

40p EVERY WEEK • No 89 • Dec 1 1984

PERSONAL

Computer

NEWS

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buyers guide
to home computers**

A full disk system for the Spectrum

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SOFT STACK

Five pages of
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ZX Spectrum

40p



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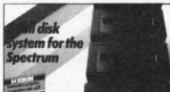
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Idioty exposed — including ours, plus a few dates for your executive desktop appointments register.

Survey slams Spectrum

The Sinclair Spectrum has taken a hammering in a micro reliability survey.

In the survey retailers said that over 25 per cent of Spectrums sold were returned to the shops. The majority of these were confirmed as faulty.

The Acorn Electron, Amstrad and BBC micro were the most reliable with a return rate of around five per cent.

The survey was carried out by Business Decisions Ltd (01-580 8061) who questioned a cross section of 100 retail outlets including branches of Boots and WH Smiths and independent computer shops.

It was conducted in October on behalf of Aspect, Acorn's advertising agency. Business Decisions' interviewers asked the retailers: 'Thinking of the brands individually, can you tell me what proportion of your sales of each brand was returned in the last six months for any reason.' The figures for each micro were as follows:

Spectrum	25.4%
Vic 20	18%
Commodore 64	13%
Amstrad	4%
Electron	5%
BBC	5%

In response to another question, retailers said that taking sales of all micros together, over three quarters of the returns were because of faulty machines.

The main causes of failures among Spectrums were faulty power supplies and inability to load software. The figures were:

Power packs	28%
Software loading	24%
Keyboard	20%

The majority of faults in the Vic 20 were due to the cassette player and in the Commodore 64, the power pack. For the Electron and BBC the main problems were with keyboards, power supplies and cable connections.

Micro makers promise full Christmas stocks

The big three micro makers have promised that there'll be no repeat of the supply crisis that hit stocks of popular micros last Christmas.



The figures compare unfavourably with the figures quoted by the manufacturers themselves. In a survey carried out by PCN in the run up to Christmas last year, the percentage of returns to the manufacturer during the warranty period was:

Spectrum	5%
Commodore	under 1%
Acorn	under 5%

It should be stressed that these figures are based on returns to the manufacturer.

Commodore said that it wouldn't necessarily quarrel with the results of the Business Decisions' survey but would prefer to see more of the survey before making a full comment.

'But the situation has changed very drastically since the move to the new production facilities at Corby,' a spokesman said.

'The last six months have been a transitional period, but quality control is the number one issue at Corby at the moment and everyone is working flat out on it. The quality control standard as of now is, we believe, second to none.'

Sinclair doubts the figures produced by Business Decisions. 'To comment properly we would need to study the report in detail. Our own return rates are very substantially lower and currently well over 40 per cent of computers received by us from retailers have no fault found,' a spokesman said.

Acorn, understandably, is delighted that its reliability figures are so good in comparison with its competitors. But it does think that the results of the survey should sound a loud warning to British micro manufacturers as the quality-conscious Japanese arrive. 'It is exactly the sort of thing that lets MSX in through the back door,' said a spokesman.

Sinclair expects to sell 400,000 computers. A spokesman said: 'We are meeting delivery dates and demand.'

Acorn too is exuding confidence that it can meet Christmas demand for BBCs and Electrons.

'Unlike last year we did not turn the production tap off over the summer period,' a spokesman said.

Commodore expects 'greater emphasis' this year on peripherals, but its Corby factory is in full production, working 16 hours shifts. 'We don't foresee any problems,' said a spokesman.

MONITOR: COMDEX REPORT

IN BRIEF

Keyboard hitches that hit a batch of Spectrum Pluses sent to WH Smith (issue 87) have now been resolved. Some users found when they tipped the micro upside down some of the keys fell off. However, a spokesman from WHS said the problem has been fixed.

Choosing a game could become easier thanks to a hybrid system developed by Racom of Reading. Racom's MX70 is intended to be installed in shops and loaded with previews of games on video tapes. A tape can hold 70 samples, each lasting about 50 seconds, and Racom claims that the average access time will be two seconds. The MX70 has a 22in colour screen, keyboard, and a graphics generator.

Playful Talent Computers has launched a pair of text adventures on Microdrive for the Sinclair QL. The games, called ZKUL and West, cost £19.95 each — if this kind of price becomes the norm the Microdrive will be dead and buried before long.

Sanyo's expanding range of business machines will grow another arm in January with the launch of the MBC775. This is a portable with an 8088, 256K RAM, and 16K of video RAM. Sanyo is continuing to plug IBM PC compatibility with the machine.

Restless experts will appreciate the latest variants of the Husky hand-held micro. Husky Computers has released the Husky SP (Special Performance) and a 352K version of the Hunter, described by the company as ideal for applications where complex software needs to be presented in a simple form.

Atari has manned the battlements to defend its Crystal Castles. As a result of legal pressure it has persuaded MRM Software to drop a 'substantially similar' game called Castle of Gems. BBC users can look forward to the official Crystal Castles in December at about £10.

Yorkshire HiTech is offering BBC bug-hunters an 8K ROM called, appropriately, Micro-Scope. It includes single-stepping, trace limits, basic breakpoints, extended error reporting, and route maps. Running concurrently with a program, the unit splits the screen to give its output alongside the program's. It costs £20.

Quicksave has signed up rights to new programs from Tony Crowther, of Potty Pigeon and Suicide Express fame. The games are Black Thunder and Griffin.

Something old, less that's new

Most cities make something — cars, ships, steel. In Las Vegas they make money and appropriately last week the gambling capital of America played host to 100,000 dealers and manufacturers in one of the biggest computer bashes in memory.

But the products on show largely failed to live up to the epic size of the event. Only Texas Instruments had a new machine, few of the big software publishers unveiled anything different, and peripherals were disappointingly familiar.

Predictably, IBM dominated the proceedings, to the dismay of many, not least Apple president John Sculley. In his keynote speech that opened the show, Sculley warned that companies relying on IBM compatibility were looking at a hard year. The introduction of the



Texas Instruments' Pro-Lite — carrying the fight to the portable makers.

AT, Topview, and other moves by Big Blue 'make it increasingly difficult for independent companies to build a long-term business proposition on IBM-compatibility alone', he said.

He also called for innovation at the user level rather than worrying about 'esoteric matters' like operating system standards. There is a far bigger opportunity to run our business as a market-driven company than it is to have a knee-jerk reaction to every new technological feature that competitors bring to the market,' he said.

Asking dealers to turn their backs on IBM was rather like asking them to bet the long shots in the casinos, but Apple had more to offer than threats and the Macintosh had a very strong presence at the show.

But first, the best of the rest. The TI machine (see last week's issue) is called the Pro-Lite and features an 80C88 processor, 256K RAM expandable to 768K, 3.5in built-in disk holding 720K, and runs MSDOS.

The display is an 80x25 LCD but an external colour monitor is supported. Options include a second disk drive, 300bps modem, an 8087 coprocessor, and a software 'drawer' that will take ROM application modules.



Image builder — Koala on the Mac allows you to alter and store video pictures.

At the same time, TI announced a licensing deal with Ashton-Tate to produce dBase III and Framework for its machines, raising the possibility of Framework in ROM for the Pro-Lite.

Epson had a couple of interesting new products on display — a miniature thermal printer and a radical alternative to laser printers. The baby is the P-80 available with a 9 or 24-element print head for thermal printing. Epson says the machine is the smallest 80-column printer on the market at around 12x3x2 inches.

It will print in multiple fonts, italic and emphasised, plus bit-image graphics. Epson expects it to sell well to users of portable computers.

Laser printers may be attracting a lot of attention but Epson has gone its own way with a page printer based on 'liquid crystal shutter with electrophotographic technology'.



Page printer — the Epson LCS.

gy' (no, we don't know what that means, either).

At \$5,000 it costs about half the price of comparable laser printers and will output seven pages a minute. It features 128K of RAM which is capable of holding a downloaded character set, and allows letter quality print and high density graphics.

So to the Macintosh, and Apple was taking great pains to kill the 'no software' stories. Most impressive was a demo of a new package from Lotus called Jazz. Jazz is an integrated package à la Symphony/Framework/Open Access offering word processor, spread-

sheet, programmable database, business graphics, mail merge and so on.

Running on the 512K Mac, Jazz is fully multi-tasking and will be available in March next year.

Among 52 other suppliers showing Mac products was Koala Technology — better known for graphics devices for the Commodore 64. Koala had an image processing system that allows you to capture images taken with a video camera, store them on the Macintosh, manipulate them using Macpaint, incorporate them into Macwrite documents, or transmit them down a modem. And for under \$400.

Another company striking out in a new direction is Infocum, renowned for adventure programs like the Zork trilogy. Infocum had its first business program on show — a programmable database called Cornerstone for the IBM PC.

Infocum has brought its extensive text-handling expertise from adventures to business and Cornerstone has attracted a rave reception from major distributors.

But more interesting is Infocum's new game. It has beaten many publishers to the punch and signed up Douglas Adams to produce the official version of The Hitch-Hiker's Guide to the Galaxy. Adams has helped convert his radio/TV/book hit for just about every machine including Commodore 64, Apple, IBM, and Atari.

Epson's P-80 — small is beautiful.



Z80 Elite rights go to Firebird

Spectrum owners can look forward to joining the Elite next spring. The auction for the Z80 rights of the Acorn mega-game (issue 82) has been won by British Telecom subsidiary, Firebird Software.

Firebird hopes to get a Spectrum version out within five months with an Amstrad version to follow. The company has not said whether it intends to produce an MSX version.

It believes that it is possible to produce an identically good game for the Spectrum and wants to interfere with the original as little as possible.

The game will come out as a Gold label game as opposed to Firebird's Silver label budget games.

The auction of the Z80 rights was carried out by Marjac Micros which represents Elite programmers Ian Bell and David Braben, and Firebird fought off a number of larger software houses who also wanted the right to publish the guaranteed chart topper.

PCN throws down the gauntlet to hackers

Calling all hackers!

If you fancy yourself as a code-cracker, we want to hear from you. Just leave a message in our Prestel mailbox — it needn't be anything fancy, just a name or an alias and some means for us to contact you.

That shouldn't be too much trouble, should it?

Record companies push re-releases

K-Tel, CBS, Tel-Star. What do these names have in common? They're all companies involved in the music business and have recently taken up software distribution. Now they've been joined by Ariolasoft, alias Ariasta.

But record companies aren't injecting any new blood into music. CBS imports Epyx software, most of which has been available over here for some time, albeit under grey import. K-Tel has had two goes at the games market — the first was a wash-out due to low quality, and although some of the more recent releases weren't bad, nothing's been heard from that quarter for a long time. And Tel-star is only involved in sales and distribution.

Ariasta isn't doing anything new either. Imports of Broderbund and Electronic Arts software have been around for some time, and Ariolasoft's catalogue is hardly impressive. Most of the games may well have been chart toppers in the US, but how long ago? There's David's Midnight Magic — a version of Pinball Construction Set, but who plays that now? Then there's Lode Runner, which is so old that Software Projects has converted it for the Spectrum. Hard Hat Mack and Murder on the Zinderneuf have been around at least six months — so what's new? If the record industry really wants to break into the software market it'll have to do a lot better than bring in elderly imported Americans.



Fifth generation is old before its time

Fifth generation computer, artificial intelligence, a knowledge processor, BRAINIAC, call it what you will. Whatever its name, I could sure use one right now. My desk is buried in clippings, I've got about a dozen pages of notes and it's all so far over my head the space shuttle is tickling its belly.

For the 1,160 (they counted on 400) computer experts gathered in Tokyo last week for the International Conference on Fifth-Generation Computer Systems, it's just tantalisingly beyond their current reach. But their arms are growing longer every day.

To appreciate just what has been accomplished in the three short years since Japan initiated its Institute for New Generation Computer Technology (ICOT), a project that was quickly emulated around the world, it helps to understand computer generations one through four.

The first generation computer used vacuum tubes for logic operation and came into being in 1947. For any who can remember those prehistoric times, it was called ENIAC. The second generation, post 1956, used transistors. The third, after 1967, used integrated circuits (IC). Fourth generation, using very large scale integrated circuits (VLSI) are currently coming into the market. Most of us are using what are generally considered 3.5th generation computers, based on large-scale integrated circuits which date from the early 70s. Many people argue that all these computers really represent a single generation since essentially they process information the same way, ie one step at a time. Experts also argue that apart from increases in speed and other minor improvements, these computers have reached their limits.

That's why the 1,000 or so experts gathered in Tokyo have set about establishing a framework for a truly new generation of computers. At its most basic level, that means a complete change of architecture, new languages, and other radical changes. Instead

of processing data one step at a time, they will be capable of parallel execution. At their penultimate, they will be capable of solving problems by inference. This is best illustrated by the caption to a cartoon in which the computer tells the operator, 'I couldn't find the data you asked for, but I did find the data you need.'

How close are we to a computer with this kind of capability? The Japanese have projected three stages over a ten-year period. Stage one, which was what the conference was all about, consisted of developing more capable hardware and software to run them. The first type, a PSI (Personal Sequential Inference) machine, is a super personal computer. How super? Its OS, called Simpose (sequential inference machine programming and operating system) and written in Prolog, consists of 90,000 lines of code, it has 80 Mb of memory in 256K RAM chips and there are plans to market it within three years. Among its other capabilities is a chemical analysis that takes 20 hours on current hardware but can be handled in something like 1.2 minutes. It can check spelling in the time it takes to hit the space bar after typing a word.

The other computer, a relational database machine called Delta, uses a new language called Mandala. It is capable of taking data in and making surmises. In one example cited, the computer rejected the sentence 'the man ate the car' as something virtually impossible, based on its understanding of the words. During the conference, the development of software capable of dealing logically with paragraphs of more than two sentences was discussed.

This is hardware and software well over my head. In any case the next step, some four years away, is to integrate these two machines and improve the software, and use that computer to take the further steps to the parallel inference machine, or Artificial Intelligence.

And that machine, I hope, will sit me down in a quiet corner and carefully and patiently explain to me exactly what it is that it does, because strange as it may seem the people developing these new computers (at least, in Japan), haven't really given much thought to applications. When asked why they are building them, the response is somewhat similar to Edmund Hillary's — somewhat, because in effect what they say is: 'Because as of now, such computers aren't there.'

Serge Powell



BBC MOUSE — At last, BBC owners can have Wimps with the new ANX mouse. This three-button beastie comes with software on ROM that lets you use it instead of the cursor keys for editing. Plugging into the user port, the mouse gives access to a full window and icon system controlled by the ROM software. In line with Apple's Lisa/Mac and Digital Research's GEM, this rodent comes with an art package which looks very much like Macpaint and with a screen dump routine for the ever popular Epson and Epson-compatible printers.

ACT/Victor deal on the rocks?

ACT could find itself on a collision course with its old supplier, Victor, as it tries a second time to clean up in the US with the Apricot.

ACT's first agreement in the US, with national distributor Micro D, was terminated by mutual agreement because of disappointing sales figures. ACT has now set up Apricot Inc and tied up an exclusive agreement with 17 regional distributors which until September were responsible for selling Apple computers to dealers.

The new ACT attack on the American market coincides with the resurrection of Victor Technologies, supplier of ACT's best-selling Sirius. Victor is coming out of bankruptcy following its sale to the Swedish computer company, Datatronic.

As part of its revival plans, Victor has said that it will be setting up a UK subsidiary to take over distribution of its products, including a new portable model, the Vickie.

Exclusive UK rights to Victor products are held by ACT, but an announcement is expected this week that the agreement will expire at the end of December.

'We met with Victor last week,' said Peter Oldershaw, ACT vice-president, 'and it has agreed that we can continue to sell the Sirius in the UK.'

According to Mr Oldershaw, ACT will service its existing customer base and meet any demand from them for additional machines.

Any agreement between ACT and Victor on future Sirius sales is dependent on the American courts giving approval for Victor's re-structuring plans.

● Another American company coming off the sick list is Osborne. It is expected to come out of Chapter 11 bankruptcy within the next few weeks and is basing its future plans on the Vixen and encore machines.

Atari to hit market with six micros

Atari is getting ready to hit the computer market hard, with six new machines that could make their first appearance next month.

The range will consist of 16- and 32-bit-bitsers said to be in direct competition with Commodore's new baby when it's revealed. Atari's 16-bit computer will be a home-entertainment machine, while the 32-bit processor machine will be pitched at the business market.



JOYEUX QL — In time for your Christmas shopping, a batch of new add-ons are available to hook up to the QL. Play games or run business packages in technicolour with a 14in monitor from Prism. The QL14 costs £199.99, £100 less than the Sinclair-recommended monitor (issue 82), and has a full 85 column width. Or give your keyboard a rest and plug in a joystick adaptor from Sigma Research. At £5.90 the adaptor enables you to use any standard joystick with a nine way D-type connector. Cambridge Systems Technology (0223-323302) has produced a range of black plastic boxes for designers to drop their QL peripherals into. The boxes can be plugged — via a suitable connector — into the expansion socket of the QL. More QL add-ons could follow.

According to Jon Dean, Atari's UK computer product manager, the home computer will be available by summer 1985 and the business machine by autumn. But we hope to have a sneak preview of them next month.

The 32-bit computer (issue 81) will have a Motorola 68000 chip, 256K of RAM, graphics and sound.

Atari's determination to be taken seriously is also leading it down other paths. One of its aims is to get its foot into the classroom with its Atari Logo computer systems. Dean said: 'This is a low cost system that will have schools up and running right away.'

The Atari Logo contains all of the standard LCSI primitives, and has the ability for full list-processing.

For £155 schools can buy a 16K Atari 600XL, cassette recorder, Atari Logo cartridge, two books, power adaptors and leads; and for £344 a 64K 800XL, a disk drive, Atari Logo cartridge, disk operating system software, two books, leads and adaptors.

● Sinclair and Acorn users can now buy a selection of popular Atari games. For the Sinclair Spectrum/Spectrum Plus, titles include Pole Position, Galaxian and Ms Pac-man at £7.99 each. And for the BBC and Electron there is Robotron:2084 at £9.99.

Oric Club ups its output to owners

Oric is throwing a lifeline to users who've been caught up in the disintegrating network of unofficial user groups.

Apart from local groups, we've counted three national owners' clubs, in various states of disarray. The best prospect for Oric owners looking for safety in numbers is the Oric Club, run under Oric's own wing from Tansoff's premises.

Opened in June (issue 65), it estimates its membership at about 3,000. Some of these have moved over from other groupings, for example the Oric Owners Users Group (OOU). A spokesman for the Oric Club said: 'We sent out letters to OOU members setting out our stall and several of them have joined.'

The Club made a slow start — there have been only two newsletters where the original plan was for a monthly publication — but its output has now been combined with the bi-monthly Oric owners magazine and it intends to raise its profile.

'The others have advertised, and we haven't so far,' said the spokesman.

But users who have ordered goods at the discount rates typically offered by the unofficial user groups and have

waited in vain for deliveries won't find any consolation in this. The Oric Club has no intention of picking up anybody else's tabs, just their member's.

Sci-fi adventurers — prepare yourselves

Hot news from America for adventure fans. A range of new programs promises great things for the New Year — from the likes of Arthur C Clarke, Ray Bradbury, Michael Crichton and other science fiction giants.

A new company called Trilium Software has released a range of games based on best-selling science fiction titles, combining the skills of its in-house programmers with the literary ability of the original authors.

Among the titles on offer are Clarke's *Rendezvous with Rama* and Bradbury's *Farenheit 451*. Crichton, author of *The Andromeda Strain*, has contributed a new title called *Amazon*.

All of the adventures are combinations of graphics and text and stick closely to the storylines of the originals. Trilium has dubbed the series 'interactive fiction' since the emphasis is not so much on puzzle solving as in resolving the overall plot.

They should be available in Britain after Christmas and will run on Commodore 64 and Apple machines. Atari and IBM versions may follow.

Prism launches rival to Commodore modem

Prism, well-known for its view-data equipment, has now produced a modem for the Commodore 64. But there's just one snag — you can't access the CompuNet service.

For £129.95, the Prism Modem 1000 comes with software on a plug-in cartridge, which fits into the 64's expansion port, and the necessary cables.

Compared to Commodore's modem which costs £99.95, Prism's is an expensive unit. The company says that its modem is the official Micronet downloader for users. Robin Wilkinson, from Prism, said: 'The solution which Prism supplies for the Commodore 64 represents a very flexible communication software package — for the hobbyist and first time user.'

Telesoftware supplied by Micronet 800 has a priority protection mechanism and telesoftware can only be downloaded by communications telesoftware. It cannot be downloaded yet by owners of the Commodore Modem.

HOMEFRONT



Micro boom is trying hard to happen

Whatever happened to the micro boom that the computer industry has been expecting? You may vaguely remember hearing that it was all supposed to happen this Christmas. Computer games were supposed to sell in their millions. A flood of new machines was expected. Well, it hasn't happened.

Shops selling computer software are empty. Thousands of computer owners and potential buyers waiting to snatch up every new release are simply finding there's nothing there.

As for new machines—if you want an IBM compatible you're in luck; if not, tough, there isn't very much around.

So MSX has made its appearance. The only problem is, that as the machines are almost identical, (and we saw the first, one back in March) they aren't exactly new. Their technology is even older.

January saw the launch of the Sinclair QL, together with criticisms in the computer press, but only now, 12 months later, is the QL making an appearance in the high street. No new machine has appeared out of the Sinclair stable to attack the Christmas market; the Spectrum Plus can hardly be called a new machine since it's only a Spectrum with an add-on keyboard, but it will ensure that Sir Clive still holds on to a large section of the market.

Commodore launched the Plus/4 and the C16 earlier in the year. Only the C16 seems to have arrived on the high street

so far. Heavy TV advertising should ensure that this is a good seller though there is still no sign of the 128K Commodore 64.

Oric seems to be very rapidly dissociating itself from the UK. Rumours that a new machine called the Stratos is going to emerge probably refer to a machine for the French market.

Acorn is still relying on the BBC and Electron to maintain its share of the British market. No new machine is expected, apart from the Acorn Business computers.

So why has there been this great change in the computer market? The manufacturers have gone over to the view that business machines rule OK.

The Big Three, Sinclair, Commodore and Acorn, have all launched machines that are aimed at a more professional market than the standard zap'em up machines that we have come to expect.

There is a strong feeling that there is no more room on the market for new machines. Enough companies have dropped out of the computer race this year to prove that point. Dragon, probably one of the major UK micro companies, has gone. The CGL M5 (Sord) failed to make an impact, even though it is an excellent machine. Earlier in the year Aquarius launched the Aquarius 2 which had a real keyboard, but again it failed to make any headway in the shops.

Does this mean that the end of the home computer is nigh, or are we going to become a nation of 64, Spectrum, BBC and possibly MSX owners? We can only hope not. Every new home computer has had at least one feature different to other machines around.

The advent of sprites and sound really made the market take off. Surely the manufacturers haven't run out of ideas. There must be some new machine around the corner that is going to grab the computer users' attention and launch another micro boom.

Stuart Cooke



Spectrum Plus — a minus for home users.

CHARTS

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

GAMES

TW	LW	TITLE	PUBLISHER	MACHINE	PRICE
1	6	Knight Lore	Ultimate	SP	£9.95
2	1	Underworld	Ultimate	SP	£9.95
3	5	Elite	Acornsoft	BBC, EL	£15.00
4	—	Ghostbusters	Activision	SP, C64	£10.00
5	2	Eureka	Domark	SP, C64	£14.95
6	10	Pyjarama	Mikro-Gen	SP, C64, AM	£6.95
7	3	Daley's Decathlon	Ocean	SP, C64	£6.90
8	11	Beach-Head	US Gold	SP, C64, AT	£9.95
9	12	Danger Mouse	Creative Sparks	SP, C64	£7.90
10	8	Bruce Lee	US Gold	C64, AT	£9.95
11	4	Raid Over Moscow	US Gold	C64, AT	£9.95
12	7	Tir Na Nog	Gargoyle	SP	£9.99
13	—	Suicide Express	Gremlin	C64	£7.95
14	9	Combat Lynx	Durell	SP, C64	£7.95
15	—	Skoodaze	Microsphere	SP	£6.95
16	17	Chiller	Mastertronic	C64	£1.99
17	14	Jet Set Willy	Soft Projects	SP, C64	£5.95
18	—	Back Packers	Fantasy	SP	£5.95
19	—	Int'l Soccer	Commodore	C64	£9.99
20	—	Eddie Kidd Jump	Durell	SP, BBC	£6.95

SPECTRUM			COMMODORE		
TW	TITLE	PRICE	TW	TITLE	PRICE
1	Knight Lore	£9.95	1	Daley's Decathlon	£7.90
2	Underworld	£9.95	2	Eureka	£15.00
3	Pyjarama	£6.95	3	Ghostbusters	£10.99
4	Ghostbusters	£9.99	4	Raid Over Moscow	£9.95
5	Beach-Head	£9.95	5	Bruce Lee	£9.95
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MICROS

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9	Spectrum Plus	£175	9	HP 85	£1,917
10	Sanyo MCP 100	£300	10	Dec Rainbow	£2,359

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the week up to November 15. 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.



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.

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- BBC Microcomputer
- Dragon

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RANDOM ACCESS



Sinclair design team needs to think again



It's some time since I read a review as succinct, informative and apt as John Lettice's of the Spectrum Plus. I was considering the possibility of purchasing one but Mr Lettice's review persuaded me against it. I can only concur with his view that it is high time Sinclair had a typist on its design team. The same goes for other manufacturers as diabolical keyboard layout causes far more frustration both during programming and word processing than is necessary.

For all Sinclair's success, and the company is to be applauded for its innovative thinking in the past, it seems to have lost its way. Don't get me wrong. I am not trying to 'knock' the Spectrum (Minus). This was a truly great step forward and a wonderful little machine at its price. There was probably only a minuscule quantum displacement left to make. However, to charge £50 extra for a tarted up Spectrum with so few new features seems a step backwards of a veritable angstrom or two.

In a world of disks, Microdrives must be a cul-de-sac, and to now produce a Spectrum Plus with only a half-hearted effort at a keyboard smacks of a hurried attempt to compete with the Commodore and MSX machines. Surely, by now, the Sinclair design team should be able to do better than think of jumping on ephemeral bandwagons.

What we need is innovation, common sense and a clear vision of what the future of home computing is about, because this is where Sinclair's future lies.

As far as Sinclair is concerned there can be no competition for the Spectrum (Minus). Until some other manufacturer can supply the same memory, colour, and graphics capability at sub-£130 it is peerless, whatever the inadequacies of the membrane keyboard. Indeed, it seems that no-one is in the position yet to offer what the home computing enthusiast so patently wants.

Share your words of praise or send us a rocket about PCN. We want to hear your views and feelings on the articles we print — and those you feel we ought to. Write to *Random Access, Personal Computer News, Evelyn House, 62 Oxford Street, London W1A 2HG*. You could win £15 for the best letter of the week.

We have the technology, so where are the machines with the large program-usable on-board memory, a host of colours, sprites, high-resolution graphics which leave sufficient memory to write a program to use, and an elegant Basic to control the lot? This, together with a Centronics printer interface, and good disk system, is all the home user needs.

K Craddock
Walsall

Flexible solution for Dragon owners

In common with thousands of others, I am trying to keep my Dragon alive. Despite the fact that a lot of software houses choose to ignore it, there must be close on a quarter of a million of us Dragon owners.

One good answer seems to be for us to use Flex. But what programs are available? And why do you not review them? It seems to me that it is taken for granted that all Dragon owners know this, but I for one, have never seen a comprehensive list of Flex programs or a written review of any of them.

D W Abel
London SE6

We don't know what programs are available for Flex, if any. That's why we haven't reviewed them — Ed.

Stop supporting foreign machines

I am appalled at software manufacturers who continue to produce software for old, outdated and what's more foreign computers.

I am the proud owner of an Oric 1 who feels frustrated when I see yet another title released for the Vic 20 or Commodore 64. I was particularly annoyed to see British Telecom starting to support the latter two. Software manufacturers with any sense would realise the Oric/Atmos is the biggest selling computer on the Continent and the publishers stand to make a lot.

The sound and graphics capabilities of the Oric are easily comparable to the CBM64 (consider *Zorgons Revenge* and *Xenon 1*). Many computers boast of a palette of 256 colours but the Oric/Atmos (via mixing) is the only one, along with the Atari, that I know of that displays all these colours on the screen at once.

There have been several programs in Microwaves to prove that. So why do software manufacturers prefer a foreign computer?
Frazer Norman
Dartford, Kent

Isn't the Oric a foreign computer on the Continent? — Ed.

Why do you continue to ignore the Oric?

Ever since PCN had a change in format, it seems to have almost completely ignored both Oric computers. There have been absolutely no software reviews and only one program.

You seem to disregard the less popular computer such as Oric, Genies and Dragons, and back the popular computers even though they already have enough support. It is magazines like yours which stamp less popular micros into the ground!
P Clasper
Belmont, Durham

PS — I am now ending my regular order of PCN, in favour of a more balanced magazine!
PPS — You never print letters of this kind, do you?

In the last few weeks we've carried programs and reviews for Atari, Oric, Dragon, Vic 20, Memotech, QL and Amstrad, as well as a host of reviews of peripherals that will work with any machine.

PS — which is the more balanced magazine you have in mind?
PPS — Yes, we do — Ed.

And what about more for the Memotech?

Regarding M Hisbet's letter (issue 86) on the Oric, I feel the same is true for the MTX, but in some cases, a lot worse. No games listings have appeared in any computer magazines, and I have seen about three adverts for software for the MTX, and that's mentioned only as MTX.

Isn't it about time that support was given — the only mention of Memotech has been in your magazine. This computer does not deserve this, and it needs more support from software houses and magazines alike.

To sum up, the MTX needs support, or like the Oric, it will be a lame duck, and its owners will perish with no support.

Robert Peet
Hooveringham, Notts

We do what we can, and we'd be delighted to publicise the efforts of others. Let us know — Ed.



Disks? ... I think you want the record department, sir.

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ROUTINE ENQUIRIES



Choosing a printer for the Memotech

QI have been considering upgrading my 48K Spectrum for some time now, and have decided on a Memotech 512. I am also thinking of buying a printer for text and graphics output, and have narrowed my choice down to three, the Epson RX80FT, Memotech DMX80 and Seikosha.

I have two questions — which would be the best one to work with the MTX 512, and what extra cables/boards would I need to make the printer work?

*J Fuller
Harold Hill, Essex*

AYou don't specify which Seikosha you're interested in — if it's the GP100A, you're talking about a printer that's in a markedly lower class than the other two, as its cheapness shows in the output.

The Epson and the Memotech seem to be pretty much of a muckness, with broadly similar features.

Memotech describes the DMX80 as having exceptionally good print quality, but we'd suggest you look at sample output from both machines when you're deciding. The DMX80 will of course match your Memotech, but apart from this both machines are good enough for you to decide on the basis of the best price you can get.

You shouldn't need any extra hardware apart from a printer cable, as the Memotech has a Centronics interface built-in. You may need some extra software for graphics purposes, but this will depend on what output you want from your printer.

Spectrum Plus vs Spectrum Minus

QI have enough money to get either a ZX Spectrum Plus or a 48K Spectrum with a £50 keyboard — what should I choose?

If you recommend that I get an ordinary Spectrum which keyboard should I get. The idea of sticking on the stickers for the DK Tronics keyboard puts me off. Should I consider the Lo Profile, which seems good quality, or should I spend a little more on a Saga Emperor, which looks better? Does the Emperor have a year's guarantee like the Lo Profile?

Do you also get the same guaran-

tee with the Spectrum as the Spectrum Plus, and is there also free software with it?

*Phillip Dickinson,
Bournemouth, Dorset*

AThe course you take really depends on what you want to do with your Spectrum, and why you want a proper keyboard. The Spectrum Plus does have a better keyboard, but quite a few people don't feel it's up to heavy word-processing use, and if you're a touch typist you might be better off with a Spectrum Minus plus keyboard, if you can work that one out!

If, on the other hand, you're more interested in programming, and perhaps writing the odd letter on your machine, the Plus would be an excellent solution. It has added editing keys, making programming considerably easier. And, buying the Plus is a lot less risky than adding a keyboard later.

If you go for an add-on keyboard, don't place too much emphasis on looks, as it's the keys themselves that matter. The DK Tronics is good value, although you're right to think that the stick-on legends are a disadvantage (they glint in the sunlight).

The Lo Profile isn't bad, but the design has been badly executed. The pitch of the keyboard is wrong, and the beast hasn't got much in the way of extra keys wired in.

The Emperor is better, although the feel of the keys isn't all it might be, and you could also take a look at the Transform, which costs £70 but is just about the most responsive keyboard on the market, and the Fuller FDS. Nordic Keyboards, Fuller's new owner, seems to have cured its crashing problems.

If you possibly can, try a few keyboards before you buy, as it's how they feel that counts.

The guarantee position for both Spectrums is the same, but you probably won't get free software with the Minus. There was a special offer over the summer, but it's unlikely you'll find a dealer with any of the packs left for you to pick up a bargain buy.

As far as guarantees for keyboards are concerned, you'll find they vary, but if a keyboard fails to act as a keyboard within a reasonable time (and a year is

quite reasonable) you're protected under consumer legislation.

Earning money from your own programs

QI have been writing Basic programs for about four years and think I can write a program to do anything, but how do I earn some money from it? I own an Oric 1 and would like to know the best business programs to write on this computer. What is the best way to sell these programs?

*John Mayne,
Reigate, Surrey*

AEasy: the best programs to write are the ones that people want to buy. Look at what's selling on other machines like the Spectrum, or find programs on the Oric and write a much better version that you think will sell.

Next, consider the following: being a good programmer doesn't qualify you to write a good program. You'll also need to know a lot about the subject you want to cover. For example, you won't be able to write a good stock control program unless you know the problems associated with traditional methods of stock control.

Second, Basic just isn't good enough for most business applications — it's far too slow. While speed may not matter much in a text program for writing short letters, it becomes critical in serious applications.

If you still want to go ahead, don't think about marketing the product yourself unless you're ready to go into business properly. A better bet would be to approach local software dealers and ask them to evaluate the program.

If they reject it, accept that and either improve it, or give up. If the program is good, they may want to help either by selling it, or putting you in touch with a software publisher.

Alternatively, send it to a software house specialising in business applications for home computers.

Tracking down the Enterprise

QI read a magazine article about the Enterprise computer which said it would be in production in November. However, I am unable to

obtain any information about it. Can you put me in touch with a dealer? If not, can you tell me when I can expect the Enterprise to go on sale?

*M Ladh,
Bolton, Lancs*

AThe Enterprise was first announced in September last year and delivery was promised for April this year. But ... at this year's PCW Show in September this year, Enterprise Computers had some models on display which were not fully operational. Apparently there were problems with the video processor.

At the show, Enterprise revised its delivery dates to January 1985. Whether it can meet the latest schedule remains to be seen.

A further point: software for the Enterprise was conspicuous by its absence at the PCW Show, and it's doubtful if any software companies are working on it yet as they'll be tied up with Christmas production for machines that are available.

Amstrad error causes confusion

QWhy is it that after running some of the Amstrad programs printed in PCN, I get an error message in a SYMBOL AFTER COMMAND? Is it something to do with the machine code?

*Paul Stevens,
Atrincham, Cheshire*

AWhen the Amstrad is returned on it issues a SYMBOL AFTER 240', giving you 16 characters 'free' for redefinition. Many programs use SYMBOL AFTER 32 in order to redefine the normal alphabet. This moves HIMEM down to make room for character shape definitions with SYMBOL.

However, the MEMORY command also moves HIMEM down and programs which use machine code routines have to lower HIMEM to make room for them. But if you try to reserve space for extra characters after moving HIMEM down, the Amstrad refuses — it's already fenced off some RAM, and can't access it.

If you want to use SYMBOL AFTER in programs which move HIMEM about, make sure that you use it before MEMORY. The simplest way is to issue the relevant commands at the start of the program: SYMBOL AFTER 1; MEMORY HIMEM-numberofbytes.

MICROWAVES



Have you any good answers for Amstrad owners or brainwaves for the Beeb? Share them with fellow computer users by sending them to us. Not only will you get £10 for every tip published, but you could find a bonus of £50 comes your way if you are chosen as the Microwave of the month. Send them to *Microwaves, PCN, Evelyn House, 62 Oxford Street, London W1A 2HG.*

Avoid unwanted messages on the BBC

When saving screens on the BBC, it is most annoying to know that you have saved the data blocks and the 'Record then Return' message in addition to your program.

My solution is to use the following lines at the end of the

graphics program.

```
1000 VDU 5
1010 MOVE 0, 10000
1020 *SAVE SCREEN 3000 8000
to save, and to load use:
10 VDU 5
20 CLS
30 MOVE 0, 10000
40 *LOAD SCREEN 3000
```

Iain Simpson
Mossbank, Shetland.

Getting more colours in the Beeb's Mode 2

I have discovered a very simple way of making the BBC produce a whole new range of colours in Mode 2.

Graphics colour is normally set to one of 16 variations with a GCOL statement. If, however, a number (0-255) is stored at address &359, the subsequent

plotting of triangles etc will be in one of these 256 colour combinations.

Of course the contents of this location can be changed very frequently, enabling many of these shades to be displayed simultaneously.

Changing the contents of &358 is worth trying before listing or printing in Modes 0-6.
H M Hoffman
London E9 6EJ

```
3 REM MORE COLOURS IN MODE 2
4 X%=0 : REPEAT
5 MODE 2: X%=X%+1 : ?&35A=X% : CLG
6 ?857=RND(255)
7 A=900
10 MOVE0,0
20 DRAWA,A
30 PLOT85,A,0
40 ?857=RND(255)
50 MOVE0,0
60 DRAW0,A
70 PLOT85,A,A
80 FOR X=1 TO 3000: NEXT X
90 UNTILFALSE
```

Another method of saving Amstrad arrays

The following applications note is the standard answer given by Amsoft to the question asked in Routine Enquiries (issue 87) concerning saving arrays on the Amstrad.

The difference being in line 90 WRITE 9 and NOT PRINT 9 as in the reply. WRITE takes up less space on tape and will allow the use of commas in \$ variables. Also when using data files the process can be speeded up by locking the cassette buffer as in lines 40-70.

You should suppress the Basic garbage collection to speed up the operation of your program. The following program shows you how to do this

and then goes on, to demonstrate saving data and retrieving it from tape.

Line notes
10-30 set up a number of variables.
40-70 is a routine documented in appendix 9.2 of the Basic Reference Manual. It allocates the cassette buffer.
80 opens a file, for output, called 'example-one'.
90 sends a,d%,names to the cassette.
100-120 sends each element of orders to the cassette, cassette.
130 Closes the output file.
140 reopen, for input the

file called 'example-one', reads the data from the cassette into these variables b,c%,surnames.
160-180 reads the next lot of data from the cassette into the

elements of orders. closes this input file.
200 prints b,c% and surnames to prove they have received the data.

Gill Stevenson
Amsoft

```
10 DIM orders$(10)
20 a=22.5:d%=3:name$="Wilkinson"
30 order$(0)="Telegraph":order$(1)="Mirror"
cr":order$(2)="Times":order$(3)="Mail"
40 OPENOUT"dummy"
50 hm=HMEM
60 MEMORY HMEM-1
70 CLOSEOUT
80 OPENOUT"example_one"
90 WRITE #9,a,d%,name$
100 FOR n=0 TO d%
110 WRITE #9,order$(n)
120 NEXT n
130 CLOSEOUT
140 OPENIN"example_one"
150 INPUT #9,b,c%,surname$
160 FOR n=0 TO c%
170 INPUT #9,order$(n)
180 NEXT n
190 CLOSEIN
200 PRINT b,c%,surname$
```

Useful tips for Memotech owners

Here are a few useful tips for Memotech owners:

- When reading or writing to the VDP control ports to control the screen, you should first disable cursor flash/sprite movement.
- This is because the ROM sends its own data to the VDP ports when it updates the cursor or any sprites being animated from Basic, and this data can disturb your own VDP read or writes. So, before addressing the VDP directly, POKE 64862,7 and POKE 64862,15 when you have finished writing.
- If you miscalculate addresses or data when using the VDP it is easy to corrupt the character set. To get your character set back press — ESC,B,O.
- Most of the Memotech's operating system is vectored via the system variables so it is possible to insert your own routines into the Basic interpreter, the Noddy interpreter or

the Panel, to give those examples.

The system jumps to USEROR (FDS4) whenever the Basic interpreter encounters an error, which contains the machine code instructions — JP 18AF.

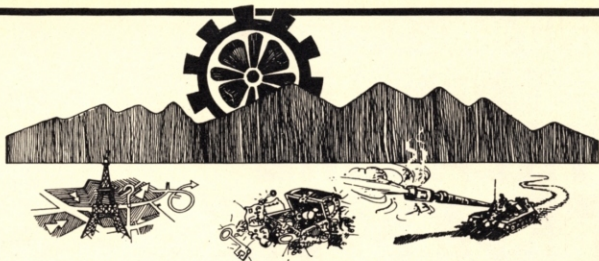
Altering this to JP 8012 would jump to a user supplies routine at 8012. The cause of the error can be investigated by examining the keyboard buffer (FB4B) or by examining the area pointed to by ERRPOS (FDS4).

In the same way, every time RET is pressed while in Noddy or the Panel, the system jumps to FXPAND(F4BE) and USERNOD (FAA1) respectively.

Normally these locations contain the instructions — RET NOP NOP — but these can be directed to a user supplied routine if required using a jump instruction.

This feature of the Memotech allows you to create new instructions or commands to be used as standard commands alongside existing ones.

Nic Joynson
Belvedere, Kent



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TRIANGLE TREASURE TROVE

Create a treasure chest of triangular patterns with this program from Brian Wood, based on the well-known mathematical theorem of Pascal's triangle.

Pascal's triangle is a treasure trove of mathematical gems. Centuries old, the triangle is easy to understand and its properties can be illustrated simply on your BBC using this program.



A single Pascal's triangle, made with a divisor of two.

Pascal's triangle starts with the number one at its apex. Successive rows beneath this are obtained by adding pairs of the numbers from the row immediately above. As there is nothing on either side of the end of each row of the triangle, this is represented by a zero for the moment.

Hence, the first row is 010. The second is 0110, where the two ones are obtained by adding 0+1 and 1+0 in the row above. The third row will be 0+1, +1+1 and 1+0, giving 01210.

The zero at either end of each row will be left out of the triangle when it is displayed, as below.



Pascal's triangle.

First of all, the program gives a menu showing the options available. Option one gives instructions on how to pass and continue the program while it is

displaying a pattern and how to return to the menu at the end of a display.

Option two displays a single Pascal's triangle, while three and four show respectively two and four triangles used as a pattern in a rectangle, showing interesting graphical effects.

If options two, three or four are selected, the program will come back and ask whether a number or binary pattern is required. The number pattern shows each of the numbers calculated in a Pascal's triangle after casting out tens. For example, option two with the number pattern selected will start with the first rows of Figure 2 and continue for another 31 rows.

If the binary pattern is selected then the program will ask for the divisor to be selected. Any number from two to nine can be selected, with two and five producing some of the best patterns.

After this selection has been made, the program will ask whether a colour pattern is desired. If not, type in N, and a black and white display will be shown. In this display, numbers that cannot be divided evenly by the divisor are shown as a star and those that can as a dot.



A single triangle, with a divisor of five.

But the difficulty in carrying out calculations in even a small triangle on a micro is that the size of the numbers involved becomes very large. The way I have shown the triangle in this program is by casting out tens whenever the result of a calculation becomes larger than that number.

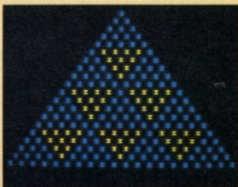
In order to show the various fascinating graphical patterns that can be produced, a divisor is entered into the micro and divided into each number in turn. Numbers wholly divisible by the divisor are represented by stars and those not, by dots.

Alternatively, the binary pattern can be represented by two different coloured stars according to whether the numbers were wholly divisible or not.

Running the program

The program combines several variations on Pascal's triangle into one menu driven package.

The colour version, chosen by typing Y, features a palette of seven colours. Each is numbered and you make your selection by typing into the keyboard. The first colour selected will represent numbers that cannot be exactly divisible by the selected divisor and the second, those that can. If the second choice is made the same as the first, the program ignores it and waits for a different one to be entered.



Two Pascal's triangles, with a divisor of two.

Mode 7 the teletext mode, is used to enable the whole program to be easily understood in Basic and for the pattern to be readily printed out on any printer. Mode 7 also enables a large array area to be used in the program combined with colour and a good graphical display.

Useful techniques

The program is menu driven by placing the procedure to display the menu, PROCMENU, together with its procedures that branch off to other parts of the program inside the REPEAT . . . UNTIL loop of lines 140 and 250. Only menu choice five provides an exit to end the program. Any menu choice between two and four causes the program to branch off to the procedure, PROCtriangles.

All the patterns are built inside a two-dimensional array, which is the matrix, M%. The size of the matrix is determined by the procedure for the selected pattern *ie* PROCcontriangle, PROCtwoTriangles or PROCfourTriangles. Before the pattern is built, each of these procedures calls PROCinitialise which incorporates the procedure PROCcleararea and clears to all zeros the area where the pattern will be constructed in the matrix.

Building a triangle

The building of the single triangle starts with one at the apex placed halfway along the first row of the matrix $M\%$ in PROCNTRiangle at line:

```
630 M%(40,1)=1
```



Two triangles again only using blue and yellow.

All the numbers on the rows beneath are the sum of the two numbers above them. In order to show the number pattern clearly in the triangle no number is placed directly below another number. Hence, on one row the numbers will all be in odd columns and in the next row in even columns, and so on. The rule adopted in this program is that valid cells occur in even columns on odd rows, and in odd columns on even rows. The lines that carry out this function are:

```
670 IF R% MOD 2=0 AND C% MOD 2=1
PROCNUM
```

```
680 IF R% MOD 2=1 AND C% MOD 2=0
PROCNUM
```

The row numbers are identified by $R\%$ and the column numbers by $C\%$. Note that the command MOD gives the remainder after division so that even rows will return remainder 0 after division by two and odd rows by one. Therefore, in line 670, $R\% \text{ MOD } 2=0$ FINDS THE EVEN ROWS AND $C\% \text{ MOD } 2=1$ finds the odd columns. Odd rows and even columns are found in a similar way in line 680.

In order to make the program look at each column in turn, lines 670 and 680 are placed inside the FOR $C\% \dots \text{NEXT } C\%$ loop of lines 660 and 710. This loop is placed inside another one for the rows, FOR $R\% \dots \text{NEXT } R\%$ of lines 650 and 720, so that all the columns are inspected on every row.

When a valid position is found, the procedure PROCNUM is called. This sums the figures in the columns immediately to its left and right of the row above the current one. The columns immediately to the left are $C\%-1$ and those immediately to the right $C\%+1$. The row above the current one is $R\%-1$. Hence the required sum can be shown in line:

```
910 M%(C%,R%)=M%(C%-1,R%-1)
+M%(C%+1,R%-1)
```

In order that no number exceeds ten in the triangle, the procedure PROCSTOUT is called. Here line 1820 subtracts ten if the result of the sum exceeds ten.

```
1820 IF M%(C%,R%)>10 M%(C%,R%)
=M%(C%,R%)-10
```

When the array $M\%$ was cleared in

PROCcleararea, it was filled with zeros. Those cells in the array not used by the program will want to be printed out as spaces. Hence, later in PROCshowtriangle the zero will be used to display a space as in line:

```
8040 IF M%(C%,R%)=0 PRINT " "; ELSE
PROCalphnumeric
```

However, when casting out tens a number subtracted from ten may also equal zero, but here it will be needed to be shown as zero. Hence the value ten is retained so that later it can be used to print out a zero. This is done later in PROCnumbers, in line:

```
8310 IF M%(C%,R%)=10 PRINT 0; ELSE
PRINT M%(C%,R%);
```

In the same sort of way that one FOR $\dots \text{NEXT}$ loop was nested inside another to build the triangle in array $M\%$, another such nested loop is used to display it. Here in PROCshowtriangle each cell of the array is displayed by looking at each column in a FOR $C\%=F\%$ TO $L\%$ $\dots \text{NEXT } C\%$ loop of lines 8030 and 8060 which is nested inside the FOR $R\%=1$ TO $B\%$ $\dots \text{NEXT } R\%$ OF LINES 8020 AND 8090. THE PARAMETERS $F\%$, $L\%$ AND $B\%$ ARE SET UP BY THE CALLING PROCEDURE.

PROCshowtriangle is used to display all triangles except the single Pascal's triangle in colour, which has its own procedure PROCshowsinglecoltriangle.

Building a rectangle

By rotating Pascal's triangles through 45 degrees it can be used to form a corner section.

Another triangle can also be started in the opposite corner of the rectangle. The two triangles can be built up until they meet. The procedure to build these triangles is initiated in the program PROCtwoTriangles.

The two-triangle pattern is carried out by setting the top left corner and its opposite, right bottom corner to a one which will be the apex of each triangle. Then the pattern in the triangle is built up from each apex to meet in the middle. For maximum graphical effect no spaces are left between numbers.

Both halves of the triangle are built up in a similar fashion. Take the top left half first: the apex of this triangle will be at $M\%(1,1)$. The next two values, below it will lie on the adjacent sides of the



Four triangles, with a divisor of two.

rectangle. Each value will be calculated by adding the value in the previous column on the same row to the value in the same column on the row above. This is given in the program in procedure PROCtscale (top left side calculation) line:

```
2310 M%(C%,R%)=M%(C%-1,R%)
+M%(C%,R%-1)
```

By starting on the top row and calculating from the first column to the last one, all the values will be known as each one is calculated in turn. The program performs the calculation in this way by putting line 2310 in the FOR $C\% \dots \text{NEXT } C\%$ loop of lines 2230 and 2250.

In order to carry out this loop on every row, it is put inside the FOR $R\% \dots \text{NEXT } R\%$ loop of lines 2220 and 2270.

However, as the triangle is built up in the rectangle, one less column is used on each successive row until the last one is reached. Reducing the column width in this way is performed in the program by using a variable $V\%$. This variable is initially set up on line:

```
2210 V%=L%
```

for the total number of columns $L\%$ is then decremented at the end of each one in line:

```
2260 V%=V%-1
```

until it reaches the first column on the last row.

Just as two Pascal's triangles can be incorporated into a rectangle, so can four. This is carried out in the program

Flags and variables used between procedures

M% (81,41) MMM atrix in which number pattern of Pascal's triangle is formed.
P% Records previous choice of the menu to save recalculating is the same as the new one.

A% Number of the menu choice. Ten is added to the number if colour is chosen in PROCchoosecolour

R% Row number

C% Column number

N% $N\%=1$ for number pattern or $N\%=2$ for binary pattern, decided in PROCselectoutput

D% Value of divisor used to obtain binary pattern obtained by PROCselectdivisor

B% Bottom row number

F% First column number

L% Last column number

E% Number of the column equi-distance between first and last columns.

H% Row number half-way down.

X% Mode 7 control code of colour representing numbers that give remainders after being divided by the selected divisor ($D\%$).

Y% Mode 7 control code of colour representing numbers that can be equally divided by the selected divisor ($D\%$) (ie has no remainders).

C\$ Used to signify whether colour has been selected $C\$="Y"$ or not $C\$="N"$.

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13

by starting one triangle from each corner of a rectangle and then controlling them to fill each quarter. This procedure is initiated in the program by PROCfourtriangles.

PROCfourtriangles calls the procedure PROCmultiparams and PROCinitialise to set up the required parameters and clear the appropriate area of the matrix in which to build the pattern. In order to divide the rectangle into quarters, further parameters, derived from PROCmultiparams are required. These parameters, are the middle column E% and

row H% numbers, which are obtained from line:

```
3030 E%=L%/2:H%=B%/2.
Then the procedure calls four further procedures in turn to calculate each quarter of the rectangle in lines 3040 to 3070.
```

PROCTopleftquarter is similar to PROCleftquarter but no variable V% is required as each quarter is constructed as a rectangle. The same sort of method to calculate the other quarters is adopted. The pattern in each quarter is started off by making the corner position the apex

of the triangle and hence equal to one. Each quarter uses a separate procedure to calculate its pattern:

```
PROCTopleftquarter has apex M%(1,1) and uses PROCtscal
PROCToprighquarter has apex M%(L%,1) and uses PROCtrscal
PROCTbottomleftquarter has apex M%(1,B%) and uses PROCtblscal
PROCTbottomrightquarter has apex M%(L%,B%) and uses PROCbrscal
Finally the program uses PROCshowtriangle to display the pattern generated from the matrix M%.

```

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Listing

```

50 REM ** PASCAL'S TRIANGLE **
60 REM (C) BRIAN WOOD **
70 REM ** OCTOBER 1984 **
80 *KEY1OLDIMRUM IH
100 MODE7
110 DIM M%(81,81):REM set up matrix
120 P%←0:REM Previous choice flag
140 REPEAT
150 PROCtitle
160 PROCmenu
170 IF A%≠1 PROCinstructions
180 IF A%≠1 AND A%≠5 PROCtriangles
200 UNTIL A%≠5
220 PRINTAB(1,24)"Finished"
250 END
260 DEFPROCtriangles
270 C%←N"
310 PROCselectpattern
320 IPW%←1 PROCselectdivisor:PROCchoosecolour
330 IF (A%≠2 OR A%≠12) AND P%≠2 PROCconstrtriangle:P%←2
340 IF A%≠3 AND P%≠3 PROCtwotriangles:P%←3
350 IF A%≠13 AND P%≠13 PROCtwotriangles:P%←13
360 IF A%≠4 AND P%≠4 PROCfourtriangles:P%←4
370 IF A%≠14 AND P%≠14 PROCfourtriangles:P%←14
380 IF A%≠12 PROCshowingcoltriangler ELSE PROCshowtriangle
390 ENDPROC
400 DEFPROCchoosecolour
410 PROCtitle
420 PRINTAB(1,12)"Would you like colour (Y/N)?"
430 REPEAT
440 C%←GET$
445 IF C%≠"Y" AND C%≠"N" VDU?
450 UNTIL C%="Y" OR C%="N"
460 IF C%="N" ENDPROC
470 A%←5+I%
480 PROCpalette
490 ENDPROC
500 DEFPROCtitle
510 CLS
520 FOR I%←2 TO 3
530 PRINTAB(2,I%)CHR$(141)"PASCAL'S TRIANGLE"
540 NEXT I%
550 PRINTAB(11,5)"(C) Brian Wood"
560 ENDPROC
600 DEFPROCconstrtriangle
610 PROCsingleparams
620 PROCinitialise
630 REM put a one in middle of top row
640 REM this is apex of triangle
650 M%(4,1)=1
660 REM sum lines below from this value
670 FOR R%←2 TO 4
680 FOR C%←1 TO 4
690 IF R% MOD 2 = 1 AND C% MOD 2 = 1 PROCsum
700 IF R% MOD 2 = 1 AND C% MOD 2 = 1 PROCsum
710 PROCcastout
720 NEXT C%
730 NEXT R%
740 ENDPROC
800 DEFPROCinitialise
810 CLS
820 PROCtitle
830 PRINTAB(1,8)"Initialising"
840 PROCcleararea
850 ENDPROC
900 DEFPROCsum
910 M%(C%,R%)←M%(C%-1,R%)+M%(C%+1,R%-1)
920 ENDPROC
930 DEFPROCselectdivisor
940 PRINTAB(1,12)"Select a divisor i.e. a number 2 to 9":
950 REPEAT
960 D%←GET-48
970 UNTIL D%≠1 AND D%≠16
980 ENDPROC
990 DEFPROCselectpattern
1000 PROCtitle
1010 PRINTAB(1,9)"Which type of pattern would you like?"
1020 PRINTAB(1,12)"1) Number Pattern"
1030 PRINTAB(1,14)"2) Binary Pattern"
1040 PRINTAB(1,22)"Select a number 1 or 2":
1050 REPEAT
1060 N%←GET-48
1070 UNTIL N%≠1 OR N%≠2
1080 ENDPROC
1090 DEFPROCsingleparams
1100 P%←4:R%←21:I%←0
1110 ENDPROC
1120 PROCcleararea
1130 FOR R%←1 TO I%+1
1140 FOR C%←1 TO I%+1
1150 M%(C%,R%)←0
1160 NEXT C%
1170 NEXT R%
1180 ENDPROC
1190 DEFPROCcastout
1200 REM no numbers above ten
1210 IF M%(C%,R%)>16 M%(C%,R%)←M%(C%,R%)-16
1220 ENDPROC
2000 DEFPROCtwotriangles
2010 PROCsingleparams
2020 PROCinitialise
2030 PROCToplefthalf
2040 PROCbottomrighthalf
2050 ENDPROC
2200 DEFPROCleftquarter
2210 V%←16
2220 FOR R%←1 TO V%
2230 FOR C%←1 TO V%
2240 IF C%≠1 AND R%≠1 M%(1,1)=1 ELSE PROCtscal
2250 NEXT C%
2260 V%←V%-1
2270 NEXT R%
2280 ENDPROC
2300 DEFPROCtscal
2310 M%(C%,R%)←M%(C%-1,R%)+M%(C%,R%-1)
2320 PROCcastout
2330 ENDPROC
2400 DEFPROCbottomrighthalf
2410 V%←2
2420 FOR R%←R% TO 1 STEP-1
2430 FOR C%←16 TO V% STEP-1
2440 IF C%≠16 AND R%≠16 M%(16,16)=1 ELSE PROCbrscal
2450 NEXT C%
2460 V%←V%-1
2470 NEXT R%

```

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Listing

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```

2460 DEFPROC
2470
2500 DEFPROCbscal
2510   M$(C%,R%)=M$(C%+1,R%)+M$(C%,R%+1)
2520 PROCcoastout
2530 ENDPROC
2550
2560 DEFPROCmultiparams
2570   M% = 1
2580   IF C%="N" THEN M% = 1 ELSE M% = 2: I% = 2
2590 ENDPROC
2600
2610 DEFPROCfourtriangles
2610 PROCmultiparams
2620 PROCinitialise
2630   M% = 1: I% = 2: M% = 2: I% = 2
2640 PROCtopleftquarter
2650 PROCtoprightquarter
2660 PROCbottomleftquarter
2670 PROCbottomrightquarter
2680 ENDPROC
2690
2700 DEFPROCtopleftquarter
2710   FOR M% = 1 TO M%
2720     FOR C% = 1 TO M%
2730       IF C% = 1 AND M% = 1 THEN M$(1,1) = 1 ELSE PROCtbscal
2740       NEXT C%
2750     NEXT M%
2760 ENDPROC
2770
2780 DEFPROCtoprightquarter
2790   FOR M% = 1 TO M%
2800     FOR C% = 1% TO M% + 1 STEP -1
2810       IF C% = 1% AND M% = 1% THEN M$(1%,1%) = 1 ELSE PROCtbscal
2820       NEXT C%
2830     NEXT M%
2840 ENDPROC
2850
2860 DEFPROCbottomleftquarter
2870   FOR M% = M% TO M% + 1 STEP -1
2880     FOR C% = 1 TO M%
2890       IF C% = 1 AND M% = M% THEN M$(1,M%) = 1 ELSE PROCtbscal
2900       NEXT C%
2910     NEXT M%
2920 ENDPROC
2930
2940 DEFPROCbottomrightquarter
2950   FOR M% = M% TO M% + 1 STEP -1
2960     FOR C% = 1% TO M% + 1 STEP -1
2970       IF C% = 1% AND M% = M% THEN M$(1%,M%) = 1 ELSE PROCtbscal
2980       NEXT C%
2990     NEXT M%
3000 ENDPROC
3010
3020 DEFPROCcoastout
3030   M$(C%,R%) = M$(C%,R% - 1) + M$(C% + 1,R%)
3040 PROCcoastout
3050 ENDPROC
3060
3070 DEFPROCbottomleftquarter
3080   FOR M% = M% TO M% + 1 STEP -1
3090     FOR C% = 1 TO M%
3100       IF C% = 1 AND M% = M% THEN M$(1,M%) = 1 ELSE PROCtbscal
3110       NEXT C%
3120     NEXT M%
3130 ENDPROC
3140
3150 DEFPROCcoastout
3160   M$(C%,R%) = M$(C%,R% + 1) + M$(C% - 1,R%)
3170 PROCcoastout
3180 ENDPROC
3190
3200 DEFPROCbottomrightquarter
3210   FOR M% = M% TO M% + 1 STEP -1
3220     FOR C% = 1% TO M% + 1 STEP -1
3230       IF C% = 1% AND M% = M% THEN M$(1%,M%) = 1 ELSE PROCtbscal
3240       NEXT C%
3250     NEXT M%
3260 ENDPROC
3270
3280 DEFPROCshowinglecoltriangle
3290   CLS: VDU23,1,1:PRINT:PRINT:PRINT
3300   FOR M% = 1 TO M%
3310     FOR C% = 1 TO C%
3320       IF M% MOD 2 = 1 THEN PROCprintevensrows
3330       IF M% MOD 2 = 1 THEN PROCprintoddsrows
3340       NEXT C%
3350     NEXT M%
3360   IF A%="N" THEN PROCwait
3370   NEXT M%
3380   PROCwait
3390   VDU 23,1,1:PRINT:PRINT:PRINT
3400 ENDPROC
3410
3420 DEFPROCprintevensrows
3430   IF M% MOD 2 = 1 THEN PROCprintoddsrows
3440   NEXT C%
3450 ENDPROC
3460
3470 DEFPROCprintoddsrows
3480   IF C% = 1 OR C% = C% THEN PRINT " "; ELSE IF C% MOD 2 = 1 THEN PROCprint
3490 ENDPROC
3500
3510 DEFPROCprint
3520   REM (C) BRIAN WOOD 1984

```



LAST BLAST

Bob Chappell gets to grips with a little delight called 'The Final Mission'

If you're one of those Spectrum owners still recovering in the intensive care unit, having been mauled and maddened by *Mountains of Ket* and tortured and tantalised in *Temple of Vran*, prepare for instant relapse. Just when you thought it safe to go back to your micro, Incentive Software has released *The Final Mission*, the third part of its Ket Trilogy.

Incentive doesn't call itself that for nothing. To lure you out of your sickbed, it is offering a video recorder to the first person to score 100 per cent in all three parts. Just think — should you be the lucky winner, you can retire to your bed and watch reruns of *The Magic Roundabout*.

The Final Mission of the title has you seeking out and defeating the evil Vran Verusbel, and with a monicker like that he deserves everything coming to him. But first you must pass the five enigmatic Gate Guardians — you knew there'd be a catch, didn't you? The adventure starts as you wake up — stunned — in a cell (unpadded). Although you can't see anyone, you are not alone. Edgar is here to keep you company. If you don't know or had deliberately erased him from your mind, Edgar is your friendly neighbourhood assassin bug (Edgar the earwig?) — he's been planted on your neck to deter you from scarping when the going gets rough.

Hard cell

In the cell is a wooden chair which has clearly been donated by the Ket Prisoner's Aid Society — a swift examination reveals a useful item strapped to one of the legs. An easterly glow is coming from a window above a door. No havanas for guessing that the door is locked. It is also 8ft high and made of oak so save your strength — you can't break it down. The window's not so tough though as you start chanting 'Easy, easy', you're out of your cell and ... into another one.

The sarcastic chant thwarted on my lips when I discovered that this cell had no obvious exits. Worse still, I was unable to return to my original cell. The instructions warn of one-



The Forest At Worlds End: descriptions are brief as the puzzles and mapping are the main attractions.

way doors so that must have been one of them — thanks a bunch, instructions. When I did eventually find the way out into a corridor and to the Hall of Pillars, I came face to face with the 'en' monster. No, I don't know what an 'en' monster is either except that it is capable of giving you a most severe duffing.

As with the first two parts of the trilogy, *Final Mission* goes into a combat sequence whenever you pick a fight. Should your energy fall to a fat zero during the struggle, your adventuring days are over — until you start again, of course.

The text is immaculately presented and the vocabulary reasonable, though response to input is a wee bit on the slow side. A splendid adventure with a splendid prize for some lucky person.

Arboreal adventure

Another Spectrum offering, *Interceptor Micro's Forest At Worlds End* is a tasty text and graphics adventure. Although you just know it — the local Princess has been captured by the evil wizard and you must rescue her. When are we going to have an adventure where the local princess incarcerates the evil wizard?

Although this is mainly a text adventure, some of the locations are shown graphically — attractive, and fast with it. On the subject of speed, the program's response to each command (which can include adjectives, adverbs and prepositions) is instantaneous. This helps to keep the pace flowing nicely. The adventure is not played in real time so your adrenalin will not need to work overtime. The textual descriptions are fairly short; puzzles and mapping are the real meat in this game.

No picnic

The adventure was written by one David Banner. Although you won't meet the Incredible Hulk in the woods, you will almost certainly encounter a pesky elf who attacks you at every opportunity. Once you have a weapon, you can dispose of the elf quite easily — but, because this adventure has a number of random elements, five'll get you ten that other members of the elf clan continue to pop up. You could easily find yourself in breach of the countryside code by littering the place up with a pile of dead elves.

One of my favourite sorts of puzzles is included — how to

cross a chasm that is too wide to jump? Locating an object to help with this difficulty is no problem — finding the right words to manipulate it usefully is not so simple (hint — you need four words, one of which is a preposition).

An enjoyable adventure but I could have done without the random attackers.

To the rescue

To round off this week's column, the Dungeon Master has at last condescended to take down his Bumper Fun Book of Hints and Tips, has brushed away the bats nesting therein and has turned to the chapter market Unzipping Zork. This unprecedented action is a result of a heartfelt plea from Mancunian K James, a frustrated *Zork I* devotee. He's found the Jewelled egg but can't open it without damaging the clockwork canary inside.

And even if he could, what should he do with the canary anyway? The following (written backwards) should help: 1 OYE EHTN EPOT 'NOD 2 U OVMO RFTI LAET SFEI HTEH TTEL 3 F EIHHT EHTM ORFT IREV OCER 4 TSE ROFE HTNI PUTI DNHW. Happy Zorking is the only thing left to say!

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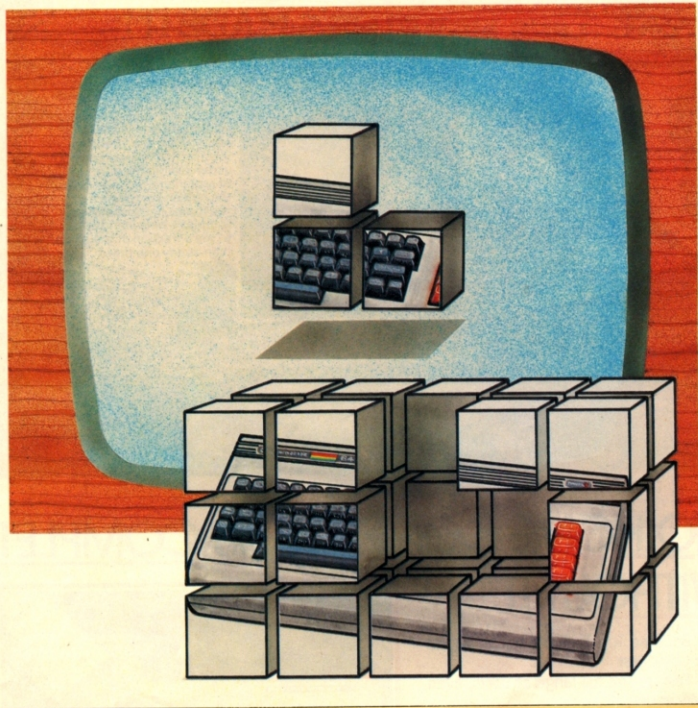


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MOVING PICTURES

Using machine code to move high-resolution screens from one part of the memory to another is much faster, but how do you access all the locations? And how do you move pictures from one section of the memory to another? Key in these listings from Richard Keeble, and you'll find the answer.

At some stage, most people who own Commodore 64s dabble with high resolution graphics.

On the 64 the high resolution screen is 320 dots wide by 200 dots down which means 64000 dots (8K of memory space) must be controlled when using the full screen. Any actions carried out in this mode will take place very slowly in Basic, but machine code runs much faster and is perfectly suited for this type of work.

Having decided to use machine code, what is the best way of accessing 8,000 bytes? The fashion in today's adventure games is to provide pictures of locations, so how can pictures stored in one section of memory be moved quickly to another?

Most people would suggest a method using indirect addressing, as shown in Program 2. There is another method using direct addressing, but how can an

8-bit register, with a maximum value of 256, access 8,000 locations?

The answer to this is by self-modifying code. Put simply, this means one section of the program will overwrite another part of the same program. The best way to describe this is to go through Program 1 in detail:

LDA 53272

ORAIM 8
STA 53272
LDA 53265
ORAIM 32
STA 53265

This first section of code relocates the screen to 8192, and switches on the high resolution mode.

LDXIM 0

LDYIM 63

These two lines initialise the values of the two registers. The Y register is set to 63 to act as a loop counter (8000/256 = 64).

LDAX 49152

STAX 8192

INX

BNE 247

This is the first loop and is the powerhouse of the program. The first line loads information from 49152 (source) and stores it in the accumulator. The following line deposits this information into a new position on screen at 8192.

Having done this, X is incremented and the zero flag is tested to see if it is set. Once the loop has been passed through 256 times this will be true and the program moves onto the next section:

INC 49174

INC 49177

DEY

BNE 238

Here, the code modifies itself by writing over the two lines at 49172 and 49175. The most significant byte of each address is increased by one, but as these are 16-bit addresses, the decimal value is increased by 256. The Y register can now be decremented and if not equal to zero then the program returns to the first loop.

The last section of code simply restores locations 49173, 49174, 49176 and 49177 to the values held at the start of the program.

If using this to load several different screens, then this end section of code should be placed at the beginning, and the source values altered.

The Basic program contains the data statements to load the machine code routines. Program 1 is in lines 200 to 230, and can be run from Basic using sys 49152. Program 2 is in the remaining data lines, and is run using sys 49209.

Basic program

```

10 FORX=0TO105
20 READA
30 POKE49152+X,A
40 NEXT
50 A=TI:SYS49152:B=TI
60 E=(B-A)/60
70 C=TI:SYS49209:D=TI
80 F=(D-C)/60
90 PRINT"PROG 1 RUNNING TIME (SECS)= "E
100 PRINT"PROG 2 RUNNING TIME (SECS)= "F
110 POKES3272,PEEK(53272)AND247:REM RETURN TO NORMAL RESOLUTION
120 POKES3265,PEEK(53265)AND223:REM RETURN SCREEN TO 1024
130 END
200 DATA 173,24,208,9,8,141,24,208,173,17,208,9,32,141,17,208
210 DATA 162,0,160,63,189,0,192,157,0,32,232,208,247,238,22,192
220 DATA 238,25,192,136,208,238,169,0,141,21,192,141,24,192,169,192
230 DATA 141,22,192,169,32,141,25,192,96
240 DATA 173,24,208,9,8,141,24,208,173,17,208,9,32,141,17,208
250 DATA 160,0,162,63,169,32,133,81,169,0,133,80,133,82,169,192
260 DATA 133,83,177,82,145,80,200,208,249,230,81,230,83,202,208,242
270 DATA 96
  
```

Program 1

ADDRESS DECML HEX	MACHINE CODE	ASSEMBLY CODE PROGRAM
49152 C000	AD 18 D0	LDA 53272
49155 C003	09 08	ORAIM 8
49157 C005	8D 18 D0	STA 53272
49160 C008	AD 11 D0	LDA 53265
49163 C00B	09 20	ORAIM 32
49165 C00D	8D 11 D0	STA 53265
49168 C010	A2 00	LDXIM 0
49170 C012	A0 3F	LDYIM 63
49172 C014	BD 00 C0	LDAX 49152
49175 C017	9D 00 20	STAX 8192
49178 C01A	E8	INX
49179 C01B	DO F7	BNE 247
49181 C01D	EE 16 C0	INC 49174
49184 C020	EE 19 C0	INC 49177
49187 C023	88	DEY
49188 C024	DO EE	BNE 238
49190 C026	A9 00	LDAIM 0
49192 C028	BD 15 C0	STA 49173
49195 C02B	BD 18 C0	STA 49176
49198 C02E	A9 C0	LDAIM 192
49200 C030	BD 16 C0	STA 49174
49203 C033	A9 20	LDAIM 32
49205 C035	8D 19 C0	STA 49177
49208 C038	60	RTS

Program 2

ADDRESS DECML HEX	MACHINE CODE	ASSEMBLY CODE PROGRAM
49209 C039	AD 18 D0	LDA 53272
49212 C03C	09 08	ORAIM 8
49214 C03E	8D 18 D0	STA 53272
49217 C041	AD 11 D0	LDA 53265
49220 C044	09 20	ORAIM 32
49222 C046	8D 11 D0	STA 53265
49225 C049	A0 00	LDYIM 0
49227 C04B	A2 3F	LDXIM 63
49229 C04D	A9 20	LDAIM 32
49231 C04F	85 51	STAZ 81
49233 C051	A9 00	LDAIM 0
49235 C053	85 50	STAZ 80
49237 C055	85 52	STAZ 82
49239 C057	A9 C0	LDAIM 192
49241 C059	85 53	STAZ 83
49243 C05B	B1 52	LDAY 82
49245 C05D	91 50	STAY 80
49247 C05F	C8	INY
49248 C060	DO F9	BNE 249
49250 C062	E6 51	INCE 81
49252 C064	E6 53	INCE 83
49254 C066	CA	DEX
49255 C067	DO F2	BNE 242
49257 C069	60	RTS

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DUCK SHOOT

Andy Newham's shoot-em-down game is also a useful exercise in Oric 1 and Atmos programming.

Shoot as many of 30 ducks as you can by choosing a number from 1-9 for each duck's position on the screen. As well as being a game for children to play, Duck Shoot teaches many useful programming techniques on the Oric 1/Atmos, such as making programs Oric 1/Atmos compatible, defining your own graphics characters and displaying them using a short machine code routine.

Table 1: variables

DISABLE	ROM routine to disable keyboard
ENABLE	ROM routine to enable keyboard
AA	Atmos adjustment for PLOTS
DOAGAIN	TRUE/FALSE variable to divert code on game replays.
COL%	Colour attribute for curtains
LA	Location of a character cell on the Text screen (see Figure 1)
NUM	Numbering of ducks in parade
HITS	Ducks hit
SPEED	Game speed selected by the player
DUCKS	Loop count for 30 ducks to be shown
R%	Random number 1-9 for duck location
TIME	Compared to SPEED to control the time player has to shoot each duck
SHOT	Key number pressed (1-9)
NAME\$(1-9)	Names of highest scorers. Speeds 1-9
NAMES\$(10-18)	Second highest scorers. Speeds 1-9
H10	Highest scores at Speeds 1-9
H2()	Second highest scores. Speeds 1-9
PRTAT	Line number for PRINT AT subroutine

Atmos/Oric compatibility

To test for which computer is being used, line 70 looks at a location in the ROM which contains 204 on the Atmos and 89

on the Oric 1. In further tests it is quicker to test the value of a variable such as AA, set using this test, rather than repeat the PEEK test.

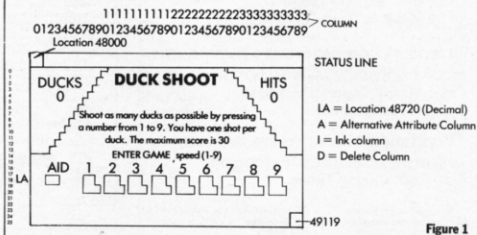
This test assigns different values to four variables, DISABLE, ENABLE, PRTAT and AA depending on whether it detects an Oric 1 or Atmos. DISABLE and ENABLE hold the start locations for the ROM routines which switch the keyboard off and on respectively, thus giving a 20 per cent speed increase in non-input parts of the program. The Atmos locations have not yet been published and were found by searching the new ROM for corresponding routines. To use any ROM routine, the two equivalent start addresses are needed, so that the CALL works on both.

removed with RIGHT\$ as in lines 860 and 880.

Program notes

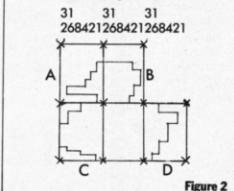
- 60** HIMEM protects the machine code above #8000.
- 90** Byte 618 controls various toggles (see Table 2). 10 sets VDU and Protected column on, and the other toggles off. Unlike ?CHR\$(X), this method is independent of previous settings and only needs one statement.
- 100** DOAGAIN sets to FALSE (see line 230).
- 110** Byte 524 sets the CAPS lock on/off (255=ON, 127=OFF).
- 140** Black background attributes are plotted to form the edge of

Text Screen Plan



The variable PRTAT is set to 40 or 50 (on Oric 1/Atmos respectively) and controls which subroutine line is used to position the text cursor. On the Atmos, PRINT@X,Y; is used on line 50, but on the Oric 1 two locations, 616 and 617, are poked with the Y and X values in line 40. A Print At facility was needed to delete the duck using CHR\$(14) since PLOTting this does not work. The variable AA is used to move all the PLOTS over one on the Atmos, since X can range from 0-39 rather than 0-38 on the Oric 1.

Designing the User-Defined Graphics



The Atmos puts two spaces between numbers, but the Oric 1 only puts one. So when you produce tables, convert numbers to strings with STR\$ before PLOTting them. The unwanted green attribute produced by the Oric 1 should be

the left-hand curtain. They stop the background colours plotted in line 150 from spilling over to the right.

- 180** PLOTS 'DUCK SHOOT' in double-height. CHR\$(10) turns the string into the double-height top half which must be plotted on an odd-numbered Y row.
- 230** On the first game play DOAGAIN is FALSE, so lines 240-480 are performed. However, if the game is replayed, DOAGAIN will be set to TRUE in line 910, and lines 240-480 skipped to save time.
- 240** Initialises the High Score Table names to ten blank squares.
- 250-300** Define the graphics to display the duck (see Figure 2). The alternate character set, starting at #BB80 in Text mode, was used to avoid interference.
- 310-480** To incorporate a machine code routine into a Basic program, first store the instructions on DATA statements and use a loop to transfer these to a safe position in memory (above HIMEM). CALL#8000 transfers control to the address specified and begins the machine code routine.
- 330** Machine code displays letters on the screen using their ASCII codes. #41, the code for A, is

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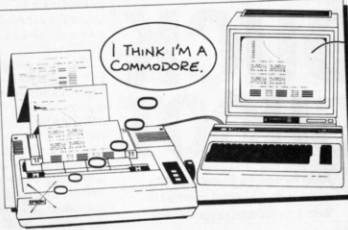
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An Epson in Commodore clothing



How many Commodore home computer owners, when faced with buying a printer, have longed to own an Epson but been put off by the problems involved? Firstly, it's not easy to connect the two together. Secondly, even when connected, it may be necessary to load driver software or the cartridge slot may be unusable. Finally, Commodore-specific characteristics such as graphics and formatting commands will not be available.

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stored in the main memory or Accumulator with Load Accumulator.

Y, another memory, is initialised to 0. Y will affect the final position of the letter.

To position a letter in machine code a screen address is needed. This must have been previously stored in the first two locations of Page 0, using DOKE (see lines 510 and 650). This instruction can now store the contents of the Accumulator on the screen at the address specified in Page 0 with the value of Y added. By incrementing Y by 1 in line 370, a B can then be placed next to the A. To place the C below the A, Y is loaded with 40 as there are 40 character cells per row. A £ character and the letter D are then placed to the right of this (see Figure 2). Note that all the characters will appear in their alternate form and A-D have been redefined. RTS returns control back to Basic.

The location of the first character cell in a row Y is 48000 + (Y+1)*40. So for row 17 it is 48000 + 18*40 = 48720. The next two POKEs make all characters on rows 17 and 18 appear in alternate form.

This displays the nine possible duck positions starting at column three with a gap of one

column between each duck (see Figure 1). The ducks are numbered by PLOT using ASCII codes of the numbers. The duck's screen address (LA+X) must be DOKEd into Page 0 before calling the machine code.

A key pressed, from 1-9 only, is stored in SPEED for the game speed desired.

This cannot be used to delete the ducks as a new foreground colour will reveal the old drawings, so the Print at subroutine is used to position the cursor on

redisplayed as they have been deleted.

Generates a random number from 1-9 and stores in an integer variable R%, which is quicker than using INT. Uses R% to calculate and store the corresponding screen location for the duck in Page 0 for use by the machine code routine.

PLOT number of ducks so far displayed and number hit.

This loop controls the time for the player to shoot the duck, from ten seconds at Speed 1 to one second at Speed 9.

The key pressed is stored in SHOT and if it is from 1-9 a SHOOT sound occurs.

If the correct key is pressed, turns the duck red, increments HITs and EXPLODES the duck.

The same method as in line 570 is used to delete the duck, with CHR\$(10) moving the cursor down so two rows are deleted.

Clears screen and turns on cursor (see Table 2).

If the present score does not beat the highest score, jump to see if it beats the second highest.

If it is the highest score so far, transfers the previous details to the second highest score and inputs the new name.

Clears screen. Turns on double height to display the title with the escape code. Switches off DH with CHR\$(4).

Table 2: byte 618 toggle settings

Add up the values for each toggle and POKE 618, X where X is the total.

Toggle	On	Off
Cursor	1	0
VDU	2	0
Printer	4	0
Keyclick	0	8
Protected column	0	32
Auto double height	64	0

a row and CHR\$(14) deletes it. Since the Oric 1 manual does not list the PRINT codes on page 147, add 128 to the PLOT code, so 140 produces flashing characters.

Waits for space bar to be pressed and deletes message.

Displays DUCKS and HITs in white letters.

Alternate attributes must be

Listing

```

10 REM ((((( DUCKSHOT )))))
20 REM ((( ( BY A. J. NEWMAN )))
30 GOT000
40 POKE16,T:PRINT POKE17,X:RETURN
50 PRINT@T,T:RETURN
60 TEXT:CLS:HI=HEM0000
70 IPEEK(8000)+8 THEN DISABE=BECCAIE
NAME=BE04:PRAT=40:AA=0:GOT050
80 DISABE=BE76A:ENBLE=BE930:PRAT=50:
AA=1
90 CALL DISABE:POKE618,0:PAPER:INX3
100 DIM NAME$(18),HI(9),H2(9):DORGAIN=F
ALSE
110 POKE524,255:POKE48035,0
120 : REPEAT
130 REM --- Draw a19p curtains ---
140 X=13:FORY=8TO12:PLOTX+AA,17,16*X-1
NEXT
150 FORT=8TO12:COL=X+7*(Y-7)-INT(Y/3)+17
PLOTX,T,COL:XNEXT
160 X=26:FORY=8TO12:COL=X+7*(Y-7)-INT(Y/2
)+17:PLOTX,T,COL,X+X:INX1
170 REM --- Instructions ---
180 X=8:FORPLOTX=5,1,CHR$(10)+DUCK SHO
OT:PLOTX=5,2,CHR$(10)+DUCK SHOOT"
190 PLOTX,T,"Shoot as many ducks"
PLOTX
,8,"as possible by pressing"
200 PLOTX,T,"a number from 1 to 9"
210 PLOTX,10,"You have 1 shot per duck"
220 PLOTX,11,"The maximum score is 30"
230 IF DORGAIN THEN 580
240 FORT=1:TO18:NAME$(T)=TO10:NAME$(EL
):NAME$(EL)+CHR$(12):NEXT T
250 REM --- Define U.D.G.'s ---
260 RESTORE:FORM=85TO108:FORK=8TO7:IREAD
:POKE8800+BNN*X,D,NEXT INX
270 DATA 0,0,1,3,6,31:IREM "A" (hit.)
280 DATA 0,0,36,62,62,60,50:IREM "B"
290 DATA 5,31,63,63,63,31,7:IREM "C"
300 DATA 62,62,60,50,50,56,48:IREM "D"
310 REM --- Locate machine code -----
320 FORX=8800TO8800:B:READ I:POKEX,D:INX
T

```

```

330 DATA88,841:'LDAR#1="A"
340 DATA88,0:'LDY 0
350 DATA88,80:'STO(80),T
360 DATA88,842:'LDAR#2="B"
370 DATA8C:'INY
380 DATA81,80:'STA(80),Y
390 DATA88,843:'LDAR#3="C"
400 DATA88,828:'LDY 40
410 DATA81,80:'STA(80),Y
420 DATA88,85F:'LDAR#F (A block)
430 DATA8C:'INY
440 DATA81,800:'STA(80),Y
450 DATA88,844:'LDAR#4="D"
460 DATA8C:'INY
470 DATA81,800:'STA(80),Y
480 DATA80:'RTS
490 REM --- Duck parade ---
500 LA=48720:POKELA=INT(POKELA/40,9)
510 X=3:FORNUM=49TO57:DOKE0,LA+X:CALL88
000:PLOTX+AA,15,NUM:INX+X:NEXT
520 REM --- Game starts ---
530 HIT5=0:CALL ENBLE
540 PLOT8+AA,13,'ENTER GAME SPEED (1-9)
"REPEAT:ISPEED+VAL(LET)
550 INT(ASPEED/80)SPEED(10):SP8=SP8*(SPE
EED):PLOT3+AA,13,RIGHT$(SP8,LEN(SP8)+1)
560 FORT=7TO12:PLOT7+AA,T,CHR$(0):NEXT
570 Y=13:X=0:IGOSUB PRAT:FORN=1TO12:PRI
NTCHR(14):NEXT
580 PRINTCHR$(140) : "PRESS (SPACE BAR)
TO START GAME":
590 REPEAT:INT(LEN(KEY$)):"PRINTCHR$(14)
600 CALL DISABE
610 FORT=19TO24:PLOT7,Y,20:INX
620 PLOT7+AA,3,CHR$(7)+DUCKS"PLOT32+AA,
3,"HITS"
630 FOR DUCKS=1 TO 30
640 POKELA,3:POKELA+40,9
650 R=INT(RND(1)*9)+1:DOKEA,LA+R*X+1
660 DA=STR$(DUCKS):PLOT2+AA,4,CHR$(0)+R
IGH$(D$,LEN(D$)-1)+":

```

```

670 HE=STR$(HITS):PLOT33+AA,4,RIGHT$(HE
,LEN(HE))-1)
680 CALL88000:CALL ENBLE
690 TIME=0:REPEAT:TIME+1:TIME+1:SHOT=VAL(
KEY$):UNTILSHOT=0:DOKE1,HE*400/SPEED
700 CALL DISABE:IFSHOT=0:THENSHOT=1
710 IFSHOT=R*THEPOKELA+1:POKELA+41,1
:HITS+HITS+1:EXPLODE
720 X=X+17:IGOSUB PRAT:PRINTCHR(14):C
HR$(10):CHR$(4)
740 CALL ENBLE
750 REM - Update & Display High Scores
760 CLS:POKE10,1)
770 IFHITS<H(SPEED):THEN800
780 NAME$(SPEED+9)=NAME$(SPEED):H2(SPEE
D)+H(SPEED):INPUTNAME:NAME:~SPEED)
790 H1(SPEED)+HITS:GOT40
800 IFHITS>H2(SPEED):THENINPUTNAME:INM1
81(SPEED)+H2(SPEED)+HITS
820 CALL DISABE
820 CLS:POKE618,74:PRINTSP$(CHR$(22)
"JXXX HIGH SCORE TABLE XXX")CHR(4)
830 PLOT8A,4,"SPEED"~CHR(14)+FIRST
PLOT2+AA,4,CHR(23)+"SECOND"
840 T=6:SPEED=1:TO9:SP8=SPEED(SPEED)
850 PLOT8A,T,RIGHT$(SP8,LEN(SP8)-1)+":
"CHR(14)+LEFT$(NAME$(SPEED),10)
860 H1=STR$(H1(SPEED)):PLOT7+AA,T,"
+RIGHT$(H1$,LEN(H1$))-1)
870 PLOT7+AA,T,CHR$(23)+LEFT$(NAME$(SPE
ED),10)
880 HE=STR$(H2(SPEED)):PLOT35+AA,T,"
+RIGHT$(H2$,LEN(H2$))-1)
890 T=7+2:NEXT INX:CALL ENBLE
900 PLOT8+AA,25,"ANOTHER GO (Y/N) " :RE
PEAT:GETA:UNTIL(A$="Y"ORAB="N")
910 DORGAIN=TRUE:CLS:CALL DISABE
920 :
930 POKE618,11:PRINTPRINT"THE END"
940 CALL ENBLE:END

```

TIMEX TAKES A SPIN

Timex has moved back into the home computer market with a disk system for the Spectrum. John Lettice gives it a whirl.

Timex is back in the home computer market — but this time the product is a disk system for the Spectrum giving 160K per side. Until now the company's major contribution to micros has been the production of the Sinclair Spectrum and, significantly if less famously, assembly and production of other items such as disk drives.

So although a 3in drive for the Spectrum developed by Timex Portugal seems exotic, it all falls into place when you put the products together.

The system we reviewed consisted of an interface, disk controller, power supply, and twin disks. It can be extended up to four drives, but you'd need a second power supply for this. Other items in the pipeline include CPM and a clip-on keyboard. The prototype of the latter is a fairly dubious-looking beast, but I'm assured production models will be better.

The drives fell into a category somewhere between prototype and pre-production. The works and the O/S were final, and the casing was sort of final, subject to rerouting a few exterior cables to make it tidier.

Aside from the drives there are some useful extras that come with the system: a system reset switch on the interface and a further reset on the disk controller (the latter does a reboot on the drives), and a pair of RS232 ports round the back of the controller.

These are odd, in that the sockets are Atari D-type, *ie* like the one on Interface 1 but inside out. I've never seen an RS232 like this before, but there's a certain logic to it as it should be easy to get a cable made up. Or it would be if the pinouts were in the manual — Timex please note.

Setting up

As everything bar the interface is cased in a black box it should be easy to stack the system to one side of the machine. Connecting it up goes something like this: first you plug the interface into the back of the Spectrum, then you plug the large D-connector into the interface, connecting it to the controller. So far, so good, but now comes the tricky part: you connect the ribbon cable from the back of the controller to the drives, and the power outputs from the power supply to the drives and the controller.

You now have four boxes all connected to one another, and bearing in mind that the power supply must go on top for cooling purposes, it's a bit like a cat with a ball of string when you're trying to stack them. I cracked this by putting the controller at the bottom facing back to

front, but if Timex does move all the connections to the back of the units it'll make life a lot easier.

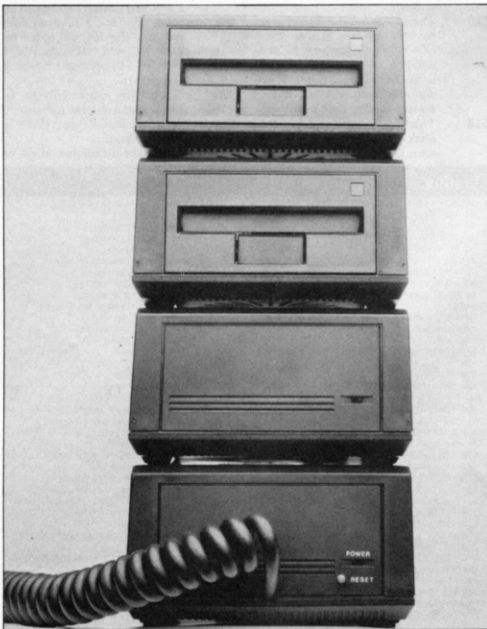
The next bit, being software, is a lot easier. When you power up the whole shooting match there's a little routine telling drive A that it wants a disk. It just sits there thinking 'gimme a disk' to itself until you put one in, whereupon the Timex Operating System (TOS) boots up, and you're airborne.

In use

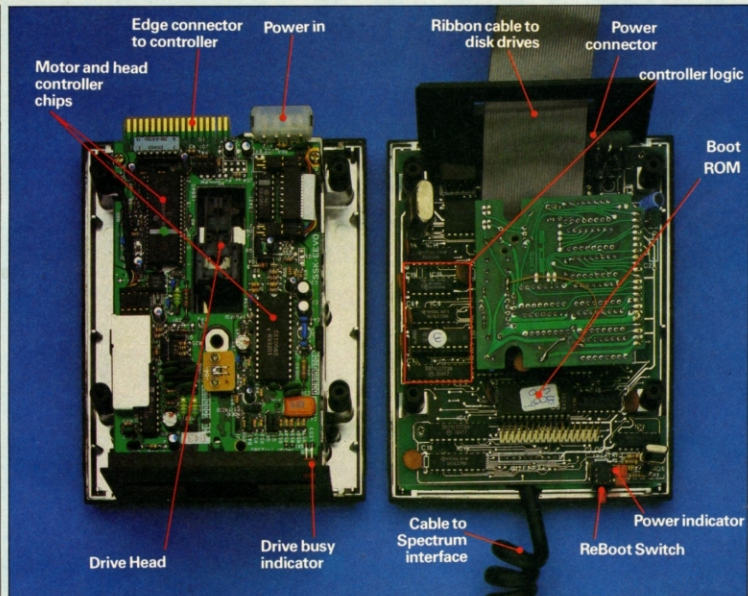
When you're producing third party disk drives for an established machine it's always difficult to know which way to jump. On one side there's the lure of CPM, full professional systems and the like; while on the other there's the pressure to maintain compatibility with the basic machine.

In the first case it's possible you'll wind up with a system that effectively uses your existing micro as a terminal, and if you did this with a Spectrum you might also start thinking about sticking on a professional keyboard. You can imagine the ads: 'fully compatible with your existing hardware; no fiddly connections to make; no need to void your guarantee — just throw away your existing machine...'

At the moment Timex has jumped the other way. The TOS takes up a little space right at the top of RAM, but in most cases it shouldn't be too difficult to convert software to run with it. Moving software from tape to disk is really no more difficult than moving it from tape to Microdrive, *ie* something between impossible and, with the help of the odd software house, dead easy. ■



The towering Timex disk system is ready for action — just don't knock into it.



A drive and the controller.

The commands used by the system are basically Microdrive commands, **LOAD***, **SAVE*** and so on, although there are some minor modifications, and the syntax is much improved. **LOAD*DEMO***, for example, loads the demo program from drive 1, provided you happen to be logged onto drive 1 at the time. Switching drive directories is dealt with by: **GO TO*DISK 2***.

You can, however, load a program from disk 2 and remain with directory 1 by using:

LOAD *DISK 2 _ programname*.

Details of the disk's contents can be produced with **CAT***. This on its own will produce a directory of the drive you're currently logged onto. The directory screen gives filename, filetype and length of file, and you can use wildcards throughout to zero in on specific filenames and types.

There are two types of wildcard: **CAT*D+*** will give you details of all files beginning with **D**, no matter how long the names are. **CAT*D?*** will give you all two-letter filenames beginning with **D**, **D?** three-letter and so on.

The drives come with two demo disks. The system has a slickly programmed demonstration of the drives' capabilities, while the other has a help file and a number of games. Disk 1 is a series of

linked programs that form a basic explanation of what disk drives are and, curiously enough, it tells you how to connect the drives up to your machine. It's very pretty, marred only by a few misspellings. There's also a demonstration slide show apparently lifted lock stock and barrel from *Paintbox*, and this provided a useful opportunity to do some timings.

The drives will load 7K worth of screen in just under four seconds, with saving being about the same.

I set them a little task, loading a screen, saving it, erasing it, incrementing a screen count then going back to the beginning, and over an hour they were running through this at ten seconds per cycle. They didn't sound at all happy about it, producing a gentle 'I'm saving your disk in half noise with every pass, but I'm told this is normal and in this and other tests they didn't make a mistake, crash or do anything daft.

Superficially the operating system is quite simple, but it does have hidden depths which allow you to produce directories within directories, for example. These can be nested up to 16 deep, and allow files to be grouped logically. They operate in the same way as the overall disk directories, so you can be

logged onto a sub-directory just as if you were logged onto a disk.

As for the RS232s, I couldn't test them because I didn't have a cable, and although my provisional manual had some data on comms I think it could do with a rewrite.

Verdict

As Spectrum drives go I'd say this was a good first attempt. I've seen flashier systems in prototype, and I've heard of even flashier systems under development, but this one will at least be available in the near future. Ordinarily its simplicity might be a criticism, but as most Spectrum owners will have little experience of disk systems, simplicity can be an advantage.

And of course if the CPM implementation comes to fruition it should be possible to upgrade to a more complex operating system, and Timex will be able to have its cake and eat it. █

REPORT CARD: 1 TO 5

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

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PERSONAL

Computer

NEWS



PRICES AND SPECS

PLUG-IN PARAPHERNALIA

SOFTWARE FRONT-RUNNERS

GOOD BUYS AND LONG SHOTS

Yuletide Guide to Micro Hardware



UNRAVELLING

THE

MICRO

MAZE

So you want to buy a computer? If you already own one and are looking for an upgrade, you can skip down the page a little, but first-timers start here.

First question: Why do you want to buy a computer? Absolute honesty is called for at this point. There are a lot of computers out there gathering dust because somewhere, somebody lied. The industry misleads potential buyers, buyers deceive themselves and the white heat of technology becomes a herd of white elephants.



The vast majority of home computers are used for playing games. There's nothing wrong with that. There is a strong body of opinion which says that with the exception of the business community, the human race will find entertainment to be the best use of computers.

Many computers are used to learn to program, a few get roped into educational spheres, a few more are put to serious use. The use you want from your computer will virtually dictate the type of machine you buy. If you lie, you'll waste your money.

If you simply want to see what the fuss is about, buy the cheapest machine you can lay your hands on. You're not marrying the beast. If you don't like it, sell it or scrap it. If you get hooked you can buy a heavyweight machine later.

If you want to play games, go for a machine with the

best games support. If you're serious about education buy on that basis. If you can use a computer as a tool — for finance, writing or whatever — you're looking for a different machine than the Donkey Mineroid addicts.

What it all means

The most off-putting thing to most people is that when they try to learn about this thing that's going to set them back several hundred pounds, nobody talks English. The jargon is not created to confuse, it's simply a technical shorthand. It's easier to talk about RAM than about Random Access Memory — easier still to talk about memory. But from the buyer's point of view, you don't need to know much.

You can start by looking for a few basic things in a computer. How much memory does it have? The more the better, since the larger memory allows more powerful, sophisticated and useful programs.

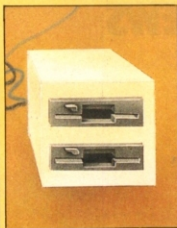
Check out the keyboard. Unless you're strictly a games player, you'll be using the keyboard a lot. If you're not comfortable with it, you won't be using your machine as much as you might.

Look for good colour and sound facilities. Again, the more the better. The screen display attracts a lot of attention but generally you can do just about anything on a 40x24 text screen, and high resolution is nice but may not be essential.

The 'resolution' means the number of distinct points the machine can show on screen. Machines that can show fine detail are nice for games, possibly useful for business graphics, essential for good educational programs. How much of everything you want again depends on what you want the machine to do.

The same goes for peripherals — things you

If you're thinking about buying a computer, peripheral or software — but don't know where to begin — our three-part buyer's guide will help you out. This week, a look at home computers puts you on the right track. Next week, you'll be taken on a peripherals tour and in the final week, you'll get gemmed up on software.



plug into the computer. If you're a games player you can settle for joysticks, programmers will want a printer at least, serious users should look for disk drives. The greater the expansion capabilities of the machine the better — the facility to add more options as your interest grows. This in turn can greatly extend the computer's useful life. On the other hand, don't pay for things you'll never want.

Which brings us to ...

How much it will cost

How much have you got? Prices have dropped dramatically in the last year and you should be able to find a machine to suit your bank balance — anything from £50 to £1,000. But remember the industry deception mentioned earlier. That lie goes like this: buy a computer for Exxx and you can play games, educate your children, write letters, club magazines, the great 20th century novel — and run your business too.

The truth is that the computer can do all those things — once you've spent another Exxx.

A simple rule of thumb is this: however much the computer costs, it will be the cheapest part of the system. Even a humble £100 machine will grow — £250 for a disk drive, £300 for a printer, say 20 programs for £150, joysticks, light pens, a dedicated monitor. And by the time you've paid off the HP on that lot, you'll be looking for an upgrade ...

Upgraders start here

Eventually the equipment you've got just doesn't seem to make the grade any more. That vast 32K memory looks tiny in comparison to the 48K and 64K machines gracing your friends' homes. Your friends don't come round because they can't abide waiting for your tape system to load. Your computer club colleagues cold shoulder you because you don't have CP/M compatibility.

Whatever the reason, it happens to most of us at some time ... the upgrade.

The two common reasons for upgrading are straightforward. Either you bought the wrong machine first time, or you've outgrown your equipment. Either way, the solutions ought to be fairly obvious.

The catch seems to be that everyone wants the perfect machine. Well, it doesn't exist. There isn't even a single second best.

The answer is to pinpoint the problems with your current system and look for the machine that offers the best remedy without sacrificing too much. You



may be lucky and find the perfect computer for your needs. More likely you'll have to give up some much-desired feature.

PCN — and probably every other computer magazine in the world — receives an endless stream of letters asking the same questions: which machine should I buy? We don't know. All we can do is to throw questions back. ■

HARDWARE: BUYERS GUIDE

AQUARIUS I

Manufacturer: Radofin
Price: £50
Memory: 4K
Display: 40x24

Hardware

Very compact main unit with rubber, Spectrum-type keyboard. Built-in expansion slot takes additional memory cartridge and software packs. The memory size makes for an extremely limited machine although

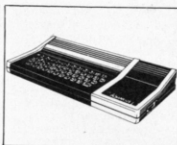
the Basic is reasonable. Possibly one to consider if you want to learn Basic programming on a tight budget.

Software

Very little and of low quality. The graphics are reasonable but the 4K memory imposes severe limitations. You should count on being left pretty much to your own devices here.

Expansion

An 8K memory cartridge is available but no software to



exploit it. There's nothing in the way of peripheral support for disk drives and printers which would be rather redundant given the

limitations on the machine.

Conclusion

The Aquarius I was Mattel's much-heralded launch into the world of home computers but after a series of price cuts, Mattel dropped it. Radofin took it over and cut the price to its current level but even that failed to push the machine sufficiently against the likes of the Vic 20 and Spectrum. It isn't really a contender unless you can't summon the cash for anything else.

SORD M5

Manufacturer: CGL
Price: £50
Memory: 20K
Display: 40x24

Hardware

The Sord, like the Aquarius, was almost stillborn against the tough competition of Spectrum and Vic, despite its excellent construction, good Basic, graphics and sound. It features a rubber

keyboard and cartridge slots for memory expansion and games.

Software

Not much around but what there is tends to be of good quality, especially in the games market. Other subjects are strictly limited, however. You won't find the best-sellers in the Sord format.

Expansion

Again, very limited. No



alternatives to tape storage, but it does have a parallel interface, so adding a

printer would be easy.

However, any decent printer will cost up to four times the price of the machine. . .

Conclusion

A good machine that deserved to succeed but didn't. One to consider if you're on a tight budget, don't want a big range of games and commercial software, and don't mind the lack of support from dealers.

VIC 20

Price: £90
Manufacturer: Commodore
Memory: 5K
Display: 22x23

Hardware

Very well constructed with a full, typewriter-like keyboard including four programmable function keys, joystick ports and lots of interfaces. Graphics — once exceptional — are only average by today's standards but include the ability to display high-resolution with addition of

the Super Expander cartridge, and eight colours. Sound features three voices including white noise.

Software

The range is not huge but there's a fair amount of everything — games, applications, education and programmer's utilities, usually of a high standard. Most games are written for the standard memory but many take advantage of RAM expansions. It's highly unlikely that any new programs will be forthcoming, though.



Expansion

A wide range of expansion options exists, both through Commodore itself and third party suppliers. Disk drives, printers, light pens, joysticks and interfaces are readily

available. Memory expansion cartridges exist in 3K, 8K and 16K formats and can be piggybacked to provide a maximum usable RAM of 28K.

Conclusion

Although well past its prime the Vic has much to commend it and could serve as the ideal introductory machine for under £100, especially in the run-up to Christmas when many retailers may well discount heavily in the face of Commodore's more recent machines.

ATARI 600XL

Price: £90
Manufacturer: Atari
Memory: 16K
Display: 40x24

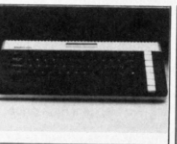
Hardware

Essentially a redesigned Atari 400, the 600XL is smart and well constructed with a typewriter-like keyboard including four pre-set function keys. The graphics and sound are superb and the Basic is a well-

implemented version of the standard Microsoft dialect.

Software

A great deal to choose from especially, but not strictly, games. Although many have been around for some time, they stand up well to more recent offerings. The catch is that most are American imports and tend to be extremely expensive although a few are available at the standard price of around £6-£10.



Expansion

Atari makes a range of peripherals including disk drives and printers, and

several third-party products extend the range even further.

Conclusion

Another of the pre-Christmas bargains since Atari has now stopped production. This means discounts are likely but continued support is dodgy. Difficult to choose between this and the Vic in the sub-£100 bracket. Both machines have staunch devotees.

HW HARDWARE: BUYERS GUIDE

SPECTRUM

Price: £125
Manufacturer: Sinclair
Memory: 48K
Display: 32x24

Hardware

A small box with an infamous rubber keyboard — after initial teething troubles the Spectrum has proved to be a reliable machine. Most of the hardware features represent a compromise — but a very good one. Sound is limited and graphics aren't brilliant but the software support has superseded any limitations. The Basic is idiosyncratic making

upgrades to other machines more difficult than most, but this isn't a major criticism. In fact, where the Spectrum is concerned there aren't any major criticisms.

Software

The biggest and arguably the best range of any computer. The games are outstanding, but there are also many good applications and programmer's utilities — even a number of business programs.

Expansion

Virtually limitless — interfaces allow you to hook up printers, modems, disk drives, and anything else



you fancy. Sinclair's own Microdrives are a vast improvement on cassette systems although not a match for disks, but at around £90 it's hard to quibble.

Conclusion

There are only two grounds for doubt — the age of the

machine and the awful keyboard. The latter can be remedied by the range of add-on, real keyboards, or by the Spectrum Plus, Sinclair's recent upgrade which adds a more usable — though far from perfect — keyboard. The other doubt is simply that many machines now beat the Spectrum on basic specifications. However, if you want to play games, or an introduction to computers, or the budget won't stretch much beyond £100, the Spectrum is the machine by which all others are judged — and often found lacking.

COMMODORE 16

Price: £130
Manufacturer: Commodore
Memory: 16K
Display: 40x25

Hardware

Well constructed if somewhat ugly variation on the theme set by the Vic 20 and Commodore 64. The keyboard is Commodore's standard typewriter-like unit with the familiar four function keys on the right side. The Basic is much improved although by no

means the best on the market. It does, however, include commands to control the sound and graphics — both of which are above average. The only ground for criticism is the memory size, limited in comparison to the 32K-plus that is now common, and makes 16K measly.

Software

With the machine less than two months old software is obviously thin on the ground. However, conversions from earlier



Commodore machines shouldn't be difficult and Commodore itself will have packages out soon.

Expansion

Typically, Commodore

altered many of the interfaces on its new machine but it remains compatible with Commodore's range of printers and the 1541 disk drive. Future support should be good.

Conclusion

As a replacement for the Vic 20, the 16 is well aimed. The price includes a starter pack of cassette recorder and software pack and looks good value. One of the ideal machines for the first time buyer.

MZ700

Price: £150
Manufacturer: Sharp
Memory: 64K
Display: 40x25

Hardware

Very well built model with professional keyboard, function keys included. A good Basic and reasonable sound, but graphics are

limited. The price includes a built-in tape deck and there is an optional four-pen printer/plotter.

Software

Somewhat limited but generally good, although none of the best-sellers is available. Good support from some publishers, notably Kuma which produces a range of



applications and utilities.

Expansion

Rather limited — as yet there are no disk drives available and a future appearance seems unlikely. Very few options apart from printers.

Conclusion

Another of the also-rans. It has a number of drawbacks including the limited expandability.

TANDY COLOUR

Price: £160
Manufacturer: Tandy
Memory: 16K
Display: 32x16

Hardware

Tandy is one of the world's largest computer manufacturers and the construction of the CoCo reflects that. Unfortunately, the other specifications let it down badly. The display is

limited and is all capital letters. Graphics are poor although an expensive plug-in ROM can be used to extend them dramatically. Similarly, a memory expander increases RAM to 64K but also at a high price.

Software

The CoCo has proved quite popular in the US and much software is available there but by the time it reaches Britain the price (you



guessed) is high. Games are good but other programs are limited.

Expansion

A vast amount of Tandy equipment is compatible with the CoCo including modems, printers and disk drives. Price is a drawback.

Conclusion

A reasonable machine but the pricing policy is ludicrous. By the time you've brought it up to a reasonable specification you'd be better off if you'd bought a £500 machine.

COLOUR GENIE

Price: £170
Manufacturer: Lowe Electronics
Memory: 64K
Display: 40×25

Hardware

A standard, full-travel keyboard sits atop a unit that bears a close resemblance to the Commodore 64, down to function keys and graphics characters on the keytops.

A number of interfaces are included. Joysticks, light pen and printer ports among them.

Software

A surprising amount—probably in the region of 200 titles with some good games and a variety of applications and programmer's utilities. The usual caveat applies, however—you won't find the games you Spectrum and 64-owning friends will



be raving about.

Expansion

A range of standard interfaces ensures that

many of the third party products will plug in, including printers and disk drives, although software support for them might be hard to come by.

Conclusion

A much undervalued machine, it doesn't compete with the Sinclairs, Commodores or Acorns. But if you want a reasonable machine on which to learn programming, you could do worse.

ATMOS

Price: £180
Manufacturer: Oric
Memory: 48K
Display: 40×28

Hardware

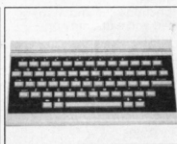
After the true awfulness of the Oric 1, the Atmos was definitely a step up. Rather 'plastic' in feel, it was neatly designed in smart red and black with a good keyboard, although it is far from professional in quality. The sound and graphics are

as good, and in some cases better than, the Spectrum's and the memory is as big as most.

Software

A large selection, probably lagging behind only the Spectrum and 64. Many, although not all, of the biggest sellers are available. The Atmos falls short in other areas, though, with very few applications or serious utilities on the market.

Expansion



Not a vast range of expansion options but the essentials are there—printers and disk drives. The catch with the disks is that

little software is available in the required format, so you're even more limited.

Conclusion

The future for the Atmos is a little uncertain. Oric has cancelled its big TV and magazine advertising campaigns and looks—at least temporarily— to be turning its back on Britain to exploit its greater success on the Continent. That said, most of what you need is already available and there may be bargains to be had.

ATARI 800XL

Price: £170
Manufacturer: Atari
Memory: 64K
Display: 40×25

Hardware

An attractive, well built black and silver box with a typewriter-like keyboard housing what remains one of the sound and graphics machines on the market.

The Basic has been overtaken by recent arrivals but is eminently usable. It tends to share the same virtues and faults as the Commodore 64—faults largely hinging on the use of non-standard interfaces.

Software

See the Atari 600XL—same comments apply, same software runs on both machines with exception of some business applications



which require the larger memory.

Expansion

Ditto

Conclusion

While the Atari range has been successful in the US, it never achieved the same penetration in Britain, largely because of the two-pronged attack of the Spectrum and 64. While it remains one of the best machines available, it has perhaps lost too much ground and is haunted by its unfair reputation as only a games machine.

COMMODORE 64

Price: £180
Manufacturer: Commodore
Memory: 64K
Display: 40×25

Hardware

A superb specification has helped the 64 to its position as the world's best-selling computer. Sound and graphics are second to none, construction is very good, the keyboard is up to professional standards and a range of interfaces completes the picture. The big 'but' is the built-in Basic.

It's awful.

Software

Everything you could possibly want is available, most of it of extremely good quality. The range of games nearly matches that of the Spectrum, while the standard is arguably better given the hardware advantages enjoyed by the 64. A host of programmer's utilities conquer many of the problems in Basic, while business users are also well catered for.

Expansion

Few, if any, machines can beat the 64 for readily available expansion



options. The snag—non-standard interfaces—can be overcome while many dedicated products offer joysticks, light pens, disk drives, printers, graphics devices and so on. Disk drives are probably the weakest of the possibilities. The 1541 is slow, but faster

Commodore drives can be used with a suitable IEEE interface.

Conclusion

Only the 64 has rivalled Sinclair's dominance in the home computer market, and the 64 may have tempted the extra £50 out of many users put off by the Spectrum's rubber keyboard. Continued software and peripheral support for the 64 seems assured. While the Basic may deter beginners to programming, the experienced user should find the 64 a powerful and versatile machine.

HARDWARE: BUYERS GUIDE

ELECTRON

Price: £190
Manufacturer: Acorn
Memory: 32K
Display: 80×25

Hardware
Extremely well designed unit houses a first-class keyboard and probably the best Basic available. The Electron is a cut-down version of the BBC Micro using the same Basic, but short of one or two graphics

options. Its biggest flaw, however, is the lack of expansion. The unit you buy will take only a joystick — further expansion requires the purchase of additional boxes to add on the interfaces.

Software
Not the biggest range in the world but not bad either, and the quality is generally good. Almost — but not quite — all BBC software will run on the Electron, but



because of the different speeds in the processors, much will be unworkably slow on the Electron.

Expansion
See above.
Conclusion

For what it offers the Electron may look pricey, but you're paying for quality. Whether you'd rather have something more tangible in return for your hard-earned is up to you. Do not, by the way, think you can upgrade the Electron to a full-blown BBC. While almost possible, it would cost more than a Beeb.

MTX500

Price: £240
Manufacturer: Memotech
Memory: 48K
Display: 40×24

Hardware
If Memotech is guilty of anything it is hiding its light under a bushel. The MTX is one of the best-built machines around offering an extremely advanced specification for the price. As standard it features exceptionally good graphics, sound, a top quality keyboard with

function keys and numeric pad and a quantity of interfaces.

Software
The only weak spot in the Memotech armoury. So far the machine has failed to attract the all-important big names but the range available is reasonably large and of a high standard. Lots of games and plenty of serious packages too. Recent indications are that some of the bigger software publishers are starting to add the machine to their lists and getting down to



some MTX programming.

Expansion
Hard to beat — printers, disk drives (including 5 and 10Mb hard disks), 80 column display, full networking. In fact,

everything you need to turn a good home computer into a business workhorse-like system.

Conclusion
Success in the micro field is an elusive thing but few who have missed deserve it more than Memotech. If they could get more software houses to back it the MTX would really take off. Even as it stands it's a superb machine for anyone who isn't counting on being able to play *Manic Miner* and its clones. Definitely worth a look.

MSX

Price: about £250
Manufacturer: a dozen of the biggest Japanese manufacturers
Memory: 64K
Display: 40×25

Hardware
Essentially a Commodore 64 with better Basic. The construction is above average with good keyboards and a range of useful interfaces. Graphics

are good with sprites and high-resolution, and the sound is also impressive.

Software
Difficult to judge as yet since the MSX machines are just starting to arrive in numbers. Expectations of quantity and quality are high, however.

Expansion
All the basics have been promised including printers, disk drives and not forgetting those essential



joysticks.
Conclusion
The promise of MSX is compatibility — any

program written for any MSX machine will run on any other MSX machine. How great an advantage that offers, however, is open to question since most software companies now produce their programs to run on the best-selling machines anyway. Although the specifications are good, other machines offer nearly as much, often for around £100 less. It may be best to wait and see.

CPC464

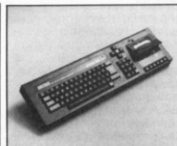
Price: £350
Manufacturer: Amstrad
Memory: 64K
Display: 80×24

Hardware
No criticisms here. It's well-built, offers extremely good graphics and sound and an excellent Basic. The real bonus, however, is that it comes complete with built-in tape recorder and monitor. For £350 you get a colour unit, £230 buys you a high-resolution green

screen monitor.

Software
The software base is still small but growing rapidly. Many of the biggest software houses have taken a favourable view of the Amstrad and are converting some of the industry standards to run on it. Amstrad's own software division, Amsoft, is taking an enthusiastic if patchy approach to software support.

Expansion
Again, somewhat limited so



far but growing. Amstrad has a dedicated printer available, but any Centronics printer should work fine. Disk drives are

promised soon. Whether there's a prospect of anything else still remains to be seen.

Conclusion
Looking good so far — but Amstrad needs to keep the machine in the public eye if it is to avoid the lapse into the shadows that befell Memotech. Certainly one to consider in the all-purpose home market but for a while at least, the Commodore 64 or Spectrum represent a safer bet. Again you might want to wait and see.

BBC MICRO

Price: £400
Manufacturer: Acorn
Memory: 32K
Display: 80×25

Hardware

For quality and reliability the BBC is unbeatable. On specification, however, it now looks a little dated. The Basic remains a leader, but the size of memory is limiting — especially in the higher resolution graphic modes and the lack of sprites has caused it to be

passed over by games players for micros such as the Commodore 64.

Software

A little limited on the games side with one notable exception — *Elite*. It's not worth buying the machine just to play it but it might fit otherwise balanced scales. For other uses, however, the BBC has a great deal to offer. It is probably the one machine that has come close to bridging the gap between home and business use and for a few



hundred pounds more it can be developed into a serious business computer. It is a fine programmer's machine too, with a variety of language options available.

Expansion

Almost unlimited with a host of possibilities not least of which are the number of second-processor options offering dramatic increases in speed and power.

Conclusion

At under £300 the BBC would still be a heavyweight title contender but the arrival of new machines and rounds of savage price-cutting have left it looking unsteady. If you can afford the money, it offers outstanding quality.

ADVANCE 86a

Price: £400
Manufacturer: Advance
Memory: 128K
Display: 80×25

Hardware

A big, hulking brute of a machine with a reasonable keyboard, good Basic and very little else. The catch is that it's not really a home computer, more a cut-down

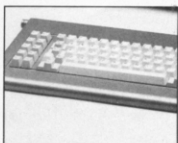
version of a serious business machine. However, in its lowest form it is adequate for neither.

Software

Very little at this level. You really need to expand it all the way to IBM compatibility before you see the software that's available.

Expansion

In this case, the expansion is really all there is to discuss.



The 86a is a fledgling IBM compatible machine but you

need to spend upwards of £1,000 to achieve that elevated status. The addition of disk drives and a dedicated monitor make it a reasonably cheap business machine but there's very little in between.

Conclusion

Not worth considering unless you're happy buying on the basis of expanding it all the way.

QL

Price: £400
Manufacturer: Sinclair
Memory: 128K
Display: 84×22

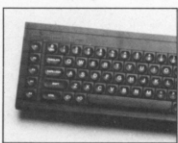
Hardware

On paper it looks extremely good: large memory, typewriter-like keyboard, built-in mass storage on Microdrives, two interfaces, a powerful version of Basic. However, the QL is a flawed beauty. The keyboard, while adequate for home use, is not up to professional standards, the Microdrives are not a real substitute for disk drives, and the interfaces are both RS232 —

a slight overkill. On the other hand it's the first machine in its price range to break away from the 8-bit monopoly of Z80 and 6502 processors by offering the 8/32-bit hybrid 68008 from Motorola.

Software

Very little so far but what is available is good, sometimes exceptionally good. The machine comes with four professional applications free — a word processor, database, spreadsheet and graphics package. Other packages around so far largely concentrate on programming with machine



code assemblers heading the list.

Expansion

Limited but with good potential. The things being discussed include hard disk drives. What's available so far includes parallel printer interfaces and dedicated monitors to take advantage

of the QL's jumbo display.

Conclusion

No machine has provoked as much controversy this year as the QL. There's no doubt that it holds out the promise of wondrous things but most of them are some way from being realised. It may be premature to consider it a true home computer with all the emphasis that's being placed on its business-like abilities. However, it could be the ideal machine for users who don't mind getting their hands dirty, figuratively speaking, and doing a little hacking into uncharted territory.

EINSTEIN

Price: £500
Manufacturer: Tatung
Memory: 64K
Display: 40×25

Hardware

A businesslike, single-box system with professional keyboard and a built-in disk drive. The Basic is very good, and it comes complete with disk operating system XtalDOS — a close relative of CP/M. Graphics are first-class and

sound is adequate.

Software

Not much yet although it's early days and Tatung (it's British despite the name) is doing a creditable job of creating software support. A few games and applications are already available. The tantalising prospect of full CP/M compatibility carries with it the prospect of huge software support.

Expansion

The Einstein has all the



interfaces you need built in so printers are easy to add, and a second drive can be added. Tatung also has a

display upgrade to take it up to the business standards of 80 columns.

Conclusion

Despite being the most expensive machine considered here it's worth more than a glance. The built-in disk drive is worth a couple of hundred pounds if you're taking things seriously, and anyone looking for a cheap way into a business system should investigate.



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SMALL TALK

Good things come in small packages. Geof Wheelwright gets his hands on the Otrona 2001 and gives the diminutive portable a high IBM PC compatibility rating.



Halfway house — the Otrona 2001 PC is an IBM compatible that falls between a desk top and a lap-held system.

Just when you thought you had comfortably settled on a powerful IBM compatible being about the size of the Compaq and a lap-held looking something like Tandy's Model 100, along comes a machine which makes its own set of compromises to achieve a size about halfway between the two.

It's the Otrona 2001 PC, an IBM compatible machine that comes with two disk drives, a built-in CRT screen, up to 640K of RAM, a serial port, a parallel printer port and an external monitor port. It's only 7in high, 15in across and 14in deep.

First impressions

Although the Otrona 2001 isn't much lighter than other portables (it weighs in at 22lb), the diminutive size and mass of the machine made it instantly appeal-

ing. I could quite reasonably see myself hopping on a train carrying the 2001, without knocking commuters unconscious.

The tilt-up facility on the built-in monitor seems an inventive solution to the portable problem. Normally, you must flip-down some legs on the main processor box to see the monitor properly — even that doesn't usually give it quite enough height. The tiltable monitor makes it easy to get round this difficulty without too much discomfort.

Keyboard

The keyboard is smaller than the standard IBM arrangement, with the function keys along the top and an indented slot in which to slide templates. This means that the templates and overlays included in programs such as

Lotus 1-2-3, Symphony and Framework will not fit across the top of the Otrona 2001.

When using *Framework*, for example, I had to make up my own paper template and run it across the top of the keyboard — though once it was in place, it was less obtrusive than ordinary IBM templates. All the standard IBM keys are preserved in this arrangement, but as with everything else on the 2001, they take up less space.

The technology behind the keyboard seems to be some form of membrane arrangement (as with the QL) and the new ACT Apricot machines. The 2001 doesn't however, have the same sticky and 'tacky' feel of the QL. I had expected this might be a major failing of the machine — but the keyboard wasn't so bad.



Even though the keyboard is a membrane type, it has a very high quality feel.

The auto-repeat is not as sensitive as on many membrane keyboards and the 'flat' arrangement contributes to the small size of the machine. A 'caps lock' light is included on the keyboard, but it's at the top left-hand corner, rather than on the shift keys themselves.

Display

The 7in amber screen, is one of the more serious compromises in the Otrona system. The one that came with the review model seemed to have a glowing quality and its resolution left something to be desired.

There are two possible reasons for this — the first is the inherent difficulty in providing any kind of decent display in the space given. The second is that Otrona provides two grades of monitor for the machine; a high-resolution and a medium-resolution. The review machine didn't indicate which type it was — I hope for Otrona's sake that it was the medium-resolution job.

Of course, if you really don't like the monitor, Otrona provides a socket for an external monitor which sits at the top of the machine and allows you to use it as a desktop micro.

Storage

The 2001 comes with various storage devices — ranging from a single-sided 320K drive, through a pair of 720K disk drives right up to a 10Mb hard disk. The drives sit to the right of the monitor — one on top of the other — with the top drive being designated as A: and the bottom B. They open and close using swing doors rather than IBM-style tabs, and indicator lights are large as life at the top left-hand side of each drive.

Expansion

Although Otrona has reduced the size of the 2001 by taking out the standard IBM

expansion slots, the micro can be expanded to 256K RAM on the board, and includes colour graphics facilities, a monitor interface, parallel printer port and serial interface inside. An extra expansion tray which also slots inside the machine brings the memory up to 640K in 64K increments and adds a battery-backed real time clock.

And if you have your heart set on using IBM expansion cards, a three-slot expansion cage can be added to the 2001 externally. This cage wasn't included with the review machine, but the company claims full IBM card compatibility.



The IBM flight simulator runs with no problems.

In use

The important test for an IBM compatible is how well it runs IBM software and hardware add-ons. Every piece of IBM software I tried on it ran without fail — including the ubiquitous Microsoft *Flight Simulator*, Ashton-Tate's *Framework*, both 1-2-3 and *Symphony* from Lotus and Psion's *Xchange*.

All this software ran without any of the special configuration or software patching sometimes required to get difficult IBM software to run on a portable. And although the function keys have been removed, they do all

seem to work properly with the IBM software.

What did give trouble was a Basic routine on a Compaq diagnostics disk. The Basic included with the 2001 (GW-Basic) seemed to differ in a few respects from that included with its slightly larger rival.

Even communications software, normally very particular about the interfaces it works with, didn't give the 2001 any trouble. Other than the operating system and the Basic, there was no software included with the system — but with full IBM software compatibility, you should be able to get anything you need.

Compatibility

It's at this stage in any IBM-compatible review that the reviewer gets a little stuck. Having decided that it functions in pretty much every way — both in terms of hardware and software — like an IBM PC, all else becomes subsidiary.

In an attempt to get round this 'mid-review crisis' and avoid it becoming a shopping list of what does and doesn't run with the machine, it's perhaps more helpful to compare the Otrona to other compatibles than to the IBM PC itself.

Although the size of the machine makes comparing it to desktop compatibles a little ridiculous, it might help put the 2001 in perspective. New desktop compatibles such as the Olivetti M24, Advance 86b and Compaq Deskpro all use the faster 8086 processor and consequently run software two to three times faster than the 8088 on the Otrona and the IBM. But on some 8086-based machines, that greater speed is paid for with compatibility problems.

Then there are the portables themselves: IBM's portable, Compaq's portable, the Osborne Encore, the Columbia portable, the Olivetti M21, the as-yet-

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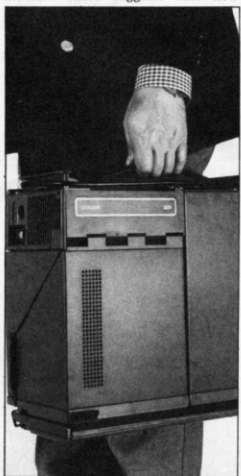
mythical Commodore PC compatible (based on the two-year-old Hyperion design). Aside from the burgeoning range of luggables, the Otrona will also find itself challenged by non-compatible 16-bit portables such as Hewlett-Packard's HP110 and ACT's Apricot range of machines.

Comparing the Otrona 2001 to this impressive field leaves the little machine in a tough position. It doesn't have the built-in software of the HP-110 or the Apricot, doesn't have the support of a huge company like Olivetti and isn't as established as the Compaq. It also uses a non-standard keyboard and can only take expansion cards with a special add-on card rack.

But even with this calibre of competition, the 2001 should be able to put up a good fight.

The problem is really going to be one of marketing, support and the right pricing structure. Only if Otrona delivers well on all three counts can it hope to get anywhere in the cut-throat IBM-compatible market. The company has started well by producing a well-engineered machine which, although it doesn't have the tank-like sturdiness of a Compaq and the keyboard/base seems a little light, does seem able to handle most of the wear and tear it will be subjected to.

Support for the machine will depend largely on how well dealers respond to it — there are enough of them who have been burned in the past to build up an attitude which suggests that new



The Otrona: probably the smallest IBM compatible.



The disk drives can read IBM format disks.

machines from smaller companies are to be treated carefully. Getting supplies out on time will be all important for Otrona.

The final factor, pricing, is probably the most important. Otrona has to make sure the machine is priced competitively, and perhaps a little under the price of its competition. If that's the case, then most of its 'eccentricities' (such as the odd keyboard and lack of expansion slots in the main box) might be forgiven in the light of the fact that it would be cheap, highly IBM compatible and very portable. But since the current price is about level-pegged with the Compaq portable, which has all the on-board expansion slots, a better monitor and keyboard and clone-style compatibility, then the Otrona will have a tough time.

All of this may seem completely irrelevant in a hardware review, but when you consider that aside from whether or not it's compatible — the only other major issue in buying a non-IBM machine is how well that machine will be supported. If the Otrona is pretty much compatible, then how well its manufacturer does in business doesn't matter — but it might later.

What if you buy an Otrona 2001 with 128K and a single drive and want to later add-in a memory expansion tray, or the IBM-compatible expansion card tray? If the company's pulled out of the country, or your dealer has stopped supporting it, then it won't matter how good the specifications looked at purchase.

Verdict

An endearing machine. If Otrona plays its cards right, this one could rival Compaq's and IBM's portable — it's smaller than either.

Whether it's a good buy or not depends on how important portability is to you and how much support there is for the machine. At £2,155 for a machine with 256K, two 360K floppies, colour card, screen and serial and parallel ports, it's competitively-priced, but not cheap.

However, the Otrona 2001 may not get the chance to be a UK success. Otrona has closed down in the US and the company's UK distributor, Duma, has stopped importing. At press time, Puma was looking to a management buy-out of the company to save the machine. Puma has said it will clear existing stocks and support machines already sold. ▀

Specifications

Price	£2,155 (with two 360K drives and 256K RAM)
Processor	8088 running at 4.77MHz
ROM	64K
RAM	128K (up to 256K on the main board and up to 640K with add-in RAM tray)
Text	80x25
Graphics	640x200
Keyboard	Modified IBMPC style membrane system. Includes ten function keys and 15-key numeric pad
Interfaces	RS232 serial, parallel printer port, colour monitor output
Storage	Two 360K drives or two 320K drives or one of either with 10Mb hard disk
Language	Basic
O/S	MSDOS
Distributor	Puma, Westward House, Leigh Lane, Bramshall, Uttoxeter, Staffs ST14 5DN

SOFTWARE PRE-VIEW

We take a look at new appearances on the software scene and outline the shape of things to come. Note to publishers: If you wish your company's product to be included in this round-up, please send only the very latest releases to Bryan Skinner, PCN, 62 Oxford Street, London W1A 2HG. Don't forget to include prices and telephone numbers.

BBC



So, the BBC isn't to be left out in the flood of Christmas software. Software Project's three releases make good use of sound and graphics.

Percy Penguin, contrary to expectations isn't a Pengu variation, it's another platform game. You control Percy, have to jump from floe to floe, collecting fish to keep your strength up, avoid seals and skuas and generally have a Polar ball. It's fun, nicely implemented, difficult and deserves to do well. *Ledgeman* is slightly better than the others, as you might

Ledgeman	£7.95	Software Projects 051-428 7990
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COMMODORE 64



Upper Gumtree is the follow-up to *Urban Upstart*, and promises to be even better. The title is the name of the most boring place in the Universe, a sleepy village, to where Professor Blowitz moves and instigates the action. You must discover the prof's fiendish plot to destroy the world.

Interview is a curious little number. The aim is, as you might guess, to attend an interview, for Front Runner master programmer, no less. And judging by this game, there should be one for an ideas generator as well. The various tasks that present themselves as you try to get to the office in time are singularly dull. Walk down the street, avoid dogs, manholes and banana skins. Then it's on to the aerial map. Here you must avoid all the above, as well as cyclists and cars, and the dogs seem to have developed a mean streak — they'll latch on to your scent and come after with a vengeance. But there's really not much to it at all.

guess it's a platform game with all the usual paraphernalia. It's rather like Durell's *Mineshaft*, but somehow lacks appeal.

Eggweezer is a maze-type game in which you have to collect diamonds, avoid or zap aliens and watch out for the maze's defence system. Software Projects is leading the way in minimalist inlays, the description of the game runs to a full three sentences.

Landing Party is a variation on *Star Trek*, but it's not bad at all. Your task is to locate and save Mr Spark, and moving from sector to sector you can orbit planets, beam down landing parties, zap Zingons and on and on.

Upper Gumtree	£6.50	Richard Shepherd 06286-63531
Interview	£7.95	Front Runner 01-992 8055
Gogo the Ghost	£2.50	Firebird 01-379 6755
Henry's House	£8.95	English Software 061-835 1358
Smuggler	£7.95	Superior Software 0532-459453
Magic Stone	£5.95	Audiogenic 0734-664646
Time Traveller	£5.95	Audiogenic 0734-664646
Juice	£7.95	System 3 01-587 0873
Suicide Strike	£7.95	System 3 01-587 0873
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Jungle Quest	£7.95	Solar Software 061-761 1170
Monkey Magic	£7.95	Solar Software 061-761 1170
Forces of Naame	£2.99	Software Supersavers 051-428 7990

Games Workshop follows up its brilliant *Battlecars* and *D-day* with an adventure, *Tower of Despair*. A map, guide and history are included in the package.

If you're looking to use your 64 for finance, you might find *Basicalc 3* useful. It's Superior's latest spreadsheet, and offers a maximum model of 2500 cells, fast moves, up to 38 character formulae, simple bar graphing, and many other facilities.

We ran a sneak screen shot of *Flyer Fox*, recently, and the game is now available from retail outlets. It features voice synthesis via the 64's sound chip, but it's a bit indistinct, perhaps accurately representing radio contact. The game itself is pretty simple, your task is to guard a cargo plane from attack from the enemy fighters. When one's spotted you hear 'Breakaway, Breakaway' over the air. Then it's down to you to locate and kill.

The graphics are adequate, the sound fair, but it's far from a chart topper. We're still waiting for *Gandalf*, after promising glimpses seen at the PCW show,

but it's not been seen since. System 3 is importing three titles from the US. *Juice* involves moving Edison, your kinetic android, from square to square to make a connection of the electric variety. Nohms

impede Edison's progress, melting him down and doing much the same for your score.

Like many successful American games *Juice* is a simple concept, but maddeningly difficult and addictive.

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SPECTRUM



Run For Gold, *Yacht Race* and *Rally Driver* are simulations from Fiveways, normally responsible for fairly high quality educational software. *Run For Gold* is a bit late on the scene as an Olympic game, and only deals with middle distance running. There's a choice of three distances, four competitions, your performance improves with your success at each level and the graphics are quite neat.

Yacht Race allows you to practice sailing at a number of levels, rudder only, trimming the sails, and balancing the helmsman. Then you can race against another yacht. It's nicely done, but the screen update is rather slow and the graphics aren't up to much. Still it's original.

Rally Driver will probably do better. It features some road racing like *Pole Position* and others, but you also have to

navigate the course, slow down for check points, try not to pick up time penalties and so on.

Boulder Dash was a big Commodore 64 hit in the US and looks set to do well over here. Front Runner's conversion is pretty good, with the exception of the sound and some of the scrolling. It's an addictive and original game which should do as well among Spectrum owners as those with 64s.

The *Sandman Cometh* has now been re-released, it's an illustrated adventure set in the land of dreams and nightmares. Watch the Dungeon page.

Graphics LOGO comes from an established publisher of books, but was written by Sigma Press, which produced *Pilot* for the 64 among others. The Logo was designed especially for the Spectrum, uses single key entry and comes with a keyboard overlay to make this simpler. It supports programs with line numbers, procedures, can link up to Basic, supports recursion and has some special graphics commands.

Graphics LOGO	£17.95	John Wiley 0243-784531
Boulder Dash	£7.95	Front Runner 01-992 8055
Boilerhouse	£6.95	Front Runner 01-992 8055
Rally Driver	£9.95	Hill MacGibbon 01-353 6482
Yacht Race	£9.95	Hill MacGibbon 01-353 6485
Run For Gold	£9.95	Hill MacGibbon 01-353 6485
Beebul	£11.99	Scorpio Gamesworld 061-834 2292
Hill Man	£11.99	Scorpio Gamesworld
The Sandman Cometh	£10.95	Star Dreams 17, Barn Ct, Seaford, Sx.

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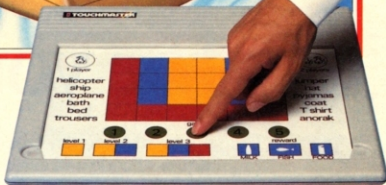
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SPECTRUM

GALILEE

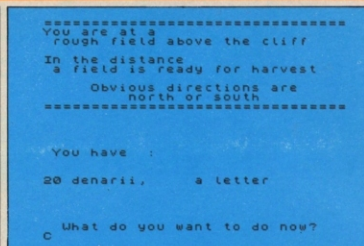


I loaded up *Galilee* with great interest, having very much enjoyed Peter Good-

lad's previous adventure *Jericho Road*. The good news is that the Rev Goodlad has raided the Bible again, and come up with another good adventure.

The Minister has a bit of the devil in him and you don't even know what your mission is. What you do know is that this is the 15th year of the Emperor Tiberius and you wake up in a graveyard where a maniac keeps popping up to hit your poor aching head. A quick poke in the T (for Inventory) reveals that you have 20 denarii and a letter, but nothing to get back at the maniac who cries 'I'll kill you again!' Again? This maniac is mad. Feh's read the letter, which tells Zebedee and sons to give employment to the bearer, signed Abrahams, Fish Gate, Fishy business. Well, provided you examine everything.

EXAMINE MAP draws a map of the Sea of Galilee and sur-



rounding area, with a flashing cursor indicating where you are.

Once you have the map of the Sea of Galilee you can check it any time you like, whether on the sea or ashore, and the cursor tells you where you are. This is useful, especially when you're crossing the Sea, but less than useful is the bug in the program which causes it to crash at one point with an out of screen report, when you venture south of Tiberius and then cross a bridge.

Pray and Help can be used, to take you to those Biblical references (cribs?), while Score

gives you a percentage to indicate how you're doing. If you die you can start the game over again, and although you go back to the beginning you can input your final score so that the game itself will be in the state it was when you left it. To understand that, you need to know that the game doesn't provide a long series of obstacles, but instead is more a gathering of information and clues, and meetings with various people.

You need a generous supply of papyrus — at the moment I've got four different maps going for the four towns I've visited, with another to come

when this Michael can row his boat ashore to Capernaum. Some of the maps should eventually connect together, I imagine. I've found the right person to take the letter to, but haven't yet been very successful with the fishing net, and at one point I seemed to be on the verge of walking in on the Sermon on the Mount.

Apart from the map there are plenty more graphics screens, including views of the towns as you approach them from the water and the insides of several buildings, from inns to synagogues. The screen is nicely laid out, with the location description and obvious directions at the top (don't forget to try the other directions, too, but don't ask me to raise you from the dead every time), and your commands and the responses underneath.

Unfortunately, the commands disappear when the response comes up, and that response disappears when you enter your next command.

An intriguing adventure, original in many ways, and despite a few problems it should appeal to most adventurers.

Mike Gerrard

Rating 8/10

Price £5.95 Publisher Shards Software 01-591 7666.

BBC

MR EE

Mr EE isn't particularly original, but it shows that, given a bit of imagination, a 6502 and 32K RAM can perform almost as well as a Z80 with 48K.

Mr EE is a wizard who can tunnel through earth and whose main aim in life is to gather cherries. As he trolls around the screen he's pursued by Umphs, an ugly gaggle of characters.

Fortunately, *Mr EE* has had the foresight to equip himself with a crystal ball which can kill Umphs.

However, the crystal ball has a mind of its own and will bounce around the tunnels cre-

ated by *Mr EE*'s frantic cherry scrambling until it hits something. If it hits an Umph, it vanishes for a few seconds. Casting the sphere shouldn't be done at random — you never



know when you might need it. A very nice touch is the way the errant bouncing does return.

Apples are scattered here and there throughout the maze, and if *Mr EE* can deftly undermine

one of these and cause it to fall on an Umph — it's goodnight and goodbye.

Nobbling all the nasties takes you to pastures new, well not that new. The maze may be a different colour and more complex, but essentially it's the same scenario.

But, hold on, there's more to this game. When all the Umphs have left their base, it becomes a lump of food.

If *Mr EE* can walk over this, the Umphs and Diggers will stop, and creatures called Maras will appear. These eat any apples they encounter, but will themselves be turned into apples if you can kill them with the crystal ball.

There's a bonus for eating all

eight cherries without pausing, more for killing more than one Umph with a single apple. I'm not sure how this can be achieved, but that's what it says on the cassette cover.

The only niggles are that you can't redefine the playing keys and the characters are a bit small.

A difficult, but not impossible game, pretty good animation, a scoring system operating at super-human levels and both pause and quiet facilities.

Bryan Skinner



Rating 9/10

Price £6.95 Publisher Micro Power 0532-458800

BBC

MINESHAFT

If you've ever envied Spectrum owners because of the relatively better games graphics, buy this. I thought I had swapped Beeb for Sinclair.

Mineshaft is a fairly straightforward platform game, with a topical theme. You have to collect as much coal as you can from the 20 locations in the mineshaft. Not pick and shovel, but mostly by your wits. Passing over the nuggets wins points, as does bouncing over the sludge.

Your miner is a big-nosed, cloth-capped figure, and he's shown as clearly as many a Spectrum character. His movement has been given just as much thought; when he springs into the air the ballistic parabola looks real, making it quite easy to learn fine control.

The 20 locations have wacky names like Impossible Jump?, The Water Works, The Junk Room and La Fin (that's the last). One of the best features is that pressing ESCAPE takes you to the next screen.

To be honest, none are very complex nor very different from each other. There's an entry

and an exit to each screen, with up to half-a-dozen or so lumps of coal sitting in what look like



impossible locations. You always start in the same position, different for each room, and have to use the platforms to leap to the coal. The red platforms

are made of sludge which disintegrates as you cross it so it's better to bounce.

Naturally, falling too far is fatal. And to add to your difficulties, you only have a limited supply of air.

Mineshaft's not a brilliant game by some Spectrum games standards, but compared with most Beeb games to date, it's one for collector's corner.

Bryan Skinner



Rating 8/10

Price £6.95 Publisher Durell 0823-54489

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SPECTRUM

JEWELS OF BABYLON

Jewels of Babylon were turned into a beautiful collection of treasures by master craftsmen more than 3,000 years ago in Babylon, and after many men had died in their pursuit they wound up in English hands by the end of the 19th century. Queen Victoria offered them as a wedding present to an Indian Princess, but the boat carrying them was attacked by pirates after leaving the shores of West Africa. The crew were left for dead, and all perished except for... guess who? Yes you.

At the start, you have tracked the pirates down to their island, and the game opens with a beautifully drawn scene of the deck of your ship, the rigging,

and the island off which you're anchored. Only a limited number of the locations have an accompanying picture, but they are all well drawn and appear instantly. The picture only appears the first time you visit a location, but can be recalled at



any time by typing 'Look', which otherwise reprints the text.

The program allows for full English sentences to be entered, though of course you can use the terse 'Go North, get

square with action to the left, gauges down the right. Instrumentation includes counters for DNAs Linked, Bugs Purged, Orbs Unused and an Orb Meter.

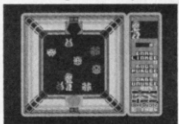
The action takes place in rooms linked by hexagon-shaped blue doors. Some rooms contain orbs, which must be collected to keep up strength, needed to get through the doors. Others contain fragments of the DNA which have to be collected. Unfortunately, the rooms are monitored by a security system which is activated as soon as you enter, and a host of

coconut' if you wish. In some ways this expands the potential of the responses, but in other ways it limits them. In the first location on board ship, for instance, you can see 'A ladder leading down to a small rowing boat alongside.' Type 'Down' and 'You can't go in that direction.' Climb down? 'Please rephrase that.' Go down? 'I don't know the word Go.' Climb down ladder? Eureka, you're in the boat.

Exploring the long sandy beach provides you with a plank, and in the palm trees above there's a coconut, and a bottle. Closer examination reveals this contains rum. There are very few objects around at first, and the game does rely rather too heavily on mazes. There were three in the first 30 or so locations (over 100 in all)

nasties slowly materialise.

You can dodge them if you're nimble fingered, and you can



hurl orbs at them. This may help your rating when you've lost your third life, but don't be reassured, as you only start with

— a swamp, a jungle and a thicket. The maze of paths in the very thick thicket led eventually to a cannibal village, where the beauty of the graphics was not matched by the looks on the faces of the natives, who had seemingly not given up their cannibal habits.

You usually get a slight warning of impending death, so the SAVE option should get a healthy use, and while an initial island walkabout gave the impression that this wasn't going to be the toughest of adventures (I may regret that later), it nevertheless had a very nice feel. **Mike Gerrard**



Rating 8/10
Price £5.50 Publisher
Interceptor Micro's
07356-71145

SPECTRUM

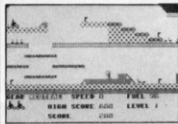
XAVIOR

As you might guess from our hero's name, your aim is to save something — no less than strands of DNA, crucial to the continuation of your race. In the cassette wallet there's a half-page story which outlines the scenario. You control Xavior, who is pretty large but quite well animated, even if he does waddle up the screen. Control is key-definable or joystick.

The display is the standard

for you in a demo mode if you wait a wee while.

With four bikes at your disposal you must make your way round the first screen collecting all the flags and avoiding the



obstacles before your fuel runs out, though you have a generous 100 units so there's little chance of that. Once you've collected the last flag the gate to the next screen opens, and off you're looking for further hazards.

Pressing the fire button or space bar allows you to do a wheelie, but otherwise control is just accelerate/decelerate and left/right.

You need your wheelie at once to jump the gap from the first platform to the second one, where a flag is standing, and a little experimentation shows you need to take this at 30 mph to avoid falling short or hitting the top of the screen. Your speed (maximum 40), fuel, lives, score, high-score and which gear you're in (up to third only) are all shown at the foot of the screen.

You bump down some barrels to the second flag, making a sharp turn to avoid the pecking chickens, then slowly drive down the screen's platforms (you can fall, but not

2,048 of them. Unfortunately the orbs don't bounce around.

There are supposed to be 4,096 rooms, and 32 designs. Many of the locations look rather similar but the monsters are varied and neatly animated.

Xavior is so complex and difficult that it should keep you amused for hours. **Bryan Skinner**



Rating 8/10
Price £5.95 Publisher
PSS 0203-81346

COMMODORE 64

STUNT BIKE

A new Ocean game is always worth looking at, and the last few have been worth buying. But the standard drops with *Stunt Bike*, which is a not very exciting attempt to let you play wheelies.

There is a revving noise but it's tame stuff, sounding more like a contented cat, while in the background there is a plodding tune of the type designed to have you tearing your hair out. The sound on/off option turns the bike sound off but the music drives you batty.

You use joystick or keyboard to move your man around the screen, and there's a promise of nine screens in total, displayed

just out of view — or at least it's supposed to, but as there's no indication in the scanner as to where your own ship is situated this proves a little tricky.

In the centre of the main screen is a sight which indicates by crossed lines whether you're climbing or turning, but these tend to be confusing as they move the opposite way to you.

The other features include a Kempston joystick option, PAUSE, a saveable high-score table and the chance to define your own keys. There's also a

demo mode which shows off the excellent sound effects, but



regrettably the sound is the best thing about *New Cylon Attack*. The enemy ships, which are extra-large *Invaders*-style

too far) till all the flags but one have been collected.

You must wheelie up a ramp, over a traffic warden and two more pesky chickens, to land on the other side where the flag is. But if you take it at 35 mph you land on the chickens, while at 40 you can hit the flag and see the gate to the next screen flash open, only to lose your life when your bike hits the deck.

Despite seeing only one screen, I was disappointed with the game as the graphics are very simply done, and with no sound to speak of *Stunt Bike* is hardly a stunner. **Mike Gerrard**



Rating 5/10
Price £6.95 Publisher
Ocean Software
061-8329143

SPECTRUM

NEW CYLON ATTACK

If this is the *new* one, I'm glad I didn't have to play the old *Cylon Attack*, which would have been so dated as to make *Space Invaders* look like a megagame.

After launch, it's you against the Cylons, with most of the screen taken up by the view through your cockpit screen. Above this is a long-range scanner showing any Cylons

shapes, lurch out of the screen at you and disintegrate into little squares when hit.

Repetition can be exciting, but simply going through wave after wave of Cylons certainly isn't — whether you end up defeating them, or they wipe the floor of the universe with you. **Mike Gerrard**



Rating 3/10
Price £5.75 Publisher
A & F Software
0706-341111

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SPECTRUM

BOUNCING BERTIE

It was inevitable we should get the micro equivalent of the K-TEL all-time greats. Especially as the bumper Christmas season looms large for software houses trying to make a crust. Power Software is not in the K-TEL league but its latest 'Budget Series' illustrates the trend. For £3.50 it can sell two well-proven game types, so what chance do new games have?

The Power Software Budget Series packages *Bouncing Bertie* and *Eskimo Capers* on the one cassette for the 16K and

48K Spectrum. *Bouncing Bertie* is a variation of *Qbert* which was very popular a year or so ago. It's low on excitement and impressive screen action, and is more of a strategy game.



The idea is to jump up and down filling in the tops of the cubes on a pyramidal structure while avoiding the bouncing balls and snakes. You can land on a disk to get back to the top of the structure.

Bouncing Bertie is frustrating to play at first, but becomes more likeable as you get more successful. In Gameplay jargon we could call this the 'familiarity threshold factor'. Resistance to high FTF is probably one of the main reasons derivative games tend to be popular with the game player: when you know how to play a close relative, you can play it with effort more quickly.

Its companion, *Eskimo Capers* also has a familiar feel to it. A maze of snowmen can be pushed about by the terrified Eskimo to block or eradicate what appear to be cold-resistant pac-men, busy gobbling their way around the maze. The cast of characters become progressively more voracious —

hatching snow devil eggs, dancing snowmen etc.

There are two complaints. Without joysticks, you're expected to manipulate the 6,7,8,9 and 0 keys for left, up, down, right and push/crumble respectively. Surely Q and A etc would be easier?

Another drawback concerns the persistent tunes. Even with five they still get tedious — no wonder the hatching snow devil eggs have such nasty personalities.

Two good versions of old games — good value. **Ian Scales**

Rating 8/10

Price £3.50

Publisher Power

Software

0384-370811

COMMODORE 64

CLUEDO

A dastardly murder has been committed at Tudor Close. Dr Black has been done to death — but in which room, with what and by whom? Could Miss Scarlet have brained him with a candlestick in the kitchen? Or was the sawbones croaked with a rope by Colonel Mustard in the conservatory?

Fans of the superb Cluedo board game will need no introduction to this famous assemblage of would-be murderers, locations and murder weapons in this authorised implementation.

The program allows up to six

participants. Any of these can be the computer playing at one of three skill levels and using elimination, deduction and a limited set of clues, the player should try to be the first one to solve the murder mystery. Not only 'whodunnit' but also 'whatdunnit' and 'wheredunnit'.

Three random clue-cards denoting the murderer, weapon and room are first removed and the remaining cards are dealt. Each player gets the opportunity to throw dice and move round the ground floor of the house. Once in a room the player can suggest the solution, the intention being to identify which cards are still present. All the information (cards, dice,

boards etc) is displayed and handled as appropriate by the computer.

Whether you prefer the board version must be a matter of taste but there's no doubt in my



mind that his official implementation is first rate. It remains faithful to the original while adding a few neat touches of its own. I especially liked the theme tunes for each character,

the Reverend Green's is *Onward Christian Soldiers* while Miss Scarlet's is *Gone With The Wind!* The graphics are a delight.

There are drawbacks, and having to ask other human players to look away when your own data is being displayed is one of them.

Overall though, this is an excellent implementation of a classic board game, and a superb blend of the old with the new. **Bob Chappell**

Rating 9/10

Price £12.95

Publisher Leisure

Genius

01-935 4622

SPECTRUM

ENDURO

This is a hypnotic game, replicating many of the qualities of fast motorway driving. Playing it for more than 20 minutes confuses your eye, frays your nerves, and makes you sweat.

The object of *Enduro* is to pass as many cars as you can during a day, a night and a morning of an endurance race. The player has a 'bird's-eye' view of the car, and mountain ranges and competing cars loom ahead.



meandering lazily in front of you and cars being overtaken at a satisfying rate, the next you're confronted with sheet ice

and a commensurate loss of driver control. Then night draws in — tail-lights are the only indication of your looming victims.

Eventually, time runs out and the game's over, unless you pass the requisite number of cars, at which point you move up to a harder level where there are more cars to pass in the available time.

Trying to occupy the same piece of track as another car causes an immediate loss in your performance rating. The penalty for hitting the side of

the track or brushing another car is having half a dozen competitors pass you. The best tactics seem to be to go flat out and take the collisions in your stride.

Enduro is a compelling game in small doses. The graphics aren't brilliant — certainly nowhere near *Pole Position* or *FullThrottle*. **Ian Scales**

Rating 7/10

Price £7.99

Publisher Activi-

sion

0628-2448

COMMODORE 64

MR ROBOT

Beyond Software has released what I consider to be one of the best platform and ladder games.

On feature alone makes *Mr Robot* stand out from the crowd: the ability to design and configure your own screens, and if you've bought the disk version you can even save them for future play. The design option features a wide range of components. Each component is shown as an icon — simply

move the cursor to one you like, press the fire button and hey presto, you can replicate that component anywhere on the screen.

Now to the game. You have to guide a walking, climbing, leaping robot around the screen. Passing over every power pill (shades of Pacman!) lying around. To speed the journey there is just about every mechanical aid going, all available for *Mr Robot*'s use. There are ladders, lifts, treadmills, greasy poles, magnets, transporters and sundry elevators.

Hazards include plunging off

the end of a platform, bombs which start spluttering when touched, then explode a few



seconds later, and alien fire. *Mr Robot* can surround himself with a protective aura by grabbing one of the many energiser tokens.



Rating 9/10

Price Cassette £8.95,

disk £11.95

Publisher Beyond

Software

01-837 3699



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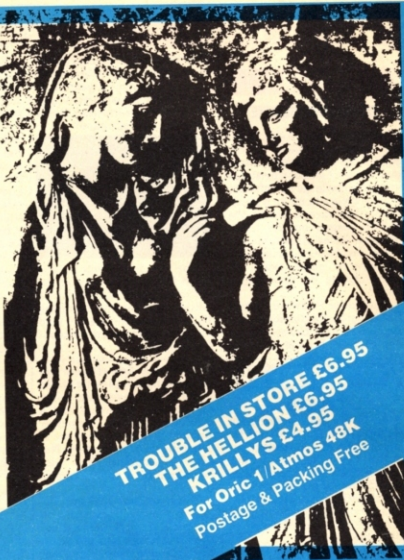
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SUITE EXTENSIONS

Simon Williams tries out a suite of 11 utilities called Discmaster which Beebugsoft hopes will prove top of the pops with users.

With the paltry number of five names allowed per disk, the infamous 'Can't extend' error and numerous other little quirks Acorn was generous enough to include in its DFS, BBC users with disk drives need all the help they can get. Enter Beebugsoft with its suite of utilities costing less than two thirds of the usual market price.

Features

Discmaster is a suite of 11 utilities which can certainly ease the intelligent use of single or double drives. Each routine in the suite is preceded by a neat header display and may be used repeatedly once loaded into the micro's memory. The main menu is loaded on booting the disk. Figure 1 shows the options it contains.

Each routine is written mainly in Basic, and most are used directly from the main disk. The Move down, Overlay and Disk menu programs, however, need to have routines attached to each user program.

In use

The search and edit routine is really two separate utilities. Search will hunt through a specified range of sectors and tracks for a given ASCII string, which will then be displayed with its first character highlighted. Edit allows you to roam at will around your disks and alter locations byte by byte.

Examine and recover offers a secondary menu with options to examine and recover sectors of a corrupted disk, rescue the recovered file and change its load and execute addresses. For anyone who has had valuable data lost through a disk crash, this utility may warrant the cost of *Discmaster* in itself.

The Move down routine allows any disk program up to 85,000 bytes long to be shifted down to a specified address (page boundary only) and executed automatically from there. Basic and machine code programs may be handled, but the new version of the program, with the Move down routine attached, has to be *RUN. It is therefore important to keep an original copy in case alterations need to be made.

The Disk menu utility may be copied onto any user disk. File names are entered into the menu routine and allocated to a particular directory, depending on the type of program. The menu is then available directly by pressing SHIFT and BREAK, and each program may be called by typing its associated letter.

Since the dual catalogue utility allows up to 61 file names per disk surface, it seems odd to restrict the menu display to only 51.

The Disk indexer is potentially a very useful facility, as it will automatically index up to 255 disks and search for a given filename. I say 'potentially', as there are two problems with the way it works. First, the routine has to be called from the main menu, meaning at least two disk swaps on a single disk drive, before you can get at the file you're after. You should be able to copy the program to another disk.

Figure 1

- A Disk sector search edit
- B Examine and recover
- C Move down routine
- D Disk menu
- E Disk indexer
- F Tape to disk transfer
- G Link utility
- H Overlay
- I 40/80 track expander
- J Dual catalogue utility
- K Disk formatter

Second, the indexer will not automatically index a disk with a dual catalogue. It is not even possible to swap catalogues manually from within the indexer.

Instead you have to save the index, load the offending disk and swap its catalogue, load *Discmaster* and run the indexer, load the disk containing the existing index and then reload the disk whose catalogue you wish to index. Not a quick procedure.

The tape to disk transfer routine will take up to 28 named files (or all those on a given cassette), and automatically transfer them to disk. It will not copy

protected disks and you will need a tape recorder with motor control. For those upgrading to disk, this routine could save a lot of time.

The Link utility is designed to allow a programmer to keep a library of useful functions and procedures which can be called from disk and incorporated into a program under development. This allows a very modular, structured approach to be adopted when programming. The format of command recognised by the link utility is:

XX REMINCLUDE (space) (module name) where the module name is the file name of the module you wish to link. If you write programs which make repeated use of the same elements, then Linking them could well speed things up.

Overlay may initially look much the same as the Link utility, but is in fact designed to overcome the memory restrictions imposed by the Beeb when running the DFS. Areas of memory may be dynamically overlaid with new sections of code, thus effectively raising the length limit to the size of disk used. You need to know what you're doing, but full instructions for the technique are provided in the manual.

The 40/80 track expander is very useful to those upgrading from one type of disk drive to the other, as it will expand any disk without disturbing its contents.

The Dual catalogue utility will set up a second catalogue on the disk, allowing more individual files to be kept. If the disk is less than half full, and the catalogue has more than one file name left to allocate, a second one may be set up without disturbing the files on the disk. The catalogues may then be swapped using the *OVER command. This takes an appreciable time and the new catalogue is compacted each time it is swapped. This can be annoying, as it may increase the number of 'Can't extend' errors.

The last utility is a disk formatter. This is quite slow in operation, but does retry up to ten times on verifying a faulty track.

Verdict

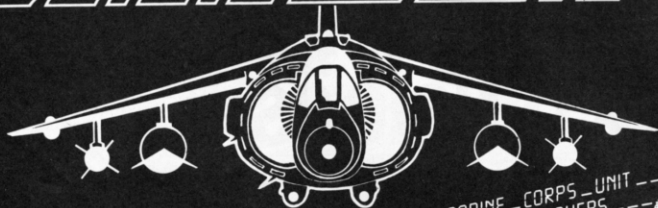
Overall, *Discmaster* offers some very interesting facilities, but these have not been integrated sufficiently. The awkwardness of using a disk suite has not been outweighed. But for the money, it's not a bad try. ✓

REPORT CARD: 1 TO 5

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

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Atari

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Atari 400 16K, boxed plus book, ideal for beginner, £65. Tel: 0621-891715 (Evening).

Atari 400 16K, 410 recorder, Microsoft Basic II (alone worth £50), games and manuals, everything, £130. Tel: Mark on 0639 914185.

Atari 400 software wanted with software. Tel: 0602-888276.

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Americans make hard-headed businessmen, it's well known, but their trade shows don't lack light relief.

One of the more novel programs announced in Las Vegas at Comdex last week was a music program for the Macintosh and Commodore 64. Called Macmusic and Computer Hitware respectively, the packages offer music composition and a string of prerecorded pop hits from the likes of M Jackson, Lionel Ritchie and The Police. The company explains: 'We're working on the Michael Jackson after-market and taking it to the computer retailer.'

Meanwhile, ACT made its US debut at the show, and very modest it wasn't. It humbly said of its Apricot range: 'It will probably turn the whole of the USPC industry on its head.' Big Blue's executives are no doubt already losing sleep.

Over at Osborne, insomnia is probably a fact of life. The ailing company's latest blunder highlights another US characteristic — no sense of humour. Its public relations department threatened to charge newspapers \$1.19 for a news release and \$1.69 for a black and white photograph; one outraged edi-

tor is reported to have replied: 'If you can't afford to give a press conference, you're not worth writing about.' Osborne shyly admitted that the joke had backfired.

Back home in issue 83 we drew attention to the fact that the 'Hot Lines' section in *Your Computer* was just a shade inaccurate, in that something like half the phone numbers

were disconnected or wrong. It would be too much to hope for the staff of *Your Computer* to read PCN, so it comes as no surprise to us that they haven't been updated.

We at PCN are generous souls, and if *Your Computer* staff would like to contact our back issues service we'd be happy to sell them a copy of issue 83.



The confrontation of Welsh Development Agent and parrot brought out the best of you in response to issue 85's Laughline competition.

Straightforward violence continues to appeal to the judges, as in Ian Aitken's 'Give me some birdseed or I'll break your arm'. But in the end we decided to award the £20 prize to Patrick Young of Belfast for an entry with a touch of local colour: 'Well, Mr de Lorean, I certainly doubt whether the Government will see through your disguise — now about this stainless-steel micro you want to build here...'

SYNTAX ERRORS

British Telecom's trial dial-up service for micro users (issue 87) may have been underexploited since we printed the wrong telephone number in our story. To check the service ring Bradford 0274-722622.

Our review of Odyssey 1 (issue 87) puts its price at £4.95. Softstone points out that the correct price is £2.99, and at that price it's not too bad.

There were a couple of errors in our report of Martech's Eddie Kidd challenge; the organiser's phone number is 0323-768456 and the closing dates are November 30 and February 8.

In the instructions for Spectype (issue 87) the keyword CHR\$ is missing from the one-line program to check the keyboard read routine. It should read 10 PRINT CHR\$(64471); GO TO 10.

The Oasis Epm program reviewed in issue 87 should have been priced at £171.35 inc VAT and not £199 as stated.

NEXT WEEK

Enter Entrepo!

Wafa storage takes the biscuit as we assess Entrepo for the Commodore 64.

Butting in

Our Spectrum listing helps you teach yourself interrupts.

Simply years ahead?

Philips P2000C IBM-compatible takes the spotlight in our comprehensive hardware Pro-Test.

Sign off

Wave goodbye to pedestrian graphics with this BBC listing for the geometrically inclined.

PAL-2000

by Mollusc

PAL 2000 just entered PCN's Top Twenty

PCN DATELINES

Event	Dates	Venue	Organisers
Electron & BBC Users' Show	Dec 6-9	New Horticultural Hall, Westminster, London SW1	Database Publications, 061-456 8383
CADCAM Intl Show	Jan 8-10	NEC, Birmingham	EMAP Intl Exhibitions, 01-837 3699
Mini/Micro Computer Exhbn Conf	Jan 13-16	Stockholm, Sweden	Sollentuna Massan, Box 174, S — 191 23 Sollentuna, Stockholm
Which Computer?	Jan 15-18	NEC, Birmingham	Clapp & Poliak 01-891 5051
High Technology & Computers Education	Jan 23-26	Barbican, London	Computer Marketplace Exhibitions, 01-930 1612
Computer Exhbn — Computer Thai	January 23-26	Bangkok, Thailand	Conf & Exhbn Management Services Ltd, 61/5 Langsuan Soi 2, Ploenduit Road, Bangkok 10500
Intl Microcomputer Fair	Jan 29-Feb 3	Frankfurt, Germany	Collins & Endres, 01-734 0543
Apricot & Sirius Computer Show	Feb 5-7	Kensington Town Hall, London	Paradox Group, 01-241 2354
Intl trade show for home comps, software, etc — LET	Feb 17-19	Olympia, London	Turret-Wheatland, 0923-777000
MEXCOM	Feb 25-28	Mexico City, Mexico	AESI Ltd, 01-379 7628

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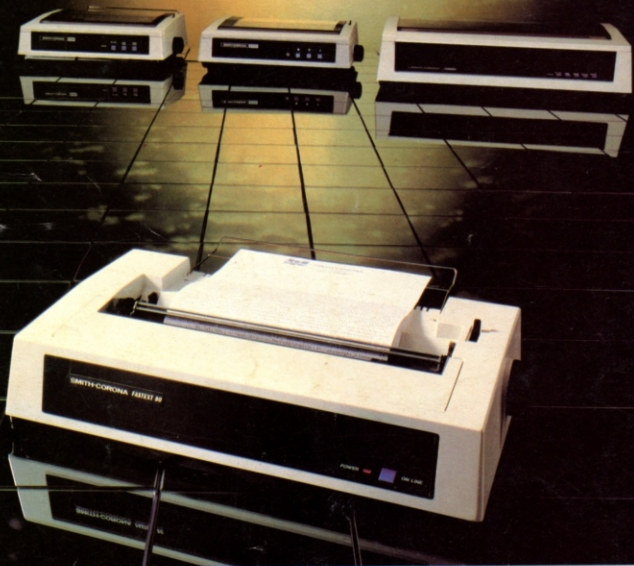


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