

P E R S O N A L

COMPUTER

weekly

NEWS

JULY 14 · 1984 · No 69

50p

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PRODUCT REVIEWS ...
... for Electron, Atari
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Business Computers

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MENU

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PERSONAL COMPUTER NEWS

Cover picture by Howard Kingsnorth.

COVER STORY**Cut-price portability 28**

Lap-held computers are the year's hot products but so far they've tended towards business prices. Now Casio has entered the fray with a £350 machine that puts portable computing in the personal price bracket.

Acorn arithmetic 20

For the mathematically minded BBC owner, calculate numbers beyond the grasp of the human mind. John Bibby takes you into the unknown.

**Z80 assembler 22**

If you can stoop this low your programming could really take off. Keith Hook helps you down to the lowest level with his continuing machine code tuition course.

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Make more of your Electron with Acorn's multi-purpose interface.

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A little black box expands your options on the Sinclair supermicro giving all of the popular joystick protocols in the same package — plus the necessary hardware for cartridge software.

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More for the artistic Apple owner with Graphics Magician, but like all magic, it isn't easy. Helena Siedlecka waves the wand.

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Whether you're dabbling with data or seriously sorting statistics, Filmstar (pronounced Filemaster, not Filmstar) or DRS could be your salvation.

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Take your strategic bomber out for a bit of after-dinner destruction, or enjoy a game of darts with the obligatory alcoholic accompaniment.

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If the military life appeals this double dose of strategic warfare might be the game. Take your choice of tank or submarine and let battle commence.

PROGRAMS**Dragon 46**

React — a colourful strategy game for two players.



QL add-ons lined up . .

Sinclair Research has laid out a spread to tempt the jaded palates of QL users.

Besides seven-day turnaround on the replacement of dongled systems and the prospect of cheaper Microdrive cartridges, Sinclair has unveiled the list of peripherals it expects to offer. It includes RAM packs, hard disk systems with and without Unix, a modem and terminal emulator, a monitor and printer, and IEEE-488 and Centronics interfaces.

The 128K and 512K expansion units have priority, said Nigel Searle, Sinclair's managing director. Making a point of avoiding any

promises on delivery dates he said the timing of other items might depend on third-party suppliers. For example, Sinclair will not be developing its own monitor but will put its label on a bought-in product.

Additional Microdrives should also be available for the system soon, as should a module to let users increase the number of slots in the expansion units.

As to the price of Microdrive cartridges, Mr Searle admitted that at £4.95 they are 'somewhat expensive' and he promised a 'very significant' price cut this year. Looking ahead, he said the technology of disk production could be

used to bring the capacity of Microdrives up to 1Mb.

The company is very defensive on the subject of the QL and naturally prefers to look forward. Sir Clive maintains the delays were 'overstated' by the press, and Mr Searle was at pains to demonstrate that production was at a level to clear the backlog some time next month.

Thereafter the company will deliver within 28 days of an order being placed and it should take only seven days to trade in a dongled early model for a finished version. Pinches of salt, of course, are still available over the counter.

A new edition of the QL User

Guide is due next month as well, and the company plans to publish the list of QDOS calls. But the news on the software front for QL users is mixed — upwards of 200 software houses are said to be working on QL software but one in particular, Psion, will charge for the version of its four QL programs implemented in integrated form in ROM. These same programs are given away on Microdrives at the moment.

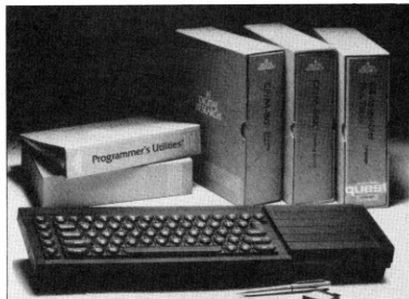
One QL add-on you probably won't be seeing is a software development tool in the form of a ROM with two RS232 ports, to hook two dumb terminals into the machine.

. . . as Quest installs CP/M

You may find yourself running Wordstar on the QL by Christmas — if you're not careful. Quest International Computers intends to have CP/M-68K implemented on the machine just as soon as there are enough QLs in circulation to make it worthwhile.

Quest says it already has CP/M-68K running on a development machine, and this will be ported over to the QL once a final version of the Sinclair micro can be made to stand still for long enough. It will cost you £49.50, and for this you'll get a Microdrive cartridge, a manual and a bootstrap ROM of some description. This will probably fit into the cartridge port, but may be put inside the case.

Quest accepts that there's not a great deal you can do with CP/M and two 100K Microdrives, but says that it's important that the entry level system should allow people to use the basic facilities of the



QDOS killer? — Quest puts CP/M-68K on the QL.

machine, and not force them to go out and buy disk drives straight away.

Its also likely that Quest will be

providing a QL upgrade path parallel to Sinclair's own. The company intends to announce a range of hardware products.

Hats off to Micromega ad policy

Micromega last week launched Full Throttle, its follow-up to the successful Codename Mat.

The company deserves a round of applause for its policy of not advertising products before they are available to the public. Many publishers produce full-colour ads for forthcoming games long before the game itself is finished — a trick they've picked up from certain hardware manufacturers perhaps?

Full Throttle at £6.95 is a 40 rider, motor-cycle racing simulation with ten tracks ranging from Silverstone to the Nürburgring.

Commenting on the current state of 'pocket money' games selling at under £3 Micromega predicts that 'the only real full-price survivors will be the houses who can consistently produce products of a standard high enough to justify continuation of normal pricing policies'. It goes on to criticise software houses which do not conduct themselves 'in a thoroughly professional and unambiguous manner'.

Oxford limbo goes on into second week

Oxford Computer Systems was still in limbo last week after ceasing trading on June 28 (issue 68).

Managing director Alan Wyn Jones had 'no comment at all' on the prospects for the company, or the chances of OCS software users finding continuing support.

But it is understood that most of the staff have gone and there looks to be little prospect of an immediate rescue bid.

Bell tolls for Imagine

By Ralph Bancroft

Imagine Software has crashed with debts estimated at £400,000 amid confusion and multiple legal actions.

On Monday this week the company was due to appear in the Chancery Division of the High Court to face a petition from creditors for the compulsory winding-up of the company.

The list of creditors includes Marshall Cavendish which is seeking repayment of a £250,000 advance made to Imagine, VNU Business Publications (publisher of PCN and other micro magazines), and Kiltdale, a cassette duplication company.

In a separate legal action last Friday, Steve Blower, a shareholder

in Imagine, was seeking enforcement of an undertaking given by directors Mark Butler and Dave Lawson to the High Court in February to release Mr Blower as a guarantor of Imagine's bank overdraft. It is believed that Imagine owes around £100,000 to the bank.

Meanwhile, Messrs Butler and Lawson together with Imagine's finance director, Ian Hetherington, have set up a new company called Finchspeed and transferred all Imagine's assets into the new company.

Early last week 53 of Imagine's 71 staff were sacked. Amongst those fired was Bruce Evers, the company's operations director.

Mr Lawson and Mr Hetherington were reported to have gone to

the US to raise new finance for Imagine's delayed 'megagames', Psychops and Bandersnatch, and although they have returned, they were unavailable for comment.

The computer and office equipment bought by Finchspeed is reported to be worth £45,000. The company paid a deposit of £4,300 for this with a promise to pay the outstanding sums in quarterly instalments. The equipment has since been removed from Imagine's offices.

Included in the list of assets is Imagine's collection of sports cars including an Aston Martin Vantage, a Porsche and a Ferrari.

The transfer of assets was agreed by a shareholders meeting held on the morning of June 30th.

Atari giveaway

By Chris Rowley

For soap opera in the executive suite forget *Dynasty* and *Dallas*, the show of the moment is Atari.

Just imagine the scenes when Jim Morgan, who came to Atari last year from the tobacco giant Philip Morris Inc, picked up the phone and learned that Warners had sold Atari to Jack Tramiel, ex-Commodore founder.

"Jim was completely blind-sided on this, I don't think he even knew about the sale until Thursday, when it was too late for him to do anything about it," said an under-used senior Atari executive.

On the Friday (June 29) the deal was consummated. That same day Jack Tramiel, his son Sam, and 20 aides were already in Morgan's office at Atari's California headquarters. It was announced later

Morgan would be 'taking a leave of several months'.

Nor did Tramiel have to put down any cash to pick up the stricken Atari. "Warners essentially gave away the company in the hope that Tramiel could make something happen," said a respected analyst. Tramiel gave Warners \$240 million in long-term notes on the new Atari Corporation while Warners gave Tramiel the right to purchase one million shares of Warners' stock at \$22 per share. Tramiel picked up only the computer and video games part of Atari. Warners hung on to the profitable coin-operated games business.

Furthermore, the \$27 million in annual interest payments to Warners will be made only if Atari has some cash flow. News of the deal dropped Warners' stock to \$22.125. The deal cost Warners another

\$425 million loss on the first quarter and gave Tramiel control of a company that has shrunk from 7,000 employees last year to 1,100 now. Tramiel and his as yet unidentified partners have agreed to sink \$75 million into the new company.

It is doubtful whether any of the current management team will survive the transition.

And what will Jack do with his lean machine? One suggestion is that Tramiel will aim for the sub-\$1,000 'complete office system', a market where IBM and Apple are also intent on taking a share. Over at Commodore, the firm Tramiel built from a Manhattan typewriter repair shop, there was 'absolutely no comment'.

■ Atari UK could not say last week what the possible effects of the handover would be in this country.

IN BRIEF

Franklin folds . . .

Franklin Computer, maker of the Apple-compatible Ace, is the latest US micro company to seek the shelter of Chapter 11 of the Federal Bankruptcy Code.

Chapter 11 keeps the creditors at bay while Franklin tries to settle its debts—\$657,000 is owed to Apple alone, part of a legal settlement imposed on Franklin in January. It also owes two law firms \$443,000. The last nail in its coffin came when it failed to obtain enough disk drives for its new CX range of desktop machines.

. . . and de Bono dies

Quietly at home de Bono Technology, the creator of the de Bono DB² database, has called it a day.

The company announced earlier this year that plans for a micro had been put back (issue 59) but now it has been forced to cease trading altogether. The demise of its major US client was the final blow, but de Bono will try to put a rescue package together for itself.

. . . while Cifer stalls

Losses of almost £1 million in the first half of the year have forced Cifer to axe 120 jobs and reshuffle its top management.

But new managing director Stuart Gregory says the company, which builds a range spanning terminals and Unix micros, will be profitable again by the end of the year. Its losses, he said, had stemmed from slow sales, component shortages, and development and manufacturing problems on the Unix line.

Rainbow cost cut

Digital Equipment (DEC) has cut the price of its Rainbow 100B, the hard disk version of its underwhelming personal computer line.

The price has come down by almost 20 per cent to £2,295 and it includes a year's free maintenance.

The configuration includes 128K, twin 400K floppies, a 10MB Winchester, and CP/M-86/80 and MSDOS.

Lynx in clubs

Despite Computers' crash the Lynx continues to attract interest and a user's club has been formed in Belfast.

The club plans a bi-monthly magazine from September 1 with a Basic program, machine code commands and utilities, reviews, news and routines in each issue. The annual subscription will be £10.

For more information write to Mr D Johnston, 14 Ardvarna Crescent, Belfast BT4 2GJ.

Kode buys Comart

One of the UK's best established micro makers has changed hands for £2.5 million.

Comart, including Xitan, the Byte Shop, and the Communicator range, has been bought by UK technology group Kode International.

Memotech prepares new challenger to BBC micro

By John Lettice

Memotech intends to launch a micro aimed squarely at the BBC micro in August. The Memotech RS128 will basically be a version of the Memotech 512 with 128K RAM and an RS232 board incorporated. At £399 it will match the BBC B's price, and the Beeb's \$32K RAM will look even more puny. Rumours of an early price drop for the Acorn flagship will be able to run at the wake of last week's software offer (issue 68).

The new Memotech's 128K RAM matches the QL's—the QL is also priced at £399—and it's beginning to look as if 128K, unthinkably massive not long ago, is becoming the new standard.

Memotech's earlier machines have gained a certain amount of respect in the micro market, but haven't noticeably taken off. The RS128 looks like a conscious attempt to change this.

Memotech also seems to be doing more in-house support work on its machines than is usual for a micro manufacturer. The company is currently putting the finishing touches to a tape-based business package, including accounts and mailing list programs, and is also set to produce a graphics generator, a music generator, and utilities.

The latter will allow you to save and load data strings, and will also include renumber and hex converter utilities.



MIX 'N MATCH—Peripheral switching devices have been in fashion for more than a year but Inmac has taken the idea one step further by producing a two-way switching unit. Its X-switch lets two micros share two peripherals and swap them at the flick of a switch. It is available for RS232 devices at £225 and for Centronics 36-pin models at £255. You can take it on a 30-day trial from Inmac at 09285 67551.

Acorn upgrades Econet

Acorn has offered a glimpse of Econet upgrades to be released officially later this year.

A new Level 3 file server will be launched in September to offer 10MB or 30MB Winchester disk drives and to support up to 60 users.

It has all the features of the recently announced Level 2 file server including hierarchical directories, password protection and an unlimited number of files and directories.

In addition, the Level 3 file server can support CP/M directories for use by stations on the network equipped with a Z80 second processor.

Included with the Level 3 file server is an in-house viewdata system that gives each user on the network access to a Prestel-like database.

Acorn also intends to improve response times on the network by increasing the speed to 200kilobits a second. A new network clock box will be available 'shortly', and existing systems will be able to run at the higher speed without further modification.

For users wanting to link up two or more networks together, the company will be making an Econet Bridge available towards the end of the year.

Acorn plans to extend the network server approach by introducing a modem server, teletext server, processor server and gateway server.

The modem server allows any user on the network to dial up Prestel, Telecom Gold and other services with an Acorn Prestel adaptor.

The Teletext server queues teletext page requests and delivers them as soon as they become available.

The processor server will give every user on the network access to a second processor.

A spokesman for the company said that problems with the 16032 project have now been overcome and that Acorn has already supplied a number of 16032 workstations to universities.

This re-opens the possibility of the 16032 appearing in the awaited Acorn Business Machine (ABM).

The spokesman said the ABM will consist of a repackaging of existing components and it appears that it will be not one but a family of machines with a choice of second processors and an integral modem as an option.

VIEW FROM JAPAN



Sing a song of Singapore — but softly

By Serge Powell

You'll have read about the mysteries of the Orient and the inscrutable ways of the Far East. It's all true, I can testify to that.

Three times now I've promised a story from abroad — abroad being from my perspective anywhere but Japan, and anywhere where I can see demonstrated the wonderful software that I read about. Twice it has come to nothing, but now it looks like I've finally managed to deliver, for PCN but not for me.

The first missed opportunity was a visit to Canada. Unfortunately I spent more time ice-fishing and recovering from hangovers than visiting computer stores, but the three or four that I found time for were as unhelpful as the ones in Japan. I couldn't blame it on a language barrier — it was more as though a swarm of locusts had gone through the places. Any software in stock was for Apple and IBM, and 8in disks with CP/M software were as rare as genuine Apples in Taiwan. There wasn't even a catalogue I could peruse so I presume everyone must get their CP/M software from discount houses or by more sinister means.

About three months later I found myself in Australia. The situation was much the same except that here were some brands of computer that I'd never heard of. Strange to say, most of the sales people seemed never to have heard of them either, or to have learnt so little about them that they couldn't make comparisons.

So I got the same kind of response that I do in Tokyo — blank stares. There was a certain consolation in that I could blame it on a language barrier of sorts: strine.

Then last week I went to Singapore. I knew this was going to be a different kettle of fish from the pungent smell in the vicinity of some of the street food markets. There was also a welcoming NEC sign outlined against the night sky as I travelled in from the airport; I have a NEC CP/M machine and the sign for me was what a pub sign must be in England when you've been driving all day.

My hotel was close to the showrooms but I checked the local brews out first. By this time I'd developed a fairly reliable cure for hangovers. But I should have stayed in the bar. At the store there were some very old favourites — in the word processing line WordStar and a clumsy little program apparently written in Basic, and modern spreadsheet technology was represented by the package that I took with my first computer years ago.

The manager of the store asked me what software I have and when I told him, incredible as it seems, he offered to trade me. And that's what Singapore proved to be all about, a blatant unconcern for copyright. Not that I'm above a little software sharing among friends, but hardly with a manufacturer's authorised dealer.

An example of how rampant disregard for copyright is: the latest albums go for \$2 to \$4 (Singapore dollars — roughly 75p to £1.50) pre-recorded on cassette, with even the labels copied.

One store offered Apple and IBM clones — or perhaps mutants — that were apparently made in Japan. Software prices, regardless of title, were £4.50 for Apple-format single-sided disks and a more businesslike £10 for double-sided IBM-format offerings. The current catalogue (yes, they print a catalogue) lists some 14 pages of about 50 titles each for the Apple and clones. For the PC and its lookalikes they come up with a paltry three pages, but a quick perusal of the titles reveals dBase II, 1-2-3, the Peachtree series, the Perfect series, the Micropro line and 30 or more games.

As usual there was no software, legitimate or otherwise, for a NEC CP/M machine so I wasn't reduced to buying, begging or stealing. It's enough to make you wonder whether it might not have been a better idea to have settled for something less expensive and shell out the extra in maintenance back in Japan.

But you get attached to a micro, and I like mine. Even so, it's frustrating to think that for what I paid for it I could have flown to Singapore, picked up a clone and a few tons of software, and still had change for a Tiger beer or two.

FAST action

Software pirates may finally get their come-uppance if FAST (Federation Against Software Piracy) has its way.

The software and hardware houses are feeling the pinch so much that they have formed a committee to get something done about the pirates. Chaired by Donald MacLean (deputy chairman of Thorn EMI Video), FAST's aim is to get a Private Member's Bill through Parliament in the near future. This will be an amendment to the current Copyright Act, last amended in 1983 to cover video cassettes, to make it a criminal offence to copy software for resale.

FAST is hoping for penalties of up to £10,000 and/or 2 years imprisonment for the software thieves and full search and confiscation powers for the police.

Claiming losses of over £10

million a year and a number of companies going out of business (imagine that) because of piracy, FAST is hoping to get the barrels rolling towards the end of this month with a speech by Nicholas Lyall QC/MP under the Ten Minute Rule. They are hoping that this will lead to a Private Member's Bill later this year.

FAST admits that one of the difficulties in proving a software theft will be marking the original software in such a way that the mark cannot be copied. Some of the current pirated versions are so good that they are completely indistinguishable from the originals except for the price. Without this proof, the police could have a hard time implementing the proposed changes in the law. FAST is hoping that the proposed penalties will be enough to put would-be pirates off.



MODEL THREE — Pioneered by IBM, the technique of cutting prices by releasing subtly different models has been taken up by Sanyo. Its UK distributor Logitek has taken the wraps off three new variations on the Model Three: the 550-2X, 555-2X and M3C-555-4X. The attributes of this trio can be respectively one 320K/360K floppy, two of the same, and two 720K disks. They cost £975, £1,390 and £1,550, each price being exclusive of VAT. Logitek is on 0257 426644.

AT&T opens Unix Europe

AT&T and Olivetti have combined forces to set up Unix Europe, the first attempt to bring the operating system direct to European users from its creator.

As predicted in issue 68, Unix Europe will concentrate at Unix System V and applications relating to it. It will licence source code and grant sub-licences to systems houses, look after installation and maintenance, offer training courses and distribute products from the Unix System V library of applications.

AT&T, the US telecommunications giant which is increasingly moving into information processing, owns 25 per cent of Olivetti the leading Italian supplier of

computers and office products. It sees 1984 as the year in which Unix will start to come into its own as a working operating system, and it points out that in Europe the licences issued have moved away from universities into businesses.

Elsrino Pini, an Olivetti executive who should know better, wins the PCN Award for Outstanding Condensation for his comment at last week's launch of Unix Europe: 'One of the objectives of the alliance between AT&T and Olivetti is to bring technology to Europe.' Anybody wishing to thank Mr Pini for delivering us from the Dark Ages should write to him c/o British Olivetti, 86-88 Upper Richmond Rd, London SW15.

Brother plots alone



Brother BP30: stand-alone plotting plus variable typesizes.

Last week saw the launch of four new products from Brother—three printers and a battery/mains typewriter/plotter. The last doesn't actually have any interfaces, so you can't use it with a micro, but it rates high on the cuteness scale.

The BP30 Graph Writer is around the same size as the EP44 printer/typewriter, but sports more of a typewriter-style keyboard, and in place of the dot matrix print mechanism has a four-pen plotter. It'll be sold for £179.95, and will

produce pie charts, bar charts and line graphs as well as operating as a typewriter using a 15 character type-ahead LCD before printing. You can type in three different sizes, and the machine also has a built-in calculator.

It's possible it will eventually be given an interface, but we're not likely to see that until the beginning of next year.

Although the BP30 will be of use for some relatively specialised tasks the M1009 will be of more immediate interest to home users. It's essentially the same dimensions as the thermal Brother HR5 but is an impact dot-matrix, and its build seems sturdier. It prints at 50 cps, and print quality is relatively good, producing normal, expanded and condensed typefaces with true descenders.

Current models emulate either

IBM or Epson printers, and have a Centronics interface. A dual Centronics and RS 232 interface model will be available shortly. It'll set you back just under £200.

The other two printers are both high-quality business jobs. The HR35 is a £1,060 daisywheel that's capable of an ear-splitting 36 cps, while the 2024 is a £1,200 dot matrix that will handle 160 cps in draft mode, and 80 or 96 cps in its three near-letter quality modes. The print quality in these modes is very good indeed.

It is fairly quiet considering its speed, and the print quality looks just about as good as you're liable to get with a plain, unvarnished cloth ribbon.

If you can afford the white heat of printer technology, you can get further information from Brother on 061-330 6531.



SHARP CORNER — Specialist Sharp MZ700 supplier Solo Software (0905 58351) has released a disk drive that fits into the cassette deck's slot on the MZ700. You will now be able to load Basic in about four seconds from the disk, rather than the three and a half minutes that the tape version took. Solo's Quick Disk unit includes a connection for the cassette drive to let you save tape-based software on to the disk. The drive is a 3in model with a capacity of 128K, and R costs £250. Deliveries will begin next month.

Pocket-money software gets boost from Cases/Charlie

The downward spiral of software prices continues unabated.

CCS announced the release of two games last week pitched at the under £3 market. The Cases Computer Simulations logo appears on the cassettes, but not the full name, which has been altered to Charlie Charlie Sugar to distinguish the budget games from the company's normal products.

The games are considerably bet-

ter than some of the recent cheapies. Dix Mille is a version of the French dice game and is surprisingly good with machine code hi-res graphics used for the rolling dice. Who Dunnit? is a sort of Cluedo for a number of players and while simple, it will tax your logic as you try to work out who killed Professor Carpenter.

■ For more news of recent software see this page and page 36.

SOFTWARE

The new releases



Stranded — not a BA terminal in sight.

Games

Commodore 64: Island Records is putting its money into game software through a company called Interdisc (01-9699414). Its first offering — from someone who prefers to call him/herself Count of Mantissa — is called Hercules and it has 50 levels of play with what is described as 'the random access principle'. If you lose your life you are plunged into a new frame totally at random. So if you can never get beyond the first screen you will at least get the opportunity to see what the rest of the game looks like.

Spectrum/Commodore 64: If you are a fan of the Automan series on television, stand by for the game. Bug-Byte has secured the rights to produce a game based on the programme. Bug-Byte says it will be out before Christmas and 'is likely to be an arcade adventure'.

Sharp MZ-700: Holdfast is a 'non-violent simulation' game from Kuma (062871778). The aim is to secure a clinic and a school for the village of Holdfast when the Dictatorial government seems intent on raising ever-increasing taxes to pay for defence.

Electron: Acornsoft has converted six Beeb programs to run on the Elk. Over-priced at £9.20 you can get Hopper, Freefall, Arcadians, Sphinx Adventure, Desk Diary and Picture Maker on mail order from Vector Marketing or from your local Acorn dealer.

BBC: New programs from Acornsoft. Droyna, Meteor Mission, Tetrapod and Volcano are arcade games and Gateway to Karos is an adventure. All priced

at £9.95.

Spectrum: When Wimbledon is over you can relive the memories with Match Point from Pson. Price £7.95 from usual outlets. And on a related subject, Bubble Bus has converted its pool game, Hustler, to run on the Spectrum.

Atari/Commodore 64: Stranded is a graphic adventure from the English Software Company (061-835 1358) with an outer space theme and featuring a character called Space Agent Sid. The Atari version costs £9.95 and the Commodore version £7.95.

Education

BBC: Get on your bike with Acornsoft's Temperature Control Simulation. Suitable for both 'O' and 'A' level, the program models the effects of changing air temperature, exercise rate and sweating efficiency on the physiology of a cyclist. It is available on cassette for £9.95 or disk for £11.50. Also from Acornsoft is Examiner, a template program

for the creation of multiple choice tests.

Business

Ormbeta: Ormbeta Xtra is a package of accounts programs designed to work in a multi-user or networking environment and can support networks of mixed machine types. Further details can be obtained from Ormskirk Computer Services (0695 77043).

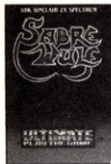
Match Point — advantage Sinclair?



PCN CHARTS

GAMES

NEW WEEKLY CHART! NEW WEEKLY CHART



	GAME TITLE	PUBLISHER	MACHINE	PRICE	
▲	1 2	Sabre Wulf	Ultimate	SP	£9.50
▼	2 1	Beach Head	US Gold	C64	£8.95
▶	3 15	TLL	Vortex	SP	£5.95
▼	4 3	Psytron	Beyond	SP	£7.95
▶	5 5	Mugsy	Melbourne House	SP	£6.95
▲	6 7	Fighter Pilot	Digital	SP	£7.95
▲	7 18	Hulk	Adv.Int.	SP, C64, AC, AI, Apple	£9.95
▲	8 16	Jack & B'stalk	Thor	SP	£5.95
▲	9 19	Lords of Midnight	Beyond	SP	£9.95
▲	10 29	Arabian Nights	Interceptor	C64	£7.00
▼	11 6	Trashman	New Generation	SP, C64	£5.95
▼	12 8	Jet Set Willy	Soft Projects	SP	£5.95
▼	13 4	Code Name Mat	Micromega	SP	£6.95
▼	14 30	Valhalla	Legend	SP C64	£14.95
▼	15 9	Night Gunner	Digital	SP	£7.95
▲	16 24	Cavelon	Ocean	SP, C64	£5.90
▲	17 13	Scuba Dive	Martech/Durell	SP, C64, OR	£6.95
▲	18 —	Son of Blogger	Alligata	C64, AC	£7.95
▼	19 14	Chukkie Egg	A&F	SP, C64, AC, DR	£7.90
▼	20 11	Atic Atac	Ultimate	SP	£5.50
▲	21 26	Antics	Bug Byte	SP	£6.95
▲	22 22	Flight Path 737	Anirog	Vic, C64	£7.95
▼	23 21	Football Manager	Addictive	SP, AC	£6.95
▲	24 —	Ad Astra	Gargoyle	SP	£5.95
▲	25 25	Chequered Flag	Psion	SP	£6.95
▲	26 —	Beaky & Egg Snatchers	Fantasy	SP	£6.50
▲	27 —	Gyropod	Taskset	C64	£6.90
▲	28 —	Loco	Alligata	C64	£7.95
▲	29 —	War of the World	CRL	SP	£5.95
▲	30 —	Encounter	Novagen	C64, 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 6**. The games chart is updated every week.
 Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT.
 Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month.
 PCN Charts are compiled exclusively for us by RAM/C, who can be contacted on 01-892 6596.

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For 'old-fashioned' read 'mature'

Although Amstrad places more store by the judgment of the marketplace than critical accolades, I was heartened to read the review of the CPC464 in Issue 65. However, I would like to mention a couple of possible misconceptions.

The one-plug operation is still quite unique in this price range. There are several systems of £500+ with this facility, but not one under £500 other than ours. As with all Amstrad equipment, the price is perhaps one of the major features of the specification — something that has been learned at an early stage in the consumer marketplace.

The screen wobble on the green tube monitor is simply explained — when placed too close directly alongside the colour monitor, as it is possible to do in our demonstration room, the magnetic field from the CRT monitor puts the fluence on the green tube's scan coils. Hardly likely to create problems in an average domestic situation where only one will be used at a time.

The tape speed comment is also unfortunate — a baud is a baud. The temptation for many programs to use all the available (even more enormous) memory means we will have some large programs that will take time to load — but in cases like Roland in the Cave (Bugaboo), the load time is distorted by the fact that the pre-loaded sign-on screen has been tacked on the front using the binary screen dump feature, subsequently reduced from 16K to 2K by the production loader program.

The technical manuals are available to qualified parties: the qualification being the purchase price. I wouldn't want anyone to think they had to have a certificate to examine the secrets of the OS.

CP/M bundling needs a little clarification. DR Logo comes free with CP/M 2.2. The other bundles are going to cost, but under a packaged price. Hopefully, the commercial advent of the disk drive with Logo will be worthy of your further attention and the 'not so wonderful' remark may be reviewed in the light of what you actually get for the meagre sum of £199 (inc).

I'm sorry we're old fashioned enough to have designed something which we know we can make for an old fashioned price, and for which good software can be written with ease, without forever coming off on the fast corners.

The implication that it might fall apart after a month is just a little unfortunate, and perhaps you would like to reaffirm its durability by checking with those software houses who have been battering the pre-prod versions for six months now and see how we rate against other machines they have known.

Overall, we are flattered that you have identified those subtle but crucial aspects about which we are



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particularly proud, and which, at a cursory glance, may not have been too strikingly obvious. Our aim was to produce a budget home micro with expandability, (maybe a 68000 second processor add-on wouldn't seem so old fashioned?), durability, value and user-friendly attributes. In short 'the best features of the rivals, and almost none of their mistakes.'

The prices quoted are also a shade optimistic: Green tube system, £299, Colour system, £329. Inclusive of VAT, though it is not unknown for discounting to occur in the retail electrical trade, is it? William Poel, Amsoft, Amstrad Consumer Electronics, Brentwood, Essex.

Max Phillips replies: I hope my review did not actually suggest that Amstrad micros fall apart after a month. Buyers should never commit to a new machine after early adverts and reviews but the important point is the Amstrad's construction impressed me and, as I said in the review, it has all the signs of a reliable, well-supported system.

My suggestion that the Amstrad is perhaps old-fashioned may need a little qualification. I don't argue with the benefits of tried and tested technology and the CPC464 benefits in both price and features by being a mature, conservative product.

On the question of documentation, you should try to make your technical information both as comprehensive and as affordable as possible. There's a little American garage operation by the name of Apple Computer that learnt this trick early on.

Computers in long haul studies

The Transport Studies Group of The Polytechnic of Central London has been funded by the Science and

Engineering Research Council to survey the likely interest that small road haulage companies may have in using micros in their business. (A small haulage company being defined as having up to five vehicles). This is part of the SERC's research into information technology.

The group wishes to contact hardware or software manufacturers and suppliers with experience with small transport companies or who are contemplating becoming involved in this area, not only in distribution packages, eg vehicle costing, vehicle performance; but also in general business packages of direct relevance to small companies, eg financial packages, word processing, planning and forecasting and customer records.

Any help would be gratefully received and I can be contacted at the address below.

Mr G N Hindley,
Transport Studies Group,
Freeport,
Polytechnic of Central London,
35 Marylebone Road,
London NW1 1YP. 01-486 5811.

Stop ridiculing the Oric micros

After long months of squirming at disparaging comments made about Oric computers, it's time to set things straight.

Firstly, it is obvious the staff at PCN hold anti-Oric opinions, which you seem to share with other computer magazines. Just why this is, I simply do not know.

It struck me that whenever the name Oric appeared in print the words 'ROM bugs' and 'tab error' were never far away. Yes, well, point taken a few times too often. Bugs were there, but why concentrate on the black spot (which can be overcome with SPC) when there is so much more to praise? In comparison with this, a lot less has been said about the different 'versions' of

the Spectrum which have emerged since its introduction. Presumably, later versions sought to improve on various less-than-perfect aspects of earlier ones.

Similarly, when comparing the keyboards of the Oric 1 and Spectrum, many writers seem to believe that there isn't much to choose between them. I don't know whether to laugh or cry. The Oric 1 keyboard most certainly felt much to be desired, but surely when compared with the Spectrum's, its superiority is unquestionable.

Talking of keyboards, the Oric's 'Upgrade Shock' seems to have caught your imagination. Sure, £60 does seem a lot of money to spend on an upgrade, but you forget this upgrade includes the new ROM and the Atmos keyboard, which is excellent and not just a 'pretty red and black case' as you put it. Compared with the £40-£50 charged for a decent Spectrum keyboard this seems very reasonable. Please explain the bias for the Spectrum.

The other Oric 'bug' most frequently mentioned is its unreliability with tape recorders. Sorry guys, but I'm afraid my battered nine-year-old tape recorder gives me as good results as anyone using any domestic tape deck with any micro. Yes, even at 200 baud! Sure, it doesn't give me 140 cent but if I were prepared to spend another £40-£50 of my student grant to buy something dedicated, as these poor Commodore users are forced to, I think I would get as good as, if not better, results than they do.

Serial attributes, ah, that's something that you can really get your teeth into, eh? Here again, you seem to choose to play down the fact that the employment of serial attributes leaves the Oric with as much usable memory as the Commodore 64 and often four times that of the Beeb.

So come on guys, please take note and give everyone a break. Make criticism where criticism is due, but give praise where praise is due.

John Wilson,
Edinburgh.

Ah... we don't lead the feeling here, we merely reflect it. Oric prompts a huge mailbox of complaints. We print only the most poignant, as you see here. And, to be fair, we write an awful lot about Oric, so many would say we are biased towards it. Finally, what's this guys? — Ed.

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.

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Oric modem and lightpen coming

Q When I purchased my Oric 1 the sales brochure stated that there would be a modem available soon. As I've given up all hope of Oric coming up with a modem within the next millennium could you please tell me if you know of a firm which makes an Oric-compatible modem.

I've also heard rumours that there's a light pen available, but where from? Finally, can you recommend a decent joystick interface, and tell me where I can acquire one of these marvels, as we have none of them in Plymouth.

R Skinner,
Efford, Plymouth.

A You obviously haven't been paying attention. Nip down the road and buy six copies of this issue of PCN as a penance. The Oric modem (Issue 64) is due in the shops very shortly. It will cost £100, and should work for the Oric 1 and Atmos. PCN has also heard one rumour of an Oric light pen, but it turned out to be false. If anyone out there does know of one we'd be pleased to hear about it.

Joystick interfaces, however, are starting to abound. Pace, on Bradford 729306, has been producing one for some time. Downsway (03727-27222) has recently released a more sophisticated one for £29.95, while Oric is planning a standard interface (Issue 63).

MSX machines and the Spectraideo

Q Issue 52 featured an article on the MSX computers from the Japanese manufacturers. I also read that with the arrival of the machines the MSX standard may take off. I would therefore be very interested if you could answer several questions, as I own a Spectraideo 318. What is currently available or what is likely to become available in the way of software for the Spectraideo? Are any software houses producing software for the Spectraideo? What is the state of the computer

market for Spectraideo and the Japanese machines? Are any retail outlets selling the Spectraideo, or will they be selling MSX machines?

WJ McKenzie,
Invercargill, N Zealand.

A There isn't a great deal of software for the Spectraideo, and this hasn't changed much since it arrived in the UK around six months ago. Spectraideo said an MSX adaptor for the cartridge slot would be made available so it could run MSX cartridges, but we're unlikely to see this until you can buy MSX cartridges in the shops.

We don't know of any houses working on software, and it's likely any Spectraideo stuff that was coming would have turned up by now. The machine may not really have caught anyone's imagination sufficiently for it to be widely sold, but the MSX companies seem to have a number of software houses and retail outlets interested, and therefore should have a fair crack of the whip.

If you want further information on Spectraideo write to Spectraideo Ltd, 165 Garth Road, Morden, Surrey, in the UK. There may be someone nearer New Zealand who can tell you, but you'd probably know more about that.

Logabax printer runs and runs

Q I would like to run my Logabax LX180 printer from either a BBC Model B or a Newbrain AD.

Can the printer be connected to either computer, and if so, how do I go about it?

J Eagles,
Peterborough.

A Well, here's one for the 'Where are they now?' column. If the advice you're about to get still doesn't help we'd advise you to hang on to the printer anyway and sell it eventually to an Industrial Archaeology Museum.

The Logabax LX180, now superseded by the 213 and 217 Series printers, should run perfectly well off the BBC's parallel port. The instruction to use the port is *FX5.1.

So far so good. But the Centronics interface, however standard it may be, is some-

times vulnerable to the speed of the host machine. This isn't a problem that you can correct by tampering with the software.

As for the Newbrain (Where are they now? See Issue 34), you may have a little more work to do. The Newbrain has no parallel port.

But the expansion unit has such a port, and if that isn't to your taste there are still suppliers with Newbrain accessories ready to help out. One such is Kuma (07537 4335) which sells a serial-to-Centronics converter for the machine for about £99.

Modems to use with Interface 1

Q I am interested in using a modem via the RS232 interface on the Interface 1, with my 48K Spectrum.

Can any modem be connected and how is this possible if software is needed to use the Interface 1?

I also want to know if any modem would be completely compatible using the RS232 since I've heard the Prism modem for the Spectrum is not.

Also, is any modem that works at 1200/75 baud able to dial up Prestel without special equipment?

Robert Walker,
Halifax, W Yorks.

A Yes, it is possible to connect any modem that has an RS232 interface to Interface 1. But, as you correctly point out this is little use without the software to drive it.

The major problem with the Spectrum is it has only a 32-column screen, whereas most databases use either a 40-column or 80-column format. Prestel, moreover, like other viewdata services, requires special software to handle the decoding of colour and other information.

The Prism modem provides both the hardware and software in ROM to allow the Spectrum to work as a viewdata terminal. It cannot, however, be used with 300/300 baud bulletin boards or non-viewdata services like British Telecom Gold.

But the Prism modem is capable of user-to-user communication, although Prism has yet to release the software that allows you to do this.

Printer restrictions with BC Basic

Q I own a Commodore 64 and am thinking about buying BC Basic, published by Kuma Computers. Can you tell me if any restrictions on the types of printer I could use — Commodore's own including the 1520 printer/plotter, or other makes — while using BC Basic?

Andrew Scott,
Dundee.

A Yes, there are certain restrictions, though none are insuperable. If you use one of the Commodore printers designed for use with the 64, such as the 1526, or the 1520 plotter, you should have no trouble at all. One slight catch with the plotter is that it has a device number of 6, while most software written for use with a printer expects a device number of 4 or 5. However, this wouldn't apply with BC Basic.

Your real difficulties arise when you start looking at other printers, including Commodore equipment not designed for the 64 such as the range of printers designed for the Pet series, or with Centronics printers.

Commodore's range operate with an IEEE interface and to use them you need an interface cartridge and, usually, some software. The problem is this software will often sit in the same area of memory as your BC Basic program. This might also apply to any kind of printer-driver program, usually for Centronics printers.

This problem can be avoided by using a Centronics interface that uses the cartridge port to power the interface while holding the routines on cartridge. This eliminates the memory conflict but, of course, ties up the cartridge port which you need for BC Basic.

So, you have to buy a motherboard to hold two or more cartridges.

It largely comes down to a question of cost, bearing in mind the motherboard and interface aren't necessary with the 64 range of printers. The reason for taking the more expensive route is that you'll get better quality print from something like an Epson while still getting reasonable value for money.

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Issue 13, June 3-9.

Pro-Tests: Teletviter for Dragon 32, Aerosoft Forth for Spectrum, GPS graphics processing system for Apple II - joystick, rulers, Ayle.
Features: Dragon micros Tandy, Oric music part 2, transferring Basic for Colour Gene and Genie II.

Gameplay: Everest Ascent (Spectrum), Colour, Genie roundup, Micro Maze (Jupiter Ace), Oris (Atari).

Program Cards: Cupid (Oric), Alien (Dragon 32), Time Bomb (Atari).

Databases: peripherals.
Microcopia: Spectrum, Part 1.

Issue 14, June 16-18.

Pro-Tests: Apple Accelerator II board, Modula 2 (Apple II), Oric, joystick Control Unit 16, Kempston Centronics Interface, BBC Speech Synthesiser.
Features: Newbrain Basic part 1, Sirius design, Apple II Didams (Spectrum), Monopole (Commodore 64), Automopoli (Spectrum), Dragon dramas.

Program Cards: Time Bomb (Atari), count, Sheep Drive (BBC B).

Databases: Software.
Microcopia: Spectrum, Part 1.

Issue 15, June 16-22.

Pro-Test: Com 35, Address Manager (Spectrum), Syrus (Commodore 64), MST Database (Epson IX-20), Virus Input Module (Apple II).
Features: Newbrain Basic part 2, Genie scene.
Gameplay: Cleared for Landing, Playing the Ace (Apple II), Vultures, Star Jammer (Dragon 32).

Program Cards: Mover (BBC B), Sprite Clock (Commodore 64), Pirate Island (Atari, 3 of 9), Microdrom (Colour Gene), Brickbat (Dragon 32).

Databases: Hardware.
Microcopia: Spectrum, part 2.

Issue 16, June 23-29.

Pro-Test: Atari v Acorn, word processing for the Commodore 64, Sunfile for CPM, MPF II printer, Z80 Pack for BBC.
Features: ZX81 Maths, US mail order, Atari graphics.
Gameplay: Computer Scrabble (Spectrum), Education (BBC), Horace and Spiders (Spectrum), Catcha Snatcha (Vic 20).

Program Cards: Video Titrer (TP99A), 1 of 6, Bowling (Spectrum), Pirate Island (Atari), cont.

Microcopia: Spectrum, part 3.

Issue 17, June 30-July 6.

Pro-Tests: Dact-16, The Organizer (CPM), Trac and ZX Test (Spectrum), Jaks (100 dayshew), Videx Ultra Term (Apple II).
Features: Leasing part 1, Atari screen action.
Gameplay: Oric chess, Grand Master (Commodore 64), Escape from Orion (BBC), Jet Pac (Spectrum), The Ring of Darkness (Dragon 32), Spectrum spectacle.

Program Cards: Video Titrer (TP99A) cont., Pirate Island (Atari) cont. Word processor (BBC), Word Processor (BBC).
Microcopia: Sound, part 1.

Issue 18, July 7-13.

Pro-Tests: Tandy 100, RS232 interface (ZX81), ROM pager (Commodore), Interface printer buffer, IBM Personal Basic, Spectrum assembler, Newbrain WP.
Features: Leasing Part 2, Lynx music.
Gameplay: Spectrum Backgammon, BBC Snooker, Commodore 64 round up, Serpentine (Vic 20), Post (Spectrum), Spectator (Safari), Program Cards: Word Processor (BBC), Fruit Machine (Spectrum).
Microcopia: Sound Part 2.

Issue 19, July 14-20.

Pro-Test: 16-bit chips, Stock count (Epson HX20), Mailplus (Torch), Smith-Corona daisy-wheel ZX81 word processing.
Features: Insurance, buying second-hand.
Gameplay: Escape MCP (Oric), Escape from Perilous (Atari), Apple round up, Temple of Apollo (Oric), Airline (Spectrum), Heathrow (Spectrum).
Program Cards: Colour Code (Atari), Wire (Dragon 32).
Microcopia: Sound, part 3.

Issue 20, July 21-27.

Pro-Tests: Raide bareboard, Vic digital tape drive, Seikoisha colour printer, Toolkit (Spectrum), Bonus (PET payroll), Newbrain monitor.
Features: Computer art, Dragon scrolling.
Gameplay: Rabbit Trail (TP99A), Artex Challenge (Atari), Vic 20, TP99A, BBC round-up, Just (Spectrum), Molar Mail (Spectrum), Print Shop (Spectrum), Time-Lords (BBC).

Program Cards: Tumbler (Oric), Weck (Dragon), Atari Errors, Speed Race (Vic 20).
Microcopia: 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), Hammer House of Horror (Spectrum), Jumpman (64), Jumping Jack (Spectrum), Fourth Encounter (Vic), Cyclons (64).
Program Cards: Collection (Vic), Bomber (64), Defender (BBC).
Microcopia: Sound, part 5.

Issue 22, August 4-10.

Pro-Test: Spectrum 10th BBC graphics, Music synthesiser, IBM plotter, Brother daisywheel, Mailroom keyboard, Magpd.
Features: Genie assembler, Oric machine code.
Gameplay: River Rescue, Oric Attack (Atari), Zork (64), Knot in 3D, 3D Combat Zone (Spectrum), Mortal (Oric), Vektor's Lair (Spectrum).
Microcopia: CPM part 1.

Issue 23, August 11-17.

Pro-Tests: 286, 286-G, Tawford, BBC microfiles, Microdrive, Tandy Model 4.
Features: Dragon machine code, Atari controllers.
Gameplay: Bridge Master, Hyx, Mainz, Miler (Spectrum), Atari roundup, Candy Floss (Spectrum), Oric, Everest (Dragon).
Microcopia: CPM, part 2.

PERSONAL COMPUTER NEWS
Is Sir Clive's the best?

Issue 24, August 18-August 24.

Pro-Tests: 1-Maker III, Spectrum Fifth, daisywheels survey, Spectrum digital tracer, Laser.
Features: Videotex, Dragon machine code.
Gameplay: Oric roundup, Cookie, Egg-Farm, Xadom (Spectrum), Sea Lord (BBC), Lustrane (Dragon), The Island (64).
Microcopia: Commodore 64, part 1.

PERSONAL COMPUTER NEWS
RETURN OF THE ATARI

Issue 25, August 25-August 31.

Pro-Test: Electron, Sonoma Basic, Oric monitors, Microdrive.
Features: Newbrain map, Acorn Atom, Dragon machine code.
Gameplay: Suspended (64), Terror Daktils, Franz AM (Spectrum), Dragon roundup, Jagger (Oric), Frogger (IBM).
Microcopia: Commodore 64.

Issue 26, September 1-September 7.

Pro-Tests: Microtan 65, BCPL, BBC tracer, 80 column PET, Oric interfaces.
Gameplay: Magic Mountain, Smugglers Cove (Spectrum), Spectrum roundup, Matrix, (64), Ninja Warrior (Dragon), Dallas, (Oric), Call to Arms (IBM).
Microcopia: Commodore 64.

Issue 27, September 8-September 14.

Pro-Tests: Sharp MZ700, BBC Exp, Apple editor, IBM mic, ZX81 surgery.
Gameplay: Zap-Zap, Zzoom (Spectrum), Spectrum roundup, Hover Bover, Benji Space Rescue (64).
Microcopia: Dragon, part 1.

Issue 28, September 15-September 21.

Pro-Tests: Zenith Z100, Small Logo, Atari Supergraphics, Newbrain CPM, IBM mic.
Gameplay: The Witness, Super Scramble, Stix (64), Harrier Attack (Oric), Monaco Grand Prix (Dragon), Pharaoh's Tomb (Spectrum).
Microcopia: Dragon, part 2.

Pro-Tests: NEC's Advanced Personal Computer, Financial Planner (IBM), Kompan's a.b.c. Countab, How Do You Spotter (Spectrum), Prom VTAS50, Extended Basic (Dragon).
Features: Spectrum machine code.
Gameplay: Halls of Death/Sword of Fargol (64), 747 Flight Simulator (BBC), Dragonfly (Dragon 32), Forensic Note Invaders (BBC).
Programs: Search (ZX81), Comp.

Databases: Hardware.
Microcopia: Everything you wanted to know about programming, part 1.
Clubset: Clubs.

Issue 29, September 22-September 28.

Pro-Tests: Kaypro II, Stock Count (Spectrum), Educational games (BBC), Brother EP22 electronic typewriter, ADS Centronics Interface (Spectrum), Jupiter Ace.
Features: Tandy Graphics, BBC Operating System.
Gameplay: Yaballa (Spectrum), HX44 roundup, Slinky (Atari), Hexport (64).

Programs: Mini Math (Spectrum), Multi-Square (Spectrum).
Databases: Peripherals.
Microcopia: Everything you wanted to know about programming, part 6.

Issue 30, November 10-November 16.

Pro-Tests: Tiger from H.H., ZX81-Forth, Exom (Oric), Cycle Plan, Growth Tracker/Deja Duet Master (Spectrum), Li-Com (Apple).
Features: Newbrain sound, BBC FS commands.
Gameplay: Creepers (Vic 20), Exterminator (64), Spectrum roundup, Death Mines of Sinus (Dragon).
Programs: Falklands Raid (BBC), Mini Math (Spectrum), Pyramid Master (Spectrum), Li-Com (Apple).
Databases: Software.
Microcopia: Everything you wanted to know about programming, part 7.

Issue 32, October 13-October 19.

Pro-Test: Mattel Computer Adapter (Intellivision), Sprig-Gen (BBC), Typing Strategy (Apple), MCode 2 (Spectrum), Gitchex Epron Programmer (Apple).
Features: Telex options, Inside the Genie.
Gameplay: Space Shuttle Froger (Dragon 32), Atari roundup, Progress (Spectrum).
Databases: Software.
Clubset: Clubs.
Programs: Bees Away (BBC), Composer (Oric).
Microcopia: Everything you wanted to know about programming, part 3.

PERSONAL COMPUTER NEWS
THE ATARI CONNECTION

Issue 33, October 20-October 26.

Pro-Tests: CWP's Cortex, Sinclair ZX Interface 2, Watford DFS (BBC), Wordsword (BBC), Atariwiner.
Features: Oric Operating System.
Gameplay: Dragon roundup, Hunter (64), Cripick Luna Crabs (Spectrum).
Program Cards: Key Utility (Lynx), Bees Away (BBC), French Test Card (Apple).
Microcopia: Everything you wanted to know about programming, part 4.

Issue 34, October 27-November 2.

Pro-Tests: NEC's PC-5020A, Simply File (64), The Forest (Spectrum), Amcom DFS (BBC), Curious Microscope (Spectrum).
Features: Oric Machine Code.
Gameplay: Fort Apocalypse/Procyon (Atari), Death Cradell (Ching, Dragon), Torch Canyon (BBC), Football Manager/Pool (Spectrum).
Programs: French Test (Apple), Babyfall (ZX81), Count (Vic 20), Mes-Arth (Vic 20), Road Hog (BBC).

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

Issue 35, November 3-November 9.

Pro-Tests: Kaypro II, Stock Count (Spectrum), Educational games (BBC), Brother EP22 electronic typewriter, ADS Centronics Interface (Spectrum), Jupiter Ace.
Features: Tandy Graphics, BBC Operating System.
Gameplay: Yaballa (Spectrum), HX44 roundup, Slinky (Atari), Hexport (64).

Programs: Mini Math (Spectrum), Multi-Square (Spectrum).
Databases: Peripherals.
Microcopia: Everything you wanted to know about programming, part 6.

Issue 36, November 10-November 16.

Pro-Tests: Tiger from H.H., ZX81-Forth, Exom (Oric), Cycle Plan, Growth Tracker/Deja Duet Master (Spectrum), Li-Com (Apple).
Features: Newbrain sound, BBC FS commands.
Gameplay: Creepers (Vic 20), Exterminator (64), Spectrum roundup, Death Mines of Sinus (Dragon).
Programs: Falklands Raid (BBC), Mini Math (Spectrum), Pyramid Master (Spectrum), Li-Com (Apple).
Databases: Software.
Microcopia: Everything you wanted to know about programming, part 7.

PERSONAL COMPUTER NEWS
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Issue 37, November 17-November 23.

Pro-Test: Apricot, Paint (Atari), MicroMacs, Toolbox, Scissors Computerate (Atari VCS 2600), Big Feas.
Features: Flight simulators, Spectrum screening.
Gameplay: Empire/Treasure Tomb, Crystal Chalice, Temple of Zorox (Dragon 32), Cobas Maze/Bewitched (Vic 20), Cosmic Convergence (64), Bagabos-Gov (Spectrum).
Programs: City Defense (Oric), Falklands Raid (BBC), Pyramid (Spectrum), Monitor (64).
Databases: Clubnet.
Microcopia: Everything you wanted to know about programming, part 8.

PERSONAL COMPUTER NEWS
THE ATARI CONNECTION

Issue 38, October 20-October 26.

Pro-Tests: CWP's Cortex, Sinclair ZX Interface 2, Watford DFS (BBC), Wordsword (BBC), Atariwiner.
Features: Oric Operating System.
Gameplay: Dragon roundup, Hunter (64), Cripick Luna Crabs (Spectrum).
Program Cards: Key Utility (Lynx), Bees Away (BBC), French Test Card (Apple).
Microcopia: Everything you wanted to know about programming, part 4.

Issue 38, November 24-November 30.

Pro-Tests: Coloco's Adam, Small Business Accounts (Spectrum), Masterfile (BBC), Monitor roundup.

Features: Apple programming, NewBrain editor part 1, Dragon action part 1.
Gameplay: Dragon roundup, Zep-Phill Blue Max (Atari), Skramble/Falcon Patrol (64), 737 Flight simulator (BBC).
Programs: Shipment (Spectrum), Monitor (64).
Databases: Hardware.
Microcopia: Guide to Monitors.

Issue 39, December 1-December 7.
Pro-Tests: Dragon 64, Tandy CGP-20, White Knight II (BBC), Cross Reference Utility (IBM).
Features: NewBrain editor part 2, Dragon Action part 2.
Gameplay: Orc roundup, Haunted Hedges/Corons of Genon (Spectrum), MicroOne Hundred & Eighty (BBC), Atari roundup.
Programs: Lower CLS (Spectrum), Shipment (Spectrum), Monitor (64), Basic Search (BBC).
Microcopia: Buyer's Guide to Micros.

Issue 40, December 8-December 14.
Pro-Tests: Times 2058, Thermal Printer TP-10, Cambridge Computing joystick (Spectrum), Beech-york The Synth Music Processor (BBC), Viazette/Viazepell (64), Education games (Spectrum).
Features: NewBrain editor part 3, Dragon Action part 3.
Gameplay: Football Wizard (Vic 20), The Quest of Merriwad (64), Way Nary's Savage Pond (Atari).
Programs: Link Four (Spectrum), Tilt (Dragon).
Microcopia: Buyer's Guide to Peripherals.

Issue 41, December 15-December 21.
Pro-Tests: Apple II, Byte Drive 500, IBM AC Power Cleaner, Commodore 170, Colour Monitor, BC Base (64), Database MST-Calc (Dragon).
Features: Computerised Psychotherapy (BBC), Spectrum Display.
Gameplay: Micropoly/Pettrigere's Diary (Dragon), 64 roundup, Dimension Destroyers/Sheer Pan (Spectrum).
Programs: Convoy Inlander (Spectrum), Grid Bike (Vic 20).
Microcopia: Buyer's Guide to Software.

Issue 42, December 22-January 4.
Pro-Tests: Spectrum add-ons (I-Microcomputers system), Oracle Filestar, Games Designer (Spectrum).
Features: Micros of 1983, Computer Security, BBC word processing, Dragon Action part 4.
Gameplay: Intercontinental Football (64), Grouch/Cherished Flag (Spectrum), Way OutJet, Boot Jack (Atari), Spectravaders/Outback (Vic 20), Danger Ranger/Up/Periscope (Dragon 32).
Databases: Clubnet.
Microcopia: Games Special.

Issue 43, January 7.
Pro-Tests: IBM Junior, Grafpad (BBC), Walters VM80 printer Display (Spectrum).
Features: Computerscape, Spectrum Display, Tabs on Orc (Spectrum), Trace Race/Pinball (Dragon 32), Colour Genre roundup, Hunter Killer No. 2, Wimpy (Spectrum), Crazy Caveman/Goodness Gracious (64).
Programs: Jungle Chase (Orc), Screen Dump (BBC).
Databases: Hardware.
Microcopia: Election part 1.

Issue 44, January 14.

Pro-Tests: Hitachi MBE-1602, Acorn Teletext (BBC), Integrex Colour printer, DTL-Boxer (64), Dian/Microprint 42-51 Multifont (Spectrum).

Features: Adventure games, Colour Genre characters.
Gameplay: Devil Assault/Wages + Dragon Killer (Dragon 32), Sonar City/Forbidden Fire (64), Survival/Outbound (Vic 20).
Programs: Mindfield.
Databases: Peripherals.
Microcopia: Election part 2.

Issue 45, January 21.
Pro-Tests: Portables - Commodore SX64, Olivetti MII, Acorn sparklet printer, Turbo 20 day-weekly, Spectrum educational software, BBC graphics extension ROM.
Features: Bargain buys: Making money with your micro.
Gameplay: Viking and Pulp Crawl (Dragon), Traxx and Wild West Hero (Spectrum), Atari/Commodore 64 roundup.
Programs: Multifaster, Fighter (Commodore 64).
Databases: Software.
Microcopia: Election part 3.

Issue 46, January 28.
Pro-Tests: Apple Macintosh, BBC sideways/BC word processing interfaces for Commodore 64; Silver Reed EX44 typewriter printer; Bridge on Spectrum and Dragon; BBC filing program.
Features: Buying by mail-order; programming the Memotech.
Gameplay: Barry Burgers and Gangers (Spectrum), Birdie Barages and Plankwalk (BBC), Blue Moon and Dancing Feats (Commodore 64).
Programs: Caves of Treasure Clubnet.
Microcopia: Modems and communication.

Issue 47, February 4.
Pro-Tests: Sinclair QL, Atari Touch Tablet, Silver Reed EXP500 diashield, IBM Cobol, BBC SPL Check.
Features: Programming the Memotech part 2. Low cost printers.
Gameplay: Motherhood and Quintic Warrior (Commodore 64), Two Gun Turtle and Multigames (Orc), Apple adventures, Spectrum roundup.
Programs: Poi Hole (Dragon).
Databases: Hardware.
Microcopia: A To Z of Atari part 1.

Issue 48, February 11.
Pro-Tests: Sinclair QL, Atari 800X/QL, Atari 32K disk drives, low cost monitors; Aztec C (Apple), BBC educational software.
Features: Sideways printing on Epson HX20.
Gameplay: Bedlam and Morris Meets the Bikers (Spectrum), Commodore 64 roundup; Zor-

gon's Kingdom and Flight Zero-One-Five (Vic 20).
Programs: Gridtrap (Lynx).
Databases: Peripherals.
Microcopia: A To Z of Atari part 2.

Issue 49, February 18.
Pro-Tests: Orc Atmos, tracker ball controller, Spectrum speech synthesizers; Rainbow Writer (Dragon); Colour genius assembler; Spectrum educational programs.
Features: Computer jargon; 42-column display on Spectrum.
Gameplay: Quadriant and Jetpac (Vic 20), Crazy Ballroom and Supacatchatropo (Commodore 64).
Programs: Sprite generator (Commodore 64).
Databases: Software.
Microcopia: A To Z of Atari part 3.

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

Issue 51, March 3.
Pro-Tests: Sharp's PC5000, Graphics Package (Orc), Fancy Font (CP/M, Torch), Superbase Application Database (64), Printer roundup-up, IEEE 488 Interface (BBC).
Features: Microdrive data files, Graphics Spectrum selection, Robopods (T1904A), Batty Builders/Bristles (Atari).
Programs: Millipede (BBC/Election).
Databases: Hardware.
Microcopia: Printers, part 2.

Issue 52, March 10.
Pro-Tests: Wren, MSX, Multisynch 64, Mr. T's Number Games etc (BBC, Spectrum, 64), Hybridcube (Orc, Atom).
Features: Adventure games.
Gameplay: Dragon roundup, Snorter/Free Fall (BBC), Spectrum roundup-up.
Programs: UFO (Vic 20), Morse code (BBC), Gary the Guit (64).
Databases: Peripherals.
Microcopia: Printer, part 3.

Issue 53, March 17.

Pro-Tests: Yamaha Y1503, Tandy TRS-80 model (RS323), MDDFS (BBC), Toolkit (BBC), The Quill (Spectrum).
Features: Screen technology, Atari graphics.
Gameplay: Megahawk/Megawarg (64), Castle of Doom/Fishy Business (Dragon 32).
Programs: Battle States (Spectrum).

Databases: Software.
Microcopia: Reaching for the Atmos, part 1.
Issue 54, March 24.
Pro-Tests: IBM's Portable PC, Spectrum keyboards, Beeblon, Games Designer (Vic 20).
Features: Atari graphics, Chip shortage.
Gameplay: Airstrike 2/Pole Position (Atari), Deathscape/Fighter Pilot (Spectrum), BBC roundup-up, Pithello (64), Charptat (CGL M-5).
Clubnet: User groups and clubs.
Microcopia: Atmos, part 2.

Issue 55, March 31.
Pro-Test: HP 150, Light pens (BBC, 64), Micro-Prolog (Spectrum), Electron Graphics System.
Features: Spectrum routines, Conners rights.
Gameplay: Patience/Metagalactic Llamas Battle at the Edge of Time (Vic 20), Loki/Rat Split (Orc), Atari.
Programs: Fast Rat (Dragon 32), Flash simulator (Atari).
Databases: Hardware.
Microcopia: Communications, part 1.

Issue 56, April 7.
Pro-Tests: Voratz Type in Talk, MicroCommand (BBC, Spectrum, 64), Commodore 1001 disk drive, Apple's Macintosh, Adventure (Dragon 32), Knoware (IBM).
Features: Spectrum maths, Animator in history.
Gameplay: Handback Aztec Challenge (64), Defence Force/Psychic II (Orc), Volcanic Planet (Spectrum).
Programs: Ace King (Vic 20), Lynx VAL.

Databases: Peripherals.
Microcopia: Communications, part 2.
Issue 57, April 14.
Pro-Tests: Microkey, Morex Disk Drive Interface (Spectrum), Atari 1020 colour printer/plotter, FT Mergewise (IBM, PC, Sierra).
Features: Spectrum maths, Portables.
Gameplay: Learning games, Fortables (Spectrum), Orc, Air Traffic Control

Super Spy (Dragon), Neptune's

Issue 58, April 21.
Pro-Tests: Wrap-Bit Rabbit, Pixii Apple graphics, Edward BBC word processor, Dynamic Graphics/Painbo/Melbourne Draw graphics tools on Spectrum, Premier Sprite board for Dragon.
Features: Commodore 64 extended files, Microfiles made easy.
Programs: C-File database for Spectrum 48K.
Microcopia: Spectrum, 64, BBC games reviewed.

Issue 59, April 28.
Pro-Tests: Grid Command, Husky Hunter, Canon X-07, Apple Homeworld, Commodore 64/FM, Dragon Sprite Magic, Atari printers, Minor Miracles modem.
Features: Assembler language.
Programs: Hubert for Orc.
Microcopia: Spectrum, BBC, Dragon, Atari games reviewed.

Issue 60, May 5.
Pro-Tests: TRS80 48K portable, BBC Disk Doctor, Spectrum Taw-ell II, Quinkey keyboard, Bob robot.
Features: Orc FILL command.
Gameplay: Pytron and Red Baron (Spectrum), Avengeit and Dragon Hawk (Dragon), Colour Genre roundup-up.
Programs: Poison Toad on Commodore 64.
Microcopia: Graphics on Commodore 64, Orc and Atari.

Issue 61, May 19.
Pro-Tests: Epson FX-8, Apple Pro-DOS, Commodore 64 Colosium 2 chess, Dragon Sprint computer, Solidisk RAM expansion for BBC.
Features: Artificial intelligence, assembler.
Gameplay: Atari roundup-up, Commodore 64 roundup-up, Quest and Operation Gromlin (Orc).
Programs: BBC/Election 3D graphics, Orc remember, Commodore 64 split screen graphics.

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

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

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Commodore in quotes

When using INPUT# to pick up previously recorded text data on Commodore computers, problems may arise if the text contains colons or commas. The problem also arises on using INPUT from the keyboard. In this case the computer responds with the extra ignored message.

The solution with INPUT is to type a set of quotes in front of any typed data and for INPUT# to record the data with preceding quotes:

```
PRINT#X, CHR$(34)D$
Where x is the file number and
D$ is the string to be recorded.
S P Rodgers,
Camden Town, London NW1.
```

Adam and the drive door saga

In *Microwaves*, Issue 66, there appears a tip for the Adam computer system. However, the tip is not quite correct as the Adam does not detect an open data pack drive door.

The answer to the I/O error problem is, therefore, to remove and re-insert the digital data pack in the drive.

Thomas Bolin, Independent Coleco Adam Users Club, Towcester, Northants.

Spectrum BIN solved by VAL

The command BIN on the Spectrum is extremely limited as it is not possible to write BIN followed by a variable, so you cannot input a binary number and find its decimal equivalent.

However, the following program gets round this prob-

lem by using the VAL command. It will also take negative numbers into account.

```
5 REM BINARY CONVERSION
10 INPUT B$
15 LET A$="":IF B$(1)="-"
    THEN LET B$=B$(2 TO LEN
    B$):LET A$="."
20 LET B$=A$ + "BIN" + B$
30 PRINT VAL B$
```

Robert Luben, Pirbright, Surrey.

Oric status is not inaccessible

Owners of the Oric 1 and Atmos may be interested to know that the status line above the top line of text is in fact easily accessible, as shown by the following program.

```
10 A$="MESSAGE ON STATUS
    LINE"
20 F=#BB7F:REM IOT 48K OF
    #3B7F IOT 16K
30 FOR X=1 TO LEN (A$)
40 POKE X+F, ASC(MID$
    (A$,X,1))
50 NEXT X
```

Note that this message is not removed by CLS or CTRL/L; you must rerun the program with the following substitution:

```
40 POKE X+F,32
or use a cassette command
(STORE, RECALL, CLOAD, or
CSAVE) or reset to clear the
message.
```

Of course, the string A\$ may be changed as desired. A possible application could be in a games program to display the score:

```
10 A$="SCORE: " + STR$
    (SCORE)
or else to give messages in a
word processor etc.
```

J P Hibbins, Chertsey, Surrey.

64 is ahead of its type

A useful facility found on the Commodore 64 is 'type-ahead', the ability to store up to ten characters in the keyboard buffer, until an INPUT is requested.

This can, however, have disadvantages for games which use the keyboard to move objects around the screen — unwanted keystrokes are stored up in the buffer. This can be avoided by restricting the size of this buffer to only one character, using the following poke:

```
POKE 649,1
Or for games which require
joystick control only, you can
```

Atari cassette salvage operation

The routine below will allow you to salvage programs that have been saved to cassette on any of the Atari machines. It works for programs that have been saved using LIST "C:" only, and not those that have been saved using CSAVE.

It also works for programs that have been saved using the Assembler cartridge. Rather than halt with an error message if the program has been corrupted, the routine simply skips the corrupted block and goes on to read the next block. In this way you can load most of your program even if part of it is unloadable.

To use the routine, first insert the cassette containing the program you are having difficulty loading and press Play on the recorder. Then run the routine and press any key when you hear the beep. When you hear two beeps insert a new cassette and press Play and Record, then press any key. The routine creates a fresh copy of your program which should load more easily.

F M O'Dwyer, Dublin, Ireland.

```
10 DIM FILE$(FRE(0)-100):FILE$="" :CLOSE
    #1:OPEN #1,4,0,"C":TRAP 30
20 GET #1,C:FILE$(LEN(FILE$)+1)=CHR$(C):
    PRINT CHR$(27);CHR$(C):GOTO 20
30 IF PEEK(195)=5 THEN PRINT:PRINT
    "OUT OF MEMORY - SORRY":END
40 IF PEEK(195)=136 THEN CLOSE #1:OPEN
    #1,8,0,"C":PRINT #1;FILE$;:END
50 TRAP 30:GOTO 20
```

The function of warm booting an Oric/Atmos

This short routine can make the Oric/Atmos function key work as if it were the warm boot button on the underside of the computer.

Once the program has been loaded and run the function key causes a jump to a non-maskable interrupt routine. To avoid looping, it first clears the patch at address #24A. Once the key has been used the direct command POKE#24A,#4C must be entered to re-enable the routine.

R F Harvey, Hampton Hill, TW12 1RP.

```
10 FOR N=0 TO 17
20 : READ D:POKE #400+N,D:NEXT N
30 DOKE #24B,#400:POKE #24A,#4C
40 PRINT "LOADED":END
50 DATA #48,#AD,#09,#02,#C9,#A5
60 DATA #F0,#02,#68,#40,#A9,#40
70 DATA #8D,#4A,#62,#4C,#B2,#FB
```

The Oric turns on to disco rhythms

Here is a sound to light routine for the 48K Oric 1. Enter the routine exactly as shown, then connect a cassette recorder (or any source of music) to the Oric using the program loading lead.

With the plug half-way into the cassette you will be able to hear the music and see the lights. Run the program and switch the tape on and then adjust the volume on the cassette recorder until the lights flash in time to the music.

J Mughal, Southall, Middx.

```
10 P=781 : POKE#26A,10 : CLS :
    FLAG=TRUE : POKE 48035,0
20 IF PEEK(P)=2 THEN FLAG=TRUE :
    PAPER 0 : GOTO 20
30 IF FLAG THEN PAPER
    INT(RND(1)*6+1) : FLAG=FALSE
40 GOTO 20
```

use: POKE 649,0 which will stop any input from the keyboard.

The buffer may be returned to normal with:

POKE 649,10
David Gristwood, Sunderland, Tyne & Wear.

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After the art of motorcycle maintenance, the craft of computer coding. Harriet Arnold reports.

Plotters of cabbage-patch corner

A horticultural show is the last place you'd expect to find computer programming. Or it was until Nailsea's multi-user club decided to challenge Avon groups to a graphics competition as part of the local show's craft section. Programming will vie with preserves and petit point for the show goers' attention.

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Contact Brian Boyde-Shaw on Nailsea (0272) 851337.



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Explore new channels



The BBC's specially packaged interrupts have the potential to turn your micro literally into a sound investment. With just a rudimentary understanding of machine code it's possible to produce background music while a program is loading, or while you're playing a game.

The routines here are designed to be as versatile as possible, so many of its parameters are set up as a separate block of memory.

This means that it's possible to alter the envelope number, sound channel, tempo and tune itself while the interrupt routine is running.

The programs use the BBC's specially packaged interrupts, known as events. When a predefined event occurs, the computer is forced to stop whatever else it's doing and run the machine code routine provided by the user. Normally all events are disabled, but by issuing the appropriate instruction to the operating system, one or more may be enabled.

From Basic this is done by typing *FX14, (event number) and from machine code by calling an OSBYTE &OE routine. A table of various events is given on page 465 of the User Guide. The event may be disabled again with a *FX13, (event number) command.

Interrupt driver

There is a practical limit to the length of the user routine the micro can service before it starts to lose control of its normal functions, but a simple sound routine can easily be accommodated. Listing 1 gives the source code for a suitable event handler and sound routine. A description of the code involved should help explain exactly how the program works:

Line 30 defines where the assembled

```

10REM Source code for interrupt-driven music.
20FOR n%:=0 TO 3 STEP 3
30P%=&900
40[
50OPT n%
60.start
70CLD
80LDX#4:LDA#14:JSR&FFF4
90LDA#(sound MOD 256):STA&220:LDA#(sound DIV 256):STA&221
100RTS
110.sound
120TXA:PHA
130LDA#00:LDX#6FA:LDY#6FF:JSR&FFF4
140CPX#5:BCC.finish
150LDY#92:LDA(&90),Y:STA&97
160INY:LDA(&90),Y:STA&99
170INY:STY&92
180CMP#0:BE.NOTE
190LDY#0:STY&92
200.note
210LDY#9C:STY&95
220LDX#93:LDY#0:LDA#7:JSR&FFF1
230LDY#9B:STY&99
240LDY#0:STY&97:STY&95
250LDX#93:LDA#7:JSR&FFF1
260.finish
270PLA:TXA
280RTS
290]
300NEXT
310END
    
```

Listing 1

machine code should be stored. Page 09 is normally used as an RS423 cassette or envelope buffer, but for most games applications the four envelopes provided within page 08 should be sufficient, leaving 09 for storage of the interrupt routine. If the main program needs to use page 09, the interrupt code may be relocated elsewhere.

Line 70 sets the computer to binary mode, which is essential before any events are enabled.

Line 80 is the OSBYTE call which enables event 4. This event is triggered every time a vertical sync pulse to the TV or monitor is detected. Effectively this means an event is

generated every 1/50th second.

Line 90 resets the vectors that the BBC micro uses as signposts to the piece of code it is required to service on detection of an event. This is a two byte address and is stored in locations &220 and &221 (low byte first).

Line 100 returns control to Basic.

The main part of the machine code routine does the work of keeping the sound buffer topped in the background to another program. It operates as follows:

Line 120 stores the contents of the 6502's X register onto the stack. This value must be preserved and reinstated before control is handed back to the main

Listing 2

```

E
10REM Load data for two tunes into pages nine and eleven of memory.
20n%=&0960:REPEAT
30READ f%,d%
40?n%=f%:n%?1=d%:n%=?n%+2
50UNTIL d%=0
60n%=&0B00:REPEAT
70READ f%,d%
80?n%=f%:n%?1=d%:n%=?n%+2
90UNTIL d%=0
100END
110DATA 53,3,61,3,69,3,81,3,73,3,73,3,89,3,81,3,81,3,101,3,97,3,101,3,81,3,69,
3,53,3,61,3,69,3,73,3,81,3,89,3,81,3,73,3,69,3,61,3,69,3,53,3,49,3,53,3,61,3,33,
3,49,3,61,3,73,3,69,3,61,3,69,3
120DATA 53,3,61,3,69,3,81,3,73,3,73,3,89,3,81,3,81,3,101,3,97,3,101,3,81,3,69,
3,53,3,61,3,69,3,41,3,81,3,73,3,69,3,61,3,53,3,33,3,53,3,49,3,53,6,0,0
130DATA 33,10,81,10,73,10,69,10,57,10,61,10,89,20,49,10,97,10,89,10,81,10,77,1
0,81,10,101,20,109,10,101,10,97,10,89,10,81,10,73,10,69,10,61,10,89,20,49,20,53,
20,0,0
>

```

program (see line 270).

Line 130 generates an OSBYTE call with A set to &80 and this returns information about a variety of internal buffers, depending on the value in X. In this case, with X set to &FA, the number of spaces remaining in the sound queue for channel 1 will be returned.

You should carry out this check and leave the sound buffer alone if it is full, otherwise the main program will halt until there is room to put another note into it. **Line 140** checks if the buffer is full and if so, branches to the end of the routine.

The controlling parameters for the routine, set up separately from the code itself, are placed in a section of zero page memory normally reserved for the Econet system. This is done so that programs that make use of the user locations (&70 to &7F) will not be affected by this routine.

The locations used are given below:

```

&90 address of start of data (low)
&91 address of start of data (high)
&92 data pointer
&93 sound channel number (low byte)
&94 sound channel number (high byte)
&95 envelope number (low byte)
&96 envelope number (high byte)
&97 note frequency (low byte)
&98 note frequency (high byte)
&99 note duration (low byte)
&9A note duration (high byte)
&9B rest duration
&9C envelope reference

```

The address of the start of the note data is put into locations &90 and &91, the data pointer (&92) is set to 0, the duration of the rest between notes is put into &9B and an envelope number (1 to 4) is entered into &9C. The routine is started with CALL&0900. Locations &93 to &9A act as a parameter block for an OSWORD &07 call, which is made from within the machine code and is equivalent to a SOUND command in Basic. The rest of the routine works as follows:

Lines 150 to 170 read the appropriate sound data, two bytes at a time, from a separate data block into locations &97 and &99.

Lines 180 and 190 check whether the end of the note data has been reached. If so, the

Listing 3

```

10REM Sets up parameters and starts music.
20REM Press any key to swap tunes.
30ENVELOPE1,1,1,-1,1,1,2,1,32,0,0,-4,126,63
40ENVELOPE2,1,1,-1,1,1,2,1,18,1,0,-1,72,126
50?93=1: ?94=0: ?96=0: ?98=0: ?99=0: ?9A=0
60CALL&0900
70REPEAT
80 ?90=&60: ?91=&09: ?92=0: ?98=2: ?9C=1
90A=GET
100 ?90=0: ?91=&0B: ?92=0: ?98=0: ?9C=2
110A=GET
120UNTIL FALSE

```

data pointer is zeroed and the tune starts again from the beginning.

Line 210 loads the envelope number from the reference location (&9C) into its place in the OSWORD parameter block (&95). This is done each time a note is required, as the value is lost from &95 when the succeeding rest is played.

Line 220 is the OSWORD &07 call to add the note to the second queue.

Lines 230 to 250 repeat the sound call, but with the envelope and frequency parameters set to 0 and the duration value taken from the rest parameter (&9B).

Line 270 restores the value of the X register and **line 280** returns control to the main program.

Handling the data

The data block for the frequencies and durations of the notes can be located in a number of different places. The example data is stored in the rest of page 09, from the end of the machine code on, and part of page 0B, which is the user key buffer. Don't press any user keys when running this example.

The two tunes are JS Bach's *Jesu Joy of Man's Desiring* and the Disney theme *When You Wish Upon A Star*. The data is very simply constructed using the frequency table on page 181 of the User Guide and a keyboard music program like that on the *WELCOME* cassette.

Each data pair consists of a frequency and duration value, and the data is terminated with a double 0, which the machine code will detect as an end-of-data marker. Listing 2 reads the relevant data out of the data lines and pokes it into the

two pages of memory. If you want to check that the note data is correct before committing the machine code routine to it, you can do so by replacing lines 40 and 80 of listing 2 with SOUND1, -15, F%, D%: SOUND 1, 0, 0, r where r=2 in line 40 and r=0 in line 80.

Setting parameters

The third listing sets up suitable envelopes for each tune, loads the parameter block and makes a call to &0900 to start the interrupt driver. Touching any key will then change values within the parameter block to alternate the two tunes. Pressing Escape to leave the program will not stop the music, however. To do this, either issue a *FX13.4 command to disable the event, or press Break. Call &0900 will restart the music at any time.

The usual warning when entering machine code applies particularly strongly to this program. Save the source code before running it — a mistake will usually crash the machine. Most monitors will have trouble following the program while it is running as they themselves are being interrupted.

Having typed in, saved and run listing 1, do the same with the other two. If all is correct, music should spring forth on running the third.

A natural extension to this program would be to introduce a second voice. This could be quite easily achieved by checking and loading a second sound channel and modifying the data block appropriately. The code is easy to use from within other programs and adds user interest to almost any application.

John Bibby sets out the truth behind factorial calculations on the BBC Micro.

Join in the function

Factorials have a number of different useful applications, but although many calculators include a factorial function, it's not too common on micros. This article does for the BBC what Kevin Ball's article did for Spectrum factorials (Issue 56).

The functions shown in Listing 1 can be used to calculate factorials (FNfactorial) or for such things as nPr and nCr, which mathematicians use to denote the number of ways to select r objects at a time from a set of n objects. Functions FNnpr (n%, r%) and FNncr (n%, r%) do this for you. FNnpr is a recursive function, ie it calls itself.

You should also note the utilities FNmin, FNmax and FNround, which are useful for a number of applications.

Like Kevin Ball's programs for the Spectrum, FNfactorial (n%) flakes out if n% is greater than 33. But all is not lost, as

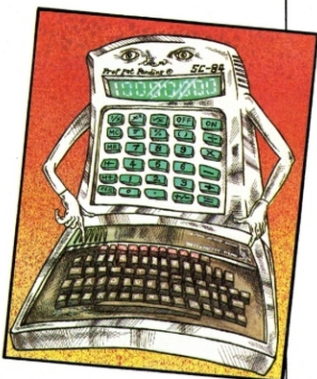
you can easily adapt the functions so they calculate the logarithms of the factorials rather than the numbers themselves.

Functions FNncr and FNnpr will work for larger values of n%. The required condition is that the maximum of r% and (n%-r%) should not exceed 33, but these functions will be sufficient for most practical work.

You can use them for calculating such things as the number of ways to select four playing cards from 13. This is FNncr (13,4), or 495. The inverse of this, or 0.00202, is the probability of selecting all four court cards from the 13 cards of one suit.

The functions given here can be used in a variety of probability applications. If you add the lines in Listing 2 to Listing 1 you will get the output in Figure 1.

Incidentally, the BBC LN function is roughly ten per cent faster than the LOG function.



Listing 1

```

50 DEFFNfactorial (n%)=FNnpr (n%,n%)
60
70 DEFFNnpr (n%,r%)
80 IF n%<r%OR r%<0 PROCerr1:=0
90 IF r%=0=1
100 IF r%=1=n%
110 =(n%-r%+1)*FNnpr (n%,r%-1)
120
130 PROCerr1:ENDPROC
140
150 DEFFNmin (x,y)
160 IF x<=y=xELSE=y
170
180 DEFFNmax (x,y)=x+y-FNmin (x,y)
190
200 DEFFNncr (n%,r%)
210 =FNround (FNnpr (n%,r%)/FNfactorial (r%))
220
230 DEFFNround (x)=INT (x+0.5)
  
```

Listing 2

```

10 max%=33
20 FOR i%=1 TO max%:PRINT:PRINT:PRINT i%,FNfactorial (i%):PRINT
30 FOR j%=1 TO i%:PRINT j%,FNncr (i%,j%):NEXT
NEXT
  
```

Figure 1

318.222 83865E33 — factorial 31.

1	31
2	465
3	4495
4	31465
5	169911
6	736281
7	2629575
8	7888725
9	20160075
10	44352165
11	84672315
12	141120525
13	206253075
14	265182525
15	300540195
16	300540195
17	265182525
18	206253075
19	141120525
20	84672315
21	44352165
22	20160075
23	7888725
24	2629575
25	736281
26	169911
27	31465
28	4495
29	465
30	31
31	1

These are the number of ways of selecting 1, 2, 3 etc objects from a total of 31.

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 8DH answer is wrong it should be 93
 DAA add 6
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With subtraction the DAA statement subtracts 6 if the result is a carry. The computer detects which operation is being carried out (add or subtract) by the N flag in the F register, which is set to 1 when carrying out a subtraction and reset for an addition. The H flag (Half-carry) is set whenever the first 4 bits are greater than 9.

It's easy to write routines to add more than 8 bit numbers. The H flag is automatically set if there is a carry to the next 4 bits and the DAA automatically adds it to the left 4 bits if the result is positive. If these 4 bits result in a value greater than 9, the C (carry) flag is automatically set. By using the Z80 ADC (add with carry) or SBC (subtract with carry) instructions we can transfer this carry to the next 8 bits to adjust that value.

The following is a BCD ADD subroutine that can be used for any amount of bytes by altering the value of the B register. On entry DE points to Score buffer and HL points to Points buffer:

```

AND A      ; Clear Carry Flag
LDB,4     ; 4 Digits
LOOP: LDA,(DE) ; Get 1st operand
          ; (score)
ADC       ; Add 2nd operand
A,(HL)   ; (points)
DAA      ; Adjust
LD(DE),A ; Put back in score
          ; buffer.
INCDE    ; Align to next
          ; operand
INCHL    ; Align to next
          ; operand
DJNZ     ; Do it again until B =
LOOP      0
  
```

It is then a simple matter to display the result on the screen by converting each hex digit to ASCII by adding 30 hex to align, for example: LD A,digit
 ADD A,30H
 LD(SCREEN),A; Display

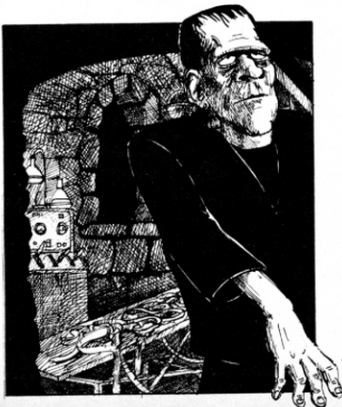
```

GRAPHIC:
CALL CLS      ; WIPE OUT ALL MESSAGES
CAL DISP     ; DISPLAY GRAPHICS ON TOP LINE.
LD HL,4427H  ; TOP LINE, LAST COLUMN OF SCREEN.
LD A,"*"    ; CHR:(42) NOW IN A REG.
          ; PUT ON SCREEN.
SET:
CALL INPUT   ; KEYBOARD SCAN RETURNS WITH
CP "R"      ; CHARACTER IN A REG. HAS 'R' BEEN
          ; PRESSED ?
JR Z,MAINLP ; YES SO RETURN TO MAIN PROG.
CP "+"      ; WAS IT A REQUEST TO DISPLAY NEXT
          ; 16 CHARACTERS
JR NZ,DEC   ; NO NOT +
LD LD A,(GRFNO) ; GET WHICH GRAPHIC NUMBER 128 = 1ST BLOCK
ADD:
ADD A,10H   ; INCREMENT TO NEXT 16 GRAPHICS.
CP 0C0H     ; IS A = CHARACTER 192 ?
JR NC,SUB   ; IF IT IS OR IF ITS >192 GO TO SUB
LD LD A,(GRFNO),A ; ELSE SAVE NEW GRAPHIC POINTER.
CALL DISP   ; AND DISPLAY THEM ON TOP LINE.
JP GET      ; THEN GO SCAN KEYBOARD FOR ANOTHER DO.
DEC:
CP "-"      ; IS IT A REQUEST TO DROP DOWN 16 CHAR
JR NZ,CURSOR ; NO., THEN CHECK FOR CURSOR MOVES.
SUB:
SUB 10H     ; DECREMENT 16 CHARACTERS.
CP 08H     ; IS CHARACTER = 128
JR C,ADD    ; IF LESS THAN 128 RESTORE TO LAST VALUE.
;
LD LD A,(GRFNO),A ; O.K SO SAVE.
CALL DISP   ; AND GO DISPLAY NEW SET OF 16 CHARS.
JP GET      ; RETURN FOR ANOTHER SCAN.
  
```

; This section checks cursor keys. If keys are pressed then # cursor
 ; is moved to the next graphic left or right. If 'D' is pressed
 ; this is a signal that you wish to design graphic so matrix is
 ; displayed '*' is deleted from Top RHS of screen.
 ;

```

CURSOR:
CP 08H      ; CURSOR LEFT KEY ?
CP Z,LEFT  ; YES GO MOVE "*" CURSOR LEFT
CP Z,RIGHT ; CURSOR RIGHT KEY ?
JP Z,FRIGHT ; YES MOVE # RIGHT.
CP "D"     ; DESIGN GRAPHIC ?
JR Z,DELASK ; GO AND DELETE #.
JP GET     ; NOTHING LEFT TO CHECK RE-SCAN.
DELASK:
LD HL,4427H ; SCREEN POS LAST COL TOP LINE.
LD A,20H   ; SPACE
LD LD A,(HL),A ; BLANK OUT *
;
; LOAD MATRIX ONTO SCREEN
;
LD HL,SCREEN ; POSITION OF GRAPHIC MATRIX.
PUSH HL     ; SAVE IT ON STACK.
LD C,08H   ; LOOP COUNTER.
LPA:
LD B,08H   ; LOOP COUNTER 8 X 8 = 64 POSITIONS.
LD A,MATCR ; MATRIX BLOCK INTO A.
LPB:
LD LD A,(HL),A ; SEND TO SCREEN.
INC HL     ; NEXT SCREEN POSITION.
LFB DE,20H ; DO UNTIL B = 0
LD DE,20H ; 48 FOR 48 COL SCREEN - 20H FOR 32
          ; SCREENS.
POP HL     ; GET ORIGINAL POSITION
ADD HL,DE  ; NEXT LINE OF SCREEN.
DEC C     ; SUB 1 FROM C VALUE.
JR Z,ALG  ; IF C=0 THEN MATRIX ON SCREEN.
PUSH HL   ; STILL NOT DONE SO SAVE HL.
JR LPA    ; GO LD B FOR ANOTHER 8 GOES.
ALG:
CALL FNDCHR ; GO AND GET GRAPHIC OVER # CURSOR.
; GRAFIK... START OF ROUTINE SUPPLIED LAST ISSUE.
;
; TO BE CONCLUDED.
; END
  
```





PLUS POINTS

Interface extras for Kenn Garroch's Electron.

The Plus 1 closes the gap between the Electron and the BBC, since it gives the former all the interfaces many machines have as standard such as a Centronics, analogue joysticks, and cartridge software.

Installation

The Plus 1 has the Electron's creamy colour, fits on the back and bolts on in much the same way as the Spectrum's Interface 1. It is the same width and height as the Electron and extends back about 3in.

Just remove the expansion bus cover and slot it on, do up the bolts and it's ready to go. After switching the machine on and typing `*HELP` the Electron comes up with:

```
EXPANSION 1.00
ADC/PRINTER/RS423
RS423 ? 1 could not find any other hole
mark or scratch resembling an RS423 port.
Acorn's explanation is that an RS423 will
be released along with a few 'other'
expansions on cartridge, hence the need
for internal software to run it.
```

On top of the Plus 1 are two slots for the cartridges. These have flip-down lids and are about half as long again as the cartridges. The rear of the Plus 1 contains the other two interfaces, the Centronics port and the analogue joysticks port. The latter does not appear to support the light pen facilities that the BBC's does.

Documentation

The Acorn spiral-bound manual covers

everything relating to the interfaces, as well as a number of the 'new' `*FX` commands necessary to run the various devices in the Plus 1.

The manual covers everything from installing the Plus 1 to what the new and altered `*FX` commands do.

There are also complete instructions that should allow the printer cable to be wired up.

Connection to the analogue port is via a 15-pin 'D' plug. This is the same as that used for the BBC joysticks so they are completely compatible. Attaching other analogue inputs to the port is also possible if they fit the specifications.

The ROM cartridges come in two forms: the first loads itself into memory much the same way as the cassette and disk systems. The second has the same effect as the sideways ROMs on the BBC, *ie* they are switched into memory instead of the Basic (between `&8000` and `&C000`). The `*ROM` command switches in the cartridge filing system and it is possible to use, from the current language, `*EXEC`, `*CAT`, `*LOAD` etc.

In use

The Plus 1 is as simple to use as it is to set up. The analogue port will probably be mainly used for joysticks. These work using the `ADVAL` command — the manual says `ADVAL 0 to 4` should be used to read the joystick.

Using the arguments 1 to 4 returns A/D values between 0 and 65535 in steps of 256,

for each of the inputs. In fact, it is possible to get the readings between 0 and 255 in steps of 1 by using the arguments 5 to 8 respectively.

To use the printer simply plug it in, hit `CTRL B` or `VDU2`, and away it goes. It may be necessary to enter `*FX6` to make the Electron send line feeds, but that depends on the printer.

Loading the software from the ROMs takes some time, as long as a disk load on the BBC. To use the software, insert the cartridge and turn the power on. The front slot then auto-boots with the normal Acornsoft loading screen. To load the program from Basic the `*EXEC !BOOT` command can be used, but again, this only loads the front cartridge. It is possible to load any of the programs with `LOAD` or `*LOAD` and a catalogue of both cartridges is available with `*CAT` of `*`.

Verdict

The Plus 1 complements the Electron, though one can't help but think the analogue and printer ports should have been fitted as standard.

The cartridge software is more convenient and reliable than cassettes but slow, considering the load is a direct memory transfer.

It seems the Electron will never be brought up to the BBC's capabilities since there are no plans to produce a Tube interface from Acorn. But the Plus 1 goes part of the way and does it well.

PCN

Some new *fx system commands available with the Plus 1

Command	Operation
<code>*FX3,X</code>	Select device to which the output is sent
<code>*FX5,X</code>	Select the printer driver
<code>*6fx</code>	Select the printer ignore character
<code>*FX16,X</code>	Select the number of A/D channels between 0 and 4
<code>*FX17,X</code>	Force the A/D conversion to restart
<code>*FX140,X</code>	Select the cassette filing system
<code>*FX163,128,X</code>	Enable/disable input/output through the Plus 1
<code>*FX229,X</code>	Alters the effect of pressing the escape key
<code>*FX230,X</code>	Enables or disables the normal action of the escape key

The following is available from an `OSBYTE` call only: `A=128`, `X=0` to 4, `X=0` returns the number of the last analogue channel sampled, in Y. `X=1` to 4 returns the last reading of the channel specified in X as a 16-bit integer in X and Y (low and high).

Product Plus 1 interface for the Electron Price £59.90 Cartridge price £12.85 Manufacturer Acorn Computers Distributor Vector Marketing, Dennington Estate, Wellingborough, Northants NN8 2RL, or Acorn dealers.



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PCN7

STEAMING AHEAD

PCN PRO-TEST PERIPHERALS

Gavin Monk tries a Spectrum joystick interface

interface and its non-Sinclair competitors is the ROM cartridge socket. A hinged flap on the top of the Turbo hides this and keeps out the dust.

As on Interface 2, ROM cartridges should not be inserted while the computer is switched on. Sadly, there's no microswitch built into the socket, as on Atari machines, to switch off the power when a cartridge is inserted. Otherwise the cartridge operation was faultless.

Verdict

At £22.95, the Ram Turbo interface could well be seen as essential for Spectrum games players. True, the slight problem of the Kempston socket not always performing as expected could have been prevented by using a hardware switch to select the different modes. But the obstruction of the Mic socket is inexcusable and should have been detected and corrected at an early design stage. Apart from these two faults, however, Ram has produced a winner.

Product Name: Ram Turbo Spectrum joystick interface. Price: £22.95. Manufacturer: Ram Electronics (Great Britain) Ltd, 100 East Road, Chislehurst, Kent.

Joystick modes

	Left socket	Right socket
Mode 1	Sinclair (right)	Kempston Sinclair (left)
Mode 2	Protek/AGF Cursor keys	Kempston Simclair (left)

Kempston mode

and key five. This is because the software scans both the cursor keys and port 31 (Kempston), making it react as if key five was pressed when the fire button was held down.

This can be overcome by using the Protek/AGF mode. Switch off the Spectrum, plug the joystick into the left socket, and hold down the fire button while switching on the Spectrum. Release it once the Spectrum's screen clears.

In this mode, the Turbo interface is compatible with Kempston and Sinclair (left) protocols.

The Turbo must be set up in a different mode to mimic the cursor keys because the Sinclair right hand socket also simulates keys 6-8 but doesn't use them for the directions indicated by the arrows.

To test whether the turbo interface works with hardware add-ons, I connected the micro-speech unit and loaded up Ultimate's Lunar Jetman from Microdrive. And it worked excellently.

Cartridge socket

The main difference between this

Two joystick interfaces, a ROM socket and full bus expansion is probably all any game player needs for the Sinclair Spectrum. The Ram Turbo sports all this, and compatibility with the Kempston, Sinclair Interface 2, and Protek/AGF interfaces for a mere £22.95.

The Turbo comes, with its three-page instruction pamphlet, in a box slightly larger than that used for Interface 2. Ram claims the Turbo contains a 'unique power protection device'. This doesn't mean you can insert it without removing the power supply — the Turbo cannot be connected unless the power plug is removed. This is due to a little plastic plate through which the power lead must be pushed once the interface has been fitted onto the Spectrum.

Once connected, the Turbo sits flush with the top of the Spectrum and the styling is nicely matched. Unfortunately the plastic housing slightly obstructs the Spectrum's 'mic' socket, making insertion of this plug difficult. The Turbo operates happily with Interface 1, except that a network socket is also obstructed.

In use

On power up, the unit is compatible with both Sinclair and Kempston protocols. This is when things get complicated. The right socket is the same as the left on Interface 2, and the left socket is the same as Interface 2's right. This means the right socket simulates keys 1-5 and goes into port 31, and the left socket simulates keys 6-0. In this mode, almost all of the software tried, including ROM software, worked as usual with the Kempston and Sinclair joysticks.

A problem arose using software compatible with both Protek/AGF and Kempston interfaces, and the same trouble occurred with software that used the

The Ram Turbo joystick interface is compatible with both Sinclair and Kempston protocols.

PCN JULY 14 1984

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Lap portables have always cost an arm and a leg, and the launch of machines like the Epson PX-8, Apple IIc and Osborne Encore (for more strap than lap) indicates that the manufacturers are heading upwards in pricing rather than down. But as the big boys vacate the lower regions, a gap in the market for a few stripped-down back to basics machines may just be opening. It's this market the Casio FP-200 is aimed at.

For your entry level £350 you get the classic lap-sized wedge shape, containing 8K RAM and a very passable Microsoft-ish Basic, which goes under the nom de guerre of Casio C-85 Basic. The screen is only 20 columns by eight rows, but it's fast and relatively clear, and the keyboard's tolerable. If you're looking for a cheap start in mobile computing this could be it.

Presentation

The Casio's what the advertising copywriters laughingly refer to as 'book-sized'. This means it's approximately the same size as two medium-sized dictionaries sitting side by side, and exactly the same size as the Epson HX20, Tandy 100 and NEC 8201.

Once you've unboxed, it's a matter of putting two AA size batteries in the back-up battery housing and a further four AAs in the main battery housing and you're ready to go. The machine's on/off switch is on the left hand side of the case, and there's a mode switch on the top right of the main keyboard for Basic or CETL (Casio Easy Table Language), which allows you to switch between Basic and the ROM-based spreadsheet. There's no built-in word processor, so it seems that the Epson HX20 rather than the Tandy/NEC has been taken as the target to aim for.

Documentation

The review machine came with an unnerving quantity of manuals — the reference manual has an index of commands, but if they'd all had proper indexes I'd have been really impressed. Still, it looks like it's all there, and a modicum of determination should allow you to dig it all out.

The Operations Manual introduces the machine, and shows Casio's history by leaning heavily on the mathematical role of the micro. A section of program examples includes a sales performance table, mailing list and a Golf Tournament scoring table. This sounds to me a bit like the employment profile of a dynamic young sales rep, and probably tells you a bit about the kind of customer Casio's aiming for.

Next in the logical progression of manuals is the C-85 Basic and CETL Reference Manual. This deals in detail, although not as clearly as I'd have liked, with the syntax of the FP-200's commands, and also gives useful information on

PCN PRO-TEST HARDWARE

John Lettice balanced the Casio FP-



CASIO'S LAP OF H

200 firmly on his lap and tapped out this Pro-Test.

HANDHELD COMPUTER **CASIO**
FP-200

REMOTE

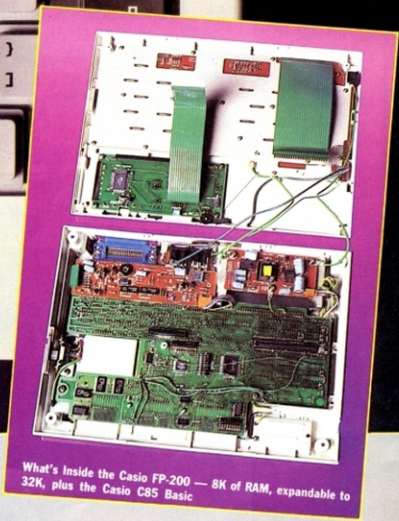
OFF

ON

MODE

CETL

BASIC



What's Inside the Casio FP-200 — 8K of RAM, expandable to 32K, plus the Casio C85 Basic

HONOUR

The new Electron from Acorn.

Ask any child at school why it's worth £199.

Most British children have one thing in common with the new Electron microcomputer: they speak the same language.

You see, the Electron is the first micro remotely in this price range to use BBC Basic, the computer language that is rapidly becoming the standard in British schools.

But that's not all. Most children will feel at home with the Electron as soon as they lay hands on it.

This is because it has developed out of the Micro that has been chosen by over 80% of schools participating in the Government's current Micros In Schools project. It has a similar keyboard and has most of the functions of this much acclaimed (but naturally, more expensive) machine.

So now children will be able to continue their computer studies at home. They'll be able to use the same educational programs they use at school. And, if asked nicely, they'll be able to help willing adults take their first steps into computing.

All this for only £199.

A micro technology break-through.

And now a few reasons for adults why

NOW YOU'VE MASTERED MONSTERS,
WE CAN MOVE ON TO MONEY
MANAGEMENT.



the Electron is such an exceptional machine at the price.

The Electron is neat and compact. Yet it is fast and powerful. (Full details, for the technically minded, are in the box opposite.)

It produces high quality sound using its own internal speaker.

And it offers a range of facilities many larger more expensive machines just cannot match.

For example the Electron's colour graphics have the highest resolution of any home computer.

This is because the chip that controls the graphics, specially designed by Acorn, is one of the most advanced of its kind. As a result,

the Electron delivers twice as many characters across the screen as its closest competitor.

Built to last and to grow.

The Electron has been designed and built to be a permanent part of the family, year in year out.

Particular care has been paid to the keyboard. It is electric typewriter style: robustly constructed with a good, solid 'feel'. It has a space bar and single entry keys for key commands.

In other words it's comfortable and easy to use, avoiding the need for the manual gymnastics sometimes associated with calculator style keyboards.

And it will grow with you via expansion modules, that Acorn are developing, to take peripheral additions such as printers and disc drives. So as your knowledge, interest and ambitions develop, the Electron can develop with you.

Additionally, to give you all the support you'll need to generate your own applications software, we've established a phone-in service attended by specialists to give advice, encouragement and practical help.

A gentle teacher.

The Electron plugs straight into virtually any TV set and cassette player so you will be



ready to go as soon as you get it home.

It comes not only with a comprehensive user guide, which describes the machine and its functions, but also with a book that takes you step by step through the basic principles of programming.

A free taste of its versatility.

You will also receive an "Introductory" cassette which will put the Electron through its paces showing you a little of what it can do with its 64k of memory (32k ROM, 32k RAM).

The cassette will give you a taste of those exceptional colour graphics we mentioned earlier; of its ability to play and notate music, and show you how it might help in home accounting. It will challenge you to a few games and will, if you ask it, do your whole family's biorhythms in a matter of seconds.

You will in short, through the 15 separate programs it contains, get a glimpse of the Electron's potential. But only a glimpse, for that potential is as limitless as your own interest and imagination.

A widening range of software.

To help you realise some of that potential, Electron software already ranges from "Personal

Money Management" through "Starship Command" to "Creative Graphics" (which, incidentally, includes some spectacular three-dimensional rotating shapes). Naturally, with its strong educational links, educational software will be extremely

EXPERTS LIKE 'WHAT MICRO?'
AND ME RATE THE ELECTRON
HIGHER THAN ANY OF THE
COMPETITION.



important for the Electron and even now O and A Level revision papers are being processed for Electron users.

How to get your Electron.

The Acorn Electron can be found at local Acorn dealers and major high street stores. However, if you would like to order one with your credit card, or if you would like the address of your nearest supplier, just phone 01-200 0200.



Technical Specifications

Hardware.
2MHz 6502.
32K ROM 32K RAM (64K total).
High resolution graphics 640 x 256 max.
Seven display modes.
8 colours and 8 flashing colours.
1200 baud CUTS tape interface with motor control.
Expansion bus for add-on interface modules.
Internal loudspeaker.
PAL UHF output to colour or black and white domestic TV.
RGB output for colour monitor.
56 key full travel QWERTY keyboard with spacebar.

Software.
BBC BASIC.
Extensions include interger, floating point and string variables, multi dimensional arrays: IF...THEN...ELSE, REPEAT...UNTIL, procedures with local variables.
Operating system allows plot, draw and fill commands.
Event timing.
Built-in assembler.
6502 assembly language can be mixed with BASIC.

The Acorn  Electron.

communicating between CETL and Basic.

The latter seems quite easy, so it's no real trouble to perform mathematical operations on data you keep in your spreadsheet.

The machine language and communications manual should be seen as an example to manufacturers everywhere. It sets out to provide you with a basic grounding in 8085 machine language and also deals with communications using the FP-200's RS232C port.

All three of these manuals suffer from a lack of organisation, but it's good to see a manufacturer willing to give the customer a little more information than is usual.

But this is by no means all. There's also a quick reference guide, and a 160-page tome called Powerful Library of business, utility, maths and games listings, even includes a hex dump and disassembler. The games program I hacked in didn't exactly quicken my pulse, but it's a lot better than the proverbial kick in the teeth. If all micros came out with this little lot attached it'd be at least a couple of months before the honest punter noticed there wasn't any software for them!

Keyboard

The main keyboard is a full-travel qwerty effort. The keys are a bit odd — slightly dish-shaped — and rather than rattling or springing back they produce a sort of dull clunk feel. Once you've got used to this it's actually no worse than most keyboards, and a lot better than some.

The two shift keys, shift lock, control, return, and delete are in the standard positions, and are a darker brown than the main keys. You also get a caps lock on the left of the space bar (stupid place to put it) and a graphics shift on the right, which produces a range of block graphics — not marked on the keys, but documented in the manual.

Along the top of the keyboard, just below the screen, are a total of 13 oval shapes, about halfway between keys and buttons. The five on the right are the function keys, shiftable and programmable, giving you a total of ten. Function keys are generally labelled something like 1 to 10, but Casio in its wisdom has decided to call them PF0 to PF9.

The four cursor keys are next along — they're not organised as a cluster which, considering the amount of space the small screen leaves, is a wasted opportunity. Next along there's CLS/Home, Stop/Cont, Break and On. The On key simply switches the screen back on after it's timed out,



The LCD (Liquid Crystal Display) screen uses a matrix of segments to build up the characters — a similar principle to the cathode ray tube. However, each segment is physically addressed by a circuit. This contributes to the relatively high cost of flat screen technology.

The liquid crystal is sandwiched between two layers of polarising glass — the bottom layer has a silver backing to make it a mirror. As liquid crystal has the ability to rotate light as it passes through, the rotated light is not of the same orientation as that coming through the polarised front screen and can therefore be reflected back again. When a small current is applied to the crystal in the LCD, however, the light is not rotated and so isn't reflected back. Instead it's absorbed, producing the black effect which forms the characters.

which it does if you don't use it for around seven minutes.

Screen

The small size of the screen is curious. There's bags of space along the top of the machine, so there would theoretically have been no problem fitting a larger NEC/Tandy style display. As it is, the small 20x8 LCD looks a bit lost up there. A small wheel on the rear edge of the micro adjusts the display a little, but the design of the screen is such that it's comparatively difficult to read.

The NEC and Tandy machines, for example, have 40x8 displays, measuring 205mm by 55mm. The Casio's screen is slightly smaller than half this size, measuring 97mm by 41mm, and this makes a significant difference to the legibility of the individual dots in the letters.

Moving onto the resolution, we run across another oddity. The Casio's resolution is 160x64, while the NEC's is 256x64. It doesn't take a mathematical genius to work out that the Casio's horizontal resolution is a lot higher than half the NEC's, despite the Casio screen being less than half the length of the NEC's.

The next step is to look at the way the characters are defined on the screen. Normally one dot space between letters is regarded as sufficient to produce a reason-

able image, but the Casio's characters are defined in such a way as to leave three spaces between each letter.

The overall effect of all this is to produce characters that are quite small, quite light, and a nuisance to read. The trade-off is of course that you get better graphics, because this is really what the display is geared to. But I'd say the price paid for the graphics capability is too high.

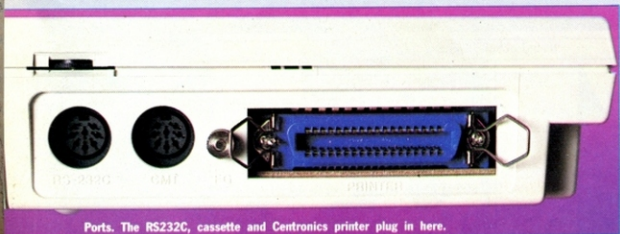
Still, with the aforementioned large quantity of space available at the top of the case, it might be that Casio will consider putting in a larger screen

Software

The only software I saw for the machine was written by Eclectic Systems and distributed by Kuma. Deskmaster 2 is described in the manual as 'a powerful word processor', but powerful may apply more to the imagination of whoever wrote the manual. It needs so much memory that it'll only take around one and a half pages of prose, and it slows up the Casio's otherwise excellent screen handling. Basically it's to Wordstar what Mickey Mouse is to Sir John Gielgud.

Peddling this little effort at £29.50 isn't likely to do either Kuma's or Casio's reputation a lot of good. At a more budget £9.95 you can also get Metric to Imperial Conversions, and there's also a Machine Code Support Pack and Deskmaster 17, which is a project analysis tool. I have yet to see the last two, and I'm confident I wouldn't have understood Deskmaster

The poor quality of the Kuma software is all the more disappointing when you compare it with the quality of Casio's own CETL. I also have my doubts about the chances of a lap portable which forces you to waste time loading a word processor from tape, and trust that Casio will eventually apply itself to producing a ROM-based machine.



Ports. The RS232C, cassette and Centronics printer plug in here.

Now your Mr Smith can handle the JRs of this world.

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THE SALES EDGE

Give your team The Sales Edge

No matter how well you brief your sales people, there is one critical skill that separates the star performer from the rest.

That skill is reading the customer right.

Which is where the astonishing **Sales Edge** program comes in. With it you can build a team full of stars.

It gives your Mr Smith a pre-meeting briefing from the very best sales-psychology brains, right there on his computer screen. And Mr Smith handles the whole thing himself.

The Sales Edge purpose is to match his characteristics to JR's and then provide him with a Sales Strategy Report to guide him through every phase of the meeting from opening to closing the sale.

Feed in the facts Working with a 3-disk kit and a step-by-step manual, the program is swiftly loaded and a file opened. First, Mr Smith has to introduce himself, a simple matter of pressing the 'agree' or 'disagree' keys to a brilliantly devised set of 85 questions – to establish his own sales strengths and personality.

He makes choices on such propositions as "I like the risk involved in a sales career" – or – "I am troubled when someone breaks the rules."

It takes only minutes and will serve all his client-relations files.

Next, Mr Smith inputs his perceptions of JR's personality by agreeing/disagreeing to a set of 50 characteristics such as –Rebellious?

– Ambitious? – Independent? – Flashy? – Colourful? – Distant? – Kind?

Print out the strategy Now the program can digest and correlate the two personalities and come up with its advice.

It tells you 'What to expect' – 'How to Succeed' – 'Opening Strategies' – 'Presentation Strategies' and 'Closing Strategies' – in a 200 line plus printout.

Dip in anywhere and Mr Smith is getting practical, usable insights in dealing with JR – "he has the ability to make decisions fast... impulsively. You, on the other hand, are very cautious. Follow his lead...conclude your work quickly..."

One sale recovers cost Here's a program that not only wins sales but also trains staff, helping them to minimise weaknesses, build on strengths. It gives each



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Hants., GU14 7NF.

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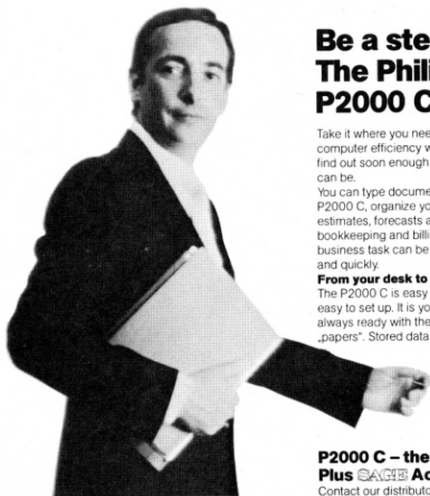
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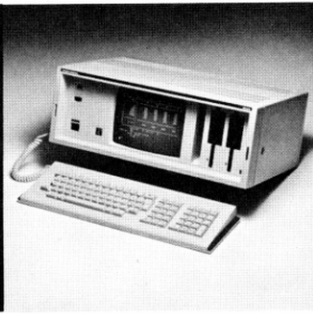
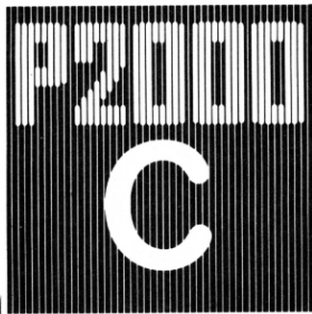
At home or on business trips

The P2000 C has a convenient carrying strap to help you take it home or on trips. Prepare for meetings, analyze plans, polish up documents with the decisive information literally at your finger tips.

Feature Highlights

1. 19" screen, 24 x 80 display, 32 KB video RAM
 2. 64 KB RAM user memory, 256 KB RAM disk optional
 3. Two 5 1/4" floppy drives with up to 640 KB per disk
 4. CP/M* and p-System** provide access to a large range of available software
 5. Interfaces: serial printer, external floppy drives, hard disk, data communication, slave monitor, IEEE-488
- * CP/M is a trademark of Digital Research Inc.
** p-System is a trademark of Softech Microsystems Inc.

P2000 C - the affordable portable. With free software. Plus SAGE Accounts Packages on Free Trial.
Contact our distributors for a list of dealers in your area.



For a list of dealers please contact:

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Telex: 24667. **Midielectron Distribution**, Midielectron House, Nottingham Road, Belper, Derby, Tel: (017382) 6611, Telex: 377 879.

Dealer enquiries welcome.

Expansion

Sliding back the large panel on the base of the machine reveals three expansion slots. These take neat little 8K RAM or ROM packs, bringing the total possible memory up to 32K. One of these is taken up by the CETL pack, but this still leaves you with a good supply of memory.

Round the back of the keyboard there's a standard Centronics port, cassette port and a 5 pin DIN RS232C. The main battery store is on the left of this, and slides out to reveal a socket for a disk interface. This is a neat example of necessity being the mother of invention, as you can't use the drive with the batteries. If you can't actually fit in the drive without being forced to plug in the mains adaptor, you can hardly make a mistake.

The review machine didn't come with a drive, but it sounds like it will be a revolutionary piece of technology. It would appear to be a 70K 5.25in. so its main virtue's liable to be increased speed rather than storage capacity. In any event, no decision to import the drive to the UK has yet been taken, but it may turn out either to be too expensive to sell, or to be priced so low that there'd be no profit in it.

Casio also sells a four colour printer-plotter and a graphics printer along with what the Nipponeseak of the documentation refers to as the 'Ten-keyboard', which plugs into an odd little DIN socket on the right hand side of the case. It's actually a numeric keypad rather than the ten keyboards you'd expect.

Operation

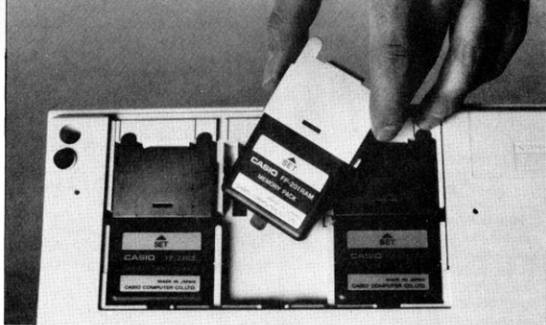
The FP-200 has two battery stores — the main one provides power for normal operation, and the back-up stores memory while the machine's switched off. Unusually, it uses ordinary non-rechargeable batteries for the latter. There's no low power indicator as such — the screen refusing to work is nature's way of telling you to put in new batteries, and in order to do so you have to save anything vital to tape before you replace the batteries, as anything in memory is lost.

Can you see the join in that one? If the screen won't work, how do you save things to tape? Fortunately, there's a mains adaptor, but it had me worried for a moment!

Besides this, the manual's actually a bit misleading on this. The main batteries do seem to operate when the machine's switched off, so it would appear to be safe to change the back-up batteries without using the mains adaptor.

The fairly standard Basic is pleasant to use, editing in particular having a couple of nice touches. Type **EDIT** and the first line of the program comes up for editing, and cursor left or cursor right moves you around one character at a time. But try to shift cursor left or right and you'll move up and down through the program one line at a time.

The manuals lean heavily on the maths/data processing side of computing, but considering the machine's facilities this is a



Expansion: Tucked away in the base panel are the extra 8K RAM or ROM packs to build up to 32K.

plus. Any work you do on it is liable to be geared to the Casio Easy Table Language, a sort of skeleton spreadsheet designed to be able to talk to Basic.

I'd better explain that. CETL is basically an empty, scrolling table whose size you define. There are only 16 one letter commands, so you can use it while referring to a single page of the quick reference guide. These 16 commands allow you to manipulate data or print it out with very little in the way of tears. Eat your heart out, Lotus...

Now a primitive spreadsheet's all very well, but what if you wish to perform calculations on your data? No problem, in the case of CETL. You insert a pointer to a program within your table, then any calculations you wish to make can be performed by a program entered in Basic mode. It's just a matter of switching between CETL and Basic modes at the relevant time.

So what you've actually got in the FP-200 is a highly flexible hand-held spreadsheet, and to use it to the full you'll want to knock up several programs to perform your own regular calculations. The programming examples in the operations manual are therefore liable to be of more interest to the average user than those that come with other handhelds.

Communications

The technical manual kicks off the Comms section with a useful explanation of what's going on and why. I found myself in severe danger of actually learning something. In order to transmit programs you use the form `SAVE "COMO":A`. That's essentially

the same syntax as saving to tape, which uses `SAVE "CASO:filename"`. The A in the transmit statement, incidentally, specifies ASCII format for the program being transmitted.

Program reception is dealt with by `LOAD "COMO"`, and data transmission and reception uses the `OPEN` command followed by `PRINT#` or `INPUT#`. It all seems plain sailing, and the manual is highly commendable.

Verdict

I've gone through a number of different stages while reviewing the FP-200. My initial reaction was that it was a nice cheap machine, but that the word processing software and the small screen let it down badly. But at that point I was really judging it by my own standards and needs rather than by its own standards. Some journalists inevitably mark down a laptopable if it doesn't have a proper word processor, and they'll tend to forget that not everyone actually needs a machine that will produce prose on the march.

Let's suppose you're in sales, you move around a lot, and you need to keep tabs on how stock's shifting. Suddenly the FP-200 looks very attractive. You can manipulate figures easily, with a minimum of computing experience, and the processes involved are transparent enough for you to be able to pick up the computer knowledge you need to do it justice.

In a role of that sort the Casio would excel, but it still lacks flexibility. If Casio improved the screen and added a ROM word processor the FP-200 would be a real winner. As it is, it's a cheap and effective tool in its chosen market.

PCN

SPECIFICATIONS	
Price	£345
Processor	8085
RAM	8K standard, expandable to 32K
ROM	32K standard, expandable to 40K
Text screen	20 characters by eight lines
Graphics screen	160x64 pixels
Keyboard	56 keys, including five programmable function keys
Storage	tape
Interfaces	Centronics and RS232C
Language	Casio C85 Basic, Casio Easy Table Language
Dimensions	310x220x55.5mm
Expansion	8K RAM and ROM packs fitted internally, numeric keypad and single 70K disk drive (keypad and drive are unlikely to be sold in the UK)
Distributor	Casio Electronics, 01-450 9131



PRE-VIEW

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, PCN, Software Editor, 62 Oxford Street, London W1A 2HG; and please don't forget to include prices and a telephone number.

Games

Mind Games, from Oasis Software, features Chess, Draughts, Backgammon and Invader Cube for the Spectrum. *Aces High* for the BBC and Electron is another collection of games including Blackjack, Pontoon, Draw-Poker and Stud Poker.

Cases Computer Simulations are entering the 'pocket money' games market with *Dix Mille*, a dice game, and *Whodunnit?*, a sort of murder quiz.

Bug-Byte's *Star Trader* is difficult to describe; it combines aspects of strategy games with arcade features. In one part you have to buy or sell items such as sacks of grain and have to be careful to keep up your strength by partaking of nourishment — if you're not fit you're not deemed capable of flying your cargo vessel. On the way to other planets you're likely to be attacked by pirates and it's here the arcade action comes in.

That's not all though, for once you make harbour there's import duty to be paid on goods. As these taxes can be crippling you may choose to lie, risking heavy penalties if you're

caught. While each part on its own is a bit dull, the combination and the multiplicity of possible courses of action make this quite a successful game.

Moving to the 64, *Murphy*, from Mogul Software, is the best of the bunch but bears a curious resemblance to Ocean's latest, *Gilligan's Gold*, which is a *Donkey Kong* set in a gold mine. Murphy scores with good graphics and sound together with some clever animation.

Hercules is being heavily publicised, but our reviewer described it as 'ridiculously impossible, very fast with poor graphics and sound'. *Spy School* gives you four games in one, each of which is a variation on *Frogger* and related games and has the air of being produced via a games designer program. Microdeal's *Mr Dig* is a *Dig Dug* clone, while *Star Trooper* from Melbourne House is a competent *Jet Pac*.

Education

Widgit Software extends its range of early learning programs with *Adventure Playground* and *Castle of Dreams*. The first of these is a bargain as you get two good games, one having four parts on the one cassette. Of these, *The Queen of Hearts* is a child's first computer adventure, with all the standard trappings of 'You can see: . . .', 'Exits are: North, East'.

The other game on the tape, *Crooked Adventure*, is based on the Crooked Man nursery

rhyme. One of the four sections involves moving a large cat around a field chasing a mouse. Each correct answer to a shape/sequence question allows one move, after which the mouse moves a square at random.

To complete the whole set you have to find keys and glasses, then get the crooked man, his crooked cat and crooked mouse into their crooked house. The games are appealing and novel, if a little limited in their educational content.

Utilities

Software support for the Commodore 64 as a small business machine is growing rapidly, as witnessed by the release this week of *Autocalc 64*. This is a machine code, disk-based spreadsheet from Richard Shepherd. The package comes with a demonstration file and the row/column limit is 255 with the further constraint that there may not be more than 2000 calls in a model. At £14.95, and with a fairly full set of standard operations such as replication, variable cell width, calculations and justification.

Omnicalc 2 is an upgraded version of the Omnicalc Spectrum spreadsheet, and existing Omnicalc users can upgrade for £8. The program allows you to make use of Microdrives and there are facilities for up-and-downloading data via an RS232 hook-up, and simple histogram charting — an unusual feature for such a program. The row

limit is 250, while the maximum number of cells is 4000.

At first sight, *Omnicalc* would seem to have better facilities than *Autocalc 64*, showing that 64K isn't necessarily better than 48K — it's what you put in it that counts.

Go Sprite allows you to design up to 32 sprites on-screen, then convert the information to DATA statements for use in your own programs. The design part is quite comprehensive and includes an animation facility so you can see how your sprites will look in motion.

Graphix from Zipprint adds 16 graphics commands to the 64's vocabulary, which has to be a good thing. The commands include Colour, Draw, Paint and so forth — all standard commands which you'll find on most microc these days, but which novice 64 programmers will find extremely useful, even if the program is rather overpriced for what it is.

White Lightning is a Forth-based graphics development system whose manual runs to some 130 pages and comes with two demonstration programs. The program has two parts; there's the character or sprite designer and *Ideal*, the Forth bit. The whole system looks very impressive. Given its built-in interrupt system for fore/background tasks, and its Forth-Basic extension and interfacing, it could be a boon for the Spectrum games designer.

BBC B

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Caesar the Cat	£6.95	Mirrorsoft 01-353 0246

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Purchase Ledger	£29.95	Kemp 01-444 5499
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Autocalc 64	£14.95	Richard Shepherd 06286 63531
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ELECTRON

Exploring Adventures	£7.95	Duckworth 01-485 3484
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SPECTRUM 48K

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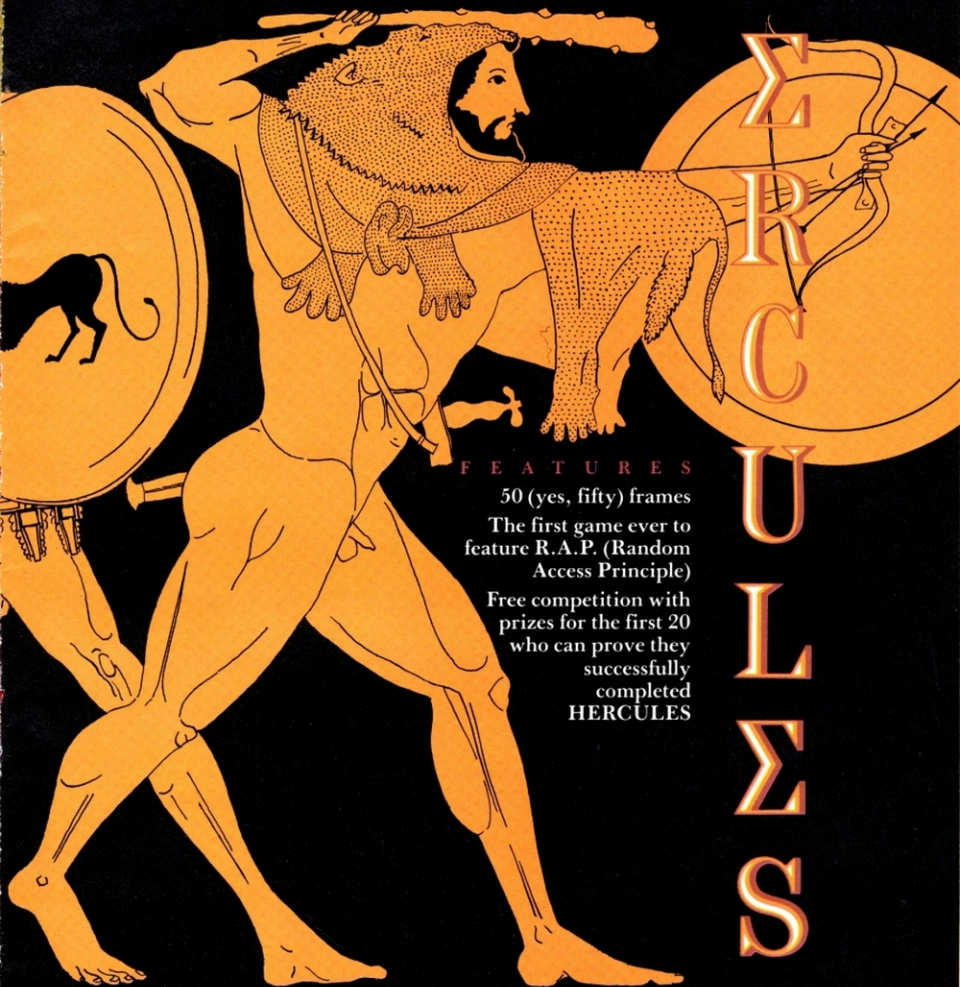
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CARTOONS IN VIEW



An open window totally schemed in with the Graphics Magician.

Apple users interested in creating and animating their own graphics will be interested to hear about Penguin Software's new version of Graphics Magician. The package allows you to create simple colourful graphics and, for those with time and patience, animation suitable for games.

Features

A little programming is involved in animating your figures, but don't tear your togas, friends, because, oddly enough, the programming involved is not as difficult as you might imagine, providing you plan ahead carefully, and do things step by step. It involves five or ten lines for some quite complicated stories, typically.

Any toga-tearing is more likely to result from the difficulty of understanding animation itself, visualising your objective, and the procedures involved in getting the computer to do it for you.

First plan your storyline. For example, we are standing in front of an open window, there is a plant in the window box, and green fields outside. A bee buzzes in through the window, has a sniff at the plant and flies away. The sky darkens to night-time.

To get this epic onto the screen, the first thing to do is design, draw and paint the parts of the picture that will not move—the walls, curtains, window frame, scenery outside and so on.

The drawing program does not have the facility to draw squares, triangles, arcs and ellipses, which is included in the drawing program of The Complete Graphics System (Issue 64). Fortunately, the two systems are compatible, so if you need any of these features, you can paint the scenery with the Complete Graphics System, switching over to the Graphics Magician for final animation.

In use

Getting started is easy: load the disk into your master drive, and turn on. The main menu will appear, and keying in the letter for an input device will get you straight into

Helena Siedlecka may not be Walt Disney but she has tried Graphics Magician on the Apple II...

the drawing program. The options here are J for joystick/KoalaPad/Trackball or any other game I/O-connected device, T for Apple Graphics Tablet or H for Houston Instruments' Hi-Pad. Apple's Mouse isn't supported in this version.

When drawing and painting using any Penguin graphics program, you must ensure any shape to be filled with colour has a solid outline. It is easy to miss breaks, so use the zoom facility to find and fix them. The fill facility works like an express train—and a runaway leak can spoil your picture in no time.

The storyline includes a change from day to night, so we must add in some brushstrokes. For example, the sky goes from pale blue through a vivid red sunset to black. The change in colour is brushed in, and a coded form is stored in the memory. If this data is later used to recreate the same strokes over the original (daylight) picture in the final animation sequence, night will appear to fall, because redrawing is so fast.

This is a side-effect form of animation, but can be a valuable extra. These strokes are saved on disk in a special format called a sequential picture file, which has the suffix .SPC. Other suffixes are .PTC, a normal 8K binary image, and the space-saving .PAC format.

The Graphics Magician has three animation editors: the shape editor, which allows you to draw the shape, the path editor, which designs the paths the objects travel along; and the animation editor which coordinates the final sequence.

Having set the scene, we need a star—in this story it is a bee. Objects to be animated are normally drawn using the Graphics Magician Shape Editor but this restricts you to the keyboard, and rather limits you to simple shapes.

However, a shape capture facility picks up pictures created using the superior drawing facilities of the drawing program, or the equipment in Complete Graphics System, and converts them into the right format as objects to be animated in the Graphics Magician system.

I discovered this useful facility tucked away at the back of the manual, but it really deserves a home in the main menu. There are several others, such as a binary transfer utility, which I would have expected to see on some subsidiary menu. Also, I didn't like having to drop out into DOS.

The path editor is reached by keying P from the main menu. This option defines the paths along which your objects move. The flashing cursor moves, plots and



Charts offer the user a varied choice of brush and screen colours.

registers those moves such as IJKM under the control of eight single stroke key presses.

When you select the path editor, you are asked if you want to load a background picture. This enables you to plot animation paths more accurately, so the bee flies out of the window, not into the wall.

The BLOCK mode is fast, but wipes out the background. The two BLOCK WITH BACKGROUND modes preserve the background in an extra 8,000 bytes of memory.

The various objects (on disk as .SSH shape files) and the paths (.PTH binary path table) are loaded into the animation editor, which combines and saves them as a new file called the .ANM binary and machine language file.

Last of all, you have to write a small(ish) program. This is the logic behind all the various moves and objects... the actual drama, and the program's first task is to load the background scenery (saved in .PIC, .PAC or .SPC format). Next the .ANM file is loaded, and called by the program, which then performs one step of the animation, and possibly after some paths have been switched, or objects deactivated, depending on the user's responses and events on the screen, your program loops back repeatedly.

Conclusion

The Graphics Magician offers a wide variety of options and very simple animation is possible—but the untutored user is likely to get confused, tired and bored by the complexity of controls and routines.

RATING (5)

Features
Documentation
Performance
Usability
Reliability
Overall value



Name Graphics Magician Price £48.25 System
Apple II Publisher Penguin Software Format
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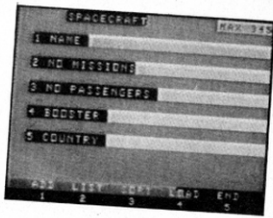
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DEALING WITH DATA



Two cassette-based Dragon databases organise David Rosam's life for him.

PCN PRO-TEST SOFTWARE



One of the most important — and commonplace — applications for computers in the business world is database manipulation, allowing large amounts of data to be manipulated and retrieved. Two recent databases for the Dragon are DRS (Data Retrieval System), and Filmastr — which is a rather nasty contraction of file master.

Not having a mailing list, and recently having disposed of my stock of gudgeon pins for pre-war American Fords, I decided to use the two databases for trying to impose some semblance of order on a large and rambling record collection.

In use

As DRS is wholly in machine code, and Filmastr is in a mixture of Basic and machine code, the programs are loaded using CLOADM. DRS needs to be EXECUTED, but Filmastr auto-runs.

The first step with either package is to design the screen format. Both packages use the Dragon's inverse characters for the overall heading — in my case Albums — and the data fields — perhaps date of birth, diameter or flavour. Only DRS distinguishes between numeric and character fields.

When setting up the screen display with Filmastr, there is a whole string of prompts. Although helpful initially, they slowed my progress and do not allow you to alter anything retrospectively.

DRS has a different approach. Lacking the prompts, it does allow full-screen editing. The only annoying facet of the package at this stage is that the <shift>+key has to be depressed to display the inverse field headings. As there is no shift lock, I found the process rather laborious, and repeatedly failed to keep <shift> depressed.

The authors of DRS have thoughtfully incorporated a key repeat, but there's no such facility with Filmastr. Key repeat makes filling the data fields with dummy characters easier and shortens the data formatting chore considerably.

DRS allows you to change the data format at a later date if you've not allowed sufficient space for a certain entry, but with Filmastr again there's no going back. You have to get the field lengths correct at the very beginning.

While setting up my screen format I

encountered a further difficulty. Having decided on field titles of title, artist(s), label, number, recorded, released and musicians, I found that Filmastr's maximum field length of 64 characters was too short for groups larger than three. When I set up the fields according to instruments I found that I didn't have enough space for all the common instruments. I had to settle for the rather unsatisfactory compromise of having two separate musicians fields.

I found DRS rather more satisfactory with its maximum field length of 128 characters. It was therefore possible to squeeze in a more realistic number of musicians — but it's just as well I don't like big bands.

Having completed the screen formatting DRS requires you to tell it to commit it to memory. On the other hand Filmastr requires you to store the format on tape, only to reload it into the machine ready for data entry.

Having completed my data formatting I was interested to see how many screensfull — cards if you like — I could store in my Dragon 32. Filmastr informed me that I could store information about 113 albums, while I had to fill DRS with dummy files to discover that the maximum number of albums would be 94.

There is little to choose between the packages when it comes to entering data. In either case it's quite simple and painless. Filmastr presents you with one of two menus: add/list/sort/load/end or select/save/print/sum/delete/change. There is a single main menu for DRS offering options of design screen/add records/search/report/input/output/erase memory/quit.

DRS has a more sophisticated armoury of search options, allowing matching of characters in specific positions, searches for letters and strings within fields, searches for strings within fields — say looking for letters from D to J — and numeric comparisons. Filmastr, on the other hand, just offers searching for letters and strings within the fields and numeric searches.

Where Filmastr does score over DRS, though, is with its printing facilities. They are easier to use and quicker to access.

Alongside the ability to retrieve data very quickly, databases allow you to sort information according to your needs. Both

databases allowed me to order my albums according to title, record label, artist(s), or the musicians. Files can be saved to disk with both packages, although I didn't try this myself. DRS specifies the Dragon Data DOS, but no particular system is specified for use with Filmastr. Anyone wishing to use disks with the software should check with Microdeal about which type is suitable.

It is possible to transfer DRS to disk — a very useful facility to have, particularly if you buy a disk at a later date.

Verdict

DRS and Filmastr both undoubtedly work as databases, allowing quick data manipulation and retrieval. But don't expect too much from your Dragon database system. If you have a screenful of fields you'll be limited to about 100 records — not very many. You'll need a disk if you want to link files together to manipulate larger amounts of data — you'll also need the disk version of Filmastr.

As with so much software, the question of who would want such a package and what they use it for has to be asked.

Don't be fooled. There's no way that a Dragon and cassette system could be used as a serious business system. Do you really need anything more than a card index?

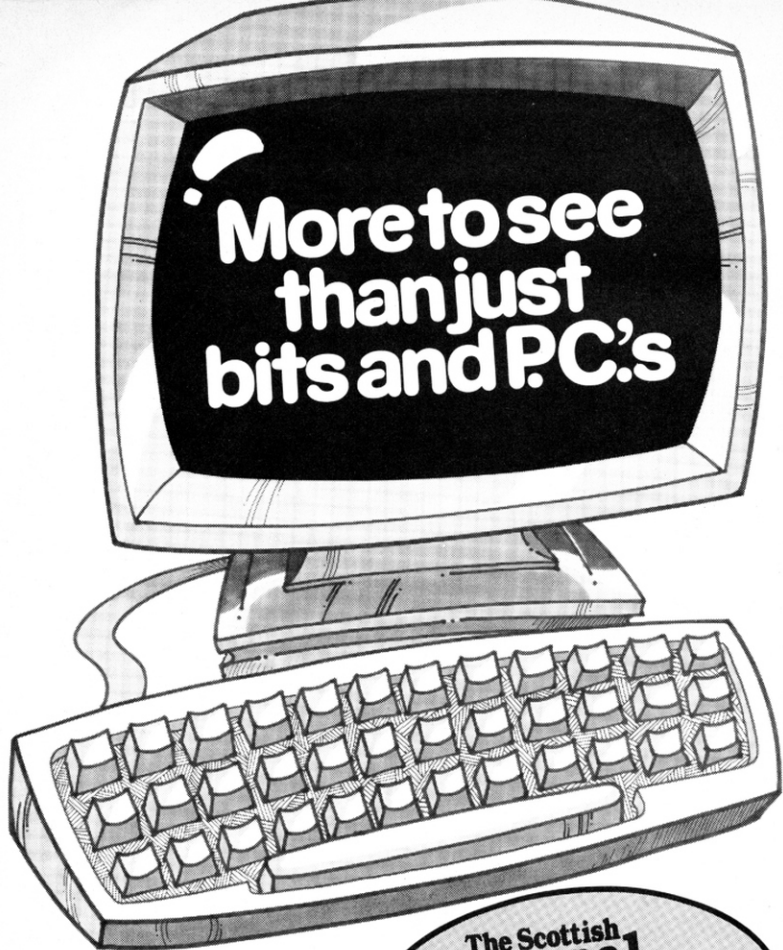
If you do have a suitable application — something like a small mailing list springs to mind — then DRS, in particular, will fill the bill.

RATING (5)

	DRS	Filmastr
Features	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Documentation	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Performance	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Usability	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Reliability	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Overall value	■ ■ ■ ■ ■	■ ■ ■ ■ ■

Name Filmastr **Application Database System**
Dragon 32 **Price** £19.95 **Publisher** Microdeal
Software (0726-3456) and Sum-
Ware **Format** Cassette **Outlets** Mail
Order/retail

Name DRS (Data Retrieval System) **Application**
Database **System** Dragon 32/64 **Price** £14.95
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48K SPECTRUM

Zoom in to danger

Name Tornado Low Level System
48K Spectrum Price £5.95
Publisher Vortex, 061 973 9580
Language Machine code Outlets
Retail

Take the hot seat in a Tornado in this low-key version of the fighter pilot favourite.

Objectives

Your mission is to take out six enemy bases by dipping over them for low-level passes. Not that they are sitting ducks since they are in tricky locations and you must watch out for buildings, trees, pylons and strange poles. And you are limited by time and fuel.

In play

After briefing you examine the targets on a map, which can be viewed at any time. Wait for the tanks to fill up, taxi along the runway and take off.

Your birds-eye view of the Tornado shows it to be flying over land so flat it must be Holland, minus the windmills. The plane's shadow gives a 3D effect and changes its size and shape accurately to suggest height and direction.

You can climb, drop, turn, sweep and use the Tornado's swing-wing feature to fly at supersonic speed.

On the right of the main screen is a radar map, and instrument indicating the time, fuel and bases remaining, as

well as an altimeter and the score. Flying dangerously low all the time earns extra points.

The radar screen is essential since it displays a wider area than appears on the main screen, warning when you are approaching a target and whether you are on-course for a hit. Without this the bases loom up and flash by before you've time to say 'blue leader', especially if you've swept back your wings.

The landscape is uninspired but the plane's nimbleness is impressive, with smooth movement up and down and through 360°. There's a heartstopping moment every time the bomber swoops down to meet its shadow since you must go very low for a hit.

As the area in view is so small, it's difficult to line up, so part of the skill is judging where the enemy's installations will be. Also, you may find yourself in a tight corner where, for instance, you have to fly under overhead wires.

The test was simple, but I found it difficult to stay intact.

Verdict

Although piloting the Tornado required skill, I had no problem falling asleep at the controls. It's just not exciting enough for addictive play, more a game for the single-minded.

Harriet Arnold

RATING (5)

Lasting appeal



Playability



Use of machine

Overall value



Reckless Eric

Name Dartz System 48K Spectrum
Price £5.00 Publisher Automata.
Tel: 0705 735242 Format Cassette
Outlets Retailers

Eric has a penchant for pints, and a passion for darts. He's a fat, drunken slob who plays under your control, in between knocking back the bitter, falling to the gents or quietly falling through the floor.

Objectives

Eric takes on a 301 or 501 game for one or two players, according to established rules: you wittle away the total, and finish with a double. But the real challenge is to cope with Eric's weakness for the demon drink, and its attendant ills, if you are to finish a game, let alone beat someone else. The champ develops from merely merry through to paralytic and beyond help. Your only hope is to score before Eric has seen the bottom of too many glasses and been rendered dead drunk — literally.

To put darts on a micro satisfactorily is well-nigh impossible: Eric represents a compromise by making this a game of chance.

In play

No time to pause and get the feel of the darts. You must press any key to stop the cursor as it zips round a yellow and black board. Once you've chosen a segment to aim for, you close in on it and attempt to increase your score by stopping the cursor on a double or treble.

But you must first hit the 3 segment to score 25 or a bull's eye.

Delay or inaccuracy means the dart simply bounces out of the board.

In one corner of the screen is a cartoon, so you can watch the revolting Eric make a throw or swallow another pint with a disgusting gugging sound.

The depiction of Eric's activities is exquisite. However, once you've seen one wonky throw, and marvelled, you've seen them all.

Practised as Eric is, he's also increasingly squiffy. Each shot increases his blood alcohol level as surely as the beer. Not only is Eric capable of missing the segment you've aimed for, or simply dropping the dart, but his weak bladder will put him out of the picture, as does falling through the floorboards due to his obesity.

His environment is no help. Well-meaning fans keep topping up the bitter while other meannies lace it with stronger stuff. The crowd's loud chatter may even blow a dart wildly off course.

Verdict

Eric's peccadilloes are amusing for only a limited time. After that they just become irritating and his essential charmlessness shows through. The balance is weighted too much in favour of chance, and for lasting entertainment Eric's score is likelier to be nearer the madhouse than double top.

Harriet Arnold

RATING (5)

Lasting appeal

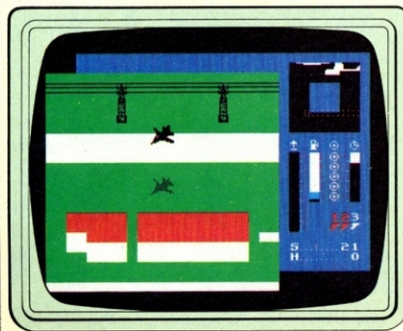


Playability



Use of machine

Overall value



ATARI

Deep matters

Name Submarine Commander
System Atari (any 32K) **Price** £8.95
Publisher Creative Sparks (Thorn EMI) 0252 543333 **Format** Cassette
Language Machine code **Other versions** Vic-20 (16K) **Outlets** Retailers

Strategy and simulation are the main ingredients in this sea warfare game.

Objectives

As commander of an instrument-laden submarine, your mission is to seek out all enemy shipping and send it to Davy Jones's locker, while ensuring that your sub is not despatched to said locker by depth charges, hull damage or total loss of torpedoes or fuel.

In play

The screen is split vertically into three segments, the left and right sections containing various instrument readouts while the central and larger section holds one of three main views.

The instrument displays, numerous enough to be initially bemusing, cover such essentials as speed, attitude and depth, hydrophone chart, compass, fuel and air, battery charge, and hull damage.

The central area gives either a map, sonar screen or periscope view. The map shows both your own position and that of the enemy — and even as you're looking, they're on the move. Steering your sub is fairly

easy, once you've got the hang of it. Joystick up or down sends the sub rising or descending; you can crash dive or surface rapidly at the touch of a key. Moving the joystick to the left or right while keeping an eye on the attitude and compass reading controls the rudder.

Speed is handled by keys 0 to 9 though, needless to add, you move a lot slower underwater than on the surface.

The sonar screen shows any enemy ships as white blips while your position, shown as a white cross, remains static in the centre. Upping the periscope will result in a view of the surface provided you're not more than 50 feet under.

Should an enemy ship hove to while you're peering through the periscope, it will appear as a moving silhouette — then's the time to fire off a torpedo or two. More often than not, though, it'll be your ship that's doing the sinking, preceded by a violent shaking of the screen as depth charges explode around you. The sound effects really come into their own here.

Verdict

Those who like their action fast and furious may not find this game their glass of grog but for those who like a slow build-up to their excitement, with both strategic and simulation elements, it should be a winner.

Bob Chappell

RATING (5)
Lasting appeal ●●●●●
Playability ●●●●●
Use of machine ●●●●●
Overall value ●●●●●



Think tank

Name Tank Commander **System** Atari (any 32K) **Price** £8.95
Publisher Creative Sparks (Thorn EMI) 0252 543333 **Format** Cassette
Language Machine code **Other versions** Vic-20 (8K) **Outlet** Retailers

Army recruiting officers are no fools — show the lads a clip of a tank in action and they'll join up in droves. But there's no need to take the Queen's shilling if all you want is to take command of a tank — with *Tank Commander* you can enjoy the thrills without spills.

Objectives

Driving a tank in the heart of enemy territory, what else could your objective be but to locate and destroy. Missions entail destroying enemy tanks, command posts and fuel dumps, and rescuing one of your agents. Five skill levels, a variety of large battle zones and a two-player option ensure interest is sustained at a high level.

In play

The combat area is impressively big so what you see filling the whole screen at any one time is just a fraction of the battlefield. As your tank rolls around the zone, other parts of the terrain scroll crisply into view. Travel is fastest along roads, slower (but still quite nippy) over open country. Swamps are a real drag, mountains and rivers totally obstructive while minefields and gun emplacements are a positive health hazard.

Movement of your small tank

and turret can be controlled independently. Both can be rotated clockwise and anticlockwise and the tank has forward and reverse gears.

Should a tree or a civilian's house lie in your path, you may prefer to go around them rather than blast them out of your way, and not just because you're really a sentimental old fool under that macho exterior. More practically, you'll need all the ammo you have to deal with more aggressive objects than bungalows and beeches. For example, enemy tanks come homing in on you, letting rip with shells to leave you in no doubt that 'make love, not war' isn't their favourite philosophy.

You should have no compunction about demolishing enemy command posts though, but do make sure it's not one of your own — not only will HQ be a trifle miffed but you'll also lose your only source of fuel and ammo replenishment.

Occasionally, an enemy aircraft will arrive with guns blazing — you can't shoot it down but must try to get out of the way. You can summon and control an aircraft of your own to protect you — but you've got to be very quick.

Verdict

Thundering guns, gigantic playing area, smooth scrolling, bags of action and plenty of variety add up to a heck of a good game. Quick march to your local store and sign on for this one, you lucky lads.

Bob Chappell

RATING (5)
Lasting appeal ●●●●●
Playability ●●●●●
Use of machine ●●●●●
Overall value ●●●●●



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132-161	facility	178	Illegal move message, return to player input	202-208	reaction
	Number check — checks if reaction point has been reached	179	Clear X input after mistake	209-221	Draw reaction
		180	Clear Y input after mistake	222-227	Update score arrays
162-172	Number total — checks for a winner	182-187	Clears square, increases number of discs by one, and draws the disc number.	228-245	Draws disc and number with no number update
173-177	Update player. Clear input section of screen	188-210	Routine to check for a	246-260	Title screen
				261-266	Instructions
					Data for instructions

```

60 L$(105)=D$+"BU2U1BD3D4BR2BUB"
61 L$(108)="BR2D8BR2BUB"
62 L$(109)=D$+"D4U4R2D4U4R2D4BR2BUB"
63 L$(110)=D$+"D4U4R3D4BR2BUB"
64 L$(111)=D$+"R4D4L4U4BR6BU4"
65 L$(112)=D$+"DBU4R4U4L4BR6BU4"
66 L$(113)=D$+"D4R4L4U4R4D8E2G2BR3BU12"
67 L$(114)=D$+"D4U2R1E2R1BR2BU4"
68 L$(115)=D$+"R4L4D2R4D2L4BR6BUB"
69 L$(116)="BR2D4R3L3D3R3BR2BUB"
70 L$(117)=D$+"D4R4U4BR2BU4"
71 L$(120)=D$+"F4BL4E4BR2BU4"
72 L$(121)=D$+"D4R4U4DBL4U2D2R4BR2BU12"
73 L$(122)=D$+"R4G4R4BR2BUB"
74 L$(33)="BR2D6BD1D1BR2BUB"
75 L$(34)="BR2D2BR2U2BR2"
76 L$(35)="BR5D8BR2UBR3R3D3L8BD2R6BU5BR2"
77 L$(36)="BR2BD2R8L8BD2R8D2L8R3D2UBR8D2D8
BR5BUB"
78 L$(38)="BR6G2F2E2H2BD4G2F2E2H2BR4BD4H
6H2BR10"
79 L$(46)="BR2D6D2BUBR2"
80 L$(63)="BR2D2U2R8D4L4D2BD1D1BR6BUB"
81 GOSUB 90
82 GOSUB 228
83 DRAW"S"+STR$(SC):COLOR CR
84 DRAW"BM"+P$
85 FOR I=1TOLEN(W$)
86 W=ASC(MID$(W$,I,1))
87 DRAW L$(W)
88 NEXT I
89 RETURN
90 PMODE3,5:PCLS
91 C(2)=1:C(3)=1:TL=1:M(2)=0:M(3)=0
92 COLOR1:LINE(0,0)-(256,192),PSET,BF:CO
LOR1
93 DX=-8:DY=33:PL=2
94 COLOR4
95 FOR A=1TO7:FOR B=1TO5:P(2,A,B)=0:P(3,
A,B)=0:NEXTB,A
96 FOR X=20 TO 240 STEP 30:LINE(20,50)-(
X,180),PSET,B:NEXT
97 FOR Y=50 TO 180 STEP 26:LINE(20,Y)-(2
30,180),PSET,B:NEXT
98 FOR L=1TO7:DX=DX+30:W$=STR$(L):P$=STR
$(DX)+",40":CR=4:GOSUB83:NEXT
99 FOR L=1TO5:DY=DY+26:DRAW"BM0,"+STR$(D
Y)+L$(L+48):NEXT
100 LINE(0,30)-(256,32),PSET,BF
101 RETURN
102 PMODE3,5:SCREEN1,0:IF DI=1 THEN W$="
DEMONSTRATION":P$="50,5":CR=4:GOSUB83
103 IF DI=1 THEN GOSUB 260
104 IF DI=1 THEN GOTO 285
105 FOR L=1TO1000:NEXT
106 CR=4:P$="40,2":W$="PLAYER TURN":S
C=4:GOSUB83
107 CIRCLE(131,6),6,PL
108 W$="X=":P$="10,17":GOSUB83
109 COLOR1
110 A$=INKEY$:IF A$="" THEN 110
111 IF A$=CHR$(13) THEN 117
112 IF A$=CHR$(8) THEN GOSUB179:GOTO110
113 X=VAL(A$)
114 IF X<1 OR X>7 THEN SOUND10,2:GOTO110
115 W$=A$:P$="32,17":GOSUB83
116 GOTO 110
117 IF X<1 THEN 110
118 W$="Y=":P$="200,17":GOSUB 83
119 P$="226,17"
120 A$=INKEY$:IF A$="" THEN 120
121 IF A$=CHR$(13) THEN127
122 IF A$=CHR$(8) THEN 180
123 Y=VAL(A$)
124 IF Y<1 OR Y>5 THEN SOUND10,2:GOTO120
125 W$=A$:GOSUB83
126 GOTO 120
127 '
128 PLAY"T175ABBCDFCAACB"
129 IF PL=2 THEN P=3:GOTO131
130 IF PL=3 THEN P=2
131 GOSUB181
132 REM**NUMBER CHECK****
133 GOTO 162
134 IF P(PL,2,2)>3 THEN X=2:Y=2:GOTO202
135 IF P(PL,3,2)>3 THEN X=3:Y=2:GOTO202
136 IF P(PL,4,2)>3 THEN X=4:Y=2:GOTO202
137 IF P(PL,5,2)>3 THEN X=5:Y=2:GOTO202
138 IF P(PL,6,2)>3 THEN X=6:Y=2:GOTO202
139 IF P(PL,2,3)>3 THEN X=2:Y=3:GOTO202
140 IF P(PL,3,3)>3 THEN X=3:Y=3:GOTO202
141 IF P(PL,4,3)>3 THEN X=4:Y=3:GOTO202
142 IF P(PL,5,3)>3 THEN X=5:Y=3:GOTO202
143 IF P(PL,6,3)>3 THEN X=6:Y=3:GOTO202
144 IF P(PL,2,4)>3 THEN X=2:Y=4:GOTO202
145 IF P(PL,3,4)>3 THEN X=3:Y=4:GOTO202
146 IF P(PL,4,4)>3 THEN X=4:Y=4:GOTO202
147 IF P(PL,5,4)>3 THEN X=5:Y=4:GOTO202
148 IF P(PL,6,4)>3 THEN X=6:Y=4:GOTO202
149 FOR Y=2 TO 4
150 IF P(PL,1,Y)>2 THEN X=1:GOTO202
151 IF P(PL,7,Y)>2 THEN X=7:GOTO202
152 NEXT Y
153 FOR X=2 TO 6
154 IF P(PL,X,1)>2 THEN Y=1:GOTO202
155 IF P(PL,X,5)>2 THEN Y=5:GOTO202
156 NEXT X
157 IF P(PL,1,1)>1 THEN X=1:Y=1:GOTO 202
158 IF P(PL,7,1)>1 THEN X=7:Y=1:GOTO 202
159 IF P(PL,1,5)>1 THEN X=1:Y=5:GOTO202
160 IF P(PL,7,5)>1 THEN X=7:Y=5:GOTO202
161 GOTO 173
162 REM**CHECK NUMBER TOTALS**
163 IF TL=0 THEN C(2)=0:C(3)=0
164 PI=2
165 X=1
166 FOR Y=1TO5
167 IF P(PI,X,Y)>0 THEN C(PI)=C(PI)+1
168 NEXT Y
169 X=X+1:IF X<8 THEN 166
170 IF C(PI)<1 THEN GOTO293
171 PI=PI+1:IF PI<4 THEN 165
172 GOTO 134
173 PL=PL+1:IF PL>3 THEN PL=2:TL=0
174 M(PL)=M(PL)+1
175 IF DI=1 THEN RETURN
176 COLOR1:LINE(0,0)-(256,28),PSET,BF:CO
LOR4
177 GOTO 106
178 W$="ILLEGAL":P$="86,17":CR=2:GOSUB83
:PLAY"T50ABDEDFGFFG":CR=4:FORL=1TO1000:N
EXT:COLOR1:LINE(84,15)-(170,28),PSET,BF:
RETURN
179 COLOR1:LINE(28,15)-(70,28),PSET,BF:C
OLOR4:GOTO106
180 COLOR1:LINE(225,15)-(238,28),PSET,BF
:COLOR4:GOTO 110
181 IF P(X,Y)<>0 THEN GOSUB178:GOTO176
182 CX=(X*30)+5:CY=(Y*26)+37

```

REACTION

```

267-275 Recover from
demonstration and asks if
instructions required again
277-280 Line programs for title
screen
281 Partial screen clear

286-291 Demonstration game
293-295 Signal 'Game over'
296-308 Display winner
311-320 Display game over and
prompt for another game
321-323 Prints Thank you

183 P(PL,X,Y)=P(PL,X,Y)+1
184 COLOR1:LINE(CX-12,CY-12)-(CX+14,CY+1
2),PSET,BF:COLOR4
185 CIRCLE(CX,CY),12,PL
186 P#=STR$(CX-15)+"",+STR$(CY-4):W#=STR
$(P(PL,X,Y)):CR=PL:GOSUBB3:CR=4
187 RETURN
188 REM***CHECK FOR REACTION***
189 CX=(X*30)-15)+20:CY=(Y*26)-13)+50
190 IF X=1 AND Y=1 AND P(PL,X,Y)>1 THEN
GOSUB 203
191 IF X=7 AND Y=1 AND P(PL,X,Y)>1 THEN
GOSUB 203
192 IF X=1 AND Y=5 AND P(PL,X,Y)>1 THEN
GOSUB 203
193 IF X=7 AND Y=5 AND P(PL,X,Y)>1 THEN
GOSUB 203
194 FOR SX=2T06:IF X=SX AND Y=1 OR Y=5 T
HEN IF P(PL,X,Y)>2 THEN GOSUB 203
195 NEXT SX
196 FOR SY=2T04:IF Y=SY AND X=1 OR X=7 T
HEN IF P(PL,X,Y)>2 THEN GOSUB 203
197 NEXT SY
198 FOR SX=2T07:FOR SY=2T04:IF X=SX AND
Y=SY THEN IF P(PL,X,Y)>3 THEN GOSUB 203
199 NEXT SY,SX
200 E=0
201 RETURN
202 CX=(X*30)+5:CY=(Y*26)+37
203 C=PL:H=1
204 FOR I=1T010:C=C+1:IF C>4 THEN C=1
205 CIRCLE(CX,CY),12,C
206 S=80+(I*10):SOUND S,1
207 NEXT
208 COLOR1:LINE(CX-12,CY-12)-(CX+14,CY+1
2),PSET,BF:COLOR4
209 P(PL,X+1,Y)=P(PL,X+1,Y)+P(P,X+1,Y)+1
:P(P,X+1,Y)=0
210 P(PL,X-1,Y)=P(PL,X-1,Y)+P(P,X-1,Y)+1
:P(P,X-1,Y)=0
211 P(PL,X,Y-1)=P(PL,X,Y-1)+P(P,X,Y-1)+1
:P(P,X,Y-1)=0
212 P(PL,X,Y+1)=P(PL,X,Y+1)+P(P,X,Y+1)+1
:P(P,X,Y+1)=0
213 P(PL,X,Y)=0
214 SY=1
215 FOR SX=1T07
216 IF X<1 OR X>7 THEN NEXT SX
217 IF Y<1 OR Y>5 THEN GOTO220
218 IF P(PL,SX,SY)>0 THEN GOSUB 222
219 NEXT SX
220 SY=SY+1:IF SY<6 THEN 215
221 GOTO 132
222 XX=((SX*30)-15)+20:YY=((SY*26)-13)+5
0
223 COLOR1:LINE(CX-12,YY-12)-(CX+14,YY+1
2),PSET,BF:COLOR4
224 CIRCLE(CX,YY),12,PL
225 W#=STR$(P(PL,SX,SY)):P#=STR$(CX-15)+
", "+STR$(YY-4)
226 CR=PL:GOSUB 83
227 RETURN
228 GOSUB276:W#="STRAIT SOFTWARE":CR=2:P
#="38,1":GOSUBB3
229 W#="presents":P#="82,8":CR=2:SC=6:GO
SUBB3:SC=4
230 FOR L=1T01500:NEXT
231 W#="ReactionN":CR=4:SC=12:P#="17,84"
:GOSUBB3
232 SC=4:CR=4
233 X=2
234 FOR L=1T050
235 COLORX:LINE(15,79)-(243,120),PSET,B
236 PLAY"TD00ARDA"
237 X=X+1:IF X>4 THEN X=1
238 NEXT
239 GOSUB279
240 PMODE3,1:SCREEN1,0
241 W#="INSTRUCTIONS? <Y/N>":P#="14,180"
:CR=2:GOSUBB3
242 A#="INKEY#":IF A#="" THEN 242
243 IF A#="Y" THEN 246
244 IF A#="N" THEN 102
245 GOTO 242
246 PCLS:PMODE3,1:SCREEN1,0:W#="REACTION
":CR=4:SC=8:P#="35,0":GOSUBB3
247 RESTORE
248 CR=3:SC=4
249 FOR SN=1 TO 4
250 FOR R=1 TO 9
251 READ W#:P#="0",+STR$(15*R)+15):GOSU
B83
252 NEXT R
253 IF SN=1 THEN W#="Press <SPACE> to co
ntinue":P#="20,180":CR=2:GOSUBB3:CR=3
254 IF INKEY#<>CHR$(32) THEN 254
255 COLOR1:LINE(0,20)-(256,179),PSET,BF
256 NEXT SN
257 COLOR1:LINE(0,179)-(256,192),PSET,BF
:COLOR2
258 DI=1
259 GOTO 102
260 PMODE3,1:FOR X=0 TO 256 STEP5:LINE(1
28,18)-(X,192),PSET:NEXT:PMODE3,5:RETUR
N 261 DATA AIM," To clear the board of y
our",opponents discs., "
262 DATA METHOD," By entering X&Y co o
rdinates","when asked by the computer, o
ne",of your discs will be placed into,one
of the 35 playing squares.
263 DATA " By placing your discs on to
p",of each other you can make that,squar
e reach REACTION point.,This will create
an explosion in,the square scattering d
iscs onto,the surrounding squares.,If th
ese squares are occupied by
264 DATA your opponent then his discs wi
ll,become yours and change colour.
265 DATA " To enter co ordinates type"
,the number and press <ENTER>.,If you ma
ke a mistake press the,backspace arrow t
o clear the,number.,You are not allowed
to place a,disc on a square occupied by
your,opponent., "
266 DATA " The squares have various",R
EACTIION points and these are,shown in th
e table below," " " CORNER SQUARE,...
...2"," " EDGE SQUARES.....3"," "
INNER SQUARES.....4"," " CENTRE SOUA
RE.....5"," "
267 PMODE3,1:SCREEN1,0:SC=4
268 GOSUB90
269 PMODE3,1:SCREEN1,0
270 COLOR4:LINE(98,105)-(158,114),PSET,B
F
271 CR=2:W#="INSTRUCTIONS":P#="56,90":GO
SUBB3:W#="<Y/N>":P#="98,105":GOSUBB3
272 A#="INKEY#":IF A#="" THEN 272
273 IF A#="Y" THEN 246
274 IF A#="N" THEN 102
275 GOTO 272
276 PMODE3,1:SCREEN1,0:COLOR3
277 FOR Y=0 TO 78:LINE(0,0)-(128,Y),PSET
:LINE-(256,0),PSET:NEXT

```

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REACTION

```

278 RETURN
279 COLOR3:FOR X=0 TO 256:LINE(128,120)-(
(X,192),PSET:NEXT
280 RETURN
281 COLOR1:LINE(1,85)-(255,120),PSET,BF:
COLOR4:RETURN
282 COLOR4:RETURN
283 GOTO 283
284 COLOR1:LINE(0,30)-(256,192),PSET,BF:
COLOR4:RETURN
285 FOR L=1TO1000:NEXT:X=1:Y=1:GOSUB129
286 X=2:Y=1:GOSUB129
287 X=1:Y=2:GOSUB129
288 X=2:Y=1:GOSUB129
289 X=1:Y=2:GOSUB129
290 X=2:Y=1:GOSUB129
291 X=1:Y=1:GOSUB129
292 FOR L=1TO3000:NEXT
293 P$="68,17":CR=2:W$="GAME OVER":GOSUB
83:CR=4
294 IF D1=1 THEN D1=0:GOTO267
295 PLAY"TI5ABCDCBCCDEDFCDEDFCAF6CDEDCBC
DCDE"
296 PMODE3,1:PCLS
297 W$="REACTION":P$="8,5":SC=10:CR=2:GO
SUBB3
298 W$="C> 1984 BY P BAYLISS":P$="9,35"
:SC=4:CR=3:GOSUBB3
299 COLOR1

```

```

300 W$="WELL DONE PLAYER "
301 IF PL=2 THEN PL$="ONE"
302 IF PL=3 THEN PL$="TWO"
303 W$=W$+PL$:P$="8,70":CR=2:GOSUB 83
304 W$="YOU ARE THE WINNER":P$="15,85":G
OSUB 83
305 W$="HARD LUCK PLAYER "
306 IF PL=2 THEN PL$="TWO" ELSE PL$="ONE"
"
307 W$=W$+PL$:P$="8,130":CR=4:GOSUBB3
308 SCREEN1,0
309 GOSUB90
310 GOTO 312
311 **END**
312 PMODE3,1:SCREEN1,0:COLOR1:LINE(0,55)
-(256,192),PSET,BF:COLOR4:LINE(0,0)-(256
,192),PSET,B
313 W$="G A M E O V E R":P$="38,60":CR=
3:GOSUBB3
314 GOSUB 90
315 PMODE3,1:SCREEN1,0
316 CR=4:W$="ANOTHER GAME?":P$="48,140":
GOSUBB3
317 A$=INKEY$:IF A$="" THEN 317
318 IF A$="Y" THEN 102
319 IF A$="N" THEN 321
320 GOTO 317
321 PCLS:CLS
322 W$="T H A N K Y O U":P$="34,90":CR=
4:GOSUBB3
323 FOR L=1TO3000:NEXT
324 PRINT@130,"**REACTION**":PRINT:PRI
NT" ***G A M E O V E R***":PRINT:PRINT
" *(C) 1984 PAUL BAYLISS*":PRINT:PR
INT:PRINT
325 NEW

```

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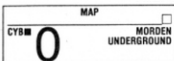
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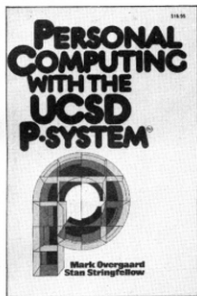
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'Personal computing with the UCSD p-System' by Mark Overgaard and Stan Stringfellow, published by Prentice Hall at £14.40 (paperback, 448 pages).

Although MSDOS and CPM are still favourites other operating systems are making their mark, notably Unix and the UCSD p-system.

The latter was developed in the past decade at the University of California, San Diego (UCSD), for use as a friendly computer environment within the university. However, word spread and the system is now available for most 16-bit computers.

Which is where this book comes in. It's an excellent guide to the operating system, explaining in detail how to use it. Fully illustrated tutorials include how to use the text editor, the file handling and how to cope with Fortran or Pascal. But for the languages alone you'd be better with a book dedicated to it. The UCSD p-system was designed around Pascal — still its primary language.

Little experience is assumed, and because of the fluid writing style, most features of the p-system are well explained.

This is a thorough and well-structured reference guide, though quite expensive. If you want to find out more about the p-system this is a good place to start. **PL**

'Computer art and animation: A user's guide to TI99/4A Color Logo' by David Thornburg, published by Addison Wesley at £10.95 (paperback, 216 pages).

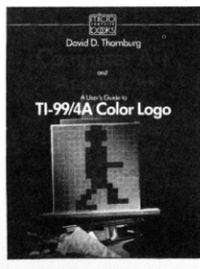
You need a pretty extensive TI99/4A system to make the best use of this book, at least

memory expansion and a TI Logo cartridge, but preferably a disk system and a video recorder as well. If you've got all that, it might be an entertaining way to get to grips with Logo.

It points out that there are two approaches to computer art or graphics. There's the graphics tablet or drawing program such as MacPaint or Atari Touch tablet which is an analogue of natural art — you are still drawing, painting and colouring. The other approach is art using turtle graphics.

Since the book is based around TI's Logo (turtle graphics) cartridge, that's the method the author uses. It lets you define the routines you want to use, and lets you bring animation into the art, aided by TI's excellent video chip and sprites.

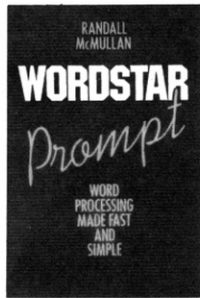
The book is written entertainingly, and develops the use of Logo well; but however competent a Logo programmer you are, it's never going to be as quick as producing visuals using MacPaint, the Koalpad or Atari's Touch tablet. Though these deny you animation, you do start drawing straight away. **PL**



'Wordstar Prompt' by Randall McMullan, published by Granada at £5.95, (paperback 92 pages).

Wordstar Prompt is a beginner's guide to using Micropro's well-known word processing package. It's surprising Granada feels there is a need for a book like this, given Wordstar's age and the wealth of explanatory texts available. However, this book is cheap and clear while other texts tend to be wordy and expensive.

Wordstar Prompt has two sections; part one has 15 pages of text, each facing a full-page diagram. Topics covered in-



clude moving the cursor and screen, breaks and hyphens, disk storage, paper size, dot commands and printer controls. The diagrams are simple but well-designed, the text clear and unambiguous.

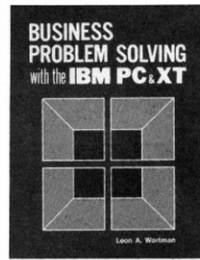
Part two, Wordstar Explained, covers much the same ground, but in more detail and without the diagrams. There is a three page overview of using Mailmerge, but only three paragraphs on Spellstar.

Four appendices list control commands, dot commands for Wordstar and Mailmerge as well as the IBM/Wordstar keyboard configuration, and a full index is provided.

The book has only about 50 pages of text, but at the price is a good investment for someone who wants to start using Wordstar without wading through the manual or a wordy tutorial. **BS**

'Business Problem Solving with the IBM PC & XT' by Leon Wortman, published by Prentice Hall at £17.95 (paperback 324 pages).

In an effort to ease life for the reader all programs in this book are written either in Basic or Pascal and run equally well on



the IBM PC or XT.

The text assumes a thorough knowledge of all PC documentation and the machine's operation and manipulation. This might be a big assumption as not all micro users spend so much time on their machines as the authors of books about them and it's slightly incongruous since Mr Wortman also brackets the English meaning of many computer terms after using them.

The many programs range from control of car costs to statistical evaluation of employees. Although the typesetting could have been more standardised to make a clearer and neater book, the contents are of genuine use to the average business executive (if there is such a thing), and most of the programs are well written for use by someone with relatively little experience. **CO**



'Assembler for the IBM PC and PC-XT' by Peter Abel, published by Prentice-Hall at £20.95, (hardback, 416 pages).

This book gives first-class explanations of the architectural knowledge required for assembler programming, supplying all you need to write easy material for the IBM PC.

The author used PC DOS as the operating system for this book but states that CPM has an almost identical assembler instruction set. He points out that the suppliers are continually upgrading their systems, so the final authority rests with the manuals.

Should you feel capable of teaching yourself how to program in assembler then Abel's book is as good as any other.

If you are unsure as to whether or not you would like to use a low-level language then look elsewhere for advice, or for a cheaper guide. **CO**

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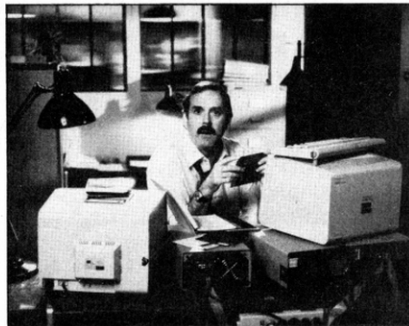
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SLANTAX ERRORS

Our review of the Everyman database package mistakenly stated that the software was available only for the IBM PC. This should have said 'only for the PC, Sirius, Apricot, Texas Instruments Professional, NCR Decision Mate, and all IBM compatibles'. Versions for the Hewlett-Packard 150 and the Apple range are on the way.

Scorpio Software (Issue 68) is on 061-834 2292.

No, honestly

There are words people use to express a meaning and words they use to sound impressive, sincere, thoughtful etc. You hear a lot of the second category from people who regularly open their mouths on television.

Nigel Searle, Sinclair Research's managing director, has been sadly neglected by the TV companies but definitely shows promise with the long words that sound good. At a press briefing on the QL last week he declared: 'We are fixing all the bugs of which we're made aware. We'll replace any firmware that has anything like a significant bug in it.'

But Nigel, God bless him, is too honest to let the resonant word 'significant' go without further comment. He added: 'I can't define what a significant bug is.'

NEXT WEEK

Tatung test — find out how the Tatung Einstein performs, relatively speaking.
SnapDragon — Part II of our feature on Dragon sprites.

A la modem — We review the versatile Portman from Interlekt.

Light pen — For Commodore 64 owners, a Pro-Test of the Edumate light pen.

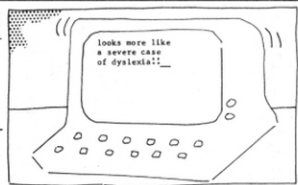
BBC Base — Database management on the BBC, by courtesy of Gemini and exclusive to PCN.

Gameplay — reviews of the latest action on *Oric* and *Atari* systems.

Programs — practice your satellite retrieval techniques with a space shuttle program for the BBC.

Charts — now weekly, PCN's regular look at the popularity stakes.

PAL-2000 by Mollusc



PCN DATALINES

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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
Scottish PCW Show	July 26-28	Assembly Rooms, Edinburgh	Scottish Industrial & Trade Exhibitions 031-225 5486
What Micro? Computer Show	July 14-15	Battersea Park, London SW11	Sue Holliday, VNU, 01-636 6890
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
Advanced Technology	August 9-13	St George's Hall, Liverpool	Advanced Technology, 051-236 0121
Acorn User Exhibition	August 16-19	Olympia, London	Computer Marketplace Exhibitions 01-930 1612
Electron & BBC Micro User Show	August 31-Sep 2	UMIST, Manchester	Database Publications, 061-456 8383
IBM System User Show	Sept 3-5	Olympia	EMAP International Exhibitions 01-837 3699
PCW Show	Sept 19-23	Olympia	Montbild 01-486 1951
Computer Communication & Control	Sept 26-28	Brighton Centre	Institution of Electrical Engineers 01-240 1871
Computers in Action	October 30-Nov 1	Anderson Centre, Glasgow	Trade Exhibitions, 0764 4204

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
National Computer Conference and Exhibition	July 9-12	Las Vegas, USA	American Federation of Information Processing Societies Inc. 0101 703 620 8900

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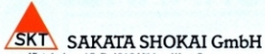
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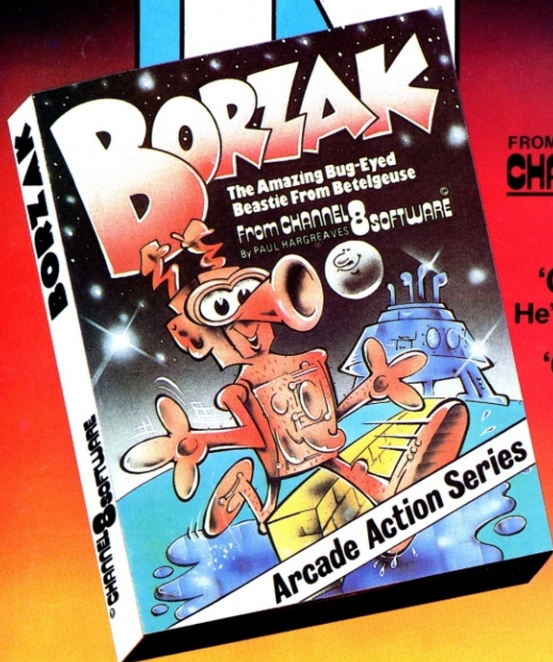
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