

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

# 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

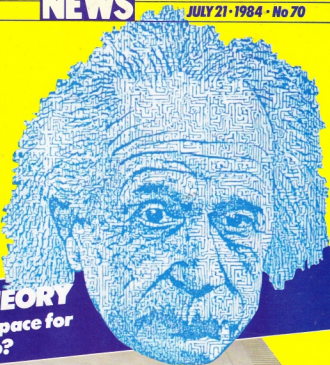
## SINCLAIR ALL SORTS

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?



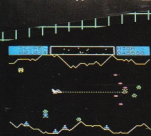
## THE KEY TO PROFESSIONAL GAMES DESIGN ON THE SPECTRUM 48K

### 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, can be moved around or inverted with amazing speed and smoothness. Operations are possible between screen windows, Sprites and reflected/enlarged or with zooming across several screens. Sprites can even stretch across several screens. Sprites can be moved around or inverted with amazing speed and smoothness. Operations are possible between screen windows, Sprites and reflected/enlarged or with zooming across several screens. Sprites can even stretch across several screens. Sprites can be moved around or inverted with amazing speed and smoothness. Operations are possible between screen windows, Sprites and reflected/enlarged or with zooming across several screens. Sprites can even stretch across several screens.

**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



- 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.

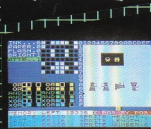
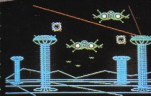
# WHITE LIGHTNING

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.



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



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

**OASIS SOFTWARE**

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

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: \_\_\_\_\_

Address: \_\_\_\_\_

**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.

## REGULARS

**Monitor** 2

Viva el Dragon! The Spanish step in, page 2; Imagine founders in confusion, page 3; Ericsson takes on IBM PC, page 4; and ACT draws fire from the Advertising Standards Authority, page 5.

**Charts** 6

Every week the new entries, the risers, fallers and those that have ground to a standstill.

**Random Access** 8

Send us your thoughts, we might send you a tinner. This week, opinions on software pirates, new clubs, and the QL again.

**Routine Inquiries** 10

If you've got a problem we've probably got the solution. PCN's panel of experts is at your disposal.

**Microwaves** 14

Readers's hints and tips for Spectrums, Commodore 64s, Ataris, Adams, Amstrads and Dragons.

**Clubnet** 16

Let micro talk unto micro in Nottingham.

**Software Pre-View** 36

A quick look into the future. We look at the new software before it reaches the shops.

**Billboard** 51

Looking for a bargain? Got a bargain for someone else? This is the page.

**Quit/Datelines** 56

The bit at the back for connoisseurs of the comic. Plus forthcoming events at home and abroad.

## SPECIALS

**Dragon sprites** 18

Following up on the machine code routines in issue 66, an action game that demonstrates the graphics power of your machine

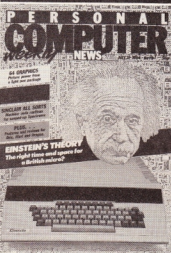
**Spectrum sorts** 21

Speed up your Sinclair's sorting routines with Kevin Ball's machine code program.

**MENU**

July 21 1984

No 70



Cover by Michael Kilrain and Syd Hughes.

## COVER STORY

**Einstein's theory** 28

A new British micro with a price and specification that pitches it straight into the ring with the BBC Model B. Trevor Jenkins finds a lot in its favour.

## HARDWARE

**Tatung old-fashioned** 32

Completing the Tatung duo, a business system to the tried and tested formula of Z80 and CP/M. Brendin Lewis compares it with the new generation of IBM lookalikes.



## PERIPHERALS

**Portman modem** 24

Put your micro in touch with the world with this full-featured modem from Interlekt. Kenn Garroch makes the connection.

**64's light touch** 27

Yet another tool for the computer artist — the Edumate light pen. Guaranteed to bring out the Picasso in you.



## SOFTWARE

**BBC gem** 39

Your BBC could become a business aid with this ROM-based data management package.

## GAMEPLAY

**Atari** 43

Superheroes abound — put yourself in the shoes of Bruce Lee or the Incredible Hulk.

**Oric** 44

Five new offerings for the Oric/Atmos under the scrutiny of Nick Rann.

## PROGRAMS

**BBC Model B** 47

Into space with Shuttle. Can you capture the runaway satellite while avoiding the explosive obstacles.?

## 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 tele-software 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.

# 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 continue 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 that they can't refuse. Its move ends months of uncertainty 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.

## Computers gloom lifts as rescue prospects improve

Computers 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, Computers 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 Computer'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 Portu-

guese 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 economies 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 mini-

num 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. . .

# 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 breaks 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

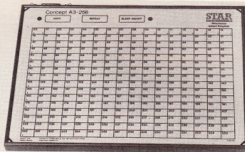
The Tatum Einstein, Pro-Tested in this issue (page 28), will soon become the world's most secretive micro.

The Einstein's operating system Xial 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 spokes-

man, 'it all comes down to time.' With a fast computer you might crack the Tatum 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 BBT 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 computer-aholic 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, Quicksilver 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 special 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 demigogs in connection with Kronenbourg 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 mass 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



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

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 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.



TELESLIP — Spectrum users green with envy at the virtual monopoly of teletext 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 813777.



## 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	Prizes but 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 MS.

### 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 Star Tutor 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 Kildale 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:** Basic3c 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 Bliagger	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-fills 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 RAMC, who can be contacted on 01-892 6596.

# SUMMER SALE (PRINTERS)

	RRP	Sale Price
<b>EPSON PRINTERS (DOT MATRIX)</b>		
RX 80T 100 cps 80 columns .....	£249	£199
RX 80 F/T 100 cps 80 columns .....	£285	£229
FX 80 160 cps friction and pin feed .....	£438	£324
FX 100 F/T 160cps friction and tractor .....	£569	£499
RX 100 F/T 100 cps 132 columns .....	£450	£385

<b>OKI MICROLINE PRINTERS (DOT MATRIX)</b>		
80 cps 80 column .....	£199	£185
82A 120 cps 80 column .....	£299	£255
92P 160 cps (NLQ) .....	£449	£379
84P 200 cps IBM PC Compatible (NLQ) .....	£799	£630

<b>SHINWA</b>		
CP80 80 cps 80 column .....	£199	£175

<b>CANON</b>		
PW 1080A 160 cps (NLQ) 80 column .....	£319	£275

<b>DAISY WHEEL PRINTERS</b>		
DYNEER DW16 16 cps .....	£329	£285
DAISY STEP 2000 20 cps .....	£285	£235

All prices are for cash with order. Telephone your Access number or send cheques, P.O.s., etc., payable to:



**STEVON MICROS**  
199 DUNSTABLE ROAD  
LUTON, BEDS  
0582 458630



Prices exclusive of VAT and delivery.

**TO ALL MACHINE CODE PROGRAMMERS**

**WE ARE LOOKING FOR:-**

**Good, original 100% machine code programs**  
Even if you have hesitated in the past from submitting your work for possible publication we want to see it. While we are only looking for programs of the highest quality we will not embarrass you by rejecting your work outright if it does not quite come up to standard. Instead we offer friendly advice and assistance to those we think show promise with a little work.  
Simply send a copy of your program to the address below.

**OR**

**Perhaps you have machine code programming ability but just can't come up with that winning idea?**  
Or have been seduced by offers of colossal sums of money for your work, only to be disappointed when the royalty cheques start coming in. Out of the thousands of programs on the market, only a handful call for sufficient quantities to return royalties in the amounts often quoted — and there can be slim pickings for the rest!  
So why not write programs for which we supply the ideas? No imagination required, and a set, very good return irrespective of subsequent sales levels.  
Only two points remain. To apply send a C.V. and a recent sample of your work to the address below.

**PROGRAMS FOR ALL POPULAR MACHINES WILL BE CONSIDERED, EXCEPT NORMAL RESOLUTION ZX81.**

**The Software Farm,  
155 Whiteladies Road,  
Clifton, Bristol BS8 2RG  
Tel: (0272) 731411**

## GAMES... GAMES... GAMES

### THE VIRGIN COMPUTER GAMES SERIES

£££££'s of  
*Entertaining Games*  
for only £2.95

Each book contains more than 20 quality games programmes, each one specially written for the series and unavailable elsewhere. Moving graphic games, arcade games, reflex flexers and brain stretchers are all here and guaranteed to provide hours of entertainment.

Only £2.95 each



- GAMES FOR YOUR ZX 81
- MORE GAMES FOR YOUR ZX 81 (£3.50)
- GAMES FOR YOUR ZX SPECTRUM
- MORE GAMES FOR YOUR ZX SPECTRUM (£3.50)
- GAMES FOR YOUR VIC 20
- MORE GAMES FOR YOUR VIC 20
- GAMES FOR YOUR BBC MICRO
- MORE GAMES FOR YOUR BBC MICRO
- GAMES FOR YOUR DRAGON
- MORE GAMES FOR YOUR DRAGON
- GAMES FOR YOUR ATARI
- GAMES FOR YOUR ATARI 600XL
- GAMES FOR YOUR TRS 80
- GAMES FOR YOUR ORIC
- MORE GAMES FOR YOUR ORIC
- GAMES FOR YOUR COMMODORE 64
- MORE GAMES FOR YOUR COMMODORE 64
- GAMES FOR YOUR ACORN ELECTRON
- GAMES FOR YOUR TI 99/4A

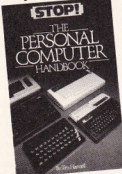
### THE PERSONAL COMPUTER HANDBOOK

3rd Annual Edition

**TIM HARTNELL**

*The complete guide to selecting and using small computers, including an explanation of how they work and what they can do for you, a detailed analysis of the available systems on the market and how to buy them, and how to get the most from your computer with an extended step-by-step guide to programming.*

Only £4.95

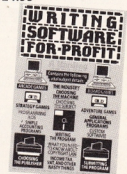


### WRITING SOFTWARE FOR PROFIT

**A.J. HARDING**

*Most software authors find writing programs at home and many have dreams of seeing their hardwork published. With this in mind, this book examines how to choose the right machine and the right computer software before explaining in depth the best approach to program writing and submitting your finished program.*

£4.95



Available from all good bookshops, or direct from the publishers adding 12 1/2% to the price of each book ordered to cover our postage and packing. Please make cheques/P.O.'s payable to Virgin Books and send to: Computer Books Offer 2, Virgin Books, 61-63 Portobello Road, London W11 3DD

## 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



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

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 Hoiland,  
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 add-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 Sorcerers 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 Basic-d-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. DJ 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 Prohrose, 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 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.

## M-TEC

AT LAST! BBC BASIC to run on YOUR CP/M Computer

## BBC BASIC (Z80)

Now available for the TORCH and DISKPACK with full GRAPHICS

WHY STRUGGLE ON using OLD FASHIONED BASICS when you can have ALL THE ADVANTAGES OF BBC BASIC (Z80) on your computer?

Of course, we can't turn your computer's video display into a high resolution colour monitor, but we can give you all the other features of BBC BASIC including:

- > LONG VARIABLE NAMES
- > MULTI-LINE REPEAT UNTIL STATEMENTS
- > MULTI-LINE NAMED FUNCTIONS
- > MULTI-LINE NAMED PROCEDURES
- > POWERFUL DIRECT MEMORY MANIPULATION USING THE INDIRECT OPERATORS
- > AN IN-LINE ASSEMBLER USING STANDARD Z80 MNEMONICS
- > VERY SOPHISTICATED PARAMETER PASSING IN THE CALL STATEMENT
- > SERIAL RANDOM AND INDEXED DISK FILES PLUS THE ABILITY TO ACCESS ANY BYTE IN THE FILE.
- > CLEAR SCREEN, TAB(X), TAB(Y), POS, VPDS and TIME Plus ALL THE OTHER STANDARD COMMANDS etc.

You can copy any program written in older standard versions of BASIC with little change OR you can write well-structured and easy to read programs like a professional.

You need never say GOTO again. But we won't stop you. Price, including postage, £95 + VAT

TORCH version including SOUND and GRAPHICS £110 + VAT BBC BASIC (Z80) will run on any computer using CP/M 2.2 or later and a Z80 processor. It comes complete with an instruction manual, a tutor on file handling and configuration notes.

Trade enquiries welcome

M-Tec Computer Services (UK), Ollands Road, Reepham, Norfolk

Telephone Norfolk 870620

Prestel Mailbox No. 603870620

## DUCKWORTH HOME COMPUTING

All books written by Peter Gerrard, former editor of *Commodore Computing International*, author of two top-selling adventure games for the Commodore 64, or by Kevin Bergin. Both are regular contributors to *Personal Computer News*, *Which Micro?* and *Software Review* and *Popular Computing Weekly*.

### EXPLORING ADVENTURES ON THE ORIC 48K by Peter Gerrard

This is a complete look at the fabulous world of Adventure Games for the Oric Computer. Starting with an introduction to adventures, and their early history, it takes you gently through the basic programming necessary on the Oric before you can start writing your own games.

Inputting information, room mapping, movement, vocabulary — everything required to write an adventure game is explored in detail. There follow a number of adventure scenarios, just to get you started, and finally three complete listings written specially for the Oric, which will send you off into wonderful worlds where almost anything can happen.

The three games listed in this book are available on one cassette. £8.95

Other titles in the series include *Sprites & Sound on the 64*, *12 Simple Electronic Projects for the VIC*, *Will You Still Love Me When I'm 64*, *Advanced Basic & Machine Code Programming on the VIC*, *Advanced Basic & Machine Code Programming on the 64*, as well as *Pocket Handbooks for the VIC*, *64*, *Dragon*, *Spectrum* and *BBC Model B*.

Write in for a descriptive leaflet (with details of cassettes).



DUCKWORTH

The Old Piano Factory, 43 Gloucester Crescent, London NW1 7DY  
Tel: 01-485 3484

## ROUTINE INQUIRIES

Lost in a maze of bits and bytes, trapped in a forest of errors, bugged by Basic? Whatever the problem, CALL on us. Our panel of experts is at your command.

**Write to:** Routine Inquiries, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

### 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 CPM, and costs £221.

Compared to the price of the

drive this isn't exactly a flea-bite, 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 essential 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 Mini-modem 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 porta-

bility. 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 Britain, 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 to 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.

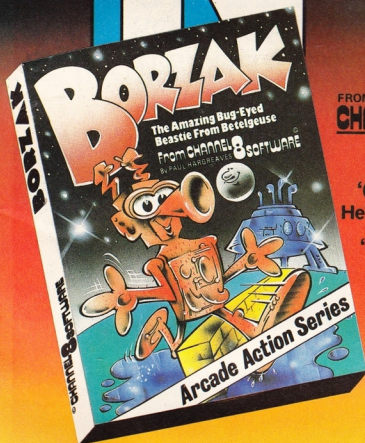
Lee Simmons, Nottingham.

**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

# NUMBER 1



FROM  
**CHANNEL 8 SOFTWARE**

'Oh Borzak ★■?!'  
 He's just fallen in the bog.

'Oh Borzak ★■?!'  
 He's just been hit  
 by a piranha.

Borzak the amazing bug eyed beastie from Betelgeuse is our Number One, maybe he will be yours.

Borzak runs, jumps and ducks on the way to his spacecraft, on 48k Spectrum and Commodore 64 with keyboard or joystick control. Price £6.95 including VAT.

'Oh Borzak ★■?!' Don't curse too loud if you can't get him back to his ship.

## OTHER CHANNEL 8 SOFTWARE TITLES

- SHEAR PANIC
- THE BLACK SQUID
- THE CONSTRUCTOR
- I SPY FOR KIDS LANDER
- PRIMARY MATHS
- MATHS TUTOR TODDLER TUTOR
- 'GOTCHA' MATHS
- ASTRAL ZONE

- FEASIBILITY EXPERIMENT
- TEN LITTLE INDIANS
- THE WIZARD AKYRZ
- ARROW OF DEATH PT. 1
- ESCAPE FROM PULSAR 7



- THE GOLDEN BATON
- ARROW OF DEATH PT. 2
- PERSEUS & ANDROMEDA
- THE TIME MACHINE
- WAXWORKS CIRCUS

**CHANNEL 8 SOFTWARE**<sup>©</sup>  
 51 Fishergate, Preston,  
 Lancs PR1 8BH.  
 Tel: (0772) 53057



Selected titles available from larger branches of , Greens at Debenhams, Lewis's, Spectrum dealers and good computer shops everywhere, (in case of difficulty send P.O. or Cheque direct).



# ACCESS CEEFAX AND ORACLE BROADCAST INFORMATION

DESIGNED FOR USE EXCLUSIVELY WITH THE 16K AND 48K MODELS OF SINCLAIR ZX SPECTRUM MICROS. THE TTX 2000 SITS NEATLY UNDER YOUR ZX SPECTRUM THE TTX 2000 PACKAGE COMES COMPLETE. IT

CONTAINS:

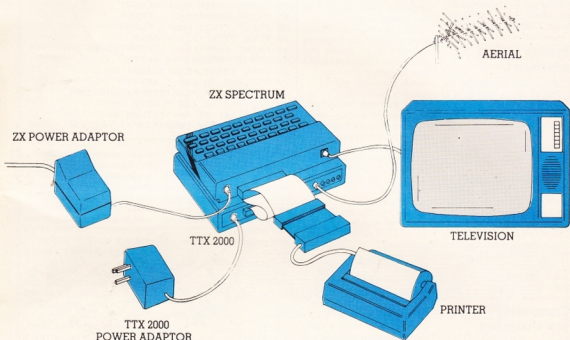
THE TELETEXT RECEIVER  
POWER SUPPLY ADAPTOR  
ZX INTERFACE CABLE

+ FULL DETAILED INSTRUCTIONS.

THE ADAPTOR INCLUDES BUILT-IN SOFTWARE TO INSTANTLY RECEIVE TELETEXT.

SIMPLY CONNECT UP  
PLUG IN  
SWITCH ON  
AND TUNE IN

THE TTX 2000 WILL WORK WITH ANY STANDARD BLACK AND WHITE OR COLOUR TELEVISION. JUST CONNECT IT UP TO YOUR TV AERIAL.



DESIGNED  
AND MANUFACTURED BY



O. E. LIMITED,  
NORTH POINT,  
GILWILLY INDUSTRIAL ESTATE,  
PENRITH,  
CUMBRIA CA11 9BN.  
TEL: (0768 66) 748.

TELEX: 64157.

PRESTEL MAILBOX: 093051909.

## THE TTX 2000 ORDER FORM

Please send me a TTX 2000 for £143.75 (incl VAT P&P)\*

° I enclose a cheque/PO made payable to O.E. Limited.

° Please debit my Access/Visa account as appropriate.

Access card No: .....

Visa card No: .....

Signature: .....

Name: .....

Address: .....

Postcode: ..... Tel: .....

\*Allow 28 days for delivery. °Delete as necessary.



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

You all know the feeling: after hours, days or even weeks spent on a particular problem you suddenly see the answer. Or on one of those late-night expeditions through the memory map you find some undiscovered feature. Well don't keep it to yourself—send it here. We pay £5 for every tip and routine printed and £25 for a genuine Megawave.

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 McMurray,  
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 0,1,10,15
40 SOUND 1,Z,10,15
50 NEXT Z
60 NEXT I
70 FOR I=1 TO 100
80 SOUND 0,1,8,10
90 SOUND 1,1,8,10
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

## 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 POKE'd 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
```

'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*

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 gluing 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*

## 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

```
PROGRAM 1
10 A$ = "ADAM Users Club"
20 BS = "P. O. Box 9"
30 CS = "Towcester"
40 DS = "Northants"
50 E$ = "NS12 70G"
60 FS = CHR$(4)
70 PRINT FS: "OPEN FILE"
80 PRINT FS: "WRITE FILE"
90 PRINT A$
100 PRINT BS
110 PRINT CS
120 PRINT DS
130 PRINT E$
140 PRINT FS: "CLOSE FILE"
150 PRINT "File is stored"
160 END
```

```
PROGRAM 2
10 FS = CHR$(4)
20 PRINT FS: "OPEN FILE"
30 PRINT FS: "READ FILE"
40 FOR I = 1 TO 5
50 INPUT G$(I)
60 NEXT I
70 PRINT
80 PRINT FS: "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

## MICROWAVES

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, &H7C0
20 B=&H7C0
30 READ AS: IF AS="Z" THEN 100
40 POKE B+1, VAL ("H" + AS)
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=0T05
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
:60 NEXTN
190 FORST=21T020STEP-1
200 CO=ST
210 FORN=0T05
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 GOT0190
```

## 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.

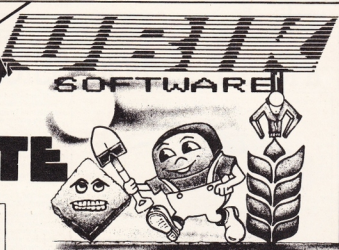
This mode does have its drawbacks. You can only use HIRES commands and print, and only 23 of the 28 text lines can be addressed using CURSET. DRAW and CIRCLE will not function properly but FILL does work extremely quickly and correctly. PAPER and INK work but should not be used as they will overwrite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

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

AVAILABLE  
AUGUST 1st  
Spectrum 48K £5.95  
BBC 'B' £7.95  
from all leading stockists

# Paranoid

Available soon for  
Commodore 64 &  
Amstrad CPC464



ORDER NOW - FAST DELIVERY

Please send me by return of post, Paranoid Pete for the:

Please tick appropriate box

BBC Model B  at £7.50 inc. P&P.

SPECTRUM 48K  at £5.50 inc. P&P.

I enclose a cheque/postal order for ..... made payable to  
UBIK Software.

Name .....

Address .....

Dealers & Stockists enquiries welcome.



Send to: UbiK Software, 66 Rothwell Road, Gosforth,  
Newcastle upon Tyne, NE3 1UA. Tel: (091) 284 0044.

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

## A little mutual understanding

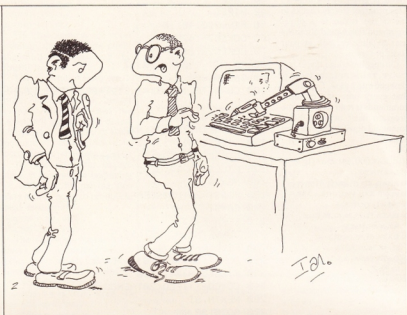
Extensive use of Basicode, despite its limitations, is being encouraged in Nottingham Microcomputer club. It's seen as a way to cross-pollenate the activities of the club's several energetic machine-specific groups.

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 usefulness.

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



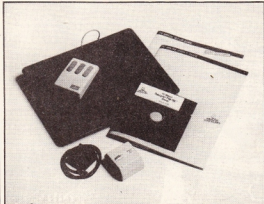
*'Since we taught it Basicode it'll talk to anything.'*



## Test drive our mouse

MOUSE SYSTEMS

# a MIGHTY PROFESSIONAL mouse



the mouse professionals use

Fully compatible with IBM PC-XT, without having to change existing software, PC Mouse eliminates the necessity to remember complicated commands. Designer Pop-Up menu software (V.3) and PC Mouse enables users to design or personalise Pop-Up menus for most IBM PC and PC-compatible software.

**Designer Pop-Up menu software includes pre-configured pop-up menus for:**

Lotus 1-2-3™, Visicalc™, Multiplan™, IBM Personal Editor™, Volkswriter™, Wordstar™, Supercalc™, PFS Write™ and Multimate™.

**Version 3 also works with:**

Microsoft™ Word. The Multi Tool series & Window (when available).

**In addition, PC Mouse can be used directly with:**

VisiOn™, Concept VP™, DESQ™, Halo™, CADPlan™ and AutoCAD™.

**NEW IMPROVED MOUSE WINDOW SOFTWARE:** for the systems programmer Mouse Systems offers Mouse Window software, a toolkit of advanced graphics utilities for IBM Pascal, Microsoft™, Lattice C or assembly language. The package includes complete in-depth documentation and software. Supports "Raster-Op" access to display memory. Additional improvements include automatic mouse cursor tracking with user definable cursor styles, and operator "event" processing providing simple to use programme interface for all operator keyboard and mouse interaction inputs.

Technical details are available for OEM's wishing to use Mouse Systems' Mouse on non-IBM equipment, or their own software.

TM: \* signifies manufacturers' trademark/registered trademark

DATA DESIGN TECHNIQUES COMPUTER SYSTEMS LTD

Unit 16b Norman Way Severn Bridge Industrial Estate Portskewett  
Gwent NP6 4YS. Tel: 0291 423781 Telex: 497576

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



**'The Art of Micro Design' by AA 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 synthesizers 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. —

**artificial intelligence on the dragon computer**

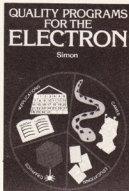
make your micro think

keith and steven brain



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 intelligent, 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 than 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 is 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 introduction 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.

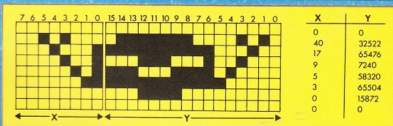
But the real value of the book is in its remarkable scope. In addition to the most thorough explanation of Basic that I have seen for the machine, it delves into the world of peripherals, with particularly good chapters on use of cassette, disk and printer. There is also a useful round-up of some of 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**





# DRAGON GRAPHICS



```

610 REM BIT7
620 X=COS(PI*2*X/16*7+K/40*X/20*X/40*X/20*X/40*X/20*X/46*X/116*X/34*X/68*X/62*X/124*X/0*X/0/
0*X/0)
630 PPODE4.1:PCLS:FORJ=1TO380:PSET:RND(255),RND(167):NEXT
640 LINE(0,191)-(0,191):PSET
650 FORI=40TO255STEP5
660 LINE(-I,191-RND(24)):PSET:NEXT
670 PPODE4.1:SC=0
680 NL=6:KL=200
690 X=SPRITE:0*X/1*X/0/143*X/0/
700 FORI=2TO NL:X=SPRITE:(I*X/1+RND(230)*X/0*X/1):NEXT
710 FORI=2TO NL:X=SPRITE:(I*X/1+RND(230)*X/0*X/1):NEXT
720 FORI=2TO NL
730 D=RND(2)-1:IFD=0 THEN D=255
740 X=MOVE(I,XD,X/1):NEXT
750 X=CNTL(0,XNL)
760 PCLS:SCREEN:0
770 REM START OF GAME
780 C1=0:C2=6: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:SCREEN:0
800 P=JOYSTX(C1):IFP<1 THEN X=MOVE(C1,X/C1) ELSE IF P<2 THEN X=MOVE(C1,X/
4*X/1) ELSE X=MOVE(C1,X/C1*X/1)
810 Y=PEEK(C5):IF Y<68 OR Y<67 GOSUB980
820 R=SCOLL(C1):IF R<C3 THEN I160
830 FORI=2 TO NL:Y=SPRITE(I)
840 IF Y<28 THEN KL=KL-C3:NEXT ELSE NEXT
850 IF KL<C1 THEN I160 ELSE LINE(I,1)-(KL,1):PSET:LINE(KL,1)-(255,1):PSET
860 KL=KL-1
870 GOTO 880
880 L=0:L=SPRCL(C1)
890 FORI=2 TO NL
900 R=SPRCL(I)
910 IF U=AR AND U<AR+2 THEN 970
920 NEXT
930 LINE(U,160)-(U,C1):PSET
940 SOUND:1
950 LINE(U,160)-(U,C1):PSET
960 RETURN
970 X=MOVE(I,X/0)
980 X=MOVE(NL,X/0)
990 SC=SC+1
1000 J=SPRCL(1)
1010 K=SPRCL(1)
1020 LINE(U,160)-(U,K+24):PSET
1030 X=SPRITE:I,X/0/X/KKX/1)
1040 X=SPRITE:I,X/1/X/KKKX/0)
1050 X=SPRITE:0)
1060 LINE(V,160)-(U,K+24):PSET
1070 S=SPRCL(NL)
1080 W=SPRCL(NL)
1090 X=SPRITE(NL,1)+(RND(230)*X/0*X/1)
1100 IF NL=1 THEN I120
1110 X=SPRITE:I,X/1/X/KKX/1)
1120 D=RND(2)-1:IFD=0 THEN D=255
1130 D=RND(2)*X=MOVE(I,XD,X/0):X=MOVE(NL,X/0)
1140 X=SPRITE:I,X/0/X/KKX/1)
1150 RETURN
1160 FORI=130TO255STEP5:PPODE4.1:SCREEN:0:SOUND:1:PPODE3.1:SCREEN:0:X=WHITE
1)
1170 NEXT
1180 X=CNTL(0,X/0)
1190 PPODE4.1:SCREEN:0
1200 X=SPRITE(0*X/0/X/0/X/0)
1210 FORI=40TO140:LINE(I,1)-(256-I,192-1):PSET:0:NEXT
1220 FORI=1TO1000:NEXT
1230 CLS
1240 PRINT" GAME OVER!"
1250 PRINT" YOU SCORED",SC
1260 POK65494,0
1270 END
1280 CLS:PRINT#255,"PLEASE HATE THIS GAME WAS WRITTEN USING THE SPRITE
GENERATOR ROUTINE AND IS WRITTEN IN BASIC!"
1290 RETURN
1300 CLS
1310 PRINT"THIS GAME IS PLAYED WITH THE RIGHT JOYSTICK, YOU MUST PREVENTHE D
ROMES FROM 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 GENERATOR ON THE FRONT OF FUEL LEFT IN YOUR SHIP, THE FUEL
CHARGE IS SHOWN AT THE TOP OF THE SCREEN,AFTER YOUR FUEL HAS RUN OUT YOUR SCOR
E WILL BE DISPLAYED."
1330 R=IKEY:IFR=** THEN I330
1340 RETURN
    
```

OFFER CLOSES  
31st August 1984

SAVE £8

# 16 FREE PCN's

If you subscribe now  
You save £8 and get all this.....



We'll deliver 61 copies to your door for the price of just 45.

61 issues normally £30.50  
Special offer just £22.50

And if you subscribe already, you can take advantage of this offer by extending your order for another year.

But don't delay in claiming your £8 of freebies. Call Gill Stevens on 01-439 4242 Ext 226 with your credit card details, or complete this order form.

I would like to subscribe to Personal Computer News.

- 61 issues UK £22.50
- 61 issues rest of world: Surface £35.00
- 61 issues rest of world: Airmail £65.00
- I enclose my cheque made payable to Personal Computer News.
- Please charge my Access/Visa/Diners/American Express card (delete where not applicable)

Account No. ....

Signed .....

What type of Micro do you use?

Do you use it for home/work/education

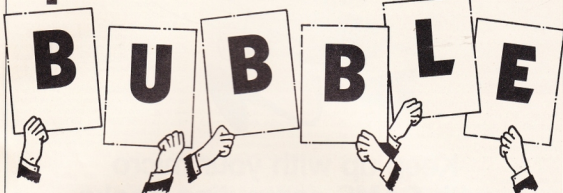
Name .....

Address .....

Please send this order form with your remittance to Personal Computer News, Subscriptions Dept, Freepost 3B, London W1E 6GZ (no stamp is needed on the envelope).

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.

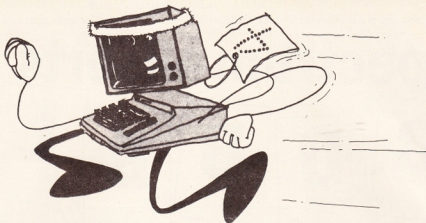
The obvious solution to this execution time problem is to sort using a machine

## Bubblesort listing disassembled

```

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 23601 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

```



## Keep up with your micro with SAMS computing books

With these new books from SAMS you can make sure that you're never behind in the computing race

### ATARI

#### Atari for Kids from 8 to 80

Michael Zabinski and Michael Scheck

A fun guide which quickly and easily explains all the important programming concepts.

1984/200 pages/ISBN 0 672 22294 9/£12.50

#### Programmers Reference Guide for the Atari 400/800 Computers

David Heiserman

An invaluable guide, covering all aspects of programming. Contains two large chapters on graphics.

1984/496 pages/ISBN 0 672 22277 9/£17.50

### APPLE

#### Apple II for Kids from 8 to 80

Michael Zabinski

An enjoyable and easy to follow book of instructions to help you quickly begin writing your own programs.

1984/184 pages/ISBN 0 672 22297 3/£8.95

#### Enhancing your Apple II, Volume 1

2nd edition

Don Lancaster

Gives details on customizing your Apple and shows you how to produce amazing graphics effects and much more.

1984/256 pages/ISBN 0 672 21822 4/£12.50

### GENERAL

#### Computer Language Reference Guide

2nd edition

Harry Helms, Jr.

If you know at least one programming language, this guide will help you understand eight more, including ALGOL, BASIC, C, COBOL, FORTH, FORTRAN, LISP, Pascal and PL/1.

1984/192 pages/ISBN 0 672 21823 2/£7.95

### COMMODORE

#### Commodore 64 Starter Book

Titus and Titus

An ideal desktop companion intended to help get every new owner up and running with a minimum of fuss.

1984/384 pages/ISBN 0 672 22293 0/£14.50

#### Learn BASIC Programming in 14 Days on your Commodore 64

Gil Schechter

Consists of fourteen chapters which, if covered at the rate of one each day, will teach most people how to program successfully.

1984/192 pages/ISBN 0 672 22279 5/£10.50

#### Mostly BASIC Applications for your Commodore 64, Books 1 and 2

Howard Berenbon

Both books are packed with ready-to-enter, serious and fun BASIC programs which will keep you entertained for hours.

Book 1: 1984/128 pages ISBN 0 672 22355 4/£10.50

Book 2: 1984/264 pages ISBN 0 672 22356 2/£11.95

#### VIC 20: Games 'n' More

Earl Savage

Contains twenty games, four fun patterns, ten home educational and three personal/household programs for you to enter and enjoy.

1984/160 pages/ISBN 0 672 22088 1/£9.50

AVAILABLE FROM ALL GOOD BOOKSELLERS  
SAMS books are distributed in the UK by Pitman Publishing, 128 Long Acre, London WC2E 9AN  
(Tel. 01 379 7383)

Pitman

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, LIST 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

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

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 (RANDOMIZEUSR 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.

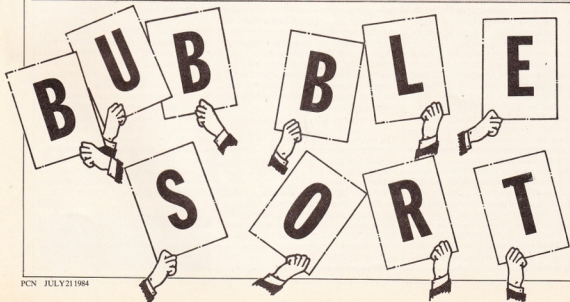
Though the routine only makes provision for strings, it is possible to sort numerical data if you first run a loop to convert your numeric array into the string array D\$. Page 58 of the manual has details on this.

### 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

```



## PCN PRO-TEST PERIPHERALS

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 pulling or button pressing needs to be done manually.



# MULTIPLE MODEM

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

### 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 a 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

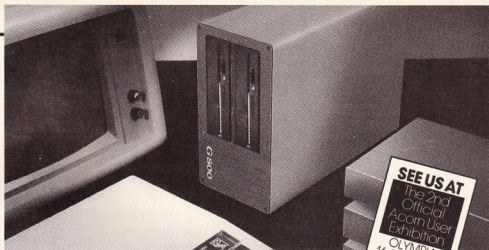
matter of remembering to watch the telephone charges.

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.

**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.



## The Graduate. The first IBM PC compatible upgrade for the BBC model B micro.

From only £764.00 the new Torch Graduate will upgrade your BBC Model B to a powerful 16 bit business computer.

Disc and hardware compatible with the IBM PC, the Graduate is the latest addition to the Torch range of BBC upgrades. It's MS™-DOS operating system is customised to IBM compatibility allowing exploration of the massive range of IBM compatible business software, programming aids, compilers and languages universally available from most major software houses.

### Introduction to MS™-DOS

The Graduate offers two levels of upgrade, the G400 and the G800, both with 128K on board user memory as standard (optionally 256K). This can be increased to 1.2 Mbytes with an IBM compatible expansion board. The G400, contains a single, double sided 320K formatted disc drive and provides the low cost introduction to MS™-DOS for the

### TECHNICAL SPECIFICATION

- 8088 16-bit processor running at 5 Mhz
- 128K or 256K RAM
- MS™-DOS operating system customised to IBM compatibility
- Model G400 - Single, double sided, high density disc drive (320K formatted)
- Model G800 - Twin, double sided, high density disc drives (640K formatted)
- Integral stabilised power supply
- 2 IBM PC compatible hardware expansion buses
- Software compatibility allows Lotus 1-2-3 and all popular IBM PC business programs to run without modification, subject to the constraints of the BBC keyboard and display
- Disc interface is not required
- Keyboard text and graphics supplied by BBC Model B

### • THE GRADUATE •

user who wants real 16 bit power from his Model B.

### More data storage

A step up from the G400 is the G800 which offers twin, double sided 320K disc drives for extra data storage. Both the G400 and the G800 provide the possibility of

further expansion for networking, modems, etc., via the IBM compatible hardware slots provided by the Graduate models. Each model comes complete with a well written user/technical manual and connecting leads.

### Just plug it in

Unlike other add-ons there is no need to open the BBC to make the connection. The compact and tidy Graduate models simply plug in to the 1Mghz bus on the Model B. Within minutes you can be up and running with an IBM PC compatible system that really means business.

### The range

Add 256K RAM, 640K disc storage and IBM PC compatibility to the BBC Micro for less than £1,000.

Graduate G400 (128K) £764 inc. VAT  
Graduate G400 (256K) £815 inc. VAT  
Graduate G800 (128K) £949 inc. VAT  
Graduate G800 (256K) £999 inc. VAT

For further information complete the coupon today.

# TORCH

COMPUTERS

Lighting the way ahead.



Torch Computers Limited  
Abberley House, Great Shelford, Cambridge CB2 5LQ.  
Telephone (0223) 841000. Telex 818841 TORCH G.

The Graduate is manufactured by Torch Computers under licence from Data Technologies Ltd.

To: Torch Computers Ltd., Abberley House, Great Shelford  
Cambridge CB2 5LQ. Telephone (0223) 841000  
Please send further information on the Graduate and the  
address of my nearest dealer.

Name

Address

Post Code  Telephone

PCN 6

# SOLO SOFTWARE SILLY SUMMER SALE

**CHOOSE ANY 5 FOR ONLY £9.95**

Keep the family happy for hours during the summer holidays with this super summer offer from Solo Software. Any 5 of the games below for only £9.95 complete.

You may order more than one set of 5 games and save even more:  
**5 GAMES FOR £9.95**  
**10 GAMES FOR £18.90**  
**15 GAMES FOR £27.85**

<b>SLAKER</b> Search the woods for the wealth of the serpent king whilst being pursued by his servant snakes. Then escape avoiding the guards.	<b>TRACKER</b> While hunting the many beasts you must never cross your own tracks. The speed gradually increases - PANIC!!!	<b>ALADDIN'S CAVE</b> Avoiding the crazed geni, you must find the fastest way out of the caves and collect as many jewels as you can.	<b>UPYOURS</b> A humorous (not to say insulting) character analysis program based on the answers you give to some probing and personal questions.
<b>SAFE-CRACKER</b> Catch the robbers who have broken into the bank vaults without getting doberbed.	<b>PARA-SHOOT</b> Your gun tower is under attack from parachutists. Either shoot the planes before they drop the troops or kill the commandos as they descend.	<b>CHANNEL TUNNEL</b> Race the computer guided French to complete your tunnel in the most economic way. Avoid digging through solid rock as this slows you down.	<b>HEADACHE</b> Try to escape from this labyrinth of corridors whilst being chased by a maniac with a lawn-mower.
<b>LAZER BLAZER</b> You must destroy all the invaders before your time runs out - but you must kill them in the right order to score maximum points.	OFFER ONLY AVAILABLE FOR: <b>SHARP III-7000</b>		<b>SUPER-MOUSE</b> A cat and mouse game where you are the cat searching for the real mouse. But watch out for SUPER-MOUSE because he kills pussies like you!
<b>FISHERMAN FRED</b> For the younger games player. Try to help Fred catch some fish for his tea. Six skill levels.	<b>THREE CARD BRAG</b> The traditional card game but you must play the computer. You may bluff if you wish but so will he and he's pretty good at it!	<b>GOLD MINER</b> Find the real gold hidden in the mine-maze whilst being chased by the miner. Don't get walled in.	<b>DOMINATION</b> A game of battle and conquest for two players. Each side takes turns to attack, defend or retreat. Based on strategy - not luck.
<b>INCA GOLD</b> Fend off the horde of bandits who are attempting to rob the tomb. You can move the gold or kill the bandits with your sword.	<b>TYPE TRAINER</b> Learn your way about the standard QWERTY typewriter keyboard. Tests at 4 skill levels and gives scores in words per minute. Really useful.	<b>COMPUT-A-SLOT</b> An all-action simulation of a slot machine complete with HOLD and even a handle to pull. Scores for 2 or 3 of a kind plus mystery pay-outs.	<b>CONVEYOR</b> Fast fingers and quick wits needed to sort the items on the conveyor belt into the correct places before the scrap bin overflows.

PLEASE CIRCLE THE GAMES YOU WANT ON THE LIST BELOW AND RETURN TO:  
 SOLO SOFTWARE LTD, 95B BLACKPOLE TRADING ESTATE WEST, WORCESTER WR3 8TJ



- |                |                 |              |                |
|----------------|-----------------|--------------|----------------|
| ALADDIN'S CAVE | PARA-SHOOT      | SAFE-CRACKER | CHANNEL TUNNEL |
| HEADACHE       | LAZER BLAZER    | SUPER-MOUSE  | GOLD MINER     |
| DOMINATION     | THREE CARD BRAG | TRACKER      | UPYOURS        |
| FISHERMAN FRED | SLAKER          | INCA GOLD    | CONVEYOR       |
| TYPE TRAINER   | COMPUT-A-SLOT   |              |                |

I ENCLOSE A \*CHEQUE / \*POSTAL ORDER / \*CREDIT CARD NUMBER FOR £ \_\_\_\_\_

MY \*ACCESS / \*BARCLAYCARD Account Number is \_\_\_\_\_  
\*delete where applicable

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

For 24 hour telephone service  
 you may order on  
 ACCESS or BARCLAYCARD



This offer closes  
 on August 31st, 1984

# 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 becoming 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 relevant software. So there's none of that opening up the computer and plugging in extra boards as with some machines.

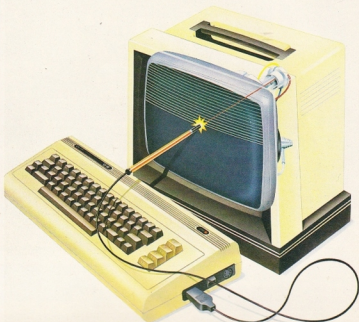
## In use

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 relevant 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



## 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 2048,13
180 POKE 5+39,1:REM SET SPRITE COLOUR
200 POKE 5+21,1:REM TURN SPRITE ON
210 REM NOW POKE X POSITION OF SPRITE
220 REM WITH X POSITION OF PEN
230 X=PEEK(5+19)*1.8
240 IF X<255 THEN POKE 5+16,0
250 IF X>255 THEN POKE 5+16,1:X=X-255
260 POKE 5,X
270 REM NOW POKE Y POSITION OF SPRITE
280 REM WITH Y POSITION OF LIGHT PEN
290 POKE 5+1,PEEK(5+20)
300 GOTO 230
    
```

READY.

ore 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.

## 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.

**Product** Edumate Light pen Machine  
Commodore 64 **Price** Light pen only £34.95  
Light pen plus Peripheral Vision £59.95 **Outlet**  
Tomorrow's 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 CPM 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 microflopsies 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 CPM-compatible programs, the disks are structured in a similar fashion with the file control blocks conforming to CPM'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▶

**A COMPUTER DESK — Designed for comfort and efficiency.  
Direct to you from the manufacturers — RANGEWORTHY FURNITURE.  
£61.00 (plus p&p)**

This desk is designed to the specification and standard required by an international computer executive. Everything has been considered to offer the utmost comfort and efficiency for home and office use.

It is constructed entirely of real wood veneered with sapele, giving a rich satin mahogany finish to the highest standards of the furniture industry.

The unit is mounted on casters for smooth running and easy mobility. Also included is a four way socket master point with plugs. This may be attached to any part of the desk so that only one cable is used to the mains. The design and use of these superior materials ensures that the desk is very strong and stable in all respects.

**IT IS MADE TO LAST**

The height to the top is 32" (which is considered the most efficient and comfortable to read the VDU). The main desk surface 31" x 20" will facilitate any home computer keyboard. A special compartment 12" x 6" is provided to house large cassettes, disk drives or twin sets.

The whole unit is assembled in minutes with screw bolts to give lasting strength.

If not completely satisfied with your desk, return intact within 30 days for full refund. Allow 28 days delivery.



---

# Rangeworthy Furniture

---

Backfield Farm, Wotton Road, Iron Acton, Nr Bristol  
Telephone: Rangeworthy (045422) 767

---

**Post to: Rangeworthy Furniture, Backfield Farm,  
Wotton Road, Iron Acton, Bristol, Tel: 045422 767**

Please send me: \_\_\_\_\_ Computer Desk(s) @ £66.00 (inc. p&p) each.

I enclose cheque/postal order for £\_\_\_\_\_ made payable to Rangeworthy Furniture.

Mr/Mrs/Miss \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

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 of (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

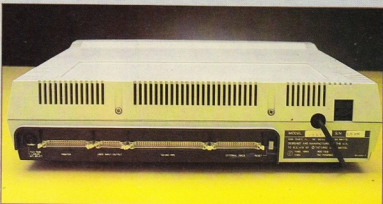
The review model came with a matching monitor, also made in the UK, which was most impressive. It is RGB compatible and also has the production video standard of YUV. The choice between them is made by altering a few links inside the Einstein, though on the model I had these were difficult to change. 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



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

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 preferring 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 repertoire 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.

## 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 WDRPRO 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 x 198 pixels; either 40 x 24 or 32 x 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 problematic accidental striking could be all too

## PCN PRO-TEST HARDWARE

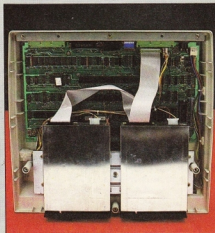
easy. Also slightly annoying was that the LEDs indicating caps and shift lock were not incorporated within the keys, but at the top right of the keyboard where they cannot be seen if a light is shining on them. They also appeared not to work from time to time, though only when a piece of software had 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 separate 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.

# COMMODORE SINCLAIR TOMORROW'S WORLD Today

London's No. 1 computer centre  
with the largest range of  
home computer hardware,  
software and peripherals.  
Come and see our exclusive  
range of imported software  
from U.S.A and the following  
peripherals for the

Commodore 64  
**EDUMATE LIGHT-PEN**

\*see review on p.27  
**SKETCHPAD**

new!  
**KOALAPAD**  
(with additional software)

27 OXFORD STREET, LONDON W1.  
Phone: 01 434 7999 01 434 2040  
NR. TOTTENHAM COURT ROAD STN.

ATARI

BBC

# INTERLEKT

## PORTMAN

### Fully approved, multi-speed British built modem

The Interlekt Portman is a low-cost modem for dial-up use providing communications facilities for personal computers, Viewdata and stand-alone terminals.

- \* Compatible with CCITT recommendations
- \* Front panel speed/mode selection
- \* Originate or answer mode
- \* Auto-answer with manual over-ride
- \* Low power consumption
- \* Attractive table-top configuration
- \* Full two-year warranty



APPROVED for use  
with telecommunication systems  
run by British Telecom conditions  
in accordance with the conditions  
in the instructions for use  
Approved Number: BA 4074 (3) E-100643

For full details, price and delivery, call  
our Modem Sales Office on Reading (0734) 589551

**INTERLEKT**  
The Complete Answer  
to all your  
Data Communications  
Problems

Interlekt Electronics

Interlekt Electronics Limited  
Interlekt House, 24 Portman Road  
Reading, RG3 1LU, England

# EARN MONEY FROM YOUR COMPUTER

★ FULL OR PART-TIME.

★ FROM YOUR OFFICE OR YOUR HOME.

Excellent money is now being made. For details send  
large S.A.E. to:

## HOME COMPUTER EARNERS CENTRE

SOUTHBANK HOUSE,  
BLACK PRINCE ROAD,  
LONDON SE1 7SJ.



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

432

## 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 6.0Mb 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 Z80 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

## PCN PRO-TEST HARDWARE

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 x 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.

# AMSTRAD

## AVAILABLE NOW!

ORDER BY TELEPHONE FOR IMMEDIATE DESPATCH ALSO IMMEDIATE DESPATCH UPON CHEQUE CLEARANCE



ONLY £229  
WITH GREEN SCREEN  
ONLY £329  
WITH COLOUR MONITOR

ORDER BY MAIL  
COMPUTERAMA  
DEPT. PCN 1  
11 Market Square Arcade Hanley  
STOKE ON TRENT ST1 1PD

ORDER BY PHONE  
for ACCESS or VISA dial our ORDER  
HOTLINE 0782 268620

CARRIAGE  
is by insured carrier. Please add £16 to cover  
carriage of monitor and keyboard units.

CALLERS WELCOME AT ALL OUR  
RETAIL STORES

AVAILABLE NOW FROM THE NATION'S  
LEADING AMSTRAD SPECIALISTS

### computerama

STOKE-ON-TRENT STAFFORD  
SHREWSBURY

## \*\*\* CUT PRICE MICROS \*\*\*

ITEM	RETAIL PRICE	OUR PRICE
APRICOT COMPUTER + 1 S/S 315 K DRIVE & 9" MONITOR	£1595.00	£1276.00
APRICOT COMPUTER + 2 S/S 315K DRIVES & 9" MONITOR	£1795.00	£1436.00
APRICOT COMPUTER + 2 D/S 720K DRIVES & 9" MONITOR	£1995.00	£1596.00
APRICOT XI WITH 5 MEG INTERNAL HARD DISK & ONE S/S DRIVE & 9"	£2695.00	£2195.00
APRICOT XI WITH 10 MEG INTERNAL HARD DISK & ONE S/S DRIVE & 9" MONITOR	£2995.00	£2396.00

(ABOVE PRICES INCLUDE MS-DOS 2.0 (RUN-TIME VERSION INC GSX GRAPHICS SYSTEM EXTENSION), MICRO SOFT BASIC INTERPRETER, CONFIGURATOR AND UTILITIES, ASYNCH COMMS, SUPERCALC AND SUPERPLANNER INCLUDING MANUALS. ALSO AVAILABLE CP/M-86, CONCURRENT CP/M-86 AND PERSONAL BASIC) PLEASE ADD £80.00 TO OUR PRICES FOR VERSIONS WITH 12" MONITOR

### SOFTWARE

PEGASUS (ANY MODULE) (PER THREE MODULES)	£350.00 £1050.00	£225.00 £600.00
DBASE II	£438.00	£306.60
FRIDAY	£195.00	£136.50
BSTAM	£135.00	£94.50
CARDBOX	£181.00	£126.70
LOTUS 1-2-3	£375.00	£262.50
WORDSTAR	£295.00	£206.50
MAILMERGE	£145.00	£101.50
SPELLSTAR	£145.00	£101.50

Call MCS on  
01-802 0019

All prices exclude VAT, please add £10 p&p on all Micro Computers.  
Government and Local Authority orders welcome

3A Woodlands Park Road, London N15



## SOFTWARE



## • WHAT'S NEW • WHAT'S NEW • WHAT'S NEW •

**Note to software publishers:** If you wish your company's product to be included, please send only the very latest releases to Bryan Skinner, Software Editor, PCN, 62 Oxford Street, London W1A 2HG; and please don't forget to include prices and a telephone number.

### 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 isn't 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 re-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 loca-

tions. 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...

### APPLE

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
-------------	-------	-----------------

### BBC

Laser Reflex	£7.95	Talent Computer Systems 041 552 2128
West	£9.95	Talent Computer Systems 041 552 2128
Star Striker	£7.95	Superior Software 0532 459453
Mr Wiz	£7.95	Superior Software 0532 459453
Missile Strike	£7.95	Superior Software 0532 459453
Spitfire Command	£7.95	Superior Software 0532 459453
Chess	£7.95	Superior Software 0532 459453
Darts	£6.95	Superior Software 0532 459453
Mutant Spiders	£6.95	Superior Software 0532 459453
Paranoid Pete	£7.95	VBK 091 284 0044

### COMMODORE 64

Kalah	£7.95	Talent Computer Systems 041 552 2128
Archipelago	£7.95	Talent Computer Systems 041 552 2128

Panorama	£17.95	Talent Computer Systems 041 552 2128
West	£9.95	Talent Computer Systems 041 552 2128
Quest for the Garden of Eden	£6.99	Phoenix 01 868 3353

### ELECTRON

Mr Wiz	£7.95	Superior Software 0532 459453
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

Cribbage	£5.50	Gamma Software 01 459 2652
Orc Slayer	£5.50	Gamma Software 01 459 2652
Mad Hatter	£5.50	Gamma Software 01 459 2652
Paranoid Pete	£5.95	VBK 091 284 0044
Trans-Express	£9.95	Romantic Robot 01 450 1605
Spectune	£9.95	XORsoft 0482 572261
Matching Pairs	£2.99	Cases Computer Simulations 01 450 2125
Rainy Day	£2.99	Cases Computer Simulations 01 450 2125
Full Throttle	£6.95	Micromega 01 223 7672/7904

# INTEREST FREE FINANCE!

OVER 12 or 24 MONTHS

ON THE

e.g.  
 IBM PC = £1988  
 ÷ 24 (months)  
 =  
 £82.83 per month

+

## OLIVETTI PC

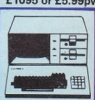
The totally IBM compatible M24. Full system with 128K - £1889

From From  
 £1795 or £9.99pw\* £1795 or £9.99pw\*

From From  
 £2195 or £11.99pw\*

The world's leading business computer - £1988

From From  
 £2195 or £11.99pw\* £1095 or £5.99pw\*



Macintosh apricot

**COMPAQ**  
 THE PORTABLE IBM  
 COMPATIBLE COMPUTER

**SIRIUS 1** **KAYPRO**



**OFFICE EFFICIENCY MACHINES, THE LONDON MICRO CENTRE**  
**OFFERS YOU TOTAL FLEXIBILITY AND SUPPORT INCLUDING: -**

- **PURCHASE - EX STOCK!** (volume purchase agreements available at competitive rates)
- **INTEREST FREE CREDIT** (arranged on most computers over £2000 )
- **TRADE IN ANY MICRO** against a new machine
- **TRAINING** (REGULAR COURSES ON IBM PC DISPLAYWRITER, LOTUS 123, INTRODUCTION TO MICRO'S, OPERATING SYSTEMS, SPREADSHEETS, DATABASES, WORDPROCESSING, etc ALSO ADVANCED MICRO COURSES)
- **BARGAINS** - CALL ON FRIDAYS FOR QUOTE ON 1 WEEK OLD SHOWROOM MODELS
- **RENTALS** (1 day to 2 years)
- **LEASING** (2 years to 6 years)
- **ON SITE MAINTENANCE**

Call in at our West London Showrooms to arrange a demonstration on—01-741 7381 or to place your order call our hotline on 01-748 8404



To: OFFICE EFFICIENCY MACHINES LTD.  
 150-152 King Street, Hammersmith,  
 London W.6. Tel. 741 7283/4/5/6

Please send me information/quote on

Please ask your sales staff to contact me  Urgent  
 I have a requirement for  1 system  2-9 systems  
 10 or more systems

I will be purchasing within  
 1 week  1 month  3 months or more

My budget is £ .....

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

Phone \_\_\_\_\_ Extension \_\_\_\_\_

\* Based on 5 years and subject to status & conditions

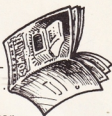
ONLY  
£3.50

# For sufferers of PCNitus THE PCN BINDER

Since March 1983, a mysterious malady  
has afflicted thousands of people in Britain—

PCNitus. The symptoms are perplexing . . .

Those afflicted are found fighting their  
way through piles of Personal Computer



News magazines  
muttering strange things like 'can't find  
the Electron Pro-Test' and 'The Spectrum  
Micropaedia must be here somewhere . . .'  
But a recent breakthrough has brought  
instant relief to PCNitus sufferers.

The cure is called the *Personal  
Computer News binder*. It's red,  
yellow and silver and holds four  
months' copies completely flat,  
even when full. You'll be able to  
read them easily and refer to  
them quickly.



So if you recognise the symptoms above — take the cure now!

Just fill in the coupon at the bottom of the page and send it with payment (£3.50 inc postage,  
VAT and handling) to the address below.

BINDER ORDER CARD. Please rush me \_\_\_\_\_ PCN binder(s) at £3.50 each. I enclosed my cheque made  
payable to Personal Computer News. Please charge my Access/Visa/Diners/American Express card (delete where  
not applicable)

Account No. .... Name .....

Address ..... Town ..... Postal code .....

..... Signed .....

Send to Personal Computer News, Binders Department, 53/55 Frith Street, London W1A 2HG



# OFFICE JEWEL

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

DataGen 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

DataGen 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 DataGen 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 DataGen 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 'DATAGEN' (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 DataGen.

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



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 formulae 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.

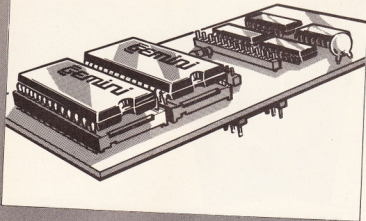
Perhaps it's not in the same league as products such as dBaseII — for instance, Datagem doesn't offer relational facilities. But it does provide many of the spreadsheet facilities of an item like Lotus 1-2-3, without the word processing.

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.



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.

### 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.

# ROCK BOTTOM PRICES *Cash & Carry* Top showroom service

PERSONAL CALLERS WELCOME AT OUR EXTENSIVE SHOWROOMS  
MOST EQUIPMENT ON DEMONSTRATION

## The UK's Best Printer Prices

### DAISYWHEEL LETTER QUALITY

Smith Corona 191 (SP or SI)	£189.00 + VAT	£217.35
Jan 6100 (P)	£265.00 + VAT	£306.25
EPSON DX3	£265.00 + VAT	£306.25
Brother HR15 (P)	£265.00 + VAT	£306.25

### PRINTER/TYEWRTERS

Brother 1520 Dot Matrix (SI)	£119.00 + VAT	£136.85
Brother EP24	£189.00 + VAT	£217.35
Silver Reed EX44 Daisy Wheel (SI)	£339.00 + VAT	£389.55

### DOT MATRIX PRINTERS

Brother HR5	£129.00 + VAT	£148.35
Canon 3080 A NLQ	£189.00 + VAT	£217.35
EPSON RX80 (P)	£189.00 + VAT	£217.35
EPSON RX80 T (P)	£189.00 + VAT	£217.35
EPSON PX80 (P)	£189.00 + VAT	£217.35
EPSON RX100 (P)	£189.00 + VAT	£217.35
EPSON RX100 T (P)	£189.00 + VAT	£217.35
EPSON LX100	£189.00 + VAT	£217.35
Sekosha CP100 (P)	£189.00 + VAT	£217.35
Sekosha CP100 (SI)	£189.00 + VAT	£217.35
Sekosha CP200 (P)	£189.00 + VAT	£217.35
Sekosha CP200 (SI)	£189.00 + VAT	£217.35
Sekosha CP300 (P)	£189.00 + VAT	£217.35
Sekosha CP300 (SI)	£189.00 + VAT	£217.35
Shiva CT30 (P)	£175.00 + VAT	£201.25
SP - Parallel Centronics (SI) - Serial RS232		

## INSTANT CREDIT Up to 36 months to pay

All items over £150 available on our easy credit terms.  
10% Deposit Plus 12, 24 or 36 Monthly Payments.  
Instant credit for personal callers subject to status,  
mail order service available. 16% interest  
rate (APR 32%). Written quotations on request.

## SUPERDISKS

LONDON'S LOWEST PRICES ON FLOPPY DISKS

Prices per box of ten ex VAT

	SSDD 40TR	DSDD 40TR	SS86TP1 80TR	DS86TP1 80TR
BASF 5 1/4"	£10.95	£18.20	£19.80	£22.50
SCOTCH 5 1/4"	£13.55	£19.50	£20.05	£24.00
VERBATIM 5 1/4"	£15.50	£23.50	£22.50	£30.50
DYSAN 5 1/4"	£16.80	£24.90	£24.90	£32.00
TDK 5 1/4"	£16.50	£24.50	—	£32.00
SONY 3 1/2"	£37.50	—	—	—

## CASH & CARRY COMPUTERS

3 Eden Walk, Precinct,  
Kingston-Upon-Thames, Surrey.  
Tel: 01-546 8974

### 12" MONITORS - GREEN SCREEN

Sony G112 Med Res	£55.00 + VAT	£74.75
Sony B112 High Res	£58.00 + VAT	£81.00

### 14" MONITORS - COLOUR

Commodore 1701 Composite/Sound	£173.00 + VAT	£198.95
Fidelity CM 14 RGB (Comp/Sound)	£179.00 + VAT	£205.85
Monolite 1431MS Norm Res RGB	£179.00 + VAT	£205.85
Monolite 1431MS for X Spectrum	£199.00 + VAT	£229.85
Monolite 1431MS Med Res RGB	£199.00 + VAT	£229.85
Monolite 1431MS High Res RGB	£279.00 + VAT	£320.85
Sony G125 Norm Res RGB	£173.00 + VAT	£198.95
Sony G117 Med Res RGB	£173.00 + VAT	£198.95
Sony G115 High Res RGB	£259.00 + VAT	£294.85

### Commodore

1541 DISK DRIVE including EASYSOFT W.P.	£173.97 + VAT	£199.95
800 Colour Printer	£169.97 + VAT	£195.95
800 Fractor Printer	£175.97 + VAT	£201.95
1550 Colour Printer/Plotter	£250.95 + VAT	£299.95
1517 Colour Monitor	£175.00 + VAT	£199.00
Simons Basic ROM	£39.00 + VAT	£45.95
Calcomp/W.P. Disk	£39.00 + VAT	£45.95
Neopart Computer Disk	£39.00 + VAT	£45.95
MSX4 Portable inc FREE Software and 801 Printer	£891.30 + VAT	£1,030.00

### Atari

800K 15K	£131.89 + VAT	£159.95
800K 5K	£139.95 + VAT	£169.95
1010 Colourset	£39.00 + VAT	£45.95
<b>RANCO MBC 555 Business Computer</b> 102K including Wordstar, Calcstar, Infostar	£899.00 + VAT	£1,034.00

### BBC

Disk Interface Kit	£71.29 + VAT	£81.95
Model B inc Disk I	£299.95 + VAT	£349.95
Cumana 1x200K DD CSK100	£195.00 + VAT	£224.95
Cumana 1x200K DD CSK200	£191.50 + VAT	£219.95
Cumana 2x200K DD inc PSU	£217.00 + VAT	£250.95
Cumana 2x200K DD inc PSU	£247.70 + VAT	£289.95
Cumana 2x400K DD inc PSU	£424.40 + VAT	£499.95

All above Cumana Disk Drives include Cable, Manual + form disk

Microvitec 14" RGB Monitor	£173.00 + VAT	£198.95
Wordstar 60 PROGRAM	£44.74 + VAT	£52.95
Torch 280 Disk Pack	£65.00 + VAT	£75.95
Acorn Electron	£187.70 + VAT	£219.95

### Siemens

Microdrive	£41.30 + VAT	£47.90
Wordcraft	£101.30 + VAT	£119.95
Spectrum 48K inc 2 FREE Games	£149.95 + VAT	£174.95
Alphazoom Printer	£48.95 + VAT	£58.95
Remington Printer II	£26.00 + VAT	£30.95
Remington Jintack II	£15.61 + VAT	£17.95
8K - 48K Upgrade	£21.70 + VAT	£24.95

## Mail Order + Export + Trade



Delivery by Securicor (3 day) please add £5.00 per item.  
Delivery by T.N.T. (overnight) please add £9.50 per item.

Send off the coupon or order by phone quoting your Access, Barclaycard No. Phone 01-686 6362. Immediate despatch on receipt of order or cheque clearance.

These prices correct until superseded by next advertisement.

To Cash & Carry Computers, FREE POST Croydon, CR9 9EB.  
Tel: 01-686 6362 Telex: 948240 Atn 19001335



Please supply

I enclose my cheque for £\_\_\_\_\_ including delivery by Securicor/T.N.T.\*

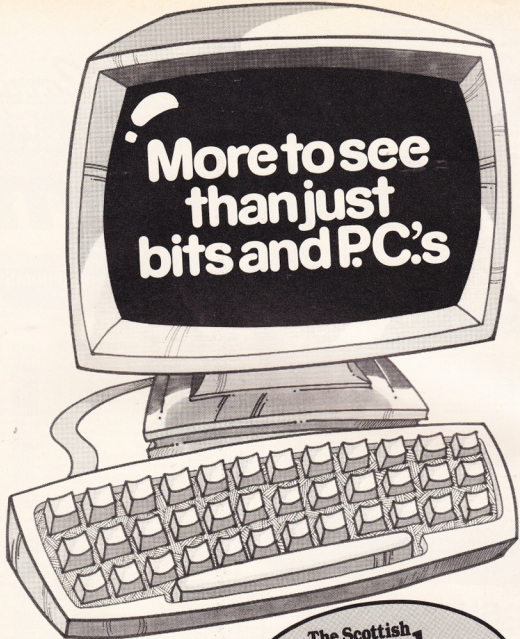
or charge my Access/Barclaycard No. \_\_\_\_\_

Name \_\_\_\_\_ Signature \_\_\_\_\_

Address \_\_\_\_\_

\*Please Delete

PCN 18/7



At this year's exhibition we'll have all the software and hardware you could possibly want to lay your hands on, whether you're a businessman or just a home enthusiast.

The Scottish  
**Personal  
Computer**  
World  
Show

OPENING TIMES: THURSDAY 26 JULY 09.30-20.00, FRIDAY 27 JULY 09.30-20.00,  
SATURDAY 28 JULY 09.30-17.00.

SEL 8a Charlotte Square Edinburgh 031-225 5486

Sponsored by:

**Personal  
Computer**  
World

Supported by



## ATARI

## Chop socky

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

Hayahhh! Taiiii! Weeeargh!  
 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 punch-  
 ing, 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 cham-  
 ber. Lanterns adorn the struc-  
 ture — 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 build-  
 ing to reach the lamps.

Before you can say 'Ah so!', a  
 menacing, black-garbed Ninja  
 comes racing in, brandishing  
 what the blurb technically de-  
 scribes 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 ballistic 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 Yamo-  
 mo kicks up a storm at Bruce's  
 anatomy. Built like a Sherman  
 tank, the Yamo 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 ex-  
 ploding '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

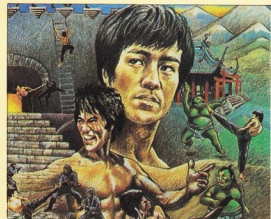
**RATING** (5)

**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** Re-  
 tailers.

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 com-  
 mands, 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 Doc-  
 tor Strange and Ant Man. The  
 adventure is overseen by a  
 narrator known as the Chief  
 Examiner.

## In play

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

Each location or develop-  
 ment is pictured — even the 'I'  
 (inventory) command brings  
 up a portrait of Banner or

Hulk with their current posses-  
 sions. 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 com-  
 mand-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 ob-  
 vious 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 Ban-  
 ner 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 adven-  
 tures 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 racy 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 Howard in jokes for a year. You take the role of the harassed 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 terradocktile egg before it hatches and takes a snipe at him. He's no spring chicken and the flagstones may crumble under his weight leav-

ing 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 Scargill's pickets.

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

**Classic Racing** (Oric1/Atmos) £7.95 Salamander, 17 Norfolk Road, Brighton O273 771942

**Pasta Blasta** (Oric 1 48K) £6.95 Arcadia, Freeport, Swansea SA3 4ZZ, 0792 403363, mail order or retail outlets.

**Them** (Oric 48K only), £5.95, Virgin Games, 61/63 Protobello Road, London W12 3DD 01-221 7535 mail order/retail outlets.

**Quack-A-Jack** (Oric 1 48K/Atmos) £7.50 Severn Software, 15 High Street, Lydney, Glos GL15 5DD, 0594 43352, mail order mainly.

**Blockbuster** (Oric 1 16/48K) £5.95, Dream Software, PO Box 64, Basingstoke RG21 2LB, 0256 25107 mail order/retail outlets.

# IKA ELECTRONICS

A SPECIAL OFFER FROM YOUR CASIO DEALER:  
BUY A CASIO SP200 AND GET A FREE  
SOFTWARE.

COMPETITIVE PRICES ARE OFFERED ON ALL  
CASIO OR PORTABLE COMPUTERS.

★ ★ ★

FP200 .....	£299 + VAT
FP 1011 PL (a mini plotter printer) .....	£209 + VAT
FP 201 (Rampack) .....	£39 + VAT
AD 4180 .....	£36 + VAT
FP 1084 (Extension lead) .....	£4 + VAT

ALL SOFTWARE FOR CASIO SP200 IN  
STOCK NOW. PHONE YOUR CASIO  
EXPERT FOR MORE DETAILS.

IKA ELECTRONICS  
324 HIGH ROAD  
LONDON N15

TEL:  
01-801 7752

# LOOKING FOR SOFTWARE?

WE HAVE BUILT A LIBRARY OF  
INFORMATION ON WHAT IS  
AVAILABLE

A PHONE CALL IS ALL IT WILL  
COST YOU TO GET SOMEONE  
ELSE TO COME UP WITH  
THE ANSWER

SOFTWARE INFORMATION  
**01-625 5404**



## HISOFT ULTRAKIT

### THE BASIC TOOLKIT

£9.45

#### FULLY MICRODRIVE COMPATIBLE

##### PROGRAM EDITING

- Block DELETE, MOVE, COPY, MERGE
- Advanced FIND & SUBSTITUTE (either global or single-shot)
- AUTO line generator
- EDIT specific line
- Full RENUMBER with line report
- Variables CASE-CHANGE

##### PROGRAM COMPACTION

- REMKILL with protection for m/c
- Statement PACKER
- 2 types of number CRUNCH routines
- Savings of up to 45% in program size possible with no change to execution logic (except that the program will run faster)

- Easy-to-use and fully interactive, works with all printers.
- Completely self-contained generating its own error-messages.
- Less than 7K in length (protecting UDG area) optionally reducible to less than 5K.

##### PROGRAM DEVELOPMENT

- Execution TRACE. Manual control over execution speed (down to 1 line/sec.). Single-step facility
- Complete ERROR and BREAK trap ON ERROR GOTO ON ERROR RESUME ON BREAK GOTO ON BREAK RESUME Can be set/reset independently
- List VARIABLES. Useful debug aid

##### EXTRA FEATURES

- Flexible ALARM CLOCK with independent control over clock time, alarm time & alarm on/off
- 10 USER-DEFINABLE KEYS (up to 256 bytes each)
- Full memory-map and display of selected system variables

PASCAL  
»£25«



HISOFT  
180 High Street North  
Dunstable, Beds. LU6 1AT  
Tel: 05821 696421



DEV PAC  
»£14«

# HOW TO BUY THE RIGHT PERIPHERAL FOR YOUR SPECTRUM!

The Spectrum Peripherals Guide by Ian Scales

**Maximise your Spectrum's potential**

The success of the Spectrum has spawned a bewildering array of competing products to enhance and expand the capabilities of the world's most popular micro.

This new paperback provides the data you need to cut your way through the jungle. Ian Scales explains the function and characteristics of each type of accessory available, giving you the

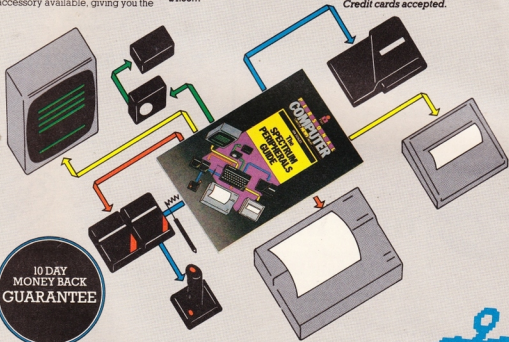
information needed to assess your requirements, evaluate the advertising claims and make an informed purchase decision.

Reviews of selected examples of each type of peripheral are included within this comprehensive guide to current products and suppliers.

**DON'T BUY A PERIPHERAL UNTIL YOU'VE READ THIS GUIDE - ONLY £4.95...**

Other books for your Sinclair ZX Spectrum in the Pan/PCN Library: 60 Programs for the ZX Spectrum (£5.95), Instant Arcade Games for the ZX Spectrum (£3.95), The Best Software Guide to Spectrum Games (£3.95). Available from your local computer book stockist or by returning the coupon below.

For immediate service or more information ring 01-200 0200 now. Credit cards accepted.



**10 DAY MONEY BACK GUARANTEE**

GET MORE OUT OF YOUR MICRO WITH...

## SPECTRUM BOOKS

POST NOW, NO STAMP NEEDED To: Pan Books Ltd, FREEPOST, PO Box 109, High Wycombe, Bucks HP10 8NP. YES, please send me the paperbacks indicated. I understand I may return them within 10 days if not fully satisfied and receive A FULL REFUND.

CUSTOMER CHECK LIST

- No of books Title
- The Spectrum Peripherals Guide @ £4.95
  - 60 Programs for the ZX Spectrum @ £5.95
  - Instant Arcade Games for the ZX Spectrum @ £3.95
  - The Best Software Guide to Spectrum Games @ £3.95

Postage and packing contribution: Please allow 35p for the first book ordered plus 15p for each additional book to a maximum charge of £1.25

Total

Amount

NAME (Mr/Mrs/Miss/Ms) \_\_\_\_\_

ADDRESS \_\_\_\_\_

POSTCODE \_\_\_\_\_

I enclose my cheque/postal order for £ \_\_\_\_\_ payable to Pan Books Ltd or debit my Access/Barclaycard/Visa/Trustcard Account no \_\_\_\_\_

Signature \_\_\_\_\_

Allow up to 15 days for delivery. This offer available within UK only.

Pan Books Ltd  
Registered in England  
Registration No. 389591

 **PERSONAL COMPUTER**  
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.

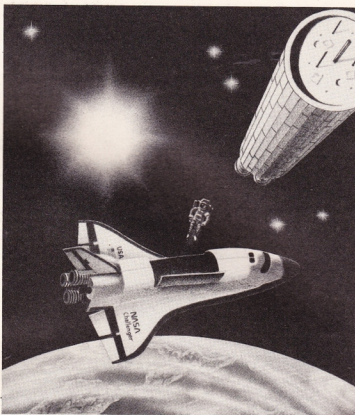
You are the pilot of the space shuttle Challenger. This is not an easy job and one of the many hazards is that when you release your satellite the computer malfunctions and sends it out of orbit. You must, of course, retrieve the satellite and to do this you put on your space suit and jetpack and leave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

```

SMODE7
10VDU23,224,12,22,38,62,12,22,110,30
20VDU23,225,0,0,0,0,0,1,1,1,1
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$224+CHR$
R8+CHR$10+CHR$225+CHR$11+CHR$8+CHR$10+C
HR$3+CHR$7+CHR$225+CHR$8+CHR$10+CHR$227
60MAN4=CHR$18+CHR$0+CHR$6+CHR$224+CHR$
R8+CHR$10+CHR$226+CHR$11+CHR$8+CHR$10+C
HR$0+CHR$7+CHR$225+CHR$8+CHR$10+CHR$227+
CHR$11
70VDU23,228,48,104,100,124,48,104,118
,128
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$228+CHR$
R8+CHR$10+CHR$230+CHR$11+CHR$8+CHR$10+C
HR$3+CHR$7+CHR$229+CHR$8+CHR$10+CHR$231
120VDU23,232,4,12,14,30,36,12,4,8
130VDU23,233,0,0,191,245,245,241,191,0
140VDU23,234,0,3,251,91,63,91,251,3
150REM**SHUTTLE***

```

```

3 160VDU23,235,0,196,224,240,120,63,63,6
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$237+CHR$
R8+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
270VDU23,255,255,255,255,255,255,2
55,255
430FORT=1TOS:PRINT'CHR$154CHR$(146+T)T
AB(5)"k k 7k k k k 7 7 7 7 'k7'"
440PRINTCHR$154CHR$(146+T)TAB(5)"j,n 5
j j j j 5 5 5 5"
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"

```

# Shuttle

## Program 2

- 10-150 Set up screen and sound envelopes and go to procedure 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 Defprocjoystick: Joystick routine
- 360-470 DEFPROCnewfuel: 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#FUEL100:MRUN:1
20#FX200,1
30#MODE7
40#PROCINSTRUCTIONS
50#A=1:B=1:ONERORPROCERR
60#VELOPE1,1,0,0,0,0,0,2,0,-10,-5,
120,0
70#VELOPE2,8,1,-1,1,1,1,1,121,-10,-5
,-2,120,120
80#PROCCHARS
90#FX19
100#FX21,1
110#PROCCHARS
120#MODE2
130#VDU28,0,31,19,27
140#PROCcolours
150#VDUS
160#PROCSTART
170#REPEAT
180#REPEAT
190#IFKEY% PROCKEY ELSE PROCJOY
200#PROCsoundONOFF
210#IF SATELITEX=FALSE:PROCSAT ELSE PRO
Cmovsat:BATX=X-32:BATY=Y-32:PROCceov
esat
220#PROCHECK
230#PROCSOUNDTRACK
240#IFAC<0 AND BC<0 AND ADVAL(-6)=0 AND
ADVAL(-7)=0#PROCSOUNDTRACK
250#IFA=0 AND B=0 RESTORE:A=1:B=1
260#UNTIL QX DRDEAD
270#IF QX=RND(10):WZ=RND(64)-RND(64):EX
=RND(32)-RND(32)
280#IFLX<0#PROCSCORE
290#UNTILFALSE
300#DEFPROCJOY:AZ=ADVAL(1)DIV256:A2Z=AD
VAL(0)AND3:THRUST=FALSE
310#IFAX<=50 ANDX%=(1210 DIR%#B)PROCMAN
:MAN3#=#MAN2#:PROCMAN:BX=42
320#IFAX>=205 ANDX%=#32 DIR%=#B)PROCMAN
:MAN3#=#MAN1#:PROCMAN:BX=23
330#IFA2Z=1:INCX=INCX+2:FUEL%=FUEL%-5:T
HRUST=TRUE:PROCFuel:IFINCX>=64INCX=#64 EL
SE PROCAN
340#PROCNEWFUEL
350#ENDPROC
360#DEFPROCNEWFUEL
370#INCX=INCX-1:IFINCX<=-32INCX=#-32
380#X=X+DIRX
390#IFX<=1210 ORX%=#32 DIR%=#0
400#Y=Y+INCY:IFY%>=200Y=#200:INCY=#0
410#IFTHRUST=TRUE PROCTRUST
420#PROCAN
430#FUEL%=FUEL%-1:PROCFuel
440#IFFUEL%<=0 PROCNAMEXPLODE
450#IFTHRUST=TRUE PROCTRUST
460#THRUST=FALSE
470#ENDPROC
480#DEFPROCKEY
490#IFINKEY#(186) ANDX%=(1210 DIR%#B)PR
OCMAN:MAN3#=#MAN2#:PROCMAN:BX=42
500#IFINKEY#(90) ANDX%=#32 DIR%=#B)PR
OCMAN:MAN3#=#MAN1#:PROCMAN:BX=23
510#IFINKEY#(97) INCX=INCX+2:FUEL%=FUEL
%-5:THRUST=TRUE:PROCFuel:IFINCX>=64INCX=#
64 ELSE PROCAN
520#PROCNEWFUEL
530#ENDPROC
540#DEFPROCAN
550#MOVEX,Y:PRINTMAN3#
560#ENDPROC
570#DEFPROCTRUST:GCOL3,1:MOVEX+BX,Y%-
40:VDU232:ENDPROC
580#ENDPROC
590#DEFPROCSAT
600#PROCmovesat
610#X=X-1:BATX%=BATX+W:BATY%=BATY+W
EX:IFBATX%>=64 W=ABS(W) ELSE IFBATX%>
=100 W=-W) ELSE IFBATY%>=90 E%=-(E%)
ELSE IFBATY%>=300 E%=ABS(E%)
620#PROCmovesat
630#ENDPROC
640#DEFPROCmovesat:VDU18,3,13,25,4,BATX
:1:BATY:233,234:ENDPROC
650#DEFPROCDEAD
660#LX=L-1:IFLX<=0 DEAD=TRUE
670#ENDPROC
680#DEFPROCHECK
690#X=POINT(X,Y):OX=POINT(X+64,Y):
IY=POINT(X+64,Y):UX=POINT(X,Y+60):KX
=POINT(X+64,Y-60):JY=POINT(SATX,SATY)
:HX=POINT(SATX+128,BATY):FY=POINT(SAT
X,SATY-32):GX=POINT(SATX+128,BATY+32)
)
700#X=POINT(SATX+64,SATY):H2=POINT(S
ATX+64,SATY-32)
710#IFJ%>12 OR H%>12 ORX%>12 ORY%>12 OR
M%>12 OR G%>12 PROCSATEXPLODE
720#IFFX%>12 OR OX%>12 ORKX%>12 ORLX%>12 OR
UX%>12 ORX%>12 PROCNAMEXPLODE
730#IFP%>13 OR OX%>13 ORLX%>13 ORU%>13 OR
K%>13 SATELITEX=TRUE:ENDPROC
740#IF SATELITEX=FALSE:ENDPROC ELSE IFP
%>8 OR OX%>8 ORLX%>8 ORU%>8 ORX%>8 PROCBOUN
US:CLS:PROCTART:ENDPROC
750#ENDPROC
760#DEFPROCSATEXPLODE:FORT=1:TORND(3):FO
RR=15:TOSTEP=1:OUNDS=-R,6,5:GCOL0,RND(1
5):VDU19,0,RND(15):0:MOVESATX+64,SATY
+16:MOVESATX+RND(64)-RND(64),BATY+RND(
32)-RND(32)
770#PLOT85,RND(1279),RND(1023):NEXT,VD
U19,0,0:0:0:PROCSATE:PROCTART:ENDPROC
780#DEFPROCCARDS
790#MAN1#=#CHR#1B+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#9+CHR#10+CHR#227
80#MAN4#=#CHR#1B+CHR#10+CHR#6+CHR#224+CH
R#8+CHR#10+CHR#226+CHR#11+CHR#8+CHR#18+C
HR#9+CHR#7+CHR#225+CHR#9+CHR#10+CHR#227+
CHR#11
810#MAN2#=#CHR#1B+CHR#3+CHR#6+CHR#226+CH
R#8+CHR#10+CHR#226+CHR#11+CHR#8+CHR#18+C
HR#3+CHR#7+CHR#229+CHR#9+CHR#10+CHR#231
820#SHUTTLE#=#CHR#235+CHR#236+CHR#237+CH
R#8+CHR#9+CHR#9+CHR#10+CHR#238+CHR#239+C
HR#240
830#ENDPROC
840#DEFPROCVAR
850#X=500:Y=500:INCX=0:DIRX=0:SHUTTLE
X=0:SHUTTLEYX=232
860#MAN3#=#MAN1#:SATELITEX=FALSE
870#DEAD=FALSE
880#FUEL%=440:LX=3:sc=0
890#ENDPROC
900#DEFPROCSTARS:GCOL0,15:FORT=0:TO50: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
920VDU19,9,610
930VDU19#B,710
940VDU19,15,1101
950VDU19,14,710119,5,7101
960VDU19,11,010119,13,4101
970ENDPROC
980DEFPROCSHUTTLE
990MOVESHUTTLEX%,SHUTTLEY%:GCOL3,B:PRINTSHUTTLE#
1000IFSHUTTLEX%>=1000:MOVESHUTTLEX%,SHUTTLEY%:GCOL3,0:PRINTSHUTTLE%:SHUTTLEX%<=0:PROCSHUTTLE
1010ENDPROC
1020DEFPROCSETATELITE:SATX%=SHUTTLEX%:MOVESHUTTLEX%+55,SHUTTLEY%:GCOL0,0:PRINTCHR#236
1030GCOL3,13
1040FORT=SHUTTLEY%TOSHUTTLEY%+RND(200)+300STEP8:SATX%=SATX%+RND(64)-RND(64):IFSATX%<=0SATX%=0 ELSE IF SATX%>=1000 SATX%=1000
1050FORR=1TO2:MOVESATX%,T:PRINTCHR#233:CHR#234:NEXT
1060SATY%=T:ENDPROC
1070DEFPROCMESSAGE(OX, #)
1080VDU4
1090CLS
1100COLOUR0%:PRINTTAB(0,2)A#
1110VDU5
1120ENDPROC
1130DEFPROCMINES
1140GCOL0,12
1150FORT=1TOLEVL%:MOVERND(670)+300,RND(900):VDU241:NEXT
1160ENDPROC
1170DEFPROCRAID0: SOUND1,-15,125,5:FORT=1TO100:NEXT: SOUND0,-4,4,255:ENDPROC
1180DEFPROC FUEL
1190MOVE10,1020: DRAW510,1020: DRAW510,980: DRAW10,980: DRAW10,1020
1200MOVE0,970: VDU243: MOVES00,970: VDU242
1210GCOL0,2
1220FORT=25TO440STEP16: MOVET,1020: PRINTCHR#244: NEXT
1230ENDPROC
1240DEFPROCfuel: GCOL2,0: MOVEFUELX,1020: PRINTCHR#244: ENDPROC
1250DEFPROCDEAD: GCOL0,0: L%L%-1: MOVE600,1020: PRINTSTRING#(4,CHR#255+CHR#8+CHR#10+CHR#255+CHR#11)
1260MOVE600,1020: PRINTSTRING#(L%,MAN4#)
FUELX=440: PROC FUEL: ENDPROC
1270DEFPROCSCORE
1280IFsc=1 A#="SATELITE" ELSE A#="SATELITES"
1290VDU22,7:FORT=2103:PRINTTAB(4,T)CHR#141CHR#136CHR#129"VDU RESCUE" :sc1CHR#1361A#:PRINTTAB(4,T)CHR#141CHR#136" On level" :CHR#136L%VX: NEXT
1300SOUND#11,0,0,0: SOUND#12,0,0,0: PROC ANFARE(1370,23)
1310IFKEY PROCKEYSTART: RUN: ELSE PROCJOYSTART
1320DEFPROCANFARE(X,2)
1330#FX21,5
1340#FX21,6
1350RESTORE X
1360FORT=1TO: READA,B,C,D: SOUND1,1,A,B#10: SOUND2,2,C,D#10: NEXT: FORT=1TO3000: NEXT: SOUND#12,0,0,1: SOUND#11,0,0,1
1370DATA#1,1,41,1,25,5,25,5,41,1,41,1,61,5,61,5,73,1,41,1,69,1,53,1,21,5,21,5,41,1,41,1,61,5,61,5,69,1,41,1
1380DATA#1,1,45,1,33,5,33,5,45,1,45,1,61,5,61,5,73,1,61,1
1390DATA#9,5,53,5,33,5,33,5,73,5,61,5,33,5,33,5,69,5,81,5,33,5,33,5,69,5,53,5,33,5,33,5

```

# 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=5T06:PRINTTAB(5,T)CHR#14:CHR#1
36CHR#129"INSTRUCTIONS (Y / N)":NEXT
1960A#GET#IFA#="N" THEN2120 ELSEIF A#
<>"Y" RUN
1970CLS
1980FORT=1T02:PRINTTAB(10,T)CHR#14:CHR#
129CHR#157CHR#135"SHUTTLE"CHR#156:NEXT
1990PRINT"" In this game you are an as
tronomer on the space - shuttle "CHR#13
6"CHALLENGER"CHR#137"."
2000PRINT"You release one of India's ne
w satellite but the main computer control
ing the satellite has malfunctioned and
has sent the satellite out of orbit. You
r job is to put on your experimental jetp
ack and retrieve the satellite."
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=1T02:PRINTTAB(13,T)CHR#14:CHR#
129CHR#157CHR#135"KEYS "CHR#156:NEXT
2060FORT=4T05:PRINTTAB(7,T)CHR#14:CHR#1
29CHR#136"Del. .... "CHR#137"Left":NEX
T
2070FORT=6T07:PRINTTAB(7,T)CHR#14:CHR#1
29CHR#136"COPY .... "CHR#137"Right":NE
XT
2080FORT=8T09:PRINTTAB(7,T)CHR#14:CHR#1
29CHR#136"TAB. .... "CHR#137"Thrust":N
```

```
EXT
2090FORT=11T012:PRINTTAB(6,T)CHR#14:CHR
#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"
2110REPEAT:UNTILGET#=""
2120CLS:PRINT""CHR#136"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"O"CHR#136CHR#129"to
switch sound on press"CHR#137CHR#131"S"
2140PRINT""CHR#136CHR#133"Press 'FIRE'
for JOYSTICKS"CHR#137CHR#134" OR:"CHR#1
36CHR#136CHR#132" "SPACE" for KEYBOARD"
2150PROCKEYORJOYSTICK
2160ENDPROC
2170DEFPROCKEYSTART
2180REPEAT:UNTIL INKEY(-99):ENDPROC
2190DEFPROCKEYSTART
2200REPEAT:UNTIL ADVAL(0) AND3:ENDPROC
2210DEFPROCKEYSTART
2220IF INKEY(-17) THEN#FX210,10
2230IF INKEY(-82) THEN#FX210
2240ENDPROC
2250DEFPROCKEYSTART
2260VDU2,7
2270VDU7,#FX15,0
2280PRINT""CHR#132:REPORT:PRINTCHR#135
"at line"CHR#129:ERL
2290END
```



## SANYO MBC 555

**SPECIAL OFFER!**

The software alone  
is worth £1,000

Only £795 (RRP £999) + VAT  
buys the ideal home and  
business computer.

**Our Package includes:-**

### Hardware

16 Bit 8088 CPU  
128K RAM  
Twin 5¼ 160k Floppy Disk Drives  
Parallel printer port  
Detached keyboard

### Software

MS-DOS  
Basic  
Wordstar  
Mailmerge  
Spellstar  
Calcstar  
Datastar  
Reportstar



Unparalleled value at this special offer price which also includes  
FREE DELIVERY anywhere in the U.K.

Hurry and take advantage of this Special Offer while stocks last.

**MAYFAIR MICROS TEL: 01-870 3255**

**Blenheim House, Podmore Road, London SW18 1AJ.**

**Commodore 64**, and C&N cassette, £75. Software, joystick, books and magazines. Cost over £340. Asking £190. Contact: S. Markides, 11 Jubilee Crescent, Gravesend, Kent DA12 4JG.

**Spectrum 48K**, Interface 1, Microdrive, ZX Printer, cassette, manuals, books, articles, programs, everything you need. Cost over £350, yours for £250. Tel: 01-986 1003.

**Vic 20 plus 16K**, tape deck, books, 70 games. All boxed and in v.g.c., cost £380, will accept £150. Tel: Wickford (03744) 2869 after 5pm.

**BBC-01.205** + ROM board + RX80/F/T + printer ROM + Disc Doctor + graphic ROM + Wordwise + disc interface + speed + games cassette. £100 + more, (950). Tel: 01-226 0590 before 6pm.

**Sinclair ZX Interface 2**, £14. Two books: 'Over the Spectrum' and '20 Programs for the ZX Spectrum 49'. Tel: Huntingdon 890223.

**Atari 1050** disk drive brand new boxed DOS 3 never used, up to 50 best disk games, £260. Rommie, 91 Highfield Ave., London. Tel: 01-203 4545.

**Olivetti** accounting computer, golf ball printer, three printing modes, suit program wizard, £350. Tel: Ray, Guildford 57817.

**NEC 8023** dot-matrix printer for sale with eight ribbons. BBC cable and cover, with ribbon £350. Tel: Bruce 049-481 4179, 7pm, £240 cash on.

**Tandy CDP 115**, four colour printer/brother, £110. Jupiter Ace, £30. Both boxed. Tel: Bruce 049-481 4179, 7pm, £240 cash on.

**Tandy CDP 115**, four colour printer/brother, £110. Jupiter Ace, £30. Both boxed. Tel: Bruce 049-481 4179, 7pm, £240 cash on.

**Wanted** interface and disc drives, also quality printer and business software for TRS 80 Mod 1 Level 2. Or complete system (other). Tel: 061-736 4158 after 6pm.

**Sharp MZ-80K** and MZ-801P printer. All manuals and cover. Also games and language software. Good condition. Offers around £400. Tel: Ipswich (0473) 684957, evenings.

**Texas TI-99-4A** £300. Tel: 0908 674646.

**Dragon 32**, immaculate condition, cassette recorder, 3 joysticks, speech synthesiser. Meteoroids cartridge, 20 cassette games, all boxed, worth £450. Sell for £180. Tel: (0325) 718387.

**Vic 20**, games for sale or to swap, etc. Chartres, Tower of Evil. All Hell Has Broken Loose. Tel: Harfield 512102, (after 4pm to 6pm).

**Oric-1**, 48K, complete with manuals, leads + includes £1100 worth s/w, as new, bargain, for quick sale, £135 on. Tel: (0603) 868887.

**SW Hi fi** for BBC B + peripherals hi fi, TD 150, turntable, Sharp U15 cart, TEAC A450 cassette, Crompton amp, Spencer SA2 minimonitors. Tel: 0685 841304.

**ZX 48K Spectrum** for sale, complete with cassette and 4 games, only 3 months old, still in box, £140 on. Brian 01-961 3421. (NW London) (anytime).

**Dragon 132**, joysticks, £200 + of software, disc cover, cassette recorder, loads of magazines and listings. Any offers. Telephone Thorne (0405) 814279, ask for Graham.

**Dasel** Lotus 123 Wordstar Multiplex Friday, all new unused very cheap. Tel: 01-788 6131.

**Oric 48K**, £70 of software, many books, cover, tape available if wanted. No loading problems, all as new, £100. Phone Harrogate 65270 after 5pm.

# Billboard

**Swap**, sell CBM 64 software. Many titles, including International Soccer, Falcon Patrol, and 40 others. Sell Acetrone Arcade system with 2 games. Offers accepted, worth about £90 new. Tel: Rusling 7588.

**Tandy DMP 100** printer with Kempston interface, cover. All leads, paper, as new, with Tasword Two word processor, £200 on. Phone Harrogate 65270 after 5pm.

**Oric** software for sale. Hobbit, Hunchback, Operation Gremlin plus many others at cheap prices. Phone Guildford 63504 for details (evenings).

**Spectrum 48K** DK-Tronics keyboard, Cambridge joystick cassette recorder, books, loads of software, games and utilities, £220 on. Tel: Formby (07048) 71751.

**For sale** Interface 2 + joystick + 4 ROM pieces, £35 the lot. Also many popular programs for sale at half price. Please ring for list. Phone Boleyn 716 after 7pm and ask for Tex. All above only for ZX Spectrum 16/48K computer.

**Oric 1 48K**, includes cassette deck, all leads, 2 games, introduction tape, manual, 4 months guarantee, £100 on. Tel: 01-221 8447 (after 7.00pm).

**Oric 1 48K** with 1 month old MCP 40 copier/over 60 games inc. ZX, Ultra, S-Dive, Hobbit, etc. Many books. New, cost over £400, bargain at £200. Tel: Wores, 0386 792500, evenings.

**Applied** monitor original as new, only £25, save £70. Delivered free Securitor guaranteed OK, or money back. Ring Lewland (07744) 23221 after 7.30pm.

**Intellivision** cartridges only £6.50 each, 18 different, inc. Lock-n-Chase, Tron, StarStrike, Astromash, Hockey, Sea Battle, D&D, Space Armada, Utopia, Golf, Tennis, Poker, Basketball. Tel: Pashy 561760.

**Gulf 600XL** + 1010 recorder, boxed as new, 5 months guarantee. Manuals + ZXsoft £175, or swap for 48K Spectrum with Microdrive. Tel: (0666) 52492.

**Spectrum 48K**, DK-Tronics keyboard, Interface 1, Microdrive, programmable joystick interface, and joystick. Cost over £330. Accept £210 on. Will split. Tel: Kiddersminster 744956.

**Oric 1**, 16K, Oric printer, cassette recorder, all leads inc. Also Mushroom, Mania and The Ultra. Sell for £210 on. Tel: 01-368 8468.

**Atari 800/500** software, Encounter, X Dimension Pengo, Moon Patrol, Jungle Hunt, Tennis, Rally Speedway, plus more from £2.50 each. Phone 01-908 51151 + 16K Ram, leads + powerpack, manual, books + magazines, software, green screen; total cost £125 - Selling for £60. Tel: 0604 493034 (after 5 o'clock). (Computer boxed).

**Oric 1 48K** + £150 software inc. Xenon 1, Probe 3, Zorgens Revenge, Hunchback Orionmash, Oric Card, Barrier Attack, Ultra Mushroom Mania, Draculas Revenge, Hobbit, £160 on. Tel: Pudsey 561760.

**Dragon 32**, ZX printer, joystick, £120 worth of games and utilities, books and mags. Great condition, printer new, £230 on. Tel: (0732) 359131 evenings.

**Spectrum 48K** with interface 1, Microdrive, Kempston joystick interface, joystick software, as new. Yours for £200. Phone Staines (81) 54803 after 7pm.

**TRS-80 Model 110k** computer with green screen monitor, and professional keyboard, lower case mod, some software, £150. Cassette recorder, £10. Tel: Farnborough (0252) 549515.

**Battle EP 25** computer with £300 roll thermal paper, suit C Centre/any RS232 computer, £130 on, including P.S.U. Phone 0632 328402/61629 office hours, 01-31-964.

**Oric 1 48K**, and Seiksha GPR80, or software, case and books, £250. Phone Gosport 520204 or SAE to Berks, 43 Milford Court, Galesmoor Avenue, Gosport PO12 27N.

**Intellivision** plus voice synthesis module, with 2 voice cartridges and 9 regular cartridges, worth £400 almost brand new, sell for £250 on. Phone 680 4878.

**Intellivision** Video Game (under guarantee) c/w voice module, 31 cartridges including 3 sound, bargain at £350, plus spent, also microcassette cartridges for sale. Tel: 01-764-4075.

**Wanted** BBC Model B with L1 Basic, 1.20S and Acorn DFS will consider without DFS. Telephone 0980 43020 (Tisbury, Hants) after 5pm.

**Club 64** is starting this summer, if you have a Commodore 64 write to: 1 Amisfield Road, Hipperholme, Halifax, W. Yorks. For latest details.

**Interface Sharp MZ80K** to Epson, complete with cables plus, and modified speed Basic for full character printing, £25. Tel: (0452) 29574.

**Spectrum** (Fuller FDS) computer, (£25 games including Mania Miner & Arcadia, £2.50 each). Joystick interface & utilities, will sell separately or all for £60. Tel: Desmond 01-266 8133.

**Atari VCS**, excellent condition, includes four games - Enduro, Battle Zone, Space Invaders, & River Raid, complete with original contents, only £50. Phone Desmond 286-8133.

**Electron** new, under guarantee, BBC cassette recorder, leads, several books, magazines, £180 on. Tel: 01-727 5202.

**ZX Spectrum** 48K with D.K. Tronics keyboard and ZX printer, cost £220, will accept £160 inclusive of large range of software. Tel: Casleford 513226 evenings.

**Tandy CDP 115** printer/plotter with pens, paper and disc cover, v.g. £100. Acornsoft Forth package £15. Cube Master cassette £3. Phone Mark, (07073) 35949.

**2 Microdrives** Interface 1, 2 cartridges with software, eg Mania Miner, all 2 weeks old, under guarantee, cost over £200, sell for £160, you can't lose out! Tel: Worthing Sussex (0803) 212988.

**BBC B**, 100K disc drive, DFS, Wordwise, Dredactor, ROMS, software including Database, Spellchecker, and Graphics, £550 on, owner emigrating to Canada. Tel: 04427 5518.

**Free Sharp MX-80K** when you buy over £300 worth of software for £275, includes lots of games + languages, editor/ assembler, monitor. Phone (0224) 642330.

**I Have** Hobbit to swap or Vallhalla, also lots of other software for CBM 64. Tel: 05694 623.

**Terch 780** card for BBC inc. software, manuals, etc. £225. Tandy 100/32K stats package, books, manuals, cassette, £115 printer, £700. Tel: 0204 694265.

**Spectrum** software originals Zeus assembler & book £6, Go to Jail (original). Spectrum as player £43. Tel: (0222) 59828.

**TI 99/4A** (nearly new), joystick, 3 modules including statistics, 2 cassettes, all leads including cassette player, boxed, worth £240 + sell for £150. Phone Leeds 688552.

**Oric 1 48K** computer, as used, still boxed. Perfect condition, £600! for quick sale. Tel: Rusling 33531.

**Commodore 64**, disk drive, 801 printer, CP/M, Easyfile, Easyprint, Practical, Simons Basic, complete usable £500, also Newbrain Adp. sell suitable cassette. Tel: Tel: Knowle 73955.

**Vic 20** cassette 16K Into to Basic Part 1, Vic 20 mags over £250 worth software worth £450, £450, £200 on. Tel: (0294) 56480.

**Atari 800XL** 64K, 1000 program recorder, joystick, manuals, £20+ programs, only £430, guaranteed 18 month offer, as new, £300. Tel: Gravesend 63642.

**ZX Spectrum 3AM** tape recorder; software including Amok, Arcadia; Books Programmer's Reference Guide, Vic Reference Guide, Learn Computer Programming, plus magazines, boxed with instructions, £75. Tel: 736 3268.

**MTX 500** 32K computer with software worth £300, manual leads etc, guarantee for 6 months cost, £310, sell for, £210, excellent condition. Tel: 027588 6601.

**Spectrum** (48K) ACF programmable joystick, £25. Time Controller and £165 software worth £360, to you only £200 all in. Ring 01-360-1493 after 5pm.

**TI99-4A**, boxed, leads, Ex Bas, Parsec, Blastoff, Rampus, Tombstone City, Personal Record Keeping, utility and games cassettes, manuals, books, £235 on. Phone 0303-44653 after 7pm.

**Oric 1 48K** Mod 20, complete with manuals, lots of software, all the best, RGB colour monitor, (needs attention), £440. Tel: Canterbury 710 435.

**TRS 80** Model 1 Lev. 2 48K, monitor, £150. £250 worth of software, word processing and other programs, manuals Home Business use, may split, £490 on. Tel: 0695-63299.

**Sharp MZ-100** unwanted gift, with tape recorder + over £75 worth of software, altogether worth, £360, to you £285. Tel: Parmar 01-552 0449 after 6pm.

**Commodore** printer 1515 (matrix), suit Vic 20/Commodore 64, £150 including 1000+ sheets of paper and delivery. Tel: 0900 826126.

**Oric 1 48K** + £154 Disk drive, £150, Simons Basic, £25. Loads of software, disk and tape, various books. Tel: Kevin 0294 2844 after 6pm.

**Spectravide** Quickshot joystick, excellent condition, boxed, £6.50. Software; Airc Atac, £3.50, 3D Tunnel, £3.50, Space Raiders, £2.50, VU-30, £16. Tel: Huntingdon 890223.

**Wanted** BBC B + disk, or Commodore 64 + disk & printer, Phone Daniel 01-346 5641.

**Texas TI-99-4A** new Nott's 99er's User's Group monthly newsletter. New membership forms. Further details from 75A Rossell Drive, Stapleford, Nottingham, NG9 7EG. Tel: 0602/399973

## Billboard Buy & Sell Form

To place your Billboard ad, fill in the form on the left, with one word per space, up to a maximum of 24 words. Send the completed form, together with a cheque or postal order for £1.50 made payable to VNU Business Publications, to: **Billboard, Personal Computer News, 62 Oxford Street, London W1A 2HG.** Note that we cannot guarantee that your ad appears in any specific issue, and that we cannot accept ads from commercial organisations of any sort.

Your name: .....

Address: .....

Telephone: .....

# MICROSHOP

Rates: £12 per single column cm. Minimum size 3cm. Series discount available. Also spot colour available. **Mechanical Data:** Column width, 1 column 57mm. 2 colours 118mm. 3 columns 179mm. **Copy Dates:** 10 days prior to publication.

Contact: Yvonne Charatynowicz

**NOW OPEN**  
 MU Games & Computers Ltd  
 HOME  
**COMPUTERS**  
 SOFTWARE & ACCESSORIES  
 COMMODORE DISKAGE, MEMORY, ACCESS & OTHERS  
 TRIVIAL BUSINESS, SIMULATOR, JUSTICE AND A  
 HOST OF OTHER PROGRAMS. HUGE RANGE OF  
 SOFTWARE CASES WITH VHS & TAPES INCLUDING ALL  
 THE LATEST RELEASES. VISIT US BEFORE YOU BUY!  
 245, HIGH ST  
**SLOUGH**  
 SLOUGH 21594  
 A member of the SPECTRUM group

**HOME COUNTIES AUCTION SALES**  
 (By order of The Receiver)  
**SALE BY TENDER**  
 OF  
**COMPUTERS, PRINTERS, ETC**  
 AT  
**THE SALEROOM**  
 65 GLENCOE ROAD,  
 BUSHEY, HERTS  
**Viewing: WEDNESDAY 25th JULY**  
**FROM 10-4pm**  
 Forms of Tender available  
 from the Auctioneer  
**Telephone enquiries: 01-950 9232**

**INCREDIBLE BARGAIN OFFER!**  
 IMPROVE THE QUALITY OF YOUR MICRO BY 100% WITH A COLOUR VIDEO COMPACTOR MONITOR that is perfect for most leading microprocessors including BBC, Commodore, Vic 20, Dragon, One and Alan (great telephone for details of other machines). Features include: a wide-angle audio and video channels, 1F screen, a remarkably compact size. Why pay hundreds of pounds for monitors when our re-manufactured monitors are only £99.00 + VAT. HURRY, as only 50 are initially available!  
 See telephone David at  
**HAYES TV RECONDITIONERS**  
 NOW ON 01-561 0562  
 Trade Enquiries welcome.

**BARGAIN OFFER**

Spectrum	Com 64	Com 64
"Sebré Will"	Beach Head	£8.95
Code Name Mat	Mario Miner	£7.50
Maggy	Chinese Juggler	£8.50
Thrusta	System 15000	£12.25
Mario Miner	"Vanilla"	£13.75
Night Gunner	Flight Path	£7.50
Free	Space Pilot	£7.50
3D Lunar Attack	Solo Flight	£13.50

**HARDWARE**

ZX Spectrum 48K	£129.00
Commodore 64	£185.00
IBM 1541 Disk Drive (+ Easy Script)	£195.00
Vic 20 (Starter Pack)	£135.00
ZX Spectrum Upgrade (Hired)**	£25.00
Quickshot 2 Joystick	£3.95
Joystick Interface (Kempston type)	£12.50
Joystick & Interface (logitech)	£22.00
Includes 4 1/2" disk on computers	
Software	Sub total
	Total

\*\*add £2.50 p&p if posted)

Plus many more for Spectrum, Com 64, BBC, One etc.  
 S.A.E. for full list of software (state computer)  
 Name Cheques and Postal Orders payable to  
**SOFT TRUCK, 12 BARTHOLOMEW FARM HILL, LONDON W9  
 01-263 2842**

**dgh software centre**  
 presents  
**Flight Simulator II**  
 for the Commodore 64  
 (as reviewed on pages 38 and 39)  
**£35.00** plus 50p (p&p)  
 10 North Street,  
 Ashford Kent.  
**Tel: 0233 32597**  
 ACCESS & VISA WELCOME  
 ALMOST 1,000 TITLES IN STOCK  
 FOR MOST POPULAR MICROS

**THOUGHTS & CROSSES**  
 37 MARKET STREET  
 HECKMONDWICK, WEST YORKS  
**Tel: 0924 402337**

BBC Model B	£339
BBC Model B (with DFS)	£469
Both with £50 worth of software and cassette recorder included free.	
SPECTRUM 48K	£125
COMMODORE 64	£199
MTX 512	£175
ELECTRON	£289

**DISK DRIVES**

PACE or CUMANA SINGLE	
100K S/S 40 Track	£149
200K D/S 40 Track	£173
400K D/S 80 Track	£215

**DOUBLE**

200K S/S 40 Track	£295
400K S/S 80 Track	£329
800K D/S 80 Track	£417
TORCH DISK PACK	£389
COMMODORE DISK DRIVE (with software package)	£210

**PRINTERS**

EPSON RX80	£269
EPSON RX80FT	£309
EPSON FX80	£389
EPSON MX100 III	£440
EPSON	FX100
EPSON DX100 D-wheel	£475
CANNON PW1060A	£305
CANNON QL RS232 (with interface)	£45
ORICO MCF45	£119
COMMODORE 1520	£95
COMMODORE MPS 801	£210

**BACK-UP TAPE COPIERS**  
 Unique machine code programs to allow security back-up copies of all the contents of your software. Available for:  
**COMMODORE 64 £5.95 ORIC £5.95**  
**VIC 20 £3.95 ATARI £5.95**  
 (All models)  
**SPECTRUM £5.95 BBC £5.95**  
**ELECTRON £5.95**  
 ALL WITH FULL INSTRUCTIONS  
 (Under Lock Key and Word List Discs)

**FAST TAPE UTILITY**  
**Commodore**  
 Commodore 64 expert, at just the long wait is over - FASTBACK converts your tapes to **TURNING LOAD** - creates fast loading copies of most programs (single- and multi-part) that run independently of the utility. For example, the model needs in 100 seconds what FASTBACK supplies in 10 minutes with full instructions. **ONLY £9.95**

**TAPE TO DISK TRANSFER UTILITIES**  
 Transfer games etc to disk. Supplied on tape with full instructions for BBC £9.95, Commodore £9.95, Atari/All models £9.95. **NEW IMPROVED VERSION** - No user knowledge required. **£9.95**  
 We guarantee this to be the best available.  
 All prices include VAT, Post & Packing. Cheques, P.O. or Phone your Card Number to:  
**EVESHAM MICRO CENTRE**  
 Bridge St, Evesham, Worcestershire, Tel: 0536 66441  
**THE MICRO CENTRE**  
 1758 Finchley Rd, Colindale, N. London, Tel: 020 4584  
 TRADE AND OVERSEAS ORDERS WELCOME.

**Software**  
**WANTED**  
**PERSONAL COMPUTERS**  
 all models bought for cash  
**Morgan Camera Company**  
 160 Tottenham Court Road,  
 London W1. Tel: 01-388 2562

**ATARI BACKUP CS.25:**  
**MAXI PRINTER (9 MODES) £5.50:**  
**FACT SHEET (PROGRAMMING TIPS) £1.**  
**GAMES EXCHANGE FACILITY (SAE)**  
**MIGHTY SPLASH LTD (PCN)**  
 123 ISLINGTON ROAD, WHITEHEAD,  
 CARRICKFERGUS,  
 CO. ANTRIM BT38 9NP.

**A Recording Datascop**  
 for £325-00???

If you have a Micro, contact:

**LOGIX**  
**TEL: 0535 55539**

**SPECTRUM KOPYCAT**  
 Simply the best. Copying any 160KB Spectrum program is as easy as 1-2-3 and saving you vast programs. Even embossed programs can now be backed up. **Only £4.95**  
 IT CAN EVEN COPY ITSELF  
 NEW  
**MICRODRIVE KOPYCAT**  
 Transfer your cassette-based software onto the 2.8 Megabyte MICRODRIVE programs. Shops & reveals programs ESSENTIAL for 810 Storage. **Only £4.95**  
 FREE Header Reader Despatched by Return of Post.  
**MEDSOFT**  
 PO Box 84, Basinstoke, Hants

**DISKS (Wabash)**

SS SD 40 Track	10 for £17
SS DD 40 Track	10 for £20
DS DD 40 Track	10 for £22
DS DD 80 Track	10 for £28
3" MAXELL CP2	each £4.50
MAXELL 3 1/2"	Sonyl each £4.50
	£50+ — 10% discount
	£100+ — 15% discount

**All prices include VAT & carriage**  
**Special terms for export orders**  
 Phone or write for details, quoting PCW

## MODULAR MICROCOMPUTER CONSOLES FOR SCHOOLS, HOMES AND OFFICES

Just 2 examples of our extensive range of consoles. This system is easily adapted to suit your personal requirement and can be readily expanded upon. The consoles support your TV/monitor safely above your micro and provide safe storage for disk drives, cassette recorder, books etc. The sturdy, well designed, mild steel construction also enables your micro to be stored safely underneath when not in use.

All consoles are formed with double bends to provide a completely safe edge to the front and rear whilst the bottom edge has rubber trim for safe use on desks etc. Attractive textured finish in either black or BBC colour match. Whilst these consoles are designed for the BBC micro they lend themselves perfectly to a variety of other models.

Write or phone for full colour brochure including dimensions and price list.



From £19.75 + VAT

TRADE EDUCATIONAL ENQUIRIES WELCOME. DISCOUNTS AVAILABLE

### J & W BUNCE

Thorpe Industrial Estate, Unit 3, Crabtree Road,  
Thorpe, Egham, Surrey TW20 8RN.  
Egham (0784) 33555

## COMPUTER LINK

COMPUTER LINK				NO. UNPACKED IN EACH BOX (SEE PACKAGING DETAILS)				BBC B CONNECTORS			
Card	(Type)	2 Year	3 Year	2 Year	3 Year	2 Year	3 Year	2 Year	3 Year	2 Year	3 Year
10-way	Edge PCB	£20.00	£22.00	10-way	Height	£15.00	£17.00	10-way	£20.00	£22.00	£24.00
10-way	£19.00	£21.00	£23.00	10-way	£15.00	£17.00	£19.00	10-way	£20.00	£22.00	£24.00
10-way	£18.00	£20.00	£22.00	10-way	£14.00	£16.00	£18.00	10-way	£19.00	£21.00	£23.00
10-way	£17.00	£19.00	£21.00	10-way	£13.00	£15.00	£17.00	10-way	£18.00	£20.00	£22.00
10-way	£16.00	£18.00	£20.00	10-way	£12.00	£14.00	£16.00	10-way	£17.00	£19.00	£21.00
10-way	£15.00	£17.00	£19.00	10-way	£11.00	£13.00	£15.00	10-way	£16.00	£18.00	£20.00
10-way	£14.00	£16.00	£18.00	10-way	£10.00	£12.00	£14.00	10-way	£15.00	£17.00	£19.00
10-way	£13.00	£15.00	£17.00	10-way	£9.00	£11.00	£13.00	10-way	£14.00	£16.00	£18.00
10-way	£12.00	£14.00	£16.00	10-way	£8.00	£10.00	£12.00	10-way	£13.00	£15.00	£17.00
10-way	£11.00	£13.00	£15.00	10-way	£7.00	£9.00	£11.00	10-way	£12.00	£14.00	£16.00
10-way	£10.00	£12.00	£14.00	10-way	£6.00	£8.00	£10.00	10-way	£11.00	£13.00	£15.00
10-way	£9.00	£11.00	£13.00	10-way	£5.00	£7.00	£9.00	10-way	£10.00	£12.00	£14.00
10-way	£8.00	£10.00	£12.00	10-way	£4.00	£6.00	£8.00	10-way	£9.00	£11.00	£13.00
10-way	£7.00	£9.00	£11.00	10-way	£3.00	£5.00	£7.00	10-way	£8.00	£10.00	£12.00
10-way	£6.00	£8.00	£10.00	10-way	£2.00	£4.00	£6.00	10-way	£7.00	£9.00	£11.00
10-way	£5.00	£7.00	£9.00	10-way	£1.00	£3.00	£5.00	10-way	£6.00	£8.00	£10.00
10-way	£4.00	£6.00	£8.00	10-way	£0.50	£2.00	£4.00	10-way	£5.00	£7.00	£9.00
10-way	£3.00	£5.00	£7.00	10-way	£0.25	£1.00	£2.00	10-way	£4.00	£6.00	£8.00
10-way	£2.00	£4.00	£6.00	10-way	£0.10	£0.50	£1.00	10-way	£3.00	£5.00	£7.00
10-way	£1.00	£3.00	£5.00	10-way	£0.05	£0.25	£0.50	10-way	£2.00	£4.00	£6.00
10-way	£0.50	£2.00	£4.00	10-way	£0.02	£0.10	£0.25	10-way	£1.00	£3.00	£5.00
10-way	£0.25	£1.00	£2.00	10-way	£0.01	£0.05	£0.10	10-way	£0.50	£2.00	£4.00
10-way	£0.10	£0.50	£1.00	10-way	£0.005	£0.02	£0.05	10-way	£0.25	£1.00	£2.00
10-way	£0.05	£0.25	£0.50	10-way	£0.002	£0.01	£0.02	10-way	£0.10	£0.50	£1.00
10-way	£0.02	£0.10	£0.25	10-way	£0.001	£0.005	£0.01	10-way	£0.05	£0.25	£0.50
10-way	£0.01	£0.05	£0.10	10-way	£0.0005	£0.002	£0.005	10-way	£0.02	£0.10	£0.25
10-way	£0.005	£0.02	£0.05	10-way	£0.0002	£0.001	£0.002	10-way	£0.01	£0.05	£0.10
10-way	£0.002	£0.01	£0.02	10-way	£0.0001	£0.0005	£0.001	10-way	£0.005	£0.02	£0.05
10-way	£0.001	£0.005	£0.01	10-way	£0.00005	£0.0002	£0.0005	10-way	£0.002	£0.01	£0.02
10-way	£0.0005	£0.002	£0.005	10-way	£0.00002	£0.0001	£0.0002	10-way	£0.001	£0.005	£0.01
10-way	£0.0002	£0.001	£0.002	10-way	£0.00001	£0.00005	£0.0001	10-way	£0.0005	£0.002	£0.005
10-way	£0.0001	£0.0005	£0.001	10-way	£0.000005	£0.00002	£0.00005	10-way	£0.0002	£0.001	£0.002
10-way	£0.00005	£0.0002	£0.0005	10-way	£0.000002	£0.00001	£0.00002	10-way	£0.0001	£0.0005	£0.001
10-way	£0.00002	£0.0001	£0.0002	10-way	£0.000001	£0.000005	£0.00001	10-way	£0.00005	£0.0002	£0.0005
10-way	£0.00001	£0.00005	£0.0001	10-way	£0.0000005	£0.000002	£0.000005	10-way	£0.00002	£0.0001	£0.0002
10-way	£0.000005	£0.00002	£0.00005	10-way	£0.0000002	£0.000001	£0.000002	10-way	£0.00001	£0.00005	£0.0001
10-way	£0.000002	£0.00001	£0.00002	10-way	£0.0000001	£0.0000005	£0.000001	10-way	£0.000005	£0.00002	£0.00005
10-way	£0.000001	£0.000005	£0.00001	10-way	£0.00000005	£0.0000002	£0.0000005	10-way	£0.000002	£0.00001	£0.00002
10-way	£0.0000005	£0.000002	£0.000005	10-way	£0.00000002	£0.0000001	£0.0000002	10-way	£0.000001	£0.000005	£0.00001
10-way	£0.0000002	£0.000001	£0.000002	10-way	£0.00000001	£0.00000005	£0.0000002	10-way	£0.0000005	£0.000002	£0.000005
10-way	£0.0000001	£0.0000005	£0.000001	10-way	£0.000000005	£0.00000002	£0.00000005	10-way	£0.0000002	£0.000001	£0.000002
10-way	£0.00000005	£0.0000002	£0.0000005	10-way	£0.000000002	£0.00000001	£0.00000002	10-way	£0.0000001	£0.0000005	£0.000001
10-way	£0.00000002	£0.0000001	£0.0000002	10-way	£0.000000001	£0.000000005	£0.00000002	10-way	£0.00000005	£0.0000002	£0.0000005
10-way	£0.00000001	£0.00000005	£0.0000001	10-way	£0.0000000005	£0.000000002	£0.000000005	10-way	£0.00000002	£0.0000001	£0.0000002
10-way	£0.000000005	£0.00000002	£0.00000005	10-way	£0.0000000002	£0.000000001	£0.000000002	10-way	£0.00000001	£0.00000005	£0.0000001
10-way	£0.000000002	£0.00000001	£0.00000002	10-way	£0.0000000001	£0.0000000005	£0.000000002	10-way	£0.000000005	£0.00000002	£0.00000005
10-way	£0.000000001	£0.000000005	£0.00000001	10-way	£0.00000000005	£0.0000000002	£0.0000000005	10-way	£0.000000002	£0.00000001	£0.00000002
10-way	£0.0000000005	£0.000000002	£0.000000005	10-way	£0.00000000002	£0.0000000001	£0.0000000005	10-way	£0.000000001	£0.000000005	£0.00000001
10-way	£0.0000000002	£0.000000001	£0.000000002	10-way	£0.00000000001	£0.00000000005	£0.0000000002	10-way	£0.0000000005	£0.000000002	£0.000000005
10-way	£0.0000000001	£0.0000000005	£0.000000001	10-way	£0.000000000005	£0.00000000002	£0.00000000005	10-way	£0.0000000002	£0.000000001	£0.000000002
10-way	£0.00000000005	£0.0000000002	£0.0000000005	10-way	£0.000000000002	£0.00000000001	£0.00000000005	10-way	£0.0000000001	£0.0000000005	£0.000000001
10-way	£0.00000000002	£0.0000000001	£0.0000000002	10-way	£0.000000000001	£0.000000000005	£0.00000000002	10-way	£0.00000000005	£0.0000000002	£0.0000000005
10-way	£0.00000000001	£0.00000000005	£0.0000000001	10-way	£0.0000000000005	£0.000000000002	£0.000000000005	10-way	£0.00000000002	£0.0000000001	£0.0000000002
10-way	£0.000000000005	£0.00000000002	£0.00000000005	10-way	£0.0000000000002	£0.000000000001	£0.000000000005	10-way	£0.00000000001	£0.00000000005	£0.0000000001
10-way	£0.000000000002	£0.00000000001	£0.00000000002	10-way	£0.0000000000001	£0.0000000000005	£0.000000000002	10-way	£0.000000000005	£0.00000000002	£0.00000000005
10-way	£0.000000000001	£0.000000000005	£0.00000000001	10-way	£0.00000000000005	£0.0000000000002	£0.0000000000005	10-way	£0.000000000002	£0.00000000001	£0.00000000002
10-way	£0.0000000000005	£0.000000000002	£0.000000000005	10-way	£0.00000000000002	£0.0000000000001	£0.0000000000005	10-way	£0.000000000001	£0.000000000005	£0.00000000001
10-way	£0.0000000000002	£0.000000000001	£0.000000000002	10-way	£0.00000000000001	£0.00000000000005	£0.0000000000002	10-way	£0.0000000000005	£0.000000000002	£0.000000000005
10-way	£0.0000000000001	£0.0000000000005	£0.000000000001	10-way	£0.000000000000005	£0.00000000000002	£0.00000000000005	10-way	£0.0000000000002	£0.000000000001	£0.000000000002
10-way	£0.00000000000005	£0.0000000000002	£0.0000000000005	10-way	£0.000000000000002	£0.00000000000001	£0.00000000000005	10-way	£0.0000000000001	£0.0000000000005	£0.000000000001
10-way	£0.00000000000002	£0.0000000000001	£0.0000000000002	10-way	£0.000000000000001	£0.000000000000005	£0.00000000000002	10-way	£0.00000000000005	£0.0000000000002	£0.0000000000005
10-way	£0.00000000000001	£0.00000000000005	£0.0000000000001	10-way	£0.0000000000000005	£0.000000000000002	£0.000000000000005	10-way	£0.00000000000002	£0.0000000000001	£0.0000000000002
10-way	£0.000000000000005	£0.00000000000002	£0.00000000000005	10-way	£0.0000000000000002	£0.000000000000001	£0.000000000000005	10-way	£0.00000000000001	£0.00000000000005	£0.0000000000001
10-way	£0.000000000000002	£0.00000000000001	£0.00000000000002	10-way	£0.0000000000000001	£0.0000000000000005	£0.000000000000002	10-way	£0.000000000000005	£0.00000000000002	£0.00000000000005
10-way	£0.000000000000001	£0.000000000000005	£0.00000000000001	10-way	£0.00000000000000005	£0.0000000000000002	£0.0000000000000005	10-way	£0.000000000000002	£0.00000000000001	£0.00000000000002
10-way	£0.0000000000000005	£0.000000000000002	£0.000000000000005	10-way	£0.00000000000000002	£0.0000000000000001	£0.0000000000000005	10-way	£0.000000000000001	£0.000000000000005	£0.00000000000001
10-way	£0.0000000000000002	£0.000000000000001	£0.000000000000002	10-way	£0.00000000000000001	£0.00000000000000005					

Copies of Issues 1 to 12 are still available from our Back Issues Department (see order form on next page). For details of their contents please call Gina Setchfield on 01-439 4242.

**Issue 13, June 3-9**

**Pro-Tests:** Teletext for Dragon 32, Abstracts Forth for Spectrum, GFS graphics processing system for Apple II+, joystick, rulers, Ajile. **Features:** Dragon meets Tandy. Onix music part 2, transferring Basic for Colour Genie and Genie

**Gameplay:** Everest Ascent (Spectrum), Colour Genie round-up, Micro-Mane (Jupiter Ace), Qix (Atari). **Program Cards:** Cupid (Oric), Alan (Dragon 32), Time Bomb (Atari). **Databases:** peripherals.

**Issue 14, June 16-19**  
**Pro-Tests:** Apple Accelerator II board, Mosbla-2 (Apple II), Onix music, Jostoff Control Unit 36, Kempston Centronics Interface, BBC Speech Synthesiser.

**Features:** Newbrain Basic part 1, Sirius designing. **Gameplay:** Ark Diddums (Spectrum), Monopole (Commodore 64), Autometriop (Spectrum), Dragon dramas. **Program Cards:** Time Bomb (Atari), com), Sheep Drive (BBC B). **Databases:** Software. **Microspedia:** Spectrum, Part 1

**Issue 15, June 16-June 22**

**Pro-Test:** Coma 35, Address Manager (Spectrum), Syms (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), Val tunes, Star Jammer (Dragon 32), Program Cards: Mover (BBC B), Space Click (Commodore 64), Pirate Island (Atari, 3 of 9), Miasma (Colour Genie), Brickbat (Dragon 32). **Databases:** Hardware. **Microspedia:** Spectrum, part 2.

**Issue 16, June 23-June 29**

**Pro-Tests:** Atari 1, Acorn, word processing for the Commodore 64, Simplefile (CP/M), MFF-II printer, Z80 Pack for BBC. **Features:** ZX81 Marks, US mail order, Atari graphics.

**Gameplay:** Computer Scible (Spectrum), Education (BBC), Horace and Spiders (Spectrum), Catcha Snatcha (Vic). **Program Cards:** Video Tiler (TT994/4), Video Tiler (TT994/4), 3 of 6, Bowling (Spectrum), Pirate Island (Atari) com. **Microspedia:** Spectrum, part 3.



**Issue 17, June 30-July 6**  
**Pro-Tests:** Duet-16, The Organizer (CP/M), Trax and ZX Text (Spectrum), Jaki-G10/dayweek, Video Ultra Term (Apple II). **Features:** Leaving part 1, Atari screen action. **Gameplay:** Oric chess, Grand Master (Commodore 64), Escape from Onix (BBC), Jet Pac (Spectrum), The Ring of Darkness (Dragon 32), Spectrum spectacle.

# PERSONAL COMPUTERS

**Pro-Tests:** Video Tiler (TT994/4) com), Pirate Island (Atari) com), Word processor (BBC). **Microspedia:** Sound, part 1.

**Issue 18, July 7-13**  
**Pro-Tests:** Tandy 300, HS322 interface (ZX81), ROM pager (Commodore 64), Interface printer buffer, IBM Personal Basic Spectrum assembler, Newbrain WP. **Features:** Leaving Part 2, Lynx music. **Gameplay:** Spectrum Backgammon, BBC Snooker, Commodore 64 round-up, Serpentine (Vic 20), Post (Spectrum), Spectrum Safari. **Program Cards:** Word Processor (BBC), Fruit Machine (Spectrum). **Microspedia:** Sound Part 2.

**Issue 19, July 14-20**  
**Pro-Tests:** 16-bit chips, Stock control (Epson HX20), Malplan (Techar), Smith-Corona day-week, ZX81 word processing. **Features:** Insurance, hatching, dhand. **Gameplay:** Escape MCP (Commodore 64), Fish from Paraly (Atari), Ape (Atari), Temple of Apath (C64), Airline (Spectrum), Health-90 (BBC). **Program Cards:** Colour Code (Atari), Wreck (Dragon). **Microspedia:** Sound, part 3.



**Issue 20, July 21-27**  
**Pro-Tests:** Ace hardware, Vide digital tape drive, Seikosha colour printer, Toolkit (Spectrum), Bonus (Epson), Newbrain monitor. **Features:** Computer art, Dragon scrolling. **Gameplay:** Rabbit Trail (TT994/4), Aztec Challenge (Atari, Vic 20, TT994/4), BBC round-up, Joust (Spectrum), Motor Mail (Spectrum), Print Shop (Spectrum), Time-Lords (BBC). **Program Cards:** Jambler (Oric), Wreck (Dragon), Atari Errors, Speed Race (Vic 20). **Microspedia:** 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), Jamjam (64), Jumping Jack (Spectrum), Fourth Element (Vic), Cyclone (BBC). **Program Cards:** Collector (Vic), Bomber (64), Definer (BBC). **Microspedia:** Sound, part 5.

**Issue 22, August 4-August 10**  
**Pro-Tests:** Spectrum Forth, BBC graphics, Music synthesiser, IBM plotter, Brother dayweek, Mailbox keyboard, Magic. **Features:** Genie assembler, Dragon machine code. **Gameplay:** Rivers Rescue, Kroc Attack (Atari), Zork (64), Kroc 3D, 3D Comba Zone (Spectrum), Maura (Oric), Veltor's Lair (Spectrum). **Microspedia:** CP/M part 2.

**Issue 23, August 11-August 17**  
**Pro-Tests:** Nord Basic-G, Tansword, BBC graphics, Microdrive, Tandy Model 4. **Gameplay:** Dragon machine code, Atari controller. **Gameplay:** Bridge Master, Styx, Mantic Miner (Spectrum), Atari River Canyon, Fliss-Hangman (Oric), Everset (Dragon). **Microspedia:** CP/M, part 2.



**Issue 24, August 18-August 24**  
**Pro-Tests:** T Maker III, Spectrum Fifth, dayweek surveyed, Spectrum digital tracer, Laser. **Features:** Videotext, Dragon machine code. **Gameplay:** Onix round-up, Cooke, Egg Farm, Nadon (Spectrum), Sea Lord (BBC), Lusitanic (Dragon), The Island (64). **Microspedia:** Commodore 64, part 1.



**Issue 25, August 25-August 31**  
**Pro-Tests:** Election, Simons Basic, Oric monitor, Microdrive. **Features:** Newbrain map, Acorn Atom, Dragon machine code, ZX81 warranty, Newbrain monitor, Daktilo, Trans Am (Spectrum), Dragon round-up, Jigger (Oric), Fragar (IBM). **Microspedia:** Commodore 64.

**Issue 26, September 1-September 7**  
**Pro-Tests:** Microstat 65, BC PL, BBC tracer, 80 column Pet, Oric interfaces. **Gameplay:** Magic Mountain, Smugglers Cove (Spectrum), Spectrum round-up, Matrix (64), Ninja Warrior (Dragon), Dallas, (Oric), Call to Arms (IBM). **Microspedia:** Commodore 64.

**Issue 27, September 8-September 14**  
**Pro-Tests:** Sharp MZ700, BBC Log, Apple editor, IBM misc, ZX81 warranty. **Gameplay:** Zap-Zap, Zoom (Spectrum), Spectrum round-up, Hoover Bover, Bemp-Space Rescue (64). **Microspedia:** Dragon, part 1.

**Issue 28, September 15-September 21**  
**Pro-Tests:** Zenith Z100, Snail Logo, Atari Supergraphics, Newbrain CP/M, IBM misc. **Gameplay:** The Witness, Super Scramble, Six (64), Haurer Attack (Oric), Morocco Grand Prix (Dragon), Phoenix's Tomb (Spectrum). **Microspedia:** Dragon, part 2.

**Issue 29, September 22-September 28**  
**Pro-Tests:** Portico Miracle, Dragon editor, BBC toolbar, Dragon drives, Apple light pen. **Features:** HX20 disassembles, TI transformations. **Gameplay:** Grudler, Glooper, California Gold Bank (64), One round-up, Bomb Affs (BBC), Split, General Election (Spectrum). **Microspedia:** Dragon, part 3.

**Pro-Test:** NEC's Advanced Personal Computer, Financial Printer (a.k.a. Kingman's a.k.a. Coun-About His Dog Speller (Spectrum), Pinus VT5000, Extended (Dragon). **Features:** Spectrum machine code. **Gameplay:** Halo's Death-Sword of Fantasy (64), T47 Flight Simulator (BBC), Dragonfly (Dragon 32), Forensic-Note Invaders (BBC), Forensic-Track (ZX81), Compu-Port (Oric). **Databases:** Hardware. **Microspedia:** Everything you wanted to know about programming, part 1. **Chalset:** Clubs.



**Issue 30, October 6-October 12**  
**Pro-Tests:** Atari 6801X, Condar Series 20 (IBM), Acacia Non-volatile Diary-Filing system (BBC), ROM extension board (BBC). **Features:** Oric sound routines. **Gameplay:** Gneedy Gub (Spectrum), Kong (Spectrum), Crayn Kong (64), Cuthbert Goes Walkabout-Movie Producer (Dragon). **Programs:** Composer (Oric), 555 (Spectrum), Anagrams (Dragon). **Databases:** Peripherals. **Microspedia:** Everything you want to know about programming. **Chalset:** User Groups.

**Issue 32, October 13-October 19**  
**Pro-Tests:** Matrix Computer Adaptor (Intellivision), Sprite-Gun (BBC), Using Strategy (Apple), MCode 2 (Spectrum), Catch (Epson Programmer) (Apple). **Features:** Telefont options, Inside the Genie. **Gameplay:** Space Shuttle Frogger (Dragon 32), Atari round-up, Spectrum 2 Football Pools (Program). **Databases:** Software. **Chalset:** Clubs. **Programs:** Bees Away (BBC), Composer (Oric). **Microspedia:** Everything you wanted to know about programming, part 3.



**Issue 33, October 20-October 26**  
**Pro-Tests:** CWP's Contest, Sinclair ZX Interface 2, Watford DFS (BBC), Wordsworth (BBC) Animator. **Features:** Oric Operating System. **Gameplay:** Dragon round-up, Haurer Attack, Crickets Lane (Oric) (Spectrum), 3 Deep-Space (BBC). **Program Cards:** Key, Utility (Spectrum), Bees Away (BBC), French Test Card (Apple). **Microspedia:** Everything you wanted to know about programming, part 4.

**Issue 34, October 27-November 2**  
**Pro-Tests:** NEC's PC-6201A, Simply File (64), The Forest (Spectrum), Amosm DFS (BBC), Curial Microspeech (Spectrum). **Features:** Oric Machine Code. **Gameplay:** For - Apocalypse/Pool (Atari), Death-Crusher/Ching (Dragon), Trench-Canyon (BBC), Football Manager/Pool (Spectrum). **Programs:** French Test (Apple), Babyfist (ZX81), Death-Crusher/MonArth (Vic 20), Rite-Hug (BBC).

**Databases:** Hardware. **Microspedia:** Everything you wanted to know about programming, part 5.

**Issue 35, November 3-November 9**  
**Pro-Tests:** Keyprio 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 round-up, Slinky (Atari), Heper (BBC). **Programs:** Mini Math (Spectrum), Multi-Square (Oric). **Databases:** Peripherals. **Microspedia:** Everything you wanted to know about programming, part 6.

**Issue 36, November 16-November 22**  
**Pro-Tests:** Tiger from H1H, ZX81-Fort, Exton (Oric), Cycle Planner (Spectrum), Tracker-Diet-Diet Master (Spectrum), U-Com 2 (Apple). **Features:** Newbrain sound, BBC FX commands. **Gameplay:** Space Invaders (Vic 20), Exterminator (64), Spectrum round-up, Death Mines of Sirius (Dragon). **Programs:** Falklands Raid (BBC), Mini Math (Spectrum), Pyramid (Spectrum). **Databases:** Software. **Microspedia:** Everything you wanted to know about programming, part 7.



**Issue 37, November 17-November 23**  
**Pro-Tests:** Apfont, Paint (Atari), BBC Micro Toolkit, Spectravideo Computerize (Atari VCS 2000), Big Ear. **Features:** Flight simulators, Spectrum screening. **Gameplay:** Empire/Treasure Tomb, Crystal Chalk, Temple of Zoren (Dragon 32), Cobas Maze/Bowled (Vic 20), Cosmic Convo/Planetfall (64), Bugaboo-Gordon (Spectrum). **Programs:** CRT Defense (Oric), Falklands Raid (BBC), Pyramid (Spectrum), Monitor (64). **Databases:** Clubnet. **Microspedia:** Everything you wanted to know about programming, part 8.



**Issue 38, November 24-November 30**  
**Pro-Tests:** CWP's Contest, Sinclair ZX Interface 2, Watford DFS (BBC), Wordsworth (BBC) Animator. **Features:** Oric Operating System. **Gameplay:** Dragon round-up, Haurer Attack, Crickets Lane (Oric) (Spectrum), 3 Deep-Space (BBC). **Program Cards:** Key, Utility (Spectrum), Bees Away (BBC), French Test Card (Apple). **Microspedia:** Everything you wanted to know about programming, part 4.



## 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-disk copiers.

Integrity! Dontcha love it? Dontcha love the way that if you take your eye off it for a moment it hits you in the back of the neck like a boomerang?

As, for example, in a popular weekly micro magazine. Now you see it, well to the fore on page 3 (left) and on page 50 (below) you don't:

## 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 Ires 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.

## SLANTAX ERRORS

There were a couple of mistakes in the 'Autour' 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 that doesn't appear to be anything special about it, except perhaps for the very swish and glossy cassette inlay.

## BACK-UP TAPE COPIERS

Unique machine code programs to allow security back-up copies of the majority of protected software. Available for:

COMMODORE 64	..... £5.95	ORIC 1	..... £5.95
VIC 20 (no memory disc)	..... £5.95	ATARI (All Models)	..... £5.95
SPECTRUM	..... £5.95	BBC (Personal Locomotives and Personal Parts)	..... £5.95
ELECTRON	..... £5.95	ALL WITH FULL INSTRUCTIONS	

## NEXT WEEK

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

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

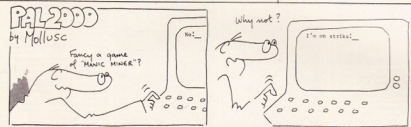
**Anything Ikon do** — We put Ikon's Ultradrive through its paces on a BBC.

**Sweet plottor** — Check out the E500 Sweet P plottor.

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

**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.



## PCN DATELINES

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

Organisers who would like details of coming events included in

PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

## UK EVENTS

Event	Dates	Venue	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 Market/place 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	Mouthill 01-486 1951
Computer Communication & Control Computers in Action	Sept 26-28 October 30-Nov 1	Brighton Centre Anderson Centre, Glasgow	Institution of Electrical Engineers 01-240 1871 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

**EDITORIAL:** Editor Cynid Miles. **Managing editor** Peter Worlock. **Sub editors** Harriet Arnold, Leah Batham. **News editor** David Guest. **News writer** Ralph Bancroft. **Features editor** John Little. **Software editor** Bryan Skinner. **Peripherals editor** Kenn Garroch. **Hardware editor** Stuart Cooke. **Programs editor** Nickie Robinson. **Art director** Jim Dunne. **Art editor** David Robinson. **Assistant art editor** Floyd Sayers. **Publisher** Mark Eisen. **Publishing assistant** Jenny Dunne. **Group publisher** John Cade. **Publishing** Adria Jackie Searle. **ADVERTISING:** **Group advertising manager** Peter Goldstein. **Advertisement manager** Bettina Williams. **Assistant advertisement manager** Sarah Barron. **Sales executives** Christian McCarthy, Laura Cade, Paul Evans, Tony O'Reilly, Yvonne Charatynowicz. **Production** Noel O'Sullivan. **Advertisement assistant** Karen Isaac. **Subscription enquiries** Gill Stevens. **Subscription address** 53 Frith Street London W1A 2HG 01-439 4242. **Editorial address** 62 Oxford Street London W1A 2HG 01-436 6890. **Advertising address** 62 Oxford Street London W1A 2HG 01-323 3211. **Published by** VNU Business Publications, Evelyn House, 62 Oxford Street London W1A 2HG © VNU 1983. No material may be reproduced in whole or in part without written consent from the copyright holders. **Photostat** by Quikset, 184-186 Old Street, London EC1. **Printed by** Chase Web Offset, St Austell, Cornwall. **Distributed by** Seymour Press, 33a Brixton Road, London SW9, 01-733 4444. Registered at the PO as a newspaper.

A 16-bit Personal Business Computer for Professionals

# Duet-16



## THE TRUE AND HIGHTEC 16 BIT...

... FROM JAPAN'S MOST ADVANCED AND WELL-KNOWN MICRO/MINI COMPUTER MANUFACTURER, PANAFACOM, TIED UP WITH SAKATA.

- Processor** Intel 8086 running at 8 MHz
- RAM memory** 128 K expandable to 512 K
- Operating System** MS-DOS Ver 1.25/2.00  
CP/M-86
- Display Unit** Super high resolution colour or monochrome, 640 x 400 pixels.
- Keyboards** ASCII, UK, French and German. Other local keyboards available on request.
- Communication** 2 serial port and one Centronics parallel port as standard. IEEE-488 is optional.

- Expansion Unit** 5 expansion slots and 10 M byte Winchester disk with Cache memory.

- Software** BASIC-86, Advanced BASIC, L-II COBOL, FORMS-2, ANIMATOR, Multiplan, WordStar, SpellStar, MailMerge, TSS support program, 1-3270 emulator



System expansion Unit

- Disks** 2 x 720 Kbyte floppy disk 10 and 20 M byte Winchester disks are optional.



Complete System with Color-Graphic

Integrated Desk Top Micro as well as portable for your business, supported by different application packages.

Fastest speed with excellent colour capability and full range of softwares.

Well designed to meet current and future demand.

Quality micro with reasonable price you have never seen.



IEEE-488 BOARD

MS-DOS, BASIC-86 and Multiplan are trademarks of Microsoft Corporation. Windows, MailMerge and SpellStar are trademarks of Microsoft International Corporation. L-II COBOL, FORMS-2 and ANIMATOR are trademarks of Macro Focus Limited. CP/M-86 is a trademark of Digital Research Inc. Duet-16 is a trademark of SAKATA SHOKAI, LTD.

**COUPON** Please send us more information about:

DUET-16       Printers       Monitors

Plotters       Floppy-Disk Drive

Name \_\_\_\_\_ City \_\_\_\_\_

Street \_\_\_\_\_ Phone \_\_\_\_\_ PCN# \_\_\_\_\_

**SKT SAKATA SHOKAI GmbH**  
Kleinhusen 15, D-40110 Hilden, West Germany  
Tel. 010 49 2103 5730 - Tlx 8581689 Snd - Telefax 02 11-32 59 19

SAKATA UK Rep Office: 48 Sutton Park, Broad Blunsdon, Swindon, Wiltshire SN2 4VV. Tel: 0793 721419. Tlx: 449606.

Other products: low-cost peripherals - printers, plotters, monitors and floppy-disk drives. Now available. Please enquire.

One of America's most popular games

**THE ULTIMATE IN BATTLE ACTION...**

# BEACH-HEAD™

commodore 64



**Incredible 3-D Graphics**  
**Unbelievable Sound Effects**

**Unique Games Concept**  
**Multiple Screens**  
**High Resolution Scenario**

**100% Machine Language**

Voted by U.S. Billboard magazine as the best game for sound and graphics on the Commodore 64

It's a unique arcade experience in sound and vision and a stunning display of Commodore 64 capabilities.

Another quality product from **ACCESS** Software.



Available on **CASSETTE** £9.95 **DISK** £12.95

**THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD**

U.S. Gold is stocked by all leading computer stores including:



**WHSMITH**

DEALERS! For information on how to become a U.S. Gold Stockist write to: Centresoft Ltd., Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH. Telephone: 021-520 7591. Overseas enquiries welcome.

# U.S. GOLD

All American Software