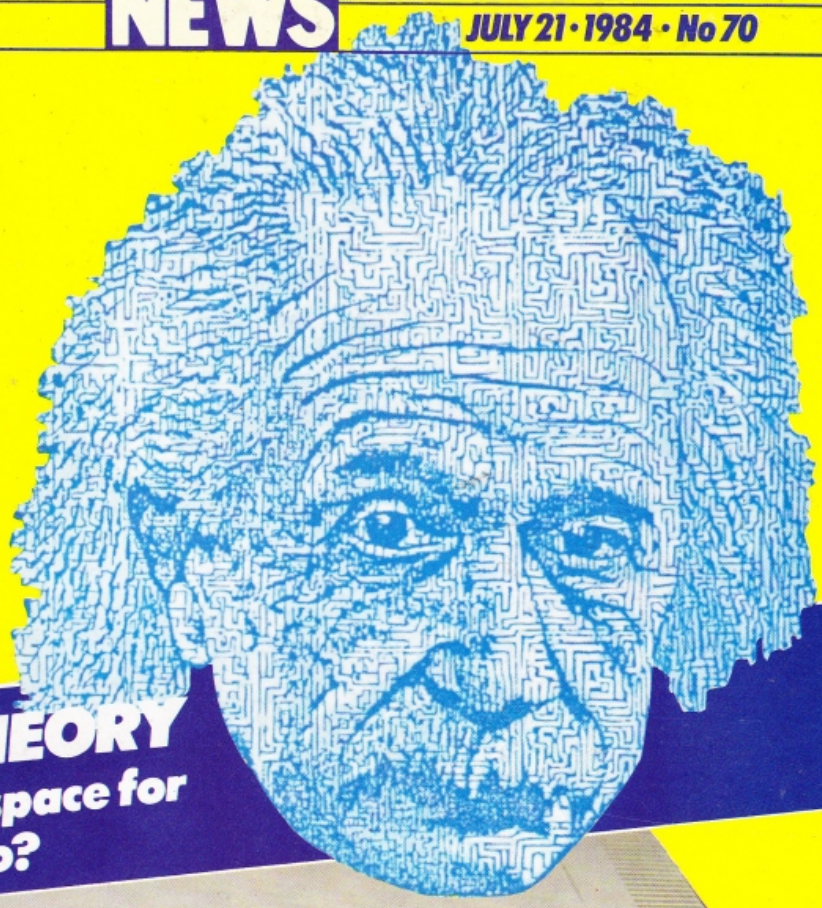
PERSONAL
COMPUTER
weekly NEWS
JULY 21 · 1984 · No 70 50p

64 GRAPHICS
Picture power from a light pen package

BBC DATABASE
Down to business with the Model B

SINCLAIR ALL SORTS
Machine code routines for souped-up Spectrums

PLUS. . .
Features and reviews for Oric, Atari and Dragon.



EINSTEIN'S THEORY
The right time and space for a British micro?

THE KEY TO PROFESSIONAL GAMES DESIGN

ON THE SPECTRUM 48K

THE GAMES LANGUAGE OF THE 80'S!

Now, without any knowledge of machine code, you can write fast, smooth, professional, totally original games and market them **without paying royalties.**

Even if you have already mastered machine code, we believe that the time and problems saved by writing in **White Lightning's** FORTH– based high level language could revolutionise commercial games writing for years to come.

IDEAL IDEAL is an Interrupt Driven Extendible Animation sub-Language. Once you have mastered IDEAL's easy to learn set of over 80 commands and just a little FORTH, you will be ready to produce arcade-quality games even if you don't know machine code. Up to 255 Sprites, each with its own user-defined dimensions can be moved around the screen (or memory), scrolled, spun, reflected enlarged or inverted with amazing speed and smoothness. Operations are possible between screen windows, Sprites and Sprite windows. Sprites can even stretch across several screens, so those difficult scrolling landscapes that form the basis of so many games are easy to achieve. Sinclair's own sound and graphics commands such as CIRCLE, DRAW and BEEP are fully supported, and there are some unique collision detection facilities.

MULTI-TASKING Because **White Lightning** uses interrupts, you can effectively run two programs at once. This means of course, that games like Space Invaders and Defender can be written without complex timing calculations. So while one program smoothly scrolls the landscape, the second animates the other characters. This is undoubtedly one of White Lightning's most powerful features.

MARKETING AND PORTABILITY Although **White Lightning** uses an integer FORTH as its host language, programs can be written in a combination of BASIC, FORTH, IDEAL and machine language.

What is more, programs written in FORTH/IDEAL will be highly portable between the Spectrum and implementations under development for other popular micros.

When it comes to marketing your completed games, there's no problem either. In fact Oasis themselves will offer to market outstanding software.

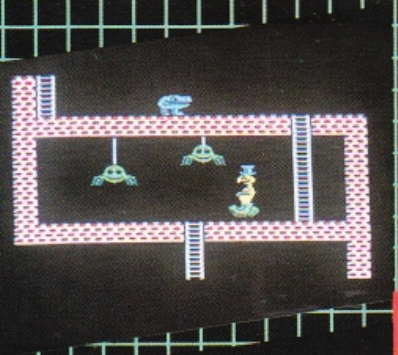
SPRITE DESIGN White Lightning, comes complete with a separate 20K program for developing the Sprites used in the main system. Not only can you use this to design your own Sprites from scratch, it also comes complete with 168 pre-defined characters covering games like **Asteroids, Pac-Man, Assault Course, Defender, Space Invaders, City Bomber, Lunar Lander, Frogger, Centipede, Donkey Kong** and many, many, more. These characters are ready to use or can be enhanced. And Sprites can be saved to tape between editing sessions before being finally loaded into the main program.

The High Level Graphics Development System for the SPECTRUM 48K . . . . .

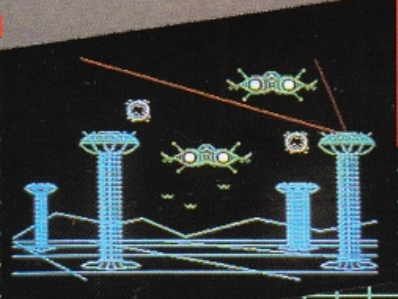
OASIS SOFTWARE

AND COMING SOON! the power of White Lightning on the COMMODORE 64!

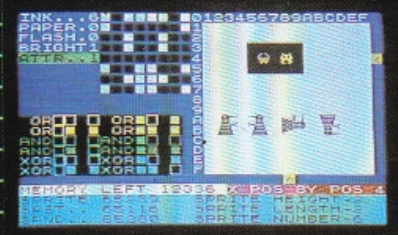
WHITE LIGHTNING



- Produces real machine code programs which run independently of White Lightning.
- A multi-tasking animation language AND a Sprite Development program together in one system-pack.



- Supplied with a FREE 16-minute demo, and a 130-page, easy-to-follow manual.



If your local dealer doesn't stock White Lightning, just send off this coupon for our rapid-despatch service.

Please send me ___ White Lightning System Packs at £14.95 each. I enclose my cheque/P.O. for £ ___

Name: ___

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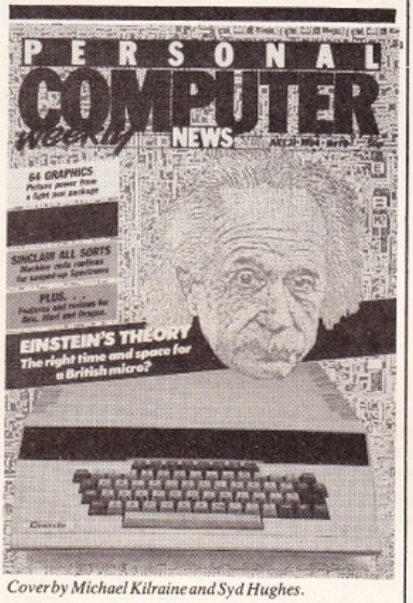
Oasis Software 9a Alexandra Parade, Weston-super-Mare, Avon, BS23 1QT Telephone: (0934) 419921. Every product carries a lifetime guarantee. All prices include extensive manual, VAT and p&p.

24 Hour Access Tele-ordering on (0934) 419921.

MENU

July 21 1984 No 70



Cover by Michael Kilraine and Syd Hughes.

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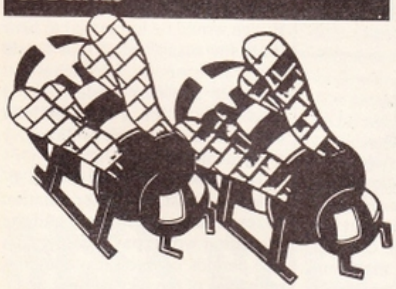

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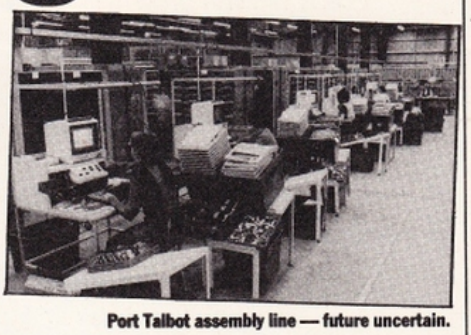
Viva Dragon!

Dragon Data — sale looks likely.



Port Talbot assembly line — future uncertain.

By Ralph Bancroft

The waiting could soon be over for Dragon users if a mystery Spanish company pushes through its rescue bid this week.

The company, Eurohard SA, was introduced to Dragon by Richard Wadman, a founder of Dragon and its sales and marketing director. 'It is a company specially formed to buy Dragon,' said Mr Wadman, 'The principals behind the company all have a background in similar types of operations to Dragon.'

Refusing to give further details about the people behind Eurohard, Mr Wadman said that it would not be appropriate to make any further comment as negotiations were at an advanced stage. 'Agreement has been reached but not concluded,' he said. The target date for completion of the sale is July 20.

Eurohard, according to Mr Wadman, is 'most definitely' interested in continuing with the manufacture of Dragon's existing machines. As to whether production would be shifted to Spain he commented 'possibly some manufacture will continue at this site.'

Mr Wadman said that he was certain that users will be able to count on continued support.

News of Eurohard's bid for Dragon came after Tandy announced that it was withdrawing from its negotiations with Dragon's receivers, Touche Ross. Following a visit from some of Tandy's French production staff it concluded that 'there was no possibility of restoring profits to the assembly plant.'

The major problem with Dragon's Port Talbot assembly plant was said to be the high rejection rate of finished micros. 'It's a shambles down there,' said one Tandy source.

'We would like to have acquired the Dragon name and finished goods stock in order to provide continuing support to Dragon users,' said Tandy's UK managing director, John Sayers. 'Regrettably we were unable to reach a satisfactory conclusion.'

Inmos sold

Thorn-EMI has bought Inmos, the UK's main hope for semiconductor self-sufficiency.

The electronics giant paid £95 million for 76 per cent of Inmos and plans to make the remaining shareholders an offer they can't refuse. Its move ends months of uncertainly at Inmos, and ends fears that the company would pass into US hands in a private sale.

Inmos, representing about £100 million of public money, is expected to make a profit of £15 million this year.

Camputers gloom lifts as rescue prospects improve

Camputers Ltd, maker of the Lynx micro, may be down but it isn't out yet.

The company crashed last month with debts of £1.8 million (issue 65) but last week Stanley Charles, Camputers chairman, was optimistic that a buyer for the company could be found.

'Negotiations are underway with several interested parties about the purchase of the business on a going concern basis,' he said. Asked how many 'several' meant he said, 'that's more than three and less than ten', but refused to discuss the identity of the bidders.

'I am reasonably hopeful that a purchaser can be found and that it can be sorted out before August,' he added.

This could be optimistic but time is not on Camputer's side as the weeks pass.

Timex disk nears port

By John Lettice

Timex is set to return to the micro business this autumn, this time with a 3in microfloppy drive for the Sinclair Spectrum. Pricing hasn't yet been finalised, but it'll probably be fixed around the £250 level for the 500K drives.

The one-time watch giant's Spectrum-based Timex 2068 was punched out of the US market just a few months ago, but 'Clocky II', which is to be brought to us courtesy of Timex Portugal, could well change all that.

Timex is heavily involved in the business of manufacturing other people's products, and the Portuguese subsidiary has experience in disk drives and micros (manufacturing, among other things, the Sinclair Spectrum). It's therefore argued that it has the necessary expertise to produce the drives.

On top of this, Portuguese labour costs are low, and Timex is a large enough company to be able to obtain far greater economics of scale than any other manufacturer of disk drives for the Spectrum. Most of the unit is to be assembled in Portugal, with only the drives currently being bought in from Japan, but they will eventually be assembled in Portugal too.

The units will consist of a minimum of three boxes — interface, power supply and single disk unit. The power supply will support two drives, and the interface can support four, so for the maximum system you will need two power supplies.

It's also intended to run CP/M on the system. This will come in the form of a card with 64K slotted into the interface, and will essentially turn the Spectrum into a terminal. An extension keyboard to go with the CP/M configuration is also planned.

The 2068 is dead, long live the 2068? Watch this space for the review. . .

BT homes in on cheap net

By Ralph Bancroft

With unusual nimbleness British Telecom has proved to be one step ahead of *PCN* readers.

In response to a letter in *PCN*, issue 67, the telecomms authority has revealed plans to implement a more realistic service for home micro users.

'Surely British Telecom could get up a cheaper network for modem users with some kind of reduced charge to help home users with attractive, realistic prices?' wrote Paul Connolly from Newcastle. His letter drew a rapid response from Howard Brown, marketing manager of BT's local network service.

'A new Telecom service which does just this will be trialled next summer in three areas,' he said. 'Known as BitStream, the facility will support micro users as well as other applications in the 'electronic home'.

'There is no need for a separate modem: users will be able to connect their micro direct to a termination box for access to a number of databases such as telesoftware libraries or messaging centres. Cost will be economical as BitStream uses existing telephone lines when they are not in use for telephone calls. BitStream is aimed at the home users and small businesses, and complements other services such as Micronet.'

BitStream bypasses the telephone at the customer's end and BT's equipment at the exchange end of the telephone line.

The techniques are already in use by the South Eastern Electricity Board for its Credit and Loans Management System (CALMS). It has set up a pilot project which allows it to read domestic electricity metres and to switch off certain appliances like immersion heaters at times of peak electricity demand.

Plans for the three BitStream trials have yet to be finalised and Mr Brown would be interested to hear from any organisation that would like to sponsor one. The idea is that a service provider would offer a local service like a local bulletin board, electronic mail or directory of local information.

The service provider would finance the cost of the termination boxes (a low cost modem) and the subscriber would pay a flat fee of a few pounds or even less for unlimited use of the service provided.

The major drawback of BitStream is its low speed. The maximum speed is around 300 baud but is more likely to operate at speeds around 75 baud which, for the downloading of information, is tediously slow.

BT is also anxious to emphasise that the services are not intended to provide the level of sophistication or geographical scope obtainable through other services.

Imagine sinks

By Ralph Bancroft

The hammer finally came down on Imagine Software in the High Court last week as a winding up order was granted to a list of seven creditors owed a total of £346,000.

A receiver moved into the company on Wednesday and immediately took steps to call off an auction of computer equipment that had been seized by bailiffs acting on behalf of the Collector of Taxes.

The whereabouts of the equipment and software associated with the Megagames project—probably Imagine's major asset — remains a mystery.

In a remarkable turn of events at the end of last week a liquidator was appointed at another games company, Rabbit Software, based in Harrow, Middlesex. The company was run by Heather Lamont, a friend of Mark Butler, one of Imagine's directors.

Both companies reported break-ins in recent months where stocks worth thousands of pounds were stolen. Police at Harrow are trying to locate Heather Lamont to obtain further details of what stock and equipment was stolen.

Merseyside Police are taking a slight interest in Imagine. On Thursday a spokesman said, 'We are not carrying out inquiries at the moment but are monitoring the situation. We don't wish to make any further comment.'

The collapse of Imagine drew a rapid press statement from Beau-Jolly, the company that recently bought a large amount of games software from Imagine at a cut down price. The company said that it wished to 'assure distributors, retailers and consumers that the range of Imagine Software will continue to be made available through all normal outlets.'

Beau-Jolly also said that it was endeavouring to recruit programmers for future games.

Acorn seals BBC deal

Acorn has tied up the BBC contract for another four years and the competition, notably Sinclair, seems to be frozen out.

The BBC said last week that after listening to approaches from a number of companies there was no question of selecting any other than Acorn. The Corporation's spokeswoman said that continuity was its main consideration — more than 350,000 BBC micros have been sold and schools in particular have a large investment in the machine.

The BBC hasn't imposed any specific conditions on Acorn but it stressed: 'There will be enhancements and improvements to the micro.'

A spokesman for Sinclair, which earlier this year showed a lively interest in getting a foot in the BBC's door, conceded with good grace that it had lost this round. But he added: 'The interesting stage could come in two to three years when extensions to an existing machine will no longer be sufficient.'

■ Acorn is preparing to validate a Fortran-77 compiler on the BBC micro, under the Xenix operating system. Where will it all lead? Acorn isn't saying, but it looks like another step towards the completion of the 16032 project (issue 69).

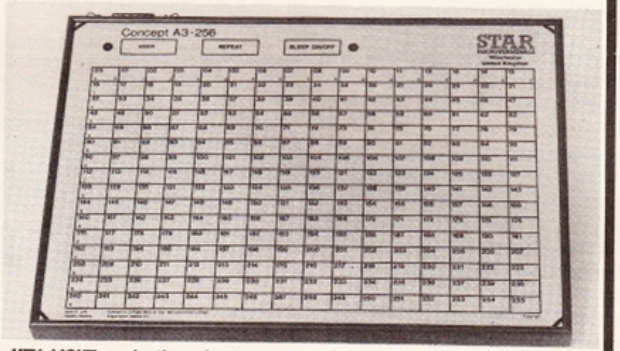
Einstein tests code crackers

The Tatung Einstein, Pro-Tested in this issue (page 28), will soon become the world's most secretive micro.

The Einstein's operating system Xtal DOS already contains the kernel of a data encryption system. A software add-on from designer Crystal Research, together with a modem, should make data transmission on the Einstein more secure than anything else in its price range.

'There is no such thing as complete safety,' said Crystal's spokesman, 'it all comes down to time.' With a fast computer you might crack the Tatung machine's encryption in eight to 30 years of continuous trying he added.

To fit the second stage of the security mechanism you will need a sub-£100 software package due from Crystal 'in a matter of months', and to use it in communications a £299 modem from Master Systems. The modem, a BABT approved unit, handles the V21 and V23 protocols.



KEY LIGHT — In the relentless search for the perfect input device Star Microterminals has rejected such fripperies as mice, touch-screens and keyboards. Its Concept flatbed keyboard is designed for programmers rather than computerphobic executives, and what it lacks in user-friendliness it makes up for with adaptability — you assign the codes generated by each cell of its touch sensitive array, set out an overlay, and tap away as though at a keyboard. Star (0962 51422) has interfaces to BBC B, Apple, Commodore, Sinclair and Research Machines systems. Prices start at £69.

MSX gets soft touch

More than 40 companies are preparing software for the MSX wave that's expected to break in the autumn.

MSX may be intended as a standard for home micros but the range of software available promises to go well beyond games. Two UK suppliers well known for their games are staying away from this area: Bug-Byte is holding off until after Christmas and Audiogenic is adapting business software, arguing that the hardware manufacturers will easily be able to assemble a catalogue of high quality games.

But games aren't being ignored. Mastertronic, the pocket-money software specialist, expects to have MSX games ready for the first machines to arrive, and Mr Micro is among other companies working with the standard. Llamasoft, Quicksilva and Salamander should also be involved.

Educational software and books are assured by the interest of Bourne Educational and Longman.

The prospects for systems software look thinner but Kuma, after a visit to Japan to buy machines, has claimed a first with an editor/assembler/disassembler.

IN BRIEF

Genie group changes

The Colour Genie user group NCGUG has emerged from its chrysalis with a new address and a new style.

No pricey prestige address for NCGUG—it is now at 64, 3rd Floor Silver Arcade, Leicester: tel 0533 532488. The changes apply mainly to the group's magazine, with the latest 36-page issue carrying much more in the way of listings than earlier editions.

It's all at the co-op

A group of small and medium-sized software houses have got together to form a marketing cooperative called United Software.

The aim of the co-op is to give smaller software producers the chance of enjoying some economies of scale where advertising and taking part in trade shows are concerned. It points out that in the long run this will help to preserve the breadth of choice available to users.

The acting secretary of United Software is Vera Sampson on 0468 41291.

Instant Index

For micro users with specialised requirements the US company Dialog has opened for business in the UK.

Its Knowledge Index service will give you access to 14 million articles, books, programs and technical reports held on file in California. In the US there are 5,000 subscribers, mainly doctors, teachers and librarians. To use the system you'll need a £75 acoustic coupler and the ability to stand a £25 connection charge on top of the 30p a minute usage charge.

ACT gets it together

ACT Pulsar has added some impressive titles to the range of software it offers for the Apricot, Sirius, and IBM PC.

From Satellite Software International it has the £350 WordPerfect word processing package; from Starcom the Files and Folders relational database for £295; from SPI Open Access, for £450; from Innovative the Smart Software range that has impressed US dealers more than competing products from Lotus and Ashton-Tate (see View from America) — the full suite costs £795; and from Micro-Pro, the CorrectStar spelling checker.

For the Apricot alone Cobol specialist Ryan-McFarland has implemented RM/Cobol via the UK software house System Design Software.

Not live at Leeds

Commodore has postponed the Fifth International Commodore Computer Show, which was due to have taken place on September 27 to 29.

VIEW FROM AMERICA

And now for something a bit different

By Chris Rowley

The Olympics are likely to be the biggest thing of the television calendar since the Superbowl, despite the lack of Russians. Viewers can expect a lot of bright new commercials, and among other things John Cleese will be making his debut in US TV commercials for Compaq.

Cleese has made four 30-second slots for Compaq to be aired on ABC TV during its exhaustive games coverage. Mr Cleese is already established among US advertising demiurges in connection with Kronenburg beer and Callard and Bowser sweets. For Compaq, maker of the leading IBM clone, he demonstrates just what can happen to buyers who ignore Compaq. Few things can really cut the ad clutter on US television. Ridley Scott, a British director, did it for Apple over the Superbowl; can Cleese do the same for Compaq?

Meanwhile Compaq seems to have handed Big Blue quite a setback in the opening stages of their battle for the portable IBM PC market. Dealers across the country report that after taking a look at the IBM Portable their customers are buying a Compaq. Today Compaq is outselling the IBM rival by four to one — a source of considerable relief to little Compaq, whose demise was confidently predicted from the day the IBM Portable was announced.

Some analysts find a warning in this for AT&T and other big companies currently trying to get a piece of the action in the IBM compatible market with machines that lack significant improvements on the original.

Enzo Torresi, senior vice president of Businessland, said: 'Even the big three letters aren't sufficient to push a product to market if it isn't a substantial step ahead in technology or price-performance.' Businessland, a Californian retail chain, is currently featuring the Macintosh.

Software news: Now that integrated software packages are thronging the shelves, potential customers will be pleased to note a new trend — 'integrated software face-ups' — such as one held recently by Computerland of Phoenix, Arizona.

The audience consisted of 35 corporate software buyers and in the ring were Symphony (memory requirement 320K), Ashton-Tate's Framework (256K) and upstart Innovative's Smart Software (192K). In the morning the audience watched group demonstrations of all three systems and in the afternoon came back for the tough stuff, one-on-one probing of each package. Then everyone filled out a questionnaire and the shop tabulated the results.

To everyone's considerable surprise it was the virtually unknown Innovative's Smart Software package that carried off the honours with Framework second and Symphony third.

Lotus came up short with Symphony's database and word processing, while Innovative's won big because of its ease of use generally and its ability to merge text and graphics. Ashton-Tate's Framework picked up points for its telecomms package and many remarked on Smart Software's low memory requirements and compared it in this respect to Symphony.

Beam me up, Scotty: New York City finally joined the future last month when the phone company opened up a full, mobile, cellular phone system. Now for $2,000 down you can have a superb radiophone that will let you make and take your calls even when you're trapped in traffic.

Taking this even further a company called Spectrum Cellular Communications of Dallas has brought out The Bridge, which connects any portable computer to a cellular phone through its RS232 port.

Now this may work fine out in the Sun Belt, where cities are essentially small and spread out, but here in this Big Apple there'll be problems. For a start there's an incredible mush of frequency pollution, reflections off big buildings, illegal CB radios, powerful cordless home telephones, and gadgets like the Japanese Mr Microphone, which will allow thoughtless extroverts to break into any radio channel within 1,000 feet to air their witticisms of the moment, be it rap, sexist jive, or just youthful exuberance.

Viking micro takes on IBM

Swedish telecoms giant Ericsson is set to enter the IBM compatible market this autumn.

The Ericsson PC is operationally compatible in terms of software and hardware add-on cards, and in the UK will be priced at 90 per cent of the cost of an equivalent IBM machine. Ericsson intends to maintain this differential even if IBM drops the price of the PC further.

Operational models were previewed at the company's European Support Centre in Brussels last week, but the official launch will not be until September. The time in between will allow the company to finalise documentation, sort out dealerships and increase its production sufficiently to avoid shortages.

The finished machine, however, is compact, with a footprint around 75 per cent of the IBM's, and rivals the Apricot in the glamour stakes.

The drives on the PC-compatible version (XT configurations will also be available) are half height 5.25 in floppies, and the fan is smaller and much quieter than the PC's. It has six expansion slots in all, one of which is taken up by the display controller, and as Centronics and RS232 ports are fitted as standard you will have five slots free.

The display's resolution is much higher than the IBM's, and the monochrome screen is amber on brown, which is easy on the eye and has apparently been approved by Swedish air traffic controllers.

Ericsson's PC — operational compatibility and glamour to boot.

Ericsson is aiming for 15 per cent of the European market in 1985. The Ericsson PC will be seen as part of the company's existing range of business equipment with the emphasis on support and integration. This is becoming something of a trend among PC compatible manufacturers, as the suppliers of typewriters and general office equipment move in. It could be that the days of the one-product manufacturer are numbered.

TELESINCLAIR — Spectrum users green with envy at the virtual monopoly of telesoftware enjoyed by BBC users can rest assured that relief is in sight. The TFX 2000 teletext adaptor from OEL (issue 56) has emerged from the development cycle and is now available from OEL on 0768 66748. The unit costs £145, including VAT, postage and packing, cables, a power adaptor, and detailed instructions. OEL is the company that designed and builds the award-winning Prism VTX 5000 modem.

Sparks fly from Atari

Atari users have got the thumbs down from one of the UK's largest software suppliers. Creative Sparks, an arm of Thorn EMI, doesn't expect to produce any new Atari software after November this year.

'It's a commercial decision,' said Creative Sparks' product manager Gordon Reid. 'It costs a lot of money to bring a product to market and our Atari sales don't justify it; our final products are due in October or November and after that I doubt we'll continue.'

When Creative Sparks was launched in April it inherited a catalogue of Atari titles from Thorn EMI, and it has added a handful of its own besides repackaging the old game under its name. But Mr Reid said that sales had been 'very flat', with neither retail outlets nor users existing in large enough numbers.

The takeover of Atari by Jack Tramiel (issue 69) didn't influence the decision — if anything it could eventually make Creative Sparks reconsider.

Apricot ads rapped

ACT is the latest big micro company to draw fire from the Advertising Standards Authority (ASA) over misleading ads.

Six members of the public complained to the ASA over adverts for the Apricot carrying a slogan, 'Go 4th from £1,495'.

Five separate grounds were quoted as the basis of the complaints.

The quoted price of £1,495 did not include VAT; the system illustrated in the ads cost £1,890 plus VAT; the version costing £1,495 plus VAT was not available; the Apricot was described as portable when, in fact, a separate monitor was required at each location where the system was used; and the ads promised 'compatibility with the . . . IPM PC' which was impossible because of the different disk systems used by the two machines.

The ASA upheld the complaints about price and IBM compatibility.

Apricot — the offending ad.

It said that ACT confirmed that the price was exclusive of VAT and had acted immediately to amend subsequent adverts.

It noted that 'it would not be possible to use software prepared for the IBM PC without it first being suitably modified'.

It requested ACT to include a note to this effect in future advertising. The ASA also partially upheld the complaint about the system featured.

The other two complaints were not upheld. The ASA accepted ACT's statement that when the advert was prepared it fully expected to have supplies of the lower cost system available. It also accepted ACT's ingenious argument that the monitor was designed to be portable and that the Apricot keyboard featured an in-built micro screen which enabled it to be used, if necessary, without monitor.

The ASA said: 'The Authority thus considered it not unreasonable to describe the system as portable.'

■ ACT was joined in the ASA's latest report by Microcare, the micro repair company. Two complaints from Yorkshire and Essex objected to a phrase in an advert that said: 'With a Microcare warranty you can have your equipment up and running in days — not weeks!'

Both complainants had experienced considerable delays in the return of computers sent for repair. The complaint was upheld and Microcare withdrew the advertising.

PENPAL — The company that last week bought out Comart this week brings you a multi-function input device. Kode's Penpad 320 includes a writing surface, an 'intelligent' pen, and a board to fit into the IBM PC for which the device is designed. It is part mouse, part touch screen, and part hand-written data entry device. Kode claims that it will process the most grimly misshapen characters, and hence it can handle graphics as well. The unit costs £750 from Kode on 0249 813771.

Manufacturers' winning ways

Eyes down and look in again for competitions coming up from ever-inventive manufacturers and retailers.

Since we last listed the forthcoming contests, news of more has reached us.

They are:

Organiser	Closing Date	Prizes	Details
CRL (01-533 2918)	September 8	Cricket bat signed by Test teams	Answer questions and suggest home application
Kaypro UK (06286 67344)	September 30	QE2/Concorde trip to New York	Buy a Kaypro, list eight best features

SOFTWARE

The new releases

Octet from CGL for the M5.

Education

BBC, Spectrum: On the doubtful grounds that you'll understand better at home what is difficult to grasp in a classroom, Griffin Software (021-236 2552) has launched four maths programs. The titles are Mental Arithmetic, Fundamental Algebra, The Theorem of Pythagoras, and Introduction to Trigonometry; they cost £9.99 on the Spectrum and £11.95 on the BBC.

IBM: Tuition of a different kind is available from Micropro (01-879 1122) with the free delivery of StarTutor disks with each copy of WordStar sold to IBM PC users. To current users of WordStar, StarTutor costs £65.

Systems/Utilities

CP/M: Industrial Software Services (01-561 0169) has released the BDS C compiler version 1.5 for CP/M-80 users. The compiler runs under CP/M-80 2.2 and onwards, or under compatible operating systems such as Turbo-Dos, and it includes an interactive 'Basic-like' debugger. It's available in most 8in and 5¼in formats for £129. For CP/M-68K users Pronto Electronic Systems (01-554 6222) has unveiled a video editor package, VED-68K, designed as an aid to professional software firms.

BBC: Anyone with the Microwriter device will henceforth be able to use it as a data entry device for the BBC micro. MicroComputer Services (01-831 6801) has produced Beeblink, a communications package which with cables, documentation and software costs £27 plus VAT.

Commodore 64: Another fast-load utility has been discovered by Kiltdale and will be available to software houses to implement. Called the Fantasy Software Turbo, it is claimed to be 4½ times faster than normal; any difference it makes to the price of software will depend on the software houses using it.

Business

IBM PC: Easy Junior, claims Scorpion Computing (025126 3706), will cut the cost of business software in half. The package incorporates stock control, invoicing, and sales, purchase and nominal ledgers; it costs £295. It is aimed particularly at people with little computer experience. QED, from Quantec (01-487 5435) is a £195 bundle of office functions including diary, addresses, filing, telex preparation, and paperwork in general. It needs at least 128K and a 320K disk drive. Out of the office Source Computer Systems (021-359 0493) has released a package to look after quality control for engineers. It costs £395 plus VAT.

QL: Sagesoft (091-284 7077) will be modifying its Sage Accounts program for the Sinclair micro.

Various: The word various hardly does justice to the scope of The Sensible Solution, which runs on up to 200 different micros including IBM, ACT, Kaypro, Hewlett-Packard and others. Version 2 is now available from O'Hanlon Computer Systems (Slough 78844). There are two aspects to the software — it can be a development language or a suite of accounting programs, depending on how you use it. Prices vary, from £565 for the language to £155 for the Run-time module.

Commodore 64: Busicalc 3 is a three-dimensional spreadsheet from Supersoft (01-861 1166). There are links to Easyscript, Vizawrite, and Chartpak. It costs £75.

PCN CHARTS

GAMES

NEW WEEKLY CHART! NEW WEEKLY CHART

	GAME TITLE			PUBLISHER	MACHINE	PRICE
▲	1	3	TLL	Vortex	SP	£5.95
▼	2	1	Sabre Wulf	Ultimate	SP	£9.95
▲	3	5	Mugsy	Melbourne House	SP	£6.95
▼	4	2	Beach-head	US Gold	C64	£8.95
▲	5	10	Arabian Nights	Interceptor	C64	£7.00
▲	6	9	Lords of Midnight	Beyond	SP,	£9.95
▲	7	—	Matchpoint	Psion	SP	£6.95
▲	8	14	Valhalla	Legend	SP, C64	£14.95
▼	9	7	Hulk	Adventure International	SP, C64, AC, AT, Apple	£9.95
▼	10	4	Psytron	Beyond	SP	£7.95
▲	11	26	Beaky & Egg Snatchers	Fantasy	SP	£6.50
▼	12	5	War of the Worlds	CRL	SP	£5.95
▲	13	—	Frak	Aardvark	AC	—
▲	14	28	Loco	Alligata	C64,	£7.95
▼	15	8	Jack & B'Stalk	Thor	SP	£5.95
▼	16	11	Trashman	N. Generation	SP, C64	£5.95
▼	17	16	Cavelon	Ocean	SP, C64,	£5,90
▲	18	21	Antics	Bug Byte	SP	£6.95
▲	19	—	House of Usher	Anirog	C64	£6.95
▼	20	19	Chukkie Egg	A&F	SP, C64, AC, DR	£7.90
▲	21	23	Football Manager	Addictive	SP, C64, AC	£6.95
▼	22	12	Jet Set Willy	Soft Projects	SP	£5.95
▼	23	15	Night Gunner	Digital Integration	SP	£7.95
▲	24	—	Stop The Express	Sinclair	SP	—
▲	25	30	Encounter	Novagen	C64, AT	£8.95
▼	26	6	Fight Pilot	Digital Integration	SP	£7.95
▲	27	—	Automania	Microgen	SP	£6.95
▲	28	—	Kosmic Kanga	Micromania	SP	£5.95
▼	29	18	Son of Blagger	Alligata	C64	£7.95
▲	30	—	Savage Pond	Starcade	C64, AC, AT	£8.95

MICROS

Top Ten over £1,000

TW	LW	MACHINE	PRICE	DISTRIBUTOR
▶1	1	IBMPC	£2,390	IBM
▲2	5	Apricot	£1,760	ACT
▼3	2	Apple III	£2,755	Apple
▼4	3	Sirius	£2,525	ACT
▲5	6	Televideo TS1603	£2,640	TH
▼6	4	DEC Rainbow	£2,359	DEC
▲7	—	Compaq	£1,960	Compaq
▶8	8	Wang Professional	£3,076	Wang
▶9	9	Philips P2000 c	£1,484	MD,KDS
▲10	—	LSI Octopus	£1,760	LSI

Top Ten up to £1,000

TW	LW	MACHINE	PRICE	DISTRIBUTOR
▶1	1	Spectrum	£99	Sinclair
▶2	2	CBM 64	£199	CBM
▲3	4	Electron	£199	Acorn
▼4	3	Vic 20	£145	CBM
▲5	6	BBC B	£399	Acorn
▼6	5	Oric Atmos	£175	Oric
▶7	7	Memotech 500	£275	MTX
▲8	9	Atari 800XL	£250	Atari
▲9	10	Oric	£99	Oric
▼10	8	Dragon	£150	Dragon

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 **July 12.** The games chart is updated every other week.
Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT.
Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month.
PCN Charts are compiled exclusively for us by RAM/C, who can be contacted on 01-892 6596.

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RX 100 F/T 100 cps 132 columns	£450	£385
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SHINWA		
CP80 80 cps 80 column	£199	£175
CANON		
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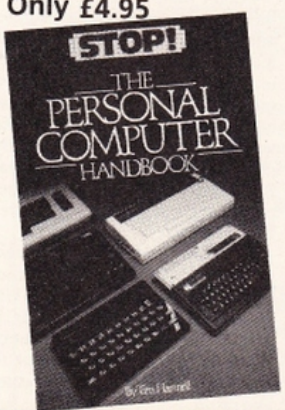

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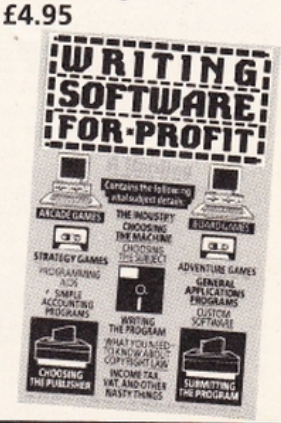

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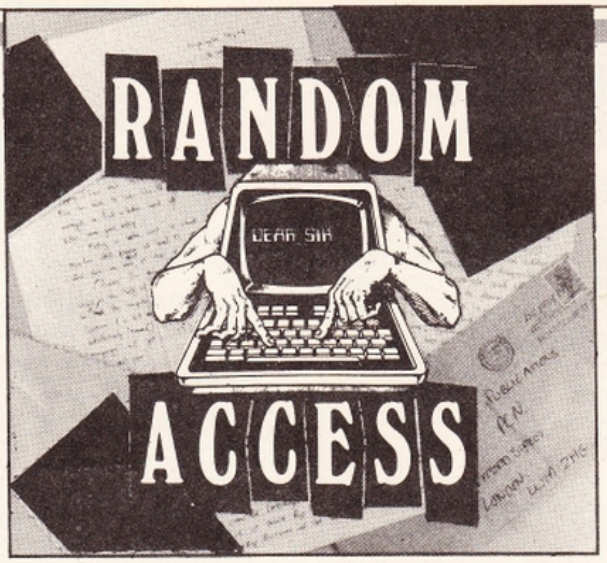


Would you like to see your name in print? Here is your chance on *PCN*'s letters page.

Is piracy a breach of contract?

In answer to those worried about copyright, piracy and such-like, if somebody wishes to make a profit from work I have done, good luck to them. This country could do with their enterprise.

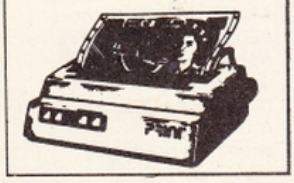
However, I realise this does not apply to most people to whom the possession of money is extremely important. If an enterprising individual wishes to make a profit from another's work (*eg* selling copies of a program) he is morally bound to obtain permission and arrange an agreement between him/herself and the author. Selling without such an arrangement is immoral, and by definition ought to be illegal.

A purchaser buys a product rather than rent/hire/borrow or licence it. Therefore, the previous owner's ties with the product are reduced to the responsibilities defined in law of ensuring the product is fit for the purpose described to the buyer.

Whether this is law or not, the new owner of the product is/should be entitled to use the product in any way he or she wishes unless it conflicts with the dictum above.

If the poor programmer, whose talent is so limited that the few coppers he earns from the limited number of programs he is capable of writing, is seriously worried about losing the investment of his time, skill and in some cases money, he should not sell his product as this must surely transfer rights to the purchaser.

PCN £10 Star Letter



The programmer in this case should license the program or ensure that it is only available by contract.

If a licensing system were introduced, the ordinary purchaser, whose only interest is to preserve his investment for as long as possible (by making 'back up' copies, or transferring to disk for faster loading, *etc*), could have their moral rights as owners of the software restored.

Programmers so proud of their masterpieces that they are unwilling to relinquish ownership and the accompanying rights would be able to preserve these and sleep peacefully at night in the knowledge that an illegal copy is not a headache of a copyright case, but a simple (did he say simple!) broken contract for which the miscreant can be sued (even more money for the programmer — well, his solicitor anyway!).

Thus Acorn could protect its programs on disk, because the programs were only licensed indefinitely (or perhaps for some specified period — say 99 years), and they would still own the program.

Normal, non-paranoid programmers like myself could sell unprotected programs, grateful for the few pounds earned, but not reliant on the money, because the benefit of writing programs is the pleasure derived from being immersed in that activity.

The solicitors would remain happy, because they (perhaps) have a stronger case and if they do work their fees out on a percentage basis . . .

Jeff Best,
Worthing, West Sussex

Newbrain still has devoted fans

I fully support D Day's letter in issue 68 concerning the Newbrain. This is a machine with very many excellent features. Its editing and text handling are such that word-processing is a doddle with only the simplest of programs, and the high resolution graphics are invaluable for engineering and computational work.

I don't want to play games, and the lack of colour is a positive advantage since I have that much more memory to play with and I can make use of an inexpensive monochrome monitor with far more resolution than is possible with all but a much more costly professional colour monitor. What is more, I can have a medium persistence phosphor which reduces flicker.

I can only suppose that the new owners find the continental market more profitable and neglect the UK in consequence. Whether this is true or not. I intend to remain one of the devoted band who continue to use their Newbrains for pleasure and profit.

L E Weaver,
St Leonards-on-Sea, Sussex

Give the 'fringe' micros a mention

It seems to me that as there are so many magazines dedicated to the big name micros, the remainder of the computer press should give a bit more space to lesser known computers, instead of devoting even more space to Spectrum and Commodore topics etc.

I can't remember the last time I saw a listing for my CGL M5 but at least you haven't forgotten us altogether like the rest.

L Rumens,
Stockport, Cheshire

Thanks for the pat on the back, but I'm not too sure if we deserve it. We last published a listing for the CGL M5 in issue 54 . . . — Ed

Dragon devotee's call to rally round

This is a letter to all your readers who are Dragon owners. With the demise of Dragon Dungeon, and with it Dragons Teeth, and now the dubious future of Dragon Data and the 32/64 machines, there is an urgent need for some sort of users group. Following a letter in another journal a small number of people have expressed an interest in setting up such a club, as have a couple of commercial houses.

What we need to know now is whether there is any point in proceeding, *ie* are there enough people who would like to join? I hope so.

A healthy users group is going to be required to encourage firms to continue to offer new titles and peripherals for our machine. So write to the address below and keep the 32/64 alive.

Jeremy Hoyland,
17 Oxford Road,
Frinton-on-Sea,
Essex CO13 9HX

Software houses are taking the wrong tack

Owing to the growing interest in the prevention of software piracy I felt compelled to write and state my views on the subject.

Recently some software houses have included a hardware add-on with their programs. For instance, Microdeal have announced the 'dongle' method. The process involves the insertion of the dongle into the joystick port whilst the program loads. The absence of the dongle prevents the loading of the program. Some houses, require the add-on in order to actually play the game.

Hardware adds-ons may well prevent pirating, but the main drawback of the method is the cost. They are expensive to produce and will therefore be expensive to buy. These games may well be 'revolutionary' but not many (non-Atari) owners I know are going to like paying that much.

Another obvious drawback is that the hardware is breakable. The height of frustration is sitting down with a broken dongle.

Software Projects have employed an ingenious device, a coloured card (wow). Unfortunately, there are many people that would rather spend two hours or so copying the card by hand than part with £6 for the real copy.

The main reason why so many people are making individual copies of commercial programs is that the programs cost too much. Surely the hardware scheme is facing the wrong way, forcing prices up instead of down.

It's always nice to own an original copy of the program. It looks good in your cassette box and makes loading much easier. However, many people are being forced to pirate simply because they cannot afford to buy them. If the software cost only £2 it would simply be not worth copying.

Well done Mastertronic. You've got the right idea but you've got to make the software worth buying. Otherwise, after seeing the game in play a potential buyer may decide that it would be a disgrace to their cassette box.

I appeal to all the software houses. First, make your software worth buying and second make it buyable — please.

Greg Bernatek,
Leamington Spa, Warwickshire

Flying Sorcerors spotted in UK

May I, through your magazine, tell any Sorcerer (it still beats some of the machines on the market today) owners who requested the Basicode-2 translation program and machine code listing (about 60 owners) from an article I wrote in the Sorcerer User Group Magazine (now ceased publication) about a

bug in the machine code listing, plus a few tips to get the system running.

The machine code bug is at 0FE51H — this should be CB not C8. You may also have experienced saving and loading problems. Try the line:

POKE 260,0: POKE 261,255: A=USR(A): LIST 1000 for saving, and the line: POKE 260,0: POKE 261,254: A=USR(A) for loading.

Lastly, Sorcerer owners using Ray Bannon's EDT48 Editor will need to change the INP(9) to INP(24) in the Basic conversion program.

Hope this sorts out any problems.

D J Every,
Plympton, Devon

Atmos upgrade won't hold still

With reference to the Routine Inquiry entitled 'Upgrading my Oric to the Atmos' (issue 67), I recently had my Oric 1 48K upgraded. The pleasing new keyboard improves on the old keyboard 100 per cent. However, the problem experienced by M Musa regarding the screen jumping and flickering is exactly the same problem I experience with my Atmos.

The problem arises after two to three hours use. I tested my television which proved to be faultless. I believe that the Atmos is at fault. Has anybody else suffered from this problem? Can you help, offer any advice? Could the manufacturer offer assistance?

Harris Benjamin,
Glasgow

Name nonsense corrected

Pleased though I am to see Ryan-McFarland's name in print, may I point out that our product names are preceded by our logo RM/; and PMCOBOL (Tandy protest issue 68) is a product unknown to me.

Barbara Primrose,
Product Support Manager,
Ryan-McFarland Corporation

Ah, em . . . Sorry about that — Ed.

Sinclair owner answers back

Having just today received yet another QL brochure from Sinclair Research, I feel that as a Spectrum owner I should write and make some points regarding Sir Clive's interview with *PCN*.

● 'We are a wealthy company, we are not in it to seize people's money.' When he launched the QL he must have known it couldn't be in customers' homes within 28 days, yet he still took their money.

● 'We will provide unbeatable quality and back up service.' — Well, I have never seen any sign of that so far, but I suppose things can only improve.

● 'We are better at delivery dates than Acorn, IBM and Commodore.' — That really is poetic licence. As regards the Acorn Electron and non existent Commodores, they were only announced as coming shortly and not launched and advertised as being available within 28 days.

In fact, the QL itself leaves a lot to be desired. Why a flat case? I doubt if Sir Clive ever tried to spend several hours typing on a flat keyboard. Then as an afterthought he gives us three plastic stick-on feet by way of compensation. And why *two* RS232C interfaces when one is enough for a modem etc, and when the other should have been a Centronics? Why not a normal D-type joystick interface? And last of all, why no on-off switch on a £400 computer?

I had a ZX81 and I have a 48K Spectrum. I was looking forward to buying a QL, but I hold no illusions about owning one in its present form.

I want to upgrade and will spend £400-£500 to do so, but unless Sinclair manages to persuade me otherwise, my money will go elsewhere.

Brian McCann,
Bangor, Co. Down

QL too big for small screen

Your readers might like to know that the Sinclair QL presents a problem when it comes to using a monitor. Apparently it overscans, which means you get an extra wide image — wider than the screen width. Consequently characters are lost on each side of the screen. This can be cured using the BORDER command, but then you cannot get the full 80 character line.

I understand that Microvitec is preparing a special version of its medium res monitor to overcome this problem, but this means that the new monitor would not be suitable for any other computer.

I would be interested to know if there is a way around this other than playing with WINDOW and BORDER.

Dennis V Long,
Gravesend, Kent.

Air your opinions, share your experiences or just point out our occasional blunders. If you have an impressive way with words you may gain £10 for the star letter.

WRITE TO: Random Access, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

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80 not needed if Noddy will do

Q Can you please explain why it is always said that an 80-column display is essential for word processing?

Would the Memotech single disk package, for instance, which includes a 40-column word processor in ROM, suffice as a poor man's word processor? Can you also say whether the so-called Single Disk Basic, supplied with this package, is in ROM and similar to MTX Basic, or does it have to be loaded from disk?

I would not wish the additional expense of expanding the standard memory nor of the extension to an 80-column card if either can be avoided.

R. Simpson,
Cumbernauld, Scotland.

A You don't actually need an 80-column display for word processing — what you *do* need is a display adequate for what you want to do. That answer isn't ducking the issue, it's just a question of horses for courses.

If all you want to do is use Noddy for a few notes or short letters then it's probably perfectly adequate, although it would be a bit pointless buying a disk unit with a set-up like that — surely tape storage would do.

But you shouldn't get hung up on phrases like 'full 80-column word processing' because even with an 80-column screen you're going to have to leave margins, and you'll find that 65 columns of text is a lot more readable. There are of course uses for 80-column, but unless you have a specific one it's not really worth bothering about.

Having said that, your 40-column display will never really look professional, and if you want a disk system, and can afford it, you really ought to buy the extras you need to make it function efficiently. The basic single disk system costs £399, which is a fairly hefty whack, and can be used on its own. The next stage is UP 1, which adds 80-columns and CP/M, and costs £221.

Compared to the price of the drive this isn't exactly a fleabite, but if you were to get a drive it really would be sensible to think in terms of upgrades some time in the near future. So really we'd advise you to buy a single drive on its own only if you have an immediate use for it other than minor word processing tasks, and only if you do intend to upgrade it later.

SBasic, by the way, loads from disk and is compatible with MTX Basic. You'd have no problems using Noddy in conjunction with it.

Modem mania hits Ireland

Q I have a Tandy 100 with a built-in Bell modem. Will this operate on CCITT transmissions. If not, can you recommend a modem that supports the following statistics: 300/300 baud asynchronous, CCITT (V21) and full duplex.

As we have a weird telephone system here in Ireland, it must be an acoustic coupler type.

Another thing, is 2 stop bits equivalent to one start and one stop bit?

Colm Buckley,
Dublin, Eire.

A No. Bell and CCITT transmissions are incompatible. There are a number of acoustic couplers on the market that operate at 300/300 full duplex but they tend to be expensive compared to directly coupled modems.

We have used a Tandy acoustic coupler (it is manufactured by Bencom Sendata) with satisfactory results. Unfortunately, it costs £280.

Two companies worth checking out are K&N Electronics (0727-32983) which sells the Minimo J7512 at £207 and Modular Technology (0869-253361) which sells the Minimodem 3005 for £171.

Buy British — and save on transformer

Q I have been offered either a Commodore 64 bought in England with a disk drive, or an SX-64 bought in the US. I have calculated them to be roughly the same price and cannot decide between them.

I want to play games on it from tape, and am looking for more compactibility than portability. Is the SX-64 completely compatible and can I run it off a normal TV?

Graham Smith,
Ludlow, Shropshire.

A There are a couple of areas of misunderstanding in your letter. First, you do not make clear whether you are being given the machine or will have to buy it or are having it bought for you. Looking up the price in the US and doing a conversion based on current exchange rates is very misleading — at the very least you would have to pay some import duty on the equipment.

Second, an SX-64 bought in the US would require a power transformer to run at all in Britian, and would not work with a British TV without modification.

Third, the SX-64 has no cassette interface so you would be committed to using disk-based software. While the best programs are available on disk, and prices are coming down, it will still cost more in the long run.

The portable in this country will cost you at least a couple of hundred pounds more so your choice seems fairly clear — go for a 64 and disk drive. It's neither portable nor particularly compact, but it is eminently workable and seems to fit your other requirements.

Wanted: 'design a program' program

Q I am writing to you hoping that you can give some recommendations on packages for the 48K Sinclair Spectrum. I would like a package to aid games development and to offer help in designing screens.

I would ideally like a package that could magnify the screen, handle sprites, detect collisions and offer the feature of machine code routines to be incorporated into the program under development. The final program must be capable of running independently from the package.

I realise Melbourne House, ISP and Oasis produce such packages but I would like to get the best value for money.

David Taylor,
Hexham, Northumberland.

A From the design point of view what you want sounds like a dedicated graphic designer's tool we know about — it's called the Apple Macintosh. If it were possible to produce a program that did all you want it to do the art of the programmer would die out. This may be why nobody's produced it yet, of course.

As far as screens are concerned there's no problem. *Melbourne Draw* or *Print & Plotter's Paintbox* will do a good job for you, and all you need do is save the resulting pictures to tape or memory as a SCREENS Melbourne Draw has facilities for increasing the size of areas of the screen, but the facilities of the packages vary, and really it's a case of you pays your money and you takes your choice.

Now if you want to produce games in addition to this you could do worse than look at *Scope*, which codes the program independently of the originating program. *Fifth* is also good, although you need the Fifth program to run your games, and there's a new package on the stocks which promises to wipe the floor with previous games design packages. Watch this space for the review.

Overall, what we'd say you needed was a good title screen designer program and a games design program. Melbourne Draw and Scope would be one possible combination. But be warned, if you want to sell your games you could run up against copyright problems, even if the programs apparently run independently, as there could be the odd man-trap inside.

Don't underestimate the ZX81

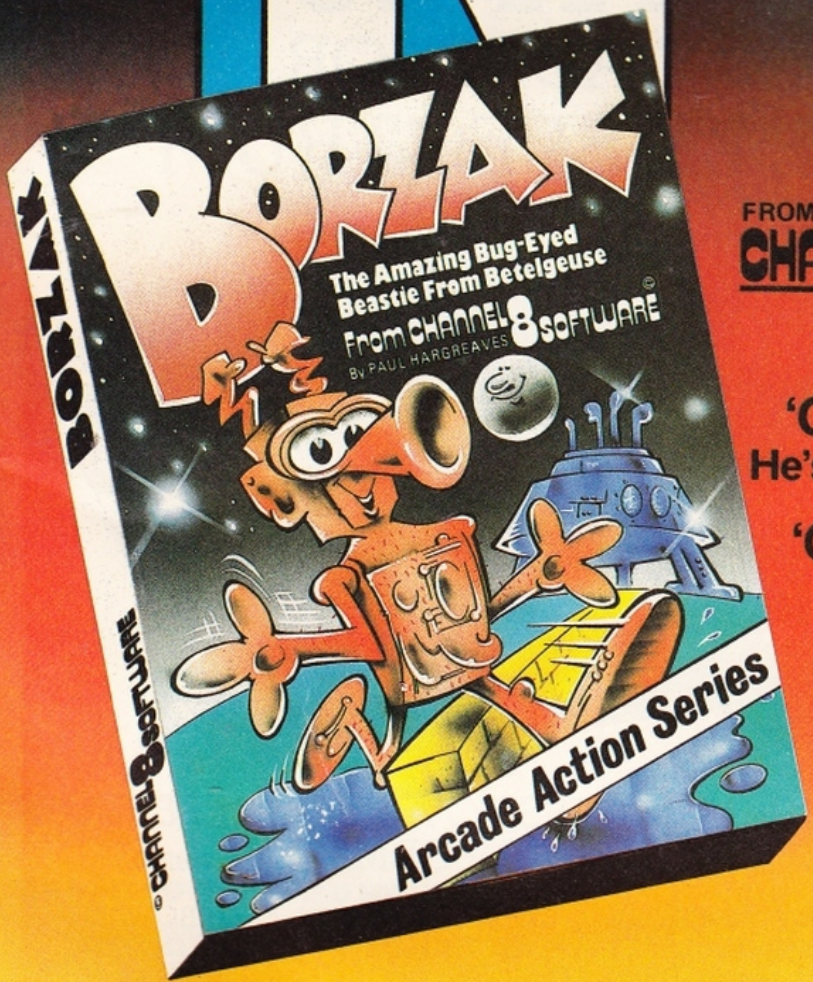
Q My friend's brother thinks it's impossible to link a ZX81 via a modem to, say, an IBM mainframe and transfer data or download programs for use on the ZX81.

Lee Simmons,
Nottingham.

A It is entirely possible to link your ZX81 to a mainframe computer. You'd need additional hardware and software to do it, but it can be done.

We have heard of one company planning an add-on for the ZX81 that allows it to be used with Prestel and would provide these kind of facilities.

THE No 1



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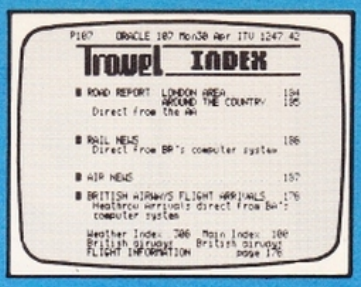

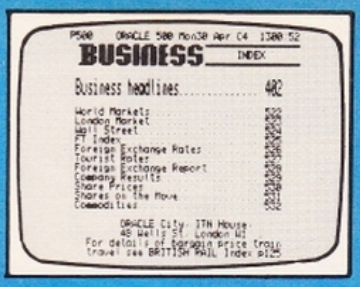

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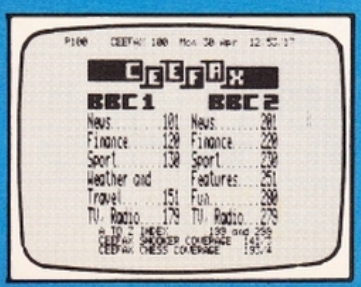

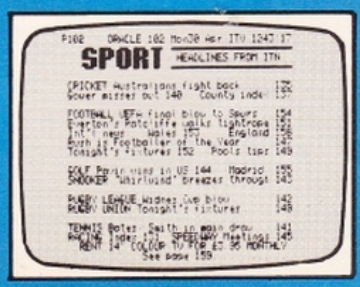

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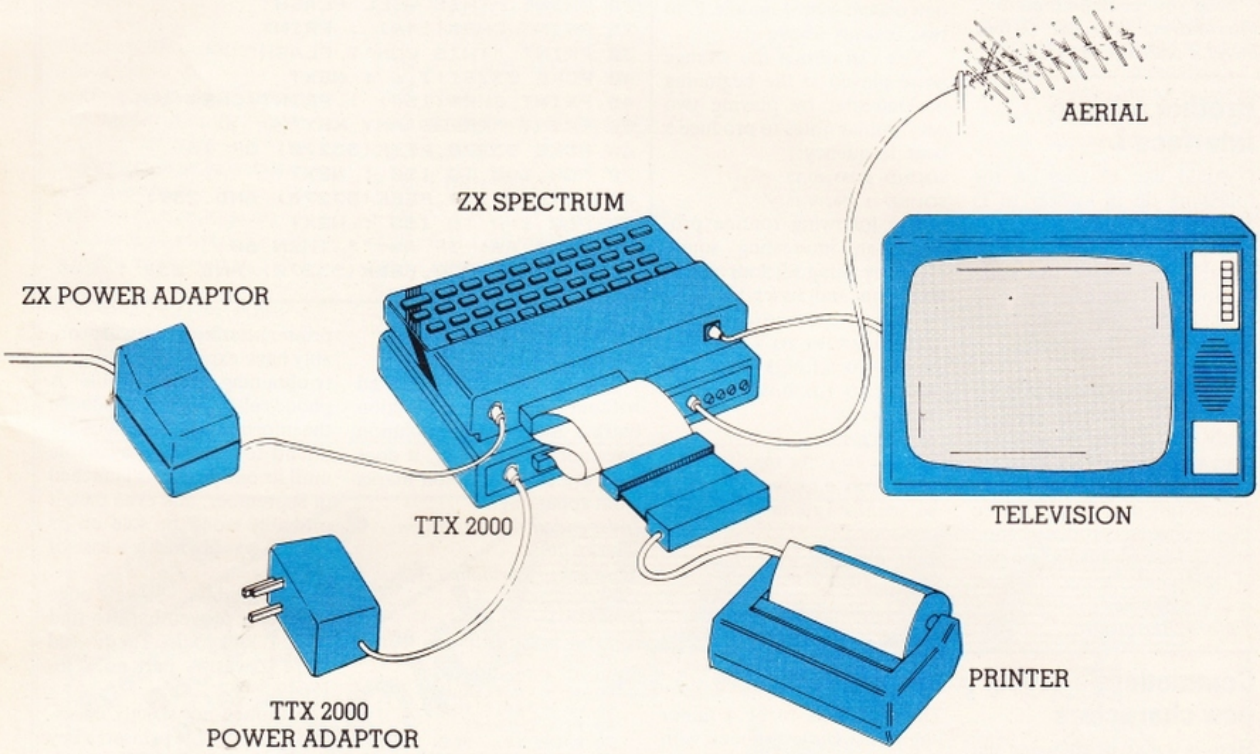

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MICROWAVES

More hints and tips from our readers to make programming a little easier.

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Send your contributions to: *Microwaves, PCN, 62 Oxford Street, London W1A 2HG.*

Brother talks to Interface 1

I would like to pass on the following tip in answer to D Snowdon's enquiry about using a Brother HR5 printer with Interface 1. I have this combination and originally made up a lead with the connections described in the Interface 1 manual.

The result was the same as Mr Snowdon's — nothing. A closer study of the Brother manual, page 43, revealed that when pin 8 is 'high', data is accepted. Connecting pins 6 and 8 on the 25 pin plug has produced good results. I use a transmission rate of 1200 baud.

A D C Chapman,
Telford, Shropshire

Commodore's new characters

Here is a way of changing the character set on the Commodore 64 to create a new character set which is made up of two different colours.

```
1 READ A
2 IF A = -1 THEN END
3 POKE 53317 + A, 31
4 GOTO 1
5 DATA 28,81,65,-1
```

Jon McMurrary,
Newtown Abbey, N Ireland

Atari chord construction

The Atari computer has four independent sound voices which means it can make four sounds simultaneously. The sound comes through the TV speaker and the voices can be blended together to make chords.

The chord of 'C' can be produced by typing the following:

```
SOUND 0,121,10,8
SOUND 1,96,10,8
SOUND 2,81,10,8
SOUND 3,60,10,8
```

The first figure is the voice number, the second the pitch, the third distortion, and the fourth loudness.

The distortion values are 0, 2, 4, 6, 8, 10 and 12 where 10 is pure. The pitch can be set between 0 and 255 and the Atari will produce all notes: sharps, flats and naturals from one octave below middle C to two octaves above it.

You can obtain the strange noise played at the beginning of Defender by playing two very similar notes to produce a beat frequency:

```
SOUND 0,255,10,15
SOUND 1,254,10,15
```

The following routine produces an interesting sound effect by using all four voices with FOR and NEXT loops.

```
 10 FOR I=1 TO 100
 20 FOR Z=100 TO 1 STEP -10
 30 SOUND 0,I,10,15
 40 SOUND 1,Z,10,15
 50 NEXT Z
 60 NEXT I
 70 FOR I=1 TO 100
 80 SOUND 0,I,8,10
 90 SOUND 1,I,8,10
100 NEXT I
```

W H Davison,
Sandy, Beds

Adam: the burning question

There appears to be a minor bug in the Basic supplied with the Adam computer. When the Adam reads a file from a digital data pack using the INPUT statement, it puts a question mark in the keyboard buffer as it would if reading an input from the keyboard.

Enter 'Program 1', SAVE it and then RUN it. When you have done that, enter 'Program 2' and save it.

When you run this program, the Adam will read from the data pack the file created by 'Program 1' and print the data on the screen. However, before the data is printed, the contents of the keyboard buffer are printed on the screen. As you can see, there are five questions marks printed before the data.

The simplest cure for this is to clear the screen before printing any data read from a data pack. Insert the following line in the 'Program 2' and run it again:

```
75 HOME
```

This time the data is printed without the preceding question marks. Although the solution does not cure the bug, it does stop the extra question marks from appearing.

Independent Coleco Adam Users Club,
Towcester, Northants

```
PROGRAM 1
  10 a$ = "ADAM Users Club"
  20 b$ = "P. O. Box 9"
  30 c$ = "Towcester"
  40 d$ = "Northants"
  50 e$ = "NN12 7QG"
  60 f$ = CHR$(4)
  70 PRINT f$; "OPEN FILE"
  80 PRINT f$; "WRITE FILE"
  90 PRINT a$
 100 PRINT b$
 110 PRINT c$
 120 PRINT d$
 130 PRINT e$
 140 PRINT f$; "CLOSE FILE"
 150 PRINT "File is stored"
 160 END

PROGRAM 2
  10 f$ = CHR$(4)
  20 PRINT f$; "OPEN FILE"
  30 PRINT f$; "READ FILE"
  40 FOR i = 1 TO 5
  50 INPUT g$(i)
  60 NEXT i
  70 PRINT
  80 PRINT f$; "CLOSE FILE"
  90 FOR i = 1 TO 5
 100 PRINT g$(i)
 110 NEXT i
 120 END
```

Amstrad print in parallel

If you have purchased an Amstrad CPC464 computer and wish to use the Centronics printer interface, you will probably have experienced difficulty obtaining a printer cable. A phone call to Amsoft produced the information that it does not intend to make one available until its one printer is launched in September, and even then it probably won't be sold on its own. It was obviously a case of DIY.

A solderless, 34-way edge connector proved hard to find until I looked in Tandy and there it was — part no. 276-1564.

Although not strictly necessary, it is possible to insert a key in the edge connector (between contacts 4/22 and 5/23 — using Amstrad rather than Tandy numbering) by carefully sawing a small slot and glueing in a suitable piece of plastic. Fitting the connectors to the ribbon cable is easily done in a vice, but be sure you get them the right way round, with positions 18 and 36 of an Amphenol plug unused.

The total cost was about £12.

D M Bryant,
Orpington, Kent

Quick as a flash on the Commodore 64

This routine demonstrates some interesting effects which can be created using the video chip in the Commodore 64.

For example if characters are on the screen in light blue, with the registers 53281 to 53283 POKEd with 6 (dark blue) you can make them disappear.

In the following example it is used to flash characters on the screen while waiting for a response.

To turn effect on: POKE 53270, PEEK (53270) OR 16.

To turn effect off: POKE 53270, PEEK (53270) AND 239.

Brian Whittle,
Huntingdon, Cambs

```
1 PRINT CHR$(147)
10 FOR I=0 TO 2
15 PRINT CHR$(154) : PRINT CHR$(18);
20 PRINT "THIS WILL FLASH"
25 PRINT CHR$(144) : PRINT
30 PRINT "THIS WON'T FLASH"
40 POKE 53281+I,6 : NEXT
45 PRINT CHR$(154) : PRINT CHR$(18);
50 PRINT "PRESS ANY KEY"
60 POKE 53270,PEEK(53270) OR 16
70 FOR I=0 TO 150 : NEXT
80 POKE 53270,PEEK(53270) AND 239:
90 FOR I=0 TO 150 : NEXT
100 GET A$: IF A$="" THEN 60
110 POKE 53270,PEEK(53270) AND 239 : END
```

Dragon's direct disability

Here is a method for disabling the direct commands on the Dragon. Every time a Basic statement is read in, a jump is made from ROM to RAM. This jump is normally returned

straight away but the routine given below makes it jump to the place where the disable routine is held. Each time the jump is made to location 377 a token is given in register 'a'. This program simply checks to see if the token is a direct command that would allow the user to alter or look at your Basic program.

On encountering LIST, LLIST, CSAVE, TRON, EDIT the token is changed into a REM. This means that every time one of these commands is read, either in the program itself or as a direct command, it will be interpreted as a REM.

```
10 CLEAR 200, &H7C50
20 B=&H7C50
30 READ A$ : IF A$="Z" THEN 100
40 POKE B+I, VAL ("&H" + A$)
50 I=I + 1 : GOTO 30
60 DATA 81,95,26,02,86,82,81,
   A7,26,02,86,82
70 DATA 81,95,26,02,86,82,
   81,A8,26,02,86,82
80 DATA 81,9A,26,02,86,
   82,39,Z
1000 POKE 378,&H7C : POKE
   379,&H50 : POKE 377,&H7E
```

Paul Ramson
Stockport,
Cheshire

```
0 CLS
10 TEXT
20 PAPER0
30 INK7
40 HIRES
50 FILL200,40,16
60 DOKE621,47960
70 POKE623,28
80 PRINT"  "CHR$(27)"Z";
90 CALL#F89B
100 CURSET0,175,3:FILL12,40,22:FILL12,40
,19
110 FORN=0TO5
120 CURSETN*18,175+N*2,3
130 FILL(6-N)*4,3,32
135 CURSET227-(N*18),175+N*2,3
136 FILL(6-N)*4,3,32
160 NEXTN
190 FORST=21TO20STEP-1
200 CO=ST
210 FORN=0TO5
220 CURSETN*18,175+N*2,3
230 FILL(6-N)*4,1,CO
235 CURSET227-(N*18),175+N*2,3
236 FILL(6-N)*4,1,CO
240 CO=CO-1:IFCO<20THENCO=21
260 NEXTN,ST
270 GOTO190
```

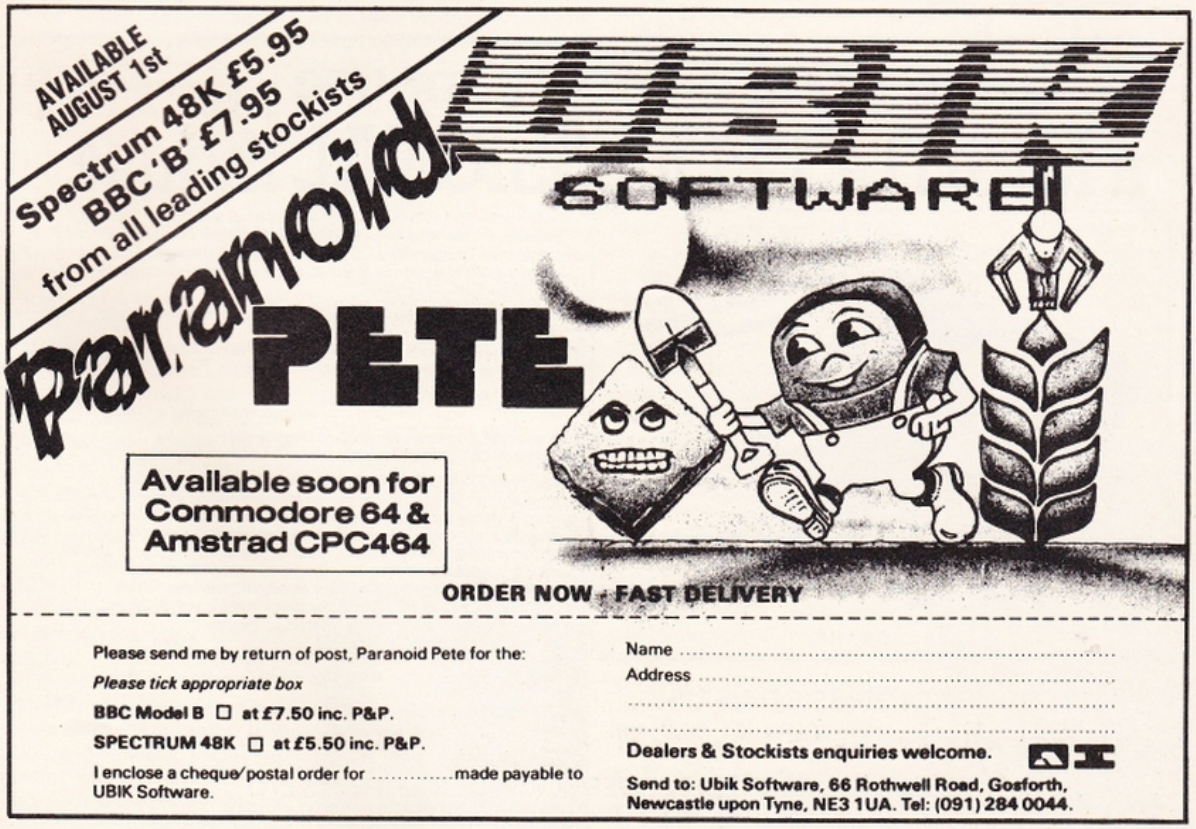
Alternative Oric screen

When investigating the Oric's screen attributes I came across what could be called a new screen mode. The routine at left will enable you to use Oric's high resolution commands in text mode.

Lines 100-270 give a demonstration of this mode, producing the effect of passing through a 3D tunnel. The effect is achieved by first setting the computer to HIRES and then displaying the 50Hz text attribute. The screen size and starting position are then changed accordingly, and finally the character set is moved to where it would be in text mode.

This mode does have its drawbacks. You can only use HIRES commands and print, and only 23 of the 28 text lines can be addressed using CURSET. DRAW and CIRCLE will not function properly but FILL does work extremely quickly and correctly. PAPER and INK work but should not be used as they will overwrite the character set further down in RAM.

(Could this reader please send in your name and address.)



Clubnet goes to Nottingham where Harriet Arnold finds micro talking to micro.

A little mutual understanding

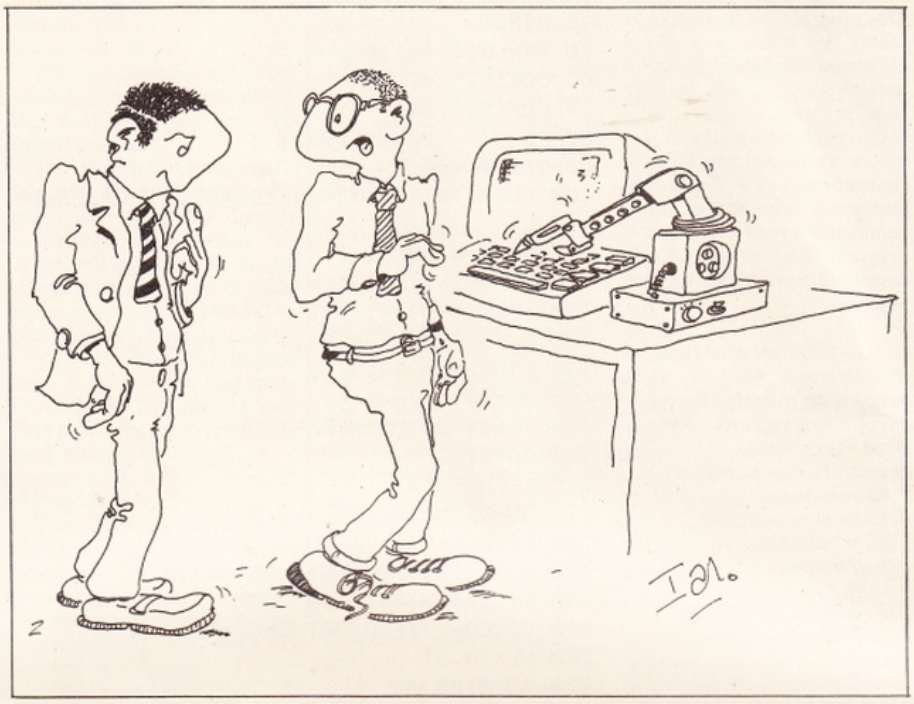
Extensive use of Basicode, despite its limitations, is being encouraged in Nottingham Microcomputer club. It's seen as a way to cross-pollenate the activities of the club's several energetic machine-specific groups.

While overall judging of the club's competitions, for instance, would be easier with Basicode, the real attraction is that all the more members would appreciate the expertise.

But standardisation penalises originality; even Basicode-advocate — and club chairman — Roy Hampton describes it as "a very limited sub-set of Basic."

Nevertheless he has high hopes of the scheme. "We're working on the assumption that we can develop Basicode to a higher level," he said. That may yet be the decisive factor in the project's usefullness.

For more details contact Roy Hampton on Nottingham (0602) 254056.



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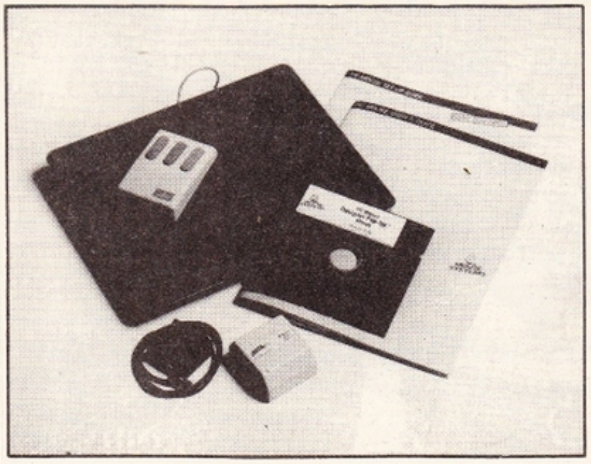

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Need some help? Or just looking for a little computer-related reading? Let us advise you.

'The Art of Micro Design' by A A Berk, published by Newnes Technical Books at £13.95 (paperback, 296pp).

The Art of Micro Design is not only for the micro enthusiast but also for the layman and, though rather technical in places, it begins where many introductory books end. It covers all the details on the hardware, and some of the software, involved in getting microprocessors up and running.

The author treats microprocessors as little black boxes into which instructions are put and out of which signals come. Starting with an overview of the various signals, three common processors are used (Z80, 6800, and 1802) to demonstrate various addressing modes and what these mean when attaching memory chips and other peripherals.

Sadly omitted, though, is indirect addressing as used on the 6502, 6809 upwards; a feature which should not have been ignored.

Other subjects are RAMs, ROMs, EPROMS, Bubble memories, and disks and how they are used as a means of storage. Then there's input/output possibilities, things like PIAs and VIAs and how they are used to an extent where manufacturers' data sheets should pose no problems. LEDs, video displays, keyboards, and voice synthesisers are among other subjects covered.

The whole field is dealt with almost up to degree standard (more so in some cases). It is very readable and useful for anyone who is either studying micros or has read the beginner's books and wants to know more. **KG**

Artificial Intelligence on the Dragon Computer by Keith and Steven Brain, published by Sunshine at £6.95 (paperback, 136 pages).

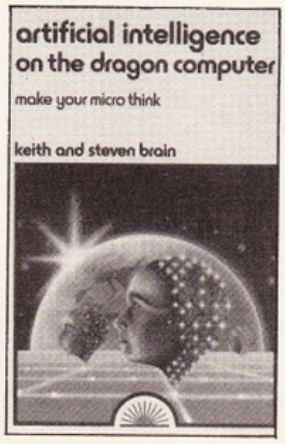
Artificial Intelligence on any computer is a tricky subject, as technically it is not achievable — at least not using the accepted definition of AI, propounded by Alan Turing in the forties: if you can't tell whether it's a computer or a human beyond the keyboard then it's intelligent (since we assume that most humans are intelligent).

We are still a long way from the artificially intelligent machine, more than 30 years after Turing's death, so the rider to the title — make your micro think — is a little dishonest.

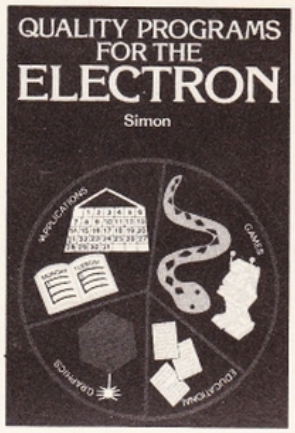
However, although the Brains have not given the Dragon artificial intelligence, they have produced a book of interesting ideas about AI. Unfortunately it gets off to a bad start with a couple of pages on science fiction robots and computers, moving on to reality via a series of tired jokes.

Chapter two blows the gaff: 'As your computer is actually totally unintelligent . . .' but from then the book deals with things which make the Dragon respond in a more reasonable (if not intelligent) way, whetting the appetite with talk of natural language, problem solving and learning.

The book culminates with a large example (five pages of flowcharts, seven of program) which simulates a computer salesman, and does have qualities of cleverness — it looks to see if you can afford to buy the machine (a vision of the future?), whether the sales commission is high enough etc, — but no real intelligence. A two page section-by-section explanation is essential to understand the program.



A book full of interesting ideas, but the humour does not work well. The most encouraging feeling I got from it was that if computers are to be inelligent, they must also be user-friendly (or just friendly). **PL**



'Quality programs for the Electron' by Simon, published by Micro Press at £6.95 (paperback, 195 pages).

Simon has revised the BBC version of 'Quality programs for . . .' (reviewed, Issue 42), with apparently few surface differences — the cover design is based on a CND logo and the chapter headings are very similar (though it's 45p more and 12 pages less then the BBC book).

However, this fine book makes the most of the Electron's strongest asset — BBC Basic — to provide good programs and easy-to-follow text. The quality of the games is high. The snake game, although graphically unimaginative, is stimulating and addictive, and wins over other versions by having a time limit to stop idle meandering.

The programs come with explanations of the more complex code and suggestions of how to modify them.

Eighteen of these in four sections (applications, education, graphics, games) make the book good value for money, and more so since the method of programming is more interesting than the results of the programs. The education section is perhaps misrepresentative, being academic rather than educational.

Unfortunately, though a cassette was offered with the BBC book, there's no such enhancement advertised with this one. **PL**

'The Elementary Atari' by William Sanders, published by Reston at £13.45 (paperback, 287 pages).

This book ia a real joy — user friendly, in fact. Like so many from America, it makes life easy from the moment you open the cover, with its spiral binding banishing that irritating problem of how to keep pages flat while reading and typing from them at the same time.

Even better, the quality of production and typography is reflected throughout by a very high standard of programming instruction suitable for all Ataris.

Each chapter takes the form of an informal tutorial with the meat of the subject sandwiched between a brief intoduction and a summary to put it all in perspective.

The clarity of the book makes some of the more daunting aspects of home computing seem almost like child's play, with short, illustrative programs falling into place just when you want to see the way in which a particular function works.

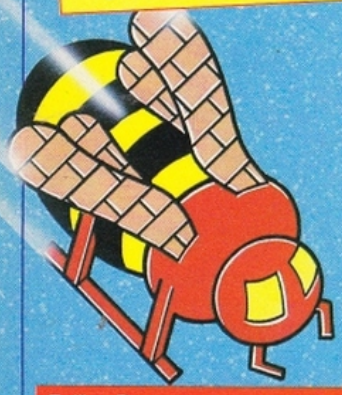
But the real value of the book is in its remarkable scope. In addition to the most thorough explanation of Basic that I have seen for the machine, it delves into the world of peripherals, with particularly good chapters on use of cassette, disk and printer. There is also a useful round-up of some of the best specialised programs available, though many of these will take a bit of hunting out in England.

As if this was not enough, the book is peppered with hints and short-cuts which alone make it worth the price. **SC**

The listing here uses Andrew Richards' feature on Dragon sprites which was published in issue 66.

Dragon drone drama

Falling Drones is a fast and smooth 'shoot-em-up' game. Use the right joystick (or the 'A' key for left, the 'S' key for right and the 'ENTER' key for fire if you have no joysticks) to control your base ship, and try to prevent the Drones from landing on the planet and taking off again, as they take large amounts of your fuel, displayed at the top of the screen. Once all of your fuel has gone the game terminates and displays your score. The game uses the sprite generator program to provide the animated aliens, your base, and the constant background display, so you'll have to load in the sprite generator program and run it before you type in the game.



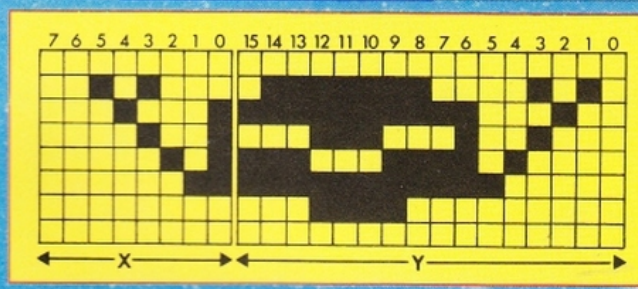
Falling Drones notes

80-620	create all the sprites that are used in the game.
160-300	create the top third of the Drone.
320-460	create the middle third.
480-620	create the bottom third of the sprite Drone.
630-660	set up the background display
690-760	clone the Drone sprite to make five of them and set up their directions and positions on the screen.
780-790	set up the variables and copy the background onto the screen.
800-870	move your base ship, check for the fire button and display fuel.
880-960	is a subroutine for firing the laser. Checks for hit on alien.
970-1150	is a subroutine for hit on alien. Destroys alien, deletes it from screen and puts a new alien at the top of the screen.
1160-1270	end of the game subroutine.
1280-1340	instructions.

If you have no joysticks then enter these lines for keyboard control:

```
800 P=PEEK(337):IF P=251 OR P=187 THEN
    X=%MOVE(C1) (C3) (C1) ELSE IF P=239
    OR P=175 THEN X=%MOVE(C1) (C4) (C1)
    ELSE X=%MOVE(C1) (C1) (C1)
810 IF PEEK(135)=13 THEN
    POKE135,0:GOSUB 880
```

```
10 REM GAME  FALLING DRONES
20 REM(C) 1983 A.M.RICHARDS
50 GOSUB 1300
60 GOSUB 1280
70 PCLEAR8
80 X=%CREATE(0)(0)(8)(0)(0)(0)(6144)(0)(6144)(0)(6144)(0)(6144)(0)(6144)(0)(6144
)(0)(6144)
90 X=%CREATE(0)(8)(8)(0)(15360)(0)(9216)(0)(9216)(8)(9232)(0)(26112)(9)(33168)(1
4)(6256)(8)(32272)
100 X=%CREATE(0)(16)(8)(18)(72)(32)(65284)(71)(9442)(88)(26138)(96)(16902)(96)(1
5366)(64)(2)(0)(0)
110 REM BLANK SPRITE
120 X=%CREATE(1)(0)(8)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)
130 X=%CREATE(1)(8)(8)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)
140 X=%CREATE(1)(16)(8)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)(0)
150 REM BIT0
160 X=%CREATE(2)(0)(0)(0)(0)(0)(0)(0)(0)(32256)(0)(23040)(15)(65520)(9)(144)(63)(65
532)(32)(6148)
170 REM BIT1
180 X=%CREATE(2)(0)(1)(0)(0)(0)(0)(0)(31744)(0)(25600)(15)(65504)(12)(33056)(31)
(65528)(48)(2056)
190 REM BIT 2
200 X=%CREATE(2)(0)(2)(0)(0)(0)(0)(0)(14336)(0)(14336)(1)(65280)(1)(42240)(1)(65
408)(3)(6272)
210 REM BIT 3
220 X=%CREATE(2)(0)(3)(0)(0)(0)(0)(0)(6144)(0)(6144)(0)(15360)(0)(9216)(0)(15360
)(0)(9216)
230 REM BIT 4
240 X=%CREATE(2)(0)(4)(0)(0)(0)(0)(0)(6144)(0)(6144)(0)(15360)(0)(9216)(0)(15360
)(0)(9216)
250 REM BIT 5
260 X=%CREATE(2)(0)(5)(0)(0)(0)(0)(0)(7168)(0)(7168)(0)(65408)(0)(42368)(1)(6547
2)(1)(6336)
270 REM BIT 6
280 X=%CREATE(2)(0)(6)(0)(0)(0)(0)(0)(15872)(0)(9728)(7)(65520)(4)(33072)(31)(65
528)(16)(4108)
290 REM BIT 7
300 X=%CREATE(2)(0)(7)(0)(0)(0)(0)(0)(32256)(0)(23040)(15)(65520)(9)(144)(63)(65
532)(32)(6148)
310 REM BIT0
320 X=%CREATE(2)(8)(0)(47)(50164)(40)(32276)(40)(20)(40)(20)(40)(20)(40)(20)(40)
(20)(40)(20)
330 REM BIT1
340 X=%CREATE(2)(8)(1)(55)(49640)(52)(32360)(52)(104)(52)(104)(52)(104)(52)(104)
(52)(104)(52)(104)
350 REM BIT2
360 X=%CREATE(2)(8)(2)(3)(26240)(3)(24192)(3)(18048)(3)(18048)(3)(18048)(3)(1804
8)(3)(18048)(3)(18048)
370 REM BIT3
380 X=%CREATE(2)(8)(3)(0)(9216)(0)(9216)(0)(9216)(0)(9216)(0)(9216)(0)(9216)(0)(
9216)(0)(9216)
390 REM BIT4
400 X=%CREATE(2)(8)(4)(0)(9216)(0)(9216)(0)(9216)(0)(9216)(0)(9216)(0)(9216)(0)(
9216)(0)(9216)
410 REM BIT5
420 X=%CREATE(2)(8)(5)(1)(26304)(1)(31424)(1)(25280)(1)(25280)(1)(25280)(1)(2528
0)(1)(25280)(1)(25280)
430 REM BIT6
440 X=%CREATE(2)(8)(6)(23)(34796)(22)(31788)(22)(44)(22)(44)(22)(44)(22)(44)(22)
(44)(22)(44)
450 REM BIT7
460 X=%CREATE(2)(8)(7)(47)(50164)(40)(32276)(40)(20)(40)(20)(40)(20)(40)(20)(40)
(20)(40)(20)
470 REM BIT0
480 X=%CREATE(2)(16)(0)(40)(20)(40)(20)(40)(20)(46)(116)(34)(68)(62)(124)(0)(0)(
0)(0)
490 REM BIT1
500 X=%CREATE(2)(16)(1)(52)(104)(52)(104)(52)(104)(42)(104)(52)(200)(60)(248)(0)
(0)(0)(0)
510 REM BIT2
520 X=%CREATE(2)(16)(2)(3)(18048)(3)(18048)(3)(18048)(3)(18048)(3)(18048)(3)(510
72)(0)(0)(0)(0)
530 REM BIT3
540 X=%CREATE(2)(16)(3)(0)(9216)(0)(9216)(0)(9216)(0)(9216)(0)(9216)(0)(15360)(0
)(0)(0)(0)
550 REM BIT4
560 X=%CREATE(2)(16)(4)(0)(9216)(0)(9216)(0)(9216)(0)(9216)(0)(9216)(0)(15360)(0
)(0)(0)(0)
570 REM BIT5
580 X=%CREATE(2)(16)(5)(1)(25280)(1)(25280)(1)(25280)(1)(25280)(1)(25280)(1)(583
04)(0)(0)(0)(0)
590 REM BIT6
600 X=%CREATE(2)(16)(6)(22)(44)(22)(44)(22)(44)(23)(44)(19)(44)(31)(60)(0)(0)(0)
(0)
```



X	Y
0	0
40	32522
17	65476
9	7240
5	58320
3	65504
0	15872
0	0

```
610 REM BIT7
620 X=%CREATE(2)(16)(7)(40)(20)(40)(20)(40)(20)(46)(116)(34)(68)(62)(124)(0)(0)(
0)(0)
630 PMODE4,5:PCLS:FORI=1TO300:PSET(RND(255),RND(167)):NEXT
640 LINE(0,191)-(0,191),PSET
650 FORI=0TO255STEP6
660 LINE-(I,191-RND(24)),PSET:NEXT
670 PMODE4,1:SC=0
680 NL=6:KL=200
690 X=%SPRITE(0)(1)(0)(143)(0)
700 FORI=3TO NL:X=%CLONE(2)(I):NEXT
710 FORI=2TO NL:X=%SPRITE(I)(1)(RND(230))(0)(1):NEXT
720 FORI=2TO NL
730 D=RND(2)-1:IFD=0 THEN D=255
740 X=%MOVE(I)(D)(1):NEXT
750 X=%CNTL(0)(NL)
760 PCLS:SCREEN1,0
770 REM  start of game
780 C1=0:C2=63:C3=255:C4=1:C5=65280:C6=126:C7=254:C8=165:C9=10:D1=12:D2=24
790 FORI=1TO4:PCOPYI+4 TO I:NEXT:SCREEN1,0
800 P=JOYSTK(C1):IFP=C1 THEN X=%MOVE(C1)(C3)(C1) ELSE IF P=C2 THEN X=%MOVE(C1)(C
4)(C1) ELSE X=%MOVE(C1)(C1)(C1)
810 Y=PEEK(C5):IF Y=C6 OR Y=C7 GOSUB880
820 R=%COLL(C1):IF R<>C3 THEN 1160
830 FORI=2 TO NL:V=%YVAL(I)
840 IF V>C8 THEN KL=KL-C9:NEXT ELSE NEXT
850 IF KL<=C1 THEN1160 ELSE LINE(1,1)-(KL,1),PSET:LINE(KL+1,1)-(255,1),PRESET
860 KL=KL-1
870 GOTO 800
880 U=D1+(%XVAL(C1))
890 FORI=2 TO NL
900 A=%XVAL(I)
910 IF U>=A AND U<=A+D2 THEN 970
920 NEXT
930 LINE(U,160)-(U,C1),PSET
940 SOUND1,1
950 LINE(U,160)-(U,C1),PRESET
960 RETURN
970 X=%MOVE(I)(0)(0)
980 X=%MOVE(NL)(0)(0)
990 SC=SC+1
1000 J=%XVAL(I)
1010 K=%YVAL(I)
1020 LINE(U,160)-(U,K+24),PSET
1030 X=%SPRITE(I)(0)(J)(K)(1)
1040 X=%SPRITE(1)(1)(J)(K)(0)
1050 X=%WHITE(5)
1060 LINE(U,160)-(U,K+24),PRESET
1070 S=%XVAL(NL)
1080 W=%YVAL(NL)
1090 X=%SPRITE(NL)(1)((RND(230)))(0)(1)
1100 IF NL=I THEN 1120
1110 X=%SPRITE(I)(1)(S)(W)(1)
1120 D=RND(2)-1:IFD=0THEND=255
1130 O=RND(2):X=%MOVE(I)(D)(O):X=%MOVE(NL)(D)(O)
1140 X=%SPRITE(1)(0)(J)(K)(1)
1150 RETURN
1160 FORI=130TO255STEP5:PMODE4,1:SCREEN1,0:SOUNDI,1:PMODE3,1:SCREEN1,0:X=%WHITE(
1)
1170 NEXT
1180 X=%CNTL(0)(0)
1190 PMODE4,1:SCREEN1,0
1200 X=%SPRITE(0)(0)(0)(0)(0)
1210 FORI=0TO140:LINE(I,I)-(256-I,192-I),PSET,B:NEXT
1220 FORI=1TO1000:NEXT
1230 CLS
1240 PRINT"          GAME OVER!"
1250 PRINT"        YOU SCORED";SC
1260 POKE65494,0
1270 END
1280 CLS:PRINT@256,"PLEASE NOTE THIS GAME WAS        WRITTEN USING THE SPRITE
    GENERATOR ROUTINE AND IS WRITTENIN BASIC!"
1290 RETURN
1300 CLS
1310 PRINT"THIS GAME IS PLAYED WITH THE     RIGHT JOYSTICK. YOU MUST PREVENTTHE D
RONES FORM LANDING ON THE  PLANET BENEATH YOU BY DESTROYINGTHEM WITH YOUR LASER.
 IF THEY   LAND ON THE PLANET THEY WILL     TAKE SOME OF YOUR VALUABLE FUEL.";
1320 PRINT"YOUR TIME DEPENDS ON THE AMOUNT OF FUEL LEFT IN YOUR SHIP. THE  FUEL
GUAGE IS SOWN AT THE TOP   OF THE SCREEN.AFTER YOUR FUEL   HAS RUN OUT YOUR SCOR
E WILL BE  DISPLAYED."
1330 A$=INKEY$:IFA$=""" THEN 1330
1340 RETURN
```

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If your Sinclair is out of sorts, give it a boost with Kevin Ball's machine code routines.

Spectrum allsorts

It is now possible to run a small database program on your Spectrum, especially with the Microdrives' recent arrival. Databases can be used to hold almost any type of data you wish them to, usually names and addresses, though other types of data are possible.

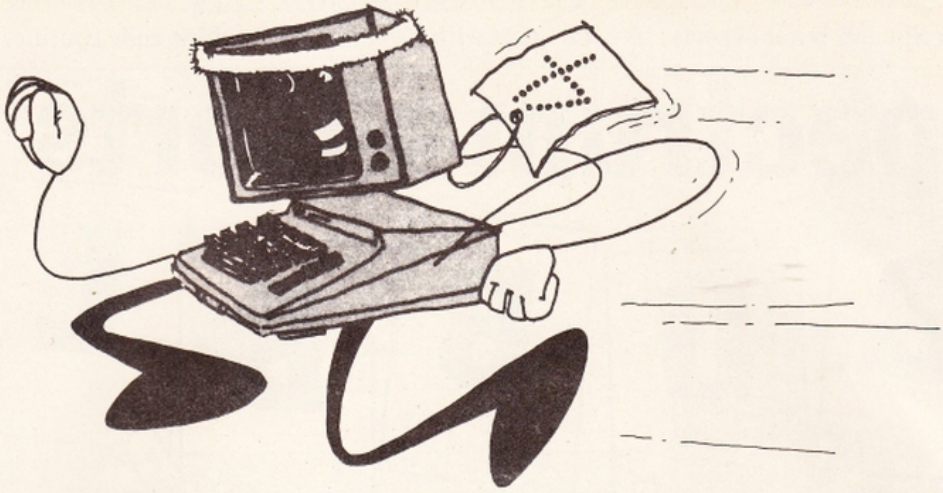
Programs of this type frequently have certain routines to manipulate the data built in. One of these routines is very often a bubblesort, with which you can sort your data into alphabetical or numerical order. Bubblesorts are used because they have a simple algorithm, and they don't take up much program space. But for such a useful routine you have to pay a small price: bubblesort routines can take an age to run. On the Spectrum this is particularly so since the Basic is slower than on most other micros. However, even a BBC gets bogged down with a large number of records to sort.

The problem lies at the root of how the sort works. Bubblesort routines are not too efficient, and this efficiency diminishes as the number of records grows because the time taken to complete the sort is not proportional to the number of records, but to roughly the number of records squared. Bubblesorts are good with five or ten records, but anything larger means a tedious delay. Try and sort a 25K database into alphabetical order and it could take weeks. Literally.

The obvious solution to this execution time problem is to sort using a machine

Bubblesort listing dissassembled

```
100 REM start
110 REM org 40000
120 REM
130 REM equ 23300  FIRST
140 REM equ 23302  SECOND
150 REM equ 23304  LOOP
160 REM equ 23306  SUB-LEN
170 REM equ 23681  STATUS
180 REM equ 23645  CH-ADD
190 REM equ &28B2  LOOK-VARS
200 REM
210 REM ld hl,(CH-ADD)
220 REM push hl
230 REM ld hl,FIRST
240 REM ld (CH-ADD),hl
250 REM ld (hl),100;'d'
260 REM inc hl
270 REM ld (hl),36;'$'
280 REM call LOOK-VARS
290 REM ld b,h
300 REM ld c,l
310 REM pop hl
320 REM ld (CH-ADD),hl
330 REM jr nc,FOUND
340 REM NOT-FOUND;
350 REM rst 8
360 REM datab &01
370 REM FOUND;
380 REM ld h,b
390 REM ld l,c
400 REM bit 7,(hl)
410 REM jr z,NOT-FOUND
420 REM inc hl
430 REM inc hl
440 REM inc hl
450 REM ld a,2
460 REM cp (hl)
470 REM jr z,IN-RANGE
480 REM ERROR;
490 REM rst 8
500 REM datab &02
510 REM IN-RANGE;
520 REM inc hl
530 REM ld e,(hl)
540 REM inc hl
550 REM ld d,(hl)
560 REM inc hl
570 REM inc hl
580 REM xor a
590 REM cp (hl)
600 REM jr nz,ERROR
610 REM dec hl
620 REM ld a,(hl)
630 REM inc hl
640 REM inc hl
650 REM ld (SUB-LEN),a
660 REM ld (FIRST),hl
670 REM ld b,0
680 REM ld c,a
690 REM add hl,bc
700 REM ld (SECOND),hl
710 REM dec de
720 REM ld b,d
730 REM ld c,e
740 REM ld (LOOP),bc
750 REM LOOP-A;
760 REM push bc
770 REM ld hl,(FIRST)
780 REM ld de,(SECOND)
790 REM ld bc,(LOOP)
800 REM LOOP-B;
810 REM push bc
820 REM push hl
830 REM push de
840 REM ld a,(SUB-LEN)
850 REM ld b,a
860 REM LOOP-C;
870 REM ld a,(de)
880 REM cp (hl)
890 REM jr nz,CONT
900 REM inc hl
910 REM inc de
920 REM djnz LOOP-C
930 REM xor a
940 REM CONT;
950 REM pop de
960 REM pop hl
970 REM ld a,(SUB-LEN)
980 REM ld b,a
990 REM LOOP-I;
1000 REM jr nc,NO-SWAP
1010 REM ld c,(hl)
1020 REM ld a,(de)
1030 REM ld (hl),a
1040 REM ld a,c
1050 REM ld (de),a
1060 REM NO-SWAP;
1070 REM inc hl
1080 REM inc de
1090 REM djnz LOOP-I
1100 REM pop bc
1110 REM dec bc
1120 REM ld a,b
1130 REM or c
1140 REM jr nz,LOOP-B
1150 REM pop bc
1160 REM dec bc
1170 REM ld a,b
1180 REM or c
1190 REM jr nz,LOOP-A
1200 REM ret
1210 REM end
```



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code routine. The routine shown here achieves this objective, and the considerable speeding-up effect obtained is shown in table 1.

The routine occupies only 138 bytes of memory, and can be placed anywhere in spare memory. It will even reside in the printer buffer, but if you wish to place it there it will have to be after address 23310, as the first few bytes of the printer buffer are used by the routine as storage space for addresses *etc.* Remember, any LPRINT, LLIST or COPY commands erase your routine.

After typing in the loading program and data lines, you should save the program in case of the almost inevitable crash. RUN the program and the code will be POKEd into memory at the location specified in line 10. Should you wish to place the routine at a different location, just change the locations on line 10 before RUNning.

When using the machine code sort routine in programs, your data must be in the character array D$ — see page 80 of your Spectrum manual for more details.

Subscripts

The array D$ must have two subscripts *ie* D$(a,b), where a is the number of subscripts (the number of different strings contained in the array), and where b is the length of each subscript (each individual string). The length of each string (the value of b) must not exceed 255, but you can have as many sub-strings (the value of a) as your memory will allow.

If you CALL the routine (RANDOMIZE USR start address) when D$ does not exist in memory, the standard 'Variable not found' error message pops up. If D$ is present in memory, but has not been DIMed correctly, (*ie* D$(4), or D$(4,2,2)), the error message 'Subscript wrong' appears.

If, however, D$ is present in memory in a correct form, it will be sorted into alphabetical order on return to Basic. For very small amounts of data the response can appear instantaneous, but the time increases with the amount of data.

Beware: don't DIM D$ with a ludicrously large number unless you are prepared either for a long wait, or you don't mind losing your data, since when the sort is running the only way to stop it prematurely is by pulling the plug out.

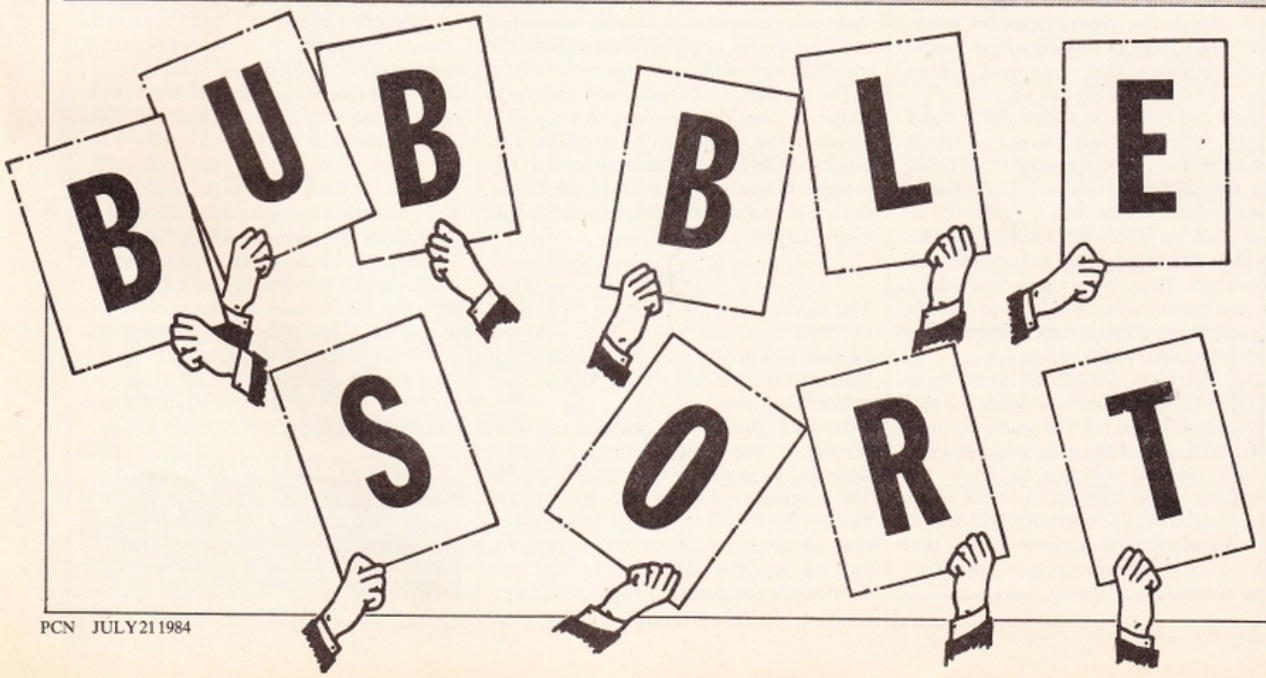
Though the routine only makes provision for strings, it is possible to sort numerical data if you first run a loop to convert your numeric array into the string array D$. Page 58 of the manual has details on this. PCN

Table 1: Bubble sort data.

Array size	Time for Basic		Time for machine code	
	mins	secs	mins	secs
(10,10)		3.5		0.04
(25,25)		18		0.38
(50,50)	1	28		3.04
(10,50)		3.5		0.1
(200,6)	27	30		7.18
(10,20)		3.5		0.06
(100,100)	7	5		24.18

Bubblesort program

```
 10 CLEAR 39995
 20 LET a=40000
 30 FOR f=a TO a+135: READ z: POKE f,z: NEXT f
100 DATA 42,93,92,229,33,4,91,34,93,92,54,100,35,54,36,205
110 DATA 178,40,68,77,225,34,93,92,48,2,207,1,96,105,203,126
120 DATA 40,248,35,35,35,62,2,190,40,2,207,2,35,94,35,86,35,35
130 DATA 175,190,32,244,43,126,35,35,50,10,91,34,4,91,6,0,79,9
140 DATA 34,6,91,27,66,75,237,67,8,91,197,42,4,91,237,91,6,91
150 DATA 237,75,8,91,197,229,213,58,10,91,71,26,190,32,5,35,19
160 DATA 16,248,175,209,225,58,10,91,71,48,5,78,26,119,121,18
170 DATA 35,19,16,245,193,11,120,177,32,217,193,11,120,177,32,199,201
```



MULTIPLE MODEM

Kenn Garroch expands his horizons via the telephone and a modem.

The Portman, from Interlekt, is one of the first low cost, multi-speed, direct connection modems to be approved by British Telecom. Made in Britain, it features 300 baud full duplex (V.21), 1200/75 75/1200 baud (V.23 viewdata terminal or host), 1200 baud half duplex operation and can be used to originate or answer calls.

Presentation

The Portman comes in a medium sized cardboard box along with its manual. The smaller orange box inside is the modem which measures about 26cm by 16cm and is just the right size to be used as a telephone stand.

The mains lead (with plug fitted), the telephone lead and the RS232 25-way connector are at the back of the box along with the fuse. The rate selection switch, mode switch and a set of LEDs are on the front.

The LEDs are used to show the status of the modem. The manual was a little incorrect on the operation of one of these. The DTR (data terminal ready) LED came on with the PWR (power) LED, even though there was nothing connected to the modem.

The manual states that this LED shows when the host computer is connected. The fact that it didn't caused a little confusion at first, but a swift phone call to Interlekt soon solved this.

Installation

The Portman uses the standard RS232 system for interfacing to its host computer. One problem with this is that the TXD/RXD (transmit and receive) and CTS/RTS (clear to send, ready to send) connections are not reversed as is usual when connecting from one computer to another. This meant using a Suss box to re-assign the connections and, ultimately, rewiring the plug.

Of course, the easiest solution would have been to buy a commercially available cable, although this is generally more expensive than making one up.

Once the cable was sorted out it was a simple matter to plug it into the computer and the modem and then insert the BT plug into the telephone socket. The manual stresses the need for an earth wire to be connected to the back, to protect BT's telephone network from extraneous voltage surges. There was a tag on the back for this, but finding a suitable earth to connect it to was a little difficult since there were no cold water pipes in the office.

The Portman is available with three different telephone connections, the BT 603A, the BT jack 95 and spade connections. With any of these it is necessary to have a two-way adaptor to allow the telephone to be plugged in at the same time. This is because the Portman does not have an autodial facility so all the dial pullling or button pressing needs to be done manually.

Documentation

A single manual comes with the Portman. This includes black and white pictures showing the various set up possibilities. All the details needed to connect the modem up to any computer and to the telephone network are present, plus the full technical specifications of the modem itself.

The back page of the manual contains a couple of cut out cards, one of which registers the owner with Interlekt, the other is an application form to send to BT to apply for connection of the modem into the telephone network. How long this will take is anybody's guess.

In use

The modem was used with an NEC 8201 portable computer and a BBC. On the NEC it was possible to dial a number of bulletin boards, using the 300/300 baud option.

In this mode the modem worked faultlessly every time. Getting connected was simply a matter of setting the switch to 300 originate, dialling the appropriate number and waiting for the tone. When this appeared, the data switch was pressed, lighting up the data LED, and the connection was made. Then it was simply a matter of remembering to watch the telephone charges.

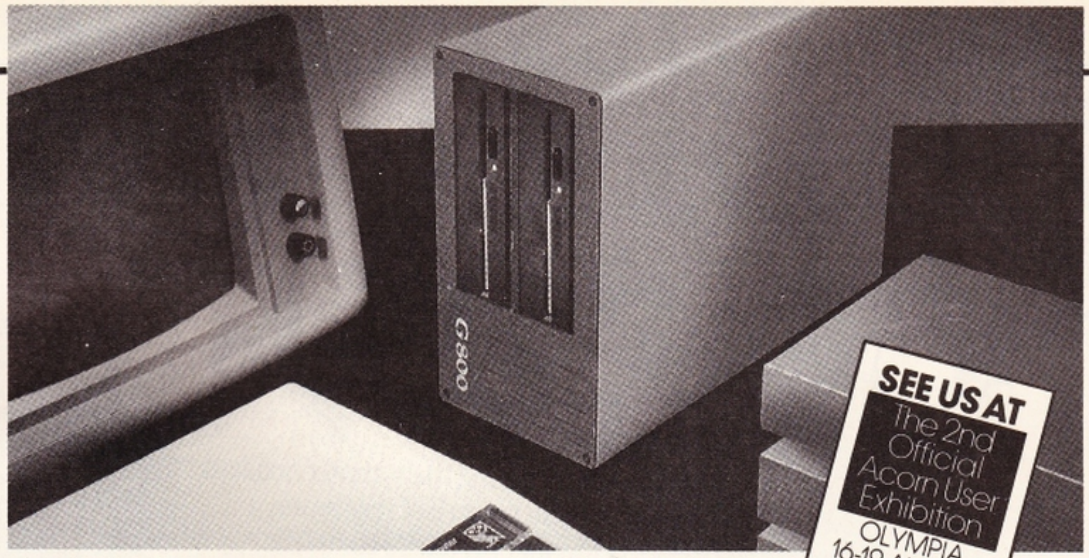
The BBC was used to check out the 1200/75 baud part of the modem. Connection to Prestel was easy, although trying to use an auto-logon wouldn't work, for some inexplicable reason, so I had to resort to manual logon every time. Apart from this, there was no problem and many a happy hour, plus lots of telephone charges, were spent wandering around inside the giant Prestel computer system.

Verdict

The Portman is a simple to use modem and its multiple speeds make it very flexible. It did have problems when working with a Torch (in 1200/75 mode) as it tended to drop the line before the connection was completed. Otherwise its operation was faultless and the uploading and downloading was perfect. All in all the Portman is a very nice piece of kit, although it seems somewhat overpriced at £225 inc VAT.

PCN

Product Interlekt Portman Multi Speed Modem **Price** £225 with mains lead, BT connector and 24 months' warranty **Supplier** Interlekt Electronics Ltd, Interlekt House, 24 Portman Road, Reading RG3 1LU



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- Model G800 – Twin, double sided, high density disc drives (640K formatted)
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Keyboard text and graphics supplied by BBC Model B

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PCN 6

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PEN FRIENDS

Stuart Cooke finds the Edumate plus software a pleasant package.

The Edumate light pen is the latest in the steadily increasing line of peripherals becoming available for the Commodore 64. Produced by Futurehouse, it has a whole range of software to use with it.

Designers of computers and computer software have long realised that an easy way to introduce software is to use one of the many alternatives to the keyboard. These are steadily becomming more available and devices such as mice, touch screens, and light pens are becoming commonplace.

The Commodore 64 has light pen circuitry built into one of its joystick ports as part of the basic machine. All that the 64 owner has to do is buy a pen and plug it in.

A complete line of educational programs called Playground Software is available for use with the Edumate. Titles range from Alphabet Construction Set, which teaches you how to draw the letters of the alphabet, to a bedtime story about the famous Little Red Riding Hood, in which you take part. For those who wish to draw pictures there is a utility program available called Peripheral Vision.

The Edumate is available with or without the software as an option.

Setting up

The Edumate light pen is much slimmer than any others I have seen and, if it wasn't for the coiled lead coming out of the top, it would look more like a felt tip than a light pen. To get the pen operational, all that needs to be done is to plug it into control port one and load in the relevent software. So there's none of that opening up the computer and plugging in extra boards as with some machines.

In use

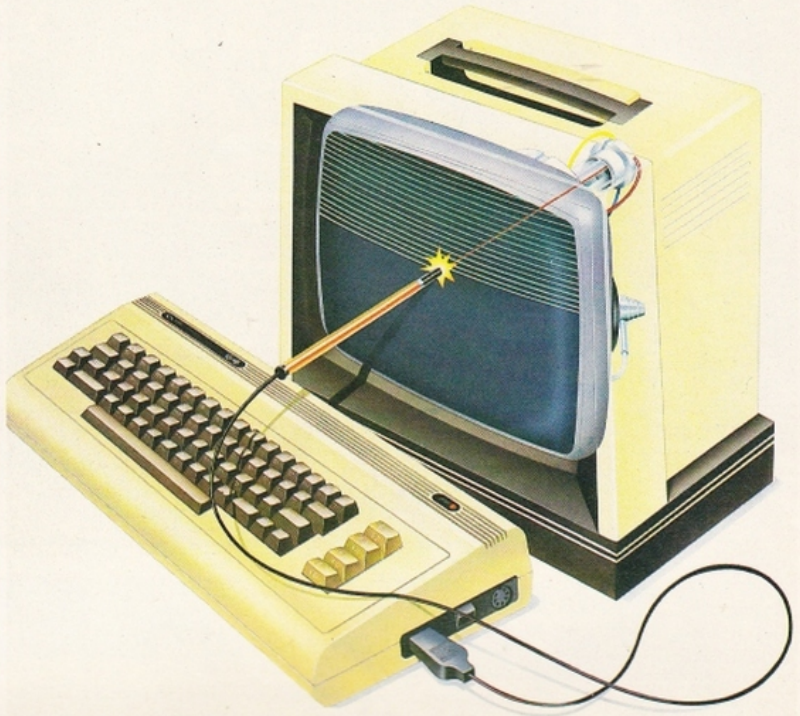
When used with the software supplied, the light pen proved to be very accurate. With some pens the registering of the position on the screen is not terribly good, which can cause a lot of problems when trying to use menus and so on.

One slight moan about the pen is the way that the cable tends to get wrapped around your arm while you are moving the pen around the screen. It would have been nice to have a little more cable with it.

The program supplied with the review pen, Peripheral Vision, is a complete graphics package and allows full colour pictures to be created using the light pen. It has all the normal features which one would expect from a drawing program. You can draw freehand, use predefined shapes, change colours by touching the pen on the relevent square, and there is a magnify option that allows a section of the picture to be blown up for detailed operations.

One of the nicest points about the program is that all the sections were made from the menu, using the light pen. The keyboard is used only when the Commodore key must be pressed to activate the light pen.

My only gripe about Peripheral Vision concerns the way in which the fill routine works. It is not possible to point the pen to fill sections which have not been outlined by colours. Before the fill can take place, the area to be filled must be surrounded by a colour and not the edge of the screen. However, by using the magnify mode, it is easy to colour the edges. Despite all this, the fill routine is very fast and it will do any shape.



How the light pen works with the 64

A light pen measures the delay from the time that a beam leaves the top of the screen until it reaches the position of the pen. This delay has to then be converted into a number from which you can work out the screen position. Fortunately the Commodore 64 works out the X and Y position for you. It is possible to read these values by simply PEEKing at location 53267 which holds the X value and 53268 which holds the Y value.

Unfortunately the X and Y values for the light pen do not prove to be equivalent to the screen positions when you are using graphics. Therefore, in the program here — which allows you to move a sprite around the screen with a light pen — the X and Y values are multiplied by 1.8 so that they are equivalent to a sprite position.

```
100 REM PROGRAM TO MOVE A SPRITE
110 REM WITH A LIGHT PEN
120 PRINT CHR$(147)
130 REM START OF SPRITE INFORMATION
140 S=53248
150 REM SET UP SPRITE
160 FOR C=0 TO 62:POKE 832+C,255:NEXT
165 REM SET UP DATA POINTER FOR SPRITE
170 POKE 2040,13
190 POKE S+39,1:REM SET SPRITE COLOUR
200 POKE S+21,1:REM TURN SPRITE ON
210 REM NOW POKE X POSITION OF SPRITE
220 REM WITH X POSITION OF PEN
230 X=PEEK(S+19)*1.8
240 IF X<255 THEN POKE S+16,0
250 IF X>255 THEN POKE S+16,1:X=X-255
260 POKE S,X
270 REM NOW POKE Y POSITION OF SPRITE
280 REM WITH Y POSITION OF LIGHT PEN
290 POKE S+1,PEEK(S+20)
300 GOTO 230

READY.
```

Verdict

The Edumate light pen is a little more expensive than some other light pens on the market but it seems well worth the cost. You will have to spend even more money if you want software but it may be well worth that little extra. PCN

Product Edumate Light pen **Machine** Commodore 64 **Price** Light pen only £34.95 Light pen plus Peripheral Vision £59.95 **Outlet** Tommorows World Today, 27-29 Oxford Street, London W1A. Tel: 01-439 7799.

EINSTEIN'S T

Tatung steps into the mid-range micro market. Trevor Jenkins reports.

As Britain's big names have stolen the limelight and made the BBC and QL household names, the UK arm of a Taiwanese electronics company has been beavering away in Bradford building a machine that promises to compete with them both.

Known mainly for its televisions and cooling fans, Tatung has brought out a £500 machine devoid of technological marvels but high in the easy-to-use stakes.

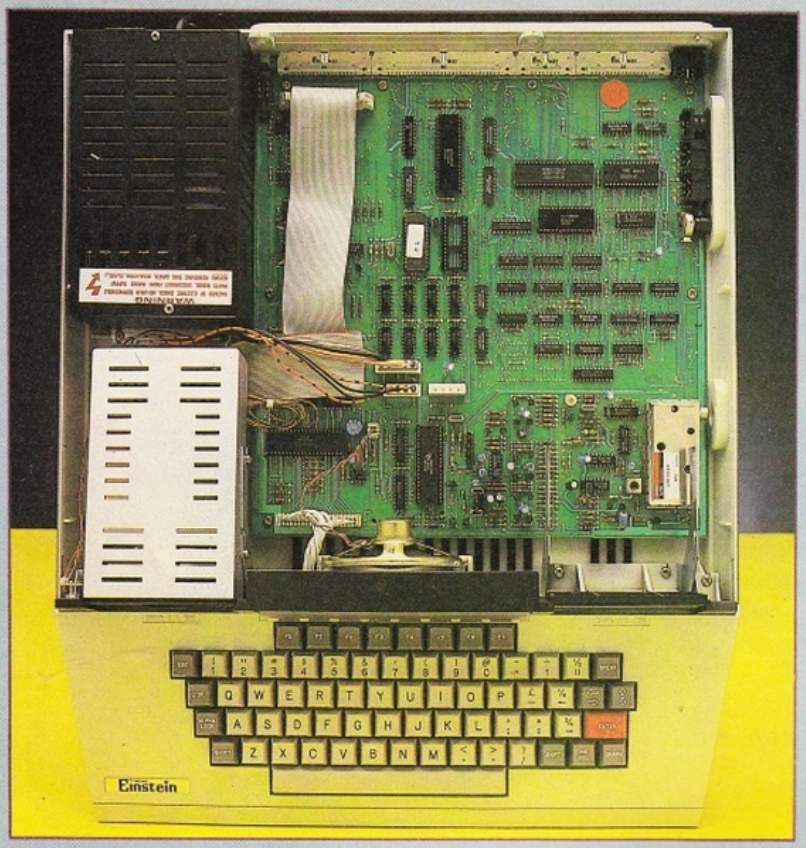
Called the Einstein, Tatung's micro has followed an example set by the famous Albert in that, like him, it avoids cluttering its memory with useless facts; it separates program and video memories so space is not wasted on things you'll never use.

In fact, it has all the feel of a machine that Acorn should have built for the BBC contract, with 64K of RAM, a separate 16K of video memory and an integral disk drive coupled with a Z80A microprocessor.

Designed for the top end of the home range or the bottom of the small business market, the Einstein comes with pleasant-to-look-at solidity, cased in neutral grey with sleek low lines.

Documentation

The review system came with three manuals: an introduction to the machine and Basic, a Basic reference manual, and a slim introduction to the disk operating system. Tatung has tried to make it easy for first-time buyers with an introduction that is pleasant to read being neither flippant



Above: Inside the Einstein — the speaker sits at the front of the 'chip board' facing the user. Below: The demonstration program shows off with sound and graphics.

THEORY

nor too serious. It takes you quickly and thoroughly through the hardware before gently leading into Basic programming, with a summary to end each chapter.

The Basic reference manual is similar to any other for the same language on other computers, though it was particularly irritating to find this one reiterated material from the introduction. More importantly, the index has no page numbers so time is wasted leafing through its several hundred pages. Near the back is an alphabetical list of Basic reserved words, also without page numbers. More care and attention over page numbering would have taken this from being just good to excellent.

In format, it is similar to the BBC user guide, being spiral bound with about the same size and number of pages, but the Einstein volume is clearer and more useful, especially in the sections on graphics, sound and file handling.

Of the three manuals, the DOS/MOS introduction is the most disappointing; in its 40 pages it attempts to cover both the ROM-based monitor program and the disk-operating system. People who started on microprocessor trainers, graduated to small systems with a ROM-based monitor and finally gained the glittering prizes of CP/M will have no problems with this manual — it is a useful pocket reference. But if you want to learn to use MOS or DOS you'd need to read something else too.

Hardware

Tatung has used the time since the launch of the BBC to design and build a product with a comparable specification without the limitations. Good-quality graphics and a disk can be used without reducing the space for programs to a few K of RAM. Including a disk drive as standard and using a Z80A is going to put the pressure on Acorn. However, text displayed either on a 40 by 24 or a 32 by 24 layout will limit some of its applications, but more of this later.

A 3in micro floppy is standard, with space for a second. The capacity of each drive is 190K, more than some 5.25in floppies. The disks are reversible giving twice the storage on each, which softens the £4 cost. The additional drive at £149 comes with new cabling and the bolts to mount it in the case (the brackets are already there).

The control and data signals from the floppy disk controller are brought out at the back of the machine, to which it is feasible to connect either 3 or 3½in microfloppies or 5.25in mini floppies. If you can wire up the necessary cable you could try 8in drives as well. A total of four drives may be connected; the external ones can be double-sided.

I found the standard floppy to be very slow, not quite as serious as using tape but nevertheless time consuming. If the disk is active everything on the machine is affected, *viz* the keyboard is locked-out and sound is slowed down. However, considering its rivals the BBC and the QL (one without secondary storage, the other with Microdrives) the Einstein's real disk drive is a bargain.

For those wanting to write or use CP/M-compatible programs, the disks are structured in a similar fashion with the file control blocks conforming to CP/M's FCBs.

The keyboard is a no-frills effort. It has 67 keys of which eight are user definable function keys, and 11 control keys, including shift, alpha lock, control and cursor movement keys. This is probably the one major criticism of the system: the feel of the keys is not positive enough, it is very spongy with a disturbing echo, since there's nothing beneath it. The review model suffered occasional problems with keys either bouncing or being ignored though, I was assured by Tatung that this has been fixed on production models, and a number of keys were incorrectly labelled, such as the ¼ which gives ¾. The keyboard features programmable auto-repeat on all keys either bouncing or being ignored, though I was assured by Tatung that this be changed but I could not find out how; this is the sort of information that ought to have been in the DOS/MOS manual.

Scanning of the keys is performed in a cunning way, the sound generator chip has two spare eight-bit ports which are used 31▶

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instead of the usual keyboard encoder chip: Anyone programming sound directly should take great care or the keyboard will produce garbage. The use of the sound generator chip for keyboard scanning highlights the design philosophy of the Einstein — to reduce the chip count to a minimum and yet produce a high specification machine.

Expansion

Expansion is possible because Tatung has designed in a Pipe connector which, like the BBC's Tube, brings the microprocessor signals out of the back of the case. Later this year it is intended to beef-up the graphics with a 256 colour, 120 sprite, 512 x 358 pixel card which will connect to the Pipe to produce an excellent games machine. Also on the card will be the facility for 80-column text. If you are interested only in 80-column text, a reduced monochrome version with only this will be available.

There is a full complement of connectors on the Einstein, an RS232 port for a serial printer or a modem, and a Centronics printer port as standard with a recommendation that you buy an Epson MX rather than an RX. Tatung never forgets the gamers, there are two joystick sockets.

The RS232 port has some limitations since 75 baud is the slowest it is capable off (some of us still want 45 or 50 baud). It is impossible to make the Einstein into a Viewdata terminal as at 75 baud, the sending and receiving speeds must be the same.

Display

The review model came with a matching monitor, also made in the UK, which was most impressive. It is RGB compatible and also has the production video standard of YUV. The choice between them is made by altering a few links inside the Einstein, though on the model I had these were difficult to change. I feared greatly for the printed circuit board: as I pulled on the clips it bent in an alarming way. However, this should not cause problems in use since it is something you are not likely to do more than once.

The monitor sits comfortably on top of the case but slides around a little if touched; I dreaded it falling off the back but Tatung prevents this with a significant lip at the back of the case. The case is strong enough to bear the weight of a 26-in colour television.

If the monitor is beyond your budget there is a TV modulator output and acceptable results are possible even with a cheap black and white TV. It is possible for the monitor and the TV outlet to be used at the same time, a very useful feature for demonstrations, classes and lectures. My only complaint about the monitor is that it did not come with a mains plug.

Software

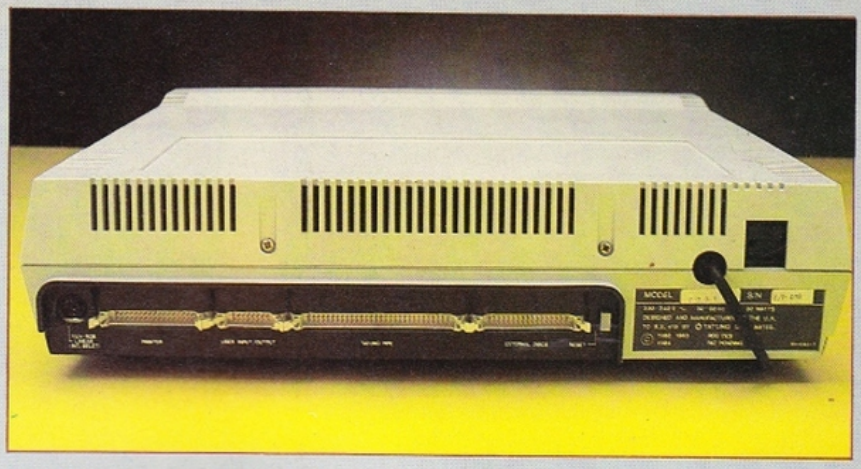
Tatung has taken a brave decision; the operating system is not CP/M but is compatible with it to the extent that Digital Research's DR Logo will be provided with production machines, though no copy of this was available for review. The operating system, written by Crystal and called XtalDOS, provides all CP/M in-built commands plus a MOS command to get you into the machine-code monitor. As mentioned above, the DOS manual is not very useful and any serious user should rely on Digital Research documentation. I was disappointed that the only other software provided was a Basic interpreter, again not choosing an established product like Microsoft Basic, but prefering XtalBasic.

XtalBasic is a good implementation providing all the features you need to write your own programs. Full access to the hardware is given via statements and functions to control the video controller and sound generator. It is possible to PEEK and POKE into the video RAM either with bytes or words. Full control of the sprite facility of the video generator makes games programming in Basic easier and still produces fast action. But if you are serious about using the Einstein to write commercial games you're going to have to resort to machine code.

File handling is easy in XtalBasic. There is a full reportoire of commands which allow you to do all your handling in Basic without having to use DOS. The file control blocks are available as a Basic string if you wish to fiddle with them or plunder the disk directory.

Where this interpreter falls down, along with most other versions of Basic including those on mainframe computers, is that statements with errors are only found when your program is being run. This slows both the machine and the programmer; the machine because it has to analyse each statement every time it is executed and the programmer because if you make a mistake it may take months before the error comes to light, by which time you have forgotten much of what the program is doing.

One feature of this Basic I did like was a statement to change the separator between items in DATA statements. Normally this is a comma but XtalBasic allows you to alter it to anything you like.



The Tatung PIPE connector allows expansion elements to be attached at the back.

Verdict

Even with the many small problems in the review model's hardware and documentation, I would still consider buying this machine. Acorn and Sinclair would have to cross my hand with much silver to persuade me to buy one of their machines now.

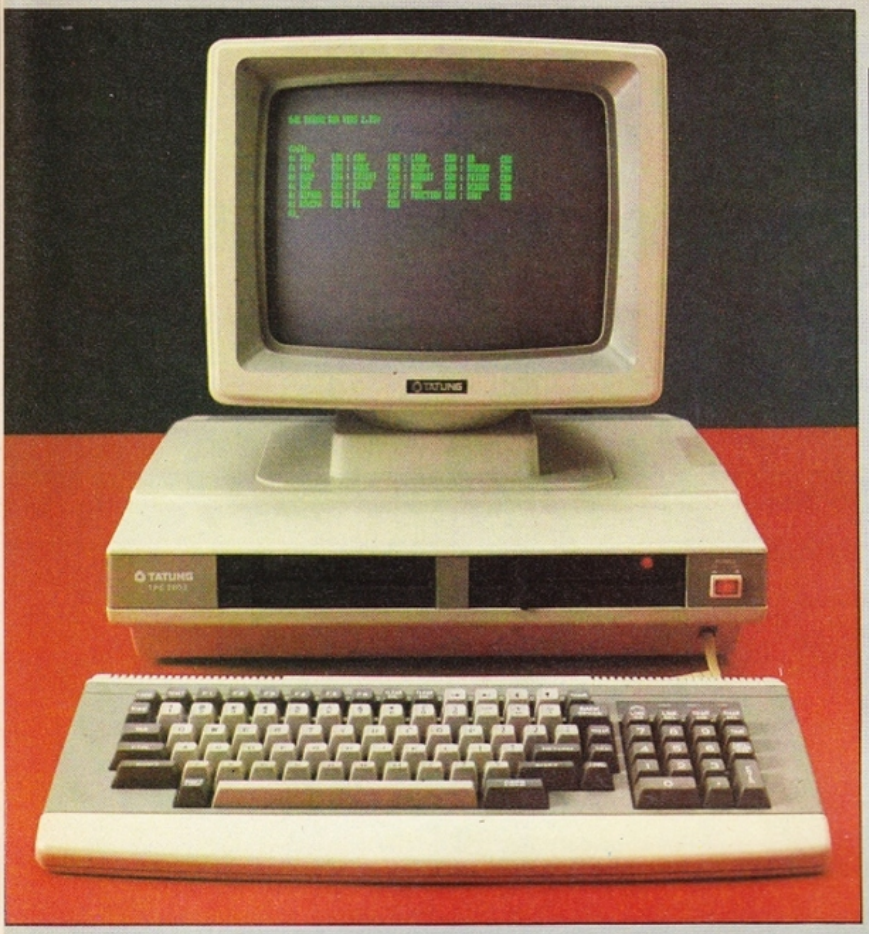
Generally, this is a good micro making use of current but not state-of-the-art techniques that ought to give many years of good service. PCN

Tatung is offering optional software at reasonable prices. An accounting system called Micro Simplex will be available for around £150. If you want a spreadsheet, Cracker costs £57.95, around a third of the cost of equivalent packages. This one will create dBase-II data files if you need a database system as well.

Two games are available: Chuckie Egg and Oh! Mummy's; each will cost £14.95 and if you are primarily interested in word processing then the WDPRO from Kuma is available and works nicely on a 40-column screen. In the limited time I used it (and without a manual) I preferred it to Wordstar.

If Tatung does not have the product you want, it may be possible to use any one of the vast array of CP/M packages, though these may take significant time and effort to convert.

SPECIFICATION
Price £499; optional colour monitor £249.
Processor Z80A at 4MHz.
RAM 64K RAM; 16K video memory and 8K ROM.
Keyboard 67 keys arranged in qwerty format. Eight user definable function keys.
Screen 256 × 198 pixels; either 40 × 24 or 32 × 24 text.
Storage 3in microfloppy; additional drive £149 including cabling.
OS/language XtalDOS (CP/M compatible), XtalBasic and DR Logo as standard.
Interfaces RS232C, 2 joysticks, parallel printer (Centronics), sound generator.
Manufacturer Tatung (UK) Ltd, Bridgnorth, Shropshire, WV15 5BR, 07462-5721.



TATUNG LOOKS FAMILIAR

A micro in the old-fashioned way, tested by Brendin Lewis.

When even a multi-national corporation such as Tatung enters the business micro industry nowadays, it takes a risk by not producing an IBM compatible machine. And Tatung has done just that with the TPC-2000.

Tatung has also not taken the popular 16-bit trail. Instead it chose a system based on the well-proven combination of CP/M and the Z80 microprocessor. Add to this almost 2 Mb of floppy disk storage; the usual parallel and serial ports; plenty of expansion options for both control and business applications and both sales and purchase ledger business software packages and you have a sound business micro with attractive looks and an attractive price.

First impressions

The machine arrives in two boxes, monitor in one box, main unit and keyboard in the other, and looks deceptively small.

When assembled the unit is very easy on the eyes, built of plastic in a two tone grey finish. The monitor tilts and swivels to suit and fits snugly into a recess in the main unit's top. The main unit's slimline design would not look out of place on an executive's desk. The keyboard connects via a curly cable to the front of the main unit and has two small swivel feet underneath to bring it to a comfortable typing angle. In fact it is uncomfortable to use without the feet, as it slopes away from the user in the normal position.

Keyboard

The keyboard has 95 keys including an 18-key numeric pad, and there are dedicated function keys such as line and character insert/delete; clear to end of line/page *etc* which have specific word processing functions. The four cursor keys are in the straight line format as opposed to the north, south, east, west format. Six user-defined function keys are available along the top of the keyboard. The remaining keys are caps lock, shift lock, reset and local. The space bar is acceptable despite its cheap feel.

Unfortunately, the reset switch is positioned next to the F1 key where problematical accidental striking could be all too easy. Also slightly annoying was that the LEDs indicating caps and shift lock were not incorporated within the keys, but at the top right of the keyboard where they cannot be seen if a light is shining on them. They also appeared not to work from time to time, though only when a piece of software had hung — after a reset they resumed normal working.

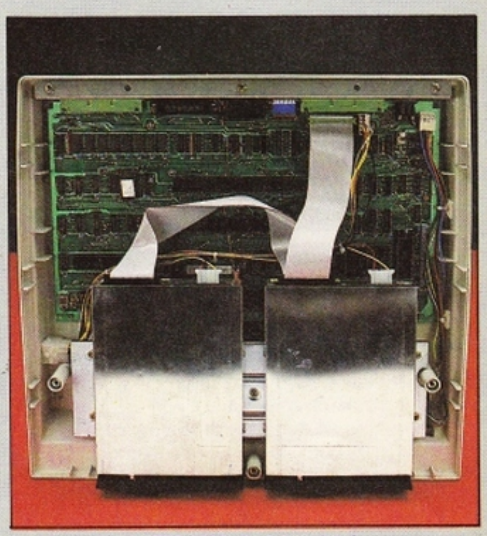
The green screen monitor display is 24 lines by 80 columns. The character set is clear and can be programmed with up to four attribute bits which allows a mixture of normal, reverse, underlined, flashing and high-intensity text on the screen at any one time. These attributes are set by escape codes sent to the display driver.

Documentation

Only three manuals arrived with the system. One each for the two software packages — sales and purchase ledgers from Fast software. Both manuals share similar design and high quality. How to run the packages is covered, with useful examples, including tables showing output from the printer for the different facets of the packages. A case study shows the first-time user how to adapt to a computer's method in a simple step-by-step approach which explains the screen display.

The other manual which arrived was the Tatung operators manual, or rather a bound photocopy of the draft operator's manual as there were quite a number of errors throughout the text. Tatung says this only went out with the review machine and production machines will be shipped with rewritten and better presented documentation. The manual contains standard system information and explanations of the CP/M built-in commands and disk utilities. This latter feature would be better presented as a separate manual or a seperate section in a ring-bound volume. It should also contain the rest of the usual CP/M information, such as information on file definition blocks *etc*, for the user to use the system to the full. On the other hand the machine is not for the primary user.

34▶



Looking inside the TPC-2000: the integral disk drives almost obscure the motherboard.

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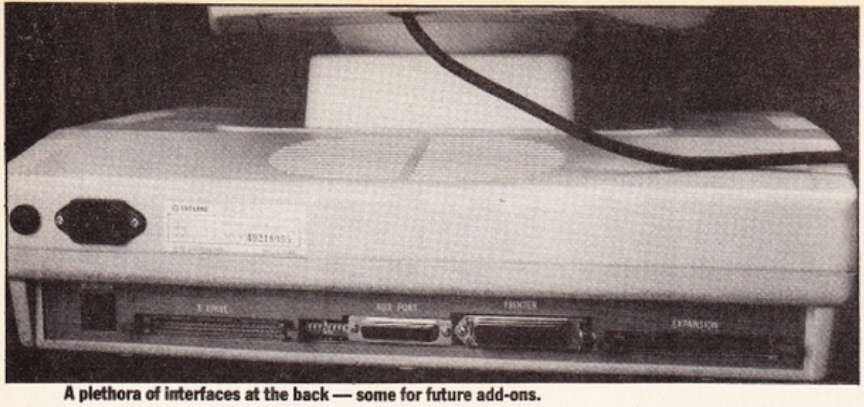

A plethora of interfaces at the back — some for future add-ons.

◀32

Storage

The system contains only 64K of RAM as this is the addressing range of the Z80 without the use of a paging register, but Tatung has got round this limitation partially by including a large amount of floppy disk storage. The two slimline 5.25in drives each contain 1Mb of unformatted data storage, which translates into approximately 720 K when formatted (the manual gives it as 760 K).

For such high-capacity drives they are extremely quiet with only the faintest rumbling when the heads are stepping over the disk. Such a large amount of disk storage enables larger software packages to run on the system, using a process called overlay. This simply means reading small sections of the program from the disk when required instead of holding the whole program in memory. An example of this is the Help menus on Wordstar.

Interfaces

At the back of the main unit are the input/output ports. These include a standard Centronics parallel printer port; a port marked auxiliary, which is the RS232 serials port; a single DIN connector through which the monitor draws both its signal and power; an 8in disk drive connector — now semi redundant because the 8in disk option is no longer available from Tatung. Tatung says, though, that this is the same connector through which the hard disk options will be fitted. The hard disk options available are in the range 6.6Mb to 27Mb as 5.25in drives and ten to 40Mb 8in drives.

The only remaining connector, besides the power inlet, is a socket marked expansion where all the remaining expansion options would be fitted. These include the eight RAMdisks (see box) and a graphics board — at the time of review the resolution was not available. Tatung has yet to decide to market this as a colour graphics option. The two other options available will probably not concern the average first-time business user, though they may interest a company wishing to use a computer for both control and their normal accounts *etc*.

The first option is a board with 14 RS232 serial ports to control installations using multi-input serial devices *eg* 'point of sale' devices such as cash registers. The second option is a board containing 64 TTL (Transistor Transistor Logic) I/O points. A typical use might be to control robotic arms.

Lastly, I took off the top and peeked inside to get an overall idea of the general electronics construction. Tatung has used common off-the-shelf components.

The no-frills single-board Z80 system, and the low chip count — from using the 280 custom chips — both promise welcome reliability.

The internal construction of the system is well-designed to leave the engineer the minimum number of replacement parts to carry around: the floppy disk assembly, the main circuit board and the power supply.

In use

The mains switch is mounted on the front of the unit, and it's a push-button at that. Potentially disastrous since an accidental power down could cause severe problems.

Booting the CP/M operating system is accomplished by inserting the system disk and pressing the F1 key. This key is preprogrammed for this purpose by the system monitor. This and all the other function keys are reprogrammed when the operating system loads, so frequently used commands such as DIR and STAT are immediately available.

Reprogramming the function keys is achieved by loading the Function utility from the system disk. This displays the current contents of the function keys and allows you to enter up to 16 character commands for each key. Since the commands all end in 'return', a command where something must be added onto the end of it is not possible.

Software

Little can be said about the availability of software for an eight-bit version of CP/M, except that almost all applications (which are too numerous to mention) are covered. So let's stick to software which arrived with the machine.

Five disks would normally be issued with the machine, four of which cover the sales and purchase ledgers given away free as a starter pack to first time users. The fifth disk is the CP/M system disk.

Though not a business man, I found the business software easy to use, even if I didn't always know what I was doing. However, when I loaded the package a menu offering both sales and purchase ledgers was displayed, but selecting the sales ledger if the purchase ledger disk is in drive B makes the system hang. At this point the caps and shift lock keys failed to operate. Other than this minor problem the packages worked well.

Two other disks included with the review system were Wordstar and Dbase II. Wordstar worked well, though I didn't test it with a printer. Dbase II also performed well and had a number of demo programs on disk, as well as a neat install program.

Last but not least is the facility which enables a user to emulate a terminal.

Verdict

As a machine which is solid and reliable, the TPC-2000 offers the first-time user a doorway into the world of computing with a system based on well-proven technology and an abundance of freely available software.

If you want a reliably-built machine with a competitive price, bear this system in mind. PCN

Disks in the RAM

A number of RAMdisks (or virtual disks as they are sometimes known) can be fitted to the TPC-2000 system. The machine can accommodate eight such RAMdisks, each with a capacity of 256K. A RAMdisk is a printed circuit board containing, in this case, 256K of RAM. This RAM is not configured as part of the Z80's memory map but is configured from within the operating system to *look* like a disk drive with 256K of storage. The big advantage is the speed at which data can be read into main memory compared with a physical disk drive. Also, the current price of RAM chips means a RAMdisk can be cheaper than a floppy disk unit.

However, a major disadvantage is that like all RAM, they are volatile storage and lose any data in them when the power is removed. This leads to a more complicated power down procedure because precautions must be taken to ensure that any relevant data stored within the RAMdisk is first transferred to floppy disk before power down takes place.

Specifications

Price	£1,699
Processor	Z80A 4MHz
ROM	4K system, 2K display
RAM	64K plus 4K display
Screen	80 × 24 alpha
Keyboard	95 keys including cursor keys, numeric pad and six function keys
Interfaces	Eight RAMdisks, two serial boards, two parallel boards, hard disk and graphics
Operating system	8-bit CP/M
Software included	Sales and purchase ledgers by Fast software
Distributor	Tatung (UK) Bridgenorth, Shropshire, WV15 6BQ.

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Games

Atari owners will be pleased to see the price of *Dam Busters*, a simulation of the Ruhr Dams raid by Lancaster bombers in 1943. The game may not be of Zaxxon or Pole Position standard, but at least its pricing is a giant leap in the right direction.

Penguin Software's new Apple game *Arcade Boot Camp* is a tongue-in-cheek, arcade-style 'levels' game.

Full Throttle is Micromega's follow up to Codename Mat and is not quite of the same high standard we have come to expect from the company. It's motorcycle based but isn't a rewrite of Death Chase. This one is Pole Position on a bike. You compete against forty riders on ten courses ranging in difficulty from Silverstone to Nurburgring. While there are only four controls — left, right, accelerate and brake — there is a very neat 'skid factor' with sound when you take bends. Running into another rider or off the course only slows you down, rather than being terminal.

There's been a spate of computer versions of card games recently; we've seen Poker on the 64 and Spectrum as well as Spectrum versions of Blackjack and Pontoon, and now Gamma Software has released the first computer version of two-player *Cribbage*. Gamma has also launched an 'advanced' adventure, *Orc Slayer*, and an arcade game, *Mad Hatter*, in which you have to tidy up the Hatter's house and collect food for his picnic with Alice.

Phoenix is now selling its double games, one arcade and one adventure, on single cassettes. The first of these is *Quest for the Garden of Eden* on the 64. Included in the package is a 'Phoenix Panic Packet' which gives you the code necessary to run the adventure as well as four clues to help you solve it.

Talent is a new company, its first releases include games for the BBC, Electron and Commodore 64. *West* is an adventure set in guess where, with a vocabulary of over 200 words, as many phrases and 130 locations. Events happen in real-time, as in Valhalla or the Hobbit (*ie* things happen while you're thinking). The BBC and Electron versions of the game are text only. Apparently all Talent games are written in Stab-1, a portable high-level language developed at Strathclyde University which, incidentally, helped found and support the new company.

Matching Pairs is one of CCS' latest budget games and is a version of 'Pelmanism' or the card game Pairs. You're presented with a grid and can see the colour/texture behind any two places at any go. Your task is to select matching pairs.

Rainy Day is a trio of games, one of which is little more than a reaction timer — really exciting this one. In Codebreaker you have 15 seconds to crack the code while Puzzle Unit is one of those games where you have to swap pieces in a grid to remake a picture.

Pocket money games are fine in theory, but in practice we're finding that you'd often do better to hack in the listings given in computer magazines.

Utilities

Panorama (H) is a graphics system for the 64 and was used to develop all the graphics for Talent's Commodore 64 games. The program is one of a series of graphics tools from Talent; the others are Animate, for designing animated sequences, and Sprite, a sprite designer. Panorama offers all the usual features you'd expect to find in a graphics package, as well as some very useful additions. Among these are rubber banding, block drag, magnification, texturing, mirroring and more. The package comes with a 37 page manual and, at least on paper, looks very good indeed.

Trans-Express is described as the essential Microdrive companion. It's a file conversion utility to allow you to transfer programs between tapes and Microdrives. The Polish company with the unlikely name of Romantic Robot will also supply you with any of the four parts separately at £5.50.

Spectune gives you basic instruction in music theory, allowing you to play, write, record and understand the way music is written and read. The Spectrum keyboard is converted into a simple musical keyboard, though perhaps the Spectrum is a curious choice for a music package . . .

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Arcade Boot Camp	$29.95	Penguin (Geneva) 312 232 1984
Map Pack	$19.95	Penguin (Geneva) 312 232 1984

ATARI

Dam Busters	£5.50	NDSL 0954 82061

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Laser Reflex	£7.95	Talent Computer Systems 041 552 2128
West	£9.95	Talent Computer Systems 041 552 2128
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Mr Wiz	£7.95	Superior Software 0532 459453
Missile Strike	£7.95	Superior Software 0532 459453
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Chess	£7.95	Superior Software 0532 459453
Laser Reflex	£7.95	Talent Computer Systems 041 552 2128
West	£7.95	Talent Computer Systems 041 552 2128

SPECTRUM

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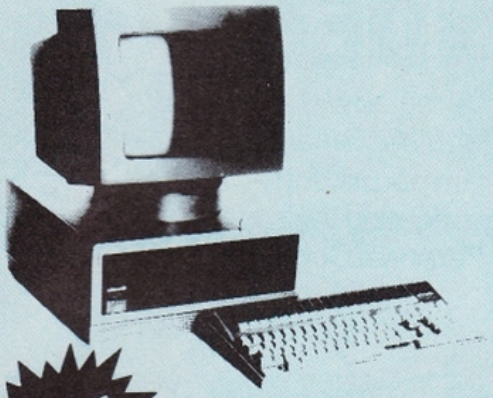

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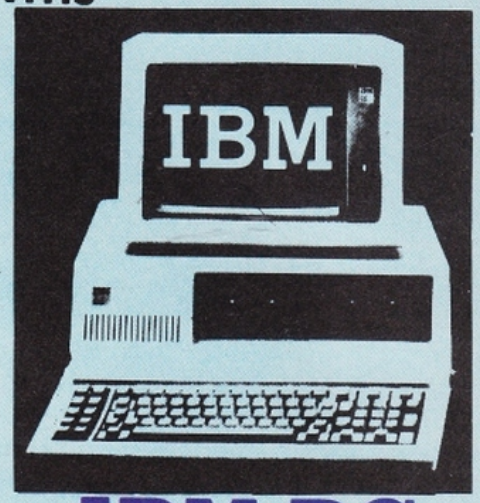

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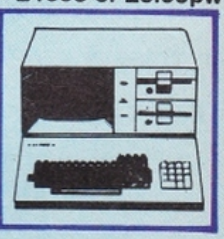

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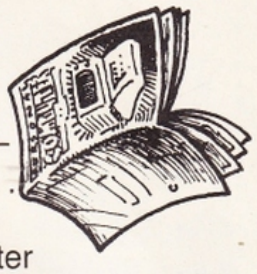

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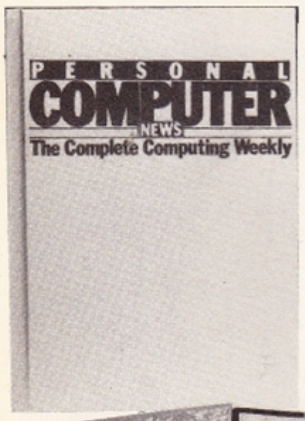

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PCN PRO-TEST SOFTWARE

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The business and commercial merits of this BBC package impressed Simon Williams.

A major drawback in the move to make the BBC Micro more 'respectable' as a business computer has been the lack of a Database Management System (DMS) with anything but rudimentary abilities. Add to that the small amount of user RAM available, and the BBC's chances have looked a bit thin.

In its simplest form a DMS can be thought of as a computerised card index, the kind you might keep as an index of clients in a business or a book index in a library. It should, however, be considerably easier to maintain and offer facilities for searching, sorting and reformatting of the information.

Features

Datagem is a sophisticated disk-based DMS which can handle files of up to 10Mb with over 5,000 records per file. Each record can be more than 6K long and is displayed as a 'card' which may be viewed through a window, much as with a spreadsheet. The fields on a card may contain formulae so that many of the functions of a true spreadsheet may be simulated.

Comprehensive search facilities are provided and sub-sets of the data may be held on one of up to eight levels within the database. Information may be extracted directly from the database for use in letters or reports written under View or, with more difficulty, integrated into Wordwise. The whole DMS is supplied in ROM, thus taking only workspace from the BBC's user RAM.

Presentation

Datagem is supplied in two ROMs on a carrier board with interfacing I/Cs. Although the review unit was a pre-production version, it was well made and sturdy. Installation instructions are included, but Datagem will also be available through dealers, so there should be no problems, even for the most timid user. The documentation will come in a loose-leaf ring binder consisting of two main sections, sub-divided under topic headings. The first is a general and detailed introduction to Datagem and the second, about experimenting, leads you through worked examples using a 15-record database supplied for the purpose.

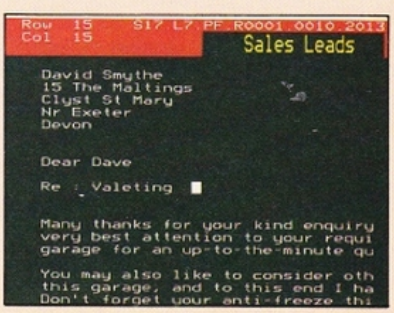
Both sections are well-written, although the review version still had a number of holes to be plugged before the product is released. In addition, a quick reference card will be supplied for when the user is familiar with the product.

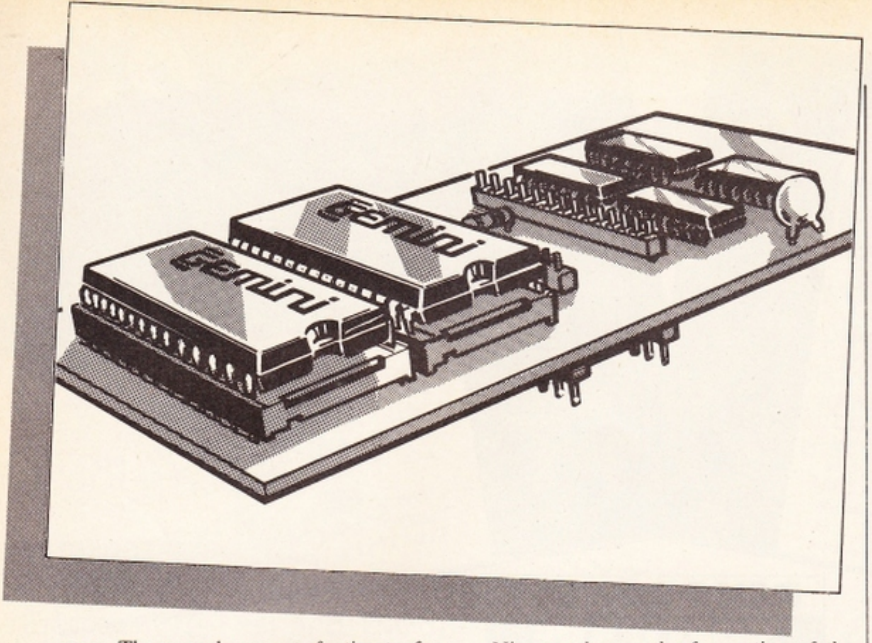
Setting up

Once the ROM board has been inserted in a spare socket inside the machine (it will sit on top of an extension board, if fitted), it is immediately available from switch on by typing *DATAGEM (or *DA.). The display is divided into three horizontally — the top three lines carry heading and status information, a single line at the bottom provides prompts and information, and the centre section carries a number of different menus or a window onto a record card.

The system uses a combination of menus and control keys, with the control characters designed as far as possible with mnemonic value. This leaves the function keys free to define macros for use within Datagem.

I set up two databases, the first being a membership list of some 70 records, each of 13 fields. This fitted in about 12K of disk





space. The second was a set of estimates for an arts centre, and these were manipulated using the formula and variable facilities of Datagem.

In use

At first a myriad of different options seem available at each level, but continual reference to the manual explains most of them adequately. You are well advised to run through the examples in the section on experimenting to get to know the system.

When operating on a record card, the cursor is held in the centre of the screen and the card is moved around it, an odd sensation until you get used to it. To save space Datagem uses Mode 7 exclusively for display, but the whole thing is written at the machine code level so everything is fast and smooth.

The first thing to do is to set up a file on disk. The system requires you to state a size (from 4K up to the total capacity of your disk/s) as well as how many disks the file will run across (up to four). The card mask, or data format, must then be set up and you have to set the right number of fields since it's awkward — but not impossible — to add extra fields later.

Fields may be moved around on a card at any stage. The disk space assigned for field titles may be altered manually as required, but it would have been better to have had this assigned dynamically by the system. It would also be more convenient to have a manual override to a dynamic allocation of file space.

Nice touches to the formatting of the screen include the foreground and background colours of the card (and of the status and prompt lines) being user-definable. The field names may be moved about the card separately from the data fields, although it's a shame that both can't be moved together. The status line offers the current level, the number of the record being viewed, the number of records on the current level and the number possible within the currently-assigned disk space. A default card may be set up so that commonly used values may be entered automatically on any other record, and a separate report card allows reformatting of the data for printing. Database statistics may also be calculated from this card.

The search facilities allow almost any comparison of values and can be set to include or exclude criteria within the search. The results of a search may be assigned to one of eight levels and a search may be conducted between two levels. It would therefore be possible in an address list to extract all people resident in a certain place, then all people over a certain age, assign each result to a different level and then search between the two for anyone with the surname Smith, for example.

The sort routine was not implemented in the version reviewed, but the company plans to include one when the product goes on sale. The company says this should allow any field to act as the search key, but will not be a particularly fast routine. Gemini intends to offer a faster sort, together with other Datagem utilities, on a separate ROM.

With the comprehensive calculation facilities in Datagem any numeric field may be assigned a formula of up to 120 characters in a similar way to a spreadsheet. In addition, up to 20 user-defined fomulae may be set up and assigned to single letter variables. Any formula may act upon fields on a record card, other variables, or themselves, and the results may be displayed in any required field.

This offers considerable scope and could take on, for example, a lot of the costing calculations in a theatre box office or travel agent. The test sheet of estimates categorised all likely income and expenditure for one tax year and revised estimates were easily calculated by adapting the formulae governing each field. The user variable facility would allow replication of a given formula within a number of fields and even across cards.

Verdict

As an attempt to move the BBC Micro into the business arena, Datagem warrants serious consideration. It is not a toy database, of which there are many examples, but an effective and versatile tool. It allows a database to be carried across disks, while still considering it as a complete database.

Perhaps it's not in the same league as products such as dBaseII — for instance, Datagem doesn't offer relational facilities. But it does provide many of the spreadsheet facilities of an item like Lotus 1-2-3, without the word processing.

Combined with a word processor such as View, Datagem would form the basis of a very competent small-business system. For those without the much-vaunted Z80 second processor, Datagem could display its many facets to much advantage. PCN

RATING (/5)

Features	
Documentation	
Performance	
Usability	
Reliability	
Overall value	

Name Datagem **System** BBC micro B + one or more disk drives **Price** £129 **Publisher** Gemini Marketing, 18a Littleham Road, Exmouth, Devon EX8 2QG **Format** ROM (24K) **Language** Machine code **Outlets** Mail order dealers.

A DMS in ROM

One of the main troubles with trying to run a database on the BBC micro is that, for all but the smallest applications, there will be insufficient memory to hold all the data. This means many functions such as searching, sorting and printing will require the program to keep accessing the information from disk, and slowing down these operations.

As Datagem is entirely stored in ROM, it takes up no user RAM for the program itself. This makes nearly 29K available for the data storage. The 80 records of the test database, each of 14 fields, were held in memory at all times, only being saved when the file was closed at the end of a session. A file of more than twice this length would still be held in memory almost all the time.

Levels of Store

One advantage of a computer database, in comparison with a manual card-index, is the ability to search for specific references. For example, you might want to extract names of all the people on an address list who live in Coventry.

Most databases will be able to pull out all the records which match particular search criteria and will produce a printed list of the information. Datagem, however, aims to provide eight levels (more accurately plateaus, since there is no true hierarchy between them) to which the user can send the results of such a search. These levels are held within the database and can be viewed independently of the main file. Records may be compared between different levels or combined in a number of ways.

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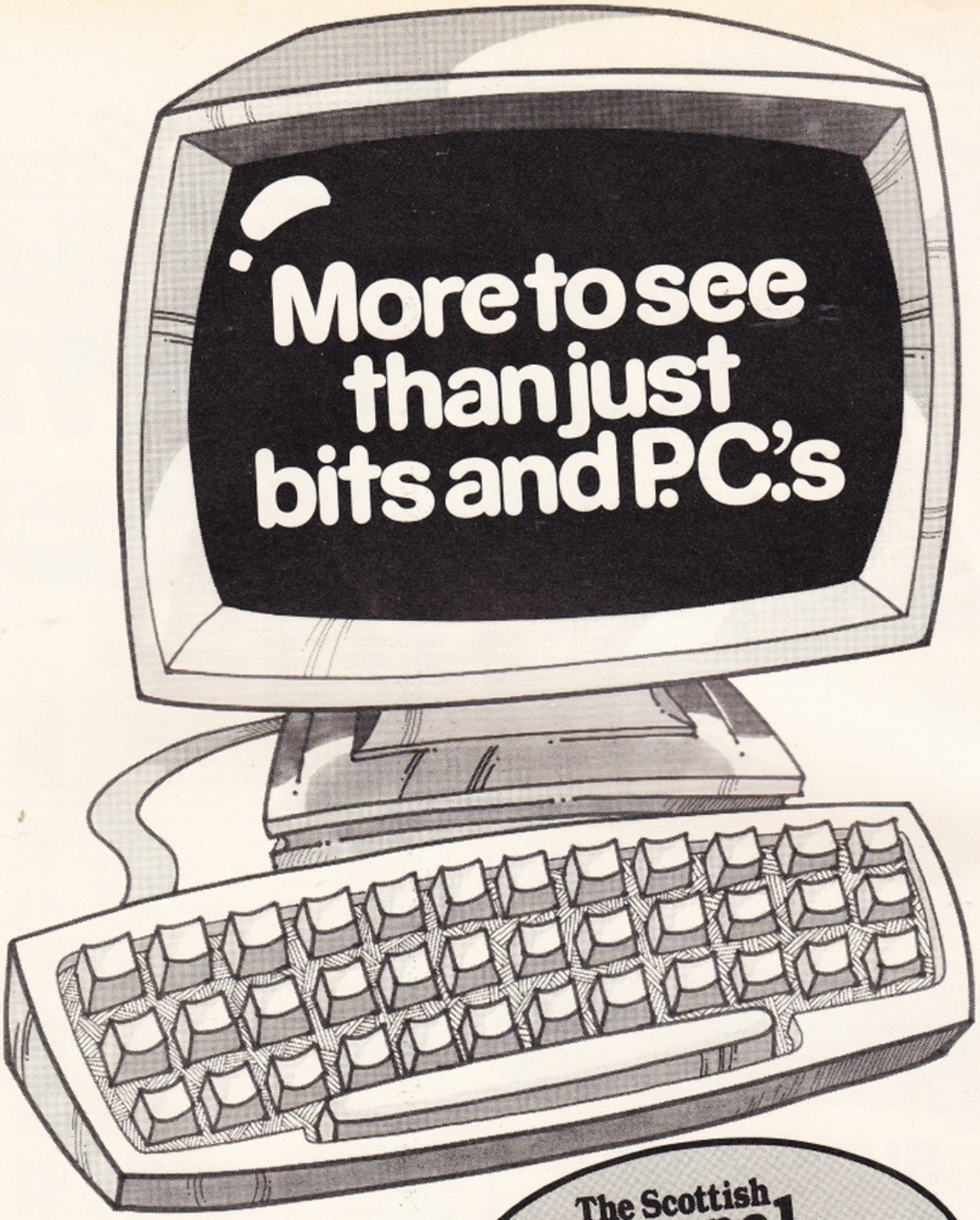

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ATARI

Chop socky

Name Bruce Lee **System** Atari 32K **Price** £12.95 **Publisher** U.S. Gold (Centresoft, West Midlands 021-520 7591) **Format** Disk **Language** Machine code **Other versions** None **Outlets** Retailers

Hayahhh! Taiii! Weeargh! These and other warlike sounds pour forth when you submerge yourself in the role that this all-action game provides. With Bruce Lee, you'll become the highest kicking, fastest punching, meanest exponent of the martial arts this side of Japan.

Objectives

Bruce must search 20 chambers for the Wizard, collecting Chinese lanterns *en route*. Trying to stop Bruce by beating his brains out with a stick is the Ninja.

In play

Stripped to the waist and ready for action, a bronze-torsoed, black-trousered Bruce starts in an oriental, open roofed chamber. Lanterns adorn the structure — Bruce must collect them as his passport to the next room. Having the athletic ability that doesn't always go with such a macho appearance, Bruce can run, spring, climb and long-jump his way around the building to reach the lamps.

Before you can say 'Ah so!', a menacing, black-garbed Ninja comes racing in, brandishing what the blurb technically describes as a bokken stick. It is clear he's not come to play hockey unless maybe it's with Bruce's head. This naive Ninja obviously doesn't visit the local Roxy fleapit often — if he did, he'd know that Bruce can launch balletic but brutal flying kicks, throw short punches that would stop a bull, and can duck by falling flat on his face faster than a boxer in a fixed fight.

Two on-target punches or kicks, all executed with those delicious whoosh and whip-crack sounds so beloved of martial arts films, are enough to put the Ninja out of action.

Heralded by what sounds like the mating call of a moose and looking like a Sumo wrestler gone mouldy, the Green Yammo kicks up a storm at Bruce's anatomy. Built like a Sherman tank, the Yammo needs three blows to knock him out.

The chamber's other hazards to test Bruce's mettle include moving electrical charges, streaming Pan lights and exploding t'sung-lin — they're burning bushes.

Once Bruce has found the Wizard, he must reach a button to destroy him. The Wizard isn't about to go gently — fireballs hurtle from his eyes. Should Bruce succeed, it's round again but tougher.

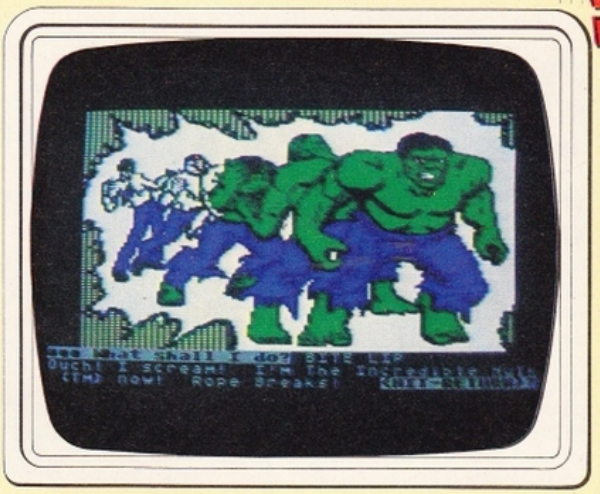
Verdict

Great graphics and lovely slap-smack sounds, this game fulfills its Eastern Promise.

Bob Chappell

RATING (/5)

Lasting appeal	
Playability	
Use of machine	
Overall value	



Green Giant

Name The Hulk **System** Atari 32K and 48K **price** Cassette (without graphics) £9.95, disk £17.95 **Publisher** Adventure International 021-643 5102 **Format** Cassette (without graphics) or disk **Language** Machine code **Other versions** Commodore 64, Spectrum, BBC, Dragon, Apple, Tandy **Outlets** Retailers.

The master returns! Scott Adams, doyen of adventure lovers, has teamed up with Marvel Comics to produce QuestProbe, a new series of text plus graphics adventures. This is the first of many and features that jolly green giant, the Incredible Hulk.

Objectives

Using simple two-word commands, you take charge of Bruce Banner and his alter-ego Hulk and guide them around their strange world. You have to locate gems and store them in a safe place (you must find where), solve all the problems to confront you and, above all, survive.

In your travels, you'll meet other Marvel characters Doctor Strange and Ant Man. The adventure is overseen by a narrator known as the Chief Examiner.

In play

An impressive title page depicting the Hulk kicks off the adventure, the imaginative graphics setting the standard for the rest of the game.

Each location or development is pictured — even the 'I' (inventory) command brings up a portrait of Banner or Hulk with their current possessions. In text mode, the room description is fixed at the top of the screen while a scrolling message area fills the rest.

After being asked if you want to restore a saved game, it's on with the adventure as Bruce Banner materialises, bound hand and foot to a chair. Although by current standards, the verb/noun command-driven adventure is a bit old hat, the first glimpse of that 'What shall I do now?' invitation sent those familiar tinglings down my spine.

No messing about but straight in to the first puzzle — how to get out of the chair? Hulk fans will know the obvious way: Banner undergoes a metamorphosis into the super-powerful Hulk whenever he experiences anger or pain.

Once transformed and free, you'll soon find the Hulk changing back again into Banner as gas seeps into the room. Puzzle two — how to deal with the noxious chemical?

Thereafter, Adams piles on puzzle after puzzle, each with enjoyable graphics.

Verdict

This is one of the few adventures where the graphics do add that extra something to the pleasure of playing. It's irresistible. The combination of Scott Adams and Marvel Comics, of textual puzzles and imaginative graphics, result in a humdinger. Go get it, True Believer.

Bob Chappell

RATING (/5)

Lasting appeal	
Playability	
Use of machine	
Overall value	

Staying the course in some racey games for the Oric and Atmos kept Nick Rann on his toes.

Oric originals on offer

CLASSIC RACING

Fancy a day at the races? Picking horses for courses is the essence of this thoughtfully constructed racing game from Salamander. You are the owner and manager of a stable of 16 horses and your aim is to become the richest of your kind by winning races. At the start of the season you know nothing about your mounts and only by monitoring their progress in the early races can you evolve a strategy to clean up in the big-money, end-of-season Classics.

Each race is run before your eyes and the graphics and sound are exceptionally realistic, as is your sense of frustration when your trusty steed slows down to chew grass just before the winning line. Still, what else should you expect with a name like Dobbin?

Fortunately, prudent betting can boost your bank balance, but to succeed you must be well up on the most suitable type of going, distance and jockey weight for literally hundreds of horses. With so much to remember my strategy went completely to the dogs but happily the bookies were quite prepared to extend my credit.

This highly-absorbing game steals a furlong or two on other micro-sports and keeps you in the saddle for hours — so may the horse be with you.

PASTA BLASTA

From the horse to the sauce — there's enough of that in this ravioli-inspired rough house to keep Frankie Howerd in jokes for a year. You take the role of the harrassed waiter at Mamma's Pasta Parlour in Italy long ago.

On the screen appear seven ravioli tins, each representing a future life. Using your powerful sauce squirter you whizz frantically round the screen defending them from ravenous Ravioli Robbers and Pasta Pinchers while attempting to deceive the homing instincts of the Pacmen.

Easy, I hear you say, but with the appearance of score-boosting Pasta Prizes and Powda Pills to refill your squirter, the screen soon resembles Spaghetti Junction at rush hour and your hopes of a quiet candlelit dinner for two look like ending up at the local chippie.

Never mind, by selecting the standard of difficulty you warm up on the easy levels before being dished up with the sticky stuff.

I did just that but still ended up with egg on my face — at least the pasta was fresh.

Unusually well-defined graphics enhance a highly original and effective production. Both manic and good humoured, Pasta Blasta is a great source of amusement — especially if you feel like a bit of a squirt.

QUACK-A-JACK

It's Friday, it's five o'clock and where's Leslie Crowther? He's playing Quack-a-Jack, no doubt. Red Jack, our web-footed hero, is trapped on a grid of flagstones in the palace dungeon. To avoid coming up before the beak he must reach the terraducktile egg before it hatches and takes a snipe at him. He's no spring chicken and the flagstones may crumble under his weight leaving him in the soup — duck soup, that is.

Hot in pursuit might be anything from a beefburger to a Kangaroo and the screen becomes rather too cluttered at times for the Oric's graphical capabilities. Similar existing games work better on other machines, but Oric owners will no doubt find this crazy caper a welcome addition to their software collection.

THEM

So this is what happens when a software firm's promotion department finally cracks. Take five fairly unexceptional games, put them all together, publish a photo of the author looking like a Broadmoor patient, enclose half a book on the subject of teenage neuroses and you've got *Them*.

With an abundance of instructions you may concentrate on an individual game or cycle through all five, playing at the level of your choice.

In game one, Trapped, you must collect a couple of blobs and head for the door avoiding the electric walls and various Thems. Game two, Blockbuster, is basically a micro version of those familiar coloured plastic tower cups. And the third game, Surrounded, features you encircled by invaders.

The next and most original game, Conveyor to Doom, depicts you tied to a horizontal conveyor belt and heading for the Big Mac mincer. Each passing alien advances the cogs a notch and you must either wipe them out or spend the rest of your days between a sesame bun and a slice of cheese.

Soulsaver, game five, requires basic elimination to piece together some broken funny bones — although by this stage the only bone I could see was one of contention.

With such a contrived introduction to a very infantile collection this project would stand a greater chance of success if as much creative thought had gone into the games as into the accompanying script.

BLOCKBUSTER

I had forgotten just how much fun playing a good old fashioned Breakout can be. This version from Dream Software has many excellent features including ball spin, eight different wall patterns and a pleasing array of colour and sound.

With genuinely effective skill level controls you can progress to a frantic tempo, and with up to five balls in play at once you'll find yourself getting through more bricks than Arthur Scargills's pickets.

While not exactly breaking out into new territory, *Blockbuster* is a smoother production of an established and unpretentious theme.

PCN

Classic Racing (Oric1/Atmos) £7.95 Salamander, 17 Norfolk Road, Brighton 0273 771942
Pasta Blasta (Oric 1 48K) £6.95 Arcadia, Freepost, Swansea SA3 4ZZ 0792 403363, mail order or retail outlets.
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  ON BREAK GOTO ON BREAK RESUME
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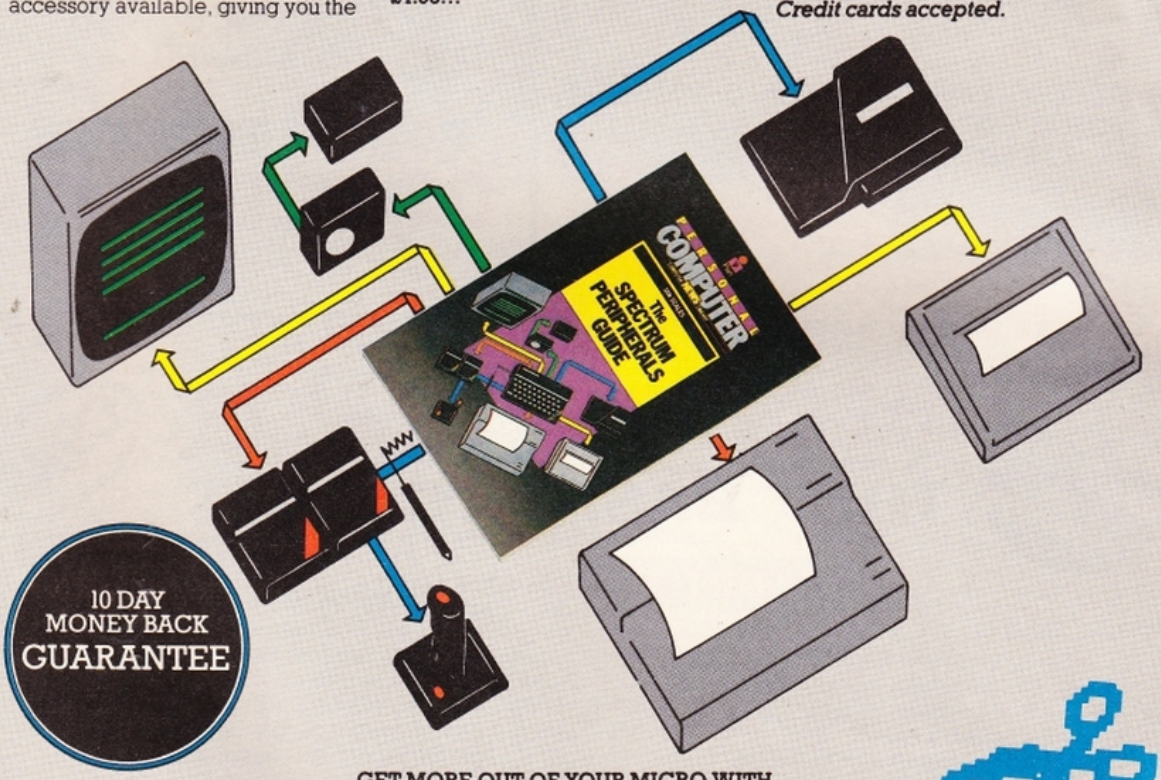

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PERSONAL COMPUTER NEWS LIBRARY

Space Shuttle

Title: *Shuttle*
Machine: *BBC B*
Language: *BBC Basic*
Application: *Game*
Author: *Jason Holliday*

Shuttle is a space game for the BBC model B by Jason Holliday, Castle Bromwich, Birmingham.

You are the pilot of the space shuttle Challenger. This is not an easy job and one of the many hazards is that when you release your satellite the computer malfunctions and sends it out of orbit. You must, of course, retrieve the satellite and to do this you put on your space suit and jetpack and leave the shuttle.

Your perilous journey is hindered by mines which you must avoid to escape disaster. As you drift around trying to track down the lost satellite your radio is constantly turning out music. This can be switched off at any time by pressing G and turned on again by pressing S.

You have three lives in each game, and in each you are pushed for time as you seem to run out of fuel so very rapidly. There are 15 levels of difficulty. In level one there is only one mine, while in level 15 there are 15 which means your movements have to be very precise.

Control is by keyboard or joystick and your speed is fairly slow. You must be careful not to float off the screen, though if you do you will fall back in fairly quickly.

This drifting motion and the constant musical accompaniment certainly make you feel you are embarking on a *2001*-type space odyssey.

Program notes

Program 1

5-270 Set up the user-defined graphics

430-490 Print the title screen and chain to the main program

```
>LIST
   5MODE7
  10VDU23,224,12,22,38,62,12,22,110,30
  20VDU23,225,0,0,0,0,1,1,1,1
  30VDU23,226,14,28,28,28,28,56,112,0
  40VDU23,227,1,1,0,0,0,0,0,0
  50MAN1$=CHR$18+CHR$3+CHR$6+CHR$224+CH
R$8+CHR$10+CHR$226+CHR$11+CHR$8+CHR$18+C
HR$3+CHR$7+CHR$225+CHR$8+CHR$10+CHR$227
  60MAN4$=CHR$18+CHR$0+CHR$6+CHR$224+CH
R$8+CHR$10+CHR$226+CHR$11+CHR$8+CHR$18+C
HR$0+CHR$7+CHR$225+CHR$8+CHR$10+CHR$227+
CHR$11
  70VDU23,228,48,104,100,124,48,104,118
,120
  80VDU23,229,0,0,0,0,128,128,128,128
  90VDU23,230,120,48,56,56,56,28,14,0
 100VDU23,231,128,128,0,0,0,0,0,0
 110MAN2$=CHR$18+CHR$3+CHR$6+CHR$228+CH
R$8+CHR$10+CHR$230+CHR$11+CHR$8+CHR$18+C
HR$3+CHR$7+CHR$229+CHR$8+CHR$10+CHR$231
 120VDU23,232,4,12,14,30,30,12,4,8
 130VDU23,233,0,0,191,245,245,241,191,0
 140VDU23,234,0,3,251,91,63,91,251,3
 150REM***SHUTTLE***
 160VDU23,235,0,196,224,240,120,63,63,6
3
 170VDU23,236,0,0,0,0,0,255,255,255
 180VDU23,237,0,0,0,0,0,224,88,254
 190VDU23,238,31,63,63,7,0,1,3,0
 200VDU23,239,255,199,207,159,160,64,12
8,0
 210VDU23,240,254,254,252,248,0,0,0,0
 220SHUTTLE$=CHR$235+CHR$236+CHR$237+CH
R$8+CHR$8+CHR$8+CHR$10+CHR$238+CHR$239+C
HR$240
 230VDU23,241,130,84,56,124,56,84,130,0
 240VDU23,242,0,112,64,96,64,64,0,0
 250VDU23,243,0,112,64,96,64,112,0,0
 260VDU23,244,0,0,0,255,255,255,255,255
 270VDU23,255,255,255,255,255,255,255,2
55,255
 430FORT=1TO5:PRINT'CHR$154CHR$(146+T)T
AB(5)"k k 7k k  k   k7 7' 7k 7' 'k7'"
 440PRINTCHR$154CHR$(146+T)TAB(5)"j,n 5
j j  j   j5 -l 5j =$  j5"
 450PRINTCHR$154CHR$(146+T)TAB(5)"z z u
z jppjpp zu pz uz 5   j5"
 460NEXT
 465PRINTTAB(12,11)CHR$141;CHR$129"SHUT
TLE"CHR$154CHR$149CHR$140
 466PRINTTAB(12,12)CHR$141;CHR$129"SHUT
TLE"
 470VDU28,7,24,32,22
 480CLS:PRINTCHR$136CHR$129" SHUTTLE IS
 LOADING"
 490PRINTTAB(5)CHR$132CHR$136;:CHAIN"SH
UTTLE"
```

PCN PROGRAMS: BBC B

Shuttle

Program 2

10-150	Set up screen and sound envelopes and go to procedures for instructions, characters and variables
160	Goes to procedure to start the game
170-290	The main loop: check to see if keyboard or joystick, checks for soundtrack and moves the satellite
300-350	Defprocjoy: Joystick routine
360-470	DEFPEOCnewfuel: Updates variables
480-530	DEFPROCkey: Keyboard routine
540-580	Print man
590-640	Routine to move satellite
650-670	You are dead
680-750	DEFPROCcheck: checking to see if you have hit anything
760-770	Procedure to blow up satellite
780-890	Set up characters and variables
900	Plots out the stars
910-970	Redefine colours

```
>L.
   10*KEY100.|MRUN|M
   20*FX200,1
   30MODE7
   40PROCINSTRUCTIONS
   50A=1:B=1:ONERRORPROCERR
   60ENVELOPE1,1,0,0,0,0,0,0,2,0,-10,-5,
120,0
   70ENVELOPE2,8,1,-1,1,1,1,1,121,-10,-5
,-2,120,120
   80PROCCHARS
   90*FX19
  100*FX21,1
  110PROCVARS
  120MODE2
  130VDU28,0,31,19,27
  140PROCcolours
  150VDU5
  160PROCSTART
  170REPEAT
  180REPEAT
  190IFKEY% PROCKEY ELSE PROCJOY
  200PROCsoundONOFF
  210IF SATELITE%=FALSE:PROCSAT ELSE PRO
Cmovesat:SATX%=X%-32:SATY%=Y%-32:PROCmov
esat
  220PROCCHECK
  230PROCSOUNDTRACK
  240IFA<>0 AND B<>0 AND ADVAL(-6)=0 AND
 ADVAL(-7)=0PROCSOUNDTRACK
  250IFA=0 AND B=0 RESTORE:A=1:B=1
  260UNTILQ% ORDEAD
  270IF Q%=RND(10):W%=RND(64)-RND(64):E%
=RND(32)-RND(32)
  280IFL%<=0 PROCSCORE
  290UNTILFALSE
  300DEFPROCJOY:A%=ADVAL(1)DIV256:A2%=AD
VAL(0)AND3:THRUST=FALSE
  310IFA%<=50 ANDX%<=1210 DIR%=8:PROCMAN
:MAN3$=MAN2$:PROCMAN:B%=-42
  320IFA%>=205 ANDX%>=32 DIR%=-8:PROCMAN
:MAN3$=MAN1$:PROCMAN:B%=23
  330IFA2%=1:INC%=INC%+2:FUEL%=FUEL%-5:T
HRUST=TRUE:PROCfuel:IFINC%>=64INC%=64 EL
SE PROCMAN
  340PROCNEWFUEL
  350ENDPROC
  360DEFPROCNEWFUEL
  370INC%=INC%-1:IFINC%<=-32INC%=-32
  380X%=X%+DIR%
  390IFX%>=1210 ORX%<=32 DIR%=0
  400Y%=Y%+INC%:IFY%<=200Y%=200:INC%=0
  410IFTHRUST=TRUE PROCTHRUST
  420PROCMAN
  430FUEL%=FUEL%-1:PROCfuel
  440IFFUEL%<=0 PROCMANEXPLODE
  450IFTHRUST=TRUE PROCTHRUST
  460THRUST=FALSE
  470ENDPROC
  480DEFPROCKEY
  490IFINKEY(-106) ANDX%<=1210 DIR%=8:PR
OCMAN:MAN3$=MAN2$:PROCMAN:B%=-42
  500IFINKEY(-90)  ANDX%>=32 DIR%=-8:PRO
CMAN:MAN3$=MAN1$:PROCMAN:B%=23
  510IFINKEY(-97) INC%=INC%+2:FUEL%=FUEL
%-5:THRUST=TRUE:PROCfuel:IFINC%>=64INC%=
64 ELSE PROCMAN
  520PROCNEWFUEL
  530ENDPROC
  540DEFPROCMAN
  550MOVEX%,Y%:PRINTMAN3$
  560ENDPROC
  570DEFPROCTHRUST:GCOL3,1:MOVEX%+B%,Y%-
40:VDU232:ENDPROC
  580ENDPROC
  590DEFPROCSAT
  600PROCmovesat
  610Q%=Q%-1:SATX%=SATX%+W%:SATY%=SATY%+
E%:IFSATX%<=64 W%=ABS(W%) ELSE IFSATX%>=
1080 W%=-(W%) ELSE IFSATY%>=900 E%=-(E%)
 ELSE IFSATY%<=300 E%=ABS(E%)
  620PROCmovesat
  630ENDPROC
  640DEFPROCmovesat:VDU18,3,13,25,4,SATX
%;SATY%;233,234:ENDPROC
  650DEFPROCDEAD
  660L%=L%-1:IFL%<=0 DEAD=TRUE
  670ENDPROC
  680DEFPROCCHECK
  690P%=POINT(X%,Y%):O%=POINT(X%+64,Y%):
I%=POINT(X%+B%,Y%):U%=POINT(X%,Y%-60):K%
=POINT(X%+64,Y%-60):J%=POINT(SATX%,SATY%
):H%=POINT(SATX%+128,SATY%):F%=POINT(SAT
X%,SATY%-32):G%=POINT(SATX%+128,SATY%-32
)
  700M%=POINT(SATX%+64,SATY%):N%=POINT(S
ATX%+64,SATY%-32)
  710IFJ%=12 OR H%=12 ORG%=12 ORF%=12 OR
M%=12 OR G%=12 PROCSATEXPLODE
  720IFP%=12 OR O%=12 ORK%=12 ORI%=12 OR
U%=12 ORK%=12 PROCMANEXPLODE
  730IFP%=13 OR O%=13 ORI%=13 ORU%=13 OR
K%=13 SATELITE%=TRUE:ENDPROC
  740IF SATELITE%=FALSE ENDPROC ELSE IFP
%=8 OR O%=8 ORI%=8 ORU%=8 ORK%=8 PROCBON
US:CLS:PROCSTART:ENDPROC
  750ENDPROC
  760DEFPROCSATEXPLODE:FORT=1TORND(3):FO
RR=15TO0STEP-1:SOUND0,-R,6,5:GCOL0,RND(1
5):VDU19,0,RND(15);0;:MOVESATX%+64,SATY%
+16:MOVESATX%+RND(64)-RND(64),SATY%+RND(
32)-RND(32)
  770PLOT85,RND(1279),RND(1023):NEXT,:VD
U19,0,0;0;:PROCDEAD:PROCSTART:ENDPROC
  780DEFPROCCHARS
  790MAN1$=CHR$18+CHR$3+CHR$6+CHR$224+CH
R$8+CHR$10+CHR$226+CHR$11+CHR$8+CHR$18+C
HR$3+CHR$7+CHR$225+CHR$8+CHR$10+CHR$227
  800MAN4$=CHR$18+CHR$0+CHR$6+CHR$224+CH
R$8+CHR$10+CHR$226+CHR$11+CHR$8+CHR$18+C
HR$0+CHR$7+CHR$225+CHR$8+CHR$10+CHR$227+
CHR$11
  810MAN2$=CHR$18+CHR$3+CHR$6+CHR$228+CH
R$8+CHR$10+CHR$230+CHR$11+CHR$8+CHR$18+C
HR$3+CHR$7+CHR$229+CHR$8+CHR$10+CHR$231
  820SHUTTLE$=CHR$235+CHR$236+CHR$237+CH
R$8+CHR$8+CHR$8+CHR$10+CHR$238+CHR$239+C
HR$240
  830ENDPROC
  840DEFPROCVARS
  850X%=500:Y%=500:INC%=0:DIR%=0:SHUTTLE
X%=0:SHUTTLEY%=232
  860MAN3$=MAN1$:SATELITE%=FALSE
  870DEAD=FALSE
  880FUEL%=440:L%=3:sc=0
  890ENDPROC
  900DEFPROCSTARS:GCOL0,15:FORT=0TO50:PL
OT69,RND(1279),RND(1023):NEXT:ENDPROC
```

980-1060	Routine to move the space shuttle and to release the satellite	1180-1230	Print fuel gauge at the top of the screen	1370-1480	Data for tune
1070-1120	Routine which prints messages at the bottom of the screen	1240	Decreases the fuel level gradually	1510	DEFPROCbonus updates score
1130-1160	Plot out mines depending what level you are on	1250-1260	Show the number of lives left by number of astronauts left	1520-1780	Start routine
1170	Produces sound of radio	1270-1310	Print the score at the end of the game	1790-1830	Routine to blow up man
		1320-1360	Play tune	1840-1860	Delete a life
				1870-1890	Check for keyboard or joystick
				1900-1920	Soundtrack

```
  910DEFPROCcolours
  920VDU19,9,6;0;
  930VDU19,8,7;0;
  940VDU19,15,1;0;
  950VDU19,14,7;0;19,5,7;0;
  960VDU19,11,6;0;19,13,4;0;
  970ENDPROC
  980DEFPROCSHUTTLE
  990MOVESHUTTLEX%,SHUTTLEY%:GCOL3,8:PRI
NTSHUTTLE$
 1000IFSHUTTLEX%>=1080:MOVESHUTTLEX%,SHU
TTLEY%:GCOL3,8:PRINTSHUTTLE$:SHUTTLEX%=0
:PROCSHUTTLE
 1010ENDPROC
 1020DEFPROCSATELITE:SATX%=SHUTTLEX%:MOV
ESHUTTLEX%+55,SHUTTLEY%:GCOL0,0:PRINTCHR
$236
 1030GCOL3,13
 1040FORT=SHUTTLEY%TOSHUTTLEY%+RND(200)+
300STEP8:SATX%=SATX%+RND(64)-RND(64):IFS
ATX%<=0SATX%=0 ELSE IF SATX%>=1080 SATX%
=1080
 1050FORR=1TO2:MOVESATX%,T:PRINTCHR$233;
CHR$234:NEXT,
 1060SATY%=T:ENDPROC
 1070DEFPROCMESSAGE(Q%,A$)
 1080VDU4
 1090CLS
 1100COLOUR0%:PRINTTAB(0,2)A$;
 1110VDU5
 1120ENDPROC
 1130DEFPROCMINES
 1140GCOL0,12
 1150FORT=1TOLEV%:MOVERND(670)+300,RND(9
00):VDU241:NEXT
 1160ENDPROC
 1170DEFPROCRADIO:SOUND1,-15,125,5:FORT=
1TO100:NEXT:SOUND0,-4,4,255:ENDPROC
 1180DEFPROCFUEL
 1190MOVE10,1020:DRAW510,1020:DRAW510,98
0:DRAW10,980:DRAW10,1020
 1200MOVE0,970:VDU243:MOVE500,970:VDU242
 1210GCOL0,2
 1220FORT=25TO440STEP16:MOVET,1020:PRINT
CHR$244;:NEXT
 1230ENDPROC
 1240DEFPROCfuel:GCOL2,0:MOVEFUEL%,1020:
PRINTCHR$244;:ENDPROC
 1250DEFPROCDEAD:GCOL0,0:L%=L%-1:MOVE600
,1020:PRINTSTRING$(4,CHR$255+CHR$8+CHR$1
0+CHR$255+CHR$11)
 1260MOVE600,1020:PRINTSTRING$(L%,MAN4$)
:FUEL%=440:PROCFUEL:ENDPROC
 1270DEFPROCSCORE
 1280IFsc=1 A$="SATELITE" ELSE A$="SATEL
ITES"
 1290VDU22,7:FORT=2TO3:PRINTTAB(4,T)CHR$
141CHR$136CHR$129"YOU RESCUED";sc;CHR$1
36;A$:PRINTTAB(4,T+5)CHR$141CHR$130" On
level";CHR$136LEV%:NEXT
 1300SOUND&11,0,0,0:SOUND&12,0,0,0:PROCF
ANFARE(1370,23)
 1310IFKEY% PROCKEYSTART:RUN:ELSE PROCJO
YSTART
 1320DEFPROCFANFARE(X,Z)
 1330*FX21,5
 1340*FX21,6
 1350RESTORE X
 1360FORT=1TOZ:READA,B,C,D:SOUND1,1,A,B*
10:SOUND2,2,C,D*10:NEXT:FORT=1TO3000:NEX
T:SOUND&12,0,0,1:SOUND&11,0,0,1
 1370DATA61,1,41,1,25,.5,25,.5,41,1,41,1
,61,.5,61,.5,73,1,41,1,69,1,53,1,21,.5,2
1,.5,41,1,41,1,61,.5,61,.5,69,1,41,1
 1380DATA61,1,45,1,33,.5,33,.5,45,1,45,1
,61,.5,61,.5,73,1,61,1
 1390DATA69,.5,53,.5,33,.5,33,.5,73,.5,6
1,.5,33,.5,33,.5,69,.5,81,.5,33,.5,33,.5
,69,.5,53,.5,33,.5,33,.5
 1400DATA13,1,13,1,61,1,73,1,73,.5,89,.5
 1410DATA89,.5,89,.5,89,.5,89,.5,89,.5,6
9,.5,89,1.5,69,1.5
 1420DATA89,.5,89,.5,5,.5,5,.5,89,.5,89,
.5,89,.7,101,.7
 1430DATA89,.7,109,.7,89,.7,101,.7
 1440DATA81,1,81,1,61,1,73,1
 1450DATA81,1,81,1,45,.5,45,.5,61,1,73,1
 1460DATA45,.5,45,.5,61,1,73,1
 1470DATA69,.5,53,.5,33,.5,33,.5,73,.5,6
1,.5,33,.5,33,.5,69,.5,81,.5,33,.5,33,.5
,69,.5,53,.5,33,.5,33,.5
 1480DATA0,0,0,0
 1490
 1500ENDPROC
 1510DEFPROCBONUS:sc=sc+1:SATELITE%=FALS
E:PROCMESSAGE(1,"Well Done !!!        Rel
ease Again"):PROCFANFARE(1390,8):ENDPROC
 1520DEFPROCSTART
 1530IFDEAD=TRUE ENDPROC
 1540CLS:PROCSTARS
 1550SATELITE%=FALSE
 1560THRUST=FALSE
 1570INC%=0
 1580PROCFUEL
 1590PROCSCREEN
 1600PROCMINES
 1610PROCRADIO
 1620PROCcolours
 1630PROCMESSAGE(1,"'NASA' CONTROL TO
CHANELENGER PREPARE TO RELEASE  SATELITE
")
 1640PROCSHUTTLE
 1650REPEAT:PROCSHUTTLE:SHUTTLEX%=SHUTTL
EX%+16:PROCSHUTTLE:FORT=1TO200:NEXT
 1660IFKEY% UNTIL INKEY(-99) ELSE UNTIL
ADVAL(0)AND3
 1670PROCSATELITE
 1680PROCRADIO
 1690PROCMESSAGE(12,"FATAL SYSTEM ERROR
 SATELITE OUT OF      ORBIT.RETREIVE AS
 SOON AS POSSIBLE")
 1700PROCmovesat
 1710IFKEY% PROCKEYSTART ELSE PROCJOYSTA
RT
 1720SOUND&10,0,0,0:SOUND1,-15,125,5
 1730X%=SHUTTLEX%+64:Y%=SHUTTLEY%
 1740Q%=RND(64)-RND(64):E%=RND(32)-RND(3
2)
 1750VDU4,12,5,19,12,13;0;
 1760PROCMAN
 1770RESTORE
 1780ENDPROC
 1790DEFPROCMANEXPLODE:FORT=30TO1STEP-1:
GCOL0,1:MOVEX%,Y%-32:MOVEX%+RND(64)-RND(
64),Y%+RND(32)+32
 1800PLOT85,RND(1279),RND(1023)
 1810SOUND0,-T,6,5:NEXT
 1820PROCDEAD:PROCSTART
 1830ENDPROC
 1840DEFPROCSCREEN
 1850GCOL0,0:MOVE600,1020:PRINTSTRING$(4
,CHR$255+CHR$8+CHR$10+CHR$255+CHR$11):IF
L%<=0DEAD=TRUE:ENDPROC
 1860MOVE600,1020:PRINTSTRING$(L%,MAN4$)
:FUEL%=440:PROCFUEL:ENDPROC
 1870DEFPROCKEYORJOYSTICK
 1880REPEAT:UNTIL INKEY(-99) OR ADVAL(0)
AND3:IFINKEY(-99) KEY%=TRUE ELSE KEY%=FA
LSE
 1890ENDPROC
 1900DEFPROCSOUNDTRACK
 1910READA,B,C,D
 1920SOUND&11,-10,A,B*10:SOUND&12,-10,C,
D*10:ENDPROC
 1930DEFPROCINSTRUCTIONS
```

PCN PROGRAMS: BBC B

PCN PROGRAMS: BBC B

Shuttle

1930-2110 Print out the instructions
2120 Inputs the level of the game
2130-2160 Start the game by pressing spacebar for keyboard or fire button for joystick
2170-2180 Keyboard start
2190-2200 Joystick start
2210-2240 Sound off option
2250-2290 Error routine

```
 1940*FX15,0
 1950FORT=5TO6:PRINTTAB(5,T)CHR$141CHR$1
36CHR$129"INSTRUCTIONS (Y / N)":NEXT
 1960A$=GET$:IFA$="N" THEN2120 ELSEIF A$
<>"Y" RUN
 1970CLS
 1980FORT=1TO2:PRINTTAB(10,T)CHR$141CHR$
129CHR$157CHR$135"SHUTTLE  "CHR$156:NEXT
 1990PRINT''" In this game you are an as
tronaught on the space - shuttle "CHR$13
6"CHALLENGER"CHR$137"."
 2000PRINT"You release one of Indias' ne
w satelite but the main computer comtrol
ing the    satelite has malfunctioned an
d has sent the satelite out of orbit.You
r job is toput on your experimental jetp
ack and    reteive the satelite."
 2010PRINT'"Your jetpack has limited fue
l so you    must be quick & precise"
 2020PRINT''CHR$129TAB(3)"Press "CHR$13
6CHR$157CHR$134"SPACE BAR  "CHR$156CHR$1
37CHR$129"to continue"
 2030REPEAT:UNTILGET$=" "
 2040CLS
 2050FORT=1TO2:PRINTTAB(13,T)CHR$141CHR$
129CHR$157CHR$135"KEYS  "CHR$156:NEXT
 2060FORT=4TO5:PRINTTAB(7,T)CHR$141CHR$1
29CHR$136"Del. ......."CHR$137"Left":NEX
T
 2070FORT=6TO7:PRINTTAB(7,T)CHR$141CHR$1
29CHR$136"COPY ......."CHR$137"Right":NE
XT
 2080FORT=8TO9:PRINTTAB(7,T)CHR$141CHR$1
29CHR$136"TAB. ......."CHR$137"Thrust":N
EXT
 2090FORT=11TO12:PRINTTAB(6,T)CHR$141CHR
$136CHR$129CHR$157CHR$134"OR USE JOYSTIC
KS  "CHR$156:NEXT
 2100PRINT''CHR$129TAB(3)"Press "CHR$13
6CHR$157CHR$134"SPACE BAR  "CHR$156CHR$1
37CHR$129"to continue"
 2110REPEATUNTILGET$=" "
 2120CLS:PRINT''CHR$130"LEVEL OF DIFFICU
LTY (1 - 15)":INPUTLEV%:IFLEV%<=0 OR LEV
%>=16 GOTO2120
 2130PRINT''CHR$136CHR$129"To switch the
 sound off at any time"'CHR$136CHR$129"p
ress"CHR$137CHR$130"0"CHR$136CHR$129"to
switch sound on press"CHR$137CHR$131"S"
 2140PRINT''CHR$136CHR$133"Press 'FIRE'
for JOYSTICKS"CHR$137CHR$134"    OR:-"'C
HR$136CHR$132"   'SPACE' for KEYBOARD"
 2150PROCKEYORJOYSTICK
 2160ENDPROC
 2170DEFPROCKEYSTART
 2180REPEAT:UNTIL INKEY(-99):ENDPROC
 2190DEFPROCJOYSTART
 2200REPEAT:UNTIL ADVAL(0)AND3:ENDPROC
 2210DEFPROCsoundONOFF
 2220IFINKEY(-17) THEN*FX210,10
 2230IFINKEY(-82) THEN*FX210
 2240ENDPROC
 2250DEFPROCERR
 2260VDU22,7
 2270VDU7:*FX15,0
 2280PRINT''CHR$132;:REPORT:PRINTCHR$135
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 2290END
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BACK ISSUES

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Issue 13, June 3-9.
Pro-Tests: Telewriter for Dragon 32, Abersoft Forth for Spectrum, GPS graphics processing system for Apple II+; joysticks, rulers; Ajile.
Features: Dragon meets Tandy, Oric music part 2, transferring Basic for Colour Genie and Genie 1.
Gameplay: Everest Ascent (Spectrum), Colour Genie roundup, Micro Maze (Jupiter Ace), Qix (Atari).
ProgramCards: Cupid (Oric), Alien (Dragon 32), Time Bomb (Atari).
Databasics: peripherals.

Issue 14, June 10-June 15.
Pro-Tests: Apple Accelerator II board, Modula-2 (Apple II), Oric-Base, Joystick Control Unit J6, Kempston Centronics Interface, BBC Speech Synthesiser.
Features: Newbrain Basic part 1, Sirius designing.
Gameplay: Ah Diddums (Spectrum), Monopole (Commodore 64), Automonopoli (Spectrum), Dragon dramatics.
ProgramCards: Time Bomb (Atari, cont), Sheep Drive (BBC B).
Databasics: Software.
Micropaedia: Spectrum, Part 1

Issue 15, June 16-June 22.
Pro-Tests: Comx 35, Address Manager (Spectrum), Sysres (Commodore 64), MST Database (Epson HX-20), Voice Input Module (Apple II).
Features: Newbrain Basic part 2, Genie scene.
Gameplay: Cleared for Landing, Playing the Ace (Apple II), Vultures, Star Jammer (Dragon 32).
ProgramCards: Mover (BBC B), Sprite Clock (Commodore 64), Pirate Island (Atari, 3 of 9), Micro-mind (Colour Genie), Brickbat (Dragon 32).
Databasics: Hardware.
Micropaedia: Spectrum, part 2.

Issue 16, June 23-June 29.
Pro-Tests: Atari v Acorn, word processing for the Commodore 64, Simplifile (CP/M), MPF-II printer, Z80 Pack for BBC.
Features: ZX81 Maths, US mail order, Atari graphics.
Gameplay: Computer Scrabble (Spectrum), Education (BBC), Horace and Spiders (Spectrum), Catcha Snatcha (Vic 20).
ProgramCards: Video Titler (T199/4A 3 of 6), Bowling (Spectrum), Pirate Island (Atari cont).
Micropaedia: Spectrum, part 3.

Issue 17, June 30-July 6.
Pro-Tests: Duet-16, The Organizer (CP/M), Trace and ZX Text (Spectrum), Juki 6100 daisywheel, Videx Ultra Term (Apple II).
Features: Leasing part 1, Atari screen action.
Gameplay: Oric chess, Grand Master (Commodore 64), Escape from Orion (BBC), Jet Pac (Spectrum), The Ring of Darkness (Dragon 32), Spectrum spectacle.
ProgramCards: Video Titler (T199/4A cont), Pirate Island (Atari cont) Word processor (BBC).
Micropaedia: Sound, part 1.

Issue 18, July 7-July 13
Pro-Tests: Tandy 100, RS232 interface (ZX81), ROM pager (Commodore), Interface printer buffer, IBM Personal Basic, Spectrum assembler, Newbrain WP.
Features: Leasing Part 2, Lynx music.
Gameplay: Spectrum Backgammon, BBC Snooker, Commodore 64 round-up, Serpentine (Vic 20), Psst (Spectrum), Spectrum Safari.
ProgramCards: Word Processor (BBC), Fruit Machine (Spectrum).
Micropaedia: Sound Part 2.

Issue 19, July 14-July 20
Pro-Tests: 16-bit chips, Stock control (Epson HX20), Mailplus (Torch), Smith-Corona daisywheel, ZX81 word processing.
Features: Insurance, buying second-dhand.
Gameplay: Escape MCP (C64), Escape from Perilous (Atari), Apple round-up, Temple of Apshai (C64), Airline (Spectrum), Heathrow (Spectrum).
ProgramCards: Colour Code (Atari), Wreck (Dragon).
Micropaedia: Sound, part 3.

Issue 20, July 21-July 27
Pro-Tests: Rade bareboard, Vic digital tape drive, Seikosha colour printer, Toolkit (Spectrum), Bonus (Pet payroll), Newbrain monitor.
Features: Computer art, Dragon scrolling.
Gameplay: Rabbit Trail (TI99/4a), Aztec Challenge (Atari, Vic 20, TI99/4a), BBC round-up, Joust (Spectrum), Molar Maul (Spectrum), Print Shop (Spectrum), Time-Lords (BBC).
ProgramCards: Tumbler (Oric), Wreck (Dragon), Atari Errors, Speed Race (Vic 20).
Micropaedia: Sound, part 4.

Issue 21, July 28-August 3.
Pro-Tests: BBC graphics, Newbrain assembler, BBC turtle, Oric printer, Triumph printer.
Gameplay: Franklin's Tomb (Dragon), Hummer House of Horror (Spectrum), Jumpman (64), Jumping Jack (Spectrum), Fourth Encounter (Vic), Cyclons (64).
ProgramCards: Collection (Vic), Bomber (64), Definer (BBC).
Micropaedia: Sound, part 5.

Issue 22, August 4-August 10.
Pro-Tests: Spectrum Forth, BBC graphics, Music synthesisers, IBM plotter, Brother daisywheel, Maltron keyboard, Mupid.
Features: Genie assembler, Dragon machine code.
Gameplay: River Rescue, Orc Attack (Atari), Zork (64), Knot in 3D, 3D Combat Zone (Spectrum), Moria (Oric), Velnor's Lair (Spectrum).
Micropaedia: CP/M part 1.

Issue 23, August 11-August 17.
Pro-Tests: Sord Basic-G, Tasword, BBC microfloppics, Microdrive, Tandy Model 4.
Features: Dragon machine code, Atari controllers.
Gameplay: Bridge Master, Styx, Manic Miner (Spectrum), Atari roundup, Candy Floss/Hangman (Oric), Everest (Dragon).
Micropaedia: CP/M, part 2.

Issue 24, August 18-August 24.
Pro-Tests: T-Maker III, Spectrum Fifth, daisywheels surveyed, Spectrum digital tracer, Laser.
Features: Videotex, Dragon machine code.
Gameplay: Oric roundup, Cookie, Egg Farm, Xadom (Spectrum), Sea Lord (BBC), Lusitanic (Dragon), The Island (64).
Micropaedia: Commodore 64, part 1.

Issue 25, August 25-August 31.
Pro-Tests: Electron, Simons Basic, Oric monitors, Microdrive.
Features: Newbrain map, Acorn Atom, Dragon machine code.
Gameplay: Suspended (64), Terror Daktils, Tranz AM (Spectrum), Dragon roundup, Jogger (Oric), Frogger (IBM).
Micropaedia: Commodore 64.

Issue 26, September 1-September 7.
Pro-Tests: Microtan 65, BCPL, BBC tracer, 80 column Pet, Oric interfaces.
Gameplay: Magic Mountain, Smugglers Cove (Spectrum), Spectrum roundup, Matrix), (64), Ninja Warrior (Dragon), Dallas, (Oric), Call to Arms (IBM).
Micropaedia: Commodore 64.

Issue 27, September 8-September 14.
Pro-Tests: Sharp MZ700, BBC Lisp, Apple editor, IBM mice, ZX81 surgery.
Gameplay: Zip-Zap, Zzoom (Spectrum), Spectrum roundup, Hovver Bovver, Benji-Space Rescue (64).
Micropaedia: Dragon, part 1.

Issue 28, September 15-September 21.
Pro-Tests: Zenith Z100, Snail Logo, Atari Supergraphics, Newbrain CP/M, IBM mice.
Gameplay: The Witness, Super Scramble, Stix (64), Harrier Attack (Oric), Morocco Grand Prix (Dragon), Pharoah's Tomb (Spectrum.
Micropaedia: Dragon, part 2.

Issue 29, September 22-September 28
Pro-Tests: Portico Miracle, Dragon editor, BBC toolkit, Dragon drives, Apple light pen.
Features: HX20 disassembles, TI transformations.
Gameplay: Gridder, Gloopert, California Gold Rush (64), Oric roundup, Bomb Alley (BBC), Splat, General Election (Spectrum).
Micropaedia: Dragon, part 3.

Issue 30, September 29-October 5.
Pro-Tests: NEC's Advanced Personal Computer, Financial Planner (IBM), Kongman's a.b.c. Countabout Hot Dog Spotter (Spectrum), Prism VTX5000, Extended Basic (Dragon).
Features: Spectrum machine code.
Gameplay: Halls of Death/Sword of Fargoal (64), 747 Flight Simulator (BBC), Dragonfly (Dragon 32), Forensic/Note Invaders (BBC).
Programs: Search (ZX81), Composer (Oric).
Databasics: Hardware.
Micropaedia: Everything you wanted to know about programming, part 1.
Clubnet: Clubs.

Issue 31, October 6-October 12.
Pro-Tests: Atari 600XL, Condor Series 20 (IBM), Acacia Non-volatile Diary/Filing system (BBC), ROM extension board (BBC).
Features: Oric sound routines.
Gameplay: Greedy Gulch (Spectrum), Kong (Spectrum), Crazy Kong (64), Cuthbert Goes Walkabout/Movie Producer (Dragon).
Programs: Composer (Oric), 555 (Spectrum), Anagrams (Dragon).
Databasics: Peripherals.
Micropaedia: Everything you want to know about programming..
Clubnet: User Groups.

Issue 32, October 13-October 19.
Pro-Tests: Mattel Computer Adaptor (Intellivision), Sprite-Gen (BBC), Typing Strategy (Apple), MCoder 2 (Spectrum), Cirtech Eprom Programmer (Apple).
Features: Telesoft options, Inside the Genie.
Gameplay: Space Shuttle Frogger (Dragon 32), Atari roundup, Spectadraw 2/Football Pools Program (Spectrum).
Databasics: Software.
Clubnet: Clubs.
Programs: Bees Away (BBC), Composer (Oric).
Micropaedia: Everything you wanted to know about programming, part 3.

Issue 33, October 20-October 26.
Pro-Tests: C/WP's Cortex, Sinclair ZX Interface 2, Watford DFS (BBC), Wordsworth (BBC), Atariwriter.
Features: Oric Operating System.
Gameplay: Dragon roundup, Hustler (64), Cricket/Luna Crabs (Spectrum), 3 Deep Space (BBC).
ProgramCards: Key Utility (Lynx), Bees Away (BBC), French Test Card (Apple).
Micropaedia: Everything you wanted to know about programming, part 4.

Issue 34, October 27-November 2.
Pro-Tests: NEC's PC-8201A, Simply File (64), The Forest (Spectrum), Amcom DFS (BBC), Currah Microspeech (Spectrum).
Features: Oric Machine Code.
Gameplay: Fort Apocalypse/Pooyan (Atari), Death Cruise/I Ching (Dragon), Trench/Canyon (BBC), Football Manager/Pool (Spectrum).
Programs: French Test (Apple), Babyfall (ZX81), Count (Vic 20), Men/Arith (Vic 20), Road Hog (BBC).
Databasics: Hardware.
Micropaedia: Everything you wanted to know about programming, part 5.

Issue 35, November 3-November 9.
Pro-Tests: Kaypro 10, Stock Control (Spectrum), Educational games (BBC), Brother EP22 electronic typewriter, ADS Centronics Interface (Spectrum, Jupiter Ace).
Features: Tandy Graphics, BBC Operating System.
Gameplay: Valhalla (Spectrum), 64 roundup, Slinky (Atari), Hexpert (64).
Programs: Mini Math (Spectrum), Multi-Square (Oric).
Databasics: Peripherals.
Micropaedia: Everything you wanted to know about programming, part 6.

Issue 36, November 10-November 16.
Pro-Tests: Tiger from H/H, ZX81-Forth, Exmon (Oric), Cycle Planner, Growth Tracker/Dieta/Diet Master (Spectrum), U-Com 2 (Apple).
Features: Newbrain sound, BBC FX commands.
Gameplay: Creepers (Vic 20), Exterminator (64), Spectrum roundup, Death Mines of Sirus (Dragon).
Programs: Falklands Raid (BBC), Mini Math (Spectrum), Pyramid (Spectrum).
Databasics: Software.
Micropaedia: Everything you wanted to know about programming, part 7.

Issue 37, November 17-November 23.
Pro-Tests: Apricot, Paint (Atari), BBC Micro Toolbox, Spectravideo Compumate (Atari VCS 2600), Big Ears.
Features: Flight simulators, Spectrum screening.
Gameplay: Empire/Treasure Tomb, Crystal Chalice, Temple of Zoren (Dragon 32), Cobus Maze/Bewitched (Vic 20), Cosmic Convoy/Planetfall (64), Bugaboo/Gorgon (Spectrum).
Programs: City Defense (Oric), Falklands Raid (BBC), Pyramid (Spectrum), Monitor (64).
Databasics: Clubnet.
Micropaedia: Everything you wanted to know about programming, part 8.

Issue 38, November 24-November 30.
Pro-Tests: Coleco's Adam, Small Business Accounts (Spectrum), Masterfile (BBC), Monitor roundup.
Features: Apple programming, NewBrain editor part 1, Dragon action part 1.
Gameplay: Dragon roundup, Zeppelin/Blue Max (Atari), Skramble/Falcon Patrol (64), 737 Flight simulator (BBC).
Programs: Shipment (Spectrum), Monitor (64).
Databasics: Hardware.
Micropaedia: Guide to Monitors.

Issue 39, December 1-December 7.
Pro-Tests: Dragon 64, Tandy CGP-220, White Knight II (BBC), Cross Reference Utility (IBM).
Features: NewBrain editor part 2, Dragon Action part 2.
Gameplay: Oric roundup, Haunted Hedges/Corridors of Genon (Spectrum), Microbe/One Hundred & Eighty (BBC), Atari roundup.
Programs: Lower CLS (Spectrum), Shipment (Spectrum), Monitor (64), Basic Search (BBC).
Micropaedia: Buyer's Guide to Micros.

Issue 40, December 8-December 14.
Pro-Tests: Timex 2058, Thermal Printer TP-10, Cambridge Computing joystick (Spectrum), Beebsynth/The Synth/Music Processor (BBC), Vizawrite/Vizaspell (64), Education games (Spectrum).
Features: NewBrain editor part 3, Dragon Action part 3.
Gameplay: Pinball Wizard (Vic 20), The Quest of Merravid (64), Wavy Navy/Savage Pond (Atari).
Programs: Link Four (Spectrum), Tilt (Dragon).
Micropaedia: Buyer's Guide to Peripherals.

Issue 41, December 15-December 21.
Pro-Tests: Apple II, Byte Drive 500, INMAC Power Cleaner, Commodore 1701 Colour Monitor, BCBasic (64), Database/MST-Calc (Dragon).
Features: Computerised Psychotherapy (BBC), Spectrum Display.
Gameplay: Micropoly/Pettigrew's Diary (Dragon), 64 roundup, Dimension Destructors/Sheer Panic (Spectrum).
Programs: Colony Invader (Spectrum), Grid Bike (Vic 20).
Micropaedia: Buyer's Guide to Software.

Issue 42, December 22-January 4.
Pro-Tests: Spectrum add-ons (U-Microcomputers system), Oric-1 Filestar, Games Designer (Spectrum).
Features: Micros of 1983, Computer Security, BBC word processing, Dragon Action part 4.
Gameplay: International Football (64), Grouch/Chequered Flag (Spectrum), Way Out/Jet Boot Jack (Atari), Supervaders/Outback (Vic 20), Danger Ranger/Up Periscope (Dragon 32).
Databasics: Clubnet.
Micropaedia: Games Special.

Issue 43, January 7.
Pro-Tests: IMB Junior, Grafpad (BBC), Walters WM80 printer Devpac (Spectrum).
Features: Computerspeak, Spectrum Display, Tabs on Oric.
Gameplay: Trace Race/Pinball (Dragon 32), Colour Genie roundup, Hunter Killer/Mr Wimpy (Spectrum), Crazy Caveman/Goodness Gracious (64).
Programs: Jungle Chase (Oric), Screen Dump (BBC).
Databasics: Hardware.
Micropaedia: Electron part 1.

Issue 44, January 14.
Pro-Tests: Hitachi MBE-16002, Acorn Teletext (BBC), Integrex Colourjet printer, DTL-Basic (64), Dlan/Microprint 42/51/Multifront (Spectrum).
Features: Adventure games, Colour Genie characters.
Gameplay: Devil Assault/Wasps + Dragon Racer (Dragon 32), Siren City/Forbidden Forest (64), Survival/Countdown (Vic 20).
Program: Minefield.
Databasics: Peripherals.
Micropaedia: Electron part 2.

Issue 45, January 21.
Pro-Tests: Portables — Commodore SX64, Olivetti M10; Acorn sparkjet printer; Turbo 20 daisywheel; Spectrum educational software; BBC graphics extension ROM.
Features: Bargain buys; Making money with your micro.
Gameplay: Viking and Pub Crawl (Dragon), Traxx and Wild West Hero (Spectrum), Atari/Commodore 64 round-up.
Programs: Battlestar Fighter (Commodore 64).
Databasics: Software.
Micropaedia: Electron part 3.

Issue 46, January 28.
Pro-Test: Apple Macintosh; BBC sideways ROM board; IEEE interfaces for Commodore 64; Silver Reed EX44 typewriter/printer; Bridge on Spectrum and Dragon; BBC filing program.
Features: Buying by mail order; programming the Memotech.
Gameplay: Barmy Burgers and Gangsters (Spectrum), Birdie Barrage and Plankwalk (BBC), Blue Moon and Dancing Feats (Commodore 64).
Programs: Caves of Treasure (ZX81).
Clubnet
Micropaedia: Modems and communication.

Issue 47, February 4.
Pro-Tests: Sinclair QL; Atari Touch Tablet; Silver Reed EXP500 daisywheel; IBM Cobol; BBC Spell Check.
Features: Programming the Memotech part 2; Low cost printers.
Gameplay: Mothership and Quintic Warrior (Commodore 64), Two Gun Turtle and Multigames (Oric), Apple adventures, Spectrum round-up.
Programs: Pot Hole (Dragon)
Databasics: Hardware.
Micropaedia: A to Z of Atari part 1.

Issue 48, February 11.
Pro-Tests: Spectravideo 328; Atari 800 XL; Dragon 3in disk drives; low cost monitors; Aztec C (Apple); BBC educational software.
Features: Sideways printing on Epson HX20.
Gameplay: Bedlam and Morris Meets the Bikers (Spectrum); Commodore 64 round-up; Zorgon's Kingdom and Flight Zero-One-Five (Vic 20).
Programs: Gridtrap (Lynx).
Databasics: Peripherals.
Micropaedia: A to Z of Atari part 2.

Issue 49, February 18.
Pro-Tests: Oric Atmos; tracker ball controllers; Spectrum speech synthesisers; Rainbow Writer (Dragon); Colour Genie assembler; Spectrum educational programs.
Features: Computer jargon; 42-column display on Spectrum.
Gameplay: Quadrant and Jetpac (Vic 20); Crazy Balloon and Supacatchatroopa (Commodore 64).
Programs: Sprite generator (Commodore 64).
Databasics: Software.
Micropaedia: A to Z of Atari part 3.

Issue 50, February 25.
Pro-Tests: Sanyo MBC550; Commodore speech synthesiser; BBC real-time control interface; BBC machine code trace; Atari home utilities.
Features: Expanding your Spectrum; introduction to Lisp.
Gameplay: Urban Upstart and Godzilla and the Martians (Spectrum), Shuttlezap and Hooked (Dragon).
Programs: Minescape (Oric).
Clubnet
Micropaedia: Printers part 1.

Issue 51, March 3.
Pro-Tests: Sharp's PC5000, Graphics Package (Oric), Fancy Font (CP/M, Torch), Superbase Application Database (64), Printer round-up, IEEE 488 Interface (BBC).
Features: Microdrive data files.
Gameplay: Spectrum selection, Robopods (TI99/4A), Batty Builders/Bristles (Atari).
Programs: Millipede (BBC/Electron).
Databasics: Hardware.
Micropaedia: Printers, part 2.

Issue 52, March 10.
Pro-Tests: Wren, MSX, Multisynth 64, Mr T's Number Games etc (BBC, Spectrum, 64), Hybrid cable (Oric, Atmos).
Features: Adventure games.
Gameplay: Dragon roundup, Snorter/Free Fall (BBC), Spectrum roundup.
Programs: UFO (Vic-20), Morse Code (BBC), Gary the Guitar (64).
Databasics: Peripherals
Micropaedia: Printer, part 3.

Issue 53, March 17.
Pro-Tests: Yamaha YIS503, Tandy TRS-80 modem (RS232), MDDFS (BBC), Toolkit (BBC), The Quill (Spectrum).
Features: Screen technology, Atari graphics.
Gameplay: Megahawk/Megawarz (64), Castle of Doom/Fishy Business (Dragon 32).
Programs: Battle Stations (Spectrum).
Databasics: Software.
Micropaedia: Reaching for the Atmos, part 1.

Issue 54: March 24.
Pro-Tests: IBM's Portable PC, Spectrum keyboards, Beebfont, Games Designer (Vic-20).
Features: Atari graphics, Chip shortage.
Gameplay: Airstrike 2/Pole Position (Atari), Deathchase/Fighter Pilot (Spectrum), BBC roundup.
Programs: Othello (64), Charpatt (CGL M-5).
Clubnet: User groups and clubs.
Micropaedia: Atmos, part 2.

Issue: 55, March 31.
Pro-Test: H-P 150, Light pens (BBC, 64), Micro-Prolog (Spectrum), Electron Graphics System.
Features: Spectrum routines, Consumer rights.
Gameplay: Patience/Metagalactic Llamas Battle at the Edge of Time (Vic-20), Loki/Rat Splat (Oric), Tennis (Atari).
Programs: Fast Draw (Dragon 32), Flash simulator (Atari).
Databasics: Hardware.
Micropaedia: Communications, part 1.

Issue 56, April 7.
Pro-Tests: Votrax Type 'n Talk, Micro Command (BBC, Spectrum, 64), Commodore 1001 disk drive, Apple's Macintosh, Animator (Dragon 32), Knoware (IBM).
Features: Spectrum maths, Adventure in history.
Gameplay: Hunchback Aztec Challenge (64), Defence Force/Psycho II (Oric), Volcanic Planet (Spectrum).
Programs: Ape King (Vic-20), Lynx VAL.
Databasics: Peripherals.
Micropaedia: Communications, part 2.

Issue 57, April 14.
Pro-Tests: Microkey, Morex Disk Drive Interface (Spectrum), Atari 1020 colour printer/plotter, FT Moneywise (IBM PC, Sirius).
Features: Assembly course, Portables.
Gameplay: Learning games (Spectrum, Oric), Air Traffic Control/Super Spy (Dragon), Neptune's

Issue 58, April 21
Pro-Tests: Wrap-Bit Rabbit, Pixit Apple graphics, Edword BBC word processor, Bynamic Graphics/Painbox/Melbourne Draw graphics toolkits on Spectrum, Premier Sprite board for Dragon.
Features: Commodore 64 extended Basics, Microdrives made easy.
Programs: C-File database for Spectrum 48K.
Micropaedia: Spectrum, 64, BBC games reviewed.

Issue 59, April 28
Pro-Tests: Grid Compass, Husky Hunter, Canon X-07, Apple Homeword, Commodore 64 CP/M, Dragon Sprite Magic, Atari printers, Minor Miracles modem.
Features: Assembler language.
Programs: Huebert for Oric.
Micropaedia: Spectrum, BBC, Dragon, Atari games reviewed.

Issue 60, May 5
Pro-Tests: TRS80 4P portable, BBC Disk Doctor, Spectrum Tasword II, Quinkey keyboard, Bob robot.
Features: Oric FILL command.
Gameplay: Psytron and Red Baron (Spectrum), Avenger and Dragon Hawk (Dragon), Colour Genie round-up.
Programs: Poison Toad on Commodore 64.
Micropaedia: Graphics on Commodore 64, Oric and Atari.

Issue 61, May 19
Pro-Tests: Epson PX-8, Apple Pro-DOS, Commodore 64 Colossus 2 chess, Dragon Sprint compiler, Solidisk RAM expansion for BBC.
Features: Artificial intelligence, assembler Pt 3.
Gameplay: Atari round-up, Commodore 64 round-up, Quest and Last Sunset for Lattica (Spectrum).
Programs: BBC/Electron 3D graphics, Oric renumber, Commodore 64 split screen graphics.

Issue 62, May 26
Pro-Tests: Compaq, Dragon OS9, Spectrum educational packages, ExpressBase II, BBC buggies, Commodore 64 Koala graphics pad.
Features: Spectrum sound, Japanese peripherals.
Gameplay: Rapedes and 1984 (Spectrum), House of Death and Operation Gremlin (Oric).
Programs: Dragon hi-res graphics, Commodore 64 graphics, Spectrum array sort.

Issue 63, June 2
Pro-Tests: Apple IIc, Sord IS11, Canon dot matrix printer, Oric disk drives, Acorn 6502 processor and Bitstick graphics system, Dragon sound packages, Commodore 64 speech synthesiser.
Features: Oric Budget, assembler Pt 4.
Gameplay: Galactic Warriors, Magic Meanies (Spectrum), Flying Feathers and Plumb Crazy (Commodore 64).
Programs: Oric assembler/disassembler.

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As they say...

Software houses threatened to boycott the last ZX microfair if companies selling tape copiers were allowed to exhibit. This magazine doesn't carry ads for tape copiers, partly because it doesn't seem right to do so. But now there is a new and even trickier question to be debated; the question of tape-to-Microdrive and tape-to-disc copiers.

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NEXT WEEK

***Aquarius re-born* — Can Radofin turn the tide with the Aquarius II? Find out in our full Pro-Test.**

***Win a 64!* — Five Commodore 64s are there for the taking in next week's competition.**

***Anything Ikon do* — We put Ikon's Ultradrive through its paces on a BBC.**

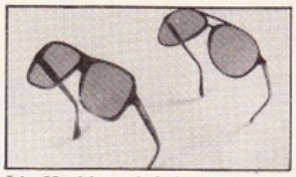
***Sweet plotter* — Check out the £500 Sweet P plotter.**

***Dragon drones* — Arcade action on the Welsh micro with this fast, sprite graphics progam.**

***Gameplay* — Aviator on the BBC gives Gameplay an aeronautical flavour, with other reviews of new Atari games.**

***Programs* — Our listing should give Oric users some typing practice.**

IC glare



It's Health and Safety Week in *PCN*. In the interests of your comfort and safety we're focussing this week on a problem that has confounded mankind down the ages — VDU-induced eye-strain.

And straight away we're able to bring you news of a remarkable new product — VDU spectacles. Fitted with Irex 90 Plus lenses, the VDU spectacles from Bolle (UK) offer 100 per cent protection against ultra-violet absorption and 90 per cent against infra-red rays.

PCN calls on all makers of monitors to re-tool immediately and start building monitors with ears, so that hard-pressed users will be able to fit their screens with these glasses before their eyesight fails completely.

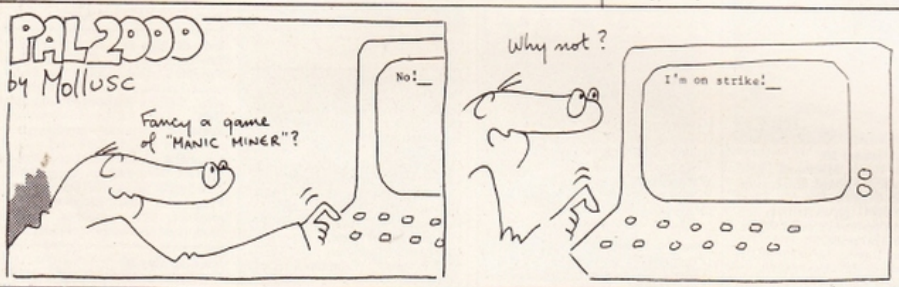
SYNTAX ERRORS

There were a couple of mistakes in the 'Autorun' routine from Jonathon Ball, in Microwaves (issue 67). Lines 190 and 270 should read as follows:

```
190 LDY #ASC("O")
270 LDY #ASC("U")
```

Hi-tech tape

Ever had trouble using a standard music cassette tape for data storage? No, nor have we, making the status of 'computer cassettes' — C15s — of 'special high quality' look like a marketing ploy to part you from your cash. Agfa has joined the gold rush with its PC15 'developed to meet the very highest standards'. Apparently, the tape is 'polyester-based' — aren't they all? The new tape will cost under £1 — just as well, as there doesn't appear to be anything special about it, except perhaps for the very swish and glossy cassette inlay.



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PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

UK EVENTS

Event	Dates	Venue	Organisers
Sinclair Computer Users' Exhibition	July 21	Essex Exhibition Centre, Chelmsford	Lance Feller 0245 252900
Electron & BBC Micro User Show	July 19-22	Alexandra Palace, London	Database Publications, 061-456 8383
Scottish PCW Show	July 26-28	Assembly Rooms, Edinburgh	Scottish Industrial & Trade Exhibitions
Advanced Technology	August 9-13	St George's Hall, Liverpool	Advanced Technology, 051-236 0121
Acorn User Exhibition	August 16-19	Olympia, London	Computer Marketplace Exhibitions 01-930 1612
Electron & BBC Micro User Show	August 31-Sep 2	UMIST, Manchester	Database Publications, 061-456 8383
IBM System User Show	Sept 3-5	Olympia	EMAP International Exhibitions 01-837 3699
Hampshire Computer Fair	Sept 6-7	Guildhall, Southampton	Testwood Exhibitions, 0703-31557
PCW Show	Sept 19-23	Olympia	Montbuild 01-486 1951
Computer Communication & Control	Sept 26-28	Brighton Centre	Institution of Electrical Engineers 01-240 1871
Computers in Action	October 30-Nov 1	Anderson Centre, Glasgow	Trade Exhibitions, 0764 4204

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
SE Asia Regional Computer Conference	Sept 24-27	Hong Kong	Industrial & Trade Fairs International, 021-705 6707

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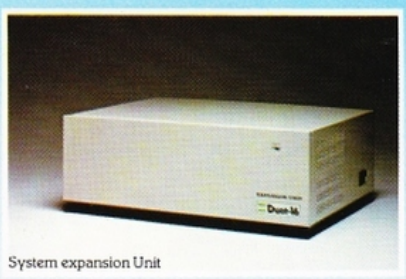

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