching between 40 and 80 columns is on the way but Commodore maintains a dignified silence. If this machine really is planned then it will hit the Plus/4 market hard.

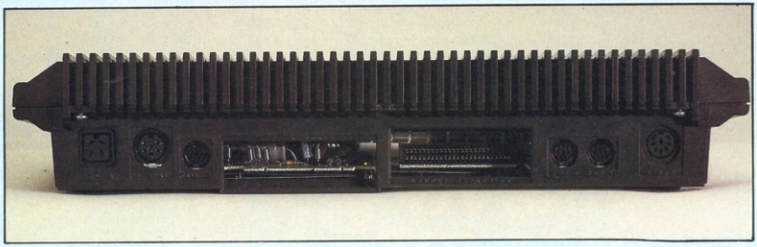
Features

So what is the 'unique selling point' of the Plus/4? It is the integral software which gives the machine its character. A word processor, spreadsheet, filing system, and graphics package are available on power-up. Known as 3 Plus 1 (four packages), this selection offers windows, and genuine integration and a form of multi-tasking.

You can transfer figures from your spreadsheet directly to your word processor, in RAM, immediately, with the window (split screen) showing both documents at once!

The Plus/4's appearance is definitely in its favour. It resembles the lap portables in size and shape, and the keyboard slopes pleasantly down to a low profile nose. The function keys have a positive 'click-feel', which tells you very effectively when the keys have registered. The Help key, which takes

The keyboard is similar to that on the SX64 and the cursor keys are conveniently placed.



All connections are clearly marked on the rear of the machine.

the place of F8, is a great added convenience.

The keyboard is noisier than on the 64, but more gently sprung. It is very pleasant to use, and lacks only the shift-lock warning light to be as attractive as the portable 64's. The cursor control keys, four of them, are attractive and large. It is a little frustrating to have no numeric keypad, especially since the 364 alternative model, with such a pad, is to be marketed elsewhere.

The power connection has at last been removed to the back of the machine out of harm's way. Typically with Commodore, the plug is a new design. Also the cartridge or memory expansion slot is just slightly narrower.

The joystick ports are different again. The Atari-type D-connector has given way to a new Commodore design. However, Commodore's own joystick will be analog.

The connection of disk drive to the computer is through the hated slow serial port. The effect is as before — user frustration. We can only hope that the 'fast-disk drive' turns out to be really fast. Connection to a television or monitor is provided for.

The new reset button is on the side of the machine and reasonably out of the way of accidental resetting.

Commodore's new Basic 3.5 has taken account of all the criticisms previously aimed at Commodore machines.

Structured programming is available, and proper control of sound and graphics is provided by new, and self-explanatory keywords. A good machine code monitor is provided, including the display of the ASCII equivalents.

The trade-off for all these extras is that sound has been cut to two voices compared with three on the 64, while the main reason for the 'serious home user' tag would appear to be the absence of sprites. Presumably writing games is not 'serious'.

Software

On the Plus/4 hitting F1 followed by the return key gets you immediately operational, in the word processor.

Commodore has paid attention to the statistical law about 80 per cent of the value being in 20 per cent of the items. This implies that most people use only a fraction of the facilities to be found in these common packages.

Thus the field was wide open for packages which, while not providing all the bells and whistles of the fully-fledged software, would nevertheless offer most of what most people needed. Approaching all four packages in this way enabled them to fit into the 32K ROM.

Word processor

The word processor has a good range of commands. It works with the 40-column screen acting as a window onto a document which is a maximum of 77 characters wide. The major limitation is that the maximum length of a document is 99 lines — 22 lines appear on the screen at any one time. Unfortunately, you cannot quickly change to 40 characters width for rapid editing of the document, as you can in Vizawrite on the Commodore 64, for example. You can of course change the document width to suit you, and reset it for printing.

Word wrapping does not take place on the screen, although it does when you print the document.

For the first time Commodore has recognised that people may use non-Commodore printers with a Commodore computer. Accordingly you can send reverse field control codes from within your text, so as to take advantage of your printers' more esoteric capabilities, like elite, or italic compressed or double-width characters.

Also a special command, 'other', reverses the character set to standard ASCII, which should solve many interfacing problems. Some of the facilities in the word processor are very impressive.

Mail-merge can take place, and there's text movement and copying. Most of the instructions will be pretty easy to remember. All of these instructions are inserted into text in reverse video (obtained by hitting Control 9), following by the appropriate mnemonic code and Control 0.

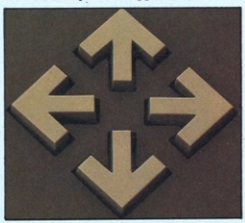
Pressing Return takes you to a new paragraph. It also deletes the remainder of the line beyond he cursor. This is bad news for experienced users of Commodore's screen-editor in Basic, who are accustomed to using Return anywhere in a line, to enter it as a Basic line. They will, on occasion accidentally delete lines which they wish to retain. However, help is at hand! There is what in trans-Atlantic parlance would no doubt be called an 'Oops' buffer.

Putting the cursor at the point where the accidental deletion occurred, and hitting the Commodore logo key followed by @, will restore the missing line!

Block insertion, deletion and movement are available. Blocks of text can be up to 16 lines long. This is not a major constraint, bearing in mind that the maximum document length is 99 lines. For insertion, you set a pointer at the end of the text already typed in, using the SP (Set Pointers) command. Then you move the cursor above this point and type in your block of text for insertion. You now have the end of the block indicated, but not the beginning.

To define this, you position the cursor at the start of the block and use the Create Block command. You then move the cursor to the place where the block is to be inserted, and use the Insert Block command followed by Return. The insertion occurs above the current cursor line, but not at the current cursor position in the line.

Although easier to do than to describe, this is pretty clumsy compared with the Insert mode of operation common to other word processors, which open-up the text, and creates space for inserted text automatically and apparently effort- 40 ▶



Cursor style: new to Commodore.

lessly! Deleting the block which has been identified is accomplished by the DB command.

For moving a block, having identified — by Setting a Pointer, and Creating a Block, you use Insert Block (IB) to make your move.

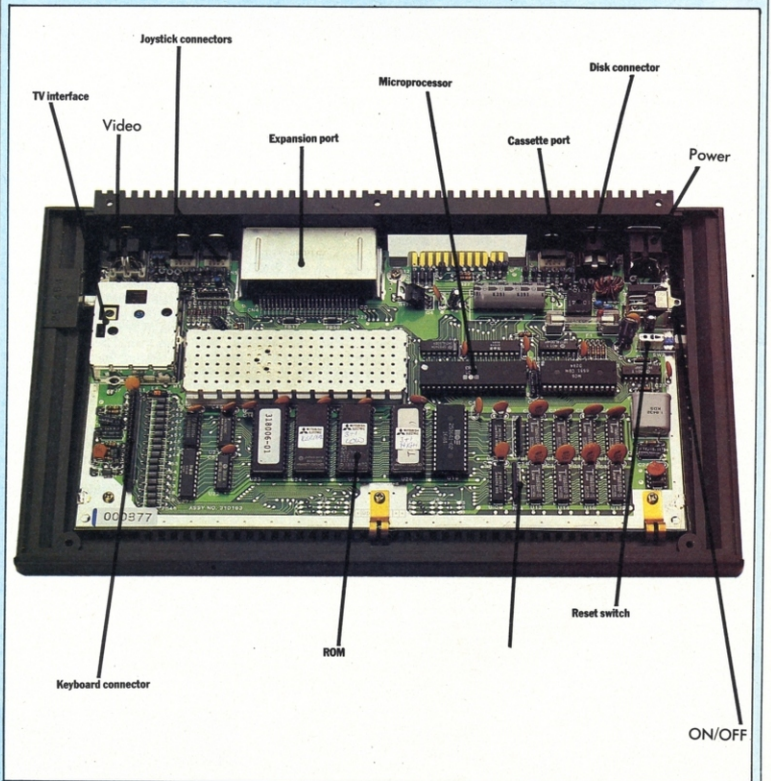
The small maximum document length — 99 lines — means that linking files will be essential for work of any magnitude. The Linkfile command is place, using a special file, 'tw' — temporary workspace.

As soon as this has been done you can load any file you wish, and start work on it. You can set up a continuous printing operation, using a whole disk-full of linked files. A pause instruction at the end of the last file enables you to switch disks and carry on!

You may also be given an instruction that the printing should pause after will send out the appropriate control codes to your particular printer.

Spreadsheet

On the spreadsheet, the cell locations are described by two numbers rather than by the almost universal combination of letters and numbers for rows and columns. This is a pity, because it leaves the way open for you to forget which comes first — row or column, — when



put at the end of any document, to enable the next part to be loaded in, and so on.

The Merge command is a disappointment. Simple enough to use, it appends the incoming text at the foot of the document. Of course you can then move it about, but that is a rather clumsy way of doing things. If you give the command PR, your document will be saved to disk automatically, before printing takes printing of each page.

Free Cursor movement is a feature of this package. F1 Function key takes you to the left margin, F2 to column 41, Home to the top line of text, and Shifted "=" acts as a TAB key. There are no commands for emboldening, double strike, underline, or similar special printer activities. For these you will have to use the ASCII function, which you are giving cell references. When you are copying formulae into cells, this is particularly dangerous. You cannot point to cells by means of cursor movements, when making up formulae, but on the other hand, you can use labels for data instead of cell-references, which is a very good feature.

Function keys F1 and F2 are used to move from cell to cell, leftwards, and

rightwards and you can edit any cell-contents, using the left and right arrow keys.

The command to get to the top lefthand corner of your sheet is achieved in a roundabout way. You hold down the CBM logo key, and press 'C' followed by typing 'home'. I would have been much happier with the use of a Function key for this very frequent activity. Similarly the GOTO command must be typed out in full too.

The spreadsheet is comparatively small — 50 rows by 17 columns. You can move about the sheet by using the cursor up and down keys. The spreadsheet is not intelligent in deciding whether you are typing in numbers, text or formulae; you must tell it.

For copying the contents of a cell, hold down the CBM key, hit c, then type 'copy', followed by the cell whose contents you want to copy, into the cell where the cursor is. The repeat command, done by holding down the CBM/ key and hitting Q, will enable you to copy the same data into a number of cells, such as with underlines.

Replicating formulae relatively is given the unusual name "fit". To copy a formula into a number of cells, you must use the repeat command, CBM Q).

Commodore offers windowing for the various elements in this set of packages. However, the window turns out to be a horizontally-split screen, with the ability to pass data from the spreadsheet or graphics package to the wordprocessor. You use the block map command to pass data from spreadsheet to wordprocessor, setting a rectangle to be transferred. The amount transferred is 11 characters per cell. Up to 36 characters per cell can be transferred by using the Map command. This will also enable you to transfer the formulae themselves into the wordprocessor, so that they can be printed out. This latter is a slower process, because you must proceed row by row.'

The usual variety of formats is available for your number cell by cell. You cannot give a command to format globally throughout the sheet in integers for example.

The sum command works on tows and columns of data. Formulae are evaluated from left to right. This is common on spreadsheets, but some prefer the correct use of the hierarchy, as in Basic. But if you inset column or rows, the formulae require adjustments.

It is possible to copy rows or columns. This is not as helpful as we might hope: data only is copied, not formulae.

You can label a cell, and refer to it by label. This is a big advantage since the numeric system is capable of causing confusion. The use of IF True, with a number of operators, enables you to proceed conditionally. This feature will permit you to modify the order of calculation.

You can freeze and unfreeze values in cells, which is all to the good. You can also left-justify numbers in a cell.

Numeric constants must be preceded by a hash sign. This comes more naturally to Americans than to us.

The spreadsheet requires rather more work, and alertness to use than more sophisticated ones. However, it has many useful features. The graphics are merely low resolution bar graphs and point graphs of any row of data on your spreadsheet. However, the graphs will print on any Commodore printer.

Graphs can be transferred into the wordprocessor for labelling and printing. The graphs are scaled automatically, which avoids the most tedious aspect of graphing. But the point graphs are created by eliminating all but the highest point in each bar of the bar graph.

Although the graphics are primitive, they serve a useful purpose. The whole package, wordprocessor, spreadsheet graphics and file manager are in a single 32K block of memory! So it is absurd to expect too much in the way of facilities.

File Manager

The File Manager is also the sort of cut-down version which you would reasonably expect. Nonetheless, you can have records containing up to 17 fields, with up to 38 characters in each field. A separate disk must be maintained for your data, because the Filer does not use the Commodore relative file system.

Random access to a record is not by key. You must either know the record number of the record (bad news!) or use a searching process, whereby your string of characters is looked for in any field of any record. This is not the fastest of processes. The maximum number of records on a disk is 999.

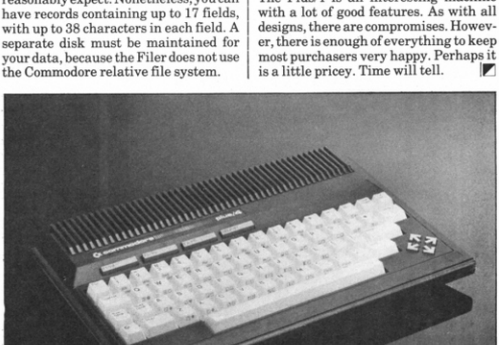
A faster Review command enables you to scan through the records more quickly, starting with any record you choose (by number). Reporting is done from within the wordprocessor, using special commands. An EOF command enables you to continue the report through the file, or the selected section of it which you have selected by your own criteria.

The Pick command carries out your selection of records, matching up to 38 characters. The Picked file can then be used for sorts or reports. You can use a delimiter of the Highrc Highrecord command. This enables you to specify the record at which the Sort, Pick, Search, Review or Reporting function is to stop.

The file manager will serve as a useful introduction to this type of operation.

Verdict

The Plus/4 is an interesting machine with a lot of good features. As with all designs, there are compromises. However, there is enough of everything to keep most purchasers very happy. Perhaps it is a little pricey. Time will tell.



SPECIFICATIONS

Price	£299.95		sette port, monitor socket, bus
Processor	7501	**Language**	Basic
ROM	32K + 32K for Plus/4	**Software**	Wordprocessor, Spreadsheet, Database, Graphics package in ROM
RAM	64K		
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Interfaces	User port, ROM cartridge port, two joystick ports, cas-		

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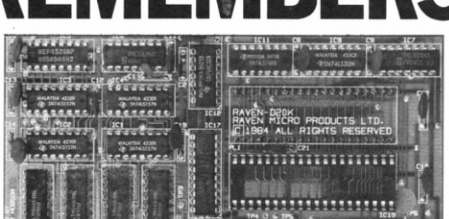
RAVEN REMEMBERS

Want 20K of extra RAM to fly out of your BBC B? Then this £70 extension pack may be a reasonable solution, says Kenn Garroch.



The Raven is designed to solve your BBC software problems, but it creates one or two more.

The biggest drawback with the BBC micro is its lack of memory, especially when using high resolution modes 0 to 3. The Raven-20, from Raven Micro Products, is a RAM expansion that gives you 20K of extra RAM.

The RAM is placed behind what would normally be the screen memory for modes 0 to 3, that is, from &300 to &7FFF. All the system screen commands are redirected to switch in the Raven, plot to it, and switch it out again. This leaves all the memory that would normally have been used by the screens available for Basic and machine code programs.

Setting up

The Raven consists of the expansion board, the documentation, and a sideways ROM.

Fitting of the board was fairly simple, if a little worrying. First of all, the 6502 processor is removed from its socket (pretty worrying), and placed into the Raven board. One detail that the documentation doesn't mention is which way round everything goes. After a little thought, I discovered a notch at the top of the Raven's 6502 socket. The 6502 notch was matched to this.

Then the Raven board was placed into the BBC with the same notch facing towards the back of the machine.

The documentation also says that the 6502 should be placed into the Raven board after the board is plugged into the BBC. I found that it was better to put it into the Raven before inserting the board. Since the sockets are offset this makes things wobble a bit if it's done the other way round.

The last thing to be put in was the sideways ROM. Raven says that the Basic ROM should be put in the right hand ROM socket and the Raven ROM in any other spare socket (if you've got any). What the firm actually means is that the Boot ROM should be put in the right-hand socket. Since I needed a Torch MCP ROM to write this with, I left it there.

On reassembling the BBC, the next thing to do was to switch on (very nerve-shattering). Bingo! it worked. Entering the *RON command turned on the extra memory, and *RTEST tested the board with no problems.

In use

Five commands are available from the Raven ROM:

- *RON to turn on the extra memory, followed by Break to initialise it.
- *ROFF to turn off the Raven although the manual recommends that the Break is used to do this since not all the pointers are reset.
- *SSAVE allows a screen to be saved to the current filing system. This is possible even if the board is in the off state.
- *SLOAD allows you to load a previously saved screen.
- *RTEST tests the Raven board and associated RAM.

Other commands available to control the Raven basically turn it on and off from machine code; *FX 111,1 turns it on, without the need to press Break, and *FX 111,0 turns it off.

The other method to turn on is with ?&D000=0 and off with ?&C000=0. These latter commands can cause some rather odd effects which seems to be due to the system intercepting only the plot and print VDU commands. The flashing cursor still appears at the same position as on the other screen and the logical colours are also common to both screens.

After fiddling with the other VDU commands, I came across a bug. If the Raven is turned on, with any of the 'on' commands, and then a VDU 21 is used to turn off the screen, every time Return is pressed, a line feed is sent to the printer (presuming it has been turned on with *FX 5 1). VDU 6 stops this happening and turns on the screen again.

The easiest cure is to use *FX 5 0 to select a printer sink, as long as you don't want to use a printer at the same time as the screen is off.

The *SSAVE and *SLOAD commands enable screens to be saved from the Raven's RAM. These are of standard format, and can be loaded to the screen with the Raven board switched off (*LOAD 1fn). Alternatively, if you have a high-resolution screen that has been saved from the normal screen RAM, it can be loaded into the Raven RAM with *SLOAD 1fn.

What you can't do is switch between the two screen areas to achieve animation effects. This is a shame since most other micros allow some kind of facility for doing this with two high-resolution screens held in the computer's memory at one time.

Documentation

The booklet with the Raven is very light on the details of how the system works. All that you get is a general description, the fitting instructions, the commands available from the ROM and a note at the back that tells you to fill in your registration form so that you can be notified of software updates.

There is also a note stating that upgrade ROMs are available if you send your EPROM plus £1.00 to Raven. This is due, according to Raven, to the fact that there is lots of space left on the ROM and they might as well fill it with something (and also repair the bug).

Verdict

The Raven does solve the memory problem for the BBC, it gives you back all the memory that is normally allotted to the screen. Fitting is easy, even for those of us without waldo fingers. Its only problems are lack of technical details on the system, and one rather insignificant bug.

If you feel that you are suffering from lack of memory then the Raven is quite a good buy.

On the other hand, it will be almost completely incompatible with virtually any piece of software you are likely to buy.

REPORT CARD 1 TO 5

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

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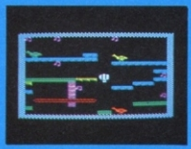
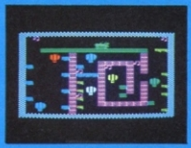
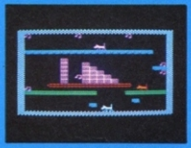


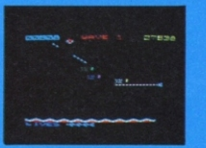


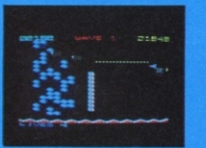


Oh what a night, drinking, dancing and singing 'til dawn. Now it's time for all the revellers to make their way home. Being a little worse for drink, you decide to walk home in the cool night air, rather than taking a taxi. Singing merrily along the way, you walk through the park and skip lightly over the ducks and catch the notes of music that seem to hang in the air. But be careful when approaching the railway, trains still run at this time of day and wild dogs are in search of food! When you have collected all the notes on the level you are on you will proceed to the next, collecting a time bonus on the way.

Miner Willy's first outing on the Commodore VIC 20.

Available on the VIC 20 + 16K expanded

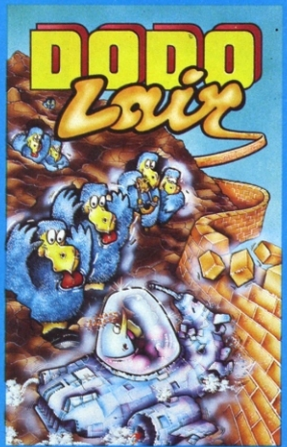




Its army to enormous dimensions, soon its attack on mankind will commence. Exploring the outer regions of a weird landscape, your secondhand 'ground skimmer' has only a single laser in its armoury. Discovering the Dodo's secret means you must destroy as many beings as possible, as the Dodo will try anything in its power to prevent the secret getting out. The game has 9 attack waves with progressive difficulty and speed. There's a bonus life every 10,000 points and bonus points after every wave, dependant on which level you are on (Bonus = Wave Number x 1000). After the wave bonus the Dodo must be hit 12 times, by bringing the number on the right of the score from 88 to 100. The number of 'Mults', 'Wallys' and 'Buildas' is also dependant on the wave number.

WARNING: 'Mults' are not affected by laser fire, but in fact, feed on it. The 'ground-skimmer' can be destroyed on collision with any enemy or enemies weapons, or by letting the 'BBs' (purple coloured enemy) getting to the far right of the screen.

Available on the unexpanded VIC 20



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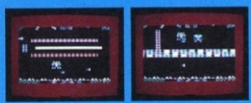
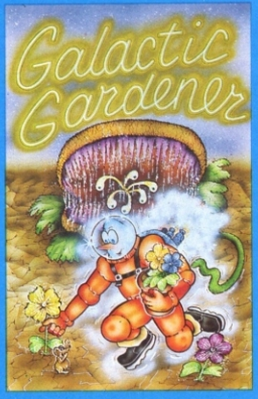
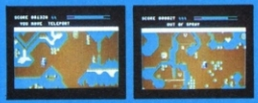


Deep in the kitchen of one of the towns first class restaurants amongst the hustle and bustle, Little Thwitchy Thwilly has just been selected from the aquarium as a customers main course . . . panic . . . sitting in the oven his first thought is survival and how to escape. As the oven is ignited and the flames start to rise he realises his only hope is to collect the dripping condensation from the pipe at the top of the oven and try to extinguish the flames. It's going to be tough, he must survive through ten different ovens and face added hazards such as the rotating spit, spinning food debris, oven foam and the restaurants pet dog, Fatty Schizo Henry, who by the way often enjoys a snack from the restaurants aquarium. Can you help him?

Available on the unexpanded VIC 20



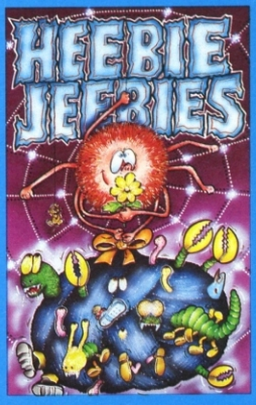


Once you were the head gardener in charge of a group of ten power-flowers. These have been stolen and hidden in a set of caves, from which you must retrieve them. The flowers are protected by forcefields, gates, begonias and patrolling snap-dragons. Be careful as the flowers are poisonous and you must find a pot to put each flower in before you try to pick it up.

The beans in the cave are harmless and extra points will be achieved by picking them up along the way, but don't touch their stalks.

If anything is touched other than a pot, beans, fuel dumps for re-fueling, sprays which can be used to stun the snap-dragons, or a plant if you have a spare pot, the result will be that you are teleported to the start of the game. It is possible for you to leave your transported back to your teleport. You begin the game with four teleport charges and an extra charge is gained for every flower collected.

Available on the Commodore 64



You play the roll of a spider in this extremely compelling game and you are faced with escaping from some very perilous situations.

You are trapped in a hole from which you must escape, but there are other insects in the hole which make your task more difficult, as contact with any of them will lead to instant death. However you are not totally defenceless you are capable of leaving a web trail which only snails can cross. By collecting the twigs that are littered around and storing them against the left hand side of the hole between the two stones a bridge will form and you will be able to climb out. But be careful — there are 15 hazardous situations to contend with — each one more difficult than the last.

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CHEETAH CHOICE

The latest add-on keyboard for the Spectrum has the feel of a professional about it, although praise for the Cheetah might be somewhat muted because of its strange layout. John Lettice runs his fingers over the new keyboard and compares it with the Transform.

A Spectrum keyboard that makes your machine look like its deadliest rival, provoking outraged cries of: 'Strewth, it's a Commodore' from your friends, may not immediately seem the smartest of ideas. And in a favourable light, the Cheetah 68FX1 looks a dead ringer for a mysterious new relation of the 64's.

But wait before you pass by on the other side. One of the intriguing things about the Cheetah keyboard is that it could easily pass for a commercial micro, and in this sense it's leaving behind the more or less hacker-style cases we've been used to up till now. The professional look of the Cheetah is a sign that the add-on keyboard market is growing up.

Construction

The top of the case is moulded in stiff black plastic, and a metal base fits snugly into this. The whole set-up is solid and robust without giving the impression, as so many Spectrum keyboards do, of being a throw-back to the 'build your own micro' days.

The quality of the printing on the keytops reinforces this impression — the legends are clear and easy to read and gentle scraping with a fingernail failed to make any impression on them, so they look to be fairly durable.

The Spectrum's printed circuit board bolts onto the Cheetah's metal base, using a series of nuts, bolts and metal pillars. The review model came with eight washers to facilitate this, and no matter how I puzzled over it, the instruction sheet seemed to require 12, but it seemed to fit well together with what I had.

Fitting Interface 1 was more of a problem. The instructions tell you to take off the base of Interface 1 then 'marry Interface 1 to 28 position slot of Cheetah'. Having done this, I found I couldn't get the arrangement to fit properly inside the case, and anyway the screw holes seemed to be in the wrong position, so I gave up, noting along the way that there didn't seem to be any provision for a ribbon cable to the Microdrive anyway.

Fortunately, the Spectrum PCB fits well to the back of the Cheetah, so you can still use Interface 1 externally, although it spoils the typing angle.

You certainly can't get the power supply inside the case, but trying to fit one can all too often be a bed of nails, so this is no bad thing.

Keyboard

The keys are laid out in two sections — the main keyboard and a 15 key numeric pad. The feel of the keys is good, but the space bar has just a little too much of a rattle and, in my view, the layout is weird.

The basic Spectrum layout is used, but at the bottom right of the main section there are four extra cursor keys, an extra shift, and a RUN key. I don't see the utility of the latter at all as, although single-key entry may be a useful addition to other micros, it's a bit pointless considering the Spectrum already has it.

The end result of the additions is that the symbol shift is lost among the rest of the keys (you keep hitting the extra shift instead) and the Enter key is displaced up to the second top row. There's and extra graphics shift key next to Enter, and at the top right are Edit, Delete and Break keys. Delete is useful, but Edit is limited by being mixed up in the body of the keys again, and considering Break duplicates the space bar, it's probably the most useless key ever to grace a keyboard.

Apart that is from the three blank keys on the Cheetah we reviewed. I could find no role for these, and imagine they're to be used for later amendments.

Considering the fact that a couple of extra keys have been added, it's puzzling that the Cheetah doesn't have separate punctuation keys. With the addition of these it would be a reasonable option for word processing, but without them its scope is severely limited.

Verdict

The basic concept of the Cheetah is good, but the execution lets it down badly. Some keys have been added for no good reason, while the keys that could have made it a good buy have been omitted. Of course there are other cases around that it outclasses, but it's expensive, and in its chosen price bracket it's competing against the Transform model.

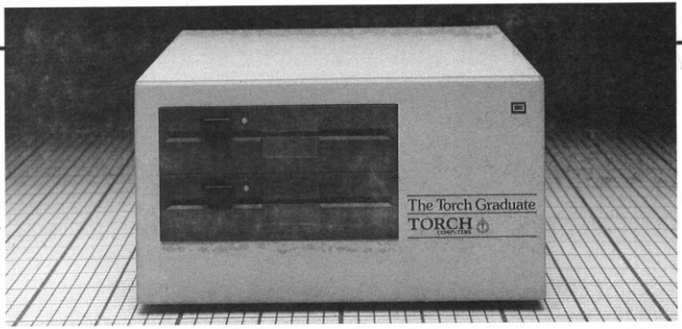
Sure the Cheetah makes the Transform look unwieldy, but the latter does have the extra punctuation keys, and the layout is considerably more sensible. Similarly, although the Transform's insides have somthing of a Heath Robinson aspect to them when filled with PCB, Interface 1 and power pack, at least there's no question that you can get them all in!

Having said that, the Cheetah is certainly of a quality to allow it to take its place among the great extension keyboards of our time, and with the caveat that wiring in too many extra keys to a Spectrum can cause considerable problems, rearranging layouts and wiring up different keys is only a minor expense for keyboard manufacturers. So if I'm right about layout problems' it would seem likely that the Cheetah will be amended and will be a more worthwhile buy.

REPORT CARD 1 TO 5

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

Product Cheetah 68FX1 **Price** £5.95
Manufacturer London Microtech 01-900 0037/8/9



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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.* Please don't forget to include prices and telephone numbers.

AMSTRAD

Ghouls, an example of how the standard of Amstrad software is rocketing now, is a very competent translation of Micro Power's BBC and Electron game. It's a platform affair with Pacman overtones, but the graphics are very well done.

ASK's latest educational program, *Number Painter* is designed to improve mental arithmetic. Players move Mr Painter up and down ladders to collect numbers, trying to prevent him from falling down.

If you've ever fancied yourself as a landloard, *Country Cottages* should interest you. It's a property game — you buy and rent cottages, struggling against hazards such as burglars, fires and ghosts, the aim being to reach a specified target of capital.

Ghouls	**£6.95**	**Micro Power 0532 458800**
Number Painter	**£8.95**	**ASK 01-874 6046**
Country Cottages	**£7.95**	**Sterling Software 01-258 0066**

SPECTRUM

Fancy a bit of martial arts? Well, *Kung-Fu* is just for you. The game features wire-frame pugilists, movement is smooth and there's an option to see a slow motion replay of winning strikes. Played against Oriental backdrops, you take on another player or your Spectrum. The theme's novel, nicely done and deserves to do well. Bug-Byte's other release, *Turmoil* is a platforms game with neat graphics and a good theme. Your task is to fill a car with oil — you must collect an oil can, then stand under an oil tank from which oil drops descend. Then you take the filled can to the car. Life isn't made easy by the sword-wielding Arabs, nor by the screen layout, nor by having to stand on moving walkways. Fortunately, there's a training mode.

Setting a time limit to adventures is unusual, but that's the name of the game in *Assignment East Berlin*. It's a text-only adventure, with a noun-verb only phrase analyser.

Eclipse continues to turn out astronomical programs. Latest is a computer verson of a globe. Continents are drawn in outline, any point on the planet's surface can be at screen-centre and you can rotate the globe in one or 15 degree (hourly) intervals. Expensive at £7.45, but interesting.

Want to get to know yourself? *Life-Line*, it's claimed, presents a fascinating new way of analysing your character, distinguishing between the personality you project and your real self. Fun and instructive as they are there's an argument that computer questionaires are worse than those in magazines, as people tend to believe what the computer tells them. *Life-Line* categorises you into a personality type, such as Leader, Coordinator or Researcher.

Kung-Fu	**£6.95**	**Bug-Byte 051-709 7071**
Turmoil	**£6.95**	**Bug-Byte 051-709 7071**
Life-Line	**£14.95**	**Stuart Systems 098064 235**
Battlezone	**£6.95**	**Quicksilva 0703 20169**
Zombie, Zombie	**£6.95**	**Quicksilva 0703 20169**
World Globe	**£7.45**	**Eclipse, 79 Ardrossan Gdns, Worcester Pk, Surrey**
The Magic Roundabout	**£6.95**	**CRL 01-533 2918**
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Assignment East Berlin	**£5.95**	**Sterling Software 01-258 0066**
Beach-Head	**£7.95**	**US Gold 021-832 6633**

BBC

Castle of Gems features Bertie Bear trying to collect gems, and stay one jump ahead of gem gobblers, gremlins and trees. The scenarios are Escher-type staircases, but the perspective can be more than a bit strange. Gems are scattered around, and as with Pacman, walking over them collects them, with an additional bonus if you get the last one on the screen. Some antagonists can be despatched easily, but others are immune to your efforts. Graphics are quite well done, but there's barely anything else to it.

LSL Logo is a 16K EPROM, hence the price, and is the result of two years' development by Catsoft, the company commissioned by the DTI for the feasibility of a BBC Logo. Written entirely in assembler it takes Logo away from the primary school image it seems to have acquired, offering floating point arithmetic and list processing.

Logo	**£59.00**	**Logo Software 01-891 0989**
Castle of Gems	**£5.70**	**MRM 0472 44304**
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European Knowledge	**£6.95**	**Micro Power 0532 458800**
Number Painter	**£9.95**	**ASK 01-874 6046**

COMMODORE 64

Good news for 64 owners is the recent deluge of 64 software. Even better news is that the majority is pretty good. Quicksilva's *Summer Games*, from Epyx is probably the definitive Olympic games program, way ahead of even *Daley's Decathlon*, *Micro Olympics* and *Decathlon*. *Doodle* looks to be a very nice piece of graphics software.

So you thought straight 'Invaders' shoot-em-ups were dead? Mr Micro's *Ad Infinitum* shows there's life in the old dog yet.

What with all these literary and mythical games — *Pegasis*, *Avalon*, *Gandalf* etc, it's not surprising that someone's gone back to the Greek classics and come up with an adventure based around Orpheus. In your travels through the 120 screens, you encounter fireballs, deadly birds, poisonous plants and the like, while new lives are gained by touching the 'Sterling' logo. Treasures are collected for points.

Catastrophes is a curious mix of game-styles. Your task is to manoeuvre your helicopter to collect bricks and build as tall a building as possible. Hazards include low-flying aircraft, storms, earthquakes and flood. In *Star Egg* you must first overcome the Guardians, and enter the hatchery to kill off newly-hatched aliens. The hatchery is a network of levels, ladders and lifts.

Orpheus in the Underworld	**£6.95**	**Sterling Software 01-258 0066**
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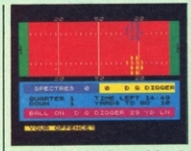
GAMEPLAY

HIT

SPECTRUM

AMERICAN FOOTBALL



After you've finished watching American Football on Channel 4, you can flick round to channel 36 on your Spectrums (and soon I understand, your Commodore 64s) and play the game yourself, minus the bruises.

There are probably two ways to design a game based on the Gridiron. One I played years ago on a Tandy (of course) required you to take direct charge of one of the players using a joystick. As soon as the whistle went the screen was a mad blur of stick men running in all directions.

Those primitive days are over — technology forges on. *American Football* from Argus Software casts the player as coach. Your job is to choose the offensive or defensive 'play' most likely to succeed under the prevailing circumstances of the game. Once you've issued instructions, your team of minions gets on with it.

The outcome seems to hinge on a combination of mostly luck and a little good judgment. You obviously don't know which play your opponent is going to choose and there seems to be a random element built in so the outcomes of identical offensive/defensive plays don't produce predictable results.

I imagine much careful coding has gone into this. The screen action is very good — all the little figures do a remarkable job of running about at the same time. Argus has thankfully provided a fairly comprehensive rules and strategy guide as a primer to the finer points of the game. It's not exactly action-packed, as you spend a fair bit of time just sitting there waiting for your team to take up positions. But I suppose you could always resort to hot dogs and popcorn to fill in the odd moments, just as you would at a real match.

American Football is well designed with a nice HELP facility and a scoreboard. It would have been a good touch to include those inane little phrases of organ music that come over the speakers at the real thing, but there you go.

Ian Scales

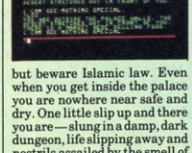
Rating: 8/10

Price £9.99 **Publisher** Argus 01-437 0626

HIT

COMMODORE 64

ZIM SALA BIM



If you've always wanted to star in one of those turkish delight advertisements but have never been asked, here's the game for you as the sole survivor of the Sultan's vicious raid on the village of *Zim Sala Bim*. There's no money left and there's no food, so it's been left up to you to break into the Sultan's palace and recover the gold he pillaged. After that you have to find the secret cave and give the gold back to the village elders. What could be easier? You've only got to get across the burning desert to the palace walls, break in and grab the loot.

But with marauding nomads intent on robbing you and leaving you for the vultures, there's also the problem of running out of water. Believe me, there are no Perrier bottles out there.

So you've reached the palace walls and carefully avoided the guards only to be faced with the pitiful sight of a poor beggar slap bang next to the food stall. If like me you're chivalrous, you'll try to get food for him — but beware Islamic law. Even when you get inside the palace you are nowhere near safe and dry. One little slip up and there you are — slung in a damp, dark dungeon, life slipping away and nostrils assailed by the smell of rotting food. If there's a way out of here, I couldn't find it.

The graphics on this game are amazing. Wherever you travel on this scrolling screen, you can see your immediate surroundings in full colour. All the objects you have to collect are there to see and the obstacles are only too obvious. And all accompanied by the most atmospheric Eastern music.

Keith Mason

Rating: 8/10

Price £9.95 **Publisher** Melbourne House 01-940 6064

HIT

COMMODORE 64

FALCON PATROL II

Your VTOL jet (that's Vertical Take-Off and Landing to the uninitiated) seems to have got right up the enemy's nose. You have gained the upper hand in the war and they are about to launch their final, all out attack on your shattered town. So FPII is the follow-up to the original Falcon Patrol.

Being a VTOL jet the Falcon is a pretty nippy little aircraft. It's highly manoeuvrable but requires considerable slowing down before you can hover or change direction to chase the enemy. But the enemy is no pushover. Its helicopter attack squadron contains colour-coded transports which, although unarmed, drop flak batteries and radar jammers, and there are gunships designed to lure you into making mistakes. Once dropped, the flak batteries release their deadly contents into the air and the radar jammers distort your radar screen which indicates the position of the enemy helicopters. Blasting the radar jammers will deactivate them.

Fully fuelled and fully armed, the Falcon carries 100 missiles but these won't last for ever. At times you will need to both refuel and rearm in order to carry on the battle. To do this you will need to drop in on one of the strategically located landing pads. But beware — those which have sustained more than 75 per cent damage will be out of action and you may find yourself grounded. That'll teach you not to fire indiscriminately.

An audible warning sounds when fuel gets close to danger level. There are 16 levels to proceed through and you gain an extra life at every fifth level you crack. Not surprisingly, the further you proceed, the heavier the enemy forces seem to get. Time to get stuck in, I think. Very good.

Keith Mason

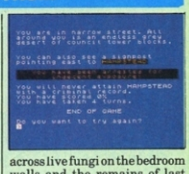
Rating: 7/10

Price £7.95 **Publisher** Virgin Games 01-221 7535

HIT

SPECTRUM

HAMPSTEAD



I thought climbing the social ladder would be a piece of cake — but after playing *Hampstead* I've had second thoughts.

Because you've got to climb up, you naturally have to start at rock bottom. So here I am sitting in the lounge of a smelly council flat in North West London, watching '3-2-1'.

To move in a direction, it's a single letter command, so I went East. There I hit the kitchen where there's a pile of dirty plates and take away cartons. Being a house-proud person I decide to 'Wash Plates' (as I thought that this was the kind of thing you'd have to do to attain Hampstead). The response I got was: 'You Can't Do That'.

Anyway, I go further East, and there's a backyard with a locked shed and a closed gate. After several attempts I get the gate open and go down a narrow street towards the dole office to get my money.

In the distance is the sign post to Hampstead. But alas, I've forgotten to get dressed and get nabbed for indecent exposure. Then I'm told I'll never attain Hampstead with a criminal record.

Next time round I explore more of the flat where I come across live fungi on the bedroom walls and the remains of last night's vindaloo and chips in the bathroom. I can't imagine why this distasteful description should add to the game — it just made me feel sick.

In the bedroom I find a tracksuit and work my way back to the gate, to once again tread the short and narrow path to Hampstead. But my luck ran out when I got mugged by a gang of thugs. Oh, well, Hampstead was just never meant for me.

This is quite a good game in terms of a challenge. There's no graphics to add to the text — on second thoughts, I don't think I'd like to see the remains of chicken vindaloo. But the documentation is well done, setting the scene and giving a few hints.

Sandra Grandison

Rating: 7/10

Price £9.95 **Publisher** Melbourne House 01-940 6064

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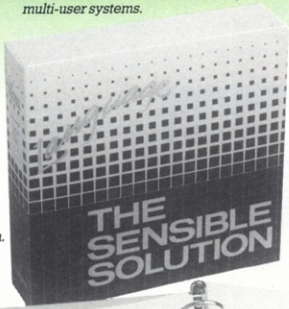

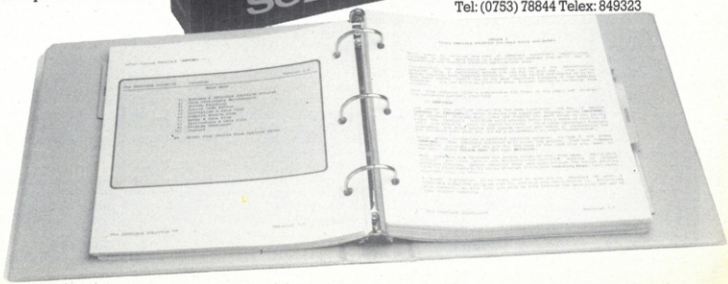

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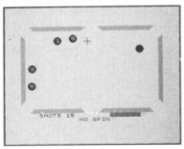
COMPUTER SYSTEMS

GAMEPLAY

SPECTRUM

HUSTLER



Hustler is a pool simulation, but don't unpack your trunks — the weather's terrible and it's the other sort of pool.

On loading, you're treated to a wonderful rendition of some purdy tune while you browse through the game options menu or the high score table. Actually, the music's great.

There are six game variations for one or two players: for the single player — any ball in any pocket, balls in order and ball in its pocket; two players — score the pockets, mini pool and lowest and highest.

Score the Pockets involves getting a numbered ball into its correspondingly numbered pocket. Mini pool is just like club pool, but instead of potting spots and stripes, you pot numbers one to three or four to six depending on who pots what first. Lowest and highest simply involves player one potting balls one to three while player two pots four to six; last one out's a sissy.

Built into Hustler is a remarkably diligent referee who not only keeps score, but spots fouls and awards extra shots to the opposition accordingly.

Another nice feature is the spin option. Besides hitting the cue ball with varying force, you can also add top, bottom, left or right spin, with a touch that ranges from ever-so subtle to quite devastating. Theoretically at least, some nifty shooting should be possible here.

I say theoretically not because of some fault with this particular game, but more a failing with all versions of computer pool. None of them even attempt to transpose the real 3D, sideways on view of a pool table in the simulation. Even with the smooth graphics, it's not a simulation at all and it's a rather boring way to spend your time.

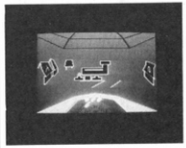
As far as computer pool goes this is a very good version, but it just doesn't go far enough.

Roger Howarth

Rating: 5/10
Price £6.99 **Publisher** Bubble Bus (0732) 355962

COMMODORE 64

TERRORIST



It could be the railway station, the airport, the telephone exchange or something more mundane . . . whatever it is one thing is for sure, the town has got a serious case of the terrorist attacks.

The authorities have called in Red Leader and the anti-terrorist squad.

You have the option of four skill levels: private, sergeant, captain or colonel and doubtless egotism will rule here. As you rush to the main trouble spot, you're given a map of the area.

The longer you take looking at this, the more points you lose from your initial allocation of a million.

To transport you around the attack zone you have the choice of a police car, a boat and a helicopter gunship. You can transfer from one to another by pressing the relevant function keys. They each have their uses, the boat for discovering the rivers on the map, the car for uncovering the roads and the helicopter for rushing to the scene of a terrorist attack as well as transporting the boat and the car to other locations.

Points are scored for uncovering the roads, rivers and the attack locations and lost for going in the wrong direction or not moving at all.

But in doing all this you have to watch your fuel levels very carefully.

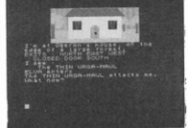
Fuel can be transferred from the helicopter to the boat and the car but don't let the helicopter run out, you have only three at your disposal. All attack areas are indicated by a shell burst and as you reach them the screen changes to show the area in more detail. Silhouettes of the terrorists will appear but you must be sure to shoot them before one of your men does. At the end of the battle the casualties are totted up and the area declared either safe or in enemy hands. How does it end? Well, it's a fight to the death. Excellent.

Keith Mason

Rating: 8/10
Price £7.95 **Publisher** Virgin Games 01-221 7535.

48K SPECTRUM

KENTILLA



In the footsteps of the great warrior Ashka you trudge round Caraland looking for the evil Grako. Ashka, sadly deceased (and foul play is suspected), is no help at all except that he has left you his sword. Nobody else is much help either; the main feature of the evil Grako's kingdom is frustration.

You have to sort out friend from foe; at the same time you have to navigate through the arid plains and dense forests by means of direction commands that don't always make sense. North and East are treated at one point as opposite directions, and there is more confusion when Ups and Downs come into play. Then there are the objects to be collected, but that's only half the story; finding out what to do with them is another matter.

So far, so familiar. There are 29 commands at your disposal to help you grope around Caraland, and the game includes an editing feature to let you recall and overtype the last command.

None of this is much help when the Urga-Mauls descend on you in strength. These, you'll find, are the worst of the early obstacles; the Cavezats fight only in self-defence but need to be bribed to part with any objects; the Ratlling Quarg is a run-of-the-mill adversary; and Ogeron, though friendly, is a man of few words. For example, he tells you that Grako is in the Black Tower but stays silent when asked where it is.

Elva, a creature you'll meet again and again as the Urga-Mauls overpower you, appears totally inert until you learn how to get on his right side.

The text is sprinkled with pictures to cover most of the locations.

As the frustration builds, so does the sense of satisfaction in making progress. It seems a perverse way of enjoying yourself.

David Guest

Rating: 7/10
Price £6.95 **Publisher** Micromega, 01-223 7672

COMMODORE 64

MAGIC MICRO MISSION

Although based on Central Television's new programme, this one from Quicksilva turns out to be just a couple of old rehashed games, neither of which is up to much.

The first is a Buck Rogers type of affair. Looking down a highway towards some distant mountains, you move a crosssight to pot oncoming flying saucers. The highway's moving bands of colour do nothing to give the game a sense of movement or depth. If a saucer gets too close, the screen just freezes.

The saucers are stubby, stylised representations and, look more like shopping baskets than intergalactic vessels. While the sound effects are not bad, six screens of pretty much the same fare is tame stuff by today's standards.

Movement is a bit stiff on the second game and the maze is smallish and uninspired. Again, the graphics are fairly crude. The idea is to move Zog, your robot, around the channels dodging the RAM chips and resistors that patrol the area.

The title page is splendid but the game selection instructions disappear off the screen before you have the chance to read them. The program is not even crash-proof: pressing RESTORE and RUN/STOP together doesn't, as with many programs, restart the game but plonks you back into Basic.

No amount of typing RUN will get it going again.

Both games are old hat and look as if they have been written in Basic. They have been done much better elsewhere.

Two for the price of one, even with a splendid title page, is no bargain in this case.

Quicksilva has infinitely superior programs to offer, and it's hard to see why they should want to damage their excellent reputation by pushing this turkey on to an unsuspecting public.

Bob Chappell

Rating 2/10
Price £7.95 **Publisher** Quicksilva 0703 20169

GAMEPLAY

STAR GAME

COMMODORE 64

BOULDER DASH

If there's a game that'll get you hooked it's *Boulder Dash* with its brilliant graphics and sound. You search caves and collect as many jewels in as short a time as possible to go through each mysterious tunnel to the next level.

If this sounds easy, you're in for a shock.

What you need to master this game is strategy and planning — these will help you to detect where boulders are going to fall. And with 16 caves and five difficulty levels you're bound to be kept busy. If you want to see how to play there's a demo that'll give you a hint.

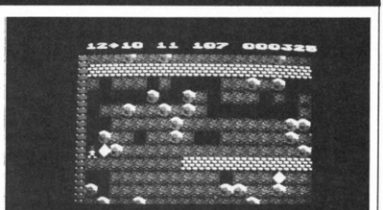
I started in cave A, level one. Then, to a bubbly tune, the screen scrolled backward with boulders and jewels appearing randomly. As if by magic, Rockford appeared with his hands on his hips, blinking his eyes and tapping his foot as if to say: 'Well let's get moving'.

At the top of the screen a tally is kept on your running score, the number of jewels you have to collect to go through the escape tunnel and a timer that starts at 150. You start off with three lives.

Controlling Rockford is just a matter of good joystick control. As he trunches along, shifting boulders with the strength of Atom Ant, the screen scrolls smoothly, vertically or horizontally, in whatever direction you want to go.

You have to work out carefully which of the brown boulders to shift because if you're not careful you'll find that they'll all come tumbling down sending the unfortunate Rockford to an early grave.

The next proved to be a killer, so I paused the action to plan a strategy. But this was to no avail because a warning sound



came on to tell me I was running out of time.

Tackling other caves at various levels was an even greater challenge. In some you have to fight against deadly fireflies, in others there are enchanted walls, butterflies and more. In all Rockford has a lot to keep him busy, when he has to outmanoeuver fireflies, black growing amoebae, transform butterflies and overcome other obstacles. If you're good you'll get a bonus try for every 500 points.

Completing caves D, H, L and Pentitles you to play a 'playable intermission'. Here you have to zap through four short interactive puzzles — if you complete them successfully you get a bonus Rockford.

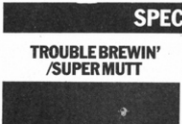
The graphics in each cave are colourful and superbly done. As for the scrolling — well, it gets top marks, it's so smooth. The sound is also done well, and it's faithful to the action on the screen. For instance, when the boulders come crashing down it actually sounds as if an earthquake is about to begin.

Boulder Dash will give you plenty to do, there's lots of choice and a variety and some of the caves are really difficult to master. **Sandra Grandison**

Rating 10/10
Price £8.95 **Publisher** Statesoft 0438-316561

SPECTRUM

TROUBLE BREWIN' /SUPER MUTT



This tape is like an old 45, with an A side and a B side. *Trouble Brewin'* is definitely the B side, for in *Super Mutt* Silversoft has created a character to rival Jeff Minter's battling sheep.

Super Mutt flies, leaps, and jumps vertically. Ears pinned back he skims the roof-tops in a quest for energy-giving green apples; defying gravity he vaults from ledge to ledge collecting floating letters that will give him the password to rescue his friend the Pup at the end of the game.

At the same time his remarkable (and energy-sapping) agility comes in handy for dodging various airborne hazards. He lacks fire-power, relying on nimble paw-work to reach his goal, but the letter collection makes this an agreeably educational game that doesn't need any mayhem to be enjoyable.

The graphics throughout are fine; the quest takes in 24 rooms and 60 landscapes, with a variety of adversaries for the paranormal dog. The game needs patience and a certain amount of ingenuity; the margins for error as you try to keep the dog's energy levels up are slight, and although some of the green apples are easy targets, the aerial bombs in many different disguises are all over the place.

Trouble Brewin' is similar in style, the aim being to collect ingredients and utensils and use them to make wine. There are five stages, all more or less the same — they differ only in the items you have to collect and the nasties you have to avoid.

The brewer jumps, climbs and waddles, but he has none of Super Mutt's charm. Once you've seen one screen full of ladders and ledges, you've seen them all unless there's something outstanding about the graphics. But Super Mutt may be demanding enough to make Trouble Brewin' a source of relaxation, especially as you can stay on the five practice screens instead of taking on the whole game. **David Guest**

Rating 8/10
Price £5.95 **Publisher** Silversoft 01-748 4125

BBC B

KENSINGTON

About a year or so ago, a new board game, *Kensington*, was a runaway success. It has now been converted for playing on your BBC B or Commodore 64.

Chess and Scrabble apart, board game conversions have not always fared well. Kensington is a happy exception, not least because the game itself is so engaging.

It is simple to pick up but can make high demands of the players' strategic skills.

The board consists of a series of triangles and squares, so arranged that they interconnect to form several hexagons. Each hexagon is either red, blue or white.

The contest is between two players, each of whom has 15 counters, blue or red.

The counters are placed in turn on the points of the shapes and thereafter slid along to adjoining points.

Capturing a square or triangle allows you to put the boot in by shifting one of your opponent's counters to any point on the board.

The winner is the first player to capture all points of either a white hexagon or one of their own colour.

It may not sound much but in practice the game is gripping.

The board is attractively represented on screen, the counters being fairly large blobs of colour.

You can use the program to play against another player or pit your wits against the computer on any one of three skill levels. It plays a mean game.

Placing of your counters can only be accomplished using a set of keys as cursor controls — joystick movement would have been better. There are a variety of options including sound effects and being able to watch the computer 'thinking' at any of ten speeds.

Kensington is an excellent game, extremely easy to learn but not one to tire of easily. There are hidden depths to this apparently simple game. If you want to give those grey cells a shake out, this is the one to go for. **Bob Chappell**

Rating 8/10
Price £12.95 **Publisher** Leisure Genius 01-935 4622

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COMPETITION
JOIN THE ELITE

Don't miss this chance to play one of the greatest games in the history of computers — Acornsoft's Elite. We're giving away an Acorn Electron, cassette unit and a copy of Elite to the winner of our exclusive competition. And there are 30 runners-up prizes of disk or tape copies of the game.

All you have to do is identify the film stills below. They're culled from smash science fiction films featuring space travel and computers. To make things a little easier we've listed eight movies — just pick the correct six and match them to the numbered pictures.

The first all-correct entry out of the hat wins the first prize. The next 30 correct entries win copies of Elite. All entries must be received by Friday, November 23.

1

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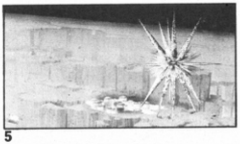
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The films:

Superman	**Alien**	**Star Wars**	**Tron**
2001 — A Space Odyssey	**Close Encounters**	**Blade Runner**	**Star Trek**

Entry Form

1 ..... **2** .....

3 ..... **4** .....

5 ..... **6** .....

If I win I would like my copy of Elite on: BBC disk BBC tape Electron tape

Name.....

Address .....

..... **Telephone**.....

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

Send to: Elite Competition, Personal Computer News, 62 Oxford Street, London W1A 2HG. Closing date Friday, November 23.

PLAY THAT TUNE

Peter Worlock turns his 64 into a music synthesiser with a complex package and produces sounds to rock to all night long.

The Commodore 64 has enjoyed a spate of graphics packages recently; now it appears that the sound synthesiser is about to take the spotlight.

The need for extensive software support is obvious after a glance at the specification of SID — the 64's Sound Interface Device — which features three sound channels, fully programmable ADSR envelopes, four waveforms, full filtering and a range of special effects such as ring modulation and synchronisation.

Any software intended to fully control the complexities of SID is likely to be complex too.

Such is the case with Musicalc. The documentation claims: 'It takes minutes to learn, a lifetime to master.' Possibly, though most of us reckon that many minutes in hours and days.

However, the demonstration pieces on the disk prove that it's worth perservering.

Features

There are two main aspects to Musicalc and they allow you to use the 64 as a music synthesiser and as a sequencer. A sequencer allows you to edit and store a sequence of notes and play them back.

In either mode you have full control over all of SID's features with on-screen displays showing the values for attack, decay, sustain, release, and tempo.

Using the editing modes you can recreate natural sounds or imitate an enormous range of musical instruments. The package comes complete with a set of 32 ready-to-use disk files that give you a built-in orchestra from guitars, pianos, drums, harpsichords and violins to all those weird electronic noises adorning the hits of our times.

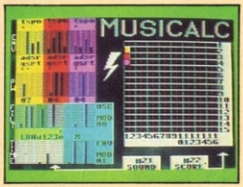
Added to this are 32 music files offering simple jingles and longer classical pieces which you can use, play along to, or change.

Documentation

Given the immense complexity of the subject, the documentation is a model of clarity. After starting with an overview of the package, it gets straight down to business with step-by-step instructions on booting up the program, finding your way round the controls and putting them into practice.

By following the booklet and working through the examples you'll get a good grounding in how to operate Musicalc.

The main 72-page manual is supplemented by a fold-out leaflet touring



the main features, and thankfully there is a glossary and handy guide to the controls — all 114 of them.

In use

This is the crunch — in their attempts to relieve the complexity of SID the programmers have largely substituted one morass of complication for another. Anyone who has used Wordstar will know and loathe its web of control codes and menus. Musicalc suffers from exactly the same problem. For example, the simple task of clearing one voice involves no less than six instructions.

What makes things worse is that for most operations the screen display remains the same, the tunes carry on playing and the only indicator that you are in some particular mode is the border colour. At the same time a multitude of keys perform similar or different tasks, depending on which mode you're in.

Once you've developed some familiarity with the controls you can create some remarkable music. In synthesiser mode you can start from any of the present sounds and tunes and simply add your own accompaniment over the top, or change any facet you like. For example, take a Bach piece. Change one of the instruments, alter the tempo, add a samba beat, or put in a percussion line — you can do whatever you want. Alternatively, you can start from scratch and set up your own sounds.

Sequencer mode is just as powerful, and complicated. You are allowed up to 255 notes split between up to three voices. In other words, you can have all voices play a piece of about 85 notes, or two voices playing 127 notes, or a bass and percussion track of perhaps 16 notes, with a 240-note melody.

You have a full range of eight octaves to play with. Once the initial set-up rountines have been performed, creating the music is fairly simple. The sequence is set out as a 15×16 grid filled in using a combination of cursor and function keys. The bonus is that the voices constantly 'scan' across the grid, so as each slot is filled-in you can hear immediately how your music sounds. If you strike a sour note, simply cursor back and try again.

Those set-up routines are involved but not difficult and allow you to define the start and end point for each of the three voices, giving you immense flexibility in setting up melody line, harmonies, backing tracks, etc.

The real joy of Musicalc comes in combining sequencer and synthesiser modes. For example, you can define a 200-note backing track using two voices as bass and percussion, then switch to synthesiser mode and while the 64 plays the backing, you can play melody.

Verdict

Musicalc is without doubt the most powerful program around for making music on the 64. Sadly, the complexity of using it is directly proportional to its power. Lots of practice will make things easier but it is never going to become second nature.

Its only failing is that there appears to be no way to use the music files you create. Beyond that, Musicalc and your 64 will allow you to experiment, compose and play music until your family and friends beg for mercy.

REPORT CARD 1-5

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

Price £45 **Publisher** Musicalc UK 01-241 2448

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▪ ELECTRON ▪

PAN AND PERSONAL COMPUTER NEWS PRESENT

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SOFTWARE PRO TEST: MACINTOSH

PICTURE THIS, MAC

Apple's Filevision for the Mac files by using pictures. Sounds childish? Geoff Wheelwright says it works very well.

When Apple's Macintosh first appeared, there were great pronouncements about how many companies were going to be producing software for the machine and how the Mac would be setting the 'next' software standard.

As it happened, many software companies still hadn't finished with the 'old' one (PCDOS on the IBM PC) and the Macintosh had to learn to co-exist in a multi-standard world. The very fact of this multi-standardness meant that the first few software packages to appear on the Mac were conversions of successful IBM PC programs — and thus were not necessarily designed with the idea of making the most of the Mac.

Programs such as Microsoft's *Multiplan* (financial planner) and *Word* (word processor) were no doubt powerful programs, but they were not designed exclusively for the Mac. The question was always, 'how can we make more of this PC feature on the Mac?' — instead of building the system from the ground up.

Despite all the companies offering software support for the machine, the most inventive program to take advantage of the machine's unique talents so far has been Apple's own *MacPaint* — the painting program which comes with the machine.

Mac users have been waiting for months for the next 'MacPaint' — a piece of software that will truly exploit the high-resolution graphics and the 68000 that lies at the heart of the machine. Well, you'll be happy to know that a product which claims to do just that has now arrived. It's 'a picture-oriented database' known as *Filevision*.

Features

Filevision is a database that looks nothing like a database. Its closest relative is the cardbox program developed on the touch-screen HP-150, where you are shown a screen-representation of a card file and you point at the card you want — but Filevision goes one step beyond that.

A traditional database has field names and records which are contained in each of those field names. Filevision uses 'field pictures' instead — each represents a category of information and can be accessed simply by moving the on-screen pointer to the appropriate picture and clicking the mouse button.

In use

As with all Californian products, the first example database on Filevision is 'Mellow'. It involves using the program to keep track of all those lovely bottles of Californian wine in the wine cellar (of course you've got one, hasn't everybody?).

When you open the 'Tour' file, you're presented with a MacPaint-style screen that contains drawing icons down the left-hand side of the screen and a wine-cellar pictured in the middle, complete with racks and wine bottles.

Each of the wine bottles, the wine bins and the wine cellar itself is considered an 'object' in Filevision parlance. So to get information about a given bottle of wine, you first use the pointer to choose 'wine' from the 'object types pull-down menu' and then select a wine bottle with the 'object selector' arrow.

There are two types of on-screen arrows, the object selector and the element selector. An object is a picture, which can be made up by a number of elements (if you've drawn a house, for instance, you might have the roof and door as separate elements in the 'house' object). It sounds complicated for a supposedly user-friendly package, but when you're using it all does, in fact, make sense.

Getting back to the bottle of wine (the one on the screen) — once you've selected the wine bottle, a title for the wine will appear on the bottom of the screen and you can get more information on it (*ie* the whole record) by clicking the mouse button twice. You'll then see a standard cardbox-style card with information about the wine's colour, year, price, how many bottles of the plonk you've bought and other necessary information.

Filevision has all the standard sort of database mixing, matching and report facilities, but its biggest strength lies in letting you easily develop graphic symbols to represent groups of bits of information. Aside from the standard collection of lines, boxes, polygons, letters and patterns (as with MacPaint) you also get a whole range of pre-defined shapes through a 'Symbols' menu that contains 20 sprite-style characters including a telephone, a bicycle, a skier, a car and a pith helmet (or maybe it's a birthday cake — it's hard to tell). There is also a strange 'typeface' called Cairo which contains an additional set of shapes ranging from funny faces to standard household appliances.

Verdict

Filevision is a wonderfully inventive package that offers the opportunity to change the way people think about databases.

My only concern has more to do with the Macintosh than the package itself. Because the Filevision pictures in database files take up lots of disk storage and need lots of memory, the average 400K single-drive Mac with 128K will have trouble making the most of it. Filevision would, however, be a superb database to use with the 512K 'Big Mac' and a hard disk system.

As it stands, however, Filevision will easily handle the organisation of wine cellars (and other similar jobs) up and down the land — whether they're stocking Californian wines or not.

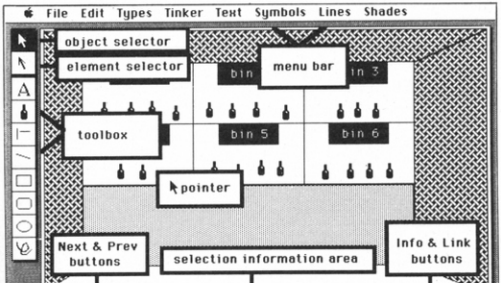


Diagram of the Filvision screen: functions and facilities.

REPORT CARD 1 TO 5

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

Manufacturer Apple **Price** £183
Availability dealers.

PCN Billboard

Acorn

BBC B 1.205, Cumana S/S 100K d/drive; Acorn d/interface, joysticks; all boxed. Plus serious/games software (cost £115), leads. Excellent condition. £650 ono. Tel: 01-864 2361 (Harrow — evenings).

BBC (Acorn) disk interface kit. Unused. Cost £105. Suitable for use with Acorn, Watford, Amcom DFS Eproms, etc £75 ono. Tel: 0636 679319.

Acorn Electron as new. Manuals, leads, data recorder and 12 games + all Electron users and other mags. £185 only. Tel: Saxmundham 3281.

BBC software for sale originals Philosopher Quest, Snowball, Colossal Adventure, Adventure Quest, Arcadians, Arcade Action, Jet Power pack, £4 each. Tel: Rugby 812940 (evenings).

BBC B with DFS & Wordwise, £380 ono. Acorn Teletext adaptor, as new, £175 ono. Cumana dual look drives, own psu. Under warranty. £295 ono. Tel: evenings 0227 750600.

BBC disk software Gemini — database, Beebcalc, Beebplot, boxed as new £12 each. Paion Vu-Cal, Vu-File cassette/disk £7 each. Tel: 01-659 1303 after 7pm.

BBC B OS 12, 1982 Basic, DFS, £350. Canon 100K disk drive (own power supply), £110. Sanyo colour monitor, £150. All V.G.C. Tel: 01-659 1303 (after 7pm).

BBC prism acoustic modem for sale, + ROM software, £40 ono. Tel: Giuseppe 01-672-4212 (after 6pm).

BBC Disc drives (Cumana) dual look 40-track half-height with own PSU, under warranty £295 ono. Acorn Teletext adaptor, ROM & manual, immaculate, £175 ono. Tel: 0227 750600.

Microvitec Cub RGB monitor, 14" screen, standard resolution for BBC micro, £130. Tel: Mr R Jones (09803) 8865.

BBC B+ Basic 2 in good condition wanted, + DFS if possible. Tel: (0202) 529787 evenings.

Upgraded BBC A 32K, via, ADC, £250 of software, data recorder, leads, books, offers above £250, letters to R. Anderson, 50, Gainsborough Gardens, Golders Green, London.

BBC B latest specs, manuals, leads, disk drive, +DOS fitted, +11 disks, games, utilities 3 blank, will accept £450 for the lot. Tel: Lindsay 051-552-4928.

BBC B 1.2 OS, Acorn DFS and Cumana 100K disc drive, also several programs + books. Buyer must collect. £500 ono. Tel: (0272) 20850 after 7pm (Bristol).

Acorn disk interface kit, new, £85, including fitting instructions and postage. Juki 6100 daisywheel printer, immaculate, boxed, £315 ono. Tel: Canterbury 750600 evenings and weekends.

Acorn Electron, boxed, joystick interface, joysticks, 2, all leads & Acornsoft, A&F Micropower, Imagine Games, £250 ono. Tel: Bedlington (0670) 824379.

BBC B software for sale, or to swap, titles include Twin Kingdom Valley, Ghouls. Tel: Dean, Stevenage 351272.

BBC B 1.20, Acorn data recorder, two joysticks and 15 original software titles, worth £556, excellent condition (still in box) — £330 ono. Tel: Runcorn (09285) 76670 evenings.

BBC B, £100 of software, will accept £70 for whole lot. Tel: 01-399 6141, ask for Matthew.

BBC 40 track 100K Cumana disk drive, half height, includes power supply and leads, 4 months old, will accept £110 ono. Tel: 01-202 9453.

Atari

Atari 400/800 software for sale: Gorf cartridge, £10; Canyon Climber and Ghost Hunter cassettes, £5 each. Originals. Will swap all for Tracball. Tel: 01-341 0464 evenings.

Swap Casio MT-70 musical keyboard for Atari 1020 printer or a dot Matrix printer or sell £100 ono. Tel: 0283 48415.

Atari Basic Cart £11. Ghost Town, Mystery Fun House, Slime, Protector, Touch Typing, £5. Wanted assembler editor, Action, Basic XL, American hardware W.H.Y. Tel: Rotherham 876306.

Shinwa CP80 dot-matrix printer and Atari interface wanted. For sale: complete set "Computer and Video Games", offers? Buyer collects. Tel: 01-341-0464 evenings.

Wanted: Atari: Tor sal, Tablet, Trackball, 850 interface and Atari/Synapse Synfile + Database disc, cash waiting. For sale: Le Stick joystick, £10. Tel: 01-341-0464 evenings.

Atari 800XL, program recorder and wico joystick, software includes Pole Pos, Donkey Kong, boxed as new, £199. Tel: (01) 550-5075, after 5pm.

Atari 400 16K including cassette recorder, games, Zaxxon, Preppie, Pac man, Star Raider, Shamus, Donkey Kong, Darts, Jumbo Jet Pilot, Galaxion etc, including books, basic, £190 ono. Tel: 02227 55405.

48K Atari 400 + 410 recorder + Basic + manuals + Paddles + joystick + over £200 original software includes Defender, Pacman, Soccer all for only £100. Tel: (Glasgow) 649 0037.

Atari software for sale: Multiboot Polycopy, DOS Polycopy, label printer, address label printer, Multicart/Pill convertor, Binary menu, Pill Menu II. Tel: Slough 28029.

Atari owner would like to swap and sell games on disk. Tel: (073128) 262 (Jon).

Atari software for sale, Star Raiders, £10. Oric Attack, £10. Jumbo Jet pilot, £9. Plus some disks and cassette software. Tel: Iver 654785.

Atari 400, eight carts, lots of tapes, two joysticks, 1010 recorder, all newly serviced, and books, £160 ono. Tel: (04862) 67469 after 5pm.

Atari software, swap/sell disks, Raster Blaster and Crypt of the Undead, cassettes: ACE, Airstrike 2, Firefleet, Preppie 1, Grid runner, Night Mission Pinball, Financial Management. Tel: 0225 23276.

Atari 800 48K, many games £140ono. Tel: West Wratting 022 029 830.

Atari software for sale: War in Russia, Carrier Force, Combat Leader, Paris in Danger, Reforger 88, Flight Simulator II. Tel: 01-941 6166.

Atari 600XL computer, with printer, tape recorder and £200 software (games) including Zaxxon, Pac-man, Defender, Star Raiders, Computer War, £220 ono. Tel: (064 73) 3392 anytime.

Atari VCS for sale, includes 17 games, plus all types of controllers available. Cost £350, sell for around £95 ono. Tel: Weybridge (0932) 55203 eves.

Atari 800 48K, basic cartridge, tape recorder and joysticks, superb machine, excellent condition, £240 ono. Tel: (0454) 316836.

Atari 400 16K +cassette recorder, Basic, assembler, Pole Position, Defender, Star Raiders +cassettes, joysticks, manuals including De-Re Atari, cost £500, sell £195ono. Tel: Stephen (047-47) 3104.

Commodore

Vic 20 16K switchable RAM Intro to Basic land 2, joystick, mags, books, dustcover, games, £150 ono. Tel: Derek 950 0685 after 5pm.

TV monitor with remote control, composite video and sound inputs, suitable for Commodore 64, only £299. Tel: 01-567 6872 after 6pm, ask for Matthew.

Vic 20 32K RAM switch CN2 and joystick. Games: Bongo, Jet-Pak, Computer-War, Matrix + magazines. £195 the lot. Tel: Epping 73754.

CBM 64, C2N cassette recorder, Simons Basic, joystick, 12 games, including Hunchback, + Review, educational software, manuals, leads, all good condition £300 ono. Tel: Adil, 01-677-6272 after 5pm.

Vic 20 expander, cassette, joystick, many good games, £100. Tel: 01-441 5906 evenings.

Vic 20 C2N 16K switchable, RAM motherboard, joystick, dustcover, reference guide, Sargon II, chess, 14 tapes, literature, £200. Tel: Paul 01-644 5701 evenings.

Commodore 64 unwanted present, hardly used, offers around £150, cassette deck £25. Tel: Romford (0708) 756495.

Vic-20 C2N cassette deck, Quickshot joystick, Basic, part 1, books + mags, software, £110 ono. Tel: Matt 01-393 0119.

CBM 1520 printer plotter £70, original software to swap or sell. Tel: 0904 707699.

Vic 20, cassette deck, 16K RAM, manuals, books, covers, £65. Games, joystick £120 ono. Tel: Aldridge 54484 after 5pm.

CBM 64 software for sale: Jumpman (cassette) £10, Pharaoh's Curse, £8, Protector II £8. Soccer £5. Tel: Waterlooville 266855 after 6pm.

Vic 20 computer with cassette recorder, 16K switchable RAM, 40-column screen converter, books, and software, only £290. Tel: 01-952 7855.

Vic 20 starter packs, 32K, + joystick + cassette recorder + centronics interface + original software, accept £180. Tel: 01- 807 1724.

Vic-20 80-column screen expander with 9Y on line and spread sheet on disk, £95 ono. Tel: 01-907 0209 after 7.

Commodore 64 C2N cassette recorder, twelve software, Quickshot, two joysticks, magazines, all £230. Tel: Esher 66272.

Commodore 64 plus cassette drive, Basic and software, worth £350, will accept £200 or offers. Tel: 01-572 1869 daytime.

Commodore 64 O'level history, Maths 'Z', £12 ono. Spectrum, brand new, also software to swap on disk or tape. Tel: 051 423 5493 after 6.30pm please.

Commodore 64 software sale, half price, all originals: Write to A Jmel, 7 Holly Road, Northampton NN1 4QL.

Vic 20 starter, includes tape player, 11 cartridges, Quickshot joystick, cassettes, large number of games all excellent condition, £200 ono. Apply: R Chamberlain. Tel: Milton Keynes 583076.

Swap CBM 64 with printer plotter, cassette Simon's Basic, joysticks, books and software, for BBC B or Memotech MTX512. Tel: (0245) 357492, will sell £340 ono.

Simons Basic £30, Scrabble, £8, lots of others, Hobbit, Soccer, Miner etc, for cash or swape for EPROM blower etc. Tony 0474-824155 after 7.30pm.

Commodore 4023 dot matrix printer, friction and tractor feed, very good condition, worth £400, selling for just £250 ono. Tel: (0272) 736666 after 4.00pm.

Software for 64, about £170 worth inc Simons Basic and Soccer Cart. Cash or swap for CBM64 EPROM blower. Tel: Tony 0474-824155 after 7.30pm.

Wanted 1541 disk drive for CBM 64, must be excellent condition plus extra's including manuals, disks and any software, price negotiable. Tel: (0438) 359583.

Vic 20 + **C2N** good condition, 16K switchable, cartridges including Gorf, Superslot, Adventure land + Mang, cassettes including Skyhawk, Donkey Kong, 2 books. £110 ono. Tel: Deeping 342249.

Vic 20 computer, 10 games, superexpander, joystick 3 books intro set, cassette recorder, £150, also printer, £120. Tel: Ferndown (0202) 873379.

Vic 20 starter pack, 16K RAM, 12" TV, Quickshot joystick, 40 tapes, magazines, Vic reveal, £250. Tel: 0279 33687 after 6pm.

Dragon

Wanted disk drive for the Dragon 32 (will consider ultra drive) reasonable price carriage and paid. Tel: Brierley Hill 74306.

Dragon 32, 1 joystick, £90 software, mags, cassette recorder + leads + manuals sell, £100, + DASM/Demon assembler monitor + 2M/C books, sell, £25. Tel: 047485 2026.

Dragon software for sale: Sprite Magic, Pettigrews Diary, UGH! Eight Ball, Skrambe, Ring of Darkness, Chess cartridge, plus microdeal joysticks, £40. Write to: 60A Hartuft Rd, Hull, HU5 4LJ.

Dragon 32, joystick, user magazines, dustcover and software, £110. Seikosha GP100A printer and lead, £130, both for £230 boxed and hardly used. Tel: 0622 62650.

Dragon 32 under guarantee, boxed as new, complete with accessories, including dustcover — £120. Dasm/Demon cartridge, £30 — games £5-£7 each. Tel: Swansea 0792 366604.

Dragon 32, guaranteed, boxed plus leads, manual, various books, magazines, software — £75 (buyer collects), £83 p/p'd. Tel: Glasgow 952 6136 Mon-Fri evenings: Ask for John.

Dragon 32 for sale, joystick, books, mags, £150 of original software, worth over £370, just £90 ono. Contact Richard on Ramsbottom (070682) 2025.

Memotech

Memotech MTX-500 + tape deck, £125. Tel: (0253) 403994.

MTX 512 64K computer. Software tapes, books, nearly new, under guarantee. £280 ono. Tel: 01-607 4839.

Memotech MTX512 80K RAM fitted Newword word processor ROM and Memotech DMX80 printer boxed manuals, £500 — will consider cheap computer plus cash. Tel: Southend 529169.

Memotech MTX 512, 64K, tape recorder, five games, book, guaranteed, £265, also Vic-20 starter pack, £80. Tel: Dudley (0384) 57360.

Newbrain

Newbrain AD c/w green monitor, compatible cassette, software incl, Database, Pascal, Textwriter, Home Budget and games. Manuals, guide, leads, prog. Tel: Cheltenham (0242) 522518.

Newbrain AD, tape recorder, technical manual, database, much software and Newbrain literature (software). £250. Tel: Medway 63427 (evenings only).

Newbrain AD, very little use, also tape recorder, printer, cable, spare p/supply, all mounted on one board, optional monitor. £225 or £325. Tel: Brighton (0273) 556184.

Oric

Oric Atmos 48K. New, still boxed, £100. Tel: Tonbridge (0732) 364185.

Oric 16K with Quickshot joystick, £80 software including, Hobbit, Xenon, Zorgon's Revenge. All originals, MCP-40 printer, £190. Tel: 01-460 9334 evenings.

Oric-1 48K in vgc, complete with software including Zorgons Revenge, 2-Gun Turtle, leads and manual, £89. Tel: 01-642 9803.

Oric 1 software, Hobbit, Wordprocessor, £6, Chess, Toolkit, £4, Xenon, Loki, Centipede, Starfighter £3. All originals. Tel: John Wright Shipley 860653.

Oric 1 48K, plus software, includes Zorgons Revenge, Hunchback etc, books, £110 ono. Tel: Fleet, 28394.

Oric 1 48K excellent condition + software including Zorgens, Zenon, Hunchback, Hobbit plus tape recorder only, £180. Tel: Jamie, Newquay (06373) 5130.

Oric 48K in good condition, plus £50 worth software, leads, and books £80 ono. Tel: (0452) 6589 evenings.

Last chance to buy my Atmos, 4 months old, still in box plus some extras, phone me an offer. M. Swanson, Spilsby, Lincs. Tel: (0790) 52120.

Oric-1 48K includes cables for RGB printer and Byte Drive 500 disk drive cable, £100+ of software, £150 ono. Tel: Sunbury-on-Thames — 84039 (evenings).

Oric Atmos 48K, perfect condition plus £45 worth of software including The Hobbit and cassette recorder, 9 months guarantee remaining, £130. Tel: 021-429 6056.

Oric Atmos 48K excellent condition, boxed, cassette player, over £70 of software inc Hobbit, Xenon 1, etc, worth over £270, will sell for £130. (01)-876-4332 (eves).

Sharp

Sharp MZ80K 48K, monitor, cassette recorder, £400 of software, Pascal, Forth, Xtal, assembler and 100 games, user notes good condition, £325. Tel: (0282) 692276.

Sharp MX80A one year old worth, £450 new, plus £100 software and monitor, tape recorder, 15 blank tapes, £200 ono. Tel: Tony on Cardiff (0222) 842948.

Sharp MZ-80K, 48K RAM, built in tape unit and monitor, plus dual disk drive, printer and manuals, £620 ono. Tel: (064 73) 3392. Chagford, Devon.

Sharp MZ-80K, 11 months old, excellent condition with £70 s/w, data recorder, manuals and magazines, sell for £240 ono, will seperate. Tel: (0282) 865821 evenings.

Sinclair

Prism VTX 5000 modem for Spectrum, best condition with box, instructions etc, £60. Tel: (01) 886 4797.

Software Spectrum, sold or scrapped! Psion Chess 48K, The Hobbit, Spectrum Forth, all guaranteed originals Tel: (0273) 725650.

Spectrum 48K, Prism VTX 5000 modem, CPD 8300 Data Recorder, £62 original software, all £200. Tel: (051) 678 7261.

48K Spectrum interface 1, microdrive, three cartridges, lightpen, joystick interface, joystick, ZX printer, paper, sound board, over £100 worth tapes, and books. Only £325 ono. Tel: Guildford 65644.

48K Spectrum with printer, sound amplifier, dust cover and software and magazines, only £165. Tel: Slough 41066.

48K Spectrum interface 1, microdrive cartridges, WH Smith tape recorder, programmable interface and joystick plus software including White Lightning. £325. Tel: (0943) 863028 after 5.30pm.

48K Spectrum, Kempston interface + Quickshot 2 joystick, cassette recorder, DK Tronics keyboard, lots of mags. All for £220. Tel: (0279) 20045.

Spectrum 48K, Fuller Box, Quickshot, Interface Kempston/Cursor, 170 progs, books mags, £180 ono. Casio FP130 keyboard, £40. Tel: (0494) 443184.

48K Spectrum, Microdrive, interface 1, Alphacom printer, software, cartridges, perfect condition, with manuals, all for £280. Tel: after 4pm, (0267 234719.

Spectrum 48K, ZX printer, B/WTV, tape recorder, joystick and interface, Currah µ speech, software, books and magazines. £199, may split. Tel: Huddersfield 656886.

ZX81 (16K) + full size keyboard cassette player, B/W NEC T.V. Lots of software: Rocketman, Fortyniner, Night Gunner + manual and leads, worth £172, bargain at £85. Tel: (0272) 744427.

ZX81 16K 5 games, all leads and manuals, £20 ono. Write to: Robin Jones, Morlan Bangor Road, Caernarfon, Wales.

48K Spectrum Alphacom printer plus books, selection of software. Value over £300, accept offers over £150. Tel: 01-459 3278 (evenings).

48K ZX Spectrum, tape recorder + over £200 of software, joysticks + interface guarantee, £180 ono. Swap for Electron, BBC-B cash adjustments maybe. Tel: 01-995 1874 after 4pm.

QL for sale Offers? Also Epson MX100 printer in suit. Tel: Gerrards Cross (0753) 882686.

For sale: interface 1 + two microdrives and RS232C cable + five microdrive cartridges and cartridges holder all leads + manual, worth about £200, sell for £130. Tel: 01-504 0565.

Spectrum 48K interface 1, two microdrives, DK' Tronics keyboard, ZXLprint III, ZX printer, Tasword 2 wordprocessor plus software, books and manuals. boxed VGC £270. Tel: 01-898 0482.

48K Spectrum, Currah speech, light pen, software, lots of mags, sell for, £220 or swap for Commodore 64, joystick, cassette recorder, software. Tel: 01-207 1806.

48K Spectrum, RAM Turbo, joystick + cartridge interface, Quickshot II joystick, ZX printer, 4 rolls of paper, DK' Tronics light pen, tape recorder, books, magazines, software. £250 ono. Tel: Peterboro (0733) 241354.

48K Spectrum + Alphacom printer (hardly used) +5 rolls printer paper, software, magazines. Sell for £200 ono, buyer collects, York area. Tel: 03477 577 after 5pm.

Spectrum 48K plus recorder nine months old, hardly used, lots of games including Jet Set Willy, Stonkers, Blue Thunder. Only £110 ono. Tel: 01-735 6094.

Spectrum 48K, DK 'Tronics keyboard, interface one, microdrive, Alphacom printer, Currah speech, RAM Turbo, joysticks plus software, half price, £350 ono. Dave Tel: 0702 552249.

ZX81 16K RAM, power supply in custom case with Maplin keyboard, software, books, £50 ono, or part exchange. Tel: Belbroughton (0562) 730 197.

48K Spectrum, ZX printer, Competition pro joystick and interface, nine games, one utility, all leads, five books, £50 ono. Wolverhampton/Birmingham area, Tel: (09073) 75200 for quick sale.

48K Spectrum, Kempston interface and joystick, lots and lots of software including the latest, mags, book, £120 ono. Computer one month old! Tel: Michael on 01-340 2630.

48K Spectrum, black and white television, Kempston joystick and interface, cassette recorder and leads, books, 10 programs including Penetrator, VU-3D, Hurg, Trans-Am, £165 complete. Tel: Ipswich (0473) 49025.

Spectrum 48K, interface 1, Microdrive, Mega keyboard, Kempston printer interface, £250 of software, may split, for details and offers ring (0377) 42803 after 7pm.

Spectrum software half price, Transform keyboard, £55, Fox programmable joystick interface, £25. Will deal for ZX printer and paper and for Currah Microspeech. Tel: 01-951-0007 after 6pm.

48K Spectrum tape recorder, stack, light rifle, 2 books, lots of games, offers. Tel: Steve 0203 418809, won't split!

48K Spectrum £50; interface, £30; Microdrive, £25; Spectrum printer, £15; Seikosha GP-100A printer, Kempston interface, £180; carriage extra, offers to Hinds. Tel: (0792) 69688.

Texas Instruments

T199/4A mini memory £38, editor assembler,_£40, Blasto cartridge, £7. P+P extra. Tel: 0245 72572 after 6.00pm.

Texas TI 99/4A bargain package. Console + extended Basic + several modules and cassettes, TI cassette + speech + joysticks + books + colour TV, £220 ono, buyer must collect. Tel: Pontefract 700702.

Wanted T199/4A extended Basic module with manual, will pay max. £25. Casio VL-10 mini keyboard for sale, £15. Tel: (0461) 50154 after 6pm.

TI99/4A boxed, all leads, extras, personal record keeping, Parsec, Wumpus, Blasto, Tombstone City, cassettes, books magazines, all for, £150 ono. Tel: (0303) 44653 after 7pm.

TI99/4A computer, 3 cartridges, including extended Basic and Parsec, with speech synthesizer, manuals, magazines and cassette lead. £200 ono. Tel: 01-804 3382.

Texas TI-99/4A, cassette unit, leads, adventure module and 3 Scott Adams adventures, TI-pilot and Blood-Bank £80 ono. Tel: 021-743 5203 after 6pm, Dave.

Peripherals

Kempston competition pro joystick and interface for Spectrum, 3 months old only, £15 ono. Tel: 01-883-0776.

DOT matrix printer, prints in 7 colours, mint condition, fast 125cps, parallel interface, £250 ono. Tel: 0865 750600 evenings.

Wanted simple working terminal with RS232 interface or 20MA coop, preferably VDU type, may consider teletype will pay around, £50. Tel: (0903) 42015 WABBS.

Alphacom 32 thermal printer plus one roll of paper, only five months old, Spectrum compatible, no interface required, £43. Tel: Shrewsbury 59356.

Qume Q30 daisywheel printer, 30CPS, perfect condition, 16-bit parallel bus with wheels and ribbons, interface and software for Nascom II if req, will demonstrate, £200. Tel: 061-236-8406 (day).

Seikosha GP100A printer, BBC cable, 5 spare ribbons and paper, £145. Also BBC software: Acornsoft, Micro-Power, etc. Originals, £3 each. Tel: Richard 01-236 6640.

Others

Flight simulator II user group (UK), having problems? phone us, diagrams of approaches, advice, monthly air race. Tel: Ray Jones (09803) 8865.

Video Genie I built-in cassette, Centronics printer interface, software Handy compatible, £80 ono. Tel: after 6pm 0480 75036. or will exchange for Texas Extras an mini-memory.

Disc software for Apple 2, Flight Simulator 2, £30, Blade of Blackpoole, £12. CBM 64 cassette software from £1, all originals, as new. Tel: Slough 71392.

Colour Genie EG2000, 32K RAM, boxed and complete with demo and manuals, immaculate, unwanted gift, accept £120. Tel: Dave, Southampton (0703) 897110.

Sharp MZ-80A 48K computer with built in monitor and tape recorder, Basic and software tapes, will sell for £350. Tel: 01-373 4156.

Swap Sharp MZ80A, 100+progs 4 languages, wanted Commodore 64 with C2N cassette, and T.V monitor. (Excellent condition please). Tel: (0202) 672669.

Newsletter join the independent users club, P.O Box 9, Towcester, Northants, NN12 7QG.

Lynx 48K, boxed as new, manual leads, demo tape, plus Level 9 assembler, Lynx User magazines, plus extras, bargain, £80 ono. Tel: 061-962 5964.

PCN every issue to date including trade only test issue. £10 the lot. Tel: Windsor 51963.

For Sale: Vextrex with original boxing game, Atari with 4 cartridges. All for £130 or exchange for 48K Spectrum. Tel: Joseph 01-672 6382.

Swap Ham International Puma 120 channel transceiver PSU aerial, valued at £130, for computer and accessories of equal value. Tel: Andrew (0294) 57184.

PCN issues 1 to 80 for £10, must collect, Tel: Barnsley (0226) 285703.

Lynx 48K boxed plus Lynx computing and software, £60 ono, owner upgraded to 96K. Tel: Tony on Warrington 812014

Sirius £2,347.55 plus Wordstar disk (no manual) MS-DOS, CPM86 Assembler, £1,919.75 plus Wordstar disk (no manual) MSDOS, Basic, Supercalc. Tel: 01-883 1681.

48K Spectrum software worth over £245; Kempston interface with joystick, blank tapes, under guarantee. Worth £400, sell £200. Tel: 01-808 5575 any time.

Spectrum 48K ZX printer + 5 rolls paper, joystick interface 2, Ferguson tape recorder, plus £500 of best software worth £700, under guarantee, mint for just £200 ono. Tel: 0254 55364.

Sinclair QL for sale. No donggles. Tel: 01-802 7796.

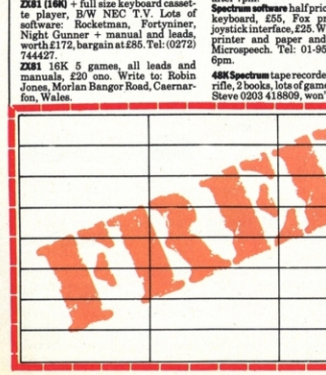
48K Spectrum, ZX printer, tape recorder and software worth over, £300, total value, £490; sell for £150. Tel: Miguel 01-354 2879 after 6pm.

48K ZX Spectrum + joystick and interface + over £200 of software, guarantee + tape recorder, £180 ono or swap for BBC B or Electron. Cash adjustment maybe. Tel: 01-995 1874 after 3.30pm.

Digital Circuit Design Program (48K Spectrum), Lords of Time, £5. Adventure Quest £5 Write to D. Hawkins, 107 Butts Hill Road, Woodley, Reading, Berkshire. Tel: 0734 698094.

Spectrum 48K brand new with software, unused and unwanted present with one year guarantee, £120 includes delivery. Tel: 01-636 9636.

Interface 1 and microdrive for sale. Three weeks old. Will sell for £60, also £130 of software top titles offers. Tel: Atherton, Manchester 878707.



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Acorn

BBC disk drive 100K (Shugart 405R) with utilities disk and head cleaner. £125. Tel: (evenings) 01-777 0357.

Acorn DFS 0.90 kit with fitting instructions, £75. High Wycombe. Tel: 0494 451103, evenings/weekends.

BBC software tapes for sale, from Frak! to Planetoid, only £2.50 each. Or all 20 for £40. All originals. Tel: Garry on 0933 76849.

BBC ROM software: View £40, Commstar £30, Screendump, £15. As new, boxed with manuals. Tel: 021-449 8355.

BBC A as new, unwanted gift. Memory upgraded to BBC B, 32K. Value £320, will accept £250. Tel: Southend 587108 after 6pm. Ask for John.

BBC B, DFS, Sanyo Data recorder and associated software and books, eight months old, immaculate, hardly used, £425. Tel: 01-858 6804/01-987 4418.

Swap Acorn Atom software-write to 1. Durleston Park Drive, Gt. Bookham, Surrey or Tel: Bookham 59621 and ask for Paul Huntley.

Acorn Electron cassette recorder, leads, some books and software, three months old, under guarantee, hardly used, £140. Tel: Halstead 0787 473930 (evenings).

Acorn Electron 22 months guarantee remaining, excellent condition with Sanyo cassette recorder leads, software, and Electron. Users bargain at £210 ono. Tel: 061-442 0770.

BBC originals: Elite (disk), JCB Digger, 3D Grand Prix (software invasion), 9 Acorn, Hobbit and 10 others from other manufacturers. All for only £50. Tel: 05827 69152.

BBC original cassettes for sale. No prizes. Very reasonable. Approx 70-80 tapes write: Sean, 23 Heathbrow Road, Oaklands, Welwyn, Herts AL6 0QG. Tel: Welwyn 4053.

Acorn Electron. All leads, under guarantee, plus lots of worth software, titles like Micro Olympics, Chuckie Egg, worth £265. Only £175 ono. Tel: 01-689 4234, after 6pm (Feltham).

BBC complete Tandy LPVII printer plus cable and screen dump. Can be seen working on Beeb. Only £99. Tel: John Southend 0702 341505.

BBC Z80 brand new. Boxed and unused complete with full set of manuals, £349. Tel: 0428 71 3537.

Disk interface kit, Acorn O.90. Around £75; 6116-LP3 CMOS RAM, new in original packing, £3.15 each plus postage. Tel: 01-202 6410 after 6pm, Mr Vekaria.

Yaseu FT101 ZDFM Mk3, many extras, swop for BBC B with DFS and disk drive or monitor. Phil Bridges 0703 (Southampton) 891975.

Wanted: disk interface for BBC Micro, any make. Tel: 0795 522100 after 6pm.

Upgraded BBC B, OS1.2, 32K VDU, DAC, joystick, £250 worth of games, software, books, cassette recorder. Offers to Mr R. Anderson, 50 Gainsborough Gardens, Golder's Green, London NW11.

Wanted BBC B in good working order for approx. £200 cash. Collection may be possible if in West Midlands. Tel: 0203 303784.

BBC Toolkit ROM from Beebugsoft, original with manual, £20. Cumana dual 100K/407K disk drive with own PSU, cables, manual, under warranty, £285 ono. Tel: Canterbury 751100.

BBC B plus DFS, disk drive, tape recorder, speakers, disk doctor, graphics ROMS, £400 software, joysticks, books, mint condition. Worth £1,200, sell for £720. Tel: Accrington, Lancs. Tel: 0254 397074.

BBC Acornsoft games, 12 of them, all originals, £5 each or £55 the lot. Planetoid, Snapper, Meteors, Snooker, Arcadians, Rocket Raid and more. Tel: 01-958 7729.

BBC ROMS, Wordwise, Watford DFS, Atari recorder, wordprocessor, £20. Games and database disks, £9. Juki daisywheel printer, £275. All boxed as new. Tel: 01-366 4299 evenings.

BBC DFS cassette, joystick, 9 months old, games, spreadsheet, £390. Sony 13in TV, £150. Tel: 01-486 0155 (work) or 01-828 5011 (home).

Torch Z80 + 800K disk pack, £1,200 software, Epson RX80, BBC-B and £100 + software and more. Offers, must sell. S. Gill, Tel: 01-485 6922.

For BBC, Torch Z80 plus £1,000 of software, £225, plus RX80 printer all unused both for £400. Must sell. S. Gill. Tel: 01-485 6922.

BBC B 1.2 OS DFS, disk drive, four cartridges, speech synthesiser and software collection, £650 ono. Jupiter Ace 16K, £35. Tel: Luton 574931.

Amstrad

Amstrad CPC464, swap my colour monitor for monochrome monitor, with or without MP1 modulator, plus cash adjustment. Tel: Yeovil 26151 Ext 228, office hours.

Amstrad CPC 464 colour, one month old approx, £80 of software, joystick, mags, etc. As new gift at £320. Tel: 01-908 1460 after 6pm.

Amstrad CPC-464 for sale (b/w monitor), £160 ono. Also concise firmware and Basic guides, £10 each, Devpac, £12. Tel: Pete, Teversham 02205 3584 (evenings).

Apple

Apple Macintosh wanted, Tel: 0795 842324 after 7pm during week or at weekends. Ask for Dave.

Apple II Europlus 64K including 16K RAM card, 12" green monitor + manuals £350 ovno or swap. Tel: 01-602 1530.

Alf 9 voice music card and software for Apple, £65. Casio PB100, boxed with manuals, £25. David Bailey, Tel: Leeds 0532 550977 (evenings).

Atari

Atari software Asteroids cartridge, £10. Pilot language cartridge, student manual, etc, £50. Tel: 0392 507784.

Atari 400 32K, 1010 program recorder, basic, manuals, and many games including two ROMS, Bruce Lee, Raster Blaster, only £100. Tel: Northwood 09274 22750.

Atari 400 + recorder + Basic + Manual + Joystick + over £200 worth of tapes. Zaxxon, Airstrike, Shamus, Preppie!, Galaxians, Soccer, and Snooker, sell £140. Tel: 01-467 8854.

Atari 400 48K, disk drive, recorder, manuals, literature, software club life membership, loads software, keyboard optional (minor repairs), highest offer. Tel: 278 4984.

16K Atari 400 computer with power pack, Basic cartridge, and Basic book. Never been used. Swaps. Will be considered, £60 ono. Tel: 01-654 6828, after 6pm.

Wanted Atari 1010 or 410 cassette, also 850 interface required. If you can help. Tel: 0249 817077 after 7pm.

Atari software to swap disc and cassette. Good selection. Tel: Brian 648 0436 after 6pm or write Brian Benton, 17 Crescent Grove, Mitcham, Surrey.

Atari 400 48K computer plus 410 cassette recorder, Real keyboard, basic, joystick, software all boxed. Excellent condition, £150. Tel: A. Hughes 0732 822559.

Atari 800 XL (64K), 1050 disk drive, joystick, blank disks, much ROM, software books, magazines, etc. Sell £480 or swap Apple IIc + cash. Tel: London, 01-761 4329 (evenings).

Wanted Atari Letter Perfect and Data Perfect, also other serious software. Tel: 0892 20694 (Tunbridge Wells).

Commodore

Commodore 64, cassette deck, programmers reference guide, using the 64, manuals, Grandmaster Chess, games, tapes. Perfect. Over £300 new. Sell £150. Offers? M. King, Tel: 01-403 5053.

Vic 20 16K RAM. Introduction Basic Part 1. Over £100 software. C2N recorder, with over £280. Will accept £180. Tel: Paul 0389 73315.

Vic 1541 disk drive for CBM 64 or Vic 20 with easyscript and games software. £150. Also two joysticks, £10. Guildford 574540.

CBM 64 Software sell or swap Solo £7.50; Beach Head, £6; Ceasar, Hunchback, Flight-Path, Revenge, £3 each. Write: A. Vun, 20E Bradmore Road, Oxford OX2 6QP. Tel: 0865 54084.

VIC 20 cassette, approx 25 games, 16K RAM 1 cartridge, 3 O level cassettes, 7 books and Introduction to Basic. All boxed, £150. Tel: Preston 077273 4627.

Commodore 1541 Disk Drive, five months old, £130. Also disk based games and cassette games for sale: Tel: 0293 28464 after 6pm weekdays.

Cbm 64 tape deck, joystick, spare leads, reference guide chemistry and physics O level revision, other software. All boxed, guaranteed, only £300. Tel: 01-853 4416.

Commodore 1541 disk drive with disk software, spreadsheet, database, word processor and assembler. Under one year old, £180 ono. Tel: 01-934 5962 daytime 025-14 4655 evenings.

Vic 20 + C2N cassette. Quick Shot II joystick, cartridges and cassettes magazines etc sell for £110 ono. Tel: Martyn on 01-907 3108.

Commodore 64 disk drive, C2N, portable colour tv, joysticks, cartridges and over 30 disks with over 300 games worth £1,000 +. Sell for £500. Tel: 05827 69152.

CBM 64 tape software for sale. Titles include: Aztec Challenge Booga-Boo, Skramble and Moon Buggy. Tel: 0703 558375 and ask for Dean after 5pm.

Commodore 64 disk drive, cassette recorder, portable colour TV, joystick, cartridges and over 30 disks of business and games software. All for only £500. Tel: 05827 69152.

Vic 20 plus C2N cassette, Basic part I, games. Swap for TI99/4A or Atari games console. G. Faces, 33 Lower Ellacombe, Church Road, Torquay, Devon.

I would like to join a Commodore 64 users club within 5 miles of Stretford, Manchester. Please contact Gary Knowles, 50 Norway Street, Stretford, Manchester.

Commodore SX64, new, best offer over £460 secures. Tel: 061-941 3102 (Medford).

Commodore 64, cassette recorder, 22 games for £180, only seven months old. Micko assembler £45, only 15 weeks old. Tel: Fleet 02514 5395.

Dragon

Dragon 32, Dragon disk system, 2 joysticks, hi-res colour lightgun, dasm, 4 books, 30 dragon users, printer cable. Excellent condition. All boxed, £190 ono. Tel: M. Swanson 0790 52120.

Dragon 32, joysticks, £135 of software including Chess Cartridge, books, manuals, cassette lead. All perfect. Bargain, £195 ono. Tel: Watford 24011 after 6pm.

Dragon 32 with Tandy GGP115 and connecting lead, screen dump software, books, games, plus hires and sound cartridges. Two joysticks. Only £200. Tel: Ian 061-432 2752.

Dragon 32 cassette recorder, printer lead, £350 + software, books, listings, Dragon User magazines, dust cover, joysticks. Sell for £300 ono. Tel: 01-472 5537.

Dragon user group (Romsey and Southampton). Meets every weekend. New members welcome. Write for details (SAE) to: A. R. Adamson, "St. Elmo", Slab Lane, West Wellow, Romsey, Hants SO5 0BY.

Lynx

Wanted Lynx peripherals and software including joystick, interface, disk drives, word processor, Zen, etc. Contact Tony on Warrington 812014.

Lynx disk drive and interface wanted, around £150 to £170 to be paid. Tel: 0323 24921 after 5pm and ask for Gavin.

Swap Lynx 96K parallel printer and joystick interfaces, books, articles + software, all boxed as new, for Atari 48K + disk drive. Tel: 0733 236914.

Oric

Oric 1 software over £100 worth, mainly adventures although some Arcade only £45. Tel: Wickford 62943 evenings only ask for Tony.

Oric Atmos 48K, two months old, perfect condition, £100 only. Under guarantee includes all leads, manual, etc. Tel: Ashford (Middx) 59326 (evenings and weekends).

Oric 1 48K mint condition, all necessary leads and Power supply. All boxed, 26 games including Hobbit, Voice Chess and books, worth £165 ono. Tel: Vernon on Bowmansgreen 0727 25986.

Swaps, Oric 1. More than 100 games (Hobbit, Waydor, Driver, H²Bert, Compucrest, Fire Flash, T-Comp, etc. . . .) Colledani Olivier, 77 Rue du Travail 67640, Fegersheim, France.

Oric 1 48K plus Hobbit, Zenon, Ultra, Centipede, Harrier Attack, Recorder and books. Worth over £200, only £99. Good condition, boxed. Tel: 01-440 3263.

Oric 1 48K. Books, lots of software, magazines and joystick interface. Excellent condition, £70 ono. Tel: Olive after 6.30pm. Tel: 01-904 3267.

Oric Atmos 48K cassette recorder, £60 worth software, books, joystick and interface, cassette leads, etc. Cost £260. Sell for £135. Tel: 0734 29157, after 4pm.

Oric 1 16K, Oric printer, cassette recorder, all leads, also Mushroom Mania and The Ultra. Sell for £110 ono. Tel: 01-368 8468.

Oric Atmos, 2 weeks old (with guarantee card), printer/plotter, cassette recorder, software books etc, £200. Tel: 01-575 5149 evenings.

Oric 1 48K, BW TV, cassette recorder, books, cassette leads and software including Xenon-1 and Battle Flight. Will accept £149 ono. Tel: Bookham 57570.

Oric Atmos 48K including cassette recorder plus £90 of software, £130 ono. Tel: 061-308 3451.

Swap Oric 48K for any interesting computer, peripherals, working or not. Oric with cover tape, software and books. Tel: Harrogate 0423 65270 (evenings).

Oric Atmos, 3 months old, plus 9 books, 13 tapes, joystick, interface, 2 folders, many mags, £140 ono. Lea Valley 741997.

Oric 1, tape recorder, £50 of books, £40 of software, 10 editions of Oric Owner, plus other goods. Offers over £60 considered. Tel: 01-699 5354.

Oric 1 48K, 15 games including Hobbit, Chess, Pasta Blaster, plus all leads, etc. Plus two books, £140. Tel: 0273 500574 (evenings).

Oric 1 48K software for sale. Tansoft's Oric Flight, new £4, Microdeal's Space Shuttle, unused, £4. Tel: Ian 0296 29376.

Wanted Pen-pal to exchange information about machine code for Oric 1 or Atmos, or any other information. Roy Rose, 231 Lymington Avenue, Wood Green, London N22 6JL.

Oric 1 48K plus cassette recorder. All leads, transformer, manual, + £50 worth of games software including Galaxicans. Good condition, £100. Tel: 01-949 0932 after 7pm.

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48K ZX Spectrum: printer, interface, microdrive joystick, amplifier £100. Software, books, Scrabble Hobbit. Micro-Prolog etc with cassette recorder £190. Tel: Sunbury-on-Thames 61329.

Spectrum 48K 6 weeks old with W H Smith data recorder quickshot joystick and £80 software £190. Tel: Kingswinford 296823 Stourbridge, West Mindlands area.

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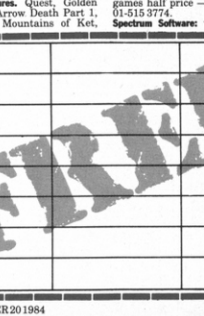

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QUIT

On the other end of the line

Every now and then a magazine editor has a bright idea. In most cases the assembled minions gratefully frame it, but sometimes this idea is fairly easy to implement, and it therefore makes it into the paper.

One hardy perennial (we didn't say they had to be original ideas) is the list of useful statistics/phone numbers. 'Think of all those readers with bent machines out there,' cries Scoop excitedly. 'If we printed a list of the phone numbers of the major home micro companies they'd be eternally grateful.'

And so it comes to pass. But what Scoop doesn't realise is that phone numbers are a bit like fresh vegetables — they go off.

Step forward *Your Computer*, proprietor of 'Hot lines,' which has apparently remained unchanged since it was unearthed along with the ten commandments.

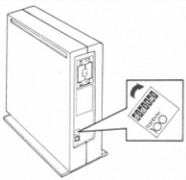
This handy little tool for the readers lists numbers for ten micro manufacturers. These include Dragon Data (gone bust, number unobtainable); Camputers (ditto); Commodore (number unobtainable, but rumoured to be still trading); Texas Instruments (line still works, but has gone a lot cooler since the company pulled out of home micros) and Atari (number perpetually engaged when we tried).

Prizes go to Acorn, Sharp and Tandy, who still answer their phones, and if it helps the hard-pressed staff of YC the new number for Sord is 01-631 0787. Sinclair's new number is 0276-685311, and sub-editors should be made aware that the dialing code is Camberley, not Cambridge.

Have you heard the one about. . .

PCN's Lidless Eye department spotted a bizarre snippet in the US magazine *Popular Computing* the other day. Apparently our American cousins are getting into a lather about possible MSX invasions, and the good people at *Popular* consulted a number of companies, Spectravideo among them.

Here we pass the story over to the Oh, What a Whopper department. A Spectravideo executive told the paper that while the machines hadn't gone down too well in the States, the company had a 15 per cent market share in every European country.



In the forefront on micro fashion

A copy of Digital Equipment's Rainbow installation guide dating from January 1983 should probably start 'First find your Rainbow,' but page 48 is the really interesting one for followers of micro fashion.

In issue 79 we hailed IBM's swivelling logo as a major step forward in micro design. You can't win them all — DEC was there first. Thanks to Mr Heinrichsons of Wokingham for pointing it out.

The real breakthrough, of course, will come when pioneering manufacturers like DEC and IBM are able to offer swivelling disk drives so that when you tilt the unit to stand upright on the floor none of the data will drop off your floppies.

SYNTAX ERROR

In last week's review of Pyjamarama we mistakenly gave the name of the publisher as Automata. It is, of course, Mikro-Gen (0344-427317).

Last week's look at the Microsound 64 Keyboard for the Commodore 64 ended cryptically 'Price to be announced.' To put your minds at rest, it's £169. The official distributor is Autographics on 0491-575469 — Tomorrow's World Today is a stockist.

In Monitor we quoted a Microsoft spokesman as saying: 'Microsoft in the UK was never intended to play a major part in the promotion of MSX.' We acknowledge that a word got lost, and that what he actually said was: 'Microsoft in the UK was never intended to play a major part in the promotion of MSX machines.'

NEXT WEEK

MSX lands

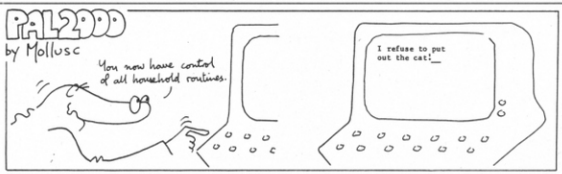
Toshiba and Goldstar have won the race to bring MSX micros to Britain. We Pro-Test both of them in a loose-coupled double header.

Gamesmanship

Maybe you didn't win an Amstrad from us at the *PCW* Show, but here's another chance to play the popular *PCN* game.

Output

There's a mastermind program for Spectrum owners, football on the Commodore 64, and the concluding part of the Amstrad sprites implementation in our DIY section.



PCN DATELINES

Event	Dates	Venue	Organisers
London Business Equipment Exhbn — LBES	October 23-26	Earl's Court, London	BED Exhibitions, 01-647 1001
Electron & BBC Micro User Show	October 25-28	Alexandra Palace, London	Database Publications, 061-456 8383
Home Tech '84	October 26-29	Exhbn Complex, Bristol	Nationwide Exhibitions, 0272-650465/15
Computer Security Conf & Exhbn	October 29-30	Conf Centre, Nottingham	Elsevier Int Bulletins, 0865-512242
Computers in Action	Oct 30-Nov 1	Anderson Centre, Glasgow	Trade Exhibitions, 0764-4204
Personal Computer Fair	Oct 30-Nov 1	Town Hall, Bournemouth	Mike Schofield Promotions, 0202-36899
Computer Conf & Exhbn — Mini/Micro West	Oct 30-Nov 2	Anaheim, USA	Electronic Conventions Inc, 8119 Airport Blvd, Los Angeles, CA 90045
Texas Instruments Owners Conv	November 3	Ritz, Manchester	TI99/4A Exchange UK, 0273-503968
Australian Computer Exhbn	November 6-9	Sydney, Australia	Riddell Exhbn Promotions Pty Ltd, 137-141 Burnley Street, Richmond 3121, Australia
COMDEX	November 14-18	Las Vagas, USA	Interface Group Inc, 300 First Ave, Needham, MA, 02194, USA
Videotex Europe Exhbn & Conf	November 20-22	Amsterdam, Holland	Online Conferences, 01-868 4466

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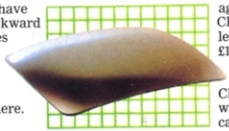

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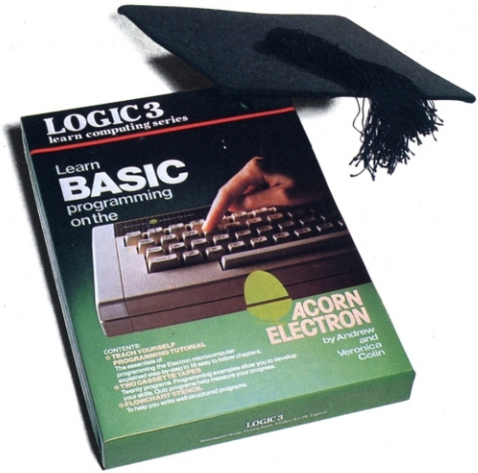

How to teach your Micro a thing or two

Thousands of home computer owners have yet to discover their microcomputer's potential to help with many of the problems and decisions that come up every day in the home or office.

Perhaps you have always promised yourself that you would teach yourself programming, but have been put off by manuals which seem to assume a lifetime spent studying computer science and mathematics. Maybe you have looked at other computer books, but have yet to find one which is free of unnecessary jargon or where the program examples bear some relevance to real life and not space invaders.

Relax, your search is over.

The 'Learn BASIC' tutorials from Logic 3 are the latest development of a teaching method pioneered by Professor Andrew Colin and perfected by testing on 3 generations of students at Strathclyde University. The 'Strathclyde Method' has been translated into 8 languages and used by over 300,000 microcomputer users.

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