PERSONAL weekly COMPUTER NEWS

50p March 17, 1984 No 53

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. . . . in our fast-moving fun listing

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A DFS that gives more K for less cash

ATARI ART
Programming tips for better graphics

MICRO MANIA
New games for the Dragon and Commodore 64

Will Yamaha's MSX micro strike the right chord?

PCN micropaedia Vol 19 Part 1

PULL OUT AND KEEP

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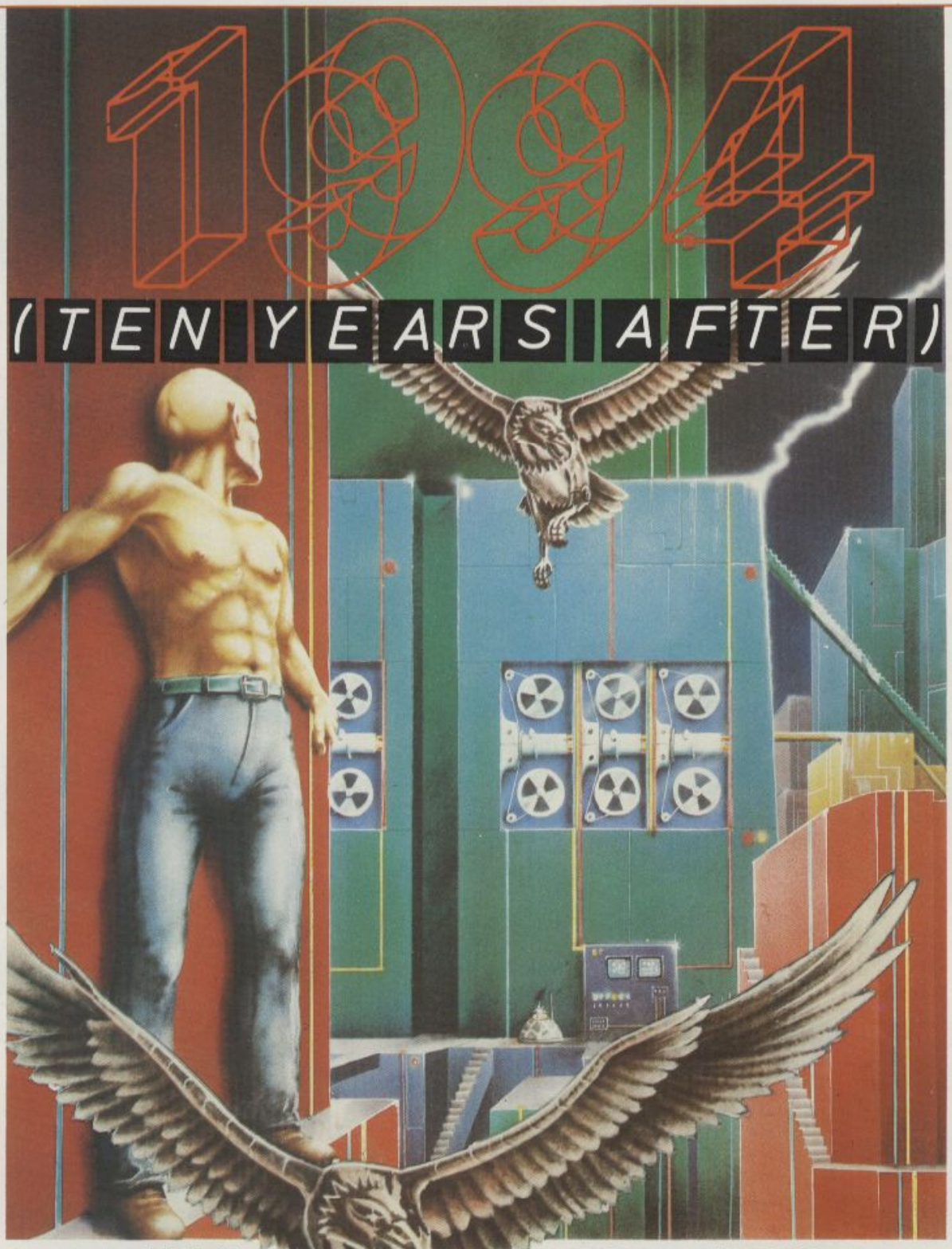
Pull-out guide to Oric & Atmos



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MENU

March 17, 1984 No 53

REGULARS

Monitor 2
Flan Enterprise five months late, page 2; ACT rescues the Sirius, page 3; micros in the race for the US presidency, page 4; Lynx leads out the Laureate, page 5.

PCN Charts 7
Galluping games and hardware highs in our weekly poll of the market.

Random Access 8
Tense and nervous? A tenner could be yours for spitting it all out.

Routine Inquiries 11
If you're in a fix with your micro we'll try to mend matters.

Microwaves 12
PCN's clues column with a bundle of microcomputing tips.

Readout 38
PCN's regular book program

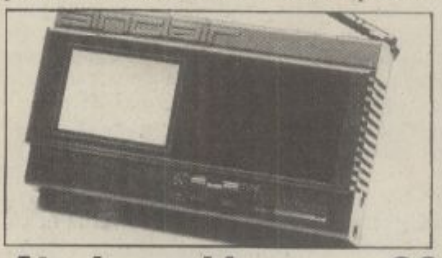
Databasics 73
Software spotting is this week's offering from our listings section.

Billboard 82
Get a cheap micro from the bargain basement at the back.

Quit/Datelines 88
The main events and the last word in computer publishing.

SPECIALS

Display for today 24
Geof Wheelwright looks at recent advances in screen technology that are putting bigger pictures on the smallest of computers.



Atari graphics 30
More info on getting the best graphics from your Atari.

Musical micro 18
Yamaha enters the micro field with its implementation of the true MSX standard. Igor Thomas is at the keyboard to conduct the proceedings.

MICROPAEDIA

Pull out and keep

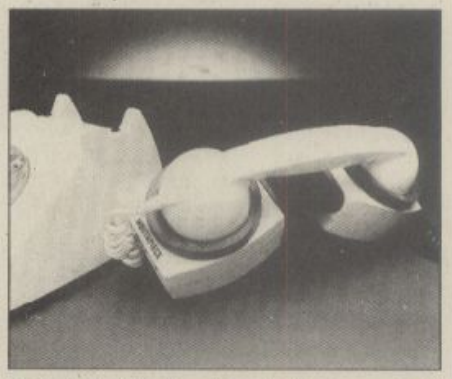
Inside the Atmos
This week sees the start of a *PCN* special on the ins and outs of the Oric Atmos, how it works and how to get the best out of it.

Competition

Win a Mac 15
An Apple Macintosh could be yours. We're giving away two as prizes in our readership survey and competition.

PRO-TEST PERIPHERALS

Modems for micros 34
Looking for a quality modem at reasonable cost? Read our review of the Tandy/Sendata model.



BBC disk decision 37
Model B owners now have another choice in the DFS market, the MDFS from Microware.

PRO-TEST SOFTWARE

BBC Tool Chip 51
Simon Williams looks at an Eprommed attack on the BBC B.

Spectrum Creation 52
Build your own adventure? Bob Chappell reports on the triumph of the Quill.

GAMEPLAY

Atari 55
Raids and races with Air Strike 2 and Pole Position.

Dragon 58
Vampires infest the Castle of Doom, while Dan Diamond stages a comeback in Fishy Business.

PROGRAMS

Spectrum 61
You've been reduced to the ranksfor incompetence, and you only chance to claw your way back is to shoot down as many enemy planes as possible with your anti-aircraft guns. Reach for the skies with Battle Stations.

Flan put on ice

By Ralph Bancroft

The fabled Flan Enterprise micro will not now arrive in the shops until September — five months adrift of the promised April delivery date. It will also have yet another name — its fourth in 12 months.

The new name and the reasons for the five month delay were due to be given at a press conference this morning (Wednesday) together with details about manufacturing and marketing plans.

But users won't have to wait until September before they get detailed information about the micro. A user group will be set up before then complete with a club magazine giving details of software and programming tips.

The official reason for the production delay is the problem arising over the need to change names and a desire to fully debug the machine before it goes on sale.

'We want to produce a trouble-free product and one that is available in enough numbers to satisfy initial demand,' said Michael Shirley, Flan marketing director.

'We have talked extensively with the retail trade who would rather see a fully debugged model appear in September in time for the Christmas rush,' he added.

Debugging the Enterprise could be a complex exercise due to the machine's innovative graphics and sound capabilities. These are achieved using two custom-made chips called Nick and Dave.

As would-be QL users are finding out and early Spectrum owners already know, custom-made chips invariably have bugs in them which can take some time to be tracked down and cured.

The first pre-production models of the micro should be available by the end of May giving Flan's engineers and the critical micro press plenty of time to identify any faults in the machine and its circuitry.

At the time of going to press, Flan was not prepared to say what the new name of the company (and the micro) would be.

However, Michael Shirley did confirm that the last change was more of a light-hearted publicity stunt than a serious intention.

It also got it temporarily off the hook of a legal action it was facing.

Elan Digital Systems of Crawley took out an injunction against Elan Computers in December last year over the use of the name. Elan Computers lost a subsequent battle to overturn the court decision.

This was not the first time the company was forced to change its name. When the company was first set up last year it wanted to call both itself and the micro Samurai.

Spirit set to steer clear?

Readers who tried to buy Spirit Software's racing game (Issue 52) may have some hope of receiving it after all. A number of *PCN* readers have been sent a letter claiming there have been problems with the moulding of the steering wheel, which is intended to provide the sort of control you get in a racing car.

A new batch of steering wheels was due to be delivered on March 12.

Spirit Software's Simon Stevens told *PCN* that customers would be offered a refund if they did not wish to wait for the game plus steering wheel. Anyone who has ordered the game and wishes to query this should contact Simon Stevens on 01-603 6074.

Please note that the number printed last week was wrong — *PCN* apologises to the subscriber on that line for any inconvenience caused.

DAISY CHAINS — This is what's known in the trade as a 'badge product'. It's yet another version of the Turbo 20 daisywheel printer (Issue 45). This version is known as the Daisy Step 2000 and costs £332 but the Turbo still seems to represent the best buy at £299. Several other versions of the Turbo/Daisy Step have been spotted over the past couple of months so those in the market for 20 cps bidirectional logic-seeking letter quality printing may be advised to shop around. For more information on the Daisy Step, call Keyaki on 0932 242777.

New TUG builds up steam

Tangerine users left high and dry by the battle over the Tangerine User Group (Issue 52) could be thrown a lifebelt. Colin Nowell, ex-director of the Group, is trying to set up a new alternative body covering both Tangerine and Oric.

At the moment the group is only at the planning stage, but Mr Nowell reckons that setting up the Tangerine group is feasible, and that the Oric group will go ahead if he hears from at least 500 interested Oric owners. He has approached Oric Products International about the latter idea and says he has been given a qualified approval, though Oric is unlikely to give the group concrete support before it actually takes off.

Mr Nowell's group intends to market a number of programs which were previously sold by Kenema Associates. Kenema's managing director is Bob Green of the Oric Owners' User Group, with whom Mr Nowell is in dispute.

Anyone wishing to help form a new Oric group should contact Mr Nowell at 18 Portishead Road, Worle, Weston-Super-Mare, Avon BS22 OVX.

CBM twins

By Wendie Pearson

Commodore has at last clarified the position on its new micros — the 264 and 364 released at Las Vegas.

Despite rumours of the machines' withdrawal in the wake of a management shake-up at Commodore, production of both models will begin in May and Commodore expects the UK launch to be in June.

Kelly Sumner, sales support co-ordinator said: 'We're going ahead with both these models, which will be made in Corby, and you can expect small quantities of the finished product to come out in May.'

These micros are expected to be in the £300 range.

The 264, also known as the Ted, has expansion ports, cursor control keys, comes with free software and is aimed at the small business.

The 264 should be kitted out with CP/M, either inbuilt or on cartridge to fit in with Commodore's general plans.

Imagine clears decks

Imagine software is set to come down to £3.95 as the Liverpool company clears the decks.

But the price cuts have been accompanied by persistent rumours that Imagine was in trouble, and last week general manager Bruce Everiss had to declare categorically that the company was in good health.

The new low prices will come into effect on March 26. Mr Everiss said there were three reasons for changing to £3.95:

- To try to deter piracy — Imagine has started to take a more active role in tackling software copying.
- To make room for a new generation of software products.
- For reasons of marketing — research has shown the company that a price below £4 causes sales to increase in multiples rather than merely in stages.

The new products Imagine refers to are a month or two off and they will cost £5.50 or more. It is also involved in contract work for a number of US micro manufacturers — Mr Everiss claimed more than half its revenue comes from work performed for third parties, and of the remainder about two-thirds is accounted for by exports at the moment.

The suggestions of trouble at Imagine arose when details of a uncompleted contract it had been engaged in with Marshall Cavendish began to trickle out. But Mr Everiss commented: 'We parted company as the best of friends.' Imagine had been appointed to produce software for the publishing company, intended to accompany a magazine. 'The intial level was do-able, but gradually they upped their sights,' said Mr Everiss. 'We came to an amicable agreement.'

Existing Imagine games cost £5.50. The news of its new prices leaked well before Imagine was ready to make an official announcement, and it has caused some embarrassment particularly to the high street chain stores which are hardly likely to sell much software at the old price before March 26.

Bruce Everiss: quashing speculation.

ACT Lifebelt for Sirius

The future of the Sirius has been assured. Victor Technologies has agreed to sell the worldwide manufacturing and distribution rights to ACT.

The deal was signed in the same week that ACT launched hard disk versions of the Apricot — a development exclusively predicted by *PCN* two months ago.

ACT has an exclusive agreement on the Sirius following a decision by Hong Kong-based Swire Pacific to drop out of a joint bid.

Swire will continue to distribute the machine in the Far East and may end up doing some of the manufacturing.

At the time of going to press, ACT was unable to confirm whether it will continue to manufacture the Sirius in California or shift production to its own factory in Scotland.

ACT is now in the curious position of manufacturing two compatible machines which compete against each other on both price and performance.

The new Apricot XI machines will sell at £2,695 with a 5Mb hard disk and £2,995 with a 10Mb hard disk. The twin 5¼in floppy version of the Sirius sells at £2,525.

The hard disks for the Apricot come from ACT's neighbours in Scotland, Rodime. The company has established a world-wide lead in 3½in Winchester technology.

At the launch of the XI, ACT's managing director Roger Foster said sales of the existing Apricot were now running at 2,000 a month. At this rate it is outselling the Sirius whose sales figures are thought to be around 1,250. As *PCN*'s latest sales chart indicates, retail sales of both machines are virtually level pegging and only just behind the IBM PC.

The deal with Victor is costing ACT around £7 million and the company intends to finance the purchase out of cash reserves.

Mac disk looks over-friendly

Apple's new user-friendly Macintosh could turn out to be just a little too forward for the experienced micro user.

The machine is so easy to use and operates in a fashion so unlike most traditional business systems that many experienced hands may find themselves confused by it.

The disk filing system, for instance, can be operated in one of several ways — each of which has a bearing on the ultimate performance of the machine. If you use the Mac's disk system in the normal way some very unexpected things happen.

On the single-drive version (which is what will be sold first in this country), you open a MacPaint or MacWrite data file from a data diskette merely by placing the 'pointer' over the appropriate ikon and pressing the mouse button twice.

You must then make up to ten disk swaps with a program disk in order to start work.

Apple says this option is only for people who have dual drives — where the disk-swapping wouldn't be necessary and the Mac would automatically get the files from the second drive. To use the single-disk system to its best advantage you must load up a program from the program disk and — once it' loaded — close the data file it automatically opens.

The screen will then go blank except for five 'keywords' at the top of the screen. You would be forgiven for thinking at this point that you'd exited from the program. But it is actually at this point that you eject the program disk and put in a data disk from which you can load data files with only two disk swaps.

A little confusing for those old hands among us accustomed to mostly blank screens meaning mostly blank memory.

Apple's Mac — disk duel.

OFT defends price cutting dealers

The Office of Fair Trading (OFT) has laid down the law on micro prices — but don't expect a free-for-all in the shops.

The OFT sought and received an undertaking from Apple UK that it wouldn't discriminate against price-cutting dealers. This action was the result of a complaint from C/WP, a former Apple dealer; but both Apple and C/WP were last week keen to dismiss the suggestion that the OFT has given dealers a charter to slash prices.

Apple maintains that the OFT has merely re-stated the existing legal position and that its own undertaking re-states its policy. But C/WP says that when Apple ceased to supply it last year 'our company was nearly obliterated,' and that Apple's decision was based on C/WP's discounting.

Apple's Mike Spring said: 'I don't really want to discuss our relationship with C/WP,' but he added: 'There were many factors involved.'

'It's not been our objective to force prices down,' said C/WP's Robin Adda. 'But if market forces suggest a price, why should the customer have to pay more for a product, and why should the retailer have a manufacturer dictating to him?'

He said that the margin on Apple products made price cutting a reasonable tactic but added a general comment: 'Retail prices continue to be absurdly inflated.'

The company is also attacking ACT through the OFT, and it is making no secret of the fact that it would like to be an Apricot dealer — but ACT has not so far shown any sign that it will take up C/WP's offer.

WH Smith joins software team

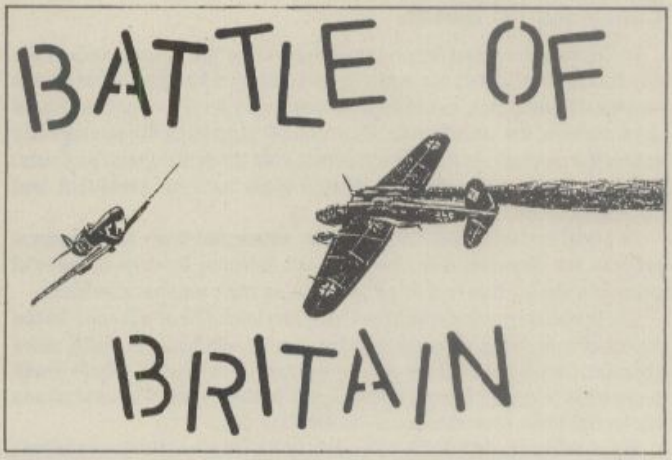
WH Smith has moved into business software — but you won't be seeing spreadsheets on the magazine racks in the immediate future.

The giant retailer has come to an agreement with Softeam, one of the USA's largest software distributors. The two companies have formed WHS Softeam as a business software distribution group.

US software from Micropro, Ashton Tate and Peachtree will be made available to selected dealers, and a wide range of popular micros will be supported, including the IBM PC, DEC Rainbow, and Epson HX20. Fujitsu, about to launch its FM7 and FM16 micros, has also come into the arrangement.

This will mean that buyers of the new machines should not have to wait too long for software. Fujitsu hopes that there will be a 'Wealth of software available from the word go' for its new machines.

The move could mean a greater and faster availability of business software, given Softeam's technical expertise in adapting software for specific machines (particularly to IBM 'compatible' machines) and the nationwide distribution facilities of WH Smith.



Maincomp in donation muddle

Remember 'Battle of Britain Simulation'? This was a £9.95 Vic 20 game advertised in October 1983 by London-based Maincomp. The advertisement said that for every copy sold of this game of 'skill, cunning and wits', £1 would be donated to the Royal Air Forces Association.

But a customer dissatisfied with the product has asked Maincomp for a refund but has not had an answer. And the RAFA has not heard from the company since June 1983, nor has it any record of donations from Maincomp.

A representative of Maincomp told us the company had sold 1,500 programs, but refused to comment on customers' letters or the issue of donations to RAFA.

Maincomp is at 1-2, Cambridge Gate, Regents Park, London NW1 4JN (01) 487-5435.

VIEW FROM AMERICA

All the President's micros

By Chris Rowley

This year's presidential election is now well and truly off the launching pad and it has already been remarked in the media that never have American elections been more thoroughly computer analysed.

To which I might add, You ain't seen nothin' yet!

Of course, the presidency is the big one but there are another 492,000 elective offices in the US, including about 20,000 mayoralties and rather fewer dog-catchers. Many of these posts are fought for with an intensity that matches the presidental stakes. In addition some of them generate higher voter turn-outs.

One worrying aspect of the spread of modern campaign techniques — television, directmail, phone banks and computerised polling — has been the ballooning cost of winning an election at a time when fewer and fewer people bother to vote. Now micros are running election-winning software and offering cheap 'smart' campaigns with precision targetting of voters.

For example there is Campaign Manager, a $750 package that runs on an IBM PC or Apple II+. So far more than 1,000 election campaigns have equipped themselves with Campaign Manager, which offers politicians the same sort of benefits that businessmen have already derived from software such as 1-2-3; building an election database, handling the budgets, searching out swing voters and sources of money.

In the 1983 mayoral campaign in Charlotte, North Carolina, a black Democrat upset the ruling white Republican with computer-directed squads of volunteers who got out the black vote. City voter lists were first sorted by mainframe to target favourable neighbourhoods; then Campaign Manager on a PC compared voter turn-out to past performances and directed the volunteers to exactly those neighbourhoods where voters were laggardly.

It is easy to see why Precision Targetting is being touted as one way to rouse the US from the democratic slumbers of the TV era.

Every social issue

In this scenario most Americans are bored by the major issues of the day and never vote but are actually quite excited by some other issues — a local housing tax, sex in high school library books, or packs of feral dogs roaming the countryside. By precisely targetting the appropriate voters the campaign's manager can motivate them to register and vote. Then, while they are about it, they'll likely vote for president and dog-catcher too.

In 1980 fundamentalist Christians, estranged from the electoral process for decades, were brought out in force by very successful computer drives that targetted abortion as their number one issue.

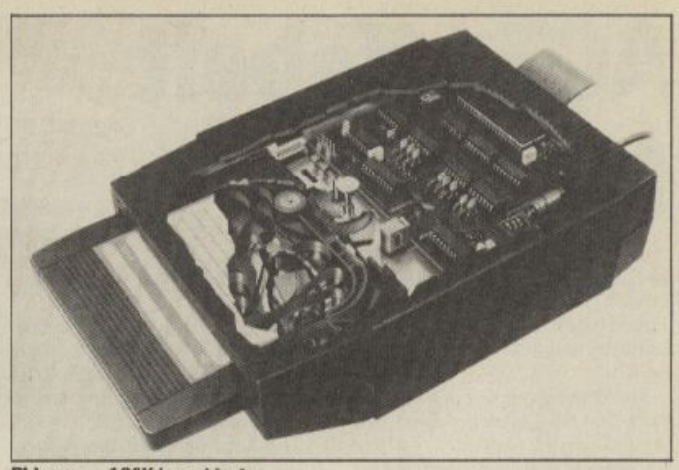
But the boom in micros implies that every social issue will soon be the object of targetting. Campaign management will become much more efficient; much less money will be wasted in delivering Whole Earth pamphlets to crusty female Republicans in their seventies, and phone banks will know just who to call on election day.

We should note that of the 435 seats in the House of Representatives 87 were won recently by five per cent or less of the vote. This is a point well taken by another software start-up called Campaign Software, which is selling its product to Republicans only.

Using this program to target the elderly, the Republicans won a State Senate seat in Fairfax County, Virginia, last November, by 337 votes. This was the first time a Republican had won there in over 100 years.

By itself micro software won't guarantee electoral success but in close fought races where finding a few hundred potential converts is all, it can offset all the television ads that big money can buy.

Bearing in mind that non-voters have, by and large, been the poor, the young, and the disadvantaged minorities, the advent of cheap but effective campaign techniques that can speak to them will revolutionise US politics at every level.



Phloopy — 100K in a phlash.

Phloopy fills tape/disk gap

The gap between tape and disk storage closed a little last week with the appearance of two intermediary devices.

The Ultra-drive and the Phloopy aim to give you faster access than is possible with cassette tape without involving you in the expense of disks.

The Phloopy, pictured here, is a fast tape storage system, giving you typical file access and retrieval times of three to four seconds, and it stores 100K on each cartridge. It is more reliable than many fast tape systems as it records data in parallel, one byte at a time, which gives a short tape (12 feet) and automatic error correction. Because of its speed the system is pseudo-random, and also provides standard disk type utilities such as CAT, INFO and VERIFY. The Phloopy will be available shortly for the BBC at £143.75 including interface, VAT and p&p, and for other micros later in the year.

The Ultra-drive is the latest version of the Hobbit (Issue 5) and comes from Ikon Computer Products. It stores 200K on a microcassette, and, like a cassette, is a serial device — but it runs at about 20 times the speed. The Ultra-drive is now available for the Dragon, and will be on sale with improved software for other machines, including the BBC, Oric, Commodore and Tandy, within the next few months. The whole package costs £80 including software and interface cable.

But what about its software compatibility with other media? Phi-mag, maker of the Phloopy, offers a utility to copy your software from cassette to Phloopy cartridge, and looks to software manufacturers to provide their software on Phloopy cartridge.

A similar utility should also be available for the Ultra-drive.

Contact Phi-mag on 0326 76060, and Ikon on 099 421515. *PCN* will soon review both.

MY BRILLIANT KOREA — No sooner has the ZX81 been killed off by CMOS chips, 32-bit devices, integrated software and QL order forms than it stages a comeback, this time on the other side of the world. Samsung Electronics will assemble and distribute the ZX81 and the Spectrum in South Korea, bearing out Sir Clive's prediction that the older system might find a new lease on life in distant parts. The first Korean Sinclair machines will be on sale later this year.

IBM gets Cobol

Adding momentum to its campaign to get Cobol on micros, Micro Focus has launched High Performance Level II Cobol on the IBM PC and XT.

H/P Level II Cobol has facilities that are specific to the PC in much the same way as Personal Cobol (Issue 47), but where that product works at the source code level the latest Micro Focus launch is a compiler; it includes a native code generator that increases the speed of execution.

The price of such performance is £1,250 to new users, and the version for the PC is available now from Micro Focus on 0635 32646.

Lynx re-launch

Following the re-launch of the 48K as the Leisure (Issue 49), Camputers is attempting to revive its flagging fortunes by re-launching the 128K Lynx as a business system called the Laureate.

It is promoting a Laureate package combining a 128K Lynx, twin 200K disk drives, CP/M, parallel interface module and free Perfect Software suite for an all in price of £999.95.

At this price it is one of only a handful of complete CP/M systems selling at or below the magic £1,000 mark. Camputers certainly considers it an attractive proposition and is aiming to sell the system to small businesses and for specialised applications.

Two pieces software already available for the machine are an estate agents package and a welfare benefits package. Camputers is using the latter as the basis for its bid to put its micros into the local offices of the DHSS.

The company claims that the Laureate is the fastest CP/M micro around. The claim is based on the use of the Z80B processor which runs at 6MHz compared to the usual 4MHz on the Z80A. However, the Camputers claim has yet to be independently verified.

Another plus feature of the Laureate is that 64K of the RAM is used to handle the video display. It offers a screen resolution of 512 by 248 pixels in eight colours compared to the 256 by 248 resolution of the 48K Leisure.

Camputers' chairman, Stanley Charles, says the relaunching of products and the move into the business market are part of a move to re-vamp the company's image.

He will undoubtedly have his work cut out. The 96K Lynx was originally due to be available in July last year and the 128K Lynx with CP/M by the autumn. Both dates were missed.

Mr Charles is also keen to scotch rumours about the financial health of the company. He confirmed that it had been seeking additional capital to finance its expansion plans for several months and a financing agreement was reached around Christmas, but the deal fell through.

'We have now reached agreement with a financial consortium,' he said, 'and we are just waiting for the stock exchange paperwork to go through before we make a formal announcement about it.'

The extra finance will enable Camputers to step up its export plans. It recently signed a £3 million deal to sell the Lynx in France and has just started shipping machines to Greece.

CBM's money for art's sake

The art of the future is what you're being invited to create in a £150,000 computer art challenge sponsored by Commodore.

If you have a Vic-20 or a Commodore 64 and are a budding creative genius you could put yourself in line for the top prize of £5,000.

There will be three age groups in the contest — under 12, 12 to 17, and 18 and over. You can get entry forms from Department CICAC, Granard Communications, 4 Babmaes St, London SW1Y 6HD.

Maintaining micros

Computeraid Services is a new company set up by Thorn EMI Information Technology to provide third party maintenance services for micro users and suppliers. The service is intended mainly for retail outlets and firms with a number of micros on the premises, but Computeraid is also willing to take the single-micro small businesses onto its books.

Launching the new service, Computeraid general manager Maurice O'Brien pointed out that there was a tendency among micro users to think in terms of insuring their hardware and software, but that this wasn't always the logical solution. He felt it was important that business users should deal with a company that knows how important it is to have fast service, and understands that getting the hardware up and running again may well be a secondary consideration to recovering vital data.

He also stressed the importance of getting a maintenance contract before your micro starts to malfunction, rather than after. Computeraid is on Farnborough (0252) 548888.

First Byte at Electron

From little Acorn Electronics addons have been noticeably slow to grow. First Byte Computers (0335 43729) has now taken its place among the early leaders in adding to the Electron a switched joystick interface.

Its unit takes Atari-type joysticks and it has been talking to software houses to make sure that when the box comes out at the end of this month there will be games to play with it.

The FBC interface will cost £24.95 from FBC's dealers.

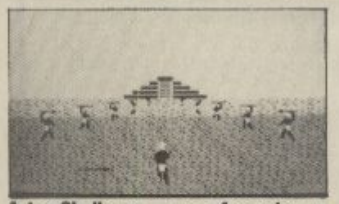
SOFTWARE

The new releases

Games

Commodore: For the 64 Audiogenic has launched a range of disk-based games to add to your boxed sets. For £12.95 each they are Frantic Freddie, Pegasis, Forbiden Forest, Aztec Challenge, and Slinky. All have various levels of difficulty and in case you manage to reach an undocumented level Audiogenic has set up a counselling service to help you out. The company can be reached through PO Box 88, Reading, Berks. Terminal Software (061-773 9313) wants you to don overalls for its latest game — Plumb Crazy, also for the 64 and costing £7.95. Ocean Software (061-832 9143) has an international flavour to its Chinese Juggler game — the idea originated in Hungary and won prizes in Budapest before becoming available for the Commodore 64 via Manchester. The game costs £6.90 and will be ready for the Spectrum and BBC soon. Mogul's (01-734 6080) latest launches run on the Vic-20 as well as the 64 and versions for the Spectrum are also available. The

The Chinese Juggler — sleight of hand with Hungarian connections.



Aztec Challenge — one of a series on disk from Audiogenic.

titles are Fire Ant, Labyrinth of the Creator, Mushroom Alley, Ludwig's Lemon Lasers, Chomper Man, Seawolf, and The Great Adventure Pack No 2. The prices are £7.95. Strategic Simulations (0101 415 964 1353) has adapted several war games to run on the 64 — Germany 1985 pits you against Soviet troops and RDF (Rapid Deployment Force) 1985 switches the scene but not the enemy. Others include Battle for Normandy, Knights of the Desert and Combat Leader. They should be available through Softsel distributors here.

Sinclair: Computer Rentals (CRL — 01-533 2918) has pulled the plug on Glug-Glug, its latest program for the 48K Spectrum. This machine code game has 32 levels and costs £5.95.

BBC: Molecule is a 'game of logic' from Bridge Software (061-832 4209) but even so it involves saving the world, in this instance from a virus. Subtitled Beat the Bug, it costs £6.90 — Alistair MacLean paperbacks are rather less.

Education

BBC: System Software (0742 682321) has four new titles in stock for anybody who wants to take a slightly off-beat look at education. Easywrite (£10) is intended to help in the development of ideas in the early stages of literacy; Stock (£14.95) illustrates a stock control system for simulation and project work; Survival (£14.95) looks at social organisation and development; and Multitest (£14.95) looks at social organisation and development; and Multiset (£14.95) is 'a multi-lingual educational utility'. Kosmos (05255 3942) has followed up its French Mistress with The German Master and The Spanish Tutor, language tuition courses that cost £9.95 each.

Various: For the Commodore 64, the 48K Spectrum, and the Oric Atmos/Oric-1 Softshop International (01-377 8034) has a series of educational games in English and other languages for five to 10 year-olds. The price is £9.95 and addition, subtraction, spelling numbers, and alphabet are covered.

Business

Unix: A full range of accounting software from Bivius (0903 212481) is now offered to users of Unix-based systems. Sphinx (0682 75343) has made the same move with Peachtree's accounting packages, offering them to Unix users after adapting them in house.

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PCN charts

Hardware | Top Ten up to £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▶1	(1)	Spectrum	£99	(SI)
▲2	(3)	VIC 20	£140	(CBM)
▼3	(2)	CBM 64	£229	(CBM)
▲4	(6)	BBC B	£399	(AC)
▼5	(4)	Dragon 32	£175	(DD)
▲6	(8)	Atari 600XL	£150	(AT)
▶7	(7)	Oric 1	£99	(OR)
▲8	(10)	Apple IIe	£750	(AP)
▼9	(5)	ZX81	£40	(SI)
▼10	(9)	Electron	£199	(AC)

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the fortnight up to March 8. The games chart is updated every other week.

Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month.

PCN Charts are compiled exclusively for us by RAM/C.

Top Ten over £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▶1	(1)	IBM PC	£2,390	(IBM)
▶2	(2)	ACT Sirius	£2,525	(ACT)
▲3	(5)	ACT Apricot	£1,760	(ACT)
▶4	(4)	Apple III	£2,755	(AP)
▼5	(3)	DEC Rainbow 100	£2,359	(DEC)
▲6	(—)	Olivetti M20	£2,180	(OL)
▲7	(8)	Wang Professional	£3,076	(WANG)
▲8	(9)	NCR Decision Mate V	£1,984	(NCR)
▼9	(7)	Kaypro 10	£2,595	(CKC)
▲10	(")	Data General Ent 1000	£2,645	(DGL)

Distributors: **AC** Acorn **ACT** ACT/Sirius **AP** Apple **AT** Atari **BW** Brainwave **CKC** CKC Computers **CBM** Commodore **DD** Dragon Data **DEC** Digital Equipment **DGL** Data General **EP** Epson **ICL** ICL **IBM** IBM **NCR** NCR **OR** Oric **SI** Sinclair **Wang** Wang **OL** Olivetti.

Machines: **SP** Sinclair Spectrum **AC** Acorn BBC **64** Commodore 64 **V20** Commodore Vic 20 **81** Sinclair ZX81 **DR** Dragon **OR** Oric **AT** Atari

Games Top Thirty

	GAME TITLE	PUBLISHER	MACHINE COMPATIBLE									PRICE
			SP	AC	64	V20	81	DR	OR	AT	OTHERS	
▲ 1 (4)	Chequered Flag	Psion	★									£6.95
▼ 2 (1)	Manic Minor	S/W Projects/Bug Byte	★		★							£7.95
▲ 3 (11)	Fighter Pilot	Digital Integration	★									£7.95
▲ 4 (17)	Atic Atac	Ultimate	★									£5.50
▲ 5 (10)	Scuba Dive	Durell/Martech	★		★				★			£6.95
▼ 6 (3)	3D Ant Attack	Quicksilva	★									£6.95
▼ 7 (2)	Hunchback	Ocean	★		★				★			£6.90
▲ 8 (23)	Rev of Mutant Camels	Llamasoft			★							£5.95
▶ 9 (9)	Alchemist	Imagine	★									£3.95
▲ 10 (21)	Hobbit	Melbourne House	★	★	★	★						£14.95
▼ 11 (6)	Flight	Psion	★									£7.95
▲ 12 (—)	Chinese Juggler	Ocean			★							£6.90
▶ 13 (13)	Death Chase	Micromega	★									£6.95
▼ 14 (7)	Mr. Wimpy	Ocean	★		★				★			£6.90
▼ 15 (12)	Lunar Man	Ultimate	★									£5.50
▼ 16 (5)	Stonkers	Imagine	★									£3.95
▲ 17 (24)	Skull	Games Machine	★									£6.95
▼ 18 (8)	Space Shuttle	Microdeal	★	★	★	★		★	★			£8.00
▲ 19 (30)	Wheelie	Microsphere	★									£5.95
▲ 20 (—)	Wizard and Princess	Melbourne House				★						£5.95
▲ 21 (—)	Quest of Merravid	Durell/Martech	★		★							£7.95
▼ 22 (15)	Jet Pac	Ultimate	★			★						£5.50
▲ 23 (26)	International Football	Commodore			★							£9.95
▲ 24 (—)	Fred	Quicksilva	★									£6.95
▲ 25 (—)	Cyrus-is-Chess	Intelligent Software	★									£9.95
▼ 26 (16)	Valhalla	Legend	★									£14.95
▲ 27 (28)	The Snowman	Quicksilva	★									£6.95
▲ 28 (—)	Blagger	Alligata			★							£7.95
▲ 29 (—)	Hungry Horace	Psion/Melbourne	★		★							£5.95
▼ 30 (14)	Pool	CDS	★									£5.95

Don't carry a LOAD on your shoulders, unburden yourself on *PCN*'s letters page.

How to ruin your programs

Have you ever come across a CLOAF or tried to RUIN a program? If you are as inaccurate a typist as I (how could I write to you at all without a word processor?), then you will have typed all sorts of silliness into your long-suffering computer. How about a glossary of such mistakes? Here are a few for starters:

CLOAF	= CLOAD
CLOD	= CLOAD
DIRT	= DIR
LUST	= LIST
LOST	= LIST
PIKE	= POKE
RUB	= RUN
RUIN	= RUN
STRONG	= STRING

Usually these clangers are caused by hitting the key to either side or by hitting two at once, but daft results can arise in other ways. When CLOADing on the Dragon for instance, an 'S' at top left of screen while Searching for the program changes to an 'F' (for Found) followed by the program name. I called my screen sketching program 'ART' . . .

L G F Bradshaw,
Blackrod, Bolton

ZX81 is still boxing strong

The ZX81 is dead, long live the ZX81! And so say just how many of us? I bought an 81 last year. My reasons were simple; I did not have enough money to buy a 'flashy job' and I wanted only to find out about computing and its compatability with my brain. At 37 one has to try these things in an almost experimental way, but more out of curiosity than need. But seriously, I wouldn't be without one now.

PCN £10 Star Letter

What constantly surprises me is that the ZX81 must have sold more than practically any other machine, but when you look in the shops for software what do you find? Space invaders, Space raiders, Zombies, Munchers, Cave-men and Space Monsters.

Although it takes intelligence and skill to write programs like these (even if the imagination is somewhat lacking) there seems to be a lack of practical software.

Psion publishes Vu-file and Vu-calc, which are both good, but little else worthwhile can be found for this inexpensive but practical machine.

Yes, the ZX81 is highly practical for many people with small businesses, clubs, associations and the ilk. Surely there must be some owners out there who can think of simple programs that could help them in their particular field (or house). There must be some faint glimmer of hope left for this little empire builder.

I run a Chinese Boxing School and naturally my thoughts turned to that subject when ideas for programming are needed. Although I have two games programs, Mighty Snake and Kung-fu Guard, the main programs I'm working on are concerning the practical running of the club or use elsewhere. Finally, if I can do it I'm sure someone else can.

Come on programmers and software houses, pull your fingers out, there is an untapped sales market out there. You don't have to follow blindly on the bandwaggon, or do you?

Mike Symonds,
Gorleston, Norfolk.

Old fashioned, but popular, Cobol . . .

I read with interest David Guest's review of our product Personal Cobol (Issue 47). His conclusions were favourable but his criticisms of the Cobol language need answering.

The main point was that Cobol is old. He's right, it is — so is English, and that's spreading ever wider too. When a language has been used successfully for a long time, it is worth learning because you can use it widely. In a language, being well established is an overwhelming virtue.

Mr Guest also says Cobol is old-fashioned. It does lack some features of recent languages, such as facilities for structured programming; but so do most versions of Basic. And these features, though useful, are not essential; whereas only Cobol has the one thing essential for data processing — clear, powerful facilities for building data files as simple or as complex as you need.

The idea that Cobol users dismiss Basic as too easy is surprising; Cobol and Basic are on the same side in this respect. Cobol was designed for ease of use, and so successful is its design that it has become the normal language of practical, commercial programming. Cobol is *closer* to plain English than Basic is; there is more to learn in Cobol only because it can do more.

Cobol has been widely used on micros for several years; the innovation in Personal Cobol is that creating a program is very much easier. On micros this has always been done by typing the program with a text editor, then spending a few minutes running a compiler before test-running the program. Personal Cobol makes the process easier.

A D T Fryer,
Cobol Language Specialist,
Micro Focus, Newbury, Berks.

. . . puts reviewer in bandages

I think the review of Personal Cobol (Issue 47) fell below the standards you usually maintain as it seemed to be used as an opportunity for David Guest to air his dislike of Cobol.

I share his dislike of the language, but would not choose a product review to make this dislike known.

Cobol is aimed at the commercial programmer. It is long established so a huge amount of business software is written in it. If you aspire to contract programming in the big wide world, fluency in Cobol will assure employment.

The review suggests there is something wrong with planning your assault on the keyboard. It suggests planning things with pencil, paper and forethought is doomed to failure. Well, I disagree. It always works. There is nothing macho about sitting at a keyboard with a blank screen, blank mind and banging away when the inspiration hits. It results in a tatty program which may give you a sense of achievement when it finally does what you want it to, but makes anyone else who has to look at the source go 'bleah'.

I would also take issue with the use of the phrase ' . . . mysterious things called RPG II or APL'. I'm not being pedantic, but why not leave out the witty asides and instead have a column sometime saying what APL is and more importantly why people use it. And the same with other languages.

I know half the population will never see APL or RPG II or Speakeasy (wot dat, you say) but that should not stop you telling them about it. After all, you have just spent two pages telling people not to buy an extremely good package which fulfils its design role admirably on the grounds that you cannot sit at the terminal and hack away with it.

Do people realise some languages are a pain to use but always give good results because they will not work unless you tell them exactly what each variable is before hand? Not like hacking, where you suddenly decide at line 2270 that you could do with an AAZG to get you through the next loop.

Paul Hardy,
Bingley, W Yorks.

Bound in Band-Aid after the wounds of this two-pronged attack, David Guest replies that he's waving the banner of 'fair comment' to Mr Fryer's letter, but is rather less polite to Mr Hardy. When, he asks, did we ever suggest not buying Personal Cobol? — Ed.

Bridging more gaps in 'Bridge Player'

I am author of the Bridge Player program, reviewed in Issue 46.

The review was, in general, favourable but a couple of criticisms of the bidding and the defence were valid on the basis of the version reviewed.

However, these specific deficiencies (and, dare I say it, a number of others) have been ironed out in a new version now available, which includes additional features.

R Wheen,
E Molesey, Surrey.

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REWIND	Rewinds tape to beginning
HALT	Halts tape between programs
SAVE<filename>	Saves a program to tape
LOAD<filename>	Loads program
SKIP<filename>	Skips to end of specific file
DIR	Displays directory of all files on tape
RUN<filename>	Loads and runs program
BREAK OFF	Disables the BREAK key
BREAK ON	Re-enables the BREAK key
FAST	Speeds up most DRAGONS
OLD	Recovers last program
APPEND<filename>	Adds file to program in memory

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Microdrive software modifications

Q Can you tell me whether the major software houses intend to publish modifications to their software to run on the long-awaited Sinclair Microdrives?

I have several utility programs, purchased at some cost, which I find cannot translate for use on the Microdrive. Does this really mean I will have to wait until Microdrive versions of these programs are available and then spend the same money over again?

Maybe you can also explain why Psion's address does not appear on its software and advertising material. Could it be just to avoid the sort of inquiries I'm trying to make?
B E Turner,
Doncaster, South Yorks.

A Unfortunately saving a tape program onto Microdrive isn't as simple as just altering the SAVE and LOAD routines. The problem is that you'll probably find yourself overwriting areas of memory, so when you try to run it from Microdrive it's likely to crash.

Tasman Software is playing fair on this one, and is willing to supply a list of amendments to the Basic part of the program to make it Microdrive compatible, but other manufacturers aren't likely to be so friendly.

The position is that, if you break into a program, the manufacturer is more likely to prosecute you than help you, their reasoning being that breaking and entering is tantamount to piracy. Now, if the program is one of those, like Tasword, that allow you enter Basic to modify the program, there should be no real question of piracy. It would be nice of the company to help you, but they're under no real obligation.

There is one set of routines that might help in situations like this. Friendly Face, from Monitor, 01-937 9801, is a tape or Microdrive package that presents ways of converting tape software to Microdrive. It doesn't help you break into a program, so any software houses reading this can put their lawyers back in the box.

You're quite right, Psion doesn't give an address or phone number. In Psion's case this may be because Sinclair is the publisher of the software (though there's still no phone number).

Many software houses, however, don't bother giving you a way of getting in touch with them. In some cases it's simply thoughtlessness, but whatever the reason, it's thoroughly reprehensible. As customers certainly provide a service to the software houses' bank accounts it's about time the software houses provided a proper service to customers.

64 load and save triple decker

Q The Commodore 64 is a good micro but has weaknesses, such as the Basic and the tape loading speed. I find the loading speed very annoying as it loads at 600 baud whereas machines like the BBC and Spectrum load at 1200 and 2400 baud respectively. Why is it so much slower than other micros and is there anything I can do to speed it up?
Geoff Connell,
Malmesbury, Wilts.

A Working with the cassette recorder on the 64 can be tedious but strictly speaking you're wrong about the baud rates. The 64 actually loads and saves at 1200 baud but this is effectively halved because all tape operations are done twice with the second copy used as a check against the first. This is why Commodore cassette systems are so reliable.

There are three ways in which you can improve loading and saving times. First, and most obvious, buy a disk drive. Although slow in comparison to other disk systems, it is much faster than tape and offers access to much better software, in addition to random access files and other applications difficult, if not impossible, with the tape drive.

Second, you could buy a neat little product from Supersoft called Arrow, a cartridge that allows you to load and save programs at several times the normal tape speed. It costs £39. Stack of Liverpool offers a similar gadget for £29, also on cartridge, but Stack's version comes with a machine code monitor and toolkit included.

The problem with these is that they only work with programs you have saved yourself, not with commercial tapes.

Finally you can try the following which will cost you nothing at all . . .

For each program that you want to load, use the tape counter to find the halfway mark and mark this down on the cassette label or inlay card. When you come to load the program, zero the tape counter then allow the tape to run slightly past the halfway mark. Your program is now in memory but you can't run it yet.

In direct mode enter the following line:

```
FOR I = 46 TO 50 STEP 2: POKE I, PEEK (832): NEXT: FOR I = 45 TO 49 STEP 2: POKE I, PEEK (831): NEXT
```

This takes the values for the end of Basic, start of variables and start of array storage from the cassette buffer and places them into the zero page pointers. Your program can now be run.

This routine is unnecessary for machine language programs as no Basic pointers are used. You can simply SYS to the start of the machine code.

Alas, poor Oric. To be, or not to be?

Q 'Tomorrow's micro today' has died. I refer to the fact that Oric Products International has ceased production of the Oric 1. Since the new Atmos won't run Oric I software, what should I do with my old Oric?

Should I sell my Oric and buy an Atmos, or go for a 'safe' machine?
D J Appleby,
Peterlee, Co Durham.

A Oric hasn't really stopped making the Oric 1, the only important differences between the Oric and the Atmos are the keyboard and the ROM. The circuit board is the same; the *PCN* one even has Oric 1 printed on it.

Most software for the Oric runs on the Atmos. The only stumbling block is whether any calls to ROM routines are made. The addresses for some of these have been altered in the Atmos, which would crash any program that tried to call them.

Oric and other companies are bound to respond to the QL challenge by producing new machines this year, so it might be prudent to wait.

Expand the Spectrum character display

Q Is it possible for the Spectrum to produce a screen displaying more than 32 characters per line *eg* two letters to a character block?

I've completed a spreadsheet program where all the figure inputs and alterations are updated on screen, but I only have room for (maybe) six adequately sized columns, and I need roughly twice that.
G R Charles, Sutton Coldfield, West Midlands.

A The 42 column display routine we published in issue 49 may help, but if you want more you can get Taswide, which is a machine code routine from Tasman software giving you a 64 column display. It costs £5.50 including postage from Tasman Software, 17 Hartley Crescent, Leeds LS6 2LL.

Oric bug or a faulty machine?

Q I have had my Oric-1 for several months but have recently stumbled across a problem.

When playing games, the sound gradually becomes distorted after about 10-15 minutes.

Is this another bug in the Oric or do I have a faulty machine?
M Mills,
Lytham St Annes, Lancs.

A Almost certainly the latter. It sounds very much as if something is going wrong when your Oric warms up. It could be the sound chip, though that's unlikely as you would probably lose the sound or the machine would hang up.

More likely is that the amplification circuits are malfunctioning when hot.

If your machine's still under guarantee you should return it for repair, if not you'll just have to see if Oric will deal with it for you at a cost.

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Memotech verify routine is no bug

The bug in the Memotech Verify routine (issue 50) is not actually a bug at all. The Memotech will save program variables, if any exist, along with the program. Thus, if the program has been run before it is saved, and no lines have been edited between running and saving, the current values of the program variables are saved.

After saving, the Memotech does a CLEAR and the program variables are 'forgotten'. Obviously, when a verify is attempted, both the length and content of the saved program are different from that in memory and a MISMATCH error occurs. To avoid this, providing you don't want to save the program variables, use the direct command CLEAR, immediately before saving the program.

This facility for saving the program variables can be very useful when SAVE is used from within a program, since when the MTX encounters an embedded SAVE command it saves the program along with its current values onto tape. A program, saved in this way will, on loading, run starting from the instruction directly after the SAVE command.

The simplest use for this is in making programs that auto-run on loading *eg*

```
10 SAVE "PROGRAMME"
20 PRINT "THIS PROGRAM WILL
   AUTO RUN"
30 STOP
```

Type in this program, start the tape for record, then type RUN<ENTER>. When the program has saved itself onto tape, load it back in and see what happens.

Dave Mansell,
Callingwood, Cornwall.

Commodore Basic which runs and runs

Caution! Basic programs on the Commodore 64 which call for machine code files to be loaded like this

```
10 LOAD "M/C",1,1
20 REM REST OF PROGRAM
```

will never work

This is because having loaded the machine code, Basic reruns the program from the beginning; *ie* attempts to load the machine code again ad infinitum. A sclution is to use the following:

```
10 C=C+1
20 IF C=1 THEN LOAD "M/C",1,1
30 REM REST OF PROGRAM
```

Similarly, a Basic program which loads another Basic program will be overwritten but the new Basic program will auto run.

S P Rodgers,
Camden Town, London NW1.

HX20 random number seed

The following routine for the HX20 can be used to produce a random number seed at the start of a Basic program. The routine uses the internal timer, locations &H0009 and &H000A, to provide an integer in the range −32768 to +32767. The timer counts from 0 to &HFFFF and then resets to zero again. This process takes 107 milliseconds and so there are approximately nine complete count cycles per second.

```
10 POKE &H7E, (&H80 OR
   PEEK(&H7E))
20 RANDOMISE 256*PEEK(&H9)
   + PEEK (&HA) −32768
30 POKE&H7E, (&H7F AND
   PEEK(&H7E))
40 'REMAINDER OF PROGRAM
   FOLLOWS
```

J M Wald
Bitterne Park, Southampton.

Commodore 64 text reverse

A useful function for the Commodore 64 would be a method of seeing at a glance the difference between screen prompts and data input by the user. While colours can be used to do this, a more visually effective way is to use reverse text. This can be done simply by including POKE 199, 1 before an INPUT statement as in the example below.

The reverse text is automatically cancelled by the return following the input of data.

```
10 PRINT "INPUT DATA"
20 POKE 199, 1: INPUT A$
30 PRINT "<2 CURSOR UP>"
40 GOTO 10
```

Brian Rogers,
Crawley, Sussex.

BBC function keys for numeric keyboard

One of the better features of the BBC micro is its built-in assembler. However, it requires the use of both numbers and their upper case symbols, such as &, *, and ". How much simpler things would have been had the BBC come complete with a numeric keypad. I would then have been able to press SHIFT LOCK and type away.

I tried to program the function keys to produce numbers, *eg*, f0=0, f3=3 and so on. This worked well until I pressed SHIFT LOCK, when all I got was blank spaces. Looking through the User Guide I saw that the function keys could be set to a new base, when in SHIFT LOCK, by *FX 226, N. Thus *FX 226, 48 sets the function keys to their corresponding numbers, with f0=0 and f4=4, but only when SHIFT LOCK is pressed.

At any time, then, the function keys can still be used to define functions. I now have the benefit of having a numeric keyboard of types, without losing use of the function keys.

Michael Manson,
Wealdstone, Harrow.

Experiment with Atari colour

The subroutine below enables you to select any of the colour registers (0-4) and alter the colour value held there. The machine code routine is loaded into page 6 of the RAM and set up to execute within the vertical blank interrupting procedure.

After enabling the routine by GOSUB 9400 you can alter the colours by pressing the console keys:

OPTION — selects the next colour register.

SELECT — increases the colour value.

START — decreases the colour value.

Once the routine is installed you should be able to use the machine normally and run other programs (providing they don't use the three function keys, page 6 RAM or their own VBI routine). Thus you can experiment with the colours produced by program displays.

```
9399 REM*** setup console keys as colour
selectors ***
9400 FOR I=1539 TO 1627:READ J:POKE
I,J:NEXT I
9420 POKE 1537,5:REM response 1=fast
255=slow
9440 POKE 1538,4:REM first colour reg
selected
9450 K=USR(1600):REM enable
9460 REM to disable use K=USR(1618) or
press RESET
9490 RETURN
9500 DATA
206,0,6,208,61,173,1,6,141,0,6,173,31,20
8,201,3
9510 DATA
208,17,238,2,6,173,2,6,201,5,208,33,169,
0,141,2
9520 DATA
6,240,26,174,2,6,201,5,208,9,254,196,2,2
54,196,2
9530 DATA
24,144,10,201,6,208,11,222,196,2,222,196
,2,196,16,141
9540 DATA
31,208,76,98,228,104,162,6,160,3,169,7,7
6,92,228
9550 DATA
104,162,228,160,98,169,7,76,92,228
```

Nick Pearce, St Leonards.

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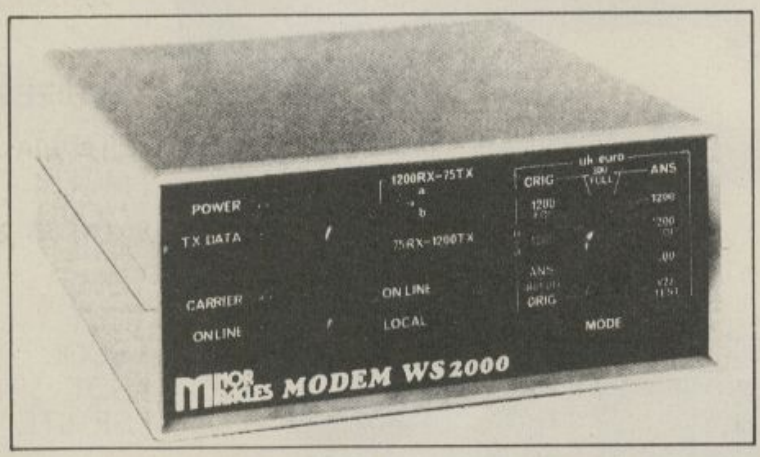

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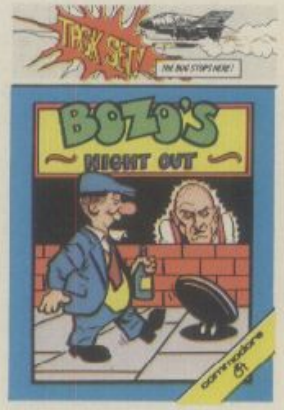

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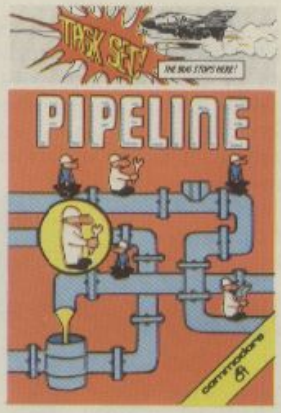

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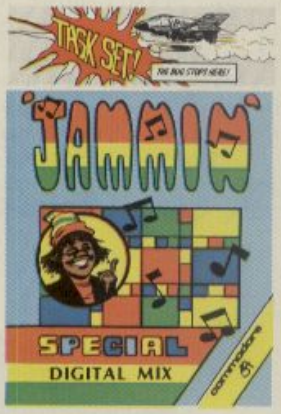

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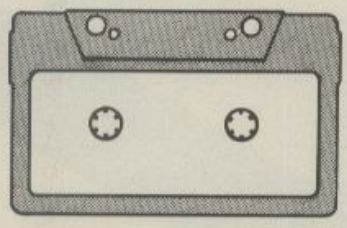

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See you at the P. C. G. SHOW where else? stand 42

From the land of the rising sun comes the news of a happy event: the birth of a forerunner in what may be yet another microcomputing revolution, the Yamaha YIS503. Descended from the inscrutable family names of Nippon Gakki and Microsoft, the YIS503 is a strong contender for leadership in the MSX stakes.

For those of you who haven't been to Japan in the last three months, MSX is all the rage in the inscrutable East, and is threatening to open a whole new international-size Pandora's box of microcomputing.

MSX is far more than just another version of Basic. Just imagine a world full of microcomputers, all of which could not only exchange programs, but would have identical screen formats, keyboard functions, and peripheral connectors. These 'dream-machines' would actually be able to accept each others plug-ins, particularly cartridges containing hardware expansions and games (sorry, I mean 'dynamically interactive applications') software.

Now, with MSX, that dream may have become a reality. For little more than $250, a Japanese micro customer can now buy as many as 15 different manufacturer's machines bearing the official MSX label. With its home market already clamouring to purchase every unit which is produced, nearly 100,000 machines have been sold so far. Perhaps this is one of the principal causes of the current 'silicon shortage', to which most western electronics manufacturers will sadly attest.

The current list of Japanese MSX manufacturers includes both recent and historic microcomputer firms, ranging from such sanguine names as Matsushita and Sony, to relative newcomers such as Kyocera and Spectravideo. Being in a classic 'first micro' position is a daunting prospect at the best of times, but this hasn't stopped Yamasha from striding quickly into the MSX marketplace.

Features

As a comparative newcomer to the micro manufacturer's marketplace, Yamaha has incorporated some remarkably sophisticated design into the YIS503. Two of its most notable features are the inclusion of 32K of usable RAM memory as standard, and an additional expansion connector for Yamaha-designed peripherals.

The shape of things to come — Britain's first MSX micro product.

As with all MSX micros a full moving-key keyboard is provided. Although the layout is standardised by MSX conventions its response and overall feel is remarkably good for such a low-priced machine. In addition to providing larger arrow keys than called for by MSX, Yamaha has thoughtfully quadrupled the size of the Return key. The overall keyboard design leaves the user with a wholesome feeling of satisfaction.

The general 'right-hand-rule' which stipulates that the arrow keys are on the right-hand side of the main keyboard, applies to all MSX micros. A few other MSX manufacturers (Sony, Canon, and National in particular) have transformed the arrow keys into something approaching arcade quality, while most of the others (Fujitsu, Toshiba, etc) have taken no initiative at all from the original MSX specifications. Yamaha's idea of re-arranging the classic diamond layout into a sort of square is not my idea of A Good Thing, but it is unique among current MSX machines and shows some degree of thought has gone into the problem.

As MSX micros are manufactured only in Japan at present, all MSX keytoards include Japanese characters as a key-selected option. Once the Hiragana/Katakana character option is selected, the micro proceeds to generate a completely different set of characters. A worrying feature of the original MSX keyboard layout specification calls for this key to be placed immediately underneath the Return key.

Yamaha has wisely moved the Caps Lock key away from its recommended position, and filled the gap with the enlarged Return key. This is a much better prospect for long-term entry in both English and Japanese, for which the Yamaha design team deserve an extra

Jay Myrdal

One feature to set the Yamaha apart from the herd is its rather professional-looking keyboard. With the necessary peripheral equipment it is capable of outstanding musical performance for the price. The synthesizer unit slipping into the port (far right) and the guts revealed (near right).

Yamaha tunes in

Igor Thomas looks at the new MSX micro from Yamaha that doubles as a synthesizer.

fortune cookie.

Only time will tell what other variations of the MSX keyboard will be necessary to suit western fingers, but Yamaha has done an excellent job of advance planning for the inevitable export users of YIS503's.

In the depths of the main circuit board a cluster of well-proven microprocessor chips attest to the easy, dare I say old-fashioned, hardware approach used throughout the machine. However, 'plain vanilla' this micro is not, with its ingenious windowable and bankable memory map and MSX plug-in facilities.

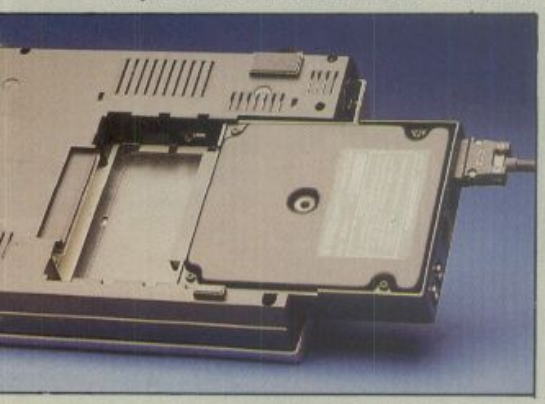
As well as the requisite Z80A microprocessor and 9928A video display (part of the MSX specification), notable microchips include an 8255 input/output/timer, a pair of custom-designed logic and sound integrated circuits, 32K ROM, containing the MSX Basic language and machine operating system.

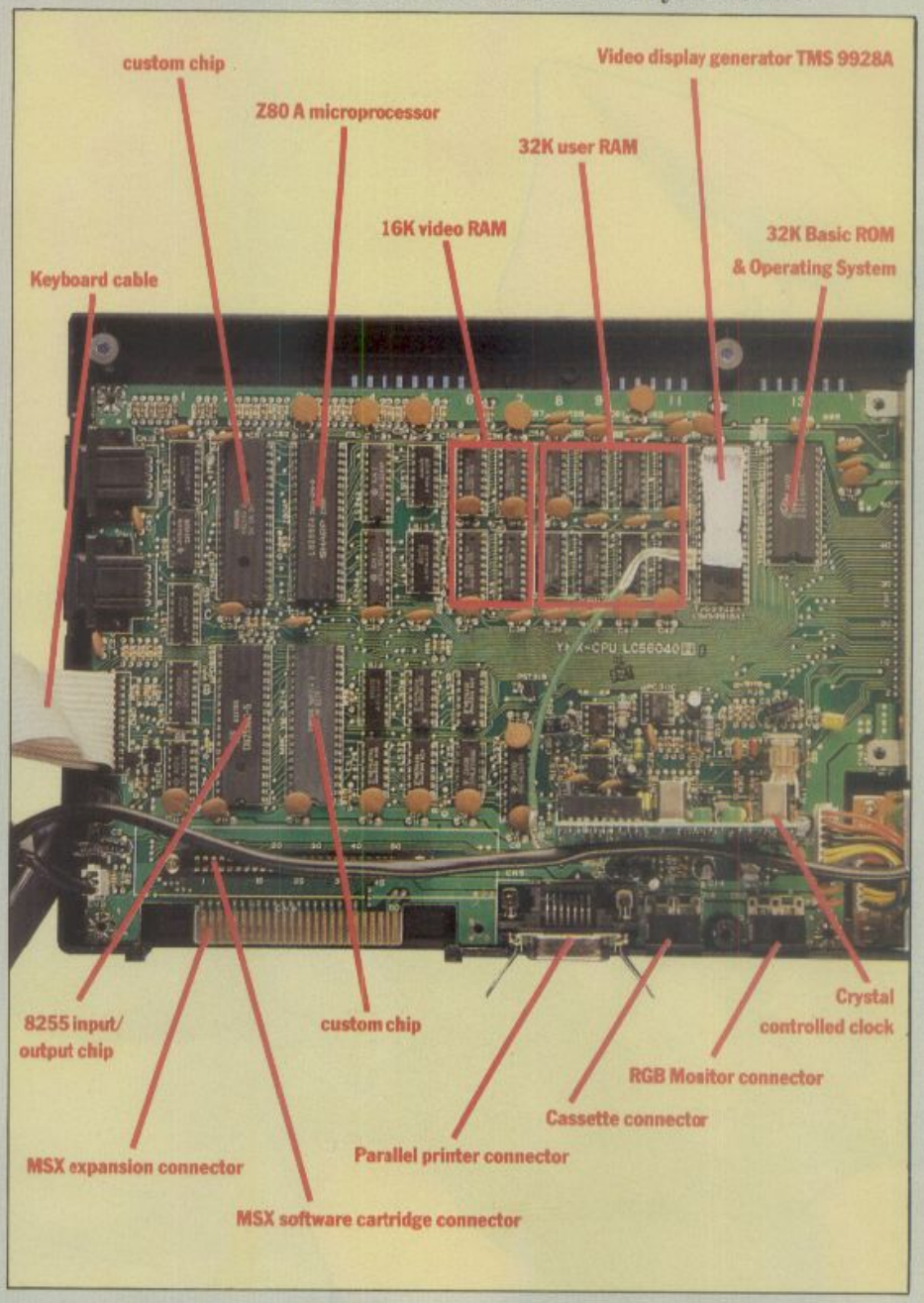
Construction

As many a hi-fi owner will attest, most micros create havoc with radio reception, and in the United States tough new laws have been introduced to combat the problem of 'noise pollution' from electronic equipment. Yamaha has displayed even further foresight here, as not only does the YIS503 meet these regulations, but it goes a few steps further.

The plastic outer case conceals extensive internal metalwork over both the main and keyboard circuit boards. Although thin and light, these screens provide an impressive degree of interference screening, as well as an ingenious heat-removing facility for the video display circuit. The SFG-01 synthesizer cartridge is actually constructed in a heavier steel case and, in conjunction with matching steel screen within the base of the cabinet, produces what must be the most noise-free audio signals ever heard by home micro users cum musicians.

Delving into the main circuit board reveals a strong Yamaha propensity for getting it right the first time. There are no messy modifications, all parts are clearly marked, outlines are provided around major functional areas, and there is a total





(bold but laudable) absence of integrated circuit sockets. This machine is designed to run and run, with very little attention from your friendly Yamaha dealer.

Part of the competition between MSX micro manufacturers is the amount of RAM supplied with the standard machine. The MSX standard specifies a minimum of 8K user memory, although thankfully none of the current models are supplied with anything less than 16K. The YIS503 is credited with 48K of RAM, however only 32K of this is actually usable as program area.

The high-resolution MSX screen consumes 16K of RAM, for which a separate high-speed RAM bank is provided. Clever hardware and operating system features allow extra RAM to be plugged onto both the cartridge or expansion connectors, allowing a staggering total of 1,024K to be addressed by the microprocessor. Standard 16K RAM cartridges are available, although plans are well advanced on a 256K model.

In use

To look at the YIS-503, you would be forgiven for thinking that it doesn't outwardly appear particularly revolutionary. Indeed, even when you start to use MSX Basic, the general feeling of déjà vu can become quite strong indeed.

This impression is perfectly natural, and indeed may be intentional (think about it)! Not being a first-time microcomputer user,

21 ►

Jet Set Willy

By Matthew Smith

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◀ 19

I actually enjoyed being able to switch on the Yamaha and immediately feel confident enough to write a program with my already hard-earned knowledge of Microsoft Basic. It was more than a slight surprise to find how readily my well-worn fingers found their way around the YIS503 keyboard, without the usual full day's 'getting used to it' torture. The general feel of the hardware reminded me of machines easily ten times the price.

It was only a few minutes work to create a really playable Space Invaders program using the built-in sprite capabilities of MSX Basic. This feature alone suggests a strong encouragement towards D-I-Y games software written in MSX Basic. A few more minutes work produced a plausable graphic art program, with the ability to draw circles, elipses, squares, and rectangles, all in solid or outline form. The built-in MSX sound generator performed accomplished versions of 'Funky Town' with great enthusiasm; programmed as easily as a simple PRINT statement.

Combining a tried-and-true (although arguably old-fashioned) version of Basic with the potential of over a *megabyte* of memory expansion, I really started to feel a silly grin cross my face. Too many times have I had to learn everything from scratch when meeting a new machine for the first time. I am surely not going to be alone in finding the built-in 'familiarity' of Yamaha's MSX micro its most endearing feature.

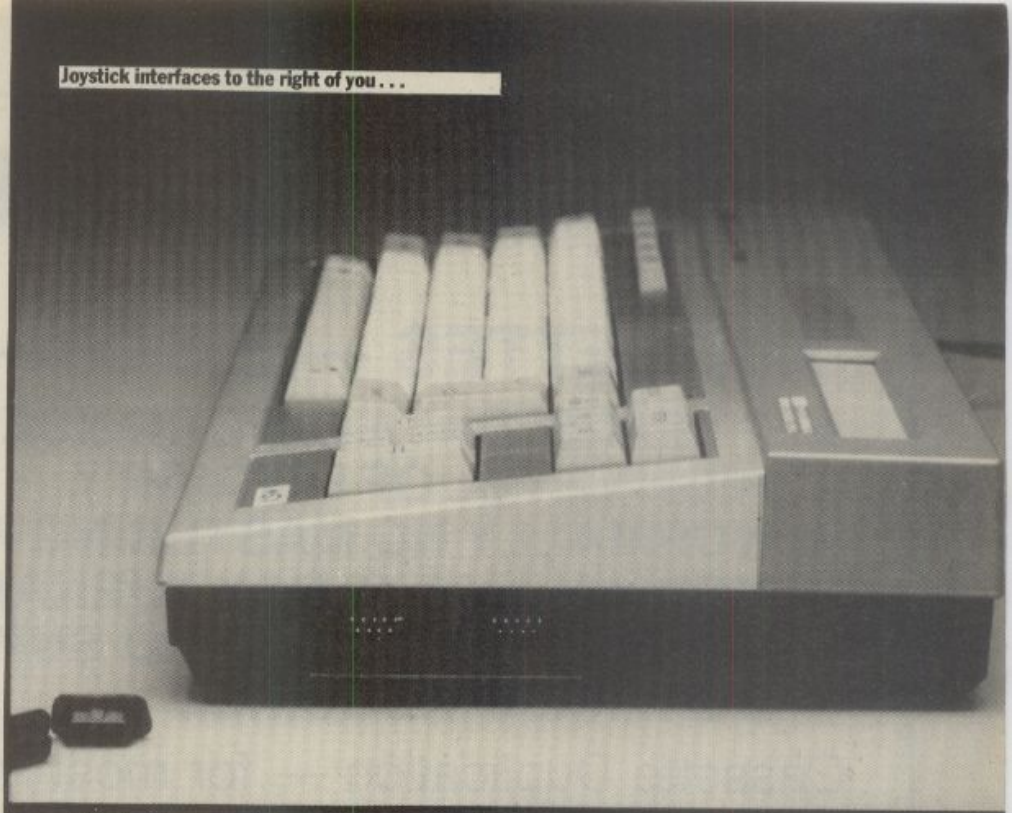
Interfaces

Although the MSX specification does not demand them, Yamaha has included both joystick and printer interfaces as standard. The joystick connectors are of the classic 9-pin D-type as used by Atari, Commodore, etc, but be warned: the MSX standard is not electrically compatible with the Atari standard. Hopefully, no major damage will occur if an Atari joystick is used in an MSX machine by accident, but adapting cables are required if this is your intention.

A parallel printer port is provided, which is electrically suitable for use with most popular makes of printer, *eg* Epson, Seikosa, Centronics. Again, an adapting cable would be required to connect a Centronics standard peripheral since Yamaha has used a cheaper, but more obscure, 14 pin JIS-type connector.

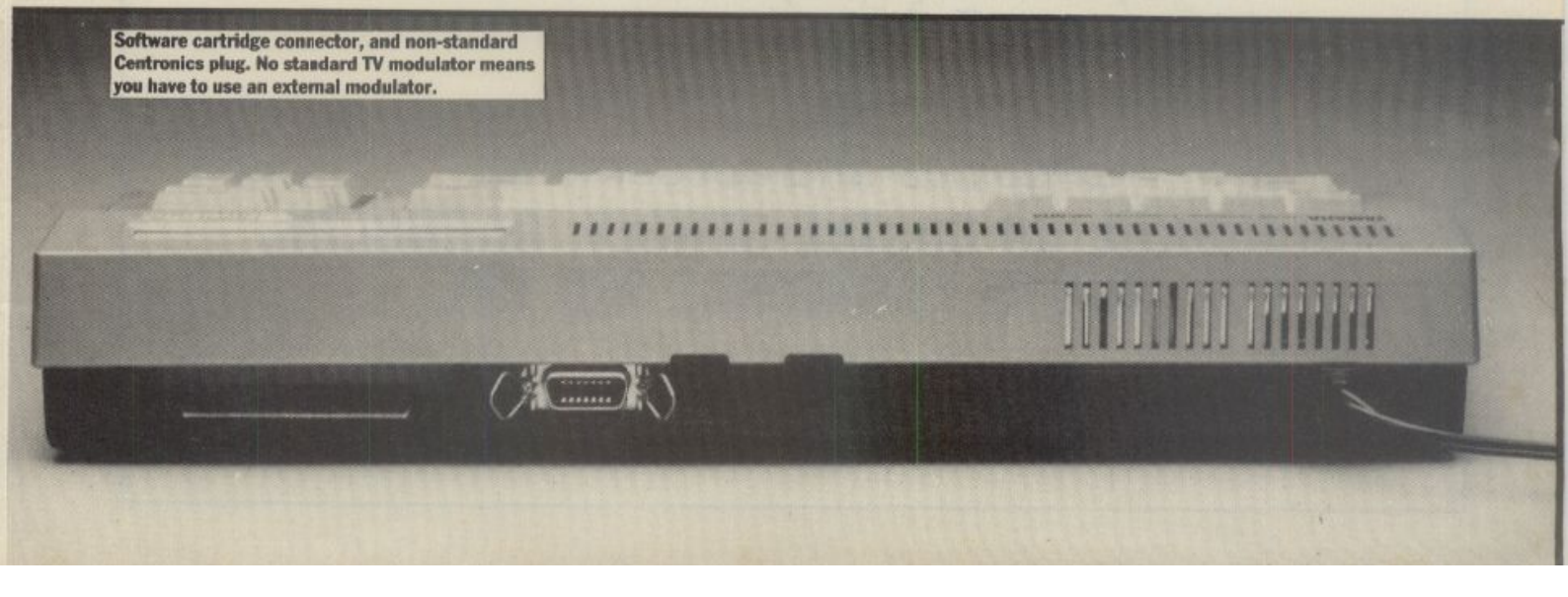
Delving further in the compact but not overcrowded hardware reveals a notable omission in that the YIS503 has no television modulator. This means that only

23 ▶



Joystick interfaces to the right of you . . .

. . . MSX standard expansion port to the left.



Software cartridge connector, and non-standard Centronics plug. No standard TV modulator means you have to use an external modulator.

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The Yamaha keyboard has a nice feel — the layout is standardised by the MSX conventions. The beloved diamond arrangement of the cursor keys has been substituted with a square.

◀ 21 a black and white or colour monitor can be used, but the implications of this are not without merit. (Also, it is much easier to have your own external modulator, to suit the type of television system you may have PAL in the UK, NTSC in the USA, etc.). Our review machine was an imported Japanese unit, and comes with a specially adapted Luxor colour monitor.

Suffice it to say that the standard 16MSX colours are wonderfully displayed, ranging from strong primaries to more delicate shades. It is not clear how much improvement may be permissible to the merely adequate 256 by 192 pixel graphics resolution, but then again, the IBM PC offers very much the same standards.

Hopefully Yamaha will be able to offer its own external modulator, as most of the modulators currently on the market are poorly designed and would probably degrade a television display considerably. However, be sure to think seriously about using a monitor. A micro as good as this merits a good display device.

The beauty of MSX expansions and cartridges lies in the ease with which they may be moved from machine to machine. Part of the character of each manufacturer's MSX machine surrounds the styling and placement of these connectors, such as in the National machine with its dual top-loaders and the Fujitsu with its side-entry model.

The 'cosmetic' variations pale by comparison to the potential of the YIS503's unique Yamaha hardware module system. This is essentially a built-in version of the MSX expansion connector (the signals and pin connections are virtually identical), which allows the YIS503 to be dedicated to a particular peripheral concept.

With the help of its well-respected electronic instruments division Yamaha has produced what may well become top of the MSX accessory pops, the SFG-01 FM Synthesizer Interface module. All you have to do is slide a discreetly-placed cover away from the underside of the machine, and slip the hardware module into the gap provided. Very sensibly, a single bolt is provided to anchor Yamaha hardware cartridges in place such that the whole machine may be freely carried about, without risk of losing expensive things from its underside!

Once so installed, your YIS503 becomes a computerised electric organ, coincidentally equipped with all the remarkable and novel features usually found on Yamaha's widely sold home organs. Built-in firmware brings a wealth of automatic features into play as soon as the correct Basic commands are given. Among over 30 different pre-defined musical instruments, the synthesiser electronics generate frighteningly realistic clavinets and vibraphones (shame we couldn't take pictures of these haunting and foot-tapping sounds).

Combine the generous variety of preset voices with 8 music channels and all you need is a keyboard. The model YK-01 is a 3½ octave 44-note polyphonic keyboard which simply plugs into a multi-pin connector on the edge of the SGF-01 module.

The 'pitch' of the keys is oddly reduced from that of conventional piano keyboards, presumably so that the whole keyboard does not greatly exceed the size of the micro itself. I constantly found my fingers attempting to travel further than necessary, being accustomed as they are to normal synthesiser keyboards. This may be a hinderance to the professional musician, but I think us lesser mortals could get used to it with practice.

Speaking of professional musicians, a slightly more advanced module, the SMD-01, is also available. It used to attach a Yamaha DX-7 to the now slightly overshadowed MSX micro. In brief: the DX-7 is a real synthesizer, sold widely through music shops, and the mind boggles at the potential of this potent combination of music and micro technology.

On both synthesiser modules further connections are provided for stereo hi-fi output, and inputs for further processing of external signals by the synthesizer electronics. All of the sounds generated by the standard MSX 3-voice sound generator are still available while a synthesizer module is installed, so all in all you'd do well to buy the neighbours a year's supply of earplugs.

The built-in 'rythm generator' takes a bit of getting used to, but if you're into Japanese disco music it's time to get funky. Further eastern innovations include an automatic 'left hand' routine, and an intelligent 'bass line' generator.

If you aren't interested in learning how to play music, perhaps you'd care to invest in yet another Yamaha add-on which allows you to play music without any effort at all. Simply slide a Yamaha Play-Card card through the YIS503 Play-Card reader (which plugs into the software cartridge connector) and hey presto, instant talent.

These cards are used by other Yamaha music products, and are generally available from suitably advanced musical instrument shops. The card is printed with the words and music of your chosen tune, and a magnetic strip along the bottom edge carries all the data necessary to play the music for you.

Verdict

Although the academics and perfectionists amongst you may be irate over MSX Basic's peculiarities, Yamaha's accountants have not been slow off the mark when pressed for a solution to the 'master plan'. By unflinching pointing to Microsoft as arguably the suppliers of the most widely-sold Basic interpreter, Yamaha's micro-computing future has been assured.

Sadly, neither Yamaha nor any of the other Japanese manufacturers would commit themselves to a UK launch date by the time this article went to press, but chances are that Christmas 1984 will see an MSX battle.

Any motorcyclist will attest to Yamaha's street credibility, while pop musicians will sing the praise of its musical prowess. The new Yamaha computer greatly benefits from Japanese manufacturing expertise, and marketing acumen. It is a clean, efficient, and well-built micro, as well as being remarkably good value for money. The YIS503 certainly stands every chance of taking the lead in the MSX marketplace for many months to come. PCN

SPECIFICATION

Price	Unknown, but probably between £150 and £200
Processor	Z80
RAM	32K usable, plus 16K video
ROM	32K (BASIC and operating system)
Screen	40 characters by 24 lines, 256 × 192 resolution
Keyboard	72 keys, English and Japanese characters
Interfaces	Cartridge connector, expansion connector, joystick sockets, parallel printer interface, rgb monitor
Operating system	MSX
Distributor	Not yet announced

Geof Wheelwright looks into some recent developments in display technology.

Stars of the screen

Adam Osborne thought he'd re-invented sliced bread (or at least had a good run at re-introducing the crumpet) when he unveiled his sewing-machine sized portable computer a few years ago.

And he wasn't far wrong. In the size of a briefcase-cum-suitcase the illustrious Mr O had managed to fit two disk drives, an entire Z80-based computer *and* a small built-in CRT screen.

Looking back on that achievement, it was neither the size of the disk drives, nor the small board that really surprised anybody — the motherboard of the Apple II wasn't much bigger and neither were its drives. It was the inclusion of the screen (and, of course, the bundled software) that took people aback.

Here, for the first time, was a truly portable computer available at a price lots of people could afford and in a size they could (barely) handle. You only needed to fold down the front panel of the machine, plug it in, and presto, the screen would come to life and your Osborne was ready for work.

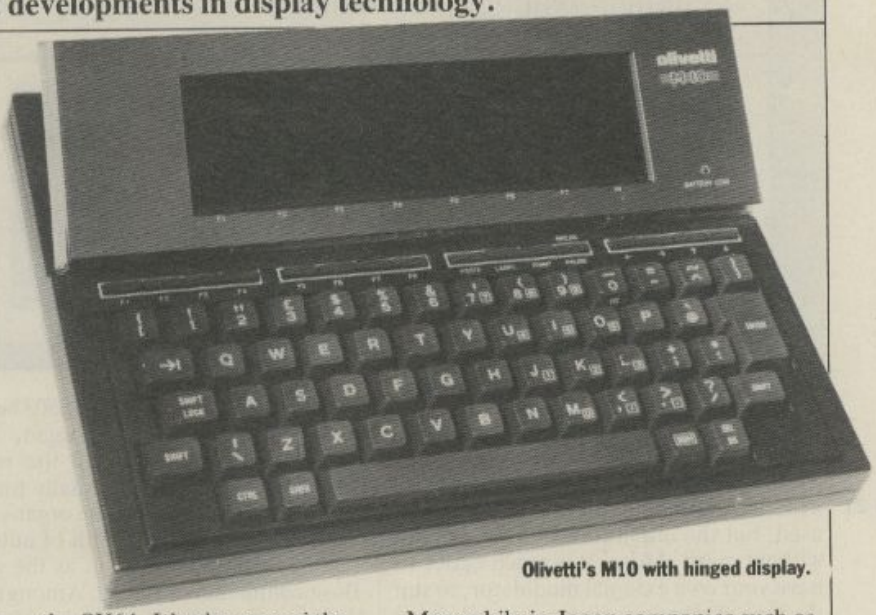
The screen was a bit small, the character grid non-standard and the keyboard a bit naff — but the Osborne 1 soon developed a devoted following of portable revolutionaries to whom these shortfalls were but mere eccentric peccadillos.

After all, what other computer could you just plug-in and use without having to haul around some silly 12in screen?

As with the leader of many a revolution, Osborne soon found he was the flavour of the month (later to become dish of the day) in an incredibly fickle year. Third-party suppliers started doing 80-column screens for his built-in CRT, other companies (such as Kaypro) started to imitate and undercut his small-screen wonder, while yet others discovered that many dollars (and pounds) were to be made in wrapping an Osborne-style box around IBM PC compatibles.

Perhaps the cheapest new machine to use a built-in CRT is the Commodore 64 portable — the SX64. It's also one of the first portable computers to incorporate a colour picture tube. It uses a five inch colour monitor — which looks to be a souped-up US colour TV tube. While this allows you to display the colour in various games, it makes things difficult when you're doing something like word processing and you need the hard contrast and definition provided by a high-resolution monochrome monitor.

Commodore's move is therefore unlikely to cause a trend toward colour monitors being included in portable computers as it's both difficult to get good resolution and a good price on them. So if you stick in a colour monitor that's going to be good enough for business use, it's going to make your machine too expensive. On the other hand if you go for a low-resolution TV monitor with a good price, you'll hardly be able to read the text.



Olivetti's M10 with hinged display.

Meanwhile in Japan companies such as Epson and Kyocera were having other thoughts about what a truly portable computer might look like — and again the essential component to make the picture complete (if you'll excuse the pun) was some form of built-in screen. When designing their telephone-book sized portables Epson and Kyocera decided to throw out the large, power-hungry and cumbersome Cathode Ray Tube in favour of Liquid Crystal Display technology.

Epson used a four line by 20 character LCD screen and decided that built-in microcassette storage and a small printer would fill out the package, while Kyocera looked at a few other innovations. The latter used CMOS non-volatile RAM and built-in applications programs — combined with and 8 line by 40-column display to produce the NEC PC-8201A, the Tandy Model 100 and the Olivetti M-10.

29 ►

Sinclair's 2-inch flat-screen TV.

A colour TV in Commodore's SX64.

Free software, only £225.

If you own a BBC Micro, you can now download, store and run programs (transmitted free of charge via Ceefax) with the new Teletext Adaptor, priced £225 inc. VAT.

These programs make up the BBC Telesoftware Service (which is intended to become a computer software broadcasting channel) and although primarily educational, they will soon develop into general interest and business areas.

And, as they will change every two weeks, you'll soon be able to build up a vast bank of top quality software without ever having to put your hand in your pocket.

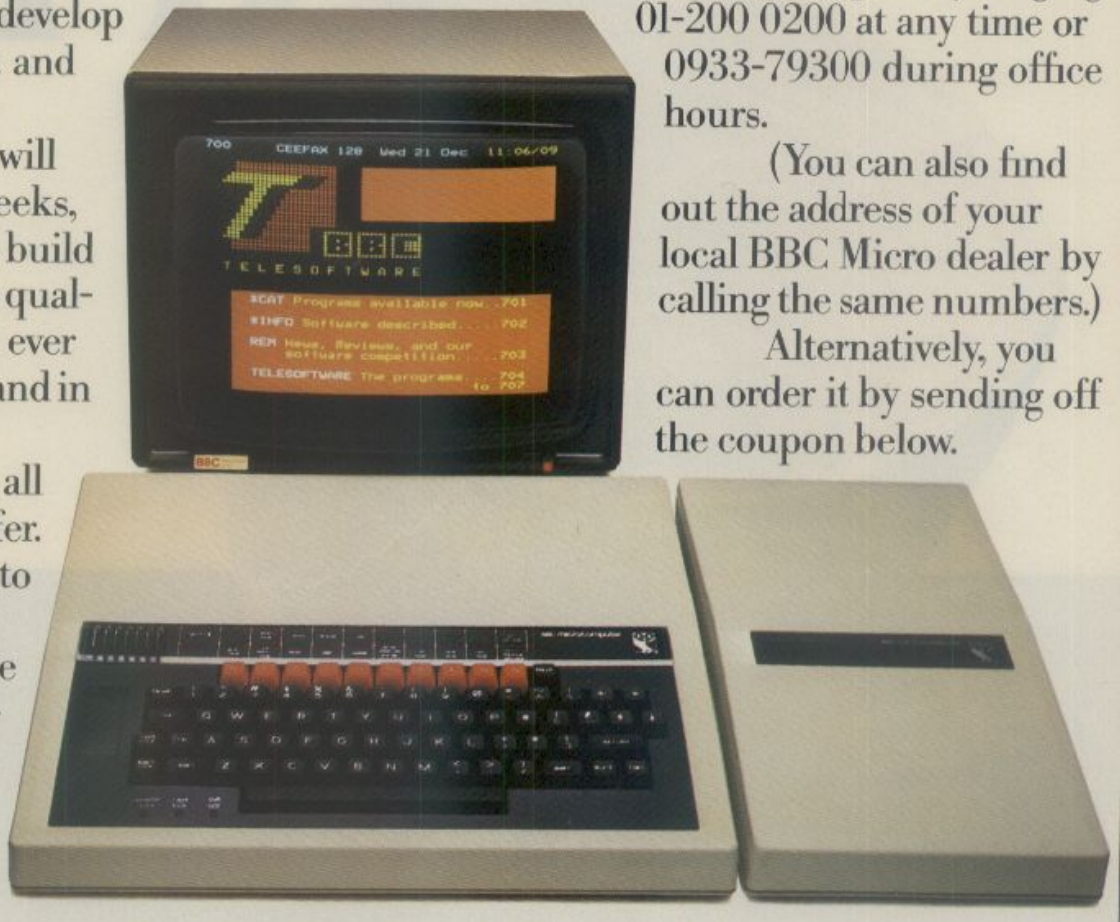
But that's not all the adaptor has to offer. It also enables you to gain access to the normal teletext store of data. This is different to simply having a teletext TV because it means this data can now be transferred to memory and manipulated in any way you wish (making graphs or bar charts for instance).

It's yet another development in our programme to help you fully realise your BBC Micro's potential.

If you're a credit card holder you can order the Teletext Adaptor by ringing 01-200 0200 at any time or 0933-79300 during office hours.

(You can also find out the address of your local BBC Micro dealer by calling the same numbers.)

Alternatively, you can order it by sending off the coupon below.



Technical Specifications

Access to Teletext and Telesoftware Services broadcast on U.H.F. channels E21 to E69.
Speed of max. data capture rate approx. 128k baud. (8 lines of Teletext per frame.)
Height 70mm. Width 210mm. Depth 350mm. Weight 2kg.
Colour: BBC Computer cream.
Construction: Moulded top and bottom to match BBC computer profile. ABS injection moulded plastic.
Controls: Four tuning potentiometers on rear panel. Mains on/off switch on rear panel.
Power in 240v, 50Hz, 15w.
Operating Temperature: 10° to 35°C.
Designed and manufactured to comply with BS415 Class 1 standard.

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Amex/Diners/Visa/Access (Delete)

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PCN 3

The BBC Microcomputer System.

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A rubbish bin for your old has been.

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■ Believe it or not, computers often suffer from amnesia.

99% start off with large enough memories, but operating functions like text, colour, sound and more particularly high resolution graphics, take large bytes out of them. Leaving very little "useable" memory for programming and games.

Not so the new Oric Atmos 48K.

This is the one home computer that takes these normal working functions in its stride.

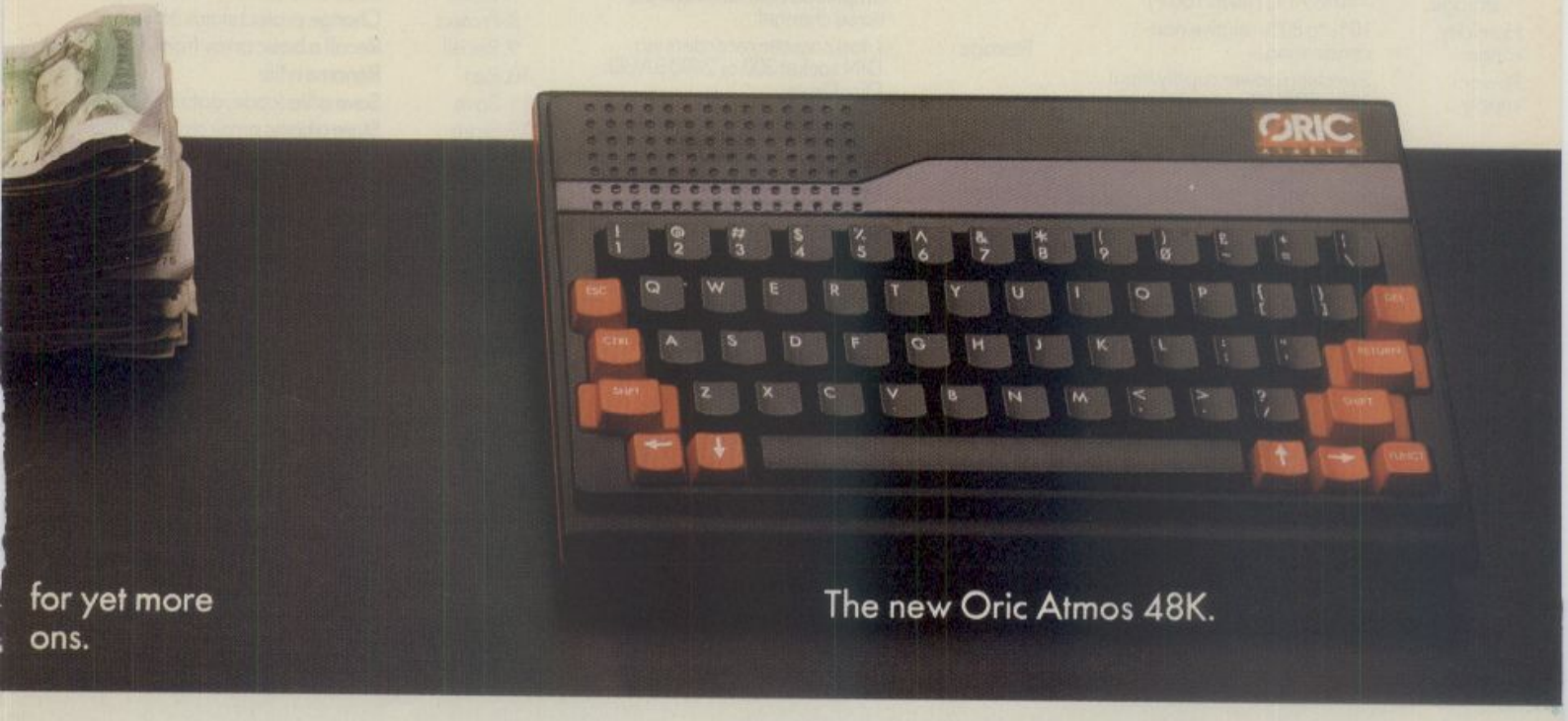
Unlike other home computers it uses the highly sophisticated serial attribute handling method used by Viewdata and Teletext, in which the attributes are stored on the screen alongside the data, instead of taking up space in the memory.

Thus the Oric Atmos never offers less than a healthy 37K of useable memory – even when the new colour printer and disc drive unit are attached. (Technical buffs see details overleaf).

So it rivals the performance of the supposedly larger, more expensive Commodore 64K, which unfortunately loses 26K of its "elephantine" memory in high resolution graphics.

It beats its immediate competitors like the Sinclair Spectrum, Dragon 32K, Vic 20 and Atari 600.

ures for esia.



for yet more
ons.

The new Oric Atmos 48K.

It beats the Lynx 48K, which costs over a third more, yet loses 34K.

It even beats the Acorn Electron and the BBC Micro which costs more than twice cs much, yet loses 23K in high resolution graphics.

And while this may surprise you, it's totally in keeping with a company recognised in the computer industry for performance and innovation.

Like its predecessor, the Oric-1, the Oric Atmos has the powerful loudspeaker and amplifier unit that prompted "Which Micro" (November issue) to comment... "Its sound facilities have more in common with those of the £400 Beeb, than the rather pathetic beep of the Spectrum. At full volume it can compete with most arcade games..."

Yet the Oric Atmos 48K costs a mere £170, including all the leads and adaptors you need to get it going.

So if you're buying a computer, remember our name. We could save you a fortune on bolt-ons... or wastepaper bins.

The new Oric Atmos 48K. ORIC

Now we've whetted your appetite, here's something to get your teeth into.

Printer Technical Specifications

Printer/ Plotting system	Ball Point Pen, 4 colour
Plotting speed: (horizontal) (vertical)	52 mm/sec (2.05ips) 73 mm/sec (3.08ips)
Printer Speed	12 characters per second
Resolution	0.2 mm/step (0.00787 inch)
Effective plotting range	96 mm (3.804 inch) x axis, divided into 480 steps. (No limit in y direction)
Characters per line	80 or 40 text mode (determined by software in graphics mode)
Characters per line	INT (480/n+1) *6) for 0=n=15
Accuracy (repetition) (movement) (distance)	0.2 mm max 0.3 mm max 0.5% max (x–axis) 1% (y–axis)
Pen life	250 metres (825 feet)
Parallel interface	8–bit parallel Uses STROBE and ACKNOWLEDGE
Temperature range storage	18.3 to 35°C (65 to 96°F) –40 to 71°C (.40 to 160°F)
Humidity range	10% to 80% relative non-condensing
Power supply	Switching power supply input 100–120 VAC 200–240 VAC
Dimensions	10¾" wide 6⅞" deep 2½" high

Atmos Technical Specifications

CPU	6502 A
Memory	Choice of 16K or 48K RAM
Memory (48K Model)	Minimum 48K RAM, max 64: 16K ROM external control signals allow use of full 64K RAM or maybe used externa ly to increase ROM/RAM
Language	Extended Microsoft basic
Keyboard	Typewriter style and pitch, 57 keys, standard computer layout, additional cursor control keys, autorepeat facility, tactile and acoustic feedback
Display	Output for B&W or colour TV, RGB output for colour monitor.
Text formct	40 line x 28 rows
Character set	Similar to Teletext format, standard ASCII double height, flashing, 80 user definable characters
Graphics	240 x 200, 8 colours
Graphic Facilities	Points, lines, circles
Sound	Internal loudspeaker and amplifier. 3-Channel sound synthesiser envelope control, amplitude control 8 octaves, noise channel
Storage	Most cassette recorders via DIN socket 300 or 2400 BAUD. Disc Drive.
Interface	Centronics, expansion port, Hi-fi, RGB Monitor, UHF TV, cassette recorder
Other	Warm reset to regain control without clearing program or data

Micro Disc Technical Specifications

Formatted Capacity	160K bytes per side (double density as standard)
No. of Tracks	40 (80 available as option at a future date)
No. of Sectors	16
Bytes per Sector	256
Transfer Rate	250K Bits/Sec

Supports up to 599 files per side, four drives single or double sided, 40 or 80 track. User definable configuration allows mixing of drive types including 5 ¼" (five and a quarter inch)
Extensive wild card facilities
Copy allows merging of basic and machine code files

Utilities

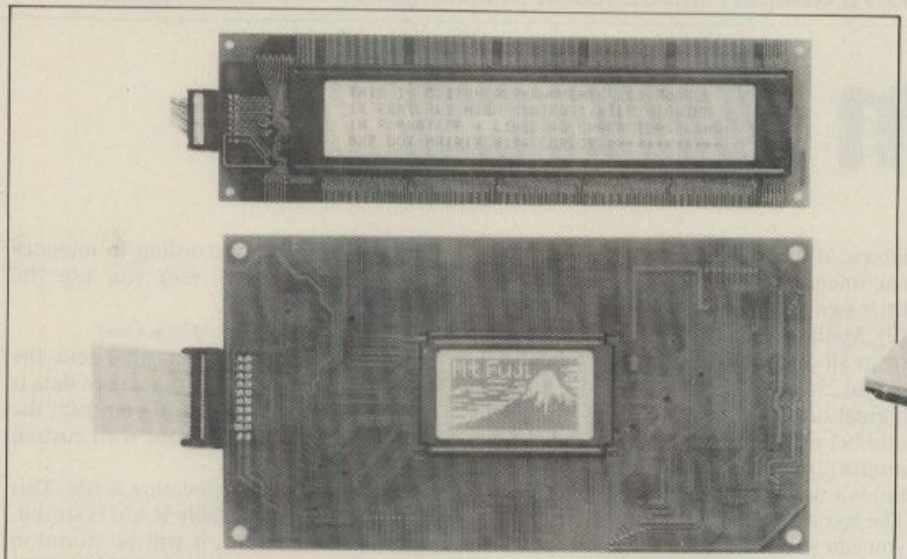
The Utilities are as follows:

1. Backup	Copy a whole disc
2. Copy	Copy a file to another
3. Del	Delete a file allowing wildcards
4. Dir	Display directory listing
5. Drv	Set the default drive number
6. Format	Format and initialise a disc
7. Load	Load a file (code data or basic)
8. Protect	Change protect status of file
9. Recall	Recall a basic array from a file
10. Ren	Rename a file
11. Save	Save a file (code, data or basic)
12. Store	Store a basic array as a data file
13. Sys	Change system configuration

Prices and data correct at time of going to press.
Specifications on the above models may change without notice.

Available at Dixons, Laskys, Comet, Wigfalls, Rumbelows and all good computer stockists.

ORIC



Two LCDs from C.Itoh.

An 80 × 8 display on the new Sharp PC 5000.

◀ 24

Recently that technology has been further expanded to provide an 80-column screen on machines like the Gavilan, the Sharp PC5000, the Teleram T3100, the MicroOffice Systems Technology Road Runner and the Xerox Series 1810 portable.

Of those new machines, only the Sharp is currently available in the UK. It uses an eight line by 80 column screen and has bubble-memory storage. But it's more expensive than the Model 100, Olivetti and NEC portables and somewhat heavier.

The Sharp's screen gives it the advantage of a larger 'window' on your program or text — and it provides a higher degree of resolution (640 by 80 dots). But LCD isn't the only style of flat-screen technology employed by Sharp.

In the upmarket Grid Compass portable, Sharp's electroluminescent display panel is used. It operates by generating orange and yellow pixels that originate in a thin layer of zinc sulfide and manganese sandwiched between two glass panels.

The front panel contains closely-packed vertical wires and the back panel contains a similarly packed set of horizontal wires. The wires are as good as invisible to the eye, but together they form a grid which, when charged with electricity at specified points causes an electrical field to be established and a wire in the metallic layer to glow.

This technology provides a high-resolution display (240 by 320 pixels) on a 12in by 12in flat panel — but it comes at a steep price. Sharp charges some $300 for the screen used on the Grid Compass.

Electrophoretic displays (or EPDs) use the same two-panel grid configuration as Electroluminescent displays, but have the distinct advantage of retaining information about screen dot locations. The EPD panels contain electrically charged particles of pigment suspended in a fluid of contrasting colour.

When current is applied, the electric field pulls the charged pigment particles to the front of the screen and creates a coloured dot.

In the immediate future, however, the flat screen in affordable micros is likely to be LCD-based. But even here there are a few developments in the LCD field that look set to make them even more attractive.

The new STM IBM-compatible portable micro — planned for introduction in the UK this September — will employ a backlight behind a built-in 80-column screen to overcome the problem that LCD screens have in lacking brightness. This means that even in poor lighting conditions, you should still be able to use your portable (unless it's too dark to see the keys.)

One further alternative to LCD flat-screens is the flat cathode-ray tube as developed by Sinclair Research in its new flat tube TV. The flat tube technology takes the standard CRT — which is usually a long, funnel-shaped affair — and turns it sideways, thus reducing the depth required for a TV tube.

In a micro, this technology could be very useful in producing Osborne-style portables that would need to be nowhere near as deep as such machines currently are. The need for depth in existing portables which use CRTs is caused by the fact that for every inch of screen you gain on the CRT, the picture tube needs to be exponentially longer — thus increasing the depth of the machine.

In a flat-tube TV that exponential growth goes sideways so that for a five or six inch screen you could have quite a long, thin box with a CRT at the front of it and a main processor board just behind it. Add to that a folding detachable keyboard at the front of the machine and you'd have quite a powerful portable computer not much longer than a violin case and not much wider than a Model 100 or NEC portable computer.

Now all you need is to have someone build it . . . any takers? PCN

Lap-held micros with LCDs — represented here by the NEC 8201A.

Mark Hutchinson presents the first of a two part introduction to Atari graphics programming.

Program Antics

The Atari is an incomparable machine for games, but the trouble is, it's so good that it's all too easy to miss out on programming. This is the first of an occasional series of articles where I hope to delve into the quieter backwaters of the Atari 400 and 800. So if you'd rather learn how to write a space invaders game than just load it in, read on.

First, let's look at a few of the memory locations we'll be using in the future. When a key is pressed, the computer looks at a location in memory called a pointer. This is like a signpost which sends the computer to the part of the memory that holds the character set, which is held in ROM, and therefore cannot be changed.

But if we change the pointer by POKEing it with a number to make the computer look into an area of RAM, which we can change, then we can place data for a new character set here. Easy so far, but now come the dreaded mathematics.

Like most home micros the Atari is what is termed an 8-bit machine. This means that each memory location is comprised of eight little switches that are either on (1) or off (0). Mathematically the possibilities range from all off to all on which (work it out) means 256 numbers from 0 to 255. This isn't a great deal, so many locations use a two number pointer to overcome this. The first number, or Most Significant Byte (MSB), holds a number that you multiply by 256. The second, Least Significant Byte (LSB), you add to the first.

If you compare this to decimal, the first number is the equivalent of the tens, while the second number is like the units. Sometimes the pointer has only one number in which case it is the MSB and must be multiplied by 256.

The number stored here is termed pages, where one page equals 256 bytes, or four pages equals 1K. For example, one location we will be using a lot is for the Display List (DL), whose pointers are 560 and 561. To find where the DL currently resides (it changes according to memory size, graphic modes, etc) you use the following command:

PRINT PEEK (560) + 256*PEEK (561)

The DL is a set of data that tells the Atari's Antic chip where the screen data is and how to use it. Again, if you reset the pointer you can set up your own custom graphics.

Another important location is 106. This is where the top of usable RAM is stored,, As it is one number, it will be stored in pages. The computer looks at this location and knows how far up in RAM it is allowed to go. If you lower the number stored here the computer will not go above it, and you'll then have stored some 'safe' RAM for your own use. You can then use a pointer to go to this area whenever you have need of the data stored there. Using the DL like this allows the storage of high resolution pictures and recalls them instantaneously, fully drawn.

Atari graphics are instant, if not easy. 32 ▶

Program 1

```
 200 GR.8: C.1: PLOT 1,1: FOR P = 1 TO 7: READ X,Y: DR.X,Y: NEXT
     P
 210 PLOT 51,25: GOS.1400
 220 PLOT 101,50: GOS.1400
 230 PLOT 121,60: GOS.1400
 240 PLOT 131,65: GOS.1400
 290 GOTO 290
1300 DATA 319,1,319,159,1,159,1,1,319,159,319,1,1,159
1310 DATA 269,25,269,134,51,134,51,25
1320 DATA 219,50,219,110,101,110,101,50
1330 DATA 198,60,198,99,121,99,121,60
1340 DATA 188,65,188,94,131,94,131,65
1400 FOR P=1 TO 4: READ X,Y: DR.X,Y: NEXT P: RETURN
```

Program 2

```
249 REM *** FIND MEMTOP IN PAGES
250 MT=PEEK(106)
259 REM *** FIND DL POINTER
260 DLLOW1=PEEK(560): DLHIGH1=PEEK(561)
290 REM *** DELETE GOTO
300 GR.1: POKE 710,0: POS.5,5: ?#6;"instant": POS. 5,8:
    ?#6;"graphics": POKE 764,255
309 REM *** BRING RAMTOP DOWN BY 10K
310 POKE 106,MT-40
319 REM *** FIND NEW DL POINTER
320 DLLOW2 = PEEK(560): DLHIGH2 = PEEK(561)
350 ?"PRESS 1 FOR DESIGN": ?:?:"PRESS 2 FOR TEXT"
399 REM *** CHANGE ROUTINE
400 K=PEEK(764)
410 IF K = 31 THEN POKE 560,DLLOW1: POKE 561,DLHIGH1: GOTO 400
420 IF K = 30 THEN POKE 560,DLLOW2: POKE 561,DLHIGH2: GOTO 400
430 GOTO 400
```

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Don't miss the great Spring show of all that's new for the Electron and BBC Micro

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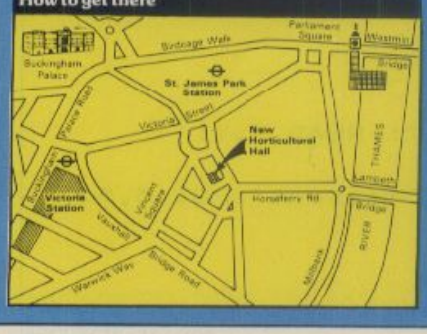

School and College Groups

Entry only £1 per student if bookings are made in advance. Send your cheque (made payable to Database Publications) and SAE to:

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10am - 6pm, Thursday, 29 March
10am - 6pm, Friday, 30 March
10am - 6pm, Saturday, 31 March
10am - 4pm, Sunday, 1 April

New Horticultural Hall
Greycoat Street, London SW1

PCN 2

◀ 30

You still have to do all the hard slogging, but once you've done it you won't be forced to await around for hours as the drawing comes on screen. You'll be used to popping in the Star Raiders cartridge, pressing G and seeing the galactic chart appear without being drawn — well, now it's your turn:

Animation can be achieved without using player/missile techniques with PLOT and DRAWTO using COLOR 1, waiting for the human to admire the computer's handywork, then PLOT and DRAWTO the same points using COLOR 0, and finally PLOT and DRAWTO new points using COLOR 1. This is satisfactory for small designs such as BEMs (bug eyed monsters), but when drawing intricate designs such as maps, graphs and circuits it is far more professional to have the graphics appear ready drawn and ready to use.

Try program 1, which draws a design in a couple of seconds. Use the line numbers given, as you'll want to expand it later. Once you've seen the basic design in operation, you can pre-empt part of RAM for your own use. If you look at page 45 of the Basic Reference Manual you will see the memory requirements for the different graphic modes.

Remember that each K of memory is four pages, and to leave plenty of room. As we are in Graphics 8, 10K — or 40 pages — should be sufficient. Now add program 2 to the program you've already typed in.

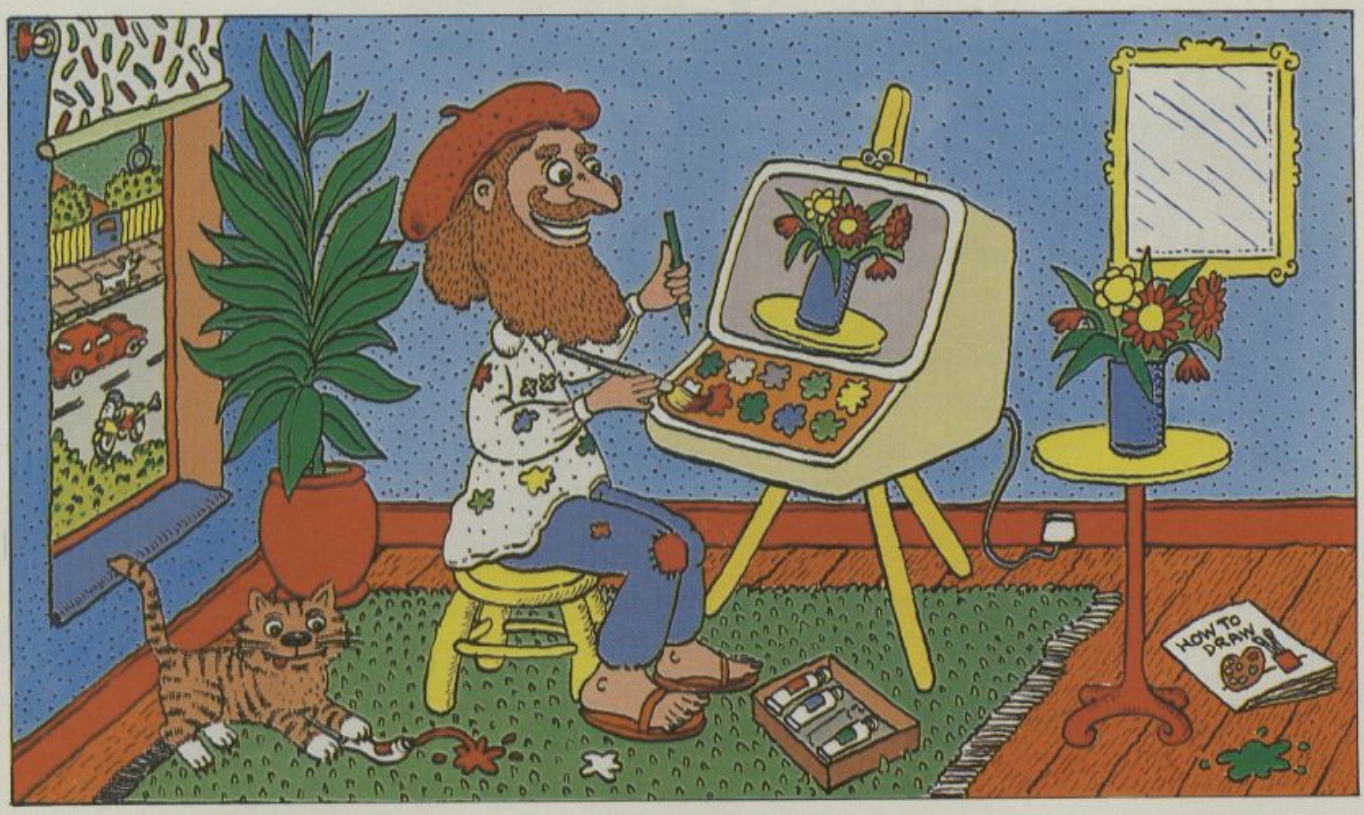
Impressive, isn't it? If you LIST the program you will see that it is quite simple. First, work out how much memory you will need for each screen, then find RAM top by PEEKing into location 106. Draw out the first screen, find the display list pointer 1 by PEEKing locations 560 and 561, move RAMtop down a suitable number of pages and thus protect that part of RAM from being overwritten. Do exactly the same for the next screen, except that this time you POKE 106 with the number of pages needed for screen 1 plus the number needed for screen 2. Finally, POKE the DL locations with DL1 for page 1, DL2 for page 2 and so on.

Did you notice that line 350 is outside the DL pointer? When a graphics mode is called a certain size of memory is allocated for it. What you do with it is irrelevant, as the pointer is already set up. All you need do is to lower RAMtop by enough pages to cover this memory plus your own program area. In case of misunderstanding, DLLOW is not a low memory pointer.

But I can hear you cry: 'This man's mad. The computer is still drawing out the design on the screen.' This is where we introduce ANTIC. Each time we call a graphics mode, ANTIC uses some of the 6502 cycle time to work out all the necessary details. What we do is to find the original data in location 559, POKE in a zero to switch ANTIC off, let the computer do what we want, then switch it back on by POKEing the original data into location 559. Remember to turn ANTIC off after each graphic command, and on again before the main sequence.

If you add the lines in program 3 you'll be able to see instant graphics. With this, try switching on a sound to relieve the boredom of a blank screen, then turning it off as your program starts.

Before you get carried away with location 559, you need to know a bit more about it. Some locations change their data so fast that it is impossible to write to them, but to make life easier, some of these locations have what is called a 'shadow', where you can write and store data. Location 559 is the shadow of 54272, the DMA control register, and is used when setting up PMG, so you need to be careful when using 559 for these two purposes in one program. PCN



Program 3

```
 10 TRAP 200
 99 REM *** FIND ANTIC
100 ANTIC = PEEK(559)
200 GR.8: POKE 559,0: C.1: PLOT 1,1: FOR P=1 TO 7: READ X,Y:
    DR.X,Y: NEXT P
300 GR.1: POKE 559,0: POKE 710,0: POS.5,5: ?#6; "instant":POS.5,5:
    ?#6; "graphics": POKE 764,255
359 REM ***ENABLE ANTIC
360 POKE 559,ANTIC
```

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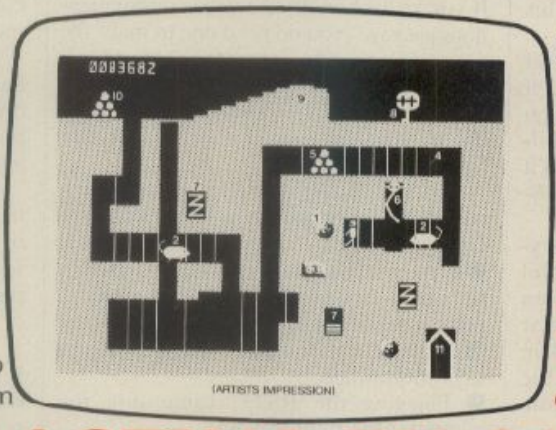
All the time the Gremlin (8) is busy digging it's way through your waste earth pile (9) to reach the entrance to your mine. Once it does you have no escape!! – so you must stop it getting there by returning to the surface to replenish the main mound (9) with the smaller pile of earth which appears on the surface as you dig (10). The deeper you dig the more points you score – but the further you have to go to replenish that mound! Once all nuggets have been collected, a cave opens (11) allowing you to pass through to the next stage – if you can reach it! This gives you more rats – but less snakes to destroy them with!!



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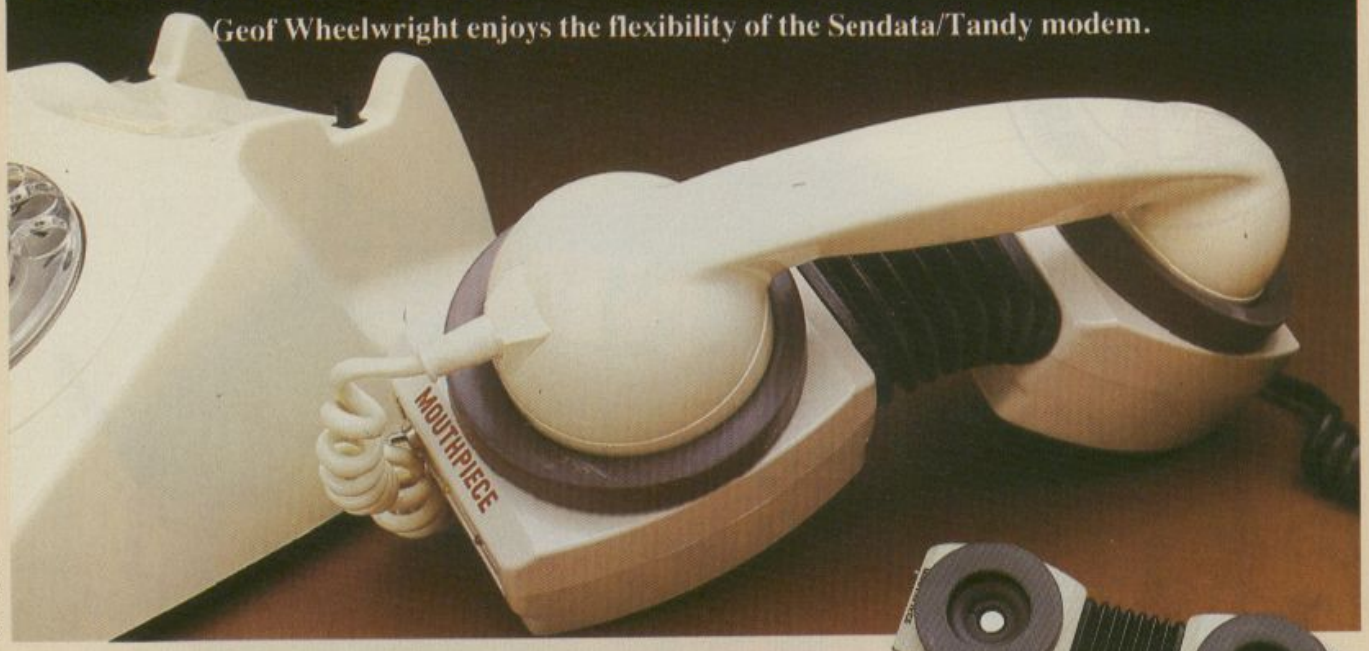
MODEM MOBILITY

Geof Wheelwright enjoys the flexibility of the Sendata/Tandy modem.



Sid Hughes

PCN PRO-TEST PERIPHERALS

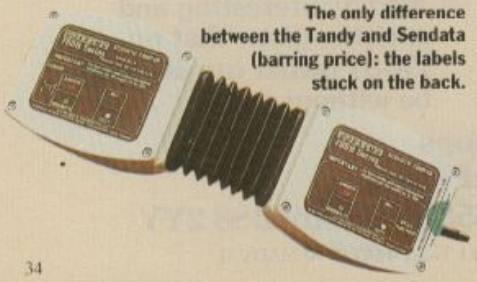
Built-in modems are the big difference between North American portables and the versions of them that reach our shores. Consequently, the effectiveness of portable machines 'in the field' is considerably reduced and the great advantages of portable computing cannot be exploited to their full. There are any number of reasons why UK editions of portable computers don't come with the built-in modems — not least of which is an allegedly slow modem approval system by British Telecom that would unduly delay the introduction of new machines in this country.

The long and short of it is that if you want a portable with a modem in the UK you'll have to buy a modem yourself. And if you want to maintain the idea of total portability in your choice of modem, you'll probably consider either the Tandy TRS-80 or Sendata 700B acoustic coupler.

These two modems are battery-operated by built-in rechargeable nickel cadmium batteries, and can run up to ten hours on one charge. They are similar enough to be treated as one modem because they are manufactured by the same company — Tandy buys them from Sendata and puts on its own 'badge'.

First impressions

The modem comes in a two-piece styrofoam box and is wrapped in plastic. It consists of two 'cups' bridged by an accordian-like bit of flexible plastic and features two lights and an answer/originate switch at one end. As the batteries are rechargable, they don't need to be removed from the machine — just plug the modem into the mains overnight and it'll be fully charged in the morning.



The only difference between the Tandy and Sendata (barring price): the labels stuck on the back.

The modem is only slightly larger than a telephone handset and will fit over any business phone and most home sets — although slimline phones could prove difficult to use with the machine.

Documentation

If you know how to use your communications package (you do need one to make the most of this modem), you shouldn't have any problem hooking up the modem and getting it going. This being the case, little documentation is needed, which is lucky as little is provided.

This boils down to the following, which covers the main problems you're likely to come up against:

- Remembering to leave the modem on Originate when you're dialling up a bulletin board or machine;
- Putting the mouthpiece in the hole that says 'mouthpiece';
- Plugging the RS232 cable into the computer the right way up.

Features

Flexibility is provided by the articulated section between the cups that allows you to get a snug fit between phone and modem. The portable nature of the modem means that you can even download information over the phone at a callbox (although the pip-pip-pip sound every 5p may cause problems with data transmission).

In use

I tested the modem with a wide variety of computers and mailboxes, and found it to be reliable and effective with all of them. The cups cut out the kind of sound interference that often garbles signals through acoustic couplers.

I used the modem most with the NEC 8201A portable computer and found that it really did give the machine that one measure of portability that was missing from it. I called from Coventry and Birmingham to London and from London to Manchester, Sweden and even Australia with no problems, and obtained consistent performance from both these modems.

Snug rubber caps fit over most telephones and cut out the interference that garbles data on so many modems.

I also tried using both the Tandy and Sendata modems together to allow communication between two micros over the phone line, and they were easy-to-use and a good deal of fun.

Of course, you pay quite a lot more (both modems cost more than £200) for this form of portable acoustic modem than you do for their cheaper 'mains-bound' counterparts.

Verdict

I thoroughly enjoyed these and would recommend them to anyone who wants a reliable and portable 300/300 baud modem. The only hesitation I might have is on price — but the superior design, inclusion of the built-in nicad batteries and portability scotches that hesitation with the assurance that, as always, you get what you pay for.

The Tandy modem is more expensive than the Sendata — but it's more easily available as Tandy has stores all over the country and Sendata is a smaller London-based company. PCN

Product TRS-80 **Price** £279.95 inc VAT **Manufacturer** Tandy (Sendata) Tel: 0922 648181 **Outlets** Tandy Computer stores **Interface** RS-232 **Product** Sendata 700B **Price** £253 inc VAT **Manufacturer** Drayton House, Gordon St., London WC1H 0AW Tel: 01-387 7792 **Outlets** Sendata **Interface** RS-232.

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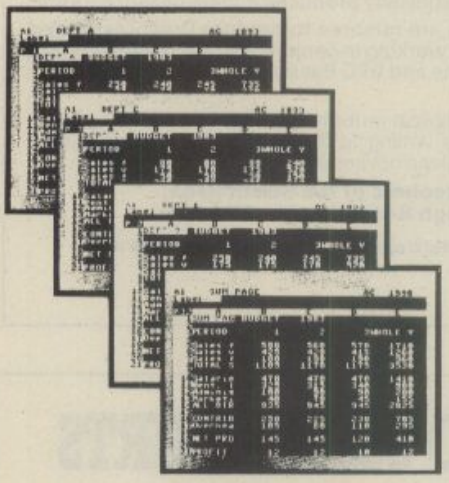

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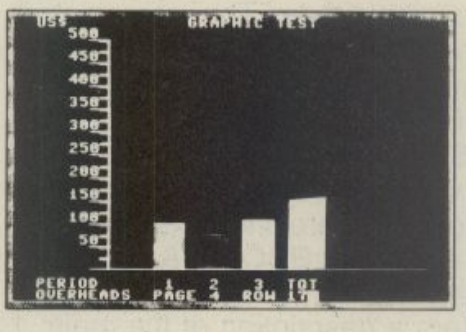

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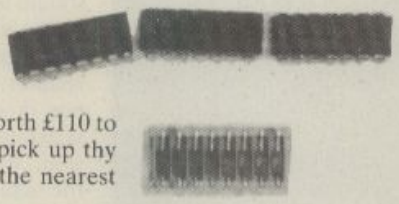
THE DISK CONNECTION

Upgrade your BBC with Microware's alternative to Acorn's disk interface says Igor Thomas.

How much longer are you going to put up with 'Searching', 'Data? Rewind tape', and 'Record then Return' on your BBC micro? If dispensing with the reliable, but *slow* cassette filing system is worth £110 to you, then it's time to pick up thy cassettes and walk to the nearest Microware dealer.



The MDDFS is supplied as a complete floppy-disk upgrade kit comprising a full set of integrated circuits, a small plug-in circuit board and an Eprom containing the disk operating system program. For more or less the same price as an official Acorn Computers upgrade the MDDFS also supports true double-density operation, which the Acorn interface does not.

If you use diskettes with double-density format, the storage capacity of any standard BBC disk can be increased by an impressive 60%. Standard 100K and 200K BBC disk drives will then be capable of 160K and 320K repectively, provided the actual drive units have no integral objections to working with double-density information.

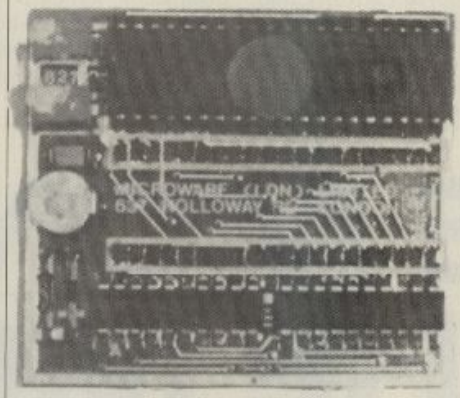
Microware is not the only company to offer a double density interface, although its design approach is the most sensible one available. Instead of inventing yet another new disk format, with all the perils such inventiveness entails, MDDFS has borrowed from the official Acorn DFS design. DFS is admittedly not the best filing system invented but it is widely used, and by adopting Acorn's standard disk format, MDDFS achieves 100% compatability with all official BBC disks.

Documentation

The accompanying manual is well written, although a little idiosyncratic in places. It contains not only a good overall reference guide to the additional commands required by the disk filing system, but also provides complete installation instructions for the interface kit.

Setting up

Fitting MDDFS to my issue 4 circuit board was one of the most pleasant BBC upgrades I've made. As I already have an official Acorn interface and 80-track drives, all that was required was for two integrated circuit chips to be removed from their sockets, and the corresponding Microware parts to be installed. Apart from the little circuit board looking slightly unsure about its new home, once I had double-checked the circuit link settings and altered the necessary DIP switch settings inside the keyboard, my new double-density BBC powered-up with a reassuring beep and has worked unfailingly since.



BBC disk filing

For those of you who have never known the joys (and pains) of using BBC disks, I must digress briefly. In theory all BBC micros are the same. In theory any disk upgrade components you require need only be plugged in. In theory the streets of London are paved with gold.

In real life, there are actually five different and widely sold versions (issues) of the BBC Micro's printed circuit board, throughout which there are at least three major variations in the floppy disk electronics.

Unfortunately BBC issues 1,2 and 3 have an errant circuit track which must be repaired before a disk interface can be fitted. Issue 7 BBC's have some of the smaller disk interface components soldered in place during manufacture, which prevents the whole circuit from being easily upgraded. Issues other than 7 need to have the keyboard DIP switch installed. The manual covers how to install the kit into issues 1 through 4, but does not cover issue 7.

In use

All the standard Acorn disk commands work as they should with subtle enhancements here and there. For example, a format program is built into the MDDFS ROM which is impressively sophisticated, and very swift at work. Also, the *CAT command displays a handy disk number from 000 to 999, which can be specified only during formatting.

Both single and double density disks may be intermixed on different drives, and the drives may be either 35, 40 or 80 tracks. A unique feature of the format program includes the ability to create proper 40 track disks on 80 track drives. A final enhancement of note is an improved *DRIVE command which remembers which of the four possible drives you've been using, even after you press BREAK.

My only real disappointment with MDDFS came when I tried to run some Acorn sofware, such as Planetiod and the Verify program, which produced polite messages of non-compliance. Dismay grew stronger when I tried to use some of the more sophisticated ROMs available for the BBC, notably Computer Concept's Disc Doctor, and Torch's CPN & Z80 second processor system, which also failed to operate.

The shortcoming here is that all these programs need to use OSWORD 7F calls which are rejected by the reviewed version of the MDDFS ROM. Although the manual refers to four versions of MDDFS, we had only the earliest version (090). Only later versions can cope with OSWARD 7F requests.

Verdict

Even with the lack of full OSWORD compatability on the review system, the MDDFS represents a very good investment. Its advanced technical specification surpasses most other systems on the market.

Product	MDDFS—Disk filing system for the BBC
Manufacturer	Microware (01-2726398)
Price	£109.25 inc VAT
Distributor	Microware, 637 Holloway Road, London N19 5SS
Other DFSs	Acorn-£96.60; Watford8£48.30 — disk filing system only; Amcom-£109.25; LVL-£90.85; Kenda DMFS-£138. (All prices quoted are for full kits, and include VAT.)

Suffering from keyboard finger? Take a break with a book.

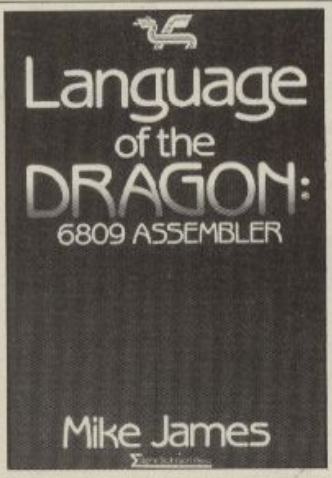
'Introducing Logo' by Boris Allan, published by Granada at £5.95 (paperback 112 pages.)

This is rather philosophical look at the 'learning' language Logo. After an introduction on how his 'learned' friends were impressed with the language, Mr Allan settles down to describing its whys and wherefores. Examples included with the text cover the main implementations, on various machines, without being particularly machine specific.

Turtle graphics, the most famous part of Logo, is described along with other capabilities. These descriptions include the text and number handling as well as control instructions. Parallels are drawn with some of the more common languages, such as Basic, Forth and Pascal, to show similarities and differences between them and Logo.

Starting simply, the book progresses to more difficult concepts of the language and finishes by describing the beginnings of an Eliza program and relational databases.

This book would satisfy the curiosity of anyone wondering what all the fuss is about, it's not too technical and is, in the main, very readable. **KG**



'Language of the Dragon: 6809 Assembler' by Mike James, published by Sigma Technical Press at £6.95 (paperback, 223 pages)

This book arrived for review just as I was trying to persuade a Dragon owner to learn machine code. It made a good first impression and having read it thoroughly. I can make two recommendations: anyone wishing a meaty, well-paced, interesting guide to the 6809 should buy this book and that the Guinness Book of Records should consider it for the book with the most mistakes. I gave up counting but there's at least one misprint on every page and there are more than 200 pages.

How is it possible to recommend a book with such a disgraceful standard of proofreading, especially when a large part of the book is devoted to a Basic program to assemble the machine code?

The answer is that all the same, it has a lot going for it: it is well conceived and persuasively written by someone who appears to have a clear grasp of what the 6809 can and should do — and, above all, appreciates what newcomers can and should learn.

The instructions are covered in logical groups, chapter by chapter. The Basic assembler is put in similarly, but is kept separate and there is no confusion. We didn't spot errors in the actual code, and the program is clearly written and well explained.

There is a micro project at the end of most chapters — limited, but with answers — and a chapter on writing a ping-pong game, recognising most people will want to learn assembler to use fast-moving graphics.

Points specific to the Dragon (sound, interrupts, ROM calls) get a good mention and I felt confident Mike James actually uses a Dragon himself.

The style is easy and suitable for any level. Highly recommended, but I hope both author and publisher give themselves a *big* rap over the knuckles **JF**

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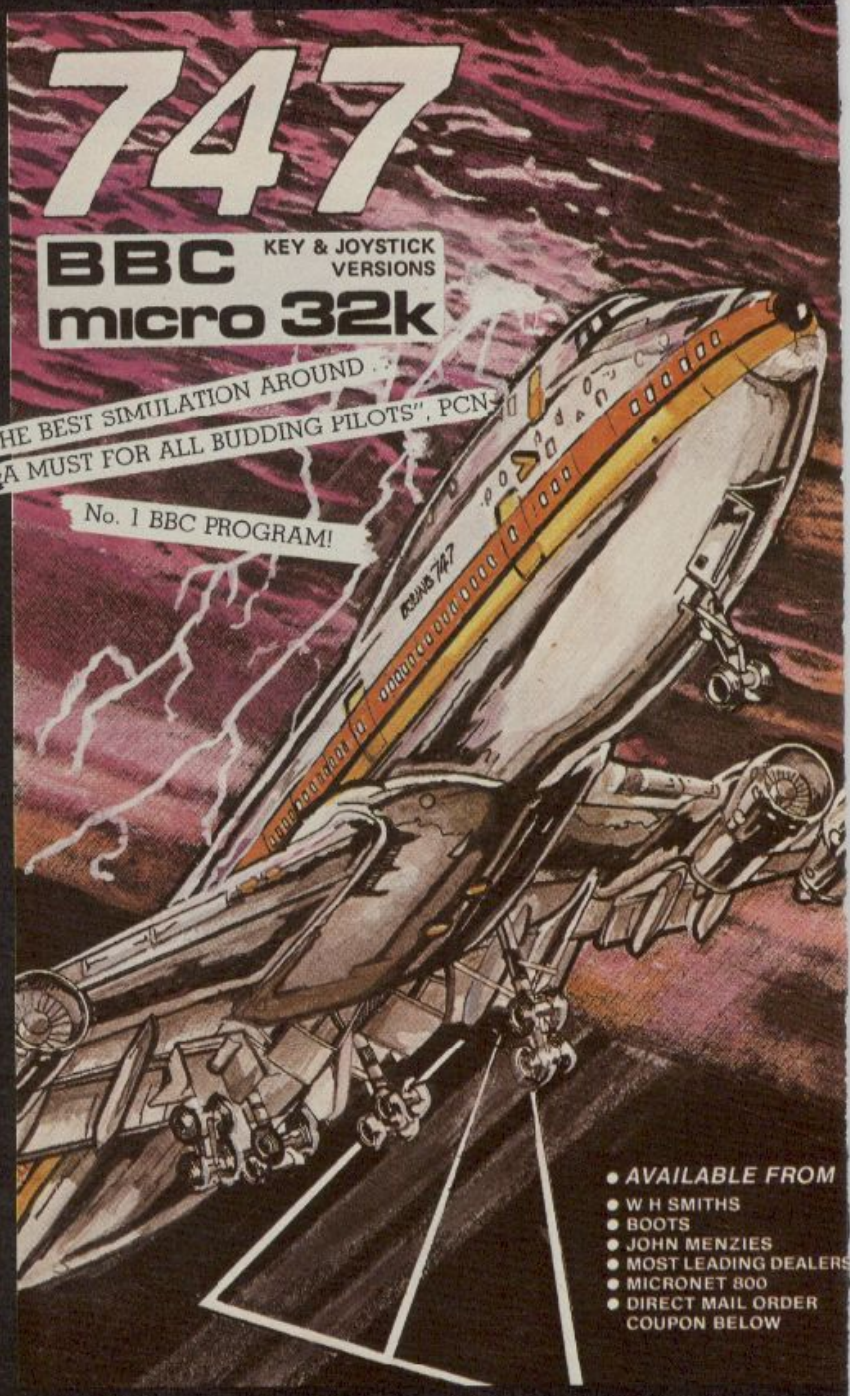

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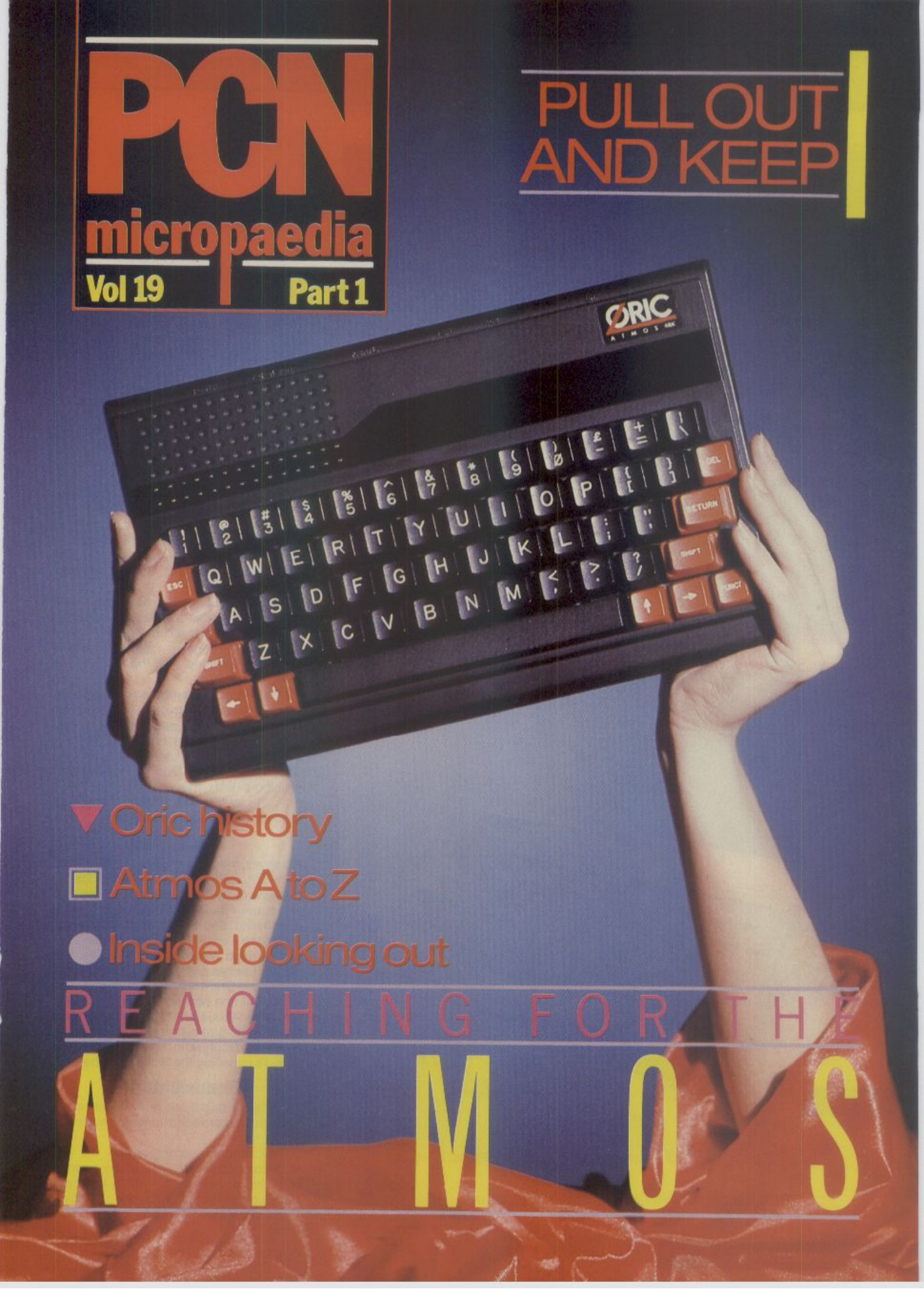


- Oric history
- Atmos A to Z
- Inside looking out

REACHING FOR THE

ATMOS

The Oric Atmos micro with its restyled case (top photo) and the Oric-1 that preceded it (bottom photo).

ORIC FILE OPENS

Oric was named after the omniscient computer, Aurac, of BBC TV's 'Blake's Seven'. Oric Products International was formed in April 1982 as an offshoot of Tangerine Computer Systems, makers of the Microtan 65 kit computer. Tangerine had come into being in the late '70s, the brainchild of Barry Muncaster and Paul Johnston, and gained popularity with the Microtan and then with its teletext adaptor TANTEL.

Financial backing from British Car Auctions helped launch the Oric-1 in a blaze of colour advertising in the autumn of 1982. A choice of 16K or 48K Oric-1 at £99.95 and £169.95 respectively was available and an Oric Communications Modem for £79.

The proposed modem and the Oric-1's 'teletext/viewdata compatible' graphics were a major attraction. In October 1982 a dial-a-game service called 'Aladdin's Cave' was mooted. And the modem has still not appeared.

Like others, the company reneged on its 28-day delivery promise in many cases, claiming it was astonished by the demand. Customers who ordered the 16K model were worst hit, some having to wait until March 1983. Oric ran into supply problems with the chips for the 16K machine and, in fact, sent out many 48K models to appease customers.

Retail deals

However, these difficulties did not detract from the technical merits of the Oric-1. Reviewers quickly labelled it as the Spectrum's main rival. Its powerful sound capabilities and built-in Centronics interface were welcomed not only by the press but by high street shops such as WH Smith, Laskys and Greens. These deals convinced Oric it should drop its mail order operation and concentrate on the shops, which it announced at the end of 1982. Many waiting mail order customers were less than delighted in the New Year to see Oric-1s crowding the WH Smith shelves.

Documentation

Oric had brought out an innovative first machine but provided minimal help for the user.

The manual accompanying the first machines was a 32-page booklet riddled with errors, apparently written by someone unacquainted with the machine. Fortunately this was soon followed by a

weightier volume (164 pages). This had the novelty of setting out in the style of 'Noddy meets the Oric-1', while the rest covered everything the enthusiast wished to know in esoteric charts and tables, apparently rivalling masonic symbols in their complexity.

Sound

Nevertheless, the Oric-1 soon had some avid disciples. The large loudspeaker and sophisticated sound commands combined to give a powerful music machine. Four preprogrammed sounds enabled programmers to PING, SHOOT, EXPLODE or ZAP their way through countless alien hordes. For the more serious aficionado two finite and five continuous sound envelopes could be used, at varied volumes, with up to three tone or noise channels.

Graphics

The Oric-1's approach to graphics tended to polarise users into those who doted on it and those whose hair rapidly receded. Since Tangerine had built a reputation for teletext graphics the Oric-1 had been made to be teletext-compatible. So, instead of following the normal approach to video memory organisation, a radically different method was used. In many other micros, including the Spectrum, a display file holds characters shown on the screen, while another separate area holds the attributes of the characters, namely their colours, whether they are flashing and so on. However, the Oric-1 (and the Atmos) uses a single display file holding both data and attributes. Thus an attribute character takes up a screen position, and it affects all other characters following it on the line: hence the term 'serial attributes'.

The net effect of these teletext-style graphics is that good displays can be tricky to set up. There is no alternative but to sit down with graph paper and plan out, not only where all the displayed characters must go, but also where all the attributes must go. Despite this, some excellent screens can be created, as some of the commercial games now available show. The Oric-1 certainly offered a good range of display attributes too — eight colours in foreground or background, double or single height, flashing or steady, and even obscure ones which changed the display synchronisation to the American standard.

Machine code aids

Another popular feature was the help given to machine code programming. Double length DEEK and DOKE keywords extended the normal PEEK and POKE, and a function HEX$ converted decimal numbers to hexadecimal. To go the other way, a number could be used anywhere in a program in its hexadecimal form prefixed by the hash sign, and the Oric-1 would convert it to decimal as required. One innovation was the provision of user-defined functions and instructions. Here, you could enter code into a memory area and it would then be used to specify a new Basic function (as &) or instruction (as !).

Software and literature

By April 1983 Oric had met orders and the mail order side of the business ceased. Tansoft, Tangerine's software arm, were quick to realise the machine's potential and they released the first Oric-1 software. Other software houses quickly followed, and books for the Oric owner soon appeared. Tansoft also published the first glossy magazine for the machine, 'Oric Owner', and included a copy with every Oric-1 sold.

Colour printer

The first Oric peripheral was the MCP40 Colour Printer which appeared in June, at £169.95. This novel device comprises a barrel containing four pens (black, blue, red and green) which moves over a continuous roll of plain paper to give hard copy of text and graphics. It uses the normal Centronics connection, and is therefore suitable for use with micros outside the Oric range.

Price war

The long hot summer of 1983 brought a long hot price war. In reply to Sinclair price cuts, Oric Products included a voucher with every Oric-1 which chopped £40 off the price of the MCP40 Printer. Free software from the Tansoft range was also included.

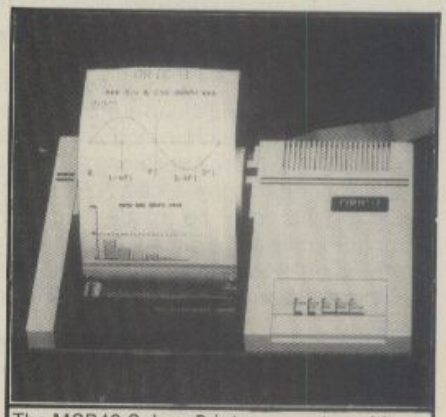
The Oric-1 bug saga

Over the summer too, Oric correspondence in the press centred on users' difficulties with some Basic instructions and functions. It became apparent that the Oric-1 was stricken with more gremlins than the average micro. Oric issued a dealers' newsletter with notes on how to answer customer questions, labelling some apparent bugs as 'the way our Basic is written'. However the ROM did contain some glaring glitches, as we now explain.

The TAB function, used to tabulate the print position to a specified point does not work correctly on the Oric-1 before column 13. The SPC function could, however, be used as an alternative. Another function, STR$, when converting a number to a string expression, places a spurious control character at the beginning. This is overcome by stripping off the first character. An instruction used in high-resolution mode, namely FILL, also acts incorrectly by failing to update the HIRES cursor position.

The Oric-1's printing facilities are marred by occasional squiggles in listings. These occur through keyboard interrupts interfering with data sent out of the printer port. Again, this is not insurmountable — the interrupts may be switched off by a machine code call to address E6CA hex.

Finally, among the major bugs, the ELSE clause of the IF statement can give unreliable results. The Oric-1 has a few other minor peculiarities, including a couple of redundant keywords in ROM (*ie* INVERSE and NORMAL) and conversion of hexadecimal data to decimal when used in POKE statements.



The MCP40 Colour Printer can act as either a printer or a plotter.

Communication problems

Oric released information on overcoming bugs through Tansoft's Oric Owner magazine, and more facts on the ROM were also promised, but little became available. It is disappointing that a technically good machine was largely under used because details of its features were not made known. However, lessons seemed to have been learned with the new Atmos, as we shall see. For example, the Oric-1 used a system variable to decide on the time delay after which to repeat a key, but hardly anybody knew about it. Now the Atmos is using the same variable, but is marketed with 'new user controlled auto repeats'.

French acclaim

The Oric-1 scored a first in September when it received the 'Best Micro of the Year' award in France. The French particularly welcomed the machine's monitor output. The SECAM TV standard used in France differs from the UK PAL system, but many continental television sets are fitted with RGB sockets. The ZX Spectrum, along with most low cost micros, does not have an RGB output, so Oric was in a winning position.

The Atmos launched

In November Edenspring Investments took over Oric Products International, and pumped in £4m for research and product development. Two months later the Atmos was launched at Birmingham's *Which Computer?* Show and Oric showed it has grown in wisdom and stature since the Oric-1. The 294-page manual is comprehensive, the ROM bugs have been removed, the keyboard is professional in standard, and lots of tidying up has been done. On the supply side too, Oric seems to have got it right. Within a fortnight of the launch I found an Atmos on the shelf of my local retailer in Middlesbrough.

TV output

A composite video signal is fed into the UHF modulator and a lead is provided with the Atmos to connect the modulator output to a UHF television. A set tuned to channel 36 will normally give a clear picture, but adjustments can be made using the control screws. Low-resolution displays consist of 28 lines of 40 characters, while high-resolution gives a 200 × 240 pixel grid.

RGB Monitor output

An RGB (red, green, blue) DIN socket allows users who want a rock-steady colour picture to connect a suitable monitor to their Atmos. This is especially handy when using high-resolution graphics.

Cassette port

The Tangerine engineers who designed the Oric-1 and the Atmos have carried the cassette interface over from the Microtan machine. A Schmidt trigger removes noise on tape input and two transfer speeds are allowed — normal at 2400 bauds and slow at 300 bauds.

ULA

The Uncommitted Logic Array chip replaces many separate logic gates. It acts as the CRT controller by reading data from the video memory map, interpreting serial atributes appropriately and sending signals along to the RGB output and the PAL encoder. The ULA also handles the timing of the RAM chips and looks after the mapping of memory addresses.

Modulator controls

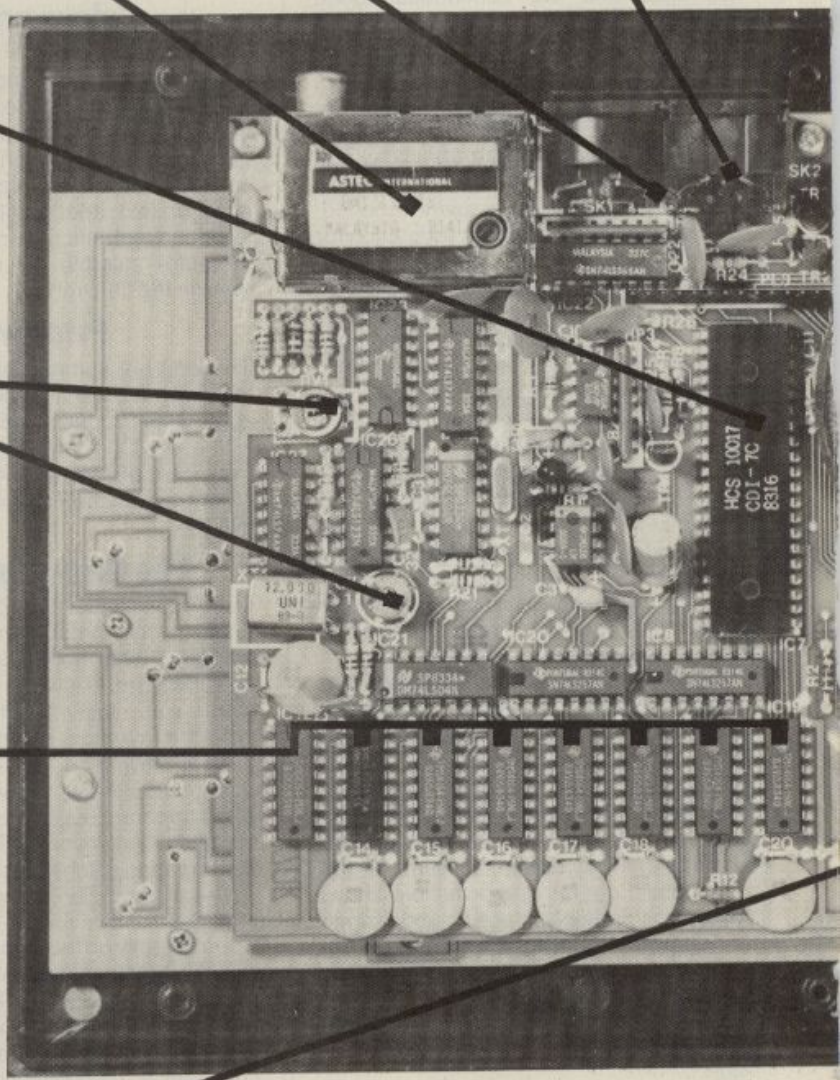
Two small holes on the base of the Atmos case give access to these screws. The silver screw (RV1) controls the bias on the signal fed into the TV modulator, while the brass screw (CV1) controls colour contrast by adjusting the frequency of the colour subcarrier. Many TVs give a good picture without these screws being touched, but adjustment can be necessary with some sets.

RAM

The 48K Atmos has a bank of DRAM chips giving 64K of memory. The top 16K of this (addresses C000 to FFFF hex) is overlaid by the ROM, but this overlay can be disabled by appropriate external control signals, for example from the Microdiscs, allowing the full 64K to be accessed. Standard and alternate character sets are downloaded from ROM and the screen map follows this area, its size depending on whether high-resolution or low-resolution graphics are in use. Page 3 of RAM is used for input/output.

8912 sound

The General Instruments 8912 chip is often found in arcade game machines — it is this that gives the Atmos its powerful sound facilities. Two tones of keyboard beeps are available: high for alphanumeric keys and low for special keys such as ESC and Return. Four pre-programmed sound commands are provided in Atmos Basic. The other three scund instructions give a variety of musical and non-musical sounds using seven sound envelopes with up to three channels incorporated simultaneously. A range of 15Hz to 62KHz is available. The input/output port of the 8912 chip is also used by the keyboard interface.



INSIDE THI

Printer port

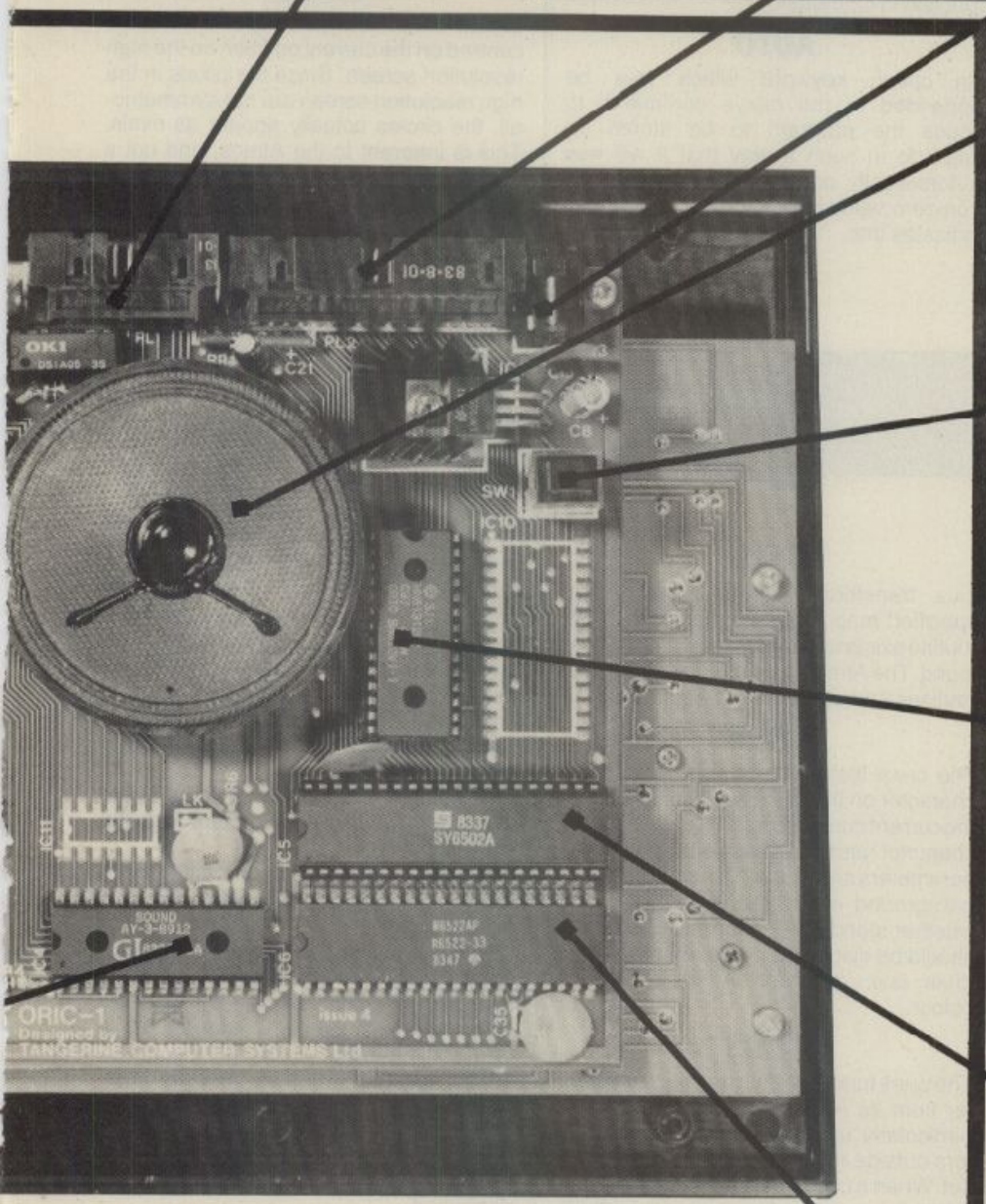
The Oric-1 proved very popular because of its ability to connect to a 'real' printer. This feature continues on the Atmos. A 20-pin socket gives a standard Centronics parallel interface, as used on a great variety of printers. The Oric MCP40 colour printer may be attached through this port to give hard copy of both text and graphics.

Expansion port

This where long-awaited Microdiscs will interface to the Atmos. The 34-pin socket brings a full range of data and control lines out to the back of the machine. By using the appropriate signals an external peripheral could be accessed using a POKE or PEEK to the spare memory area between hex addresses BFEO and BFFF.

Power socket

The Atmos is powered by the combined 13A plug and transformer giving a 9V DC supply. The 7905 voltage regulator supplies 5V to the board. A separate power supply is required for the forthcoming Microdiscs.



Loudspeaker

The hefty loudspeaker dominates the board and gives a range of power commensurate with its size. The Atmos sound commands specify volume on a scale of 1 to 15 but most sane users rarely go beyond 10.

Reset button

This button can be depressed by poking a pencil through a hole in the base of the Atmos. It causes a warm start, *ie* the Atmos resets itself but retains current memory contents. Thus an infinite program loop may be broken into and the program itself is not lost.

ROM

The Atmos ROM is labelled Basic V1.1. This replaces the Oric-1's Basic V1.0. ROM routines have been tidied up, bugs cured and some extra facilities added, but many system variables and addresses remain the same. There are only two completely new commands, STORE and RECALL, and these are used for storing and recalling arrays on cassette.

6502A Microprocessor

The Atmos uses the popular eight-bit 6502 in common with other similar micros. Although a little outdated, its assembly language is easy to learn and use. Its addressing instructions require memory to be split into logical pages, *ie* blocks of 256 addresses, with page 0 reserved for frequently required system variables and page 1 used as the stack.

6522 VIA

The Versatile Interface Adaptor has 16 registers and these correspond to the first 16 locations of memory page three. The counters of the 6522 cater for a variety of system functions including timing for the cassette interface, sound and printing. An external signal from the expansion port may disable the VIA.

E ATMOS

ATMOS BASIC

Here we analyse all the keywords of Atmos Basic from range A to E. These keywords are, in fact, identical to the Oric-1's, but changes have been finely wrought in the depths of the ROM, and some commands work differently.

ABS

ABS returns the absolute value of an expression. This is the result without its sign. It is used whenever the size of a quantity is required, regardless of its sign, typically when comparing two numbers to determine how close they are to each other.

AND

AND may be used tc link two conditions *eg* IF T>100 AND T<200 THEN PRINT "Within range"
Here both parts have to be true for the condition to be true. It may also be used as a binary operation, comparing the binary digits in the numbers it is joining. For each corresponding pair of bits it returns a 1 if, and only if, both bits equal one. This shows the similarity between the two uses of AND. To the Atmos there is no difference since it stores the value True as binary 1s and False as binary 0s.

ASC

ASC converts the first character in a string expression to its ASCII code. Characters on the Atmos are stored by means of one byte codes in the range 32 to 127 according to the ASCII convention. Character codes below 32 are control characters used for clearing the screen, moving the cursor, toggling keyclicks on and off, and so on. In parallel with the standard ASCII character set the Atmos holds an alternate set of Prestel-style graphics characters. These are accessible in LORES1 mode, or by giving the appropriate CHAR command in high resolution.

ATN

The ATN function returns the value of the angle (in radians) whose tangent is given by an expression. It can be used to find the angle of slopes, given horizontal and vertical measurements.

It is the only inverse trigonometric function in Oric Basic.

AUTO

An option keyword which may be appended to the CSAVE command, to cause the program to be stored on cassette in such a way that it will RUN automatically once loaded by CLOAD. A non-zero value in memory location #0063 indicates this.

CALL

CALL transfers program control to a specified machine code subroutine. The routine exists when a 6502 RTS instruction is found. The Atmos manual lists useful ROM routines and addresses in Appendix 9.

CHAR

The CHAR instruction is used to place a character on the high resolution screen at the current cursor position. The code of the character has to be specified together with parameters showing whether foreground, background or inverse is required, and whether standard or alternate characters should be displayed. For example:
CHAR 65,0,1 displays 'A' in foreground colour.

CHR$

The CHR$ function returns a single character from its ASCII code. The function is particularly useful for producing characters outside the normal printed character set. When a code in the range 128 to 151 is printed, it is interpreted as an attribute character: its highest bit is first removed and it then specifies a display attribute such as a foreground or background colour.
For example PRINT CHR$ (129); "BULL" displays BULL in red foreground colour.

CHR$ may also be used in LPRINT instructions to send special characters to the printer.

With the Oric MCP-40 Printer many such control codes may, of course, be used to alter character size or give graphical commands.

CIRCLE

CIRCLE draws a circle of specified radius centred on the current position on the high resolution screen. Since the pixels in the high resolution screen are not symmetrical, the circles actually appear as ovals. This is inherent to the Atmos, and not a bug. The PATTERN instruction can be used to vary the layout of the lines with which circles are drawn.

CLEAR

CLEAR sets the value of all numeric variables to zero and all character variables to null. RUN also has this effect.

CLOAD

Used to load a file from cassette tape. The Atmos has a much more powerful version of this command than its predecessor, allowing appending and verifying of files. The append facility requires a ",J" clause and causes a program file from cassette to be joined to the end of the program currently in memory. However the modules are *not* merged — the line numbers in the program on tape must be higher than those in the current program. The verify option requires a ",v' clause and enables the user to check whether a file has been CSAVED correctly.

A report on the number of verify errors detected appears on the screen after the operation.

Improvements have been made on the level of messages given when CLOAD is executing.

Whenever a file is encountered on tape, its name is shown at the top of the screen, together with a B or C label — B indicates a Basic program while C stands for a machine code file.

The proven Tangerine cassette interface standard continues its reign on the Atmos: a fast mode (2400 bauds) is the default while slow mode (300 bauds) can be invoked by ",s" at the end of the command.

Program or file names can be up to seventeen characters long and can include special characters as well as alphanumerics.

The 'Load Aborted' message may appear in the middle of a CLOAD: this usually means that the volume level on the cassette recorder is too low. In contrast, lines of "UUU . . ." in a listing after CLOAD has been executed usually indicates too high a setting. Often the volume level for successful loading is very sensitive in fast mode.

CLS

CLS clears the screen in any resolution mode. It does not affect the PAPER and INK colours, but other serial attributes are cleared out. Note that CTRL L has the same effect in immediate mode.

CONT

Restarts the execution of a program after it has been stopped. CONT can be used effectively in program debugging. A program may be interrupted by CTRL C, values of significant variables can be examined using PRINT in immediate mode, and then CONT can restart the program.

COS

COS (a) is a trigonometric function which returns the cosine of an angle whose value in radians is given by 'a'. Together with SIN, the function may be used to express grapnhical points in terms of polar coordinates *ie* x = r cos a and y = r sin a. This means that the geometry of circular shapes can be easily displayed in high-resolution displays, as shown in the example program.

C SAVE

Used to store a program or memory block as a file on cassette tape. To save a program, the CSAVE keyword is followed by the program name, with an optional ",AUTO" if it is to run automatically once loaded, and a ",S" if slow saving mode is to be employed. A memory block is saved by naming it and specifying its start and end addresses in the CSAVE command. Low- or high-resolution pictures may be stored by this method, since the data and attributes of a display lie in the same contiguous file.

When AUTO is used it causes a non-zero value to be placed in memory location #0063 as an indicator. The filename is held in a block starting at address #0035, and byte #0067 indicates fast (=0) or slow (=1).

CURMOV

CURMOV X,Y,F moves the cursor on the high resolution screen relative to its current position by X on the x-axis and Y on the y-axis. F stancs for the FB code and produces an effect according to

F = 0 background
= 1 foreground
= 2 inverse
= 3 nul

If the cursor is moved out of the range 0 to 239 on the x-axis or 0 to 199 on the y-axis then this gives an 'Illegal Quantity Error'.

CURSET

CURSET is a companion to CURMOV and has a similar format. However instead of being a *relative* cursor move it sets the cursor to an *absolute* position (X,Y) on the screen. When the high resolution instruction is executed the cursor is automatically set to (0,0). Clearly many high resolution programs do not require drawing to start at this point, so CURSET is used to initially position the cursor. Subsequently the instruction is used whenever an absolute cursor setting is needed. Typically, this is when characters are to be displayed using CHAR, or new parts of the display are to be drawn. In the example program CURSET moves the cursor prior to drawing a circle centred on a given point.

DATA

As in all dialects of Basic, DATA is always used in conjunction with the READ instruction, to define constants to be assigned to data names in the READ. However Atmos Basic is very flexible in this area. Constants may be numeric (including hexadecimal and E format) or string.

String constants need not be enclosed in quotes unless they contain required leading spaces. Without quotes, leading spaces are ignored but trailing spaces are not. If there is a null item in a DATA instruction *ie* two commas together, then the respective variable will be set to zero if it is numeric or null if it is a string.

The Atmos maintains a pointer showing the next data item to be read: this is set to the beginning of the first DATA instruction when a program is RUN and also by the RESTORE instruction. If a program attempts to READ more data items than are available then an 'Out of data' error occurs.

DATA is not very economical in its use of memory, data thus occurring both in the program area and the data area of memory, but it is convenient. Commonly it is found in programs to initialise arrays or to list values to redefine characters.

DEEK

DEEK returns the value of the double-length integer in the pair of bytes starting at a specified address. The first byte of the pair is considered to hold the low-order half of the integer and the second byte has the high-order half. Thus if byte 1 holds n1 and byte 2 holds n2 then the DEEK function gives the value (N2*256)+N1. DEEK may be used to examine system variables which often span two bytes. For example, PRINT DEEK (156) reveals where the data area of memory starts.

DEF

The DEF instruction has no directly noticeable effect — it simply defines. It has two uses defining numeric functions and defining the start of a machine-code routine. DEF FN v(w) = x defines a numeric function of the name FN v, with argument w. The expression x should contain w. The argument cannot be omitted, and there can be only one. The expression can contain data-names other than the argument but this is not recommended.

DEF USR can define the starting address in memory of a machine-code subroutine which will be called by the USR function.

Whenever an expression occurs frequently in a program and it is based upon the value of one argument, it can be replaced by a function. A common use of DEF FN is for the generation of random numbers, since these are often required between one and a given integer. For example to get a random number between 1 and 100 define the function as:

DEF FN R(N)=INT (RND (1)*N)+1

DIM

As usual the DIM instruction allocates space in memory for arrays. These may have any valid name, real or integer or character. There is a maximum of 255 dimensions for an array, and the size of dimensions is limited only by the amount of memory available. Subscripts may start at 0. Arrays need not be dimensioned providing they do not have more than 11 elements.

String arrays have strings rather than just individual characters as their elements, and these strings need not be the same length. Once the size of an array has been set by a DIM statement it may not be redefined — otherwise the 'Redimensioned array error' results. Arrays are stored in memory in an area immediately following that used for single values. An undimensioned array always has eleven slots allocated for it in memory, so this useful omission can be wasteful on space.

DOKE

The DOKE instruction places a two-byte integer in the pair of bytes starting at a given address. The high order half of the integer is put in the second byte and the low order half in the first. Thus DOKE is the reverse of DEEK, and correspondingly can be useful for altering system variables. For example a Basic program may be LIST-protected by:

DOKE #001B, #F42D

Once this has been entered the Atmos will always clear its memory when a program ends — an excellent way of protecting a program from curious users.

DRAW

DRAW X,Y,F draws a line from the current cursor position on the screen to a position X further away on the x-axis and Y further away on the y-axis, with an FB code of F. X and Y are thus relative coordinates. If the instruction attempts to draw a line outside the x range 0-239 or the y range 0-199, an 'Illegal Quantity Error' is flagged. The PATTERN instruction can be used to give a different layout to the lines drawn.

EDIT

The Oric-1 manual was never too sure whether this command existed or not — the first provisional manual included it, but wrongly explained its use, while the final manual omitted it. Perhaps Oric realise that their editing commands leave a lot to be desired.

In fact, EDIT is used to bring a copy of a program line to the cursor position, prior to editing. To subsequently alter a line the cursor movement keys are used to position the cursor on the appropriate characters, and these are then sent to the Atmos's input buffer by CTRL A. Alternatively new characters can be typed in. Once the line has been correctly typed, Return enters it into the program memory area. CTRL X can be used to cancel a line, while DEL can be used to delete individual characters. Inserting new characters into a line is messy but possible.

ELSE

The ELSE keyword provides an optional clause in the IF instruction. The problems found in using concurrent IF-THEN-ELSE instructions on the Oric-1 have been eradicated on the Atmos.

END

The instruction causes a Basic program to stop. it is identical to STOP except that it does not cause the Atmos to display a message showing at which line the program halted.

EXP

EXP (x) returns the value ex where e is the Napierian constant or exponential. The function LN is complementary to EXP, and the two can be used as log and antilog. For example if you want to find the fifth root of a number N then EXP (LN(N)/5) will give the right result.

EXPLODE

Produces a predefined sound of an explosion. For several repeated explosions a WAIT instruction must be included between them, otherwise a continuous noise results.

NEXT WEEK

We continue our look at the Atmos and Oric-1 machines with further keyword descriptions and a glimpse of Oric peripherals.

Contributor: Bob Maunder
Cover and inside photos: Monica Curtain

```
10 HX=235:HY=195:LX=20:LY=5
100 HIRES:FAPER0:INK6
110 GOSUB 1000:REM Title
120 REPEAT
130 :PRINT "0) Circle or 1) Rectangle"
140 :GET K$:N=ASC(K$):N=N AND 1
150 :ON N+1 GOSUB 2000,3000
160 :PRINT "Key S to stop, other to co
ntinue"
170 :GET K$:FINISH=(K$="S")
180 UNTIL FINISH
190 STOP
1000 S$="Circles & Rectangles"
1010 CURSET 60,0,3
1020 FOR K=1 TO LEN(S$)
1030 C=ASC(MID$(S$,K,1))
1040 CHAR C,0,1:CURMOV 6,0,3
1050 NEXT K
1060 RETURN
2000 REM Circle input
2010 REPEAT
2015 :PING:PRINT:PRINT
2020 :INPUT "Enter centre & radius (X,
Y,R)";CX,CY,R
2025 :INPUT "Ink (0 - 7)";I
2030 :GOSUB 2500
2040 UNTIL OK
2050 RETURN
2500 REM Solid circle
2510 OK=(CX>=LX+R)AND(CX<=HX-R)AND(CY>
=LY+R)AND(CY<=HY-R)
2520 IF NOT OK THEN RETURN
2530 I=(I AND 7)
2540 CURSET CX-6-R,CY-R,3:FILL 2*R,1,I
2550 CURSET CX,CY,3:FOR C=1 TO R:CIRCL
E C,1:NEXT
2560 RETURN
3000 Rectangle input
3010 REPEAT
3015 :PING:PRINT:PRINT
3020 :INPUT "Enter top left and side (
X,Y,S)";SX,SY,LS
3025 :INPUT "Paper (0 - 7)";P
3030 :GOSUB 3500
3040 UNTIL OK
3050 RETURN
3500 REM Rectangle
3510 OK=(SX>=LX)AND(SX<=HX-LS)AND(SY>=
LY)AND(SY<=HY-LS)
3520 IF NOT OK THEN RETURN
3530 P=(P AND 7)+16
3540 CURSET SX,SY,3:FILL LS,1,P
3550 RETURN
```

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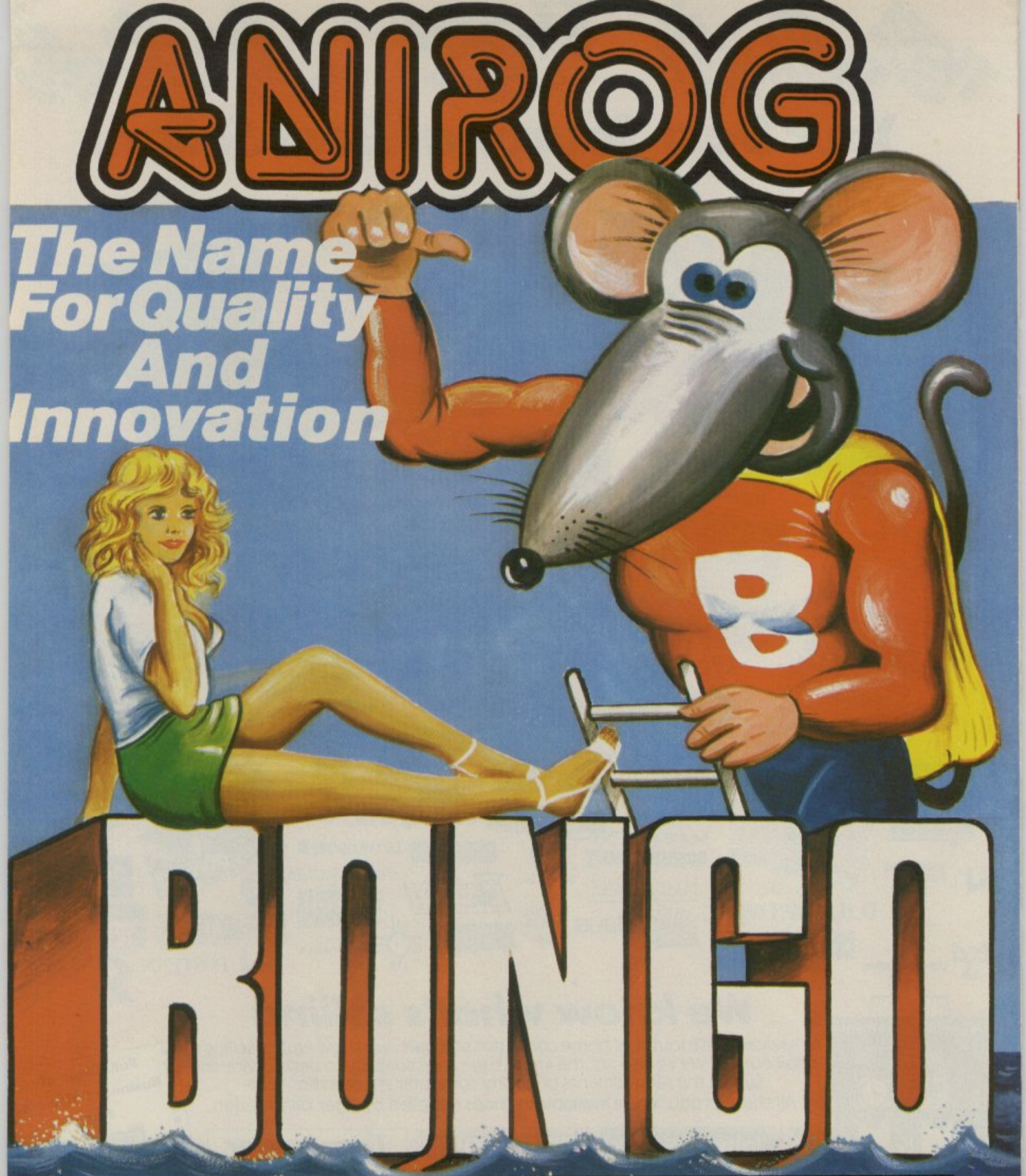

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PCN PRO-TEST SOFTWARE

BBC TOOL CHIP

Simon Williams tools along nicely with this collection of useful BBC programming aids in Eprom.

Several programs are available for the BBC micro on Eprom at the moment, but few designed specifically with the Basic programmer in mind. Toolkit provides a number of utilities useful in program construction and remedies some shortfalls in Acorn's software.

Features

The Toolkit Eprom provides 17 new commands, accessible to Basic and some valid for use within a program. In addition, aids are provided for program development in the shape of a full screen editor and a number of search, display and/or replace routines. The error checking facilities of the BBC machine are improved and various colour codings are introduced to improve on-screen listings.

Presentation

The package consists of a 28 pin Eprom housed in a plastic library case of the type often used for cassette software. This may seem rather excessive, considering the size of the chip itself, but is largely governed by the size of the accompanying 32-page manual. About the same size as a cassette, it is produced to a high standard and fully details the syntax and action of all Toolkit commands.

In use

For anyone who has added previous ROMs to their micro, the insertion of the Toolkit Eprom will be very straighforward. Removal of the top half of the computer's case and the keyboard reveals two or three spare ROM sockets on the front right of the main circuit board. The chip is simply plugged into one of these.

If all is well after following the full instructions the Eprom will signal its arrival in response to the *HELP command by displaying its version number on-screen. Toolkit's commands may be listed using *HELP TOOLKIT and *HELP INFO will display the settings of certain system variables.

All Toolkit commands are preceded with an asterisk. Some of these may be identical to command names used by other ROM packages so, to overcome any confusion that might be caused to the operating system, the Toolkit commands may also be suffixed with a 'B'. For example, both *CHECKS and *BCHECKS will perform a byte-by-byte comparison of a file recorded on cassette or disk with one resident in memory.

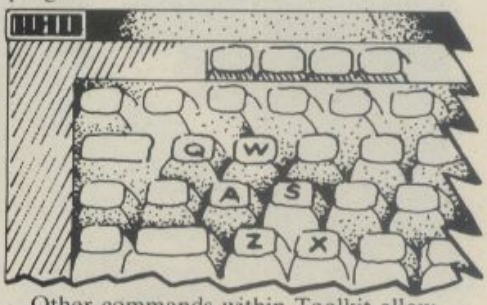
Other useful commands which rectify deficiencies in the operating system include *FREE, which lists PAGE, TOP, LOMEM and HIMEM and calculates the amount of free memory available, *MERGE, which allows two files to be easily merged together into memory, *RECOVER, which attempts to intelligently recover a 'bad program', and *RENUMBER, which permits renumbering of selected sections of a program.

The *ON command (counteracted by *OFF), produces error messages in red, comments in cyan and other information in a variety of colours. It also invokes a special error handling routine which reports not only the error and its line number, but also enters Toolkit's screen editor and moves the cursor to the likely position of the error.

The screen editor allows the user to insert or replace statements anywhere on screen, without having to use COPY as in normal cases. The down cursor key will produce successive lines and scroll the program up the screen. A valuable advantage has been missed here, as the up cursor key lists the program backwards up the screen, rather than scrolling the whole program downwards, à la Wordwise. This would have improved the editor no end.

The *UTIL command enters a separate sub program which offers another nine useful facilities. Each of these may be called through the UTILS menu or by calling *UTILn directly, where n is the number of the utility. The utilities are as follows:

1 String search: lists all lines containing the required string, which will be highlighted in cyan.
2 Search and replace: performs a string search, but also replaces all occurrences of the string with a specified alternative.
3 Move lines: transfers a section of a Basic program to an alternative location. The program will not be renumbered, so the line numbers will be out of sequence.
4 List procedures and functions: lists all lines containing DEFPROC or DEFFN.
5 List A% to Z%: displays the contents of all the resident integer variables.
6 List other numeric variables: displays all other variables used in a program.
7 List string variables: as 6 but for strings.
8 List arrays: as 6 but for arrays.
9 Change edit range: limits the action of UTILS 1 and 2 to specified lines of a program.



Other commands within Toolkit allow the packing and relocation of a program, the use of NEW and OLD within it and the saving of a text or graphics screen in any MODE.

Reliability

The utilities within Toolkit seem very robust and the provision of the optional 'B' suffix should avoid any confusion when using the program with other ROMs.

Verdict

The provision of these very useful programming aids in Eprom, where they are instantly accessible, should speed the process of programming considerably. It is a pity Beebug could not squeeze a proper windowing screen editor into the chip. But, this criticism aside, Toolkit is highly recommended.

RATING (/5)

Features	★★★★
Documentation	★★★★
Performance	★★★★
Usability	★★★
Reliability	★★★★
Overall Value	★★★★

Name Toolkit **System** BBC micro B **Price** £27.00
Publisher Beebugsoft, PO Box 50, St Albans, Herts. **Format** Eprom **Language** Machine code
Outlets Mail Order/Retail

PCN PRO-TEST SOFTWARE

QUILL CREATION

Bob Seal

Bob Chappell seeks out adventure with a program generator.

Would-be programmers of adventures should welcome this utility with open arms. The Quill is an adventure generator — you supply the plot and it produces the finished program.

Objective

One admirable objective only: to take away much of the pain, drudgery and complexity involved in programming an adventure. You still have to provide all the details such as plot, verbs, objects and actions but, using the information you feed it, The Quill will generate a working program.

Presentation

A neatly typed 52-page instruction manual comes with the cassette. The first 20 or so pages are a tutorial, devoted to getting you started with the system, the remainder describing in detail the facilities provided. It is essential to read and understand the tutorial before attempting to use the Quill seriously. Parts of it are fairly complicated.

In play

The Quill system consists of three components:

- A database which you build up. This will contain all the information such as vocabulary, events and movement tables necessary for playing the adventure.
- An interpreter, the heart of the system, which uses the database and executes the adventure.
- An editor, allowing you to set up a new database or make changes to an existing one.

On loading the program, The Quill confronts you with the editor's main menu, at first sight a formidable list of 18 options. However, many are fairly easy to understand and use. The simpler options include saving, verifying and loading a database, changing border, paper and ink colours, finding out how much memory is available, returning to Basic, and saving and verifying a complete adventure of database plus interpreter.

Most of the other main options have sub-menus which are fairly similar in content. These sub-menus normally allow you to amend, delete and insert entries, display them all on screen or have a permanent record by using a printer.

All words, messages, actions and events are given a number to be used both by you and the interpreter for quick reference purposes. One option handles the part of the database dealing with the adventure's vocabulary. Here, all the verbs and nouns that will be recognised by the final adventure are stored. Synonyms can be used, being tied to the main word by use of the same number. So GET and TAKE might both be word number five.

Other options cover messages to be output by the adventure, the description of each room or location, and the name of each object (such as key or lit torch) and their initial whereabouts (room number, already being carried or not yet existing). As an example of the latter, the lit torch exists only as a torch until, say, it is switched on.

The movement table lets you set up the paths between locations using the usual N,S,E,W,U,D directions coupled with the location number. For example, if the only exit from the kitchen (room 1) is north to the hall (2) and west to the garden (3), then the entry against the kitchen is simply N 2 W 3.

The heart of the database is the event table, where commands can be linked to conditions and actions. For example, GET HAT (hat having vocabulary reference number 6) could be set up as GET 6 OK which would signify that if the hat was present at the current location and was not already in the possession of player, it could be picked up.

Or you could link the command TORCH OFF with the condition that the lit torch must be present (PRESENT 1), the action being that the lit torch is replaced by the unlit torch (SWAP 0 1 OK).

The conditions can also reference any of 33 status flags: some are reserved for special purposes such as keeping count of the number of objects carried or whether it is light or dark. The rest may be used as you like.

There are 15 conditions and 26 actions allowed by the interpreter. While this naturally puts limitations on the scope of the finished program, there are enough there to keep most adventure writers satisfied.

Conditions include whether an object is present or absent from the current or a specified location, or whether a flag is zero, non-zero, less than, greater than or equal to a specified number.

Diagnostics

Actions cover taking an inventory, saving and reloading a game-state, displaying a message, destroying or creating an object, setting, clearing, adding or subtracting flags, and many others. A comprehensive selection, in other words.

One excellent feature lets you test the adventure as you build it. Optional diagnostics are available to let you know the contents of all the status flags at every move. This facility takes a lot of the pain and effort out of debugging an adventure. When you save the completed adventure, it can be loaded and run by itself, just like any other program — everything it needs is already built-in.

When you've created an adventure, it's yours to do with as you like. All Gilsoft ask is that you include an acknowledgement to The Quill in the completed adventure. More than generous, I would say.

Gilsoft already has Diamond Trail, created by the Quill system, on the market. Fairly straightforward, it involves a hunt for the Sinclive Diamond. Quite enjoyable in its own right and worth buying just to see what a finished Quill product looks like.

Verdict

An extremely valuable utility; the best answer yet to the adventure writer's dream of painless programming. PCN

RATING (/5)

Features	
Documentation	
Performance	
Usability	
Reliability	
Overall value	

Name The Quill **System** 48K Spectrum **Price** £14.95 **Publisher** Gilsoft, Glamorgan Tel: 0446-736369 **Format** Cassette **Language** Machine code **Other versions** None **Outlet** shops.

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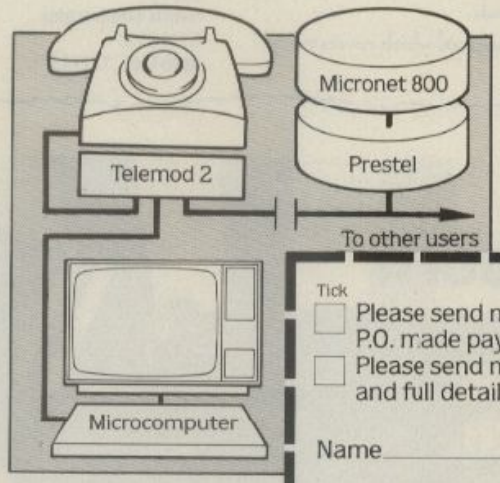

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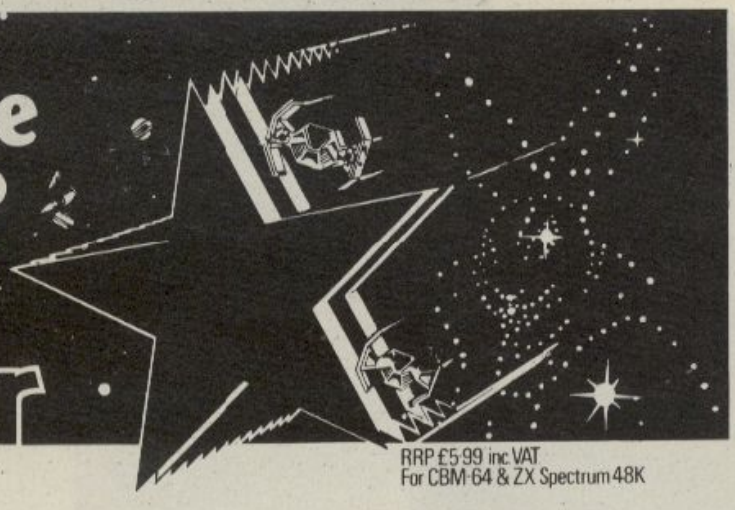

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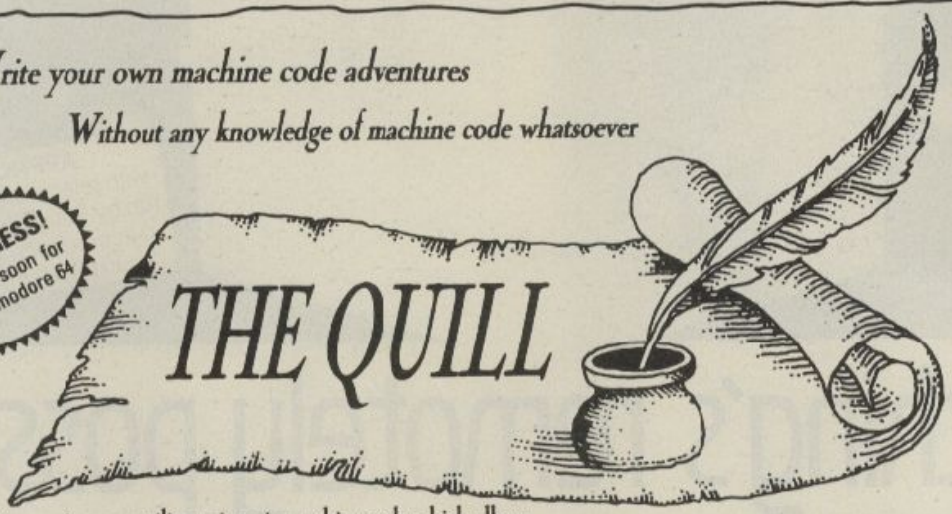

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COMMODORE 64

Stalk the hawk

Name Megahawk **System** Commodore 64 **Price** £6.95 **Publisher** Big G, Birchall Moss Hall, Hatherton Nartwich Cheshire. (0270) 811948 **Format** Cassette **Language** machine code **Other versions** None **Outlets** Mail order/Retail.

If you like zap up and avoid-the-obstacle type games, this is among the best. It even has a demonstration mode to show you the different levels.

Objectives

You control a white hawk and destroy the multitude of other hawks descending upon you. The game has six levels, each lasting a set time (shown at top left of screen). Points are gained for just evading the foes and extra points for destroying them with your missiles, laser, bombs or whatever they are.

Each level is harder and faster and for finishing the sixth and final level you add one hawk to those remaining out of the original three. The game then automatically restarts and appears to be exactly the same.

In play

The game is loaded from cassette with the usual SHIFT and RUN/STOP. Should you wish to see the demonstration you enter POKE 53248,1 before loading the game. This gives the game less time on each level, making it easier to survive long enough to see the demonstration. Why not just have a demo mode with an option at the beginning?

The software company also said an easier, but less exciting, way of seeing all six levels is to survive the first level and move the player to top centre of the screen. They were right: the player evades all the foes and is left sitting while the game plays itself.

There are no keyboard controls for this game. It requires a joystick in port two, so all those without a joystick can stop reading. Having said that, the game is very responsive and extremely fast. It is no easy feat surviving the first three levels (providing you don't cheat). The levels vary from hawks attacking head-on down a tunnel (level 1), attack from all sides in outer space (level 2) and attack from all sides including behind (other levels).

There were no loading problems or any other technical problems. This is Big G's first game and the programming is excellent. The game makes good use of sprites and colour and also has fair sound effects.

Verdict

In favour of the game is its use of the 64's facilities and the speed and response time. Against it is the fact that it is along a path so well-trodden that it seems to be sinking. Those who like standard arcade games will love this. One more if you're a collector and lover of the arcade game without frills.

Kevin Bergin

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	

Warz and all

Name Megawarz **System** Commodore 64 **Price** £7.50 **Publisher** Paramount Software, 67 Bishopton Lane, Stockton, Cleveland **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Mail order/retail.

When dealing with versions of the old arcade classics there are two approaches: make them as faithful as possible, or jazz them up almost beyond recognition. With Megawarz, Paramount has chosen the latter course and come up with something rather more than just another Asteroids variant.

Objectives

Your space ship is on the outer edge of the solar system and your mission is to return to Earth, fighting aliens on the way and picking up hitch-hiking astronauts if you can. Successfully defeat the waves of marauding spaceships and you warp inward, planet by planet.

In play

After loading you are presented with a multicolour title screen and a tuneful classical theme. Here you have the option of altering some of the factors including difficulty level, how many ships you get, and at what level you receive a bonus ship. Then it's on with the slaughter.

Throughout, Bach's Toccata plays constantly, an excellent rendition but wearing on the nerves eventually. You have the choice of turning off the sound but then you lose the laser and explosion effects too.

If you've played Asteroids you'll quickly get the feel of Megawarz. Using joystick or keyboard you can rotate your ship through 360 degrees, simultaneously whizzing about the screen. Here, though, you bounce off the sides (no wrap-around). An occasional astronaut appears and if possible you should pick him up.

Destroy the three enemy ships and you go on to a bonus phase where it's a race against time to collect another bunch of astronauts but if you take too long they mutate and come for you with a vengeance. Survive up to this point and you get a little graphics display of your ship zooming off to Pluto.

After this there's more of the same with aliens of different shapes and sizes and you must destroy increasing numbers of waves: two to get to Neptune, three to Uranus and so on.

The aliens change speed and shape and are of the kamikaze variety. Graphics are above average and the sound is superb. Keyboard controls are sensible though you really need a joystick to get the most from it, and there's a hall of fame which plays the 1812 Overture complete with explosions as you enter your name.

Verdict

Apart from the obvious question of how much of this sort of thing the market wants or needs, there are no grounds for criticism. If you like this kind of game you'll love Megawarz.

Peter Worlock

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	

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DRAGON 32

Pop out for a bite

Name Castle of Doom **System** Dragon 32 **Price** £6.50 **Publisher** Paramount Software, 67 Bishipton Lane, Stockton, Cleveland. Tel: 0642 604470 **Format** Cassette **Language** Basic **Other versions** None **Outlets** Mail order.

Here's one for the garlic-lovers, a graphics adventure where you have to see off yet another vampire lurking inside your Dragon.

Objectives

You start in The House of Doom, and if you get out of there you move to Doom Town, which in turn may lead you to The Castle of Doom, the home of Count Doom.

In play

After a few words of introduction you're shown your starting location, a simple three-dimensional drawing of a room with a window in one wall, doors in the others, and a ladder leading up somewhere. You press the space bar to remove the picture and give you the text, which tells you the possible exits and what you can see.

It doesn't take much moving about to realise that the 27 locations in The House of Doom are basically the same, but with doors and windows in different places and the addition of an object or a ladder up or down. You also soon work out that there are three floors, with each floor being nine rooms in a 3 × 3 block.

Nor does it take you very much longer to discover how to get out of the one blocked exit in the place. Typing HELP virtually tells you what to do.

Doom Town has 36 locations, but these too are all very similar, being rows of houses slightly rearranged to take account of the different exits each time. Here you might come across objects like rings, cloaks, crosses and garlic, though these aren't depicted in the graphics, just in the text.

A simple map enables you to find your way out of Doom Town and on to the Castle, though of course you have to figure out what objects you're going to need and there is a limit to what you can carry.

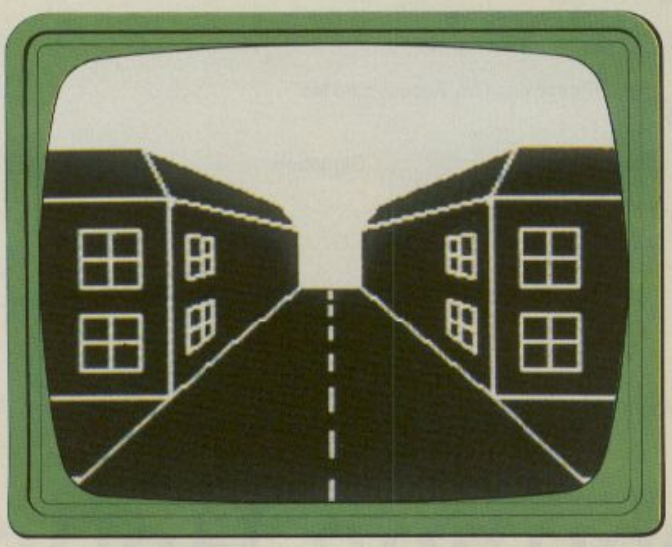
No ladders between floors this time, which means you have to figure out how to get through the trap door in one of the rooms. I couldn't bring a table or chair from one of the other rooms so I tried SHOOT TRAP DOOR. Back came the terse response: 'You were arrested. Adventure over.'

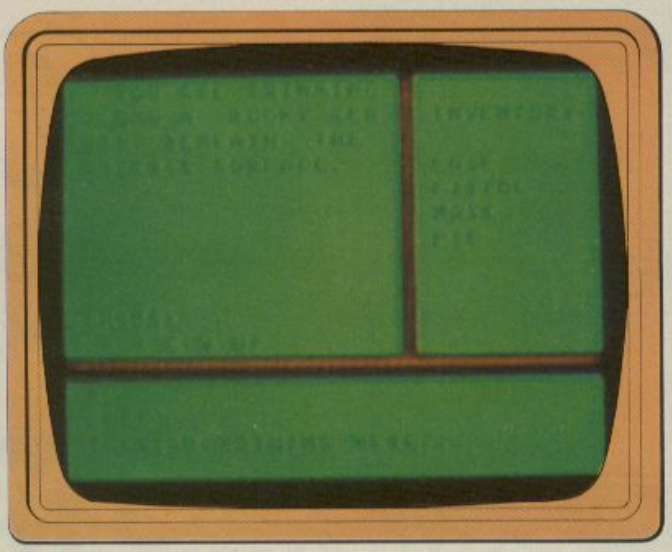
Verdict

I doubt if there'll be a next time, somehow, and it's obvious that completing the 'adventure' once will be an end to it. The Dragon is a very poor machine to attempt graphics adventures on, and when the software isn't very good either the result is inevitably disappointing.

Mike Gerrard

RATING	(/5)
Lasting appeal	1
Playability	3
Use of Machine	2
Value	2





Diamond is a gem

Name Fishy Business **System** Dragon 32 **Price** £9.95 **Publisher** Salamander Software, 17 Norfolk Road, Brighton, E Sussex **Format** Cassette **Language** Machine code **Other versions** BBC B, Oric 48K **Outlets** Mail order/Retail.

Good old Dan Diamond, Salamander's well-known private investigator, is back. I found the final part of the trilogy (Franklin's Tomb and Lost in Space are parts one and two) instantly appealing, occasionally witty and totally enjoyable.

Objective

In order to successfully complete the game, you'll need to track down who asked for your help way back in Franklin's Tomb. You must then discover their problem and solve it.

The whole adventure is in text only, but the program has that certain extra sparkle that others lack. The casefile that accompanies the package gives you the story so far. Also in the file are 20 or so drawings to add ideas to your imagination.

In play

The screen display is formatted — an idea carried over from the previous adventures. An inventory is always displayed, saving you time and effort, plus the locations and the available exits. The bottom three lines on screen are yours and the program's responses — which aren't immediately cleared.

Opening with the tune *Messing about on the River*, the program begins on a mini desert island. It's big enough for a couple of steps in either direction, but no more.

On your desert paradise you will find not radio's Roy Plomley or Robinson Crusoe but the spacecraft you landed in. The rocket booted you out onto the sand — presumably for the awful puns, or the ham acting. No amount of pleading or any threats of violence or vandalism to the spacecraft will get you back inside.

Not surprisingly, there are plenty of red herrings (and some blue kippers) in the game, and it's easy to get totally lost. It's vital to draw a map as you go along, though the addition of extra levels can make this a confusing task. The easiest way around this is to make a separate map for each level.

There isn't any HELP facility in the program, but for any intrepid investigator who ends up stuck, Salamander is offering a help sheet.

The program does take a short time to respond to your commands but it's only a matter of seconds at the most. Perhaps my brain isn't quick enough, but I found I needed a fair amount of time to sort out what was a clue and what was bogus.

There is a save game facility so you can easily pick up from where you left off.

Verdict

After many nights slaving away, I've only got about halfway through, but I'm still looking forward to solving the rest. A great problem, excellent value for money. **Jim Ballard**

RATING	(/5)
Lasting appeal	5
Playability	4
Use of Machine	5
Value	5

NEW RELEASES FOR THE DRAGON 32/64 FROM SALAMANDER SOFTWARE

TURTLE GRAPHICS

This program has been designed to provide a method of drawing pictures with your computer which is both fun and educational, and yet simple enough to be enjoyed by the young or inexperienced computer user and the enthusiast alike.

Pictures are drawn by telling the "turtle" to move forward and turn so that it traces a picture on your TV screen or 4 colour printer/plotter.

Powerful "repeat" and "word library" facilities allow you to build up new commands as you progress, and you can save your "word library" on cassette tape or floppy disc.

The end result of using a system such as this is an increased knowledge of geometry, and a basic understanding of simple programming, making the program an ideal educational tool for all ages.

- Snappy 32 page manual included.
- Runs from cassette or disc (using either Dragon Data DOS or Premier Microsystems DOS).
- Simple command structure.
- Repeat command sequences – can be nested to 32 levels.
- "Word" definition – can be nested to 30 levels.
- Powerful "word library" handling.
- Save and load library using cassette or disc.
- Dynamic editing of command strings and word library.
- Scaling and stretching commands.
- Will draw pictures on 4 colour printer/plotter (TRS-80 GCR115,MCP-40, or compatible plotter).

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DRS also has an extremely flexible report generator, allowing for anything from printing of labels to paged reports.

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- *Each record may contain a maximum of 480 characters, 26 alphanumeric fields and 10 numeric fields.*
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- *Comparative searches on numeric fields.*
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- *User definable report generator.*
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- *Disc files require Dragon Data DOS.*

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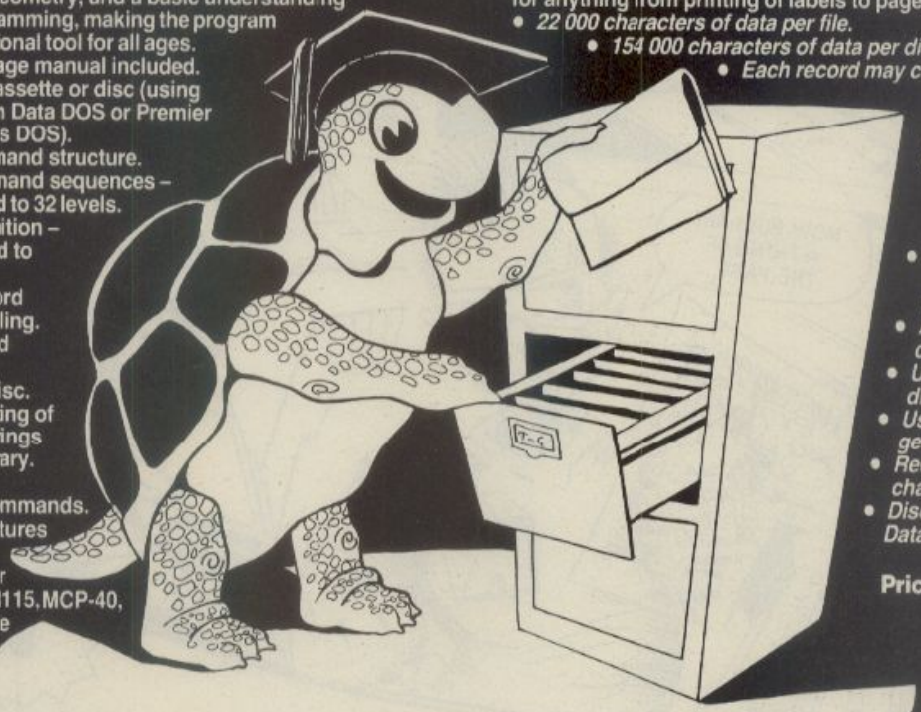

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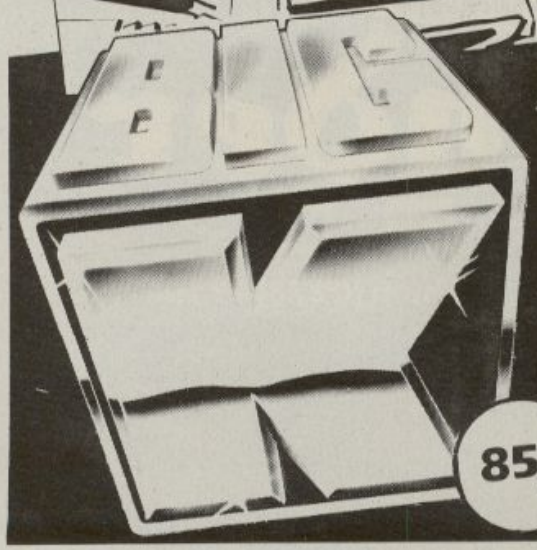

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PCN PROGRAMS: SPECTRUM

BATTLE STATIONS

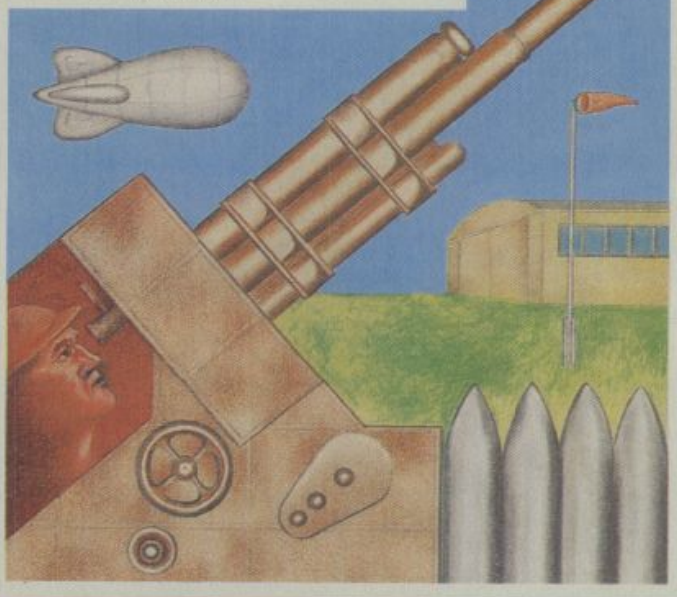
Title:	Battle Stations
Machine:	ZX Spectrum
Language:	ZX Basic
Application:	Game
Author:	Robert Higgins

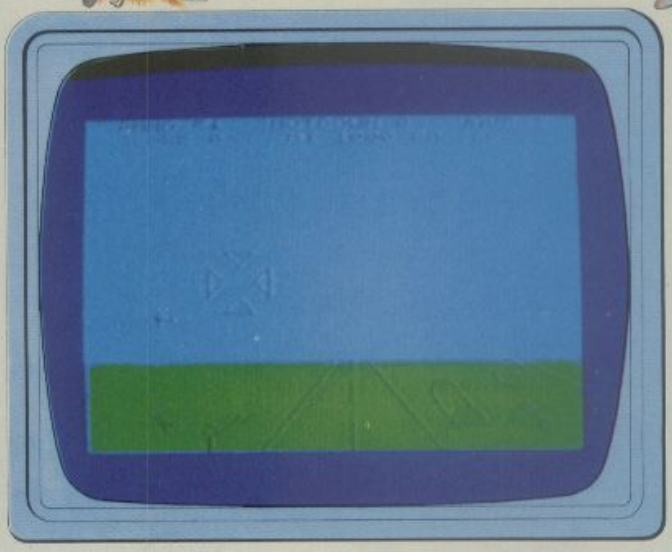
This Spectrum game from Robert Higgins of Stoke Poges in Bucks takes you back to the '40s. You take the position of a pilot in the NAF (National Air Force). Unfortunately, due to your terrible luck and awful flying skills, you have been demoted to the lowest possible rank and given the task of manning the Anti Aircraft guns.

Your only hope of achieving your lost rank and status is to shoot down as many enemy aircraft as possible. To help in this task you are put in charge of the new computer assisted sighting system (code named Blackcurrent).

Using your intimate knowledge of computers you are able to tinker with the program by a) Increasing 10 in line 2010 to allow you more time and b) Decrease (or increase) the 'diff' in lines 6 and 9003. These hints should allow you to reach your goal (the officers mess) in time for dinner.

3	Gosub and define the graphics characters.
4	Gosub and print introduction and instructions.
5-9	Set up variables and screen colours.
10	Gosub to draw runway and airfield.
100-125	Delete the sight using x and y as the horizontal and vertical positions.
130-165	Scan the keyboard and update the sight coordinates accordingly.
180-190	Delete the enemy aircraft.
195-230	Redraw the sight using UDGs (User Defined Graphics).





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Remember, though, it must be your own work, not previously published elsewhere.

```
  1 REM "BATTLE STATIONS"
  2 REM BY ROBERT HIGGINS
  3 GO SUB 5000
  4 GO SUB 4000
  5 POKE 23658,0: LET y=16: LET x=11:
  6 LET diff=.2: LET num=10: LET ax=3:
LET ay=INT (RND*26)
  8 LET score=0: LET hiscore=1000: LET
A$="HIGGINS": LET s$="WING COMMANDER": L
ET ammo=100:
  9 LET wave=0: LET lag=0: LET shot=0:
BORDER 1: PAPER 5: INK 0: CLS
 10 GO SUB 8000
 102 PRINT AT x-1,y;"  "
 105 PRINT AT x,y-1;"  "
 110 PRINT AT x+1,y-1;"  "
 115 PRINT AT x,y+2;"  "
 120 PRINT AT x+2,y;"  "
 125 PRINT AT x+1,y+2;"  "
 130 IF INKEY$="p" AND y<29 THEN LET y=
y+1: PRINT AT x,y;"  "
 135 IF INKEY$="P" AND y<29 THEN LET y=
y+2: PRINT AT x,y;"  "
 140 IF INKEY$="o" AND y>2 THEN LET y=y
-1
 145 IF INKEY$="O" AND y>2 THEN LET y=y
-2
 150 IF INKEY$="z" AND x<12 THEN LET x=
x+1
 155 IF INKEY$="Z" AND x<12 THEN LET x=
x+2
 160 IF INKEY$="q" AND x>2 THEN LET x=x
-1
 165 IF INKEY$="Q" AND x>2 THEN LET x=x
-2
 180 PRINT AT INT ax,INT ay;"  "
 190 PRINT AT INT ax+1,INT ay;"  "
 195 INK 0
 200 PRINT AT x-1,y; OVER 1;"a"
 210 PRINT AT x,y-1; OVER 1;"g"
          x+1,y-1; OVER 1;"b"
```

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– WHAT MICRO, Sept. 1983

"This is the best arcade game yet available for the ORIC. The graphics and animation are superb".

– ORIC OWNER, Sept 1983

As fleet commander in the Xenon space academy, you must protect your home planet Radon from the Aards, Paratrons and the Zorgon battle star! This 100% machine code game features the smoothest, meanest arcade action around!

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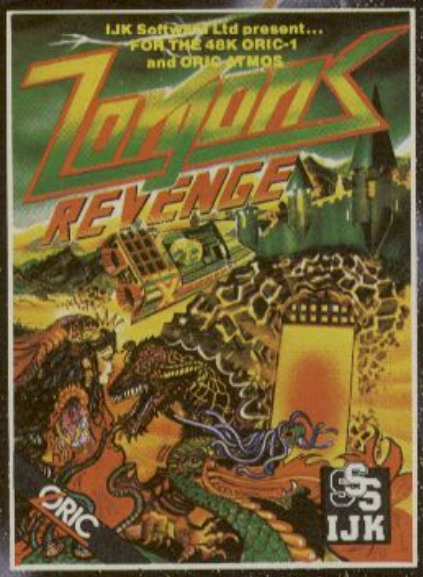

ZORGONS REVENGE

The second in the Xenon trilogy, written by the same author as Xenon-1, and continuing the high standard of excellence. Zorgons Revenge is well on its way to repeating the success of Xenon-1, and is again receiving rave reviews.

"This game certainly is the best arcade style effort I have yet seen on the ORIC. The graphics are superb...the author deserves praise...and I was impressed with the ease with which the game loaded, even though the cassettes contained 'fast' versions only". – PERSONAL COMPUTER WORLD GAMES SPECIAL, 1984

"The animation is smooth and detailed... this will be a solid gold hit". – COMPUTER CHOICE, Feb. 1984

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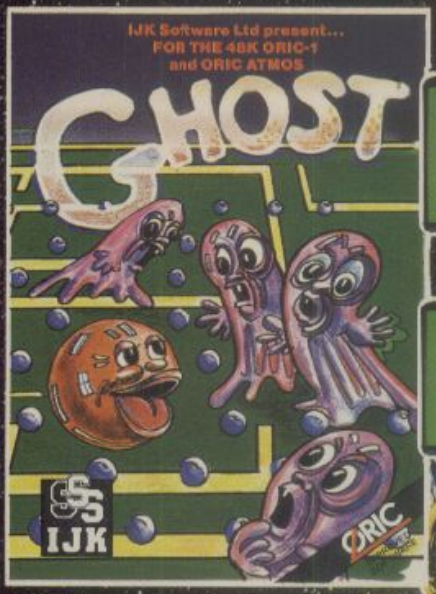

GHOST GOBBLER

In this superb version of the record breaking arcade game, you must guide the muncher around the screen, eating the dots to gain points. Eating the power pills enables you to chase and eat the ghosts, gaining bonus points. This all-action machine code favourite features ghosts, muncher, power pills, ghost box, tunnel, fruits, hall of fame, smooth action, etc., etc.
For the 48K ORIC-1 and ORIC ATMOS £7.50 inc.

PROBE 3

In this tremendous machine code arcade game, the aliens have you cornered. To survive you must destroy the fighters and evade their approaching plasma bolts and missiles. Features superb graphics, smooth action, hall of fame, etc., etc.
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GREEN CROSS TOAD

Help the toad across the road avoiding the traffic, then help him cross the river on the logs and turtles to reach the safety of the lily pads. This machine code version of the popular arcade game features lanes of traffic, logs, diving turtles, jumping toad, snakes, flies, tunes, hall of fame, etc., etc.
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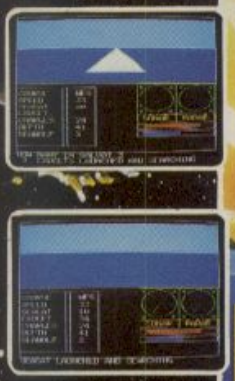

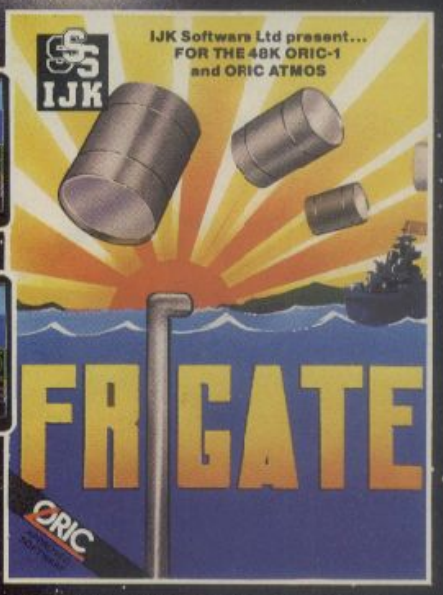

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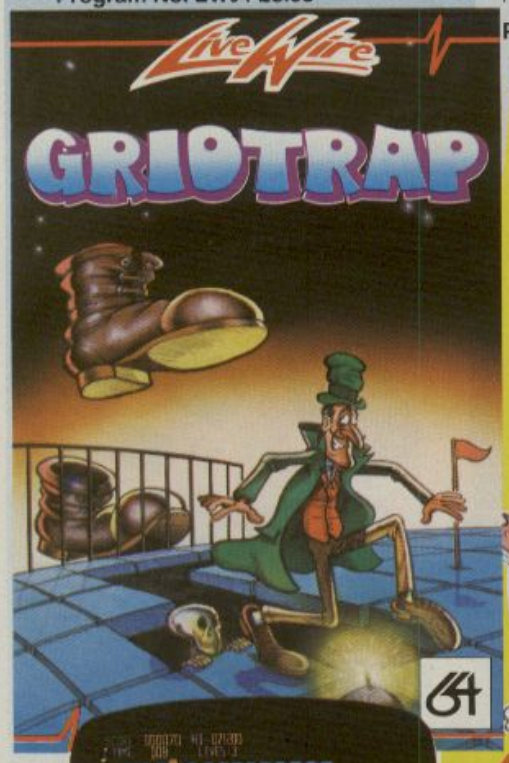
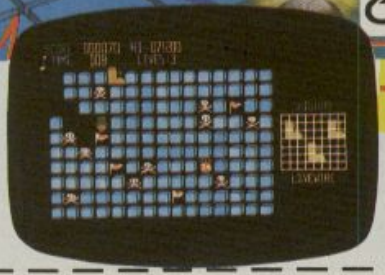
TRIAD 64





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BATTLE STATIONS

240-241	Fire the Ack Ack guns and check for a hit.
242	Check ammo. If there is none left then go to routine for end of game.
245-247	Get a new random position for the enemy aircraft and check it.
248	Make aircraft movement sound.
250	Update the horizontal position of the aircraft by the difficulty.
260	Check whether the aircraft has flown past, if so the next plane.
300-305	Print the aircraft onto the screen.
310-315	Update the screen information such as score, number of waves *etc.*
999	Continue the game.
1000-1040	Enemy plane hit, explosion routine. In line 1000 the two graphics characters at the end of the line are code 137 and 134. The characters at the end of 1010 are 134 and 137.
1050	Select new start position for approaching enemy.
1060-1070	Update the score according to how close the hit was.
1073	Get some more ammo.
1074	Update and check the number of shots fired.
1075-1080	Reset the border colour. Then return.
2000-2020	Plane has flown past check for ten planes.
4000-4999	Print the scenario and instructions.

```
 220 PRINT AT x,y+2; OVER 1;"i"
 225 PRINT AT x+2,y; OVER 1;"kl"
 230 PRINT AT x+1,y+2; OVER 1;"j"
 240 IF INKEY$="m" THEN  FOR n=1 TO 3: B
EEP .3,-40+n: NEXT n: LET ammo=ammo-2: I
F x=INT ax AND y=INT ay THEN  GO SUB 100
0
 241 IF INKEY$="M" THEN  FOR n=1 TO 3: B
EEP .3,-40+n: NEXT n: LET ammo=ammo-2: I
F x=INT ax AND y=INT ay THEN  GO SUB 100
0
 242 IF ammo<=0 THEN  GO TO 7000
 245 LET ay=ay+INT (RND*3)-1
 246 IF ay<3 THEN  LET ay=ay+1
 247 IF ay>27 THEN  LET ay=ay-1
 248 BEEP .025,-INT (RND*40)
 250 LET ax=ax+diff
 260 IF ax>15 THEN  GO SUB 2000
 300 INK 1: PRINT AT INT ax,INT ay; OVER
 1;"ab":
 305 PRINT AT INT ax+1,INT ay; OVER 1;"c
d":
 310 INK 0: PRINT AT 1,2;"SCORE:";score:
 PRINT AT 0,2;"AMMO:";ammo: PRINT AT 1,2
1;"PASSED:";lan: IF ammo<=99 THEN  PRINT
 AT 0,9;" ": IF ammo<=9 THEN  PRINT AT 1
,8;" "
 315 PRINT AT 0,11;"SHOTDOWN:";shot: PRI
NT AT 0,24;"WAVE:";wave+1: PRINT AT 1,13
;"HI:";hiscore
 999 GO TO 100
1000 PRINT AT x,y; OVER 1;"ab": PRINT ;
OVER 1; FLASH 1;AT x,y; INK 2; PAPER 6;"
  "
1010 PRINT AT x+1,y; OVER 1;"cd": PRINT
; OVER 1; FLASH 1;AT x+1,y; PAPER 6; INK
 2;"  "
1030 FOR n=1 TO 10: OUT 254,RND*7+16: OU
T 254,RND*7: NEXT n
1040 PRINT AT x,y;"  ": PRINT AT x+1,y;"
  "
1050 LET ax=3: LET ay=INT (RND*26)
1060 IF x<=7 THEN  LET score=score+200
1070 IF x>7 THEN  LET score=score+100
1073 LET ammo=ammo+7
1074 LET shot=shot+1: IF shot>=num THEN
 GO SUB 9000
1075 BORDER 1
1080 RETURN
2000 LET lan=lan+1
2010 IF lan>=10 THEN  GO TO 7000
2015 LET ax=3: LET ay=INT (RND*26)
2020 RETURN
4000 REM INTRO
4001 PAPER 0: INK 7: BORDER 0: CLS
4005 BEEP .25,10: BEEP .25,20: PRINT AT
1,9; INVERSE 1;"BATTLE STATIONS!";AT 3,4
;"ab";AT 4,4;"cd";AT 3,15;"BY";AT 5,9;"R
OBERT HIGGINS";AT 3,27;"ab";AT 4,27;"cd"
4010 PRINT AT 9,0; INVERSE 1;"SCENARIO:"
: PRINT  INVERSE 0;"YOU ARE A FIGHTER PI
LOT          PATROLLING THE SKIES ABOVE Y
OUR AERODROME. IT IS BEING ATTACKED BY E
NEMY FIGHTER-BOMBERS. IT IS YOUR TASK TO
 STOP THEM FROM      FLYING PAST YOU TO B
OMB THE      AERODROME. IF TEN FLY PAST Y
OU, YOU WILL HAVE FAILED YOUR          MISS
ION!"
4012 PRINT '''"  PRESS ANY KEY TO CONTINU
E"
4013 IF INKEY$="" THEN  GO TO 4013
4015 POKE 23692,255: PAUSE 0: CLS : PRIN
T ' INVERSE 1;"CONTROLLING YOUR SIGHT:":
 PRINT AT 4,4;"USE "; INVERSE 1;"O"; INV
ERSE 0;" TO MOVE LEFT ) USE": PRINT AT 5
,23;")": PRINT AT 6,4;"USE "; INVERSE 1;
"P"; INVERSE 0;" TO MOVE RIGHT) SHIFT";
PRINT AT 7,23;")": PRINT AT 8,4;"USE ";
INVERSE 1;"Q"; INVERSE 0;" TO MOVE UP
) FOR +"
4016 PRINT AT 9,23;")": PRINT AT 10,4;"U
SE "; INVERSE 1;"Z"; INVERSE 0;" TO MOVE
 DOWN ) SPEED": PRINT AT 13,4;"USE "; IN
VERSE 1;"M"; INVERSE 0;" TO FIRE GUNS":
PRINT AT 17,4;"PRESS ANY KEY TO CONTINUE
"
4017 IF INKEY$="" THEN  GO TO 4017
4020 CLS : PRINT ' INVERSE 1;"ATTACK WAV
ES:": INVERSE 0: PRINT "EACH WAVE CONSIS
TS OF TEN ENEMY PLANES. EACH TIME YOU SH
OOT DOWNTEN PLANES A NEW WAVE BEGINS.
EACH WAVE IS HARDER TO SHOOT     DOWN THA
N THE LAST!"
4023 PRINT '' INVERSE 1;"SCORING:": PRIN
T "YOU SCORE 200 IF YOU SHOOT A     PLANE
 UP HIGH, BUT ONLY 100 DOWNLOW. EACH TIM
E YOU SHOOT DOWN ANATTACK WAVE YOU GET A
 BONUS!"
```

66 ►

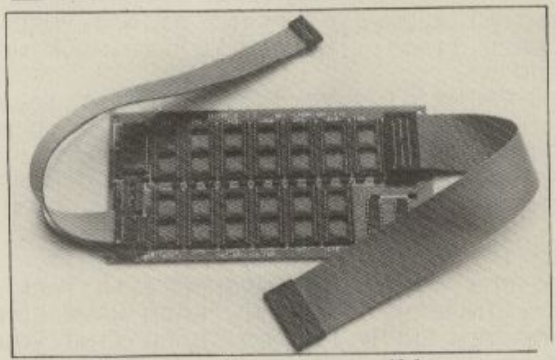
PCN PROGRAMS: SPECTRUM

BATTLE STATIONS

```
4025 PRINT "";: INVERSE 1;"END OF GAME:":
 PRINT "THE GAME ENDS WHEN TEN AIRCRAFT
FLY PAST OR WHEN ALL AMMO IS    SPENT"
4030 PRINT "    PRESS ANY KEY TO BEGIN"
4035 PAUSE 0
4040 BEEP .25,10: BEEP .25,20
4999 RETURN
5000 REM GRAPHICS
5010 DATA 0,0,0,1,1,15,0,3
5011 RESTORE 5010
5012 FOR n=0 TO 7: READ j
5015 POKE USR "a"+n,j: NEXT n
5020 DATA 0,0,0,0,0,224,0,128
5021 RESTORE 5020
5022 FOR n=0 TO 7: READ j
5025 POKE USR "b"+n,j: NEXT n
5030 DATA 5,7,255,97,3,1,0,0
5031 RESTORE 5030
5032 FOR n=0 TO 7: READ j
5035 POKE USR "c"+n,j: NEXT n
5040 DATA 64,192,255,6,128,0,0,0
5041 RESTORE 5040
5042 FOR n=0 TO 7: READ j
5045 POKE USR "d"+n,j: NEXT n
5050 DATA 255,64,32,16,8,4,2,1
5051 RESTORE 5050
5052 FOR n=0 TO 7: READ j
5055 POKE USR "e"+n,j: NEXT n
5060 DATA 255,2,4,8,16,32,64,128
5061 RESTORE 5060
5062 FOR n=0 TO 7: READ j
5065 POKE USR "f"+n,j: NEXT n
5070 DATA 128,192,160,144,136,132,130,12
9
5071 RESTORE 5070
5072 FOR n=0 TO 7: READ j
5075 POKE USR "g"+n,j: NEXT n
5080 DATA 1,3,5,9,17,33,65,129
5081 RESTORE 5080
5082 FOR n=0 TO 7: READ j
5085 POKE USR "i"+n,j: NEXT n
5090 DATA 129,130,132,136,144,160,192,12
8
5091 RESTORE 5090
5092 FOR n=0 TO 7: READ j
5095 POKE USR "h"+n,j: NEXT n
5100 DATA 129,65,33,17,9,5,3,1
5101 RESTORE 5100
5102 FOR n=0 TO 7: READ j
5103 POKE USR "j"+n,j: NEXT n
5110 DATA 1,2,4,8,16,32,64,255
5111 RESTORE 5110
5112 FOR n=0 TO 7: READ j
5115 POKE USR "k"+n,j: NEXT n
5120 DATA 128,64,32,16,8,4,2,255
5121 RESTORE 5120
5122 FOR n=0 TO 7: READ j
5125 POKE USR "l"+n,j: NEXT n
5130 DATA 18,84,169,114,252,249,252,114
5131 RESTORE 5130
5132 FOR n=0 TO 7: READ j
5135 POKE USR "m"+n,j: NEXT n
5200 RETURN
7000 REM END
7006 PRINT AT 0,2; INK 1;"AMMO:";ammo: P
RINT AT 1,21; INK 1;"PASSED:";lan
7007 FOR i=1 TO 5: FOR j=20 TO 40 STEP 5
7008 BEEP .005,j: NEXT j
7010 FOR j=40 TO 20 STEP -5
```

69 ►

ROM extension board for the BBC Micro



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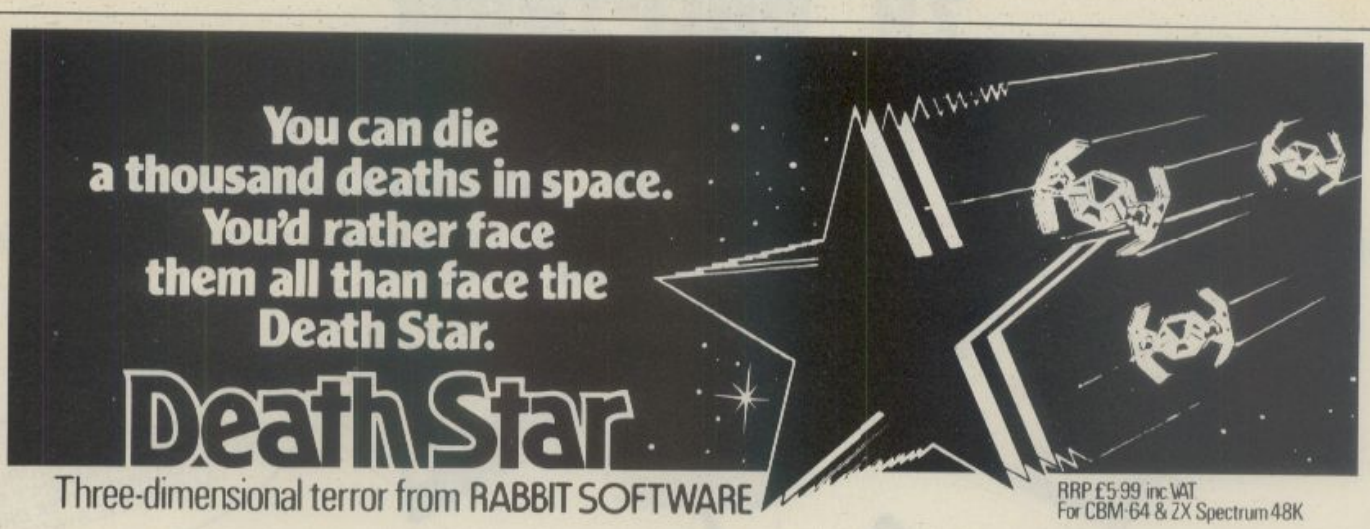

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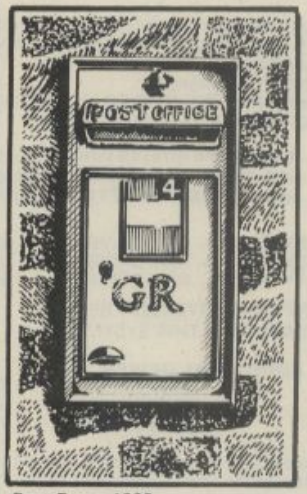

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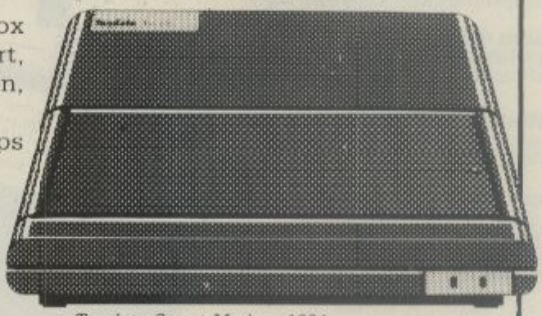
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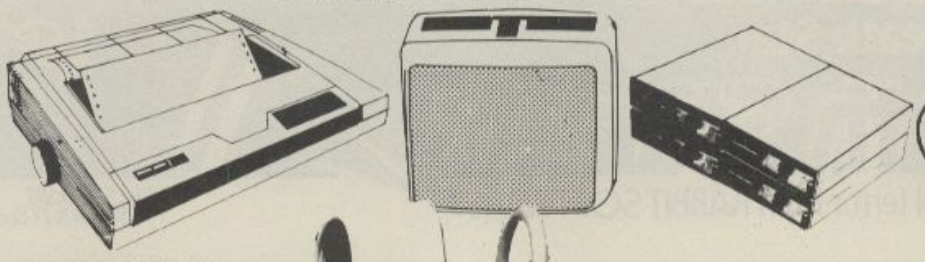

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★ SP-DOS users Reg. System keeps you posted on all future updates
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PRINTER INTERFACE Purchasing Options	FARALLEL	SERIAL (Please tick cable required)	PRICE	TOTAL
			£	£
1. Printer Interface inclusive of Cable and Driver Software			47.00	
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TEL (Day) _____ TEL (Eve) _____

Please send me full list of Word Processing Packages available from you. PCN 16/3

BATTLE STATIONS

5000-5200	Set up the user defined graphics.
7006	Post mortem on your performance.
7007-7015	End of game beeps.
7020-7065	Set the aerodrome on fire.
7070-7075	Oh dear! you have failed.
7084-7092	Work out the rank to be awarded.
7093	Print rank.
7094-7097	If high score then get and print name.
7098-7999	Prompt for another game then reset variables and replay.
8000-8999	Draw the aerodrome. Note that the spaces in line 8050 are inverse spaces.
9000-9020	Jolly good, you've completed a wave, set up the variables for next.

```
7015 BEEP .005,j: NEXT j: NEXT i
7020 BEEP .05, 50: BEEP .05, 40: BEEP .0
5,-50: BEEP .05,-40: PRINT AT 19,28; PAP
ER 6; FLASH 1; INK 2;"m"
7025 BEEP 0.05,-50: BEEP .05,-40: BEEP .
058,-50: BEEP .05,-40: PRINT AT 19,4; PA
PER 6; FLASH 1; INK 2;"m"
7030 BEEP 0.05,-50: BEEP .05,-40: BEEP .
05,-50: BEEP .05,-40: PRINT AT 19,23; PA
PER 6; FLASH 1; INK 2;"m";AT 18,23; PAPE
R 6; INK 2; FLASH 1;"m"
7035 BEEP 0.05,-50: BEEP .05,-40: BEEP .
05,-50: BEEP .05,-40: PRINT AT 17,27; PA
PER 6; FLASH 1; INK 2;"m"
7040 PRINT AT x-1,y;"  "
7045 PRINT AT x,y-1;"  "
7050 PRINT AT x+1,y-1;"  "
7055 PRINT AT x,y+2;"  "
7060 PRINT AT x+2,y;"  "
7065 PRINT AT x+1,y+2;"  "
7070 INK 0: PRINT AT 3,2; FLASH 1;"YOU H
AVE FAILED YOUR MISSION!"
7075 PRINT AT 5,10;"SCORE:";score
7084 IF score>=6000 OR score<7000 THEN
LET r$="WING COMMANDER"
7085 IF score=0 THEN  LET r$="GROUND STA
FF!!"
7086 IF score>0 AND score<1000 THEN  LET
 r$="TRAINEE PILOT"
7087 IF score>1000 AND score<=2000 THEN
 LET r$="FLT. LIEUTENANT":
7088 IF score>2000 AND score<=3000 THEN
 LET r$="SERGEANT"
7089 IF score>3000 AND score<=4000 THEN
 LET r$="CAPTAIN"
7090 IF score>4000 AND score<=5000 THEN
 LET r$="GROUP CAPTAIN"
7091 IF score>5000 AND score<=6000 THEN
 LET r$="FLIGHT OFFICER"
7092 IF score>=7000 THEN  LET r$="SQUADR
ON LEADER"
7093 PRINT AT 7,2;"YOUR RANK IS ";r$;
7094 IF score>hiscore THEN  PRINT AT 9,7
;"NEW HIGH SCORE!": LET s$=r$
7095 POKE 23658,8: IF score>hiscore THEN
  INPUT "INPUT YOU SURNAME (MAX.10)";A$:
 LET hiscore=score
7096 PRINT AT 11,9;"HI-SCORE ";hiscore
7097 PRINT AT 13,3;"BY ";s$;" ";A$
7098 PRINT AT 15,4;"PRESS A KEY TO PLAY
AGAIN"
7099: PAUSE 0: IF INKEY$="" THEN  GO TO
7097
7100 POKE 23658,0: LET y=16: LET x=11:
7110 LET diff=.2: LET num=10: LET ax=3
LET ay=INT (RND*26)
7120 LET score=0: LET ammo=100:
7130 LET wave=0: LET lan=0: LET shot=0
BORDER 1: PAPER 5: INK 0: CLS
7999 GO TO 10
8000 REM BACKGROUND
8010 PLOT 128,47: DRAW -37,-47: PLOT 144
,47: DRAW 37,-47
8015 PLOT 0,47: DRAW 255,0
8020 PLOT 64,0: DRAW 0,8: DRAW -1,0: DRA
W 0,-8: CIRCLE 64,10,PI: PLOT 64,14: DRA
W  OVER 1;13,5: DRAW 2,0: DRAW 0,-1: DRA
W -11,-10
8025 PLOT 204,15: DRAW -16,-2,PI: DRAW -
10,14: PLOT 188,34: DRAW -10,-8,PI: PLOT
 187,34: DRAW 18,-19: DRAW 19,-2
8030 PLOT 232,33: DRAW -16,0,PI: DRAW 16
,0: PLOT 216,33: DRAW -6,4: PLOT 226,39:
 DRAW -16,-2,PI
8035 PLOT 232,12: DRAW 8,2: DRAW 1,-2: D
RAW -7,-2: DRAW -2,2: PLOT 236,13: DRAW
0,2: DRAW 1,0: DRAW 0,-2
8040 PLOT 234,12: DRAW -10,10: DRAW 2,2:
 DRAW 10,-11: PLOT 226,21: DRAW -8,-5: D
RAW 1,-2: DRAW 9,3
8041 PLOT 136,47: DRAW 0,-5: PLOT 136,35
: DRAW 0,-10: PLOT 136,15: DRAW 0,-15
8042 PLOT 42,12: DRAW -10,10: DRAW 2,2:
DRAW 10,-11: PLOT 34,21: DRAW -8,-5: DRA
W 1,-2: DRAW 9,3
8043 PLOT 42,12: DRAW -10,10: DRAW 2,2:
DRAW 10,-11: PLOT 34,21: DRAW -8,-5: DRA
W 1,-2: DRAW 9,3
8044 PLOT 40,12: DRAW 8,2: DRAW 1,-2: DR
AW -7,-2: DRAW -2,2: PLOT 44,13: DRAW 0,
2: DRAW 1,0: DRAW 0,-2
8045 PLOT 34,20: DRAW 8,4: DRAW 3,-1: DR
AW -10,-6
8046 PLOT 226,20: DRAW 8,4: DRAW 3,-1: D
RAW -10,-6
8047 PLOT 40,47: DRAW -40,-16: PLOT 224,
47: DRAW 31,-16
8050 PRINT AT 16,0; INK 4; OVER 1; PAPER
 0;"                                "
8998 PAPER 5: BORDER 1:
8999 RETURN
9000 REM WAVES
9001 FOR n=10 TO 40 STEP 3: BEEP .05,n:
NEXT n
9002 PRINT AT 0,11; INK 1;"SHOTDOWN:";sh
ot
9003 LET wave=wave+1: LET diff=diff+.2::
 LET num=num+10: LET score=score+500*wav
e
9005 PRINT AT 5,7; INK 2: PAPER 6; FLASH
 1;"WAVE ";wave;" COMPLETED!":
9006 PRINT  INK 2; PAPER 6;AT 7,2;"PRESS
 ANY KEY TO CONTINUE!"
9007 IF INKEY$="" THEN  GO TO 9007
9008 CLS
9010 GO SUB 8000
9020 RETURN
```

PCN PROGRAMS: SPECTRUM

REBELSTAR
NEW
REBELSTAR RAIDERS
He manipulated some keys and the "MOOSEBASE" defences "Blue Print" filled the screen. The [illegible] clones and that monstrous organic computer "[illegible] COME" really did a perfect job. "STARLINGALE" and "FREEDREAM" were all he had! Now or never, Jo Capricorn thought . . . He punched the starsystems co-ordinates in the navigational computer and in a silent "Thud" [illegible] just him as the starship "STARLINGALE" jumped in to light speed. The Battle had begun.
Superb Graphics — Amazing Detail
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EMS
Apocalypse is produced under licence from the Games Workshop Ltd.

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*Distributors, Multiple Store and Retail Shop inquiries invited

HOW TO ORDER

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- ☐ NEBULA (No. Req.....)
- ☐ APOCALYPSE (No. Req.....)
- ☐ Please send details on Apocalypse and other games.

I enclose my cheque/P.O. for £.....

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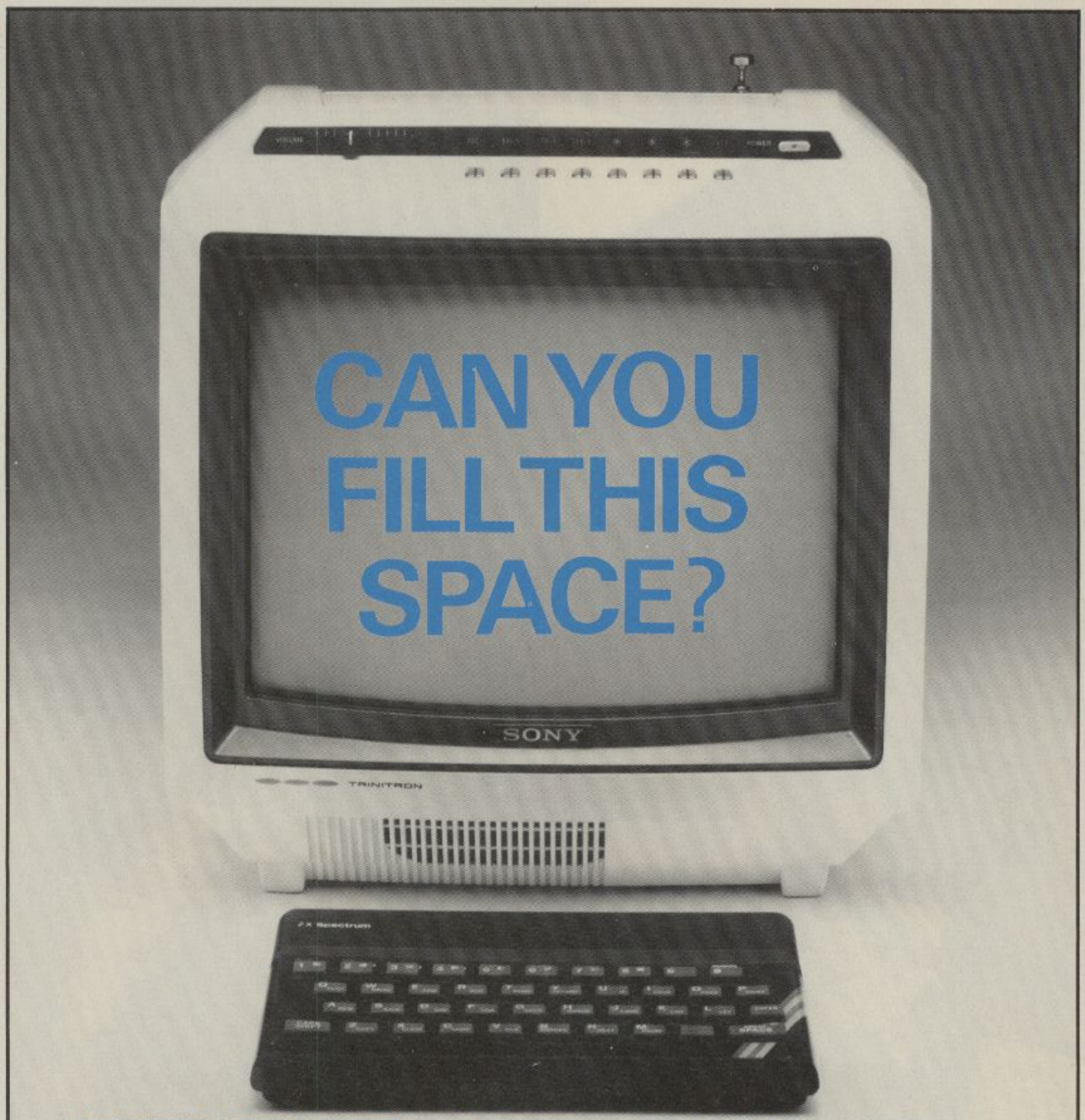
TEL: (Day) ..... TEL: (Eve).....

Please allow 7 to 28 days for details on Apocalypse and other games.



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DATABASICS

PCN Databasics is presented in three-week cycles. This week it's the turn of software packages, next week hardware, and two weeks from now, peripherals.. We can't fit all software packages in, so we've compiled a selection, giving best sellers from 100 publishers and distributors.

We confined coverage to five main types of applications: business, education, games, home and utility. All details published are the latest available.

Companies wanting to add their best-selling packages to Databasics, or wanting to update information already here, should send details to: Databasics, *Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HG.

APPLICATION Each software package is listed alphabetically by its application.

PRICE includes VAT.

MACHINE/OPERATING SYSTEM on which the best selling packages runs.

OTHER VERSIONS indicates whether or not the package runs on a different machine or operating system.

MEDIA SUPPLIED indicates in what format the package comes — either cassette, disk, or cartridge.

MAIL ORDER AVAILABLE tells you whether or not the package is available by mail order.

HARDWARE REQUIRED shows the need for special hardware, such as disk drive, joystick or printer.

PUBLISHER/DISTRIBUTOR This code refers to the distributor code table at the end of the listings, which will give the name and telephone number of the publisher/distributor.

COMMENTS — any other points of interest.

SOFTWARE

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Mail order avail.	Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge		Disk drive	Joystick	Other		
BUSINESS														
Databases	£132.25	Apple II		DB Master	48K		●		●	●			M5	Available on hard disk. Allows 1K records over 100 fields. Report generation, etc.
	£96.60	Apple III	●	PFS: File	48K		●			●			P6	Also for Apple II (£135.70). Used in tandem with PFS (£96.60).
	£217.35	Apple IIE		VisiTrend + VisiPlot	64K		●		●	●			R6	Also for CP/M. Graphic representation of data. Compatible with VisiCalc.
	£10.30	BBC Model B		Filer	16K	●			●				M7	Allows searching, sorting, saving & recovery of data.
	£295.00	CP/M	●	InfoStar	48K		●			●			M10	Also on IBM PC, MS-DOS. Integrates with WordStar and Calcstar.
	£499.74	CP/M		dBase II	48K		●		●	●			E1	Micro DBMS. Can be used for high level programming for a range of applications.
	£557.50	CP/M		Superfile	56K		●		●	●			S4	Multi-file database giving applications package information.
	£1,840	CP/M	●	MDBS II	64K		●						T2	Also on CP/M-86, MS-DOS, Turbo DOS, Unix and Xenix. Mainframe-like facilities.
	£29.32	Newbrain		Database 40/5	30K	●			●				E2	Also on the Memotech.
	£99.95	Commodore 64		Magpie	64K			●	●	●		●	A3	User-programmable database manager.
	£39.95	Commodore 64	●	Home Filewriter	64K		●			●			D7	Also for Atari. Database design system.
	£68.42	Newbrain		Invoice & Credit Program	32K	●			●				E2	The invoice program allows you to put in your own information and design invoice.
	£29.32	Newbrain		Database 40/S	32K	●			●				E2	Information gatherer, stores large quantity of information & can be interrogated at will.
	£684.25	Sirius, IBM PC, MS DOS	●	Tomorrow's Office	128K		●		●	●			S11	Complete applications generator.
Graphics	£471.50	16-bit machines		Micro-Graphpower	128		●		●	●		●	I2	Needs plotter. Business graphics which plots business data.
	£120.75	Apple III	●	Business Graphics	48K		●			●			P6	Also on Apple II (£125.35). Supports range of plotters & pie-charts, etc.
	£149.50	IBM PC	●	Graph Magic	96K		●		●	●			F1	Also on Apple II, III. Displays files graphically. *PCN* issue 1.
Management	£569.25	Commodore 8000		The Administrator	96K		●		●	●			S11	Complete applications generator. No programming required.
Financial Planning	£44.85	Commodore Pet		Busicalc	16K	●			●				S5	Also on Hytec & ICL PC. 96K version available. Helps decide on financial strategy.
	£345.00	CP/M		Bottom-Line Strategist	48K		●		●	●			P4	A business/project forecasting program. Allows user to test business assumptions.
	£281.75	CP/M	●	Master Planner	64K		●		●	●			C5	Also on MS-DOS & CP/M 86. Needs 80 column printer. Upgrade of a spreadsheet.
	£343.85	CP/M		Minimodel Financial Modelling	48K		●		●	●		●	M5	Needs 80 column screen. Model consolidation facility, colour option.
	£182.85	CP/M	●	Multi-Plan	48K		●		●	●			P4	Also on PC-DOS, Cromix, Fortune, Corvus & Sirius. Second generation spreadsheet.
	£218.50	CP/M		SP2020	48K		●		●	●			G2	Forecast effects of proposed actions. Aid to management decision-making.
	£172.50	CP/M		Supercalc	128K		●			●			A1	Electronic worksheet, representing a large flexible accounting work pad.
	£178.25	CP/M		T-Maker	48K		●		●	●			X1	Utility for analysis & presentation of numerical data & test material.
	£224.25	MS-DOS		Pulsar Business System	128K		●			●			A1	Consists of eight integrated packages & provides commercial accounting functions.
	£339.25	Osborne	●	PADA/C	64K		●		●	●			P2	Also on CP/M. Two systems. Incomplete records accounting, time/cost recording.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
	£632.50	UCSD-P System		Microfinesse	128K		●		●	●			P5	Financial modelling program for businessmen.
Integrated Software	£569.25	IBM PC		Context MBA	256K		●			●			B2	Integrated spreadsheet modelling, graphics, WP, database & communications.
	£908.50	MS DOS	●	Silicon Office	256K		●			●			F1	Also on Sirius & Victor. Comprises word processor database management system.
Payroll	£287.50	Apple II	●	Tabs Payroll	48K		●		●	●			T3	Also on CP/M & MS-DOS (64K). Up to 2000 employees, nine pay schemes.
	£80.50	Apple II		Statutory Sick Pay (SSP)	48K		●		●	●			H1	Also on Spectrum. Does all SSP calculations.
	£977.50	CP/M	●	Powerday	48K		●			●			O2	Also on MP/M and MS-DOS. Integrates with Omicrons nominal ledger. Handles SSP.
Project Management	£747.00	IBM PC	●	Micronet	48K		●			●			T2	Also on ICL PC, Sirius, Superbrain, Apple II, & others. Critical path analysis.
Project Planning	£1,150.00	Commodore 8000		Hornet	32K		●			●			C3	Has eight optional variants (all eight £4,025). Network logic & variety of screen display.
Sales Ledger	£287.50	Apple II	●	Tabs Sales Ledger	48K		●		●	●			T3	Also on CP/M & MS-DOS. Part of integrated system. 300 analysis codes.
	£805.00	CP/M	●	Powersales	48K		●			●			O2	Also on MP/M & MS-DOS. Multi-user system based on mainframe software.
	£339.25	Apple II		Sales Ledger	48K		●		●	●			H1	Supports 700 & accounts. Direct posting, credit control & 100 analyses.
	£325	DEC Rainbow 100	●	Sales Ledger System	64K		●		●	●			D2	Also on DEC Mate II. Invoicing & monthly statement generating system.
	£287.50	CP/M	●	Sales Ledger	64K		●		●	●			S2	Also on CP/M 86 and MS DOS. Flexible ledger system.
Spreadsheets	£188.60	Apple II	●	VisiCalc	48K		●		●	●		●	R1	Also on Apple III, Commodore & IBM PC, etc. The classic spreadsheet.
	£44.85	CP/M		Plannercalc	64K		●		●	●		●	C5	Needs 80 column screen. Entry level system for spreadsheet planning.
	£212.75	CP/M		Super Calculator	48K		●		●	●			E1	Spreadsheet calculator.
	£396.75	CP/M	●	Micro-Plan	64K		●		●	●			B1	Also on MP/M. Spreadsheet financial planner.
Word Processing	£92.00	Apple II		Piewriter	48K		●		●	●		●	M5	Needs 80 column card. Allows entry, editing & print formatting of any text type.
	£17.25	BBC Model B		Wordsworth	32K	●	●		●	●			I7	Disk version £19.50; cheap word processing package. *PCN* Issue 33.
	£488.75	IBM PC	●	Wordcraft	128K		●		●	●			D1	Also available on Sirius, Apricot, DEC-Rainbow, Commodore 8000, 4000, 64.
	£152.95	Apple III	●	Apple Writer 2	48K		●			●			P6	Also Apple II. Has word wrap, glossary & word processing language.
	£28.50	BBC Model B		Alphabeta	32K	●			●				H3	Also available on disk. Suitable for home & business.
	£89.00	Commodore 64	●	Paperclip	64K		●		●	●			K5	Also Commodore 8000. Compatible with WordPro & SpellPro. *PCN* Issue 6.
	£51.75	Commodore Pet	●	Papermate +	16K	●			●				S5	Also on Commodore 64, 3, 4, & 8000. Available on floppy (£53.49).
	£295.00	CP/M	●	WordStar 3.3	56K		●			●			M10	Also on IBM PC, MS-DOS. Integrates with CalcStar, InfoStar, Mail Merge, SpellStar.
	£316.25	CP/M	●	Spellbinder	48K		●		●	●			E1	Also on Oasis. Word processing & office management system.
	£225.00	IBM PC		Easywriter II	64K		●			●			X1	Bold face & underscoring on screen. 80,000 word spell checker extra (£43.15).
	£340.40	IBM PC		VisiWord	64K		●			●		●	R6	Mail merge facility with Visi file.
	£45.42	Sharp MZ804	●	Wordpro	48K	●			●				K1	Also on MZ80B+K. Available on disk (£91.94); One of few WP packages for Sharp.
	£40.25	Memotech		Propen 32 (4)	30K	●			●			●	E2	Also for New brain — word processor.
	£49.95	Tandy TRS 80 I	●	AJ Edit	32K		●		●	●		●	M6	Also on Genie I & II. Needs printer.
EDUCATION														
Basic Course	£13.95	Texas Instruments 99/4A		Teach Yourself Extended Basic	16K	●			●				T5	Needs extended Basic module.
Business Game	£9.95	BBC Model A	●	Business Game	16K	●			●				W1	Also on Model B. Two games for economics, business & general studies, teaching.
	£5.95	BBC Model B	●	Inkosi	32K	●			●				C9	Also on Vic-20. Rule for ten years, overcoming obstacles, e.g. famines.
Chemistry	£14.38	Research Machine 380Z	●	Symbols To Moles	31K		●		●	●			H4	Also on Apple II. Practise using chemical symbols, writing & mole concept.
Graphics	£9.95	BBC Model B		Creative Graphics	16K	●			●				A9	Book available (£7.50). Designed to illustrate BBC graphics. *PCN* issue 20.
History	£20.13	Sharp MZ80A	●	Kings & Queens	48K	●			●				K1	Also on MZ80K. Facts & figures on English monarchs since 1066.
Languages	£7.95	Sharp MZ80A	●	Multilinguist	3K	●			●				S8	Also on MZ80K. A language tutor to suit all European languages.
	£9.95	Commodore 64	●	Just a Mot	32K	●	●		●	●			S16	French vocabulary.
	£9.95	BBC	●	Tense French	32K	●	●		●	●			S16	Learn, revise + test French verbs.
	£10.95	BBC/B	●	At home with Shakespeare	32K	●	●		●	●			S16	Study programs on Hamlet, Henry IV, I, Twelfth Night.
	£9.95	CMB 64	●	Open Sesame	32K	●	●		●	●			S16	Tricky spelling game — 450 words.
	£14.38	Research Machine 380Z	●	Repondez	31K		●		●	●			H4	Also on Apple II. Practising French verb formation (present tense).
	£9.20	Sharp MZ80A	●	French Conjugate	48K	●			●				K1	Also on MZ80K. Automatically conjugates regular verbs into tenses.
Mathematics	£37.89	Apple II		Bumble Plot	48K		●		●	●			P4	A set of five programs for developing graphics and maths skills. For children 8 to 13.
	£9.95	BBC Model B	●	Metrics	32K	●			●				C9	Also on Vic-20+ Spectrum. Structure of metric system, for children aged 10-15.
	£5.95	BBC Model B	●	Sequences	32K	●			●				C9	Also on Vic-20. Demonstrates number patterns.
	£8.95	BBC Model B		Argle	32K	●			●				C9	Also on Spectrum. Includes four programs designed to teach simple geometry.
	£9.95	BBC Model A	●	Algebraic Manipulations	16K	●			●				W1	Also on Model B. Includes four programs designed for use in maths teaching.
	£82.80	IBM PC		Fact Track	64K		●			●			I3	Learning basic arithmetic. Presents simple two-line sums in random order.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
	£4.95	Sharp MZ80A	●	Giant Maths	32K	●			●				S8	Also on MZ80K. Big screen figures & humorous error messages. 5 to 11 years.
	£9.20	Sharp MZ80A	●	Teach Tables	48K	●			●				K3	Also on MZ80K. Plays like game but motivates children to improve their ability.
	£5.25	Spectrum		Adding and Subtracting	16K	●			●				W2	For children aged 3-7. Three animated programs with full graphics.
	£9.20	Sharp MZ80A		Directed Numbers	48K	●			●				K3	Also on MZ80K. Teaches difficult mathematical functions.
	£5.25	Spectrum		Counting	16K	●			●				W2	Graded programs. 'Good as a first introduction to numbers.' Aimed at ages 3-6.
Meteorology	£23.00	Research Machines 380Z	●	Weather	31K		●		●	●			H4	Also on Apple II. Gives synoptic charts. Teaches elementary meteorology.
Physics	£14.38	Research Machines 380Z	●	Lenses	31K		●		●	●			H4	Also on Apple II. Illustrates formation of images by lenses using ray diagrams.
	£3.00	Sharp MZ80A	●	Physics 1 and 2	20K	●			●				D6	Also MZ80K. O' level electricity and motion.
	£28.75	CP/M	●	Touch'n'Go	48K		●		●	●			C6	Also on MS-DOS. Typing tutor for mastering numeric pad & Qwerty keyboard.
Typing	£31.05	IBM PC		Typing Tutor	64K		●			●			I3	Presents exercises for learning touch typing or for improving existing skills.
Various	£29.84	Apple II	●	Face Hanger	48K		●		●	●			P4	Also on IBM PC. Designed for children to learn computer keyboard by building up face.
	£9.95	BBC	●	Junior Word Splits	32K	●	●		●	●			S16	Word games for 8-11 year-olds.
	£37.89	Apple II		Gertrude's Secret	48K		●		●	●			P4	An educational game to teach logical thinking & planning. For children aged 6-9.
	£9.80	Atari 400	●	Jigsaw Puzzles	16K	●							T4	Also on Atari 800. Has 16 puzzles and optional difficulty.
	£9.95	BBC Model B		Tree of Knowledge	32K	●			●				A9	Interactive program teaching categorisation. Simplified information retrieval.
UTILITIES														
Card Index System	£215.05	Apple II	●	VisiDex	48K		●			●		●	R1	Also on IBM PC. Needs printer. One record/screen designed for cross referencing.
	£178.25	CP/M	●	Cardbox	48K		●		●	●		●	C6	Also on MS-DOS. Needs 24×80 VDU & 100K disk storage.
Communications	£102.35	Apple II		ASCII Express — The Professional	48K		●		●	●		●	P4	Needs RS232. Asynchronous serial communications package.
	£57.50	CP/M		Xcopy 1.0	64K		●		●	●			X1	Disk copy utility for Cromemco machines. Copies 8" or 5¼" single/double sided.
	£575	CP/M	●	Bisync AC-3780	64K		●		●	●			E1	Also on MP/M & CP/M86. Micro to mainframe comms through IBM terminal emulation.
	£117.30	IBM PC		IBM 3101 Emulation Program	64K		●			●			I3	Makes PC act as 3101 terminal provides 3270 emulations when connected to host.
	£22.43	Sharp MZ80A	●	Zen	48K	●			●				K1	Also MZ80K & B. Full Z80 editor/assembler.
	£115.00	IBM PC	●	Interlink	48K		●			●			T2	Also on Sirius, Apple II, Xerox, Osborne etc. Connects processors for downloading.
	£448.50	Apple II		Editel	48K		●		●	●		●	O1	Needs modem. A Viewdata frame word processor designed to aid data editing.
	£454.25	Apple II		Owitel	48K		●		●	●		●	O1	Needs modem. Allows access to Prestel & private viewdata systems.
	£41.40	IBM PC		Asynchronous Communications	64K		●			●		●	I3	Needs asynchronous comms adaptor. Makes PC act as asyncs comms terminal.
Debugger	£258.75	CP/M	●	Animator	64K		●		●	●			M11	Also on Unix & MS100S, interactive source level debugging tool for CIS-Cobol.
File Transfer	£132.25	CP/M		BSTAM	16K		●		●	●		●	X1	Needs common interface ports or modem access. Utility for transferring CP/M files.
Graphics	£34.50	Apple II	●	Graphic Utilities	48K		●		●	●			C1	Also for Apple IIe. Parameter driven machine code programs, high res graphics.
	£24.95	Atari		Constructor	48K		●		●	●	●		C8	Less experienced & new programmers can design animated sequences.
	£9.95	BBC Model A	●	Creative Graphics	16K	●			●				W1	Also for BBC model B.30 programs on cassette produce range of pictures & patterns.
	£50.60	CP/M		CP/M Graphics	64K		●			●			D4	Range goes up to £421.70 & conforms to GKS Graphics Standard.
Language	£488.75	CP/M	●	CIS Cobol	64K		●		●	●			M11	Also on Unix. Compact, interactive ANSI 74 standard implementation of Cobol.
	£396.00	CP/M		Fortran 80	48K		●			●			T2	Useful for scientific applications, where Pascal is inefficient.
	£210	CP/M	●	Supersoft C Compiler	48K		●		●	●			M4	Also on CP/M-86, MS/DOS, PC. DOS. Fast implementation of C.
	£114.43	Commodore 64	●	DTL-Basic Compiler	32K		●		●				D1	Also on Commodore 8000, 4000 & 3000. Also tape version on CBM 64 (£39.96).
	£253.00	CP/M	●	ProPascal	56K		●		●	●			E1	Also on CDOS. Needs two disk drives. Native code Pascal.
	£40.19	Sharp MZ80A	●	Forth	48K	●			●				K1	Also on MZ80K & Osborne. Allows implementation of Forth.
	£25	Spectrum		Hisoft Pascal	48K	●							H5	Reviewed in *PCN* week ending April 8. Pascal compiler and screen editor.
	£172.50	UCSD p-System		UCSD Pascal	48K		●		●	●			D4	Portable Pascal for systems development or commercial applications.
	£201.25	CP/M		Basic 80	48K		●		●	●			X1	Industry standard Basic.
	£121.90	CP/M	●	C Basic	64K		●			●			X1	Commercial Basic. Also on CP/M86 (£265.65).
	£213.00	Any Z80		X-Basic	48K		●			●			X1	Built-in matrix functions. Supports MP/M record locking. Graphics option.
Operations	£59.80	CP/M		Operating Guide	48K		●		●	●			E1	Works by putting CP/M to sleep & replacing it with operating environment.
Operating system	£22.94	Apple II		Fasdos	48K	●			●				P4	Disk operating system for Apples which speeds up location of binary & Applesoft files.
	£277	8086 micro		Concurrent CP/M-86	48K		●			●			T2	Enables four separate tasks to run in a single user station.
	£126.50	8080 and Z80 micros		CP/M 2.2	64K		●			●			D4	O/S for 8-bit micros with over 1.5 million users.
	£379.50	8080 and Z80 micros		MP/M	64K		●			●			D4	Multiuser, multitasking. Features record & file locking, date & time stamping etc.
	£210.80	8086 and 8088 micros		CP/M-86	64K		●			●			D4	Manages up to one megabyte of RAM & allows up to 128 megabytes of on-line storage.

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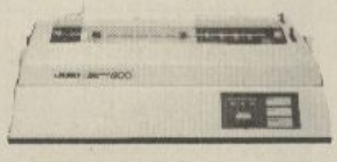

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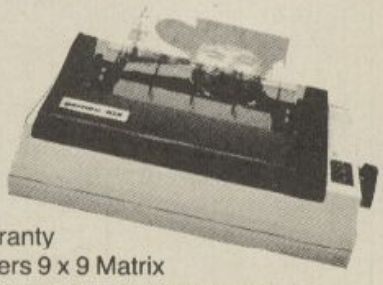

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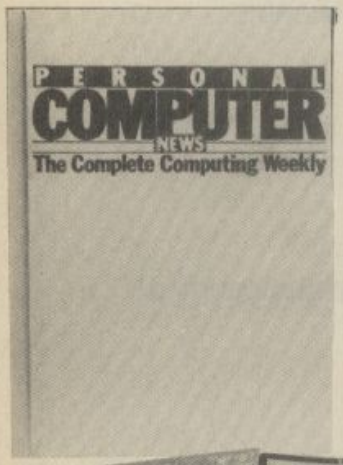

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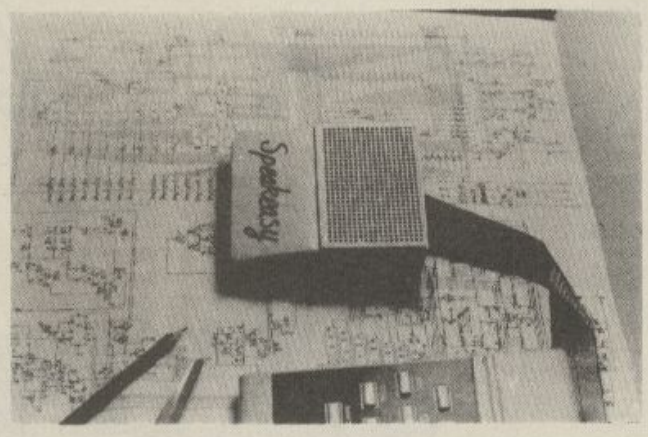

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	£379.50	CP/M	●	Last One	64K		●		●	●			S3 Also on MS-DOS and Apple DOS.
	£569.25	Commodore 8000		The Administrator	32K		●		●	●			S11 Applications generator. No programming involved.
	£684.25	IBM PC	●	Tomorrow's Office	128K		●		●	●			S11 Also on Sirius, Victor & MSDOS. Complete applications generator.
Programming Tool	£18	Apple DOS		MUM	48K		●		●	●			H8 Macro Utilities Master is a business programming aid.
	£5.95	Dragon 32		Extended Commands	32K	●			●				M15 Machine code utility giving 12 new functions controlled by 27 command words.
	£287.50	CP/M	●	Fileshare	48K		●		●	●			M11 Also on MP/M. Bank-switched memory or CP/M network.
	£7.95	Dragon 32		Dragon Selection 2	32K	●							D3 Four utility programs which can be listed to see how the program works.
	£4.00	Sharp MZ80A	●	Tape Copier	48K	●			●				D6 Back-up copier for BASIC and machine code.
Testing Tool	£95.82	CP/M 80	●	Diagnostics II	32K		●		●	●			M4 Also on CP/M-86 and MS/DOS. Tests systems.
Time Recording	£862.50	Commodore 8000	●	Minuteman	32K		●			●			C4 Also on Commodore 4000. Time recording system. Can produce range or reports.
	£402.50	CP/M-86	●	Time Recording System	64K		●		●	●			D2 Also on CP/M 80. Control over man/hour expenditure by job or account number.
Utilities	£23.00	Apple II	●	Computech Utilities Disk II	48K		●		●	●			C1 Also on Apple IIe. Error checking, copying. Single disk copy. Label disk.
	£79.35	CP/M		Visa 80	64K		●		●	●		●	M13 Constructs a menu-driven sytem to your design.
GAMES													
Arcade	£5.50	Spectrum		Zip Zap	48K	●			●				I6 Concerns a non-stop robot which avoids aliens, *PCN* issue 27.
	£7.50	Spectrum		Halls of the Thing	48K	●			●				C11 Pretty straightforward — you avoid and kill monsters.
	£9.99	Commodore Vic-20		Night Crawler	5K	●			●				R2 'A Centipede style game. Fast action, graphics and sound effects'.
	£5.50	Spectrum	●	Arcadia	16K	●			●				I6 Also on Commodore Vic-20. '12 levels of aliens attacking in different ways'.
	£4.00	Spectrum		Fozbee & the Hunny Suckers	48K	●			●				A10 Arcade game in 100 per cent machine code.
	£5.95	Oric 1		Killer Caverns	16K	●			●				V1 'Involves running off with pieces of a ladder, hidden in the caverns'.
	£7.95	BBC Model B		Microbe	32K	●			●				V1 Fast action game, written in machine code. *PCN* issue 39.
	£6.95	Commodore 64		Falcon Patrol	48K	●			●		●		V1 Fast action game of strategy and skill involving small plane.
	£5.50	Commodore Vic-20		Wacky Waiters	3.5K	●			●				I6 'Waiter serving drinks in hotel. Has to hop from lift to lift'.
	£9.99	Commodore Vic-20		Hopper	3K	●			●		●		R2 'A version of Frogger' — *PCN* issue 15.
	£5.95	Spectrum		Horace goes Ski-ing	16K	●			●				S10 'Sequel to Hungry Horace. Has to fetch skis and ski cown slope'. *PCN* issue 1
	£24.95	Commodore Vic-20		Chop Lifter	8K			●	●		●		A3 Also on Commodore 64, *PCN* issue 10.
	£19.95	Apple II		Lunar Leeper	16K		●			●			S12 Reviewed in *PCN* week ending April 22.
	£9.95	Dragon 32		Dragon Trek	32K	●			●		●		S7 'A version of Star Trek with ten levels of difficulty'. *PCN* issue 9.
	£5.95	Spectrum		Android Run	16K	●			●		●		A6 'Control android to shoot walls, kill mutants & reach central complex'.
	£7.50	Atari 400		Space Attack	16K	●					●		A11 Consists of a battle in a black hole.
	£5.50	Spectrum		Schizoids	16K	●			●				I6 'Space bull dozer nudges shapes into black hole'.
	£7.95	Dragon 32		Wizard War	32K	●			●				S7 Reviewed in *PCN* week ending April 8.
	£7.95	BBC Model B		3-D Deep Space	32K	●			●				P10 You're in a starship defending the stargate to your galaxy. *PCN* issue 33.
	£7.95	BBC Model B		Hunchback	32K	●	●		●	●			S15 Little man runs along walls avoiding obstacles.
	£24.99	Commodore Vic-20		River Rescue	8K			●			●		T4 Needs joystick. 'Captain boat through treacherous rivers to rescue explorers'.
	£7.50	Commodore 64	●	Gridrunner	64K	●			●		●		L2 Also on Atari and Vic-20.
	£7.50	Commodore 64		Hovver Bovver	16K	●			●		●		L2 Man mowing the lawn is chased by his neighbour. *PCN* issue 27.
	£5.95	Commodore 64	●	Horace and the Spiders	68K	●			●				M8 Also on Spectrum and Dragon 32.
	£7.95	Dragon 32		Wizard War	32K	●			●				S7 Needs joystick. 'Magical combat for two to nine players; interactive duel'.
	£6.95	Spectrum		Luna Crabs	16K	●							M14 Convincing 3-D graphics *PCN* issue 33.
	£5.95	Spectrum		Manic Miner	18K	●			●				B3 Guide miner Willie through 20 crazy caverns.
	£5.95	Spectrum	●	Jetpac	16K	●			●				U1 Spaceman collecting pods and rockets. *PCN* issue 14.
	£6.95	Spectrum		3-D Ant Attack	48K	●			●				Q1 Girls rescue boys (or vice versa) in a maze filled with aggressive ants.
	£5.50	Spectrum		Chukkie Egg	48K	●			●				A5 Also runs on BBC B. Try walking on the eggs.
	£6.95	Spectrum		Penetrator	48K	●			●				M8 Joystick optional.
	£5.50	Spectrum		Zzoom	48K	●			●				I6 3-D fighter game. *PCN* issue 27.
	£7.50	BBC Model B		Atlantis	32K	●			●				I4 'Guide submarine through caverns & destroy enemy'.
	£9.99	Commodore Vic-20		Annihilator		●			●		●		R2 'Based on Defender'.
Adventure	£9.95	BBC Model B		Sphinx	16K	●			●				W1 A classic adventure, moving through caves avoiding hazards to collect treasure.
	£8.00	Dragon 32		Mansion Adventure	32K	●			●				M12 Wind your way through an old mansion picking up clues to find the diamond.
	£35.00	IBM PC		Adventure in Serema	64K		●					●	I3 Needs colour graphics adaptor and direct drive colour monitor for use.
	£6.90	Oric-1	●	Zodiac	16K	●			●				A5 'The thinking person's adventure game'.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
	£12.07	Sharp MZ80A	●	Adventure	48K	●			●				K1	Also runs on Sharp MZ80B & MZ80K. 'An interactive adventure game'. *PCN* issue 12.
	£7.95	Sharp MZ80K	●	Nightmare Park	48K	●			●				S8	Also runs on MZ80A. Cross Nightmare Park.
	£4.00	Spectrum		The Last Jedi	48K	●			●				A10	Textual adventure with over 500 rooms.
	£14.95	Spectrum		Valhalla	48K	●			●				L1	*PCN* issue 35.
	£14.95	Spectrum		The Hobbit	48K	●			●				M8	Object is to get treasure. For one player. Also for Commodore 64.
	£5.00	Spectrum	●	Orb	16K	●			●				I5	Also for Dragon 32 and Commodore Vic-20. Explore labyrinth and destroy Orb
	£10.00	Spectrum	●	Pimania	48K	●			●				A7	Also runs on ZX81, BBC, Dragon 32. *PCN* issue 1.
	£5.00	Spectrum	●	The Quest	48K	●			●				I5	Also runs on Dragon 32. 'Fighting adventure game'.
	£5.00	Spectrum	●	Star Trek	48K	●			●				I5	Also runs on Dragon 32 and Commodore Vic-20.
	£10.06	Tandy TRS-80 1	●	Mysterious Adventurer	16K	●			●				M6	Also runs on Tandy TRS-80 111, Genie I, II, Colour Genie and BBC B.
	£5.95	BBC Model B		Invisible Man	32K	●			●				C9	Also on Commodore Vic-20. 'Aim is to shoot man who keeps disappearing'.
	£5.95	Spectrum		Starship Enterprise	48K								S9	Based on the classic Star Trek. Includes arcade action.
Simulation	£5.50	Spectrum		Heathrow ATC	16K	●			●				H7	Air traffic control game.
	£7.95	Spectrum	●	Flight	48K	●			●		●		P9	Also available on ZX81.
	£14.95	Atari 400	●	Up Up Away	16K	●			●				S13	*PCN* week ending April 29th 1983. Also on Atari 800. Available on disk, also.
	£22.80	Atari 400	●	Jumbo Jet Pilot	16K	●					●		T4	Also Atari 800. Ten difficulty levels. *PCN* issue 32.
	£7.95	Spectrum	●	Flight Simulation	48K	●			●				S10	Also on ZX81. Shows control panel & control view.
	£17.20	Tandy TRS-80		Jumbo	16K	●			●				M6	Also on Genie I, II, & BBC Model B, 'Simulation of piloting a jumbo'.
	£4.00	Spectrum		Advance to Mayfair	48K	●			●				A10	Play against your Spectrum. Supports printer.
Board Games	£33.35	IBM PC		Decathlon	64K		●			●		●	I3	Needs colour graphics adaptor and direct colour monitor.
Sport	£19.55	Atari 400	●	Soccer	8K			●					T4	Also on Atari 800. Reviewed 11.3.83. Aerial view of field.
	£7.95	Dragon 32		Golf	32K	●			●				S7	For one or two players. Full handicapping system.
	£8.50	BBC Model B		Billiards	32K	●			●				H3	Available on disk. 'A game for all ages'.
	£14.99	Atari 400		British Heritage Jigsaw Puzzle	8K	●							T4	Also on Atari 800. 'Educational game with selective difficulty'.
Various	£15.95	Spectrum		Scrabble	48K	●			●				P9	Expensive but popular.
HOME														
Diary	£9.95	BBC Model A	●	Desk Diary	16K	●			●				W1	Also on BBC Model B. Consists of address book & diary planner (plus instructions).
Home budget	£19.99	Atari 400	●	Home Financial Management	8K	●						●	T4	Also on Atari 800. Needs Atari Basic cartridge. Aids money management.
	£19.95	Epson HX20	●	Home Budget	16K	●			●				K1	Also on Sharp, MZ80 & Osborne. Keeps records of home finances with graphics.
	£9.95	Spectrum		Data Genie	48K	●			●				A3	User programmable home database.
	£28.75	Newbrain		Home Expenses 40/6	30K	●			●				E2	Also on the Memotech.
Music composition	£24.99	Commodore Vic-20		Vic Music Composer	8K			●					T4	Aids to aspiring composer. Also for entertainment and education.
	£5.75	Spectrum		Music Maker	48K	●			●				B5	Teaches musical notation, aids composition.

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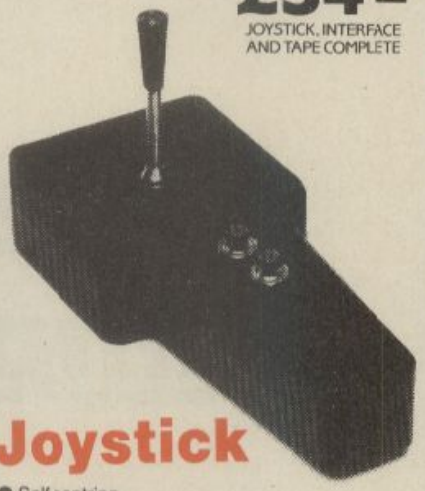

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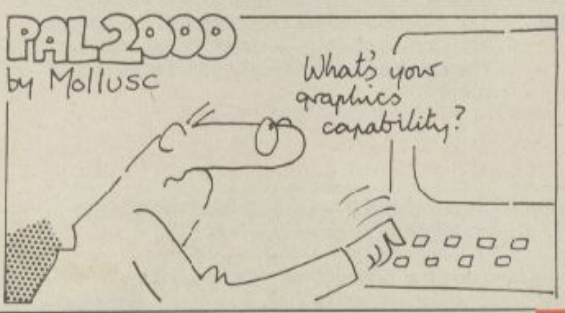
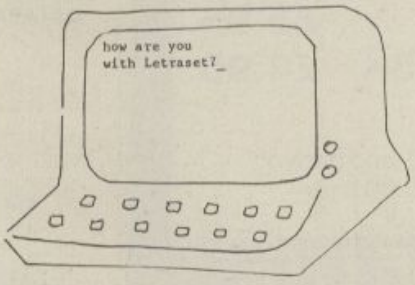
Going, going, gone . . .

Regular readers of *PCN* will note the increasing frequency with which we report on company failures. The picture has got so bad we even considered a 'Company Crashes This Week' column. Unfortunately, someone has beaten us to it.

Credit reference company Dun and Bradstreet has launched a dial-up computer service that gives you an instant credit rating on a company.

Dun and Bradstreet hopes that by establishing an early warning system it will help slow the pace of company bankruptcies and help prevent the domino effect where one company crash leads to several others failing because of the accumulation of bad debts.





SYNTAX ERRORS

Two telephone numbers were garbled in Issue 51: Dream Software, producer of the Graphics Package for the Oric, is on Basingstoke 25107; Capra-Cinderst Associates, of PCalc on A4 systems fame, is on 01-794 8899.

Whoops! In our report on the Info 84 show we quoted the wrong prices for the Torch Unicorn add-on for the BBC micro. The 68000 ZHDP costs £2,495. The Unicorn ZHDP costs £2,895.

NEXT WEEK

SCOOP!! — *PCN Pro-Tests the Portable PC from IBM.*

Win a Mac — *There are two Apple Macintosh systems on the line in the biggest ever PCN competition.*

Spectra — *Tired of the Spectrum keyboard? Pick an alternative from three possibilities.*

Atmos — *The pull-out and keep guide to the new Oric moves into week 2.*

Games — *PCN reviews games for the Atari, Spectrum, and BBC.*

PCN DATELINES

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

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

UK EVENTS

Event	Dates	Venue	Organisers
Computer Trade Show	March 13-15	Wembley Conference Centre, Middlesex	Reed Exhibitions, 01-643 8040
Scottish Computer Conference	March 13-15	Holiday Inn, Glasgow	Quadrilect, 01-242 8697
Microcomputer Applications Workshop	March 26, 27	Computer Laboratory, Liverpool University	Ms C Bryson 051 709 6022
Microcomputer Networks Workshop	March 27, 28	Computer Laboratory, Liverpool University	Ms C Bryson 051 709 6002
Electron & BBC Micro User Show	March 29-April 1	New Horticultural Hall, Westminster, London	Susie Lipman 061-456 8383
Computer Aided Design	April 3-5	Met. Exhibition Hall	Reed Exhibitions, 01-643 8040
Artificial Intelligence Seminar	April 7-8	City University, London	Warm Boot Ltd, 01-368 7561
Sir Frederick Osborn School Computer Fair	April 8	Sir Frederick Osborn School, Welwyn Garden City	Alan Henderson, Welwyn Garden 23367/8
COMPEC WALES	April 10-12	Cardiff University	Reed Exhibitions, 01-643 8040
Computers for Builders Exhibition	April 12	Cavendish Conference Centre, 82 New Cavendish Street, London W1	A4 Publications Ltd., 088-385 2051

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Personal Computer Show	March 14-17	Sydney, Australia	ECL Ltd, 01-486 1951
International Business Equipment & Computer Show	March 13-17	Singapore	International Business Centre Co. Ltd., 8F Hosoi Building, 15-7, 5-chome Honmachi, Higashi-ku, Osaka, Japan
Videotex '84	April 16-18	Hyatt Regency, Chicago	Sally Summers, 0101 212 279 8890

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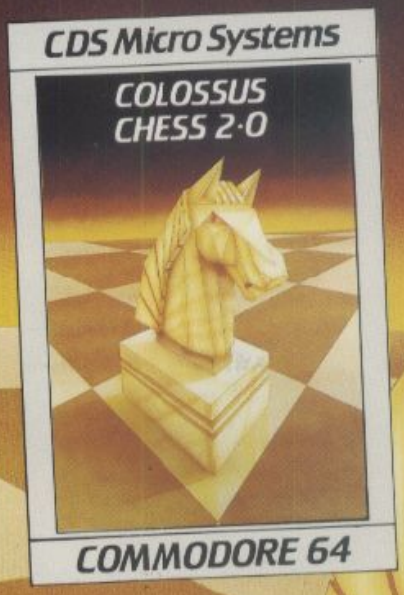

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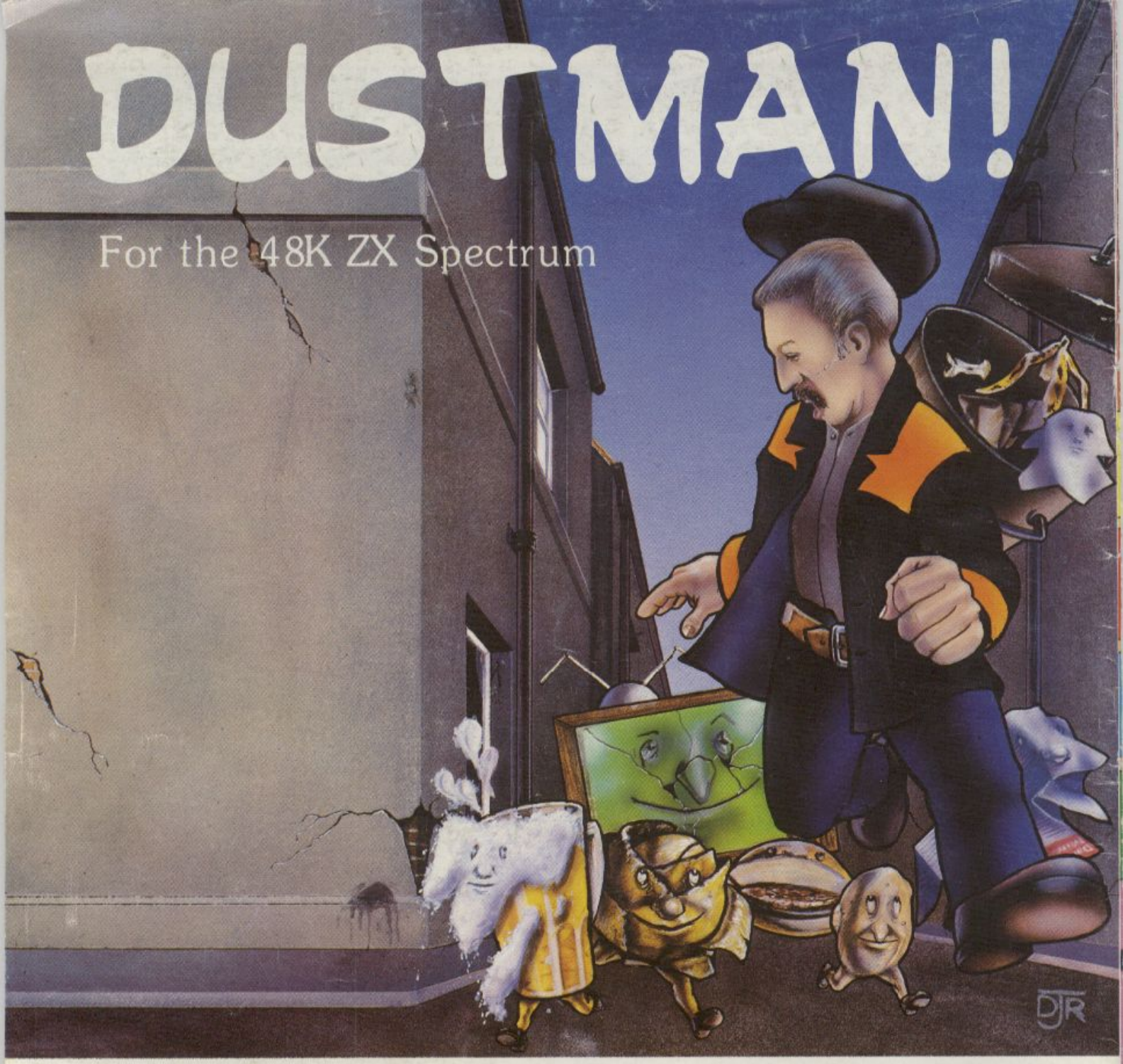

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