

P E R S O N A L

EVERY THURSDAY

COMPUTER

50p OCTOBER 6-12, 1983 Vol 1 No 31 **NEWS** THE COMPLETE COMPUTING WEEKLY

THIS WEEK

BBC SPECIAL

We test the new CMOS diary and the sideways ROM extension board

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Make the most of your micro's sound effects

IBM DATABASE

Can Condor put a mainframe in your micro?

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Wallflowers bloom

By Ralph Bancroft

The PCW show is still *the* micro show and even the claustrophobic atmosphere of the converted car park at the Barbican could not detract from its star rating.

It has to be said, though, that many visitors and exhibitors felt the star is beginning to look a little tarnished. Large numbers mean frequent scrums and frayed tempers.

As regular readers of *PCN* will know there has been such a flood of shows this year that you cannot escape the feeling that you've seen it all before.

Even the first public appearance of the ACT Apricot was an anticlimax. It was announced a couple of months ago and now looks just a little old hat.

The ACT stand itself was all high-tech, scoring high marks for presentation. On show were just four Apricots, each with a miniscrum peering at the new baby's features. The rumour was that they were handbuilt versions, not production models that will be available in the shops from next month.

The crowd on the ACT stand was small in comparison to the seething mass on the Acorn stand struggling to get a hands-on experience of the Electron or, failing that, the BBC.

The only really new attraction on this stand was hidden away in a corner with, for a large part of the time, no-one around who knew anything about it. It was an amazing graphics package that combined a Robostick high-precision trackball/joystick with the BBC's renowned

high-resolution graphics. Put together, it lets you create your own graphic displays in a manner not unlike that on Apple's Lisa.

Another low-profile exhibit was NEC's 8201 portable computer built at the same factory as the Tandy Model 100 and looking very much like it.

Taking a much higher profile was the Elan. This recently announced micro won't be available until next year so it comes as no surprise that the demonstration of the machine's promised high-resolution graphics was little more than a video tape player hidden behind the stand.

Also in the 'yet-to-appear-in-the-shops' category was the Memotech. The only consolation for not being able to buy one was the extra bolt-on goodies that were on show. Memotech was demonstrating a disk system that supported CP/M, could handle hard disks and will work with a silicon disk sub-system that promises access times five

times faster than a Winchester.

If you can't wait for the Memotech, hidden away elsewhere in the hall was a company called Solidisk Technology. It was demonstrating what it called a sideways RAM system for the Beeb. This plugs into a sideways ROM socket and gives you an extra 100K of memory. It works in a similar fashion to Memotech's silicon disk to give fast access to programs normally stored on disk.

In the show guide Solidisk Technology was promising a new micro and a 16-bit card to work with the resolutely 8-bit BBC. Alas, neither product was there for inspection. 'Can't get the chips,' was the sad refrain of the company's staff.

Another attention-grabbing product at the show was the Buzzbox, a 300-baud direct-connect modem from DaCom Systems. Selling at £80, it is British Telecom approved.

For those with smaller pockets and who know how to wield a



Down but not out — for micro fans or balloon collectors, there's nothing like the PCW Show.

soldering iron, Maplin was demonstrating its do-it-yourself 300-baud modem that costs £39.95 plus £10 if you want a box to put it in.

On the Prestel front, Micronet was demonstrating its new direct-connect modem for the Apple in glorious black and white. It turns out that Micronet has yet to develop a colour version and when (and if) it appears you will have to pay for the privilege.

Such technical problems were beneath the enthusiasts who run the Clubspot pages on Micronet. They had Apples running Prestel in full colour, plus Modems for the ZX81 and Dragon.

Jonathan's taste of honey

Jonathan Acott, 11, went home from the PCW Show with an Acorn Electron under one arm and a Tandy cassette recorder under the other.

Jonathan was the clear winner in *PCN*'s show competition, 700 points ahead of his nearest challenger. But the tension mounted as the last competitors tried their hands with the deadline approaching. In the game the bee buzzed, the flowers grew, and finally five

o'clock struck and Jonathan was home and dry.

Winners of the other cassette recorders for the highest scores on the three other days of the show were Stephen Randall, 14, of Woodford Green, Essex; Darren Scott, 15, of Hayes in Middlesex; and Bob Dudani, also 15, of London N2.

Congratulations to all of them. The rest of you can have a go at the game in next week's issue.

More power to the portable

Book-size portable computers were a big draw at the show, with new machines from NEC and Sharp making their debut.

The NEC PC-8201A bears more than a passing resemblance to Tandy's Model 100 portable — both machines were developed by the Japanese company Kyocera.



Highlights of the round table — NEC's 8201 and its peripherals.

But there are important differences between the battery-operated 40-column screen computers.

One is memory size: the NEC version can hold up to 128K of RAM, while the Model 100 runs only to 32K maximum. The basic price of NEC's machine includes 16K of RAM, while Tandy currently offers only 8K in its basic price.

The NEC micro also includes the facility for disk drives, which Tandy has opted not to include on its machine. But NEC is not clear when the drives will be available, what their capacity will be and whether or not they'll be battery-operated.

NEC's Basic is more powerful than Tandy's and it is compatible with NEC's upmarket desktop Computers, the PC-8000 and PC-88000. The NEC's more powerful

Basic editor is also supported by a superior cursor key arrangement, in which the cursor keys are a separate 'pad' to the right of the keyboard.

The machine will sell for £475 and comes standard with 16K — £25 cheaper than the Tandy's basic price and with 8K more memory. NEC promises the machine will be available in early November.

Meanwhile, Sharp's PC5000 is a rather different breed of machine. Unlike the NEC and Tandy machines, which have a built-in 40-column LCD screen above the keyboard, the new Sharp uses a "flip-up" 80-column LCD screen much like the American Gavilan portables.

The micro is based around the popular 16-bit 8088 processor running under MS-DOS. It will include 192K ROM, 128K bubble-memory RAM — expandable in two steps of 64K to 256K — and all the memory will be housed in the machine.

The display is liquid crystal and in text mode shows 80 characters by 8 lines.

The PC5000 will be launched at the International business Show in

Birmingham in two weeks. A Sharp spokesman said he expects it to go on sale in the UK in the first week of November, although supplies may be restricted until Christmas.

The basic machine will sell for £1,295, with £300 for the optional printer and an anticipated £600 or more for the disk drive.



Sharp PC5000 — look but don't touch.

Games: the way forward?

The PCW show offered interesting releases and tantalising glimpses into the software of the future.

It seems as though software houses are at last realising the need for new concepts in the games market and are working on building on previous knowledge rather than churning out increasingly similar variations.

Audiogenic's Alice in Videoland looked particularly attractive. This will be a graphics-only version of the book for Commodore 64, the player moving Alice via a joystick. In machine code and on three disks, this should be a real winner.

Less impressive but available

now was Quicksilver's Ant Attack. This gives a sort of aerial perspective over an Escher-like town and shows the way forward for a combination of adventure and arcade games.

Three products show another trend to DIY games — Games Designer from Quicksilver and Pinball Arcade from Kansas City Systems allow you to tailor the detail within a basic framework to your own wishes. Melbourne House is soon to release Hurg, which will do the same for the Kong/Pacman field. Soon you won't need to buy a new game at all... just alter one of your own.



Audiogenic's photogenic Alice in Videoland — Carroll's for Christmas?



Trainee Lunar Landers in Rabbit's burrow.

New software from Bug Byte and Rabbit Software will be in the shops in two weeks.

Bug Byte (051-709 7071) has two games out for the 48K Spectrum. Tony Milner, director of the company, says that The Birds and the Bees is about a bee flying away from its hive in search of honey, which later undergoes an attempted hijack from a teddy bear. A likely story.

Cavern Fighter involves missiles and ships. Both these Spectrum programs will be £5.95.

Twin Kingdom Valley, a graphical adventure for £9.50, can be run on the BBC B and Electron, and involves stealing treasure chests from kings; three old BBC prog-

rams have been converted for the Electron: Galaxy Wars, City Defence and Space Invaders — all for £7.50.

Rabbit's collection consists of Potty Painter in the Jungle, Lancer Lords, and The Birds, all for the Spectrum, plus Murder for the Commodore 64 and Lunar Landers for the Vic 20. They all cost £5.99. Rabbit Software can be contacted in Harrow on 01-863 0833.

Another bizarre title is due out the first week of December from Llamasoft (07356 4478) in Tadley, Hants. Revenge of the Mutant Camels will join the present range, the latest addition being Metagalactic Llamas, which is £5.50, for the Vic 20.



LEGO POWER — Basicare Microsystem has injected life into Lego. Driven by a Spectrum and using an interface developed by the company, the robot is able to move round freely under its own steam. This robot is one of many projects which the company has undertaken to show how a micro can control processes in the real world. It isn't for sale, though.

Systems for the disabled

Helpmate, a computer system for the severely disabled, was unveiled by Maincomp.

Anyone with a Lynx, Sirius, Almarc, Apple II, Apricot or IBM PC can use the home office system which consists of a VDU, A4 printer, photocopier and acoustic coupler.

The Lynx version is £2,181 while an Apricot version costs more at £2,952.

Director Colin Walsh said: 'We cater for blind, deaf, dumb and limbless people who want to work from home and we provide a range of aids for the disabled.'

The system is available from Computers of Cambridge; Reyfringe of Redcar, Cleveland; SES of Bristol, and direct from Maincomp on 01-487 5435.



Helpmate — working for disabled.

Kuma control

A 68000 CPU board can now be had for £314.50 from Maidenhead software house Kuma.

Described by sales manager John Day as a 'cheap, 68000 development system', it can be used on its own or attached to a micro. 'It would give you an incredibly powerful system if it was attached to the Sharp MZ80A,' he said.

It can be used as a process controller, controlling other equipment, and you can develop your own 68000 software on it.

The board runs at 10MHz.

A flexible friend for DIY buffs

Anyone who fancies DIY may be interested in the Dennis Computer System from Stirling Microsystems.

The system comes in kit form using 8in x 8in boards and is based around the 8-bit Motorola MC 6809 chip.

You can take your pick of peripherals, monitors and disk drives since the system interfaces with a good many of these and it uses the Flex operating system.

Software for the system includes Configurable Flex with editor and assembler, debug package, 68000 cross assembler and extended Basic. Prices range from £64.40 for the debug package to £230 for the 68000 cross-assembler.

The kit can be developed into a micro system for education, business, engineering or hobby use.

You can get parallel interface adaptors, high-resolution graphics, 64K RAM board and 6809 CPU from the company on 01-486 7671.



SOFT CENTRE — Software lined up by ACT for the Apricot now includes Concurrent CP/M in addition to CP/M-86 and MSDOS. MP/M is said to be in the pipeline, too, along with the BOS operating system. ACT is taking care of communications with asynchronous and bisynchronous packages, and the full range of ACT Pulsar applications suites will also run on the machine.

VIEW FROM JAPAN



Tinker toys tailored for success

by Serge Powell

There has been a lot of coverage in the computer media here about what are known as the 'tinker toys'. This is a nickname that has stuck to the Tandy Model 100 and the NEC 8201.

Why 'tinker toys'? It's something of a mystery, and it doesn't do much justice to the machines, both of which are going strong in Japan. The NEC machine is particularly popular. It offers 8K to 64K of RAM, a 40 by 8 character screen, an RS232 port, and plenty more. You may not have seen much of it yet, but you will.

Several comparison-type reviews have appeared but we all know the best and most reliable way to find out about hardware and software — to ask somebody who has used it. I happened across one of the first users the NEC 8201 had in this country when it was launched eight months ago; he is a programmer, and he quickly advised NEC of some bugs in the system's text editor.

How does he feel about the machine eight months on? Very complimentary. It can be a word processor that you can use anywhere. He also uses its communications software to transmit electronic mail to his head office, but unfortunately the NEC modem is not built in.

One rather unusual use that the system lends itself to is the transmission of files between various types of hardware where modem transmission isn't available. This type of transfer isn't limited to data alone — I've already heard of one case where a game program was transferred in this manner.

The NEC machine also offers a plug-in 32 K RAMpack with its own power supply, giving you another option in saving or transferring data.

With fresh batteries you can store for up to six months ahead and a convenient AC adaptor lets you drop in new batteries without disturbing it. Other features that will intrigue different types of users are a bar-code reader, a CRT adaptor (which is bigger than the 8201 itself and includes its own microprocessor for a four colour 80 by 25 display), a disk controller for NEC standard 5in drives, and what looks like a neat application program to promote the user himself if he happens to be a company.

At the press of a button . . .

One Japanese company has already demonstrated that the NEC 8201 can be a very powerful sales tool. Its first step was to write a program that could be stored in the RAMpack, and then to acquire one of the very compact, very portable 40 column thermal printers that are proliferating like rabbits over here.

It packaged the whole system very neatly in a typical briefcase and then took it on the road.

Who is there among us who could resist the blandishments of an insurance salesman who asks his questions as though from an autocue as they appear on his screen, feeds your answers into his portable, and then at the press of a button hands you your own personalised 21st century print-out of how much you'll pay, when your premiums will change, what the loan value will be, and all the rest of it.

And just think of the potential for real estate salesmen as they show their prospects from property to property, inputting the asking price, the offer price, down payment, and working out the repayments for the proud would-be purchaser on the spot. He could even produce a floor plan or print out a contract ready to be signed.

Well, you may say, these blandishments were easy enough to resist under the old manual regime. But reverse the position and apply such a system to your own work — it has possibilities, doesn't it?

For myself, I'd settle for it as a word processor. My disk drives have gone on the blink and my dealer has promised to have them back in not less than three weeks. My tape version word processor seems to have walked and the back-up is tucked away in the office which at this time of night is securely locked. I gave my typewriter away six months ago and now my pen is running out of ink . . .

Adam approved

Further setbacks have hit Coleco's Adam computer system with the result that the revolutionary all-in-one package will definitely not appear in the UK until next year.

The American Federal Communications Commission (FCC) held up testing of the system when Coleco failed to provide the word processing software needed to drive the Adam's daisy wheel printer. Coleco claimed FCC approval last week.

All new electrical equipment in the United States has to be tested and approved by the FCC to make sure that it doesn't interfere with radio transmissions.

Coleco is still hopeful that it can produce machines in the US to meet the Christmas rush but any hopes of it arriving in Europe by that time are well and truly out of the window.

Philip Gibbs, marketing manager for CBS Electronics, confirmed that a sample of the product has yet to arrive in this country.

'Without a machine to examine we have had no opportunity to assess what engineering changes are required to adapt it for the European market,' he said.

The add-on module for the games machine is likely to require little or

no conversion, he added, but the stand alone system will certainly require changes to the power supply unit to make it acceptable to the European authorities.'

Mr Gibbs will still be hopeful, however, that that add-on unit might be available in this country before Christmas.

The Adam was first revealed to the public at the Consumer Electronics Show in Chicago earlier this year. It caused a major stir by offering for \$600 a complete system including stringy-floppy (similar to the Sinclair Microdrives) and daisy wheel printer.

Similar facilities are to be offered to owners of the existing Coleco games machine at a lower cost.

Since then things seemed to have slipped. Coleco has been forced to increase the price to \$700 and the date for the first machines to roll off the production line has slipped from late August until October.

The lack of a machine for testing in the UK has also held up any guesses on what the UK prices might be. 'A dollar to pound conversion would not be a reliable guide,' said Mr Gibbs. 'Gaining approval for the European power supplies is an expensive process.'

Ace speaks for itself

The Jupiter Ace seems to have missed out on the limelight recently, but an Essex based company aims to boost it with a new sound board for the machine.

Priced at £30, the sound I/O board plugs into the back of the Jupiter Ace and provides an edge connector for other accessories. The board uses the AY-3-8910 chip which gives three channels of sound

and noises.

The sound output is via a 2.5in internal loudspeaker or a jack socket that will give about 1W into 8 ohms. Two 8-bit input/output ports are also provided by this chip.

The board is powered by the Jupiter Ace's own power supply and comes with utility software. Contact Essex Micro Electronics on 0277 72522.

Multi-Midas

The Midas business micro has been transformed into a multi-user system.

Sirton Computer Systems (01-640 6931) launched Midas-MPS last week, promising that CP/M compatibility would be maintained so

that if you already run a Midas you won't find that all your software is suddenly useless.

Like the Transtec arrangement (this issue, page 8) Midas-MPS uses a Master/User configuration. It can support up to 16 users. The Master system costs just under £6,000. Each user added to the network involves a further layout of £800.

Midas — branching out into a multi-user system but keeping CP/M.



Acorn goes to its public

Acorn Computers is moving in on the Stock Market. Ten per cent of the company's shares are being offered for sale on the Unlisted Securities Market (USM).

This move means at the minimum tender price of 120p, Acorn is valued at £134.8 million, making it the largest company on the USM. And in five years it has sprouted from a £200 company to a business turning over more than £100 million a year and making profits of £8,630,000 in the year to June 1983.

The founders of the company Hermann Hauser and Chris Curry will have 47.4 and 38.3 per cent of the shares respectively with more than a million of the shares being reserved for employees.

Slim Cumana

What does every good BBC or Dragon owner expect to get for Christmas? British floppy disk drive manufacturer Cumana hopes a good percentage of them will be waking up to find its disk drives in their stockings.

Cumana is launching its slimline floppy disk drives for both the BBC and Dragon micros during the Christmas run-up. It has packaged its drives in colourful cardboard boxes and they will be appearing on the shelves of WH Smith and the Spectrum chain.

The drives will also come with a comprehensive paperback book which acts as user guide and general rundown on how to use and maintain the products.

The drives for both micros are available in single-sided 40 and 80 track and double-sided 80 track formats, and come with a 12 month warranty.

The BBC CS100 single 40 track drive will cost £213 plus VAT, the 80 track single-sided version costs £245 and the double-sided 80 track version will go out at £344. Dual drives are available with storage capacities from 400K to 800K priced from £389 to £679.

The Dragon 40 track single drive will cost £286 plus VAT. The prices for the rest of the Dragon range will become available.



Slimline drives and flashy packaging — a Christmas box from Cumana.

ZX cartridges

Sinclair Research has made good its promise of cartridge software for the Spectrum barely four months after it revealed its plans (*PCN*, issue 10).

The Interface 2, which accepts the cartridges, was launched unobtrusively last week to co-incide with the PCW Show. Coming soon after the Interface 1, Microdrives and Flat-screen television, it seems that Sinclair has had a busy Summer. And after the enormous delay that marked the Microdrive launch it is a refreshing change to find a product launched with such speed.

The Interface 2 goes into the edge connector, looks very stylish and accepts joysticks and a new series of games cartridges. The interface and all the associated games can be used with both the 16 and 48K machines.

At present there are 10 programs available, including such chestnuts as *Hungry Horace*, *Space Raiders* and *Backgammon*. There are also arcade games — *Psst*, *Jet Pac*, *Gookie* and *Tranz Am*.

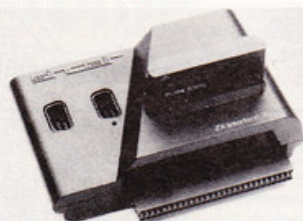
The Interface 2 is priced at £19.95 and the games are a rather hefty £14.95. You also have to buy standard 'D' connector joysticks, like those for the Atari.

The advantages of the ROM cartridges will be apparent to anyone who has had trouble loading games into the Spectrum from cassette. The cartridges take only a couple of seconds to load into the system, so the product should appeal to the non-hobbyist user who simply wants to play a few games without getting too involved in the confusing world of microcom-

puting — a 16K Spectrum with the Interface 2 and a couple of joysticks makes one of the most economical games machines on the market. An expansion port is on the back so you can hook up the printer.

The product is available by mail order from Sinclair Research, tel (0276) 685311.

PCN will run a fuller look at Interface 2 in issue 33.



Interface 2 — the gateway to cartridge software on the Spectrum.

Libs pioneer micropolitics

By Ralph Bancroft

The Liberal Party has become the first political party to set up a micro user group. Called Micro Lib, it is an information network for Liberals who want to use a micro in their campaigning.

The group was set up at a fringe meeting during the Liberal Assembly in Harrogate. The meeting heard from a number of Liberals who had used micros to help maintain membership records, organise leaflet deliveries and compute the results of canvasses of the electorate.

Also revealed was the inside story of how the Liberal candidate in Yeovil, Paddy Ashdown, had used micros to gain the seat from the Conservatives. Mr Ashdown used a Sirius and a NorthStar Horizon.

Further details from the Association of Liberal Councillors (042 284 3785).

Corona adds desk-top unit



Corona's desktop model — still aiming at IBM compatibility.

Corona data systems has followed up its IBM-compatible portable with a desktop version and has appointed Midtron as its distributor in the UK.

At £3019 for the portable and £3077 for the desktop, the machines come with 256K of RAM and offer enhanced graphics (640x325 pixels compared to 640x200 on the IBM PC) as standard.

The micros will be making their first public appearance at this

week's Autumn Computer Trade Forum in Birmingham and should be in the shops by the end of the month.

Corona is making much of its claimed compatibility with IBM, both in terms of software and hardware. It suggests that software on disks formatted for the PC can be slotted into either of its machines and run without any problems.

This may be true up to a point but users may experience difficulties with packages that make use of the PC's lower resolution graphics screen.

As all the standard features of the Corona machine, including the disk controller, extra memory, printer ports and graphics are implemented on the main circuit boards, the four expansion slots are left free for additional expansion.

Including in the selling price are free software packages including MS-DOS, Multimate (a word processing package) and GW Basic.

NCC secures lines

By Ralph Bancroft

By early next year you will be able to send and receive programs and data over the telephone without the danger of the information being stolen or 'pirated' by someone else.

The secure method of data transmission is the result of research carried out for the National Computing Centre (NCC) by Mike Shain, a telesoftware consultant.

The NCC has completed work on the specification of the system, which should incorporate a tamper-resistant module housing a modem and a chip with a unique encryption/decryption 'key'.

The encryption and decryption would be carried out by software

that would also control the speed at which the modem operates.

So far the NCC has not found a manufacturer for the device but a few firms have expressed interest.

The module together with software would probably cost between £200 and £300.

The likeliest application of the system is for telesoftware such as the business service due to be launched by Micronet 800 on Prestel. According to Mr Shain it would be possible using the system to 'try and buy' commercial software.

A subscriber could download a business package for free. He could then try it out to see if it was suitable. This free version would be

scrambled in such a way that it couldn't be saved to disk and reused. If the user wanted to buy a copy of the package he would have to download a second version that would run on his machine but nobody else's.

Because the key in the tamper-resistant module can also be used to encrypt information it could also be used to scramble and unscramble electronic information.

The encryption technique conforms to the DES standard specified by the US Bureau of Standards for protecting non-military data. The standard is already in use in this country by banks and other organisations.

The ADVENTURES of MONTY The Mountaineer

Be Apibus Semper Dubitandum Est.

"AVALANCHE!"

MONTAGUE MONTAGUE III, DUKE OF BOLTON, HAS ORGANIZED AN EXPEDITION TO CLIMB MOUNT EVEREST, BUT MONTY AND THE TWO OTHER BRITISH CLIMBERS, IAN AND TOM, DID NOT RETURN TO CAMP THE PREVIOUS NIGHT. THE AMERICAN, HANK, TAKES CHARGE OF THE SEARCH PARTY...



NOT FAR AWAY, MONTY, TOM AND IAN ARE TRAPPED AT THE BOTTOM OF A CREVASS.

"DASHED LUCKY REALLY, THAT THIS FISSURE HAS SHELTERED US FROM THE WEATHER. YOU SHARE THE LAST GINGER NUT, CHAPS. I AM SURE THAT AID IS IMMINENT."

"HAVE THE GINGER, TOM, I'LL TAKE THE NUT"

MEANWHILE, AT THE TOP...

"LOOKY HERE WHAT I'VE FOUND, CARL. MONTY'S HAT. THEY MUST BE TRAPPED BELOW."

"AND IN A MINUTE, SCHWEIN, YOU WILL JOIN ZEM IN OBLIVION."

SUDDENLY, THE TWO CLIMBERS HEAR A NOISE ABOVE THEM...

RUMBLE

"GOTT IM HIMMEL!"

"WATCH OUT. AVALANCHE!"

WILL HANK AND CARL SURVIVE THE AVALANCHE? WILL MONTY BE RESCUED? WILL CARL'S EVIL PLANS COME TO FRUITION? WILL THE AARDVARKS REACH THE SUMMIT OF MOUNT PALOMAR BEFORE PETERKINS THE FERRET-STRANGLER? DON'T MISS NEXT WEEK'S EXCITING EPISODE!

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SOFTWARE

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High Street helpers



First Bus Shop opens in Sheffield

By Ian Scales

Micro users will soon be able to use a network of bring-it-in computer repair shops, 40 of which are to be opened throughout Britain by the end of 1984.

The 'Bus Shop' chain will specialise in micro and peripheral repairs and will sell computer consum-

ables, such as disks, tapes and accessories such as books, magazines, cables, and sockets.

The company behind the venture, GCS Engineering, claims the concept is new and sees it as a long term effort to establish the shops as prominent features in UK High Streets. Most of the stores will be in shopping precincts with car parking.

GCS Engineering began by servicing large mini and mainframe computers on-site. A company with a computer system usually pays a service company both to maintain it and fix it. This service didn't seem outrageously priced when computers cost tens of thousands of pounds — service contracts were usually priced between 10 and 15 per cent of the cost of the hardware per year.

But now, most of the growth in

the computer market is in the micro area. With micros costing only a few thousand or a few hundred pounds, the cost of servicing contracts expressed as a percentage of the hardware cost jumps up dramatically. The result is that most users prefer, to do without servicing agreements. But with this High Street scheme GCS plans to tap the needs of the new users. Micros do break down and most are portable enough for a shop-based service.

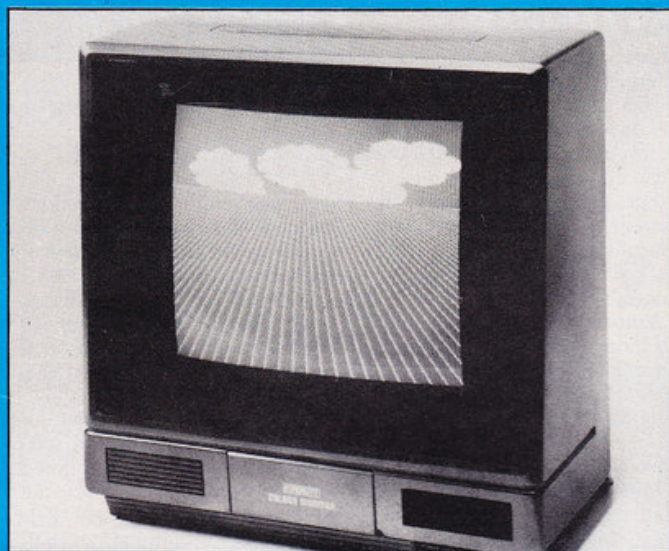
The venture could have a wide appeal. At present it is usual to take your dead, out of warranty computer, printer or drive back to the dealer who sold it. One of the main problems of owning an old system (and an old system may not have seen its second birthday) is having to wait for the dealer to fix it, or send it to the manufacturer.

Dealers and micro manufactur-

ers aren't really fixers of equipment. They are in the business of selling the newest and the best, so there's no real incentive for them to provide a good, efficient repair service.

These problems are compounded by users building up their systems from different manufacturers. It's usual, for instance, to buy a computer from one manufacturer and a printer from another, possibly not even from the same dealer. 'The Bus Shops', says GCS, 'will be the answer to all these problems.'

The shop will offer a three-month guarantee on both parts and service for popular machines including IBM, Oric, Texas, Osborne, Acorn, Sinclair, Sirius, Dragon, Atari, Sord, DEC, Commodore and Apple, plus service for peripherals. There will also be a free advice service.



FIDELITY IN — The first computer product from TV manufacturer Fidelity could make a splash. It's a colour monitor in a 14in unit with RGB, RGBY, or composite video input, and it costs just under £200. Called the CM14 it is a direct descendant of Fidelity's television manufacturing operations and it could be the first of several products for computer users. Fidelity (01-965 8771) points out that it will run with virtually any system capable of driving a monitor and, with one eye on home entertainment in general, it promises that the CM14 will work equally well with VCR, disk, cable data or satellite adaptors.

Supercalc in colour

Users of Supercalc are about to be tempted by a new version of the package that ties colour graphics to its business files.

Sorcim has announced the Supercalc 3 for the IBM and compatible micros, such as the Compaq and Eagle. Supercalc 3 improves on its predecessors, Supercalc 1 and 2, and adds colour graphics derived from its spreadsheet data files.

The graphics facilities resemble Lotus' 1-2-3 package and include pie charts, bar graphs, area graphs and high-low plotting in high resolution. The display has been designed to be effective in

monochrome, avoiding the need for the high cost colour monitors for the IBM. It is claimed that with both colour and monochrome boards and monitors, the graphs and spreadsheet can be viewed simultaneously.

Supercalc 3 should soon be available on a range of other micros such as the NCR Decision Mate 5, Sirius, Apricot, TI Professional and Fujitsu Multi 16.

You can buy it either as an individual purchase or as an upgrade to Supercalc 1 or Supercalc 2. Phone ACT Pulsar (Sorcim's main UK distributor) on 021-454 8585.

Library replies to critics

The Sinclair Owners Software Library (SOSL) has hit back at software producers who claim that libraries are robbing them of business.

The SOSL, which claims to be the country's oldest and largest software library, concludes from a survey of its members that borrowing a tape is as likely to lead to a purchase as not. It found that in 49 per cent of cases people tended to buy a tape after trying it out through the library.

The questionnaire drew more than 300 replies, which the SOSL says 'must represent quite a high proportion of members who were actively ordering' when it went out over the summer.

Some respondents gave a more detailed reply than the survey asked for. One 15-year-old claimed to have bought 40 tapes while a member of the library, and another member bought ten tapes over a year, having hired eight of them from the library previously.

At the foot of the survey, in a space for respondents' comments, many went out of their way to specify this very benefit of library membership—that it gave them the chance to test a tape before buying it.

The survey also gave the lie to several popular conceptions in the micro business, although it must be borne in mind that it covered Sinclair users only.

The single most commonly hired type of software was the adventure

game. Hardly anybody (3.27 per cent) was borrowing educational software — despite the fact that more than a third of the respondents were students.

The average age was over 28. This may explain the slight interest in 'educational software' — but 'education' covers more topics than the three Rs in this context, and it may say something about the way that different people are more or less likely to reply to questionnaires.

Some of the responses to the questionnaire:

Occupation	
Students	34.42%
Manual/unskilled	9.83%
Skilled/managerial	26.55%
Professional	25.9%
Average age	28.52%
Average membership	6.31 months
Average no. tapes hired	7.96
Spectrum owners	77.37%
ZX81 owners	35.4%

Tapes bought	
Before joining	5.6
After joining	4.9

Main subjects	
Adventures	31.14%
Simulations	16.39%
Other games	20.98%
Business/database	0
Programming aids	9.18%
Education	3.27%

Club membership	18.36%
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Disabled key in

By Judy Kirby

The homebound disabled — and that includes agoraphobics — are being offered the chance of self-employment with none of the capital outlay, and with the work lined up for them.

The 'home office' scheme from MHS will use hardware on permanent loan from the Department of Industry under its remote workstation plan. If a disabled worker can prove he or she is guaranteed an income of not less than £2,500 for a minimum of 18 months, the DoI will loan equipment up to £3,000 in value.

MHS is promoting the Lynx,

Apricot and Sirius micros for the home office, the London firm Maincomp providing software. The home office needs a micro with floppy disk capability, VDU, A4 printer, photocopier and telephone coupler. The system using the Lynx 96K would cost £1,983 and the ACT Apricot 256K system runs out at £2,684 — both within the range of the DoI plan.

According to MHS chairman Colin Walsh, the jobs for the disabled home-worker will come from accountants and insurance brokers in their home area.

'Stockbrokers and banks are interested and I suspect building

societies will be too,' he said. 'There is a lot of work that these offices don't want to be bothered with, like double-checking.'

'We will be tailoring our system to each individual disability,' said Mr Walsh, 'using special aids appropriate for each case.' His firm will also organise equipment maintenance.

'In some cases people with handicaps may have been working before they were deprived of their income by illness,' he added. 'This scheme can help anyone who is bound to the house — even agoraphobics who have been stuck indoors for years.'



BUZZ ROUTE — DaCom Systems has taken the wraps of the Buzzbox, a modem priced at £79.95. The Buzzbox complies with the CCITT V21 standard to let you into the telephone network and it has an RS232C interface for connection to your micro. It operates at 300bps in originate and answer modes. The unit is battery-powered, but a mains adaptor is available if you want to use it for long periods. DaCom is in Milton Keynes on (0908) 676797.

Genie modem

Colour Genie owners will be able to hook up and dial with a new modem from General Northern Micro-computers, 0783 860314.

The Universal modem will cost about £150, is an acoustic/direct coupler device, and will work with any RS232 interface. The company says the modem will be available by November.

In addition, the company says that the Wizard, the disk interface

for the Colour Genie is now available. At £113.85 the Wizard incorporates both disk and parallel printer interfaces. The disk operating system, called QDOS, costs another £40.25.

The Colour Genie has been holding a position in or around the Top 10 in the PCN Charts and thanks to the activities of third party suppliers it is quietly but gradually becoming a very versatile system.



Wizarddisk interface: brings the Colour Genie into the disk league.

All hands to the musical keyboard

Micros are taking a back seat in the home if the mammoth nine-day Home Entertainment Spectacular in London was a true indication of how you want to spend your leisure time.

For although companies like Sinclair, Acorn, Atari and Mattel were displaying their wares, people flocked to stalls exhibiting programmable musical keyboards.

You could buy almost anything to fill those lonely hours — cassette recorders, videos, TVs and stereos. For the computer hobbyist and boffin the absence of smaller stands was marked. This show was just for the big boys.

With about 90,000 people attending the show, the organiser Mont-build said: 'The main attraction during the whole event was a group from the Bronx, US, called Rock Steady.'

So much for Electrons, telesoftware and flat-screen TVs.

Zenith throws in software

Next time you're out shopping for a business micro with a hard disk, Zenith will be trying to catch your eye with an offer of free software.

With the Zenith Z100 hard disk system (list price £3,925) you can now get the Lotus 1-2-3 integrated business package or Peachtext 5000 thrown in.

This is Zenith's first move towards bundled applications software. Previously it has offered operating software and Basic in the price of a system, but now it is following a growing trend by including applications as well.

With Lotus 1-2-3 it is starting with one of the most successful packages in the world, but it will be the US Lotus, not the UK version.

Krypton's network factor

The Transtec Krypton series of business micros have been equipped with the missing link. You can now arrange them in a local area network (LAN).

The important element is a LANoption board which you plug into any Transtec system: that gives you any of the four Kryptons or the earlier BC Series to choose from.

But the pricy element, the network controller with a 10Mb hard disk, will set you back £3,950 on top of the £175 for the LAN board.

Transtec is calling its network Transtec. The net will serve up to 30 users, who will have up to 160Mb on hard disk to call on. Each user's 'workstation' can have its own disk

storage or use the central store, and the system allows for print spooling to cut down the number of printers you'll need.

For security there is a key encryption system that stores files in scrambled form.

The networking software will allow you to run applications under CP/M, a single-user operating system. Transtec plans to implement the UCSD p-system and MSDOS, and more operating systems are expected to be added.

A new system expected from the company early next year will feature the 16-bit Intel iAPX 186 running Xenix.

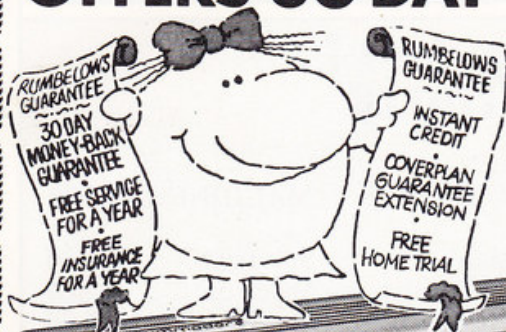
Transtec is on 01-247 1327.



Transtec: missing link for the Krypton and other Transtec devices.

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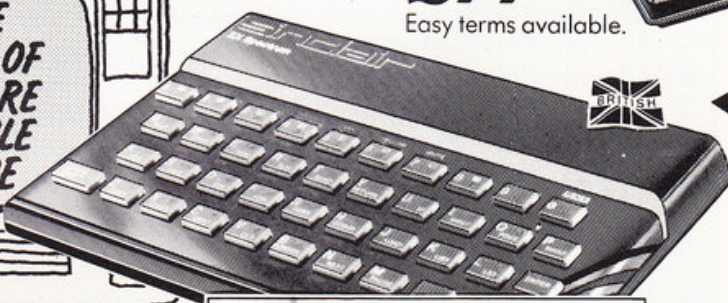
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PCN Charts

This top 30 games list is compiled from both independent and multiple sources across the nation. It reflects what's happening in high streets in the two weeks up to September 29 and, like the micro charts, does not take account of mail order sales. The micro charts this week show the number of machines sold in the two-week period ending one week before publication date, so they tell the story in the high street between September 15 and September 29.

GAMES

Top Thirty

	GAME TITLE	PUBLISHER	MACHINE	PRICE
▲ 1 (6)	Flight	Psion	Spectrum	£5.95
▲ 2 (5)	3D Tanx	DK Tronics	Spectrum	£5.50
▲ 3 (4)	Jet Pac	Ultimate	Spectrum	£5.50
▲ 4 (7)	Arcadia	Imagine	Vic 20	£5.50
▲ 5 (11)	Heathrow ATC	Hewson	Spectrum	£5.50
▼ 6 (1)	Horace and the Spiders	Psion	Spectrum	£5.95
▼ 7 (3)	Manic Miner	Bug Byte	Spectrum	£6.00
▼ 8 (2)	Penetrator	Melbourne	Spectrum	£6.00
► 9 (9)	Gridrunner	Llamasoft	Vic 20	£8.50
► 10 (10)	Kong	Ocean	Spectrum	£5.95
▲ 11 (12)	Football Manager	Addictive	Spectrum	£5.95
▲ 12 (15)	Spawn of Evil	DK Tronics	Spectrum	£5.50
▲ 13 (23)	Pool	CDS	Spectrum	£5.50
▲ 14 (—)	Jumbo Jet Pilot	Thorn/EMI	Atari/400/800	£29.95
▲ 15 (21)	Zoom	Imagine	Spectrum	£5.50
▼ 16 (8)	The King	Microdeal	Dragon	£8.00
▼ 17 (16)	Wacky Waiters	Bug Byte	Spectrum	£6.00
► 18 (18)	AH Diddums	Imagine	Spectrum	£5.50
▼ 19 (17)	Harrier Attack	Martech	Oric	£5.95
▲ 20 (26)	Zip Zap	Imagine	Spectrum	£5.50
▲ 21 (30)	Frantic	Imagine	Vic 20	£5.50
▼ 22 (19)	Nightflight	Hewson	Spectrum	£5.50
▲ 23 (—)	Talking Android Attack	Microdeal	Dragon	£8.00
▲ 24 (—)	Backgammon	Psion	Spectrum	£5.95
▼ 25 (22)	Matrix	Llamasoft	Vic 20	£8.50
▼ 26 (24)	Dictator	DK Tronics	Spectrum	£5.50
▼ 27 (—)	Hobbit	Melbourne	Spectrum	£6.95
▼ 28 (25)	Monsters in hell	Softtek	Spectrum	£6.95
▼ 29 (13)	Mad Martha	Mikrogen	Spectrum	£6.00
▲ 30 (—)	Chess	Psion	Spectrum	£6.95

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PCN Charts

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, like the games, is updated every alternate week.

PCN Charts are compiled exclusively for us by MRIB (Computers), London, (01) 408 0250.

HARDWARE

Top Twenty up to £1,000

MODEL		PRICE	DISTRIBUTOR
▶ 1 (1)	Spectrum	£99	(SI)
▶ 2 (2)	Vic 20	£140	(CO)
▲ 3 (4)	CBM 64	£299	(CO)
▼ 4 (3)	BBC B	£329	(AC)
▲ 5 (7)	ZX81	£40	(SI)
▼ 6 (5)	Texas	£99	(TI)
▼ 7 (6)	Oric 1	£130	(OR)
▶ 8 (8)	Atari 800	£300	(AT)
▶ 9 (9)	Dragon 32	£174	(DD)
▲ 10 (12)	Atari 400	£150	(AT)
▼ 11 (10)	Colour Genie	£168	(LO)
▼ 12 (11)	Sharp MZ80A	£349	(SH)
▶ 13 (13)	Lynx	£225	(CA)
▶ 14 (14)	Tandy Colour	£240	(TA)
▲ 15 (17)	Aquarius	£79.95	(MA)
▼ 16 (15)	Apple IIe	£969	(AP)
▼ 17 (16)	Epson HX20	£472	(EP)
▶ 18 (18)	CGL M5	£150	(SO)
▲ 19 (20)	Sharp PC1500	£170	(SH)
▼ 20 (19)	Nascom 3	£549	(LL)

Top Ten over £1,000

▶ 1 (1)	IBM PC	£2,390	(IBM)
▶ 2 (2)	Act Sirius	£2,525	(ACT)
▲ 3 (9)	HP 86A	£1,438	(HP)
▲ 4 (5)	Apple III	£2,780	(AP)
▼ 5 (6)	Commodore 8000	£1,200	(CO)
▼ 6 (3)	Epson QX10	£1,995	(EP)
▲ 7 (—)	Olivetti M20	£2,400	(OL)
▼ 8 (4)	Dec Rainbow	£2,714	(DEC)
▲ 9 (—)	Ajile	£2,995	(AJ)
▼ 10 (8)	Portico Miracle	£1,795	(PO)

AC Acorn Computers. ACT — ACT. AJ — Anderson Jacobson. AP — Apple Computer. AT — Atari International. CA — Computers. CGL — Computer Games Ltd. CO — Commodore. DEC — Digital. DR — Dragon Data. EP — Epson. GR — Grundy Business. IBM — IBM. JU — Jupiter Cantab. LO — Lowe Electronics. LL — Lucas Logic. MA — Mattel. MI — Midelectron. OL — Olivetti. OR — Oric. OS — Osborne Computers. PO — Portico Technology. RX — Rank Xerox. SH — Sharp. SI — Sinclair. SB — Sirtel. SO — Sord. TA — Tandy. TI — Texas Instruments.

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Software suppliers: B=Brainwave, G=Gemini, W=Watkiss Computers

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Our micros are being exported to many countries. In fact, while on holiday in Austria I glanced at one of their computer magazines. In the program pages, three out of five micros featured were British.

However, now the Japanese invasion has begun to hit us. The Sord M5 has already penetrated into a few homes. Obviously, it is fair enough for the Japanese to have a share of our market, but what effect is it going to have on the British computer industry?

The Japanese, being clever as they are, can afford to produce cheap micros. What effect can this have on us you ask? Either (1) it can lower the prices of all our home computers. Yes, dare I say it, even lower prices for uncle Clive's machines or (2)

PCN £10 Star Letter



force many manufacturers to quit production of their machines through lack of sales.

Which will it be? I rather fear it will be the latter. No longer will our homes be filled with Spectrums, BBCs, Dragons and the like, but loads of Hu Fling's specials at cheaper than cheap prices.

Just as things are going well for our country in one region of research, it looks like once again we are to be overcome by another country. So let's all forget the Japanese products and remember whilst things are going so well for us, why give others a chance?

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ACCESS

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

But without these cheapo goods wouldn't we all be a great deal poorer? Ed.

Gobbledegook is unpopular

In PCN No 27 you ran an article on how to add 1K of RAM to a ZX81 for a few pounds; this article in my opinion was excellent, it was clear and concise and would have been easily understood by most people even if they did not have a great deal of experience in electronic projects.

The following week you ran a project article on a sound generator for the ZX Spectrum; the explanation of the sound generator, its registers, and how to create various sounds was very clear, but the circuit diagram and an explanation thereof was about as clear as a Party Political Broadcast.

I have had a fair amount of experience of project construction and can usually follow the foggiest of diagrams and text, but I can safely say that you have succeeded where others have failed.

Surely the idea of a project is that as many people as are willing to have a go, can successfully complete and use the project, thus giving a better understanding of how the hardware side of things works and encouraging further future experimentation. Your project certainly does not achieve that.

You have assumed that your readers are all electronics engineers rather than computer hobbyists, so please write articles and draw circuit diagrams accordingly. A clear reprint of the Vero Board layout would

not go amiss, and could you explain why the sound generator required a separate clock — could it have not used the processor clock?

I am glad to see hardware projects in your mag and hope that in the future they may become a regular feature, but please remember not everyone has a professorship in micro electronics.

D W Haden
Telford, Shropshire

This wasn't one of our best. We will be unravelling our electronic gobbledegoop as soon as possible. So hold fire... all will be revealed. Ed.

What's a reasonable price for software?

I am writing to point out the total absurdity of Andrew Luke's suggestion (PCN Issue 25) that 'there should be a set price for all software'.

Does he really think that idea stands up to more than a moments thought? Can an advanced business database and a simple noughts-and-crosses program both be sold for £5? That would simply lead to no more highly sophisticated programs being produced. All the firms engaged in such development would simply announce 'We have stopped trading'.

Or perhaps he thinks that, to make sure the high-cost programs are covered, his 'set-price' should be, say, £2,000? In which case I can think of cheaper ways to play noughts-and-crosses!

Perhaps Andrew Luke would care to write in and tell us what

he thinks the 'set price' should be. The only clue he gives us readers (who are, doubtless, waiting with baited breath) at the moment is 'within reason, of course'. I suggest that reason is the one thing missing from his suggestion.

Iain D Stewart
Alva, Scotland

MUSE on cheap education software

Mr R Hughes writes (PCN Issue 29) complaining about a shortage of good educational software. I agree there is a lot of rubbish around, but some educational software available is really good.

But all is not lost. the MUSE, MEP, CET, software Mr Hughes would like is available for parents, even if not widely advertised. And, it is not expensive. Sinclair has made MEP software more widely available by advertising it and repackaging it, but it can be purchased by anyone directly from the MEP's distributors for less. MUSE is for both teachers and parents, and software is inexpensive. I don't know where one can buy CET software, but some of it is available free from Micronet.

MUSE can be reached at, MUSE, Freeport, Bromsgrove, Worcs B62 7BR. The MEP has 14 regional centres which might be of help. Any local education department should be able to tell you where the appropriate one is.

Another useful group is MAPE (Micros and Primary Education). Write to Barry Holmes, St Helens Primary School, Bluntisham, Cambridgeshire (don't forget when you write to these non-profit organisations to include an sae).

And finally, look carefully through software reviews, especially in specialist magazines — there IS good stuff around.

Good luck!
Doug Weller
Birmingham

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

Dragons don't forget

Q Please could you tell me how to load a subroutine in Basic on a Dragon 32 without erasing the program in memory. I would like to be able to write programs using subroutines already stored on cassette.

Herman Hagenbeek, Helmond, The Netherlands

A It's easy to 'append' programs on most Microsoft Basics. The principle is the same for all machines — all you need to know are the addresses specific to your machine.

Basic keeps two pointers to tell it where a Basic program is stored in memory. The first contains the start address of the Basic program — START is in locations 25 and 26 on the Dragon. The second pointer tells the Dragon where the Basic program ends (and incidentally where numeric variables start). END is in locations 27 and 28 on the Dragon.

So how do you append? If you move START up to two bytes before END, the Dragon will think it has no Basic program in memory. But the first program remains safely tucked away before this new Basic program area. So you then CLOAD or type in the second part of the program as normal. Finally, if you put START back at the start of the first program, the two will be joined.

On the Dragon, follow these steps:

- 1) CLOAD or enter the first part of the program
- 2) N=PEEK(27)*256+PEEK(28)-2
- 3) POKE 25,H: POKE 26,N-H*256

If you type LIST now, you'll find your program has gone. It's still there in memory — it's just hiding from Basic.

- 4) CLOAD the second part of the program
- 5) POKE 25,30: POKE 26,1

Type LIST and you should have a whole program. Note that this just tags the programs together — it won't insert line

numbers in between existing lines. So your subroutines must be at higher line numbers than your main program.

You may find other uses for this technique — you can load and run a second program without having to save the one you're working on. A nice utility to write would let you keep lots of program in memory and switch between them at will.

Moving on with the Oric

Q I've just got the hang of movement on my Oric. The problem is how to speed it up. I was told to try POKE 775,255 but this gives only a small speed increase and there's almost no improvement at all if I have a detailed display.

Can you give me a routine to speed things up . . . machine code perhaps? Oh, and while you're at it, how do you get more than two colours at once in Hires?

Adrian Stephenson, Paignton, Devon

A I'm afraid that there aren't any magic go faster routines for most micros, including the Oric. POKE 775 to reduce the amount of time the Oric spends messing about with the keyboard does help a little, but in general the speed is a function of Oric Basic and can't be changed.

If you need a faster program, you should really be writing in Forth or machine code. In many cases, you won't need to write a whole program in machine code — you just speed up the bits that go slow. In your case, if you could program in machine code, you would work on the actual graphics movement — data entry, calculations and so on could be left in Basic.

If you can't use a faster language, you will just have to try and squeeze the speed from Basic. This means thinking and writing in a 'fast' way. Concentrate on loops and subroutines — because they are repeated, improving them gives a tremendous increase in speed. Move your subroutines to the front of the program and avoid GOTOs. Both tips work because if you tell Microsoft Basic to GOTO a particular line, it starts looking for that line from

```
10 REM ORIC COLOURS
15 HIMEM#97FF:HIRE
20 AS="THE ORIC IN COLOUR"
30 FOR I=0 TO 23:FOR J=1TOLEN(A*)
40 CURSET 60+J*6,I*8,0:CHAR ASC(MID$(A*,J,1)),0,1
50 NEXT J,I
60 Y=0
80 FOR B=0 TO 7:FOR F=7 TO 6 STEP -1:FOR C=0 TO 2
90 CURSET 0,Y,0:FILLB1,1,B+16
100 CURSET 6,Y,0:FILL 1,1,F
110 Y=Y+1:NEXT C,F,B
120 END
```

All 64 possible combinations of colour for the Oric.

the start of the program onwards!

Scrap long variable names and declare the most frequently used variables first. Don't do hundreds of calculations as the program needs them (for example screen addresses). Work the lot out at the start of the program and keep them in an array as a 'look up table'. The list of go-faster tips goes on and on.

Probably the single best thing you can do if you are writing graphics games is keep off the Hires. Use user defined graphics. The characters give the impression of Hires detail and you can stick 'em in strings and move them about at speed.

Oh and while you're at it, you'll find using more than two Hires colours on the Oric another source of frustration. The Oric's graphics are capable of spectacular displays but they are unbelievably difficult to use with the commands provided.

Just to start you off, the Oric's Hires colour is controlled with serial attributes much like its TEXT screen. You'll find learning it a lot easier if you are already familiar with the text screen. Try appendix C in the manual.

As far as attributes are concerned, the Oric's Hires memory is divided up into 200 rows of 40 'cells'. These are the 200x40 bytes that make up the memory used for the screen. Each cell is six pixels (one text character) wide. So you can control the foreground and background colour of each individual block of six pixels.

Once an attribute is in a cell, all the cells to its right will have the same attributes right up until the next attribute on that line. To set the attributes you can use POKE, FILL, INK or PAPER. FILL is the one to understand — it places a given attribute into so many lines of so many cells (FILL lines, cells, attribute). Its great for setting

whole blocks to particular values.

PAPER and INK work as they do on the text screen by storing two columns of attributes down the left hand side of the screen. When you first set HIRE, all that's on the screen is these two columns. So putting random attributes produces long lines of colour:

```
10 HIMEM#97FF: HIRE
20 DEFFNR(X)=INT(RND
(1)*X)
30 CURSET
FNR(40)*6,FNR(200),0:FILL
1,1,FNR(8)+16
40 GOTO 30
```

Obviously, more productive displays require you to be very careful where you put your attributes.

Oric's graphics can be quite stunning but they do require some effort on your part. Anyway, just to encourage you to give it a try, there's a simple demo above.

Spectrum link-up

Q I own a 16K ZX81 and a 48K Spectrum. Is it possible to connect the two via the edge-connector so that the Spectrum can use the ZX81's RAM or communicate without expensive RS232 interfaces?

Michael Tomlinson, Wallasey, Merseyside

A Anything is possible if you've got the components, tools, experience and inclination to do it. This trick isn't worth the hassle — the 16K RAMpack would have to be bank-switched, among other nasties. If you must have more memory, go for a ready-designed kit such as the Basicare system or East London Robotics' SP80.

Incidentally, if you are a hardware type, then hooking the two up with a serial interface can be both cheap and interesting.

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HIRE forms of graphics

Here is an interesting and perhaps useful attribute for the Oric-1.

Type in HIRES on power up and do some drawing on the graphics portion of the screen. Then change back to TEXT mode and press control L to clear screen. Follow this by ESC then DEL. The top half of the screen will now be visible again. This could have great potential in graphic and text adventure games.

A. S. Clarke,
Sneinton, Nottingham

Something ELSE for the Oric

The ELSE bug in OricBasic can be fixed using a small patch in RAM, since the subroutine that contains the bug is called from a routine on the zero page. What the bug does is add an extra 'Y' to the variable before the ELSE. The following program demonstrates this:

```
10 A = 1: AY = 2: B = 3
20 IF A <> B THEN PRINT A
ELSE PRINT B
```

To fix the bug, type in the following program and run it. The machine code can be put anywhere in memory by altering the value of START in the first line.

```
10 START = #400: LOC =
START
20 REPEAT
30 READ DA
40 CS = CS + DA
50 POKE LOC, DA
60 LOC = LOC + 1
70 UNTIL DA = 255
80 IF CS <> 2838 THEN
PRINT "TYPING
ERROR": END
90 DOKE#F0, START: END
100 DATA #C9, #C8, #D0,
```

```
#05, #20, #61, #CA
110 DATA #D0, #07, #C9,
#27, #F0, #F7, #4C
120 DATA #4E, #EA, #4C,
#E8, #00, #FF
```

David Hunter,
Glasgow

Dragon double-take

Two tips for the Dragon 32.

1 POKE 329,0 sets the keyboard into inverse mode and POKE 329,255 sets it back to normal. This can be built into a program removing the need for shift 0.

2 EXEC 41194 can be used to pause a program (eg at the end of a page of text). Pressing any key restarts the program.

P Sutcliffe,
London SE25

The ASCII conversion

On the Oric-1, ASCII values are not readable using the KEYS function. PEEK(735) AND 127 gives the ASCII value of the current key held down. This location will not read the shift/ctrl keys, for these you need to use location 521, which returns the following values:

```
No shift/ctrl = 56
ctrl = 162
Left hand shift = 164
Right hand shift = 167
```

These keys also have the following priorities:
Right hand shift Left hand shift
Control

N Smith, Ladybridge
Deane Bottom

Back and forth Dragon graphics

This short machine code routine (above) for the Dragon can be used to invert the first four pages of the graphics screen ie change the foreground colour to the background colour and vice versa. The change is very fast and is operated by using EXEC &H6000, once the code is loaded. Program 1a is the machine code loader and program 1b is a short demonstration using the routine.

CJ Barlett,
Uxbridge, Middlesex

Which bit do you want?

A simple way of finding the exclusive OR of two numbers (bitwise) is to use the following

```
10 FOR I=24576 TO 24595
20 READ A$: POKE I, VAL("&H"+A$): NEXT I
30 DATA 8E, 06, 00, A6, 84, 88, FF, A7, B4, 30, 01
, 8C, 1E, 00, 27, 03, 7E, 60, 03, 39
50 PMODE 4: SCREEN 1, 1: PCLS
60 DRAW "BM70, 96S8U5R4D3NL4BRD2U5R4D3L4R
1F2BR2NR4U2NR3U3R4BRNR4D3R4D2NL4BRR4U2L4
U3R4BR6BD5"
70 DRAW "NR4U2NR3U3R4BRND5R4D5BR3U5NL2R2
BRNR4D3NR3D2R4BRU5R4D3L4R1F2"
80 IF INKEY$(<>CHR$(13)) THEN GOTO 80
90 EXEC &H6000
100 GOTO 80
```

These programs exchange the Dragon's foreground and background colour.

one-line program.

```
10 INPUT "Enter two num-
bers"; A, B: PRINT A; EOR
"; B"; (A OR B), AND
NOT (A AND B)
```

Jan Wortelboer,
LD Enschede, The Netherlands

Chemistry of the Lynx

The LYNX routine shown below converts the numerical values in a string representing a chemical formula into subscripts. It may be of use to LYNX users wanting to write programs using chemical formulas.

Note that the additional CHR\$(29) in line 150 prevents the subscript being overwritten by the following line.

John Ridgway, Farnworth,
Bolton, Manchester

Newbrain in the Sinclair style.

An unadvertised feature of the Newbrain is the Sinclair-style single key entry of keywords. There are obtained by using the graphics characters, but the manual does not give a listing of the relevant keys. To obtain a listing, try typing in graphics characters within program lines alongside their normal keytop characters. eg using character set 2 (use GRAPHICS key as 'shift') enter:

```
10 (graphic A) = A
```

```
20 (graphic B) = B
30 (graphic C) = C
* * *
* * * E to Y
* * *
260 (graphic Z) = Z
270 (graphic () = (
280 (graphic —) = —
290 (graphic)) = )
300 (graphic +) = +
```

LIST will now give:
10 LIST = A
20 NEW = B
etc

Experimenting with these keywords can give some surprising results.

M Waring,
Chorley, Lancs

A better ZX printout

Here is a tip regarding the use of the ZX Printer. It helps the print quality if you a) Hold the printer paper as it comes out of the printer and keep a slight tension on it.

b) Print a couple of black character lines to warm up the printer styli. This can be done on the Spectrum by:

```
LPRINT INVERSE 1; "32
SPACES"
```

This stops the first few lines in a listing being slightly lighter than normal.

J Watmough, Banchory,
Kincard, Scotland

```
100 INPUT "CHEMICAL FORMULA "; F$
110 FOR N=0 TO LEN(F$)
120 IF ASC(MID$(F$, N, 1)) < 58 THEN LET
A$=A$+CHR$(29)+MID$(F$, N, 1)+CHR$(28)
130 ELSE LET A$=A$+MID$(F$, N, 1)
140 NEXT N
150 LET F$=A$+CHR$(29)
160 PRINT F$
```

A Lynx routine to cope with chemical formulas.

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With the decline of the 400 and 800, Max Phillips Pro-Tests their rejuvenated successors.

As new micros go, the Atari XL range is almost unique. New machines are usually late, full of bugs and teething troubles and desperately short of software. Atari has simply modernised its one machine — based on the 400 and 800 models. So bear in mind this is a very mature system — tried, tested, understood and supported.

There will be two models, a 16K and 64K model. A third baby due in 1984 is the 1450XLD — a 64K machine with built in disk drives.

Unlike previous Ataris, the company will be offering official upgrades between models. Planned launch date and prices are not yet finalised for all the new products but the 600XL tested here will sell for £160.

Presentation

Atari has stuck with its spacious and futuristic packaging. The machine itself is beautifully styled and miles apart from the cheap seventies science fiction look of the 400 and 800. Its livery is a sort of chocolate and off-white and overall shape very reminiscent of one Acorn Electron.

The only flaw is a comical looking cartridge socket covered by two flimsy metal doors. Instant reaction from almost everyone who has seen it is to poke their fingers in! It's also worth noting that although the 600XL runs with existing add-ons, it looks a bit out of place sitting next to them.

Documentation

The 600 will be supplied with an Owners Guide and a 14 page introduction to Basic. We did get the flimsy Owner's Guide but the Basic booklet wasn't available.

The content is typical of Atari packaging. Oversized and mostly empty. The Owner's guide does go very quickly through the basics — setting up, self tests, keyboard and plugging cartridges in. There's even three little Basic programs for you to try.

Atari relies very heavily on its users to learn about their machines. It may be necessary to buy a Basic tutorial. This may have been reasonable in the days when a 400 didn't come with Basic, but the 600XL does and it should be documented. You'll also need Atari-specific magazines to keep you in touch and up to date.

Construction

The 600XL is superbly built — particularly for £160. The machine is solid and produced with quality components.

Inside, the main board is covered in metal sheeting to comply with America's radio interference laws. This prevents you getting at the chips with ease — well alright — it makes putting it back together again a real problem! For those that are interested, the new machines are made from the same recipe as the old — a 6502C and Atari's custom chips GTIA, POKEY and ANTIC.

The power supply is merely an improved version of the original units. A different

The Ataris born again

plug stops you swapping new for old.

The other curio is the cartridge socket. Old Ataris were famous because they automatically cut the power supply when a cartridge was changed. This was supposedly to protect both machine and cartridge from possible damage and it also offered an automatic start whenever you swapped programs.

The new socket doesn't cut the power and it doesn't hurt the cartridges. Occasionally you'll hang the system by doing it and unfortunately you do have to hit reset to actually start a new cartridge going. Still, it's better than machines where you have to switch on and off to swap cartridges.

Keyboard

The 600XL is blessed with a superb keyboard. It's very similar to the Electron and Lynx in feel but, if anything, is slightly better. For the most part it's a standard Atari layout.

There's a separate row of general purpose control buttons — Reset, Option, Select, Start and, a newcomer, Help. These make running commercial programs a real pleasure. Coupled with the Atari's ability to auto-start disk, cassette or cartridge programs, you rarely have to go near an instructions sheet to get a game going.

The only key that seems to be missing is a Pause key — useful for telephone calls, sore trigger fingers or whatever. Of course, many games would be ruined if the user could freely stop and start them. But it would be a programmer's decision to implement the key or not.

When you are actually programming the machine, the keyboard suffers from too many two fingered and often two handed combinations. The screen editor is driven with Control and Shift combinations plus editing keys on the far end of the keyboard. And there are a few sneaky unlabelled combinations — Control and 1 pauses screen output for example.

The standard control keys Control A-Z generate an antique range of Pet-style predefined graphics. The keys themselves aren't labelled, so for the first few weeks you'll need a keyboard chart sellotaped to your bathroom mirror.

The XL machines also have an international character set added to their repertoire and these are available in exactly the same manner as the predefined shapes. To switch between the two, you need to be in Basic and use the elegant and

memorable POKE 756,204. If you aren't using Basic, you have to hope that whoever wrote your program has remembered to provide a switch.

Atari has abandoned its logo key. This used to switch between inverse and true video. The key is still there, but the legend is now an equally impenetrable divided square that looks like it was stolen from a book on semaphore.

Screen

The XL machines plug straight into a TV and the 600XL also has the welcome addition of a monitor output. This drives a Composite monitor. The TV picture is a little disappointing although this could simply have been our early machine or our particular TV.

Regards actual capability, the screen is virtually unrivalled. The Ataris are capable of 16 colours at 16 brightness levels — though all 256 can't be done at the same time. The 600XL supports 16 different screen formats (or modes) — 32 if you count being able to switch a four line text window on and off at the bottom of a graphics screen. This is an improvement on the 12 modes offered by UK and recent American 400s and 800s (those fitted with the GTIA display chip) and the nine offered by the original CTIA chip systems.

The modes allow you to select between available colours, graphics resolution, text and double height text modes and so on. The maximum resolution is 320×192, with the corresponding text format being 24 rows of 40 characters. This may seem a little old-fashioned compared to machines like the Electron which can manage 80 column/640 pixel screens.

The lack of 80 column text is a bind for serious use though people who use Atari-writer seem perfectly happy with it. The lack of graphics resolution is insignificant. High resolution screens are useful for Computer aided design, art, business and mathematical graphics — large, static and detailed displays.

The Ataris have always been unashamed games machines where the lack of resolution is rarely noticed. Besides, Atari has provided far more important facilities for games writers.

For starters, there's player/missile graphics — Atari's rendering of sprites. The 600XL can control moving objects on screen in hardware providing for fast, smooth arcade games. You can use them yourself though it isn't a simple task from

the built in Basic.

Other useful tricks are smooth scrolling in any direction and the ability to reassign the colour palette at will. The result is that the Atari plays arcade games as well as any TV game and almost as well as many arcade machines. All in the comfort of your own home.

The only thing that seems to be missing is user defined characters. Of course, you don't need these for games in the way you use them on a BBC or Spectrum because you can use player/missile graphics. But they would be helpful for more serious programs in areas like maths and education.

If you ignore the gradual improvements to the system, Atari does seem to have developed a remarkable display system years ago. It is still a target that others have to follow.

Storage

The Ataris have three storage systems, cartridge, cassette and disk. The cartridges give the machine its TV game ability, allowing non-technical users to buy it as a plug-in-and-go games console.

Next up is the dedicated cassette recorder system. Atari produces its own recorder (£50). It does take some effort to convert a standard cassette recorder for use with the system. The advantage is full remote control and superb reliability. The disadvantage is that it pushes the cost up making the 600 a very expensive 16K system.

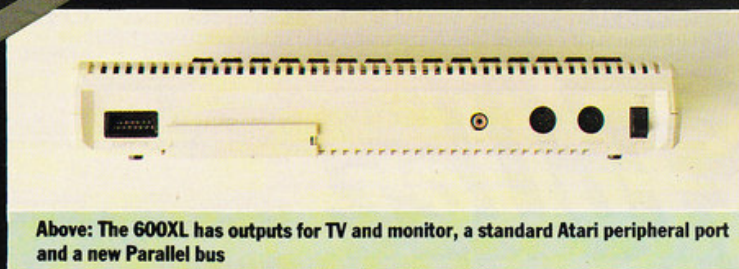
One of the much imitated tricks is the audio track on the cassette recorder which can be reproduced via the Atari through the TV. This allows programs such as a foreign language tutor to reproduce genuine foreign speech under computer control.

Finally Atari offers a disk system with its own DOS. However, the 600XL really needs its memory expansion to make the disk system practical. You can use the elderly 810 disk drive with a horribly crammed 88K per disk or a new model 1050. This uses a dual density format to provide a small 127K per disk.

One drive can be connected straight to the 600XL and if you use the 850 interface module up to four drives can be connected.

Expansion

The 600XL is very expandable simply because it's quite happy with existing 400 and 800 peripherals as well as a range of new add-ons to coincide with the launch of the XLs. The basic expansion is, of course, a 64K memory module to bring the 600 in line with the big boys.



Above: The 600XL has outputs for TV and monitor, a standard Atari peripheral port and a new Parallel bus

THE FULLER BOX

The Sound System for the Spectrum

The FULLER BOX added to the ZX Spectrum, improves the sound quality enormously. The built-in audio amplifier working well with all SPECTRUM programs.

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The FULLER BOX is complete with full documentation and a demo tape which includes the type of sounds you can achieve. It also allows you to program your own sounds. Fitting neatly onto the back of the SPECTRUM, the FULLER BOX still allows access for other peripherals, including the new SPECTRUM Micro Drives, via its duplicate user port.

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Left: The new Atari combines a better keyboard, better expandability with existing software and add ons

Besides the many packages which start life on the machine, most hits from the arcades and other micros eventually find their way onto the machine. As a games playing tool, there is little to rival it.

In business, the Ataris have a handful of successful packages. The original VisiCalc is available and word processing is catered for (even on a 16K 600XL) by Atari's own Atariwriter. The hobbyist isn't going to feel abandoned either. Available languages include 6502 Assembler, Forth, Pilot and a Microsoft Basic if you have a disk system. Expanded system can even run a full Pascal.

The drawback with Atari software is simply cost. Many packages come on cartridge — a medium which still seems to cost the Earth. An alternative system, such as the Sinclair Spectrum, offers a lower entry cost and a matching, though cheaper software base. So with the Atari you do pay extra for the quality and convenience.

Verdict

The XL range is very mature. It's one of the few new computers you can buy that offer a ready-made software and add on market. The system is, as its always been, a remarkably good piece of design.

The 600 takes the Ataris further away from being games machines and much more into serious hobby computing. Performance wise you don't get much over the existing 400s and 800s — if you're interested, keep an eye open for bargain special offers. What you do get is a computer with a superb keyboard with a serious expandability. Provided Atari can deliver add-ons such as the expander box and CP/M system, the XL machines will be stiff competition for the BBC Micro and Commodore 64.

So the XLs will appeal to serious hobbyists, those prepared to pay a little more for a well built machine with a serious growth potential. And one, of course, that plays great games.

◀ 19 It also has the standard 'peripheral' interface as well as a new parallel bus. 'Peripheral' allows you to connect either a single unit such as a cassette recorder, disk drive or one of the new Atari printers. These are an 80 column dot matrix printer, a low cost letter quality printer and a four colour printer/plotter. Alternatively, there's a multiple interface box to which it can be connected.

The new machines come into their own with an Expander box. This uses the parallel bus and so, unlike the other new add-ons, can't be bought for the 400 and 800. The Expander has dual RS232 interfaces, a Centronics port and eight free slots for all manner of goodies, both Atari and third party. Products already being whispered about are an 80 column board, clock, hard disk controller, VCS card and many more.

Atari is also planning a CP/M box providing the machines with a Z80, CP/M 2.2 and an 80 column video display. So, in theory, the 600 joins the ranks of home micros that can grow into full business machines. So, although in terms of actual performance the 600 doesn't offer that much over a 400 or 800, it has a much better expansion capability. Coupled with the new keyboard, the 600 comes across as a much more serious hobbyist computer than its games playing predecessors.

The only sad loss is that the 600XL has only two joystick sockets instead of the usual four. Most of the time users won't even notice. But there's the odd piece of vitally important software that only comes into its own with four joysticks — Thorn-EMI's Soccer, for example!

One bad habit of Ataris in general is their mad desire to leave you in a heap of spaghetti-style wiring. Many of the peripherals require their own power supplies and some of the boxes used to connect them need their own as well. Hopefully, the expander box will help tidy up an expanded system.

Basic

The 600XL breaks new ground for Atari because it has a built in Basic. However, it's not a new Basic, it's the same interpreter that comes on cartridge for the 400 and 800.

It is a simple Basic, very similar to an 8K Microsoft like those supplied by Apple and

Commodore. Parts of the system are very nice to use but it does have some limitations not least of which is that it is rather slow.

On the plus side, Basic has a delightful screen editor using the four cursor keys with insert and delete line and character. Many Basic keywords can be simple abbreviated. Basic variable names can be of meaningful length and many simple errors are echoed with a cursor highlighting the position of the mistake.

Less friendly to the beginner are the majority of run-time errors which generate error codes rather than messages. Many of the machine's really special facilities require you to start messing about with fiddly PEEKs and POKEs. Even those features which are supported, e.g. SET-COLOR, are frequently better controlled with POKE.

So Atari Basic is perfectly adequate as a home computer language. There's nothing wrong with learning it as your first language. But be aware that there are more sophisticated versions of Basic, such as BBC Basic, available on other machines.

Software

Software is the real clincher for the Atari systems. Its ancestry in arcades and TV games has given rise to a vast catalogue of professionally written and produced software. Contrary to first impressions, Atari software spans the whole spectrum — games, education and business though you'll find that a lot of software is American in nature — okay for games but useless for education.

The Atari is a stable games machine.

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Learning is Fun! 40 EDUCATIONAL GAMES FOR THE SPECTRUM



VINCE APPS

'40 Educational Games for the Spectrum' by Vince Apps, published by Granada at £5.95 (paperback, 170 pages).

Learning may be fun, as this title suggests, but typing in and playing boring pseudo educational games on a Super Sinclair Spectrum is not everybody's idea of fun.

The contents of this compendium range from maps and maths to music and morse code, although to be fair this is

quite a good selection. Many of these programs have seen the light of day many times before, even once or twice on a Spectrum in one form or another so you probably won't find anything original (what could you expect with such short programs?).

Each program is assigned a chapter which starts with an example display of the screen and a chatty intro. After the chat you get playtime instructions. Also included in each chapter are programming hints, notes and a listing.

These vary from explaining, vaguely, how the program works, covering any special effects to take note of, to nice one-liners on how to make the program harder. But there's no explanation of why altering a particular line makes the program harder.

The listings were not printed on a Sinclair sparky printer, they were done on a 'mechanical printer' to make them readable. This is quite a good idea except that it doesn't really work. The special Spectrum

characters that crop up have to be explained in the text. **KG**

36 Challenging Games for the BBC Micro

Tim D Rogers and
Chris Callender



Another listings book, although possibly one with a difference. The book contains 36 games though whether they are challenging or not, depends on what other games you've played and how long you've had your Beeb. All can be modified

36 Challenging Games for the BBC Micro, by Tim Rodgers and Chris Callender, published by Interface at £5.95 (paperback, 270 pages)

for a model A and there is an appendix which gives the modifications necessary to use the games with joysticks.

Part one of the book is a 'how it works' section. Each game is treated as a separate chapter, each of which contains a brief description of the play and how the game works. The structure of the program is outlined by listing the main procedures and variables, and you are given the program length in bytes.

Section two consists of a series of black and white screen dumps (copies of a particular display that occurred sometime during each game). But some of these are not very clear and may be discouraging. Most however, serve their purpose and show you what to expect in each game.

Part three of the book contains the program listings. These were printed on a dot-matrix printer using the LIST07 option of the BBC Basic. They are quite clear and the use of the list option will help in the understanding of the structure. **KG**

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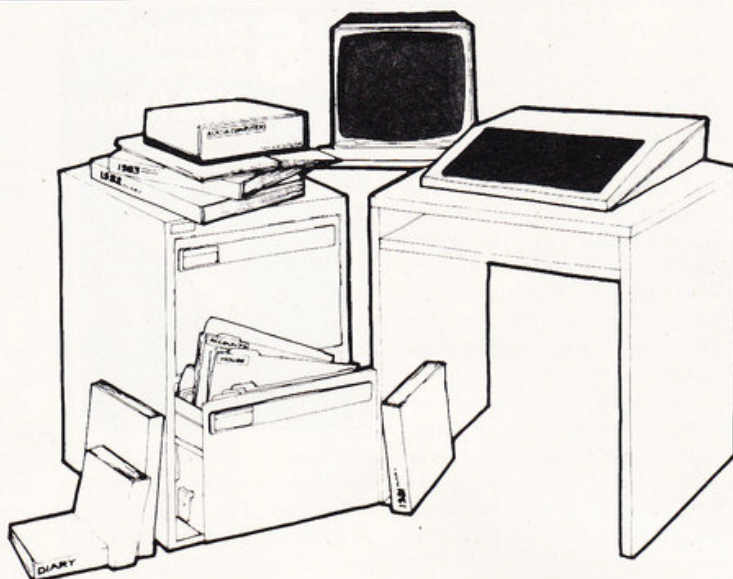
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Paul Kaufman takes Oric owners beyond *Ping* and *Zap* to build up complex sound sequences.

Oric goes Bong



For its price the Oric 1 has a comprehensive range of sound facilities. It includes two different keyclick sounds, four preset sound effects and three general sound commands.

All of these will be produced through the Oric's internal speaker or from an external amplifier if pins 4 and 5 are used on the cassette socket.

The four preset sounds are ZAP, PING, SHOOT and EXPLODE and are accessed simply by typing their names.

The three general-purpose sound commands are SOUND, MUSIC and PLAY. SOUND allows you to select a channel and a frequency and play it at any of 15 volume levels. MUSIC is similar, except that instead of choosing the frequency you can choose an octave and a note. The PLAY command allows you to select which tone and noise channels are actually played and the desired envelope shape.

If you are heavily involved in machine code programming then the Basic commands can be accessed directly in machine code if you know the correct entry points.

The preset sound commands are the easiest to use. All you have to do is to subroutine at the correct location:

PING = \$F412

SHOOT = \$F415

EXPLODE = \$F418

ZAP = \$F41B

If you are using a machine code monitor such as Tansoft's Oricmon, you would just code, say, for ZAP, JSR \$F41B. To try this from Basic enter: CALL #F41B. The same approach could be used for PING, SHOOT and EXPLODE. ZAP is slightly different from the other preset sound commands in that it is the only one that stops the processor from doing other things while it is running. This is because the pitch of the ZAP sound has to be altered while it is playing. The other preset sounds are forgotten about once the processor has triggered them.

To access the keyboard sounds a similar procedure is used. The Control G bell sound is in fact PING, and so has already been described. The entry points for the high and low key-clicks are:

KBEEP = \$FAFA Normal Keypress

CONTBP = \$FB10 Control Keypress

These could be used to simulate a castanet playing:

```
REPEAT: CALL #FAFA:WAIT 5:
CALL #FB10:WAIT 5:UNTIL
KEYS = " "
```

This will keep going until the space bar is pressed. You will find that if Control F is pressed the keyclicks are switched on and off. How does the computer know whether you pressed control F after you have pressed some other keys? Easy, a special location is reserved in memory to keep track of such things. It is known as MODEO and sits at location \$26A. Each

of the eight bits in this location has a special function (see below):

MODEO = \$26A

Bit 3, which controls the keyclick, specifies 'keyclick on' if it is clear, 'keyclick off' if it is set. This could be done in a program by entering:

POKE#26A, PEEK (#26A) OR 8 Keyclick off

POKE#26A, PEEK (#26A) AND NOT 8 Keyclick on

In machine code this would be:

```
KC-OFF LDA $26A KC-ON LDA $26A
ORA #$8 XOR #$8
STA $26A STA $26A
RTS RTS
```

This could obviously be modified to set and reset the other bits in MODEO to toggle the cursor or screen on and off.

A routine to test the keyclick flag and beep if it is clear could be:

```
TEST LDA $26A
AND #$8
BNE END
JSR $FAFA
```

END RTS

or in Basic:

```
10 IF (PEEK(#26A)AND8) = 0 THEN
CALL #FAFA
```

The three general-purpose sound commands are a bit trickier to set up but once you understand them you should have no problems.

All three commands make use of an area of memory which has been designated as a general-purpose workspace and is known as the PARAMS area, so called because it is used for parameter passing.

PARAMS begins at \$2E0 and extends for about a dozen bytes upwards. By setting up the contents of the PARAMS

area with your own routines you can use a great many of Basic's built-in routines. The first location of the PARAMS block is often used by Basic to flag whether a function has gone out of range or has a faulty parameter.

Sound

The entry point for the SOUND command is \$F41E, and all registers are used.

PARAMS usage:

\$2E0	Error flag	PARAMS
\$2E1	Channel	PARAMS + 1
\$2E2	Spare	PARAMS + 2
\$2E3	Period(L)	PARAMS + 3
\$2E4	Period(H)	PARAMS + 4
\$2E5	Volume	PARAMS + 5

Let's try to set up the SOUND command through machine code. Try something straightforward: SOUND 1,500,7

To set up the PARAMS area, first make sure that everything is in Hex. 1 and 7 are OK, but 500 must be converted. If you type PRINT HEX\$(500) the computer will convert it for you—the answer being \$1F4. Thus your sound function is set up.

Hex:

```
A908 LDA #$1
8DE102 STA $2E1
Set up channel
A9F4 LDA #$F4
8DE302 STA $2E3
Period, low byte
A901 LDA #$1
Period, high byte
8DE402 STA $2E4
A907 LDA #$7
8DE502 STA $2E5
volume level
201EF4 JSR $F41E
go to SOUND command
60 RTS
go home!
```

Bit	7	6	5	4	3	2	1	0
Function	Spare	Spare	Cols 0&1 Protected	ESC Pressed	Keyclick on/off	Printer on/off	Screen on/off	Cursor on/off

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If you are using a monitor you could try setting this routine up in memory, starting say, at \$400. You could then execute it by the command 400G.

It should be remembered that all the SOUND commands in the Oric make use of all of the 6502's internal registers. It is therefore wise to save them before executing any sound commands.

Music

Entry point = \$F424. All registers used.
PARAMS usage:

\$2E0	Error flag	PARAMS
\$2E1	Channel	PARAMS + 1
\$2E2	Set to 0	PARAMS + 2
\$2E3	Octave	PARAMS + 3
\$2E4	Set to 0	PARAMS + 4
\$2E5	Note	PARAMS + 5
\$2E6	Set to 0	PARAMS + 6
\$2E7	Volume	PARAMS + 7

Apart from setting locations \$2E2, \$2E4 and \$2E6 to zero a very similar routine to that shown above could be set up to make use of the MUSIC command. Music is interesting in that, apart from fiddling with some of the parameters, it doesn't generate any sounds. Once it has looked the note and octave values up in a table it jumps to the SOUND command, thus saving programmers the need to repeat a section of code.

PLAY

Entry point = \$F421. All registers used.
PARAMS usage:

\$2E0	Error flag	PARAMS
\$2E1	Tone enable	PARAMS + 1
\$2E2	Set to 0	PARAMS + 2
\$2E3	Noise enable	PARAMS + 3
\$2E4	Set to 0	PARAMS + 4
\$2E5	Envelope mode	PARAMS + 5
\$2E6	Set to 0	PARAMS + 6
\$2E7	Period L	PARAMS + 7
\$2E8	Period H	PARAMS + 8

If you remember back to the Oric manual you will see that PLAY only has an effect if SOUND and MUSIC use a VOLUME parameter of 0. This still applies if you use PLAY through a machine code program. Don't forget that pressing a key will cause your parameters to be overwritten by the keyclick command.

Adding preset sounds

If you are fed up with PING, ZAP, SHOOT and EXPLODE, a little more inside knowledge will allow you to add your own effects with not too much difficulty. To understand how this is done, look at the AY-38912 chip directly. Diagram 1 shows the layout of the registers within the sound chip.

Registers 0 to 5 are used to control the periods of the three tone channels. The higher the numbers stored in the registers, the lower the tones. Register 6 has the same effect for the noise channel, although with less accuracy due to only five bits

being available (0 to 31). Register 7 controls which tone or noise channels are selected.

A bit set disables the channel, a bit cleared enables it. There is also an I/O port in the chip which does not affect sound generation.

Registers 8,9,10 control the amplitude or volume of each channel. Bits L0 to L3 are used for the 15 preset volume levels. Bit M indicates that the chip is in envelope mode and the volume is controlled by registers 11 to 13. When bit M is set then L0 to L3 are ignored.

Registers 11 and 12 contain a 16-bit value, which controls the envelope period which determines how long a note takes to start and end.

Register 14 is an I/O port that is used to read the keyboard. Its use has no effect on sound production.

If you want to create a BONG sound to go with the built in PING, first write it in Basic:

```
10 SOUND 1,550,0
20 PLAY 1,0,1,1600
```

Then convert these statements into the Hex values that are to be entered into the sound chips registers. Line 10 says load up channel 1 with a frequency of 550 (or \$226 in Hex) and then refer to the PLAY command for the envelope, while line 20 says select tone channel 1 to play, with no noise channels, envelope shape 1, and an envelope period of 1600 (\$640 in Hex).

You then need to decide which values go in each register. Registers 0 and 1 control the frequency of channel A, so you should store \$26 in register 0 and \$02 in register 1 (giving \$226). As you are not using channels B, C or noise, you should store 0 in each of their registers (2-6).

Register 7 is used to switch on the required channel. Remember that each bit set means a channel disabled, so to select channel A you have to store \$3E in this register. Note that the top two bits should not be touched as they are used by the Oric for reading the keyboard. Register 8 needs

the M bit set so that the envelope control is used, so in this register you store \$10. Registers 9 and 10 are set to 0. In registers 11 and 12 you store the envelope period bytes which would be \$40 and \$06 respectively.

Then look up which envelope shape you want, which in this case is the first one. So in register 13 you store \$00. This will also trigger the chip to play the sound.

There is a routine written in ROM which will access the sound chip. It is called W8912 and sits at \$F535. It can be used by loading the accumulator with the register you wish to write to, and the X register, with the required data and then JSR \$F535. The trouble is that you have 14 registers to write to.

The Oric ROM comes to the rescue again with a routine called SNDLD, which sits at \$FA6C. This routine will take a table of 14 values and send each byte to the sound chip in turn. All you have to do to use it is to supply the start address of the data table in the X and Y registers of the CPU and then jump to the routine.

Let's take the BONG example. First you need to set up the table in memory. Let's say you start at \$2000:

```
2000 TABLE BYTE $26,$2,0,0,0,0,0
2007          BYTE $3E,$10,0,0,$40,
          $6,0
200E A200 LDX #0
      set up low table address byte
2010 A020 LDY #$20
      set up high table address byte
2012 206CFA JSR $FA6C
      send table to chip
2015 60RTS
      return to calling program
```

One disadvantage of SNDLD is that it will only work with fixed tables of parameters. If you want to create a sound that changes as it plays, such as the ZAP command, you will not be able to do it with SNDLD alone. The answer is to use SNDLD to set up the basic sound parameters and then the W8912 routine to tailor individual sound chip registers.

Figure 1

BIT		B7	B6	B5	B4	B3	B2	B1	B0	
REGISTER										
R0	Channel A Tone Period	8-BIT Fine Tune A								
R1						4-BIT Coarse Tune A				
R2	Channel B Tone Period	8-BIT Fine Tune B								
R3						4-BIT Coarse Tune B				
R4	Channel C Tone Period	8-BIT Fine Tune C								
R5						4-BIT Coarse Tune C				
R6	Noise Period					5-BIT Period Control				
R7	Enable	In/OUT			Noise			Tone		
		IOB	IOA	C	B	A	C	B	A	
R8	Channel A Amplitude					M	L3	L2	L1	L0
R9	Channel B Amplitude					M	L3	L2	L1	L0
R10	Channel C Amplitude					M	L3	L2	L1	L0
R11	Envelope Period	8-BIT Coarse Tune E								
R12		8-BIT Coarse Tune E								
R13	Envelope Shape/Cycle					CONT.	ATT.	ALT.	HOLD	
R14	I/O Port A Data Store	8-BIT PARALLEL I/O on Port A								
R15	I/O Port B Data Store	8-BIT PARALLEL I/O Port B								

The new Commodore 64 is the most powerful personal computer available to the businessman.

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A brilliant example of micro-computer technology, it will do a lot to make your business more efficient and more profitable.

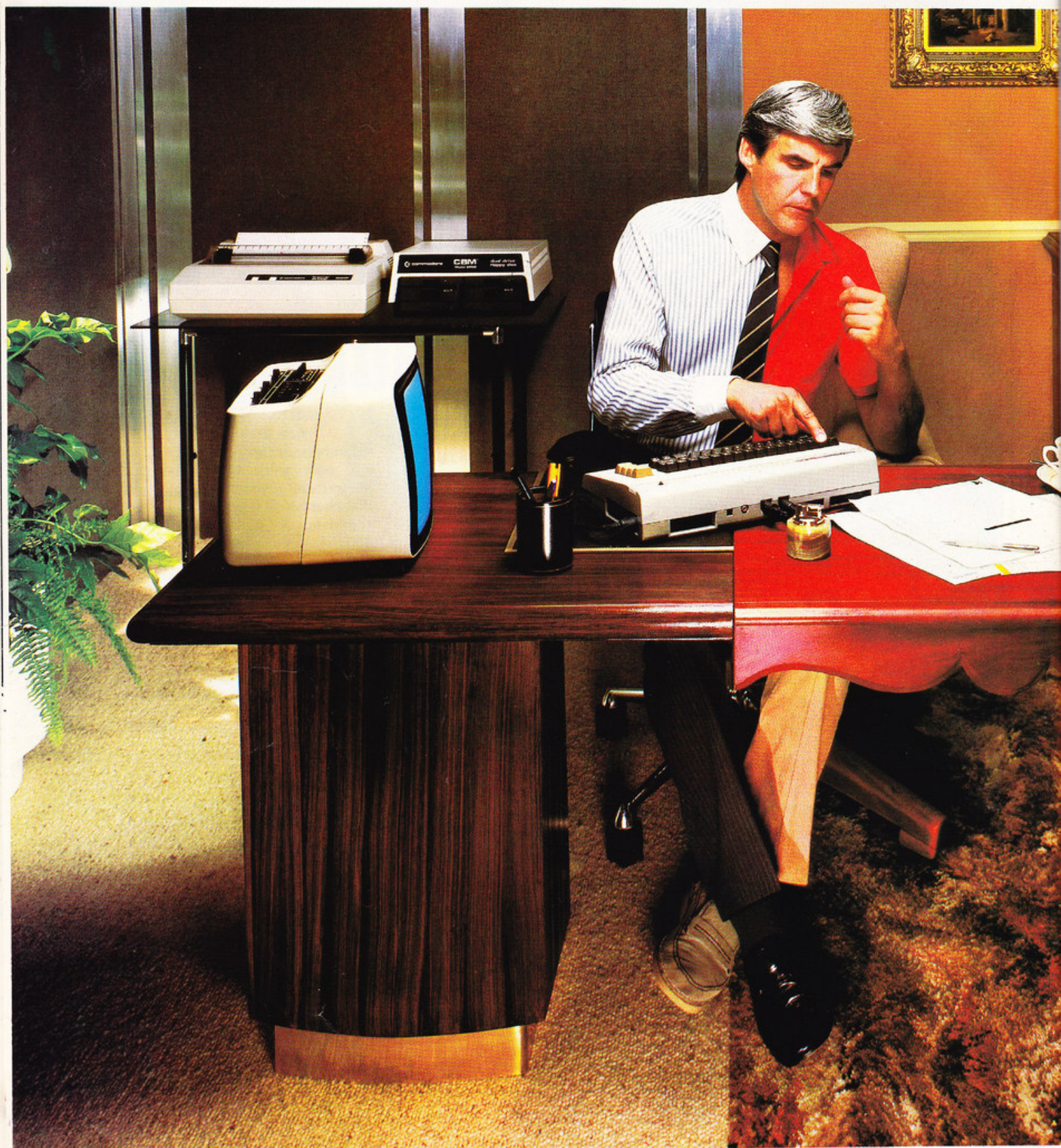
The range of software—general and specific—is very extensive, and covers financial planning, word processing, information handling and countless other business and personal tasks.

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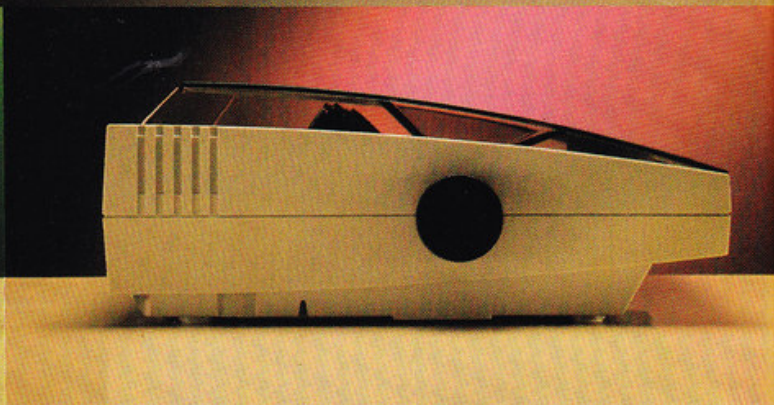
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Chris Bidmead looks at Condor, a new package designed to put a mainframe in your micro.

IBM PC takes power

Condor Series 20 is an ambitious package that seeks to put onto a micro some of the mainframe's power to create and manipulate a 'relational database'.

The idea of the relational database began with IBM (see box: *Why Relational?*), and the general outlines of Condor were developed during the late 70s as mainframe software at the University of Michigan. The system itself first appeared in this country as a cut-down version for 8-bit micros and has now come full circle back to Big Blue by being transported across to the IBM PC, where it runs under MSDOS.

Features

The strength of Condor lies in the clarity of its logic, which allows computer users to create and query their own structured database system without having to be expert programmers. The database can be sorted, compared, merged, and calculated using Condor's own English-like language interactively. More complex manipulations may be carried out by combining a sequence of pre-written instructions into a command file that can be stored on disk and used again and again.

Unlike some other database management systems, files are handled in Condor with no reference to physical record locations. This frees the program and the user from the tyranny of sequentiality, in terms of logic at least — which is certainly very much in the spirit of the relational idea.

Presentation

The software was supplied on two 5¼in floppy disks for the review machine, the IBM XT. The same software will also run on the dual floppy version of PC, and other versions are available for CP/M-80.

Instead of the familiar dwarf-format, neatly cased manual that IBM and many of the independent application houses have accustomed us to, the disks are accompanied by about 200 pages in a blue A4 loose-leaf binder.

Getting started

Getting started with Condor is initially a matter of spending half an hour checking through a supplement of closely detailed amendments to the manual and adding new pages. Even when updated the documentation has some surprising departures from the software. Most obvious are the constant references to CP/M — no-one, it seems, has taken the trouble to revise it for DOS. The IBM user unfamiliar with CP/M-80 will be baffled by references to PIP, SYSGEN and SUBMIT.

Once you're reconciled to these and some other minor inconsistencies, the tutorial first half of the manual takes you gently through the process of creating example data files.

You begin to get the flavour of Condor straight away — conversational commands, with often-used sequences of operations automated for convenience. For example, when you start to create a new data file with the command DEFINE, Condor asks you if you want to set up a new form for the file. Answer 'no' to use an existing form file; an affirmative reply leads you directly into the screen-based editor. Here by directly positioning the cursor on the screen you create the form file in which the field names and their

display positions are set up.

In some other database managers each data file begins with a header that defines the shape of the records and the kind of data they contain. Condor uses a separate file for this. As well as the form file that decides where the data will appear on the screen, each data file has an associated definition file. So after exiting from the screen editor, DEFINE leads you into the creation of this part of the database by taking you step by step through the business of defining data types.

CONDOR data types comprise alphanumeric, alpha only, numeric only, dollar (ie money type) and — one up on dBase II — date. At this stage you also have the chance to build in maximum and minimum

CONDOR SERIES 20 COMMANDS

Database creation and maintenance

DEFINE	Create a new database, redefine a database, describe a database
DESTROY	Eliminate a database or file
FORMAT	Create or revise a form. Create or revise a HELP screen
REORG	Reorganise the structure of a database, adding or deleting data items

Information input and update

APPEND	Attach records of one database to another
CHANGE	Change data item values in a database
COMBINE	Attach records of two databases, creating a RESULT database
DELETE	Delete records of a database meeting specified conditions
EMPTY	Eliminate all data in a database
ENTER	Insert new data into a database
POST	Update data item values in one database with those from another
UPDATE	Change data item values in a database meeting specified conditions

Information processing and report writing

COMPARE	Compare data item values in two databases for (not) matching conditions and create a RESULT database
COMPUTE	Compute data item values in a database
DISPLAY	View selected records of a database
INDEX	Create quick access path by specified data item names
JOIN	Attach data items of two databases by matching data item values
LIST	Produce a video display of records of a database in sequential order
PRINT	Print records of a database in sequential order
PROJECT	Create a RESULT database from selected data items of a database
REPORT	Create, modify or print a report
SELECT	Select database records meeting specified conditions, creating a RESULT database
SORT	Sort database records by data item values
STAX	View or print statistics of data items values
TABULATE	Summarise specified data item values. Print or save the result
TITLE	Print report headings

Operation aids

HELP	Assist operator in selecting procedures
RESTART	Continue processing of an interrupted command procedure
RUN	Process and execute a command procedure with options for command modification

Interfaces

READ	Transfer records from an ASCII file to an existing database
WRITE	Transfer records from a database to an ASCII sequential file

Utilities

COPY	Copy a database or file
DATE	View or enter date
DIC	View entries in the data dictionary
DIR	View the list of files in the disk directory
LOGDISK	Log a new disk in the computer
RENAME	Change the name of a database or file
SAVE	Save a RESULT database
SET	Set operating parameters
SYSTEM	Exit from back to operating system
TERM	Defines system video terminal

◀ 31 limits and set up default values. The whole process is arranged to be interactive, so that you hardly need the manual.

In use

The hub of the system is a file called DATA.DIC, the data dictionary, which keeps track of the relationship between all the format, description and data files you are using.

DATA.DIC is accessible in much the same way as an ordinary Condor database file, which helps a lot to show up the relational logic of the system once you get to know the package well. But the beginner can ignore its existence, thanks to the way DEFINE automatically logs new entries into the data dictionary without involving the user in the mechanics.

The simplest task a database performs is to display a particular record or set of records. Most database systems invite the user to define a 'model' which the software then tries to match against all the records, masking out the ones that don't fit and finding the ones that do.

In Condor the model is entered into the command line something like this: 'DISPLAY GLEDGER WHERE ACCOUNT = "SMITH01"'. In this case "SMITH01" is an exact model, but logical relations are also allowed. It's quite legitimate to say, for example: 'DISPLAY DEBTORS WHERE OWING > 450'. In fact, there is a rich vocabulary of synonyms for relational operators, and you can express the same relation as:

GT (greater than)

IS GT

IS NOT LE (is not less than or equal to)

Condor also lets you use ambiguous models. As in the MSDOS command line, a 'wildcard' asterisk means 'and any other trailing characters'. By this token 'DISPLAY GIRLFRENZ WHERE PLACE IS "NOR*"' will return details of female companionship in rendezvous as far flung as Norfolk, North Acton, Norbury and Norway.

In addition to the other 'flat mile' manipulation commands like SORT, APPEND and COPY, there are several powerful commands that can be used to manipulate multiple data files pseudo-relationally, usually by creating temporary intermediate files.

Compare allows you to make 'matching' or 'not matching' comparisons between individual fields in a pair of data files. Records that meet the criteria are accumulated in a third 'result' file.

Project creates a new data file from the current one containing only certain specified fields. Normally used prior to the JOIN command.

Join produces a result file comprising fields items from two separate data files. JOIN does its best to guess a sensible shape for the new form file in case you want to display it on the screen.

Post updates the values contained in specific fields in data file A depending on values found in comparable fields in data file B. A simple and direct method of, for

example, updating balances to a sales ledger after a payment run.

Condor lets you generate two kinds of report: plain and fancy. Simple reports are created with the PRINT command, with or without a COMPUTE clause to perform maths operations on the data. Any selecting of records required by the report has to be done beforehand.

Level III of Condor, the version under review, also includes a fancy report generator. With this you can lay out the data exactly where you want it on the page and include explanatory text. Because there's a lot of detail to define, the setting-up process is complicated, but Condor gives you some intelligent help.

When you enter the command REPORT followed by a filename you get a screen display something like this:

```
B>>>report address
CONDOR SERIES 20 RDBMS
REPORT WRITER
Version 1.01**01
Choose option
Create New Report Specification (C)
Describe existing Report Specification (D)
Revise existing Report Specification (R)
Print or Display Database Report (P)
Enter option or End <C/R>:
```

The create option takes you back into the screen editor, where you draw up an outline of the report page. This need only be an approximation, as the question-and-answer session that follows takes you through the report line by line, checking it for consistency and letting you approve or

amend default values derived from your screen layout.

Only the very experienced design a database correctly first time, but even so users needs change, and the time will come when you wish your files were arranged differently.

This is the job of the REORG command, which recalls the screen editor and leads you through the process of reordering, adding or deleting fields. Altering field descriptions is rather more complicated, and involves writing out the file in standard ASCII format and reading it in again.

Verdict

Condor's general strength is that an intelligent non-programmer can quickly create a tailor-made database system complete with help-sheets that can then be used by personnel unversed in the ways of computers. It's also one of the few database management packages to include a date type on which you can do such calculations as 'Days since last invoice = Today's date - Invoice date'.

I particularly like Condor's clear logic, and the extensive use of synonyms so that communication through the command line takes place in quite respectable English.

There are serious shortcomings, however. The IBM PC's big potential market and stable hardware environment offer an enormous opportunity to the software developer to pull an existing product together into a package that works well and has tailored documentation. MicroPro has done it with old favourite WordStar, but licensee MOM Systems appears to



Valerie Hill



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have made no efforts at all in this direction. The manual makes no concessions at all to MSDOS—in fact, the documentation is unmodified from the version issued for CP/M. Security in the form of password protection has been promised in Condor for more than a year, but there is no sign of it in this new version for the IBM.

Condor has an alarming number of overlay files, virtually one per function. Transporting the software to the 8088/8086 offered the vendors the perfect opportunity to tidy this into one neat package, but they passed it up.

Apart from system variables like \$TODAY and those that store the statistics created automatically by COMPUTE there are no variables outside the files themselves. You can often get round this by using JOIN and PROJECT to add and

remove file variables in the form of temporary fields, but it's hardly elegant.

Although Condor lets you select particular records and change the contents of fields, it won't let you do both at once. First you have to do a SELECT operation to generate a temporary file consisting only of those records that meet the criteria, then you CHANGE the fields in this temporary file.

dBase II can accomplish this (and more) in one swift move.

Condor's batch processing of commands doesn't really amount to a true run-time enquiry language, because all the conditionals have to be satisfied *before* any files are opened for operations. There's no way it can take different courses of action depending on what it finds in the files.

RATING

Features
Documentation
Performance
Usability
Reliability
Overall value



Name Condor Series 20 **Application** Inventory control, accounting, personnel reporting, etc.
System IBM PC, CP/M-80/86, MSDOS, MP/M-86 **Price** Condor I (flat file system) £95
Condor II (multiple files) £195
Condor III (fully relational) £295
Publisher Condor Computer Corporation **Distributor** MOM Systems, 21 Bon Accord Street, Aberdeen, 0224-571825.

The modern relational database is attributed to E F Codd of IBM, but what the phrase means is obscured by the way the word 'relational' crops up in several quite different contexts.

First, 'relational operators' are ways of comparing quantities, the commonest being 'greater than', 'less than' and 'equal to'. These facilities are available to all serious database systems, and have nothing to do with why relational databases are so called.

Database systems often need to bring together items of data stored separately—in different files, perhaps. The Condor manual calls this process 'relating' the files. But although a relational database may need to call on this sort of mechanism more often than others, it's by no means a distinguishing characteristic of the method.

In fact the Condor Series 20 manual adds to the confusion by calling each of its separate data files 'databases'. Correctly speaking, a database is any one body of information, whether it is stored in one file or several. It needn't be in files at all—the data might be in matrices floating about in core memory, or even hard-wired into the electronics, or a combination of these possibilities.

However the data is stored physically, relational theory sees it as being contained in a number of simple tables, like the ones shown in diagram 1. Codd called such tables 'relations', and it is this third meaning that gives the method its name.

Before Codd, it was thought that you couldn't build a database without first knowing the sort of questions that would be put to it. What you stored in databases designed along these lines was never pure data; pointers and linkages had to be laid down in anticipation of the broad shape of the queries to be put. So-called hierarchical and network database systems work this way, and give a fast response to questions of pre-determined form.

But Codd showed that there is a general rule of database design that frees the designer from having to anti-

cipate the questions. By a process he called 'normalising', any body of knowledge can be broken down into elementary relations and stored without linkages, confidently awaiting any sensible questions that may be asked.

An added advantage of the Codd approach is that if the database is extended to include new kinds of data, all that is needed is the creation of new relations. In other systems a major redesign of the whole database is usually required.

The simplicity of the concept imposes a heavy programming overhead when the time comes to get the data out again. In Codd's world the data is stored in the tables with no sequentiality, and entries can be accessed on their contents. Tables can be combined

instantly to give new views of the data. Unfortunately, all this is beyond the power of the micro.

Condor is a 'pseudo-relational' database system, substituting indexing or sequential searching for content accessibility, and the creation of temporary files for the true relational join.

But the most important thing that Condor does not do—or for that matter any of the other so-called relational systems on the micro market—is to help you set up the relational tables in the first place. Only if the data is correctly normalised will you get the proper benefits of Codd's approach, and for complex tasks like the generation of cash-flow tables that is by no means a trivial task.

CB

Diagram 1: Simple relations

CUSTOMERS			
CODE	NAME	ADDRESS	
ROB01	Robinsons & Co	18 Rothgarth Road	
MAC03	MacKenzie Ltd	112 Tudor Crescent	
JAC02	Jacques & Scott	14 The High Street	
. . . etc			
GOODS			
STOCK-NO	NAME	PRICE-IN	PRICE-OUT
300101	Galopter Handle	£120.90	£240.00
777034	Hadron Multiplier	£1,130.00	£2,500.00
001034	Time Crystal	£4.50	£9.95
. . . etc			
Relations for customers and goods			

Diagram 2: A third relation

ORDERS			
CUST-CODE	STOCK-NO	QUANTITY	DATE
MAC03	300101	500	11-JUN-84
JAC02	001034	5	14-JUL-84
ROB01	300101	25	1-MAR-84
ROB01	777034	1	26-FEB-84
... etc			
Third relation used to relate the customers and goods tables			

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David Janda tries a new storage system for the BBC, and finds the memory lingers on . . .

The number of methods for storing data and programs on the BBC micro has grown by leaps and bounds in recent months. In addition to cassette recorders and disk drives, we now have the Hobbit tape filing system and Hitachi 3in disks, which offer you long term storage of programs and data. The terms 'quick' and 'easy to use' always seem to be part of the sales pitch.

The latest breakthrough in BBC storage devices is a peripheral for the BBC micro called the Electronic Diary and Random Access Filing System, known collectively as RTC+RAM.

The RTC+RAM offers the user a filing system and an electronic diary, as well as a real time clock. So this peripheral is a 'three-in-one' job, and because it uses RAM as a backing store it is one of the



Rather bulky, but nevertheless colour-coordinated to the BBC micro.

Three of a kind

fastest means of storing/retrieving programs and data.

With the RAM filing system you store data in RAM — and because the RAM is always powered (by mains or battery) the contents are never lost when the micro is turned off. Many machines (such as the Apple) can take RAM disk cards, and although expensive, they do offer the fastest means of I/O.

The RTC+RAM only offers 4K of CMOS RAM at present, but it can be expanded to 30K by adding an extra 26K, which should be fitted by Acacia or one of its dealers.

Real time clocks have been around for a few years, and are now becoming available for most popular makes of micro. Again, the real time clock normally comes on a card and offers you access to time by either viewing or program control.

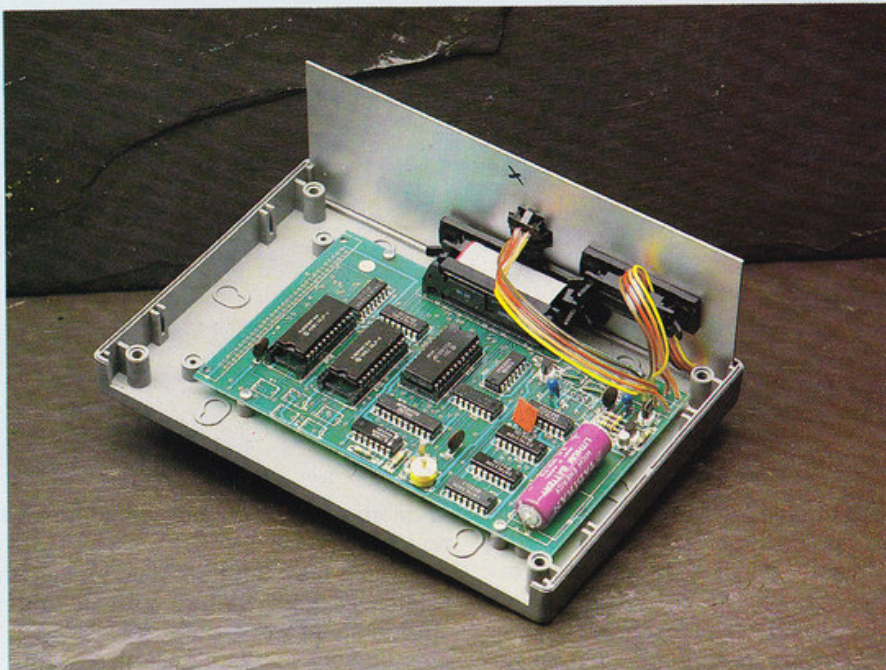
The Beeb has an internal clock which can only give the relative time since the machine was turned on, but the RTC+RAM gives absolute time, and this can be displayed on the screen or accessed by user programs. The latter suggests many interesting possibilities, such as unattended batch processing.

On the software side, diary systems have been around since day one. The problem with using these systems is that you have to remind yourself to look at the entries — and just as with a real diary — you can often forget.

Since the RTC+RAM has a real time clock, good use is made of it by the Electronic Diary. This enables the diary to set off alarms at pre-set times. Appointments can be set and you can either be reminded when power is turned on by the appointment being displayed, or by setting a time when an alarm will sound.

Hardware

The RTC+RAM consists of a rectangular



Amazing how millions is spent on component miniaturisation only to have them dwarfed by their casing.

metal case (20 × 13.5 × 8cm) which holds the real time clock chip, RAM and battery. The Basic model comes with 4K of CMOS RAM, which is made up of two 2K CMOS RAM chips.

If you wish, you can replace these with the more expensive 8K chips, thus giving you 16K. If you don't like meddling around with these things (they can be damaged by static discharge), then you can wait for the 20K expansion board from Acacia at approximately £150.

The battery (high energy 6.5 volt Lithium type) is soldered to the PCB, and this is my only grumble about the hardware. You will have to be handy with a soldering iron if you want to change it.

Two ribbon cables protrude from the casing — one leads to the Beeb's auxiliary

power out socket, and the other to the 1MHz bus connector. Both are 85cm in length, and this means that you can have the RTC+RAM unit a fair distance away from the BBC.

The RTC+RAM is not likely to be the only gizmo attached to the Beeb, so at its back there is a power out socket. This means that you will be able to plug in another piece of equipment which uses the BBC's auxiliary power supply.

On request, Acacia will also supply a special cable which will allow another piece of equipment — such as a Teletext adaptor — to use the 1MHz bus connector.

Setting up

If you follow Chapter 1 of the instruction manual, you shouldn't mess things up

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37 when you install it. I managed to complete the process in just 15 minutes.

First to install the RAM filing system and ROM-based Electronic Diary software. The ROM can be inserted into any of the spare sideways ROM sockets on the BBC, but if you wish to make full use of facilities then the right-most socket (IC101) should be chosen.

After the ROM has been installed you should check to see if it is working. This is achieved by switching on power, and if all is well the message 'No RTC' should be displayed. Unfortunately, the system then hangs up. This means that you can't have the software chip in the Beeb without having the RTC+RAM unit attached as well.

Attaching the unit is easy enough, although a little care should be taken. The power cable attaches to the auxiliary power out connector on the Beeb. I found that the plug fitted quite loosely, but this is true of most equipment that uses the Beeb's auxiliary socket.

The 1MHz bus cable is then attached with the plug inserted so that the band is to the furthest right from the arrow which points to the 1MHz bus connector.

Once all this has been done, you can turn on the BBC, and the Acacia copyright will appear and on — the top line — so will the day, date, month, year and time in hours, minutes and seconds with AM and PM indicator.

In use

The RTC+RAM electronic diary offers the user the ability to enter appointments. The Electronic Diary is accessed by issuing star commands which may or may not be followed by a parameter.

The commands available are listed below, together with a brief description of their function:

- *DIAA — Add a reminder to the Diary.
- *DIAD — Display and/or delete selected reminders set for the specified date.
- *DIAM (keyword) — Display and/or delete the reminders containing the keyword.
- *DIAR — Read and/or delete reminders that have activated the alarm.
- *TIME — Enable continuous time and date display.
- *TIMD — Disable the above command.
- *DATD — Display the time and date (not continuous).
- *TIMS — Set time.
- *DATS — Set date.

The above commands are pretty powerful and allow great flexibility in the entering and observing of the Diary entries. There are two types of reminder that you can choose: the power on reminder and the time set reminder. Both types require you to use the *DIAA command to select what type of reminder you want.

After the date has been entered you are asked 'From (Power on, Time)'. If you want power on, you enter P and are then asked 'Repetition?' Here you can enter the interval at which you wish the reminder to occur. Once this is complete 'Entry:' is

displayed, and on the next line you can enter a message.

Your message can be up to 200 characters in length, and in free format (upper and lower case). It can take up as many lines as necessary and is terminated by pressing escape. One nice feature of the system is that the function keys are set to give different colours of text as well as flashing.

When the date for the reminder arrives, and you turn on the Beeb, the message would be displayed with the prompt 'Press A to acknowledge'. If you choose not to acknowledge the message then it will be displayed every time the Beeb is turned on — otherwise it would not be displayed again until its next programmed repetition — and if the repetition was set to zero it would be deleted.

If you chose to set a time for a reminder,

'The Diary is a clever piece of programming'

you must go through the same process, and at the specified time an alarm from the Beeb's speaker will sound — even if you're in the middle of a game of Space Invaders! To turn off the alarm you can either hit Break or exit from your program and issue a star command. *DIAR displays the message that activated the alarm.

RAM Filing System

The RAM Filing System really is a filing system, albeit a small one. You have 4K RAM in which to store your programs and data, but this space must also be shared with the Electronic Diary and its list of appointments.

All the Beeb's commands are supported by the RAM Filing System, with the difference that the display looks different when they are used. The commands are: *CAT, *ACCESS, *DELETE, *INFO, *OPT 4n, *EXEC, *SPOOL, *SAVE and *LOAD.

The main difference from Acorn's DFS is that only 256 bytes are used for workspace — this starts at &E00. There is also no limit to the number of files, providing there is enough memory. One very nice feature is that the status of files is stored such that it minimises the chances of it being overwritten.

Files themselves need no buffering. To access the RFS, a *RAM command should be given and all I/O will be directed to and from the RAM. Three programs are supplied in the RAM — RWRAM, INIT and BUILD. These allow you to dump the contents of RTC+RAM to disk and back, clear the contents of RTC+RAM and build a data file.

The RWRAM program is useful because, as Acacia points out: 'No filing system is 100% secure — you should dump these programs to disk or tape when you

receive the unit, as the remaining room is very small.'

The *CAT command displays all files with their name, date and time they were created. When you create a file or save a program the first three bytes of the file attributes contain the date and time in a compressed format.

Files can be locked and unlocked with the *ACCESS command, and when the catalogue is displayed an L is attached to the end of the creation time to show that the file is locked. The status of files can be found out by issuing the *INFO command, which will display the filename, load address, execution address and length, all in hex.

Using the *OPT 4 command with *EXEC it is possible to autoboot files. Building the exec file can be done with a word processor, or using the BUILD program that is supplied with the system. The manual gives details of how to do this.

Having a real time clock working with the BBC is quite handy, and it is possible to 'read' the time in programs by making an OSWORD call. The *DATA command can also be called by program, and this will display the time and date on one line.

I found it extremely easy to use the RFS. Transferring files between different filing systems was easy, and the whole system was pretty robust. I do, however, have one grumble: the documentation is too technical, and many people will be confused if they do not already know about the workings of the Beeb.

Verdict

The RTC+RAM worked well, and the Electronic Diary was very useful. It cannot possibly replace a conventional diary, as the BBC micro is not that portable, but it does provide an easy to use appointment access and retrieval system.

The RFS was a real pleasure to use. It's both fast and easy, although having only 4K bytes of backing store will seriously limit the use of it as a serious form of storage.

Even this problem, however, should partially be relieved by the ability to expand the system to 30K with the 26K board from Acacia, and even up to the maximum 64K if you use 8K chips.

The Acacia RTC+RAM (4K) costs £147.20 including VAT. Although CMOS chips are very expensive and the Electronic Diary is a very clever piece of programming, the price could stand some trimming. The expansion board — to bring the memory up to 30K — costs about £150 in addition to the price of the Basic unit which brings the whole thing up to around a rather hefty £300 price tag.

With the ability to store up to 100 40-character messages, it is a system well worth thinking about, even at its somewhat high price.

Item Acacia Non-volatile Diary/Filing system
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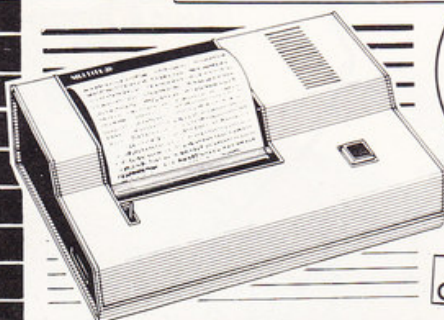
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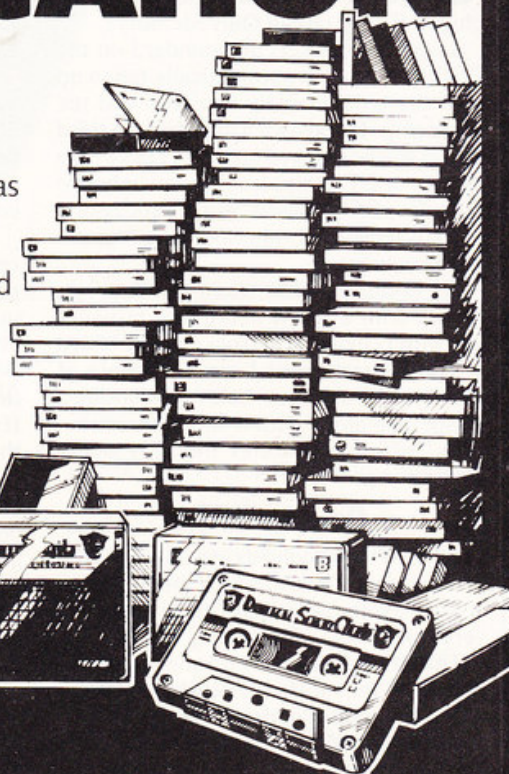
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QUITE SIMPLY THE BEST

What happens when your BBC runs out of ROM sockets? Trevor Jones plugs in one possible answer.



Gary Davies

Stretching your Beeb

One of the major selling points of the BBC Micro is its expandability, offering five sockets for paged or plug-in ROMs (Read Only Memory).

These five sockets are standard on the BBC, but two are automatically taken up with the Operating System chip and the Basic chip. If you own a disk drive, a third socket will be blocked up with a Disk Filing System or DFS chip, leaving you only two slots for ROM-based word processors, spreadsheets and alternative programming languages.

Sir Computers has taken this problem to task with a ROM board that provides you with 12 extra ROM sockets. The board arrives securely placed in a thick piece of polystyrene, and the whole unit is inside a plastic bag along with a sheet of instructions, which constitutes the only documentation provided.

Construction

The ROM board consists of a double-sided printed circuit board, which measures 6.5 x 5 ins. The board is quite thick, making it very sturdy.

The ROM sockets are arranged in three rows with four sockets in each row. They are placed on the left hand side of the board and take up half its total area. The rest of the board contains eight integrated circuits providing the necessary logic decoding and control circuits.

The unit has been designed to occupy the

socket housing the 6502 processor which is relocated in a 40-pin socket on the board.

The sockets are labelled with a one next to the number one pin on each integrated circuit.

Fitting the board is not difficult as long as you follow the instructions closely. As always with products of this type it pays to be meticulous — it saves time in the long run and reduces the risk of killing the computer.

After turning off the computer and removing the screws, you have to carefully prise out the 6502. The documentation suggests you use a screwdriver, but in our experience two Biro tops levered in simultaneously at both ends of the chip do the removing job with less risk of damage. If you bend the pins too often they snap and that means a £5 shopping expedition.

After successful extraction the 6502 can be placed in its new socket on the ROM board. But take care to locate the indentation on the chip so it's pointing towards the top of the board.

The computer is now ready to perform again. If it doesn't, go back and check for bent pins or bad connections.

The next step in the installation procedure is to break link S21 on the BBC circuit board by removing the small plug which links the two pins together. The lead supplied with the board is placed onto the two-pin connector on the ROM board next to IC 3. The other end of the lead is placed

onto the left-hand contact of S21. If this operation results in 'no language' appearing on the screen, the lead from the ROM board should be removed, turned round and replaced. After this the system should be fully operational.

In use

In use, the board proved to be reliable. The ROMs are accessed in the normal manner. To use View (Acorn's word processor) you simply enter *WORD. Other chips I used with the board were a BCPL program, Lisp and a monitor.

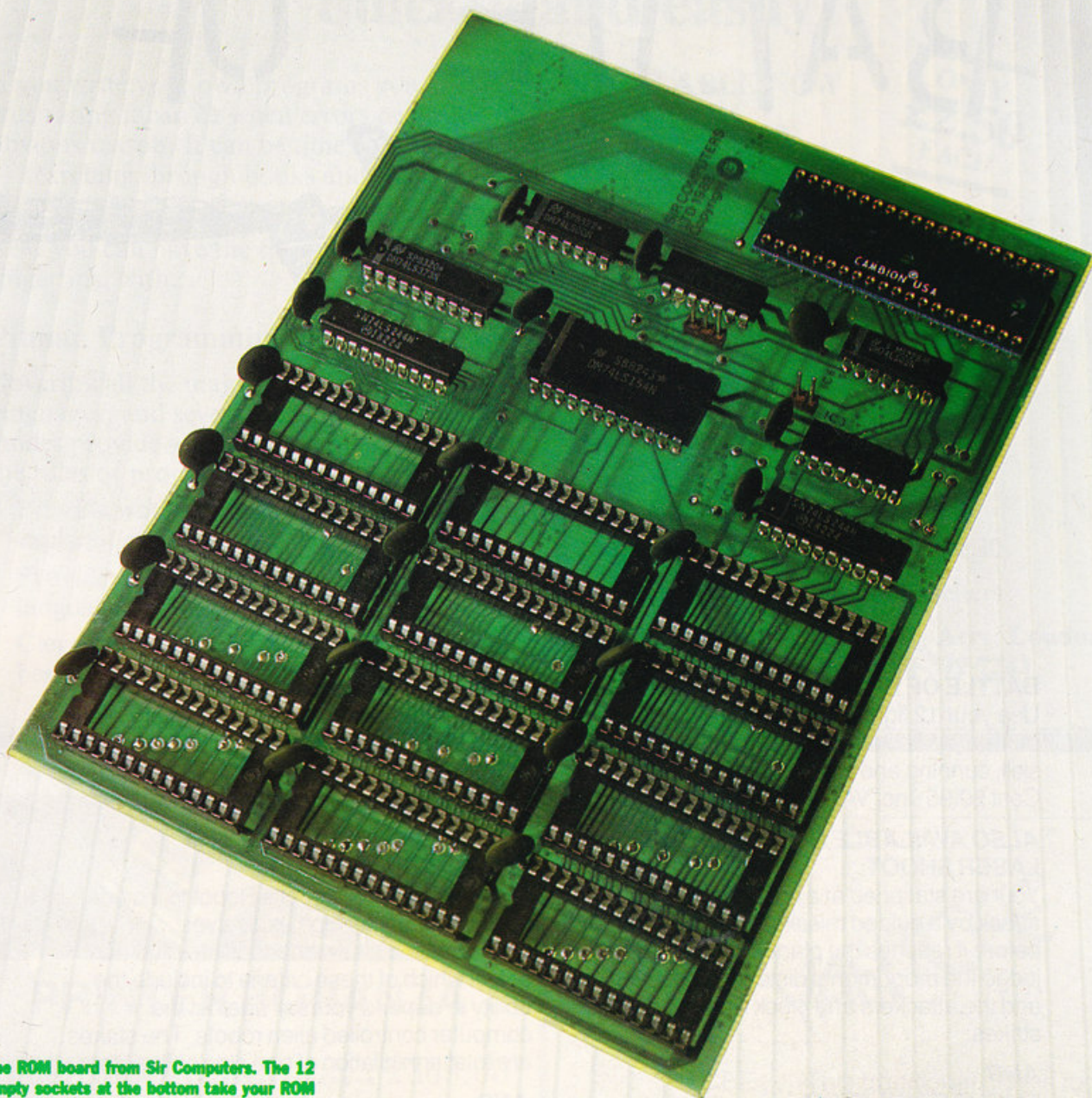
Verdict

My only grumble is that the pins on the board which replace the 6502 could be longer, raising the board higher for easier access, and the sockets are not as sturdy as the board itself.

However, the quality of the board is high and it is well worth the money. It is well constructed and has a well thought-out and uncluttered layout.

With it installed you have easy access to your ROM-based software. As more BBC firmware products arrive this extra elbow room will be a godsend to many BBC users.

Item ROM extension board **Computer** BBC
Micro Price £35 **Contact** Sir Computers (0222) 21341.



The ROM board from Sir Computers. The 12 empty sockets at the bottom take your ROM software. The monster at top right is the new home for the BBC Micro's 6502 processor.

One of the main features of the BBC Micro is its 'sideways ROM' facility. The idea was to include a line of empty sockets on the BBC board which could accept ROM or EPROM-based applications programs, fulfilling much the same function as a plug-in cartridge facility. The difference being that the user need not physically plug in the appropriate chip. Instead the computer 'pages' the chip asked for from the keyboard and includes it in the system's memory map.

So successful has this facility been that there are now more chips available than sockets — hence the need for the ROM-board. Acornsoft, Acorn's official software house, will offer both LISP, an artificial intelligence programming language, and FORTH. FORTH is a Reverse Polish Notation language which enables

you to define your own command words.

Acornsoft and other software houses also have several versions of the LOGO instructional language in chip form. Also on offer is BCPL, including a compiler, a screen editor and assembler. BCPL's claim to fame is as an I/O handler, particularly useful for developing utilities and commercial games.

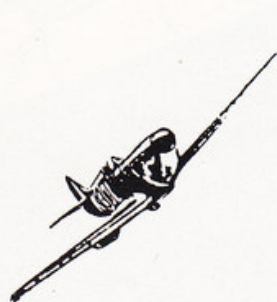
There are also two excellent word processing chips available. The first is View, from Acorn. It has the advantage of being able to be used with both cassette and disk drives, though this reduces its potential on a disk-based system as you have to go back to command mode all the time to perform saving and loading functions. View has the full complement of word processing features including justification, block moving and page

numbering.

An independent company, Computer Concepts, is offering an alternative called Wordwise. Its main features include being able to print directly from the screen (which cannot be done with View) and having an on-screen menu on the command line. It also makes good use of colour to help divide up the screen and is simple to use with an ordinary TV set.

Also from Computer Concepts is a chip-based spreadsheet program called BeebCalc. This program offers both 40 or 80 column display. Using it you can use sideways scrolling to allow a wide entry ledger with 100 entries labelled as boxes from A to Z. In the 40-column mode BeebCalc offers 23K of memory — anything over 8K won't be displayed in 80-column mode.

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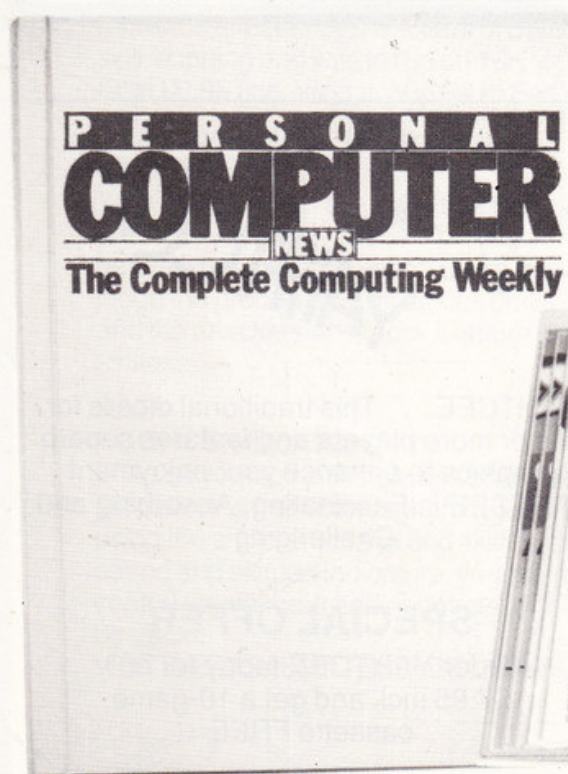
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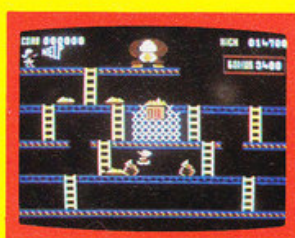
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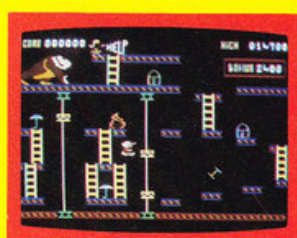
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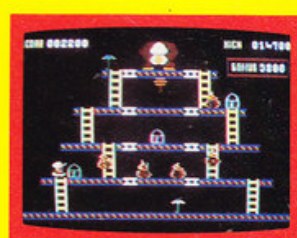
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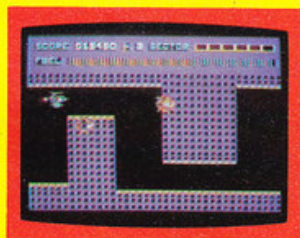
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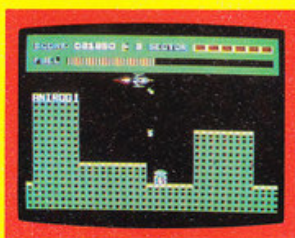
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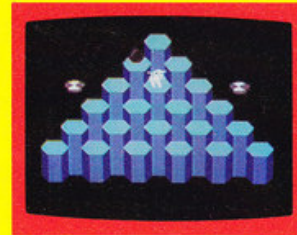
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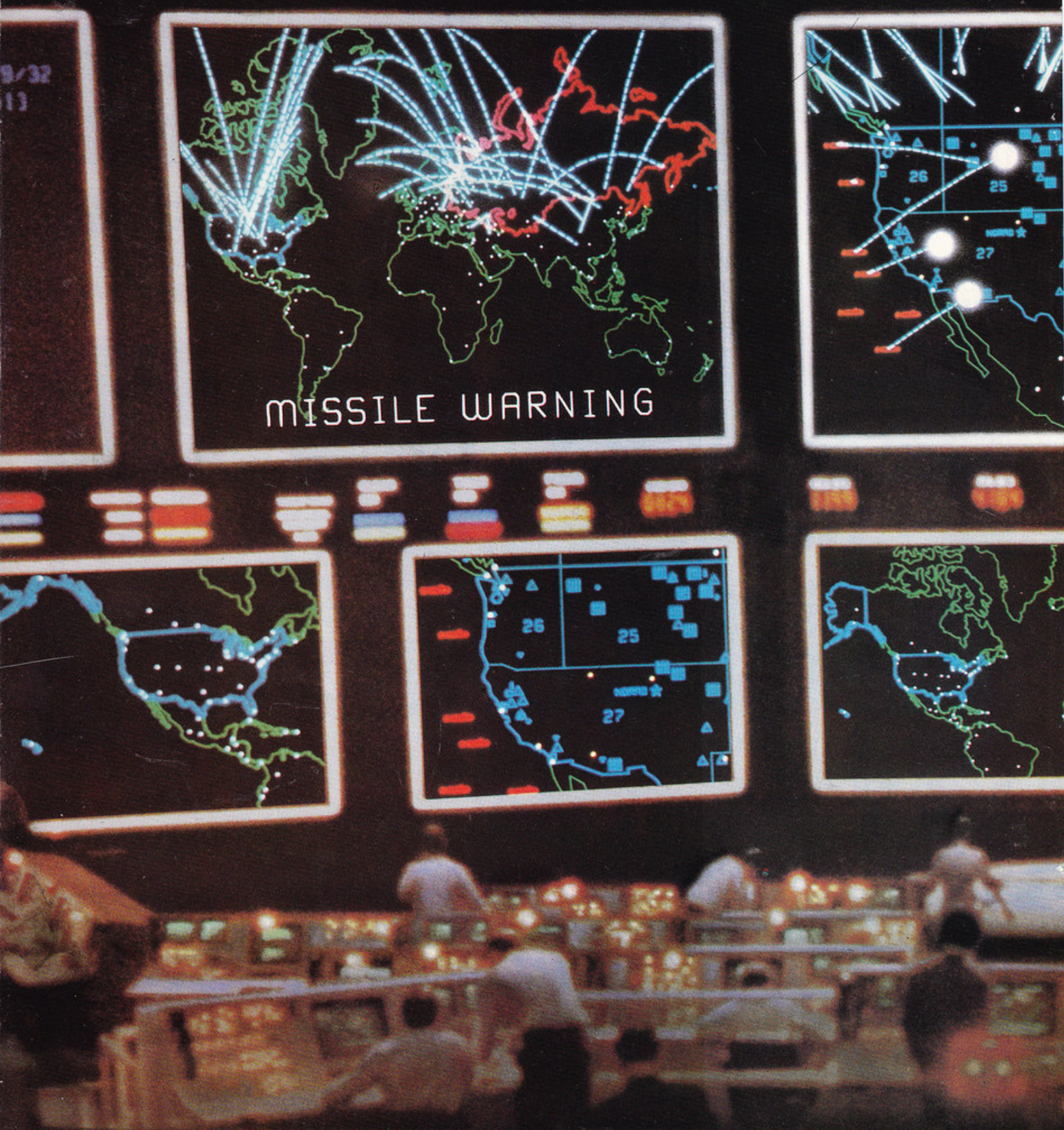
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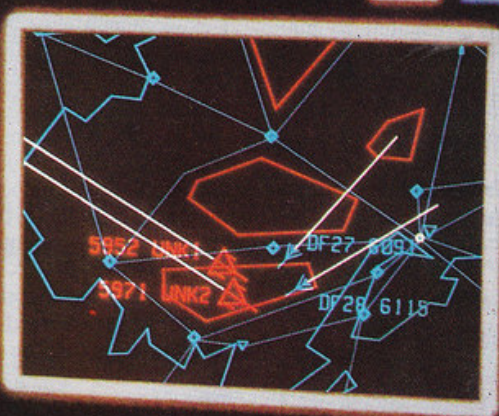
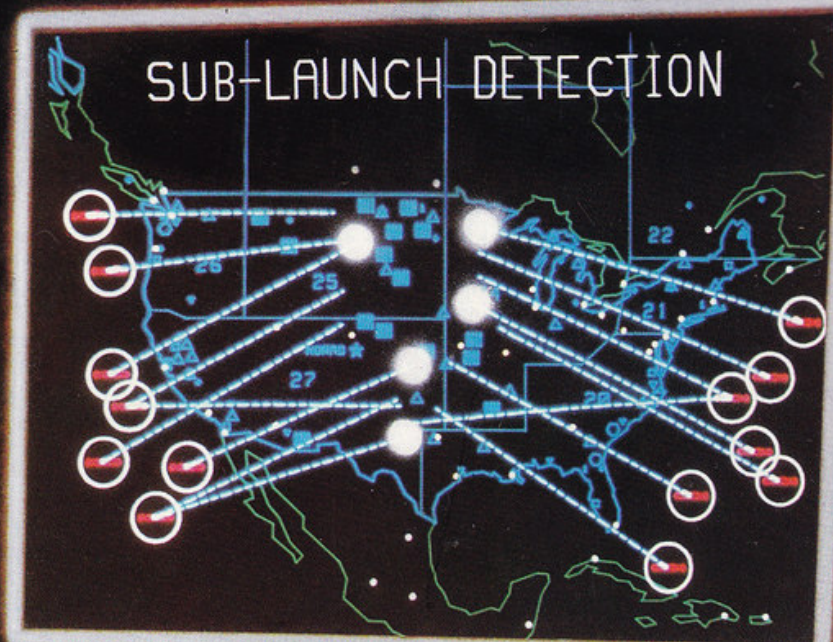
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IS IT A GAME OR IS IT REAL?

WESTERN ADVENTURE

SINCLAIR 48K

Gold fever

Name Greedy Gulch **Application** Adventure Game **System** Sinclair 48K **Price** £6.50 **Publisher** Phipps Associates **Format** Cassette **Language** Machine code **Other Versions?** Outlet?

Not being a Western fan I had to look up 'gulch' in the dictionary to find out that it means a ravine, especially with gold deposits. Most greedy prospectors heading out from this town in the search for gold however, will end up spending most of their time wandering aimlessly in the search for gold, however, will end up spending most of their time wandering aimlessly in the desert with not a nugget in sight.

This is a great pity, because 'Greedy Gulch' with its saloon, stock yard and sheriff's office has all the atmosphere of the Wild West.

Objectives

You begin in an old ghost mining town which, you are told, contains all the clues to lead you to a lost gold mine. Your first task is to decipher the clues. You must collect the necessary tools to survive in the desert and equip yourself to work the mine.

Finally you have to get the gold nugget back to the sheriff's office, all the while dodging the mysterious strangers who are stealthily following your every move.

The computer responds to commands in simple English

having a hidden vocabulary of about one hundred words. You score points by collecting the right equipment in the right order and by following an intelligently planned route to the mine.

But be careful—if you ignore veiled warnings you are likely to meet sudden death or slow death from thirst in the desert.

First impressions

The illustration on the cassette cover sets the mood with a cartoon of an eerie Western frontier town and a revolver in the foreground. Loading the program is easy. Text appears on the screen explaining the object of the game and basic operating instructions.

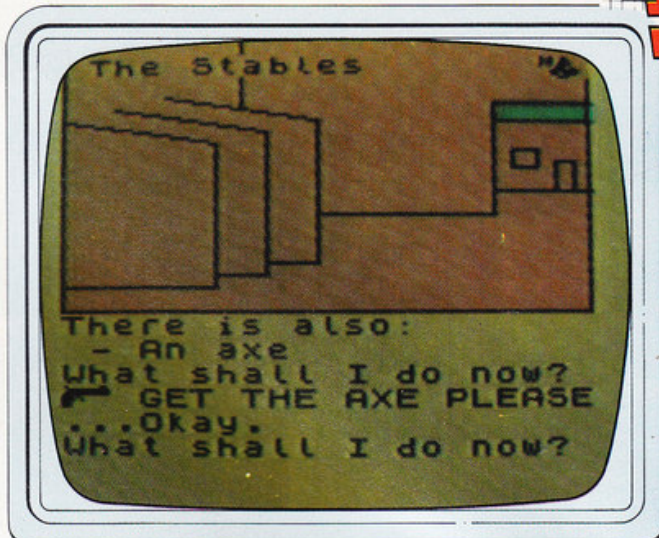
Some possible courses of action, including commands such as 'enter assay office' or go north' are explained before you start.

It is always possible to recall a 'help screen'. This has the basic instructions but unfortunately they are of little use when you are trying to do something the least bit complicated, like breach the impenetrable walls of the stockade, for example.

In play

On starting the game you arrive in the middle of the town. Your position is presented in plan form at the top of the screen. A scrolling text beneath asks 'What shall I do now?'. If you decide to enter one of the buildings a rather diagrammatic 3D colour picture appears of the interior.

In general the graphics are extremely crisp and colourful but come up on screen rather



slowly. The most useful information is contained in the text description which appears underneath.

Objects that you can collect are also listed and it rapidly becomes clear that cupboards must be opened and papers inspected. Sometimes the text poses riddles. You are told for instance that you have to work hard to gain a drink of water.

It took many attempts before I realised I must type in USE PUMP three times running in order to obtain a full bottle. Unfortunately the sound on this program is limited to the odd 'beep' and the text alone tells you the pump 'gurgles' and the gun goes 'bang'.

I even shot myself once in desperation.

The program boasts a machine coded English command line scanner for fast word recognition. This produces a satisfactorily rapid response to commands, although the replies are generally elementary and humourless.

Finding the right command to deal with each hazard is part of the game and can be enjoyable.

When I came to the ravine I suggested a variety of elaborate bridge techniques, using the carefully collected poles and plank, only to discover, after much investigation, that the successful order was JUMP (plank and all!).

Although seemingly useful gear for the would-be prospector abounds, only six items can be carried at once.

I agonized for quite some time before heading across the desert with miner's lamp but no hat.

Your score can be displayed at any time. As the game is

likely to continue to puzzle you for several evenings you have the option to 'Quit' or to store your position in the game on tape for reloading at a later date.

Before you quit it is worth trying 'Hint' although the program is sparing with its advice.

Unfortunately the mystery of Greedy Gulch is still a closed cassette to me. I have not yet broken into the stockyard nor discovered the mine. I did spend many boring hours plodding haphazardly around the desert.

The presentation of the desert maze in particular was a little uninspired.

The same picture just keeps coming up wherever you look and you become very familiar with the yellow sand dunes, the shrivelled cactus and the dead steer.

Verdict

Those who are particularly practised in adventure games may well progress faster than I did. Greedy Gulch should provide an enjoyable challenge for most players.

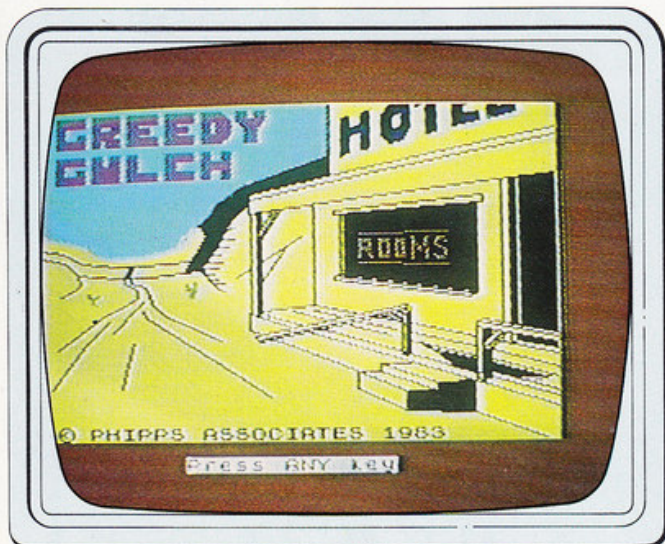
The game must be considered weak on originality and humour, but it certainly does employ sensible locations and the problems usually require common sense or logic to solve them.

Maybe this is why I didn't get very far! I might recommend this game as a good prospect for minors but it certainly is not my pick of the week.

Rosemary Johnston

RATING

Lasting appeal	★★★★
Playability	★★★★
Use of machine	★★★★
Overall value	★★★★



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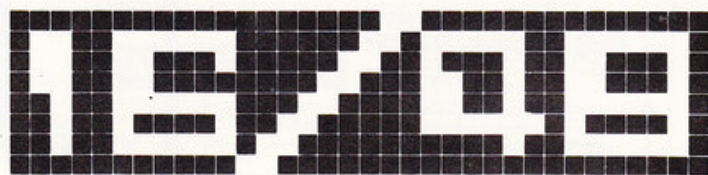
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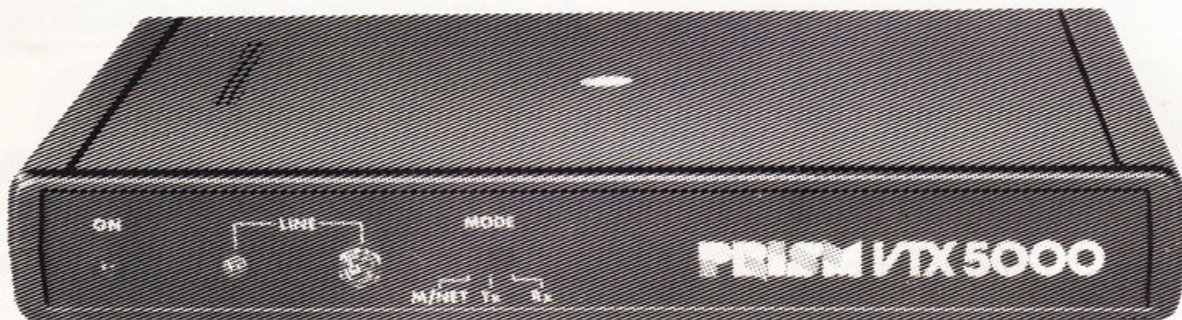
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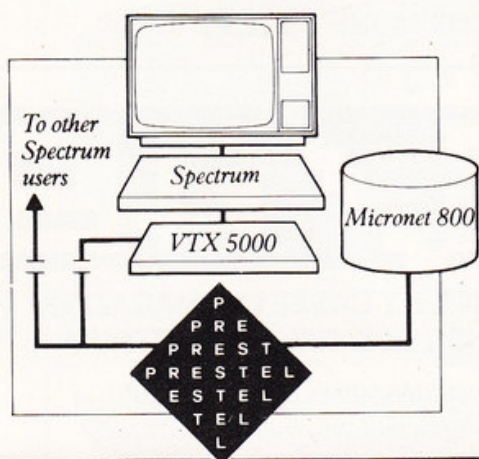
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SPECTRUM

Monkey business

Name Kong System Spectrum 48K
Price £5.90 **Publisher** Ocean Software, Ralli Building, Stanley Street, Manchester M3 5FD
Format Cassette **Language** Machine code **Other versions** None **Outlets** Sinclair dealers.

Kong just cannot keep his paws off women and here he is again with another hapless victim. Perched on high with his screaming captive, Kong once more defies another section of the population. This time his rage is directed at any 48K Spectrum owner who has a penchant for rescuing damsels in distress.

Objectives

You must endeavour to reach Kong's lair by climbing ladders and hitching rides on elevators. Kong does his utmost to deter you by tossing down barrels, hot and cold, and dumbbells. There are four screens to conquer, points being gained by smashing barrels with a hammer, completing screens and by picking up mystery objects.

In play

A title page is displayed while the main program loads. A very good menu gives you the option of keyboard, Kempston, Quickshot or Protek Joysticks. As well as the normal game, there is a demo mode and a training mode.

The game starts with Kong climbing up the right side of the screen. He jumps up and down, causing some of the girders to move. The word 'help' appears in a balloon from the captive's mouth.

You control a tiny Morph-like figure who trots briskly along in the direction you point him. He seems to exude confidence, perhaps unwisely in view of the difficulties before him. Pressing the fire button causes him to leap forward in the direction he is facing.

Kong starts swinging one of his arms and barrels come rolling down at an alarming pace. Jumps need to be timed perfectly as your figure is quite small and the barrels large. Later screens bring in the burning barrels (or are they bowls?) which move much slower but tend to float down through solid matter.

The game is quite fast. Fortunately, response to joystick movement is very good. Sound effects are minimal but appropriate.

Verdict

I particularly liked the comprehensive menu and the animation of the hero. The inclusion of a training mode is a useful idea and one other games should emulate. A good, if somewhat uninspired, version of a classic game. **Bob Chappell**

RATING

Lasting Appeal



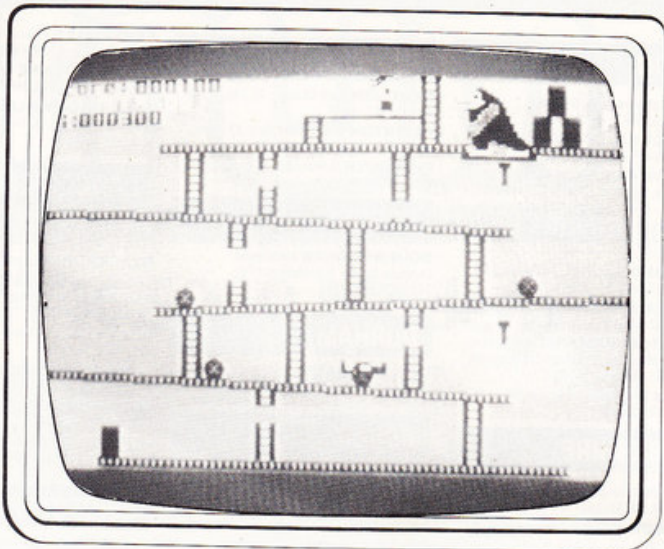
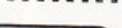
Playability



Use of Machine



Overall Value



COMMODORE 64

Escape the ape

Name Crazy Kong System
Commodore 64 Price £8.00
Publisher Supersoft, Winchester House, Canning Road, Wealdstone, Harrow HA3 7SJ
Format Cassette **Language** Machine code **Other versions** None **Outlet** Mail order and most dealers.

A version of Donkey Kong for the Commodore 64 was always on the cards and it looks like Supersoft have won the race to get theirs out first. Like most Kong clones, this one stays close to the original plot.

Objectives

Kong holds a fair maiden Prisoner at the top of an unfinished building. Mario sets out to

rescue her from Kong's clutches by scaling ladders and girders, and riding in lifts, all the while avoiding barrels and concrete tubs playfully hurled down by the ape.

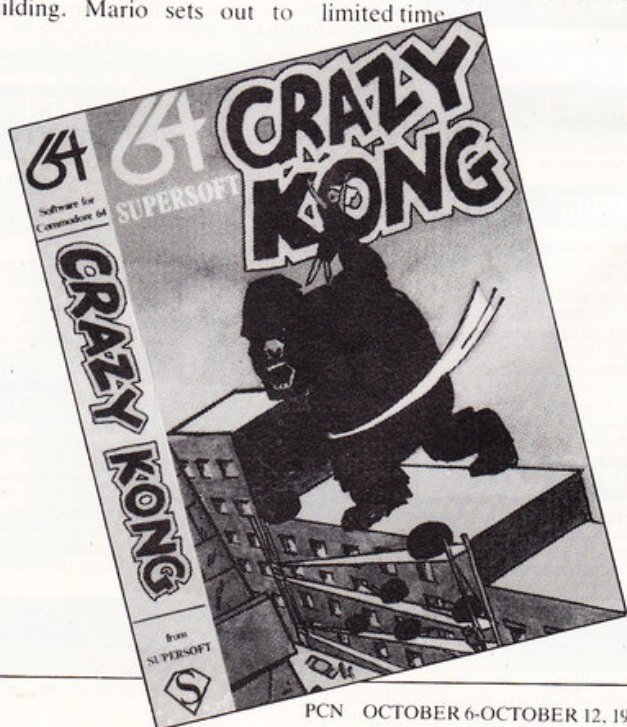
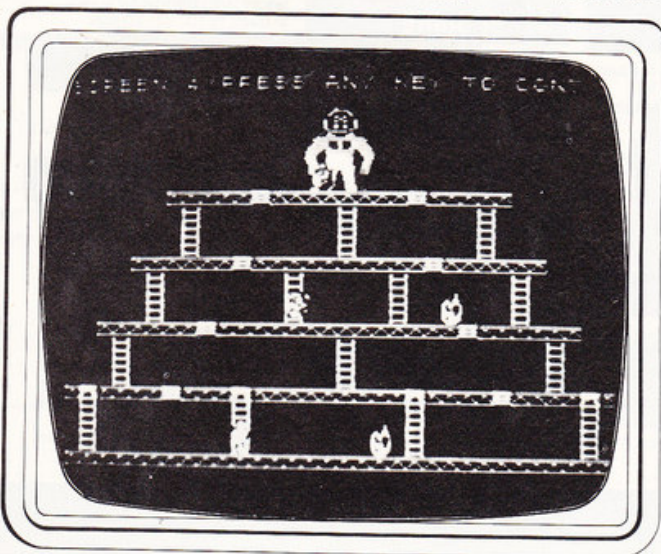
It may sound bizarre to some of you, but to most it will all be desperately familiar.

Mario must finish off Kong, not by shooting him from an airplane but by knocking out the plugs supporting the scaffolding. Points are awarded for jumping barrels and tubs, for unbunging the plugs and for completing a screen in double-quick time.

Unlikely objects, such as an umbrella and a watering can, appear from time to time.

These award you bonus points if you grab them.

There are four screens in all but completing the last takes you back to the first again where the going gets rougher. Like a cat, Mario has nine lives but limited time.



GAMEPLAY

When either run out, good-bye Mario and bad luck maiden. An extra life is gained if you reach 10,000 points. Keyboard and joystick options are also available.

In play

An instruction page with a smattering of animation is displayed and then on with the game. A rather wooden Kong stands passively aloft, barrels mysteriously appearing from around his left elbow. Down below, a cloth-capped Mario runs with a curious gait, more a hop and a skip than a sprint. The echo of his footsteps is like a typewriter clattering but the sound of the barrels rumbling down the ramps is particularly effective.

To make Mario jump vertically, the joystick fire button is pressed. Moving left, right, up or down is accomplished by appropriate joystick movement.

Jumping to the left or right takes a bit of practice — you must press the fire button and move the joystick, both at the same time.

Though the graphics and animation are weak, once you've mastered the controls the game is quite good fun. Mario falls flat on his back with a halo round his head when flattened by a barrel or having fallen off a ramp. When he's expired for the last time, an opportunity is given to enter your initials in the top score sheet.

Unfortunately, you cannot then get on with the game until a tune is played. While this is catchy, it is of the beep-burp variety and cannot be turned off or interrupted.

No use is made of the 64's impressive music facilities, but mine was a Pre-release copy — I believe the marketed version is likely to have changes in this

Verdict

While there are likely to be better versions around eventually, this is by no means a poor one. It fails to take advantage of the 64's excellent graphic and sound facilities but still manages to provide an entertaining game. All in all, it's a fairly good attempt at one of the 'standards'.

Bob Chapell

RATING

Lasting Appeal



Playability



Use of Machine



Overall Value



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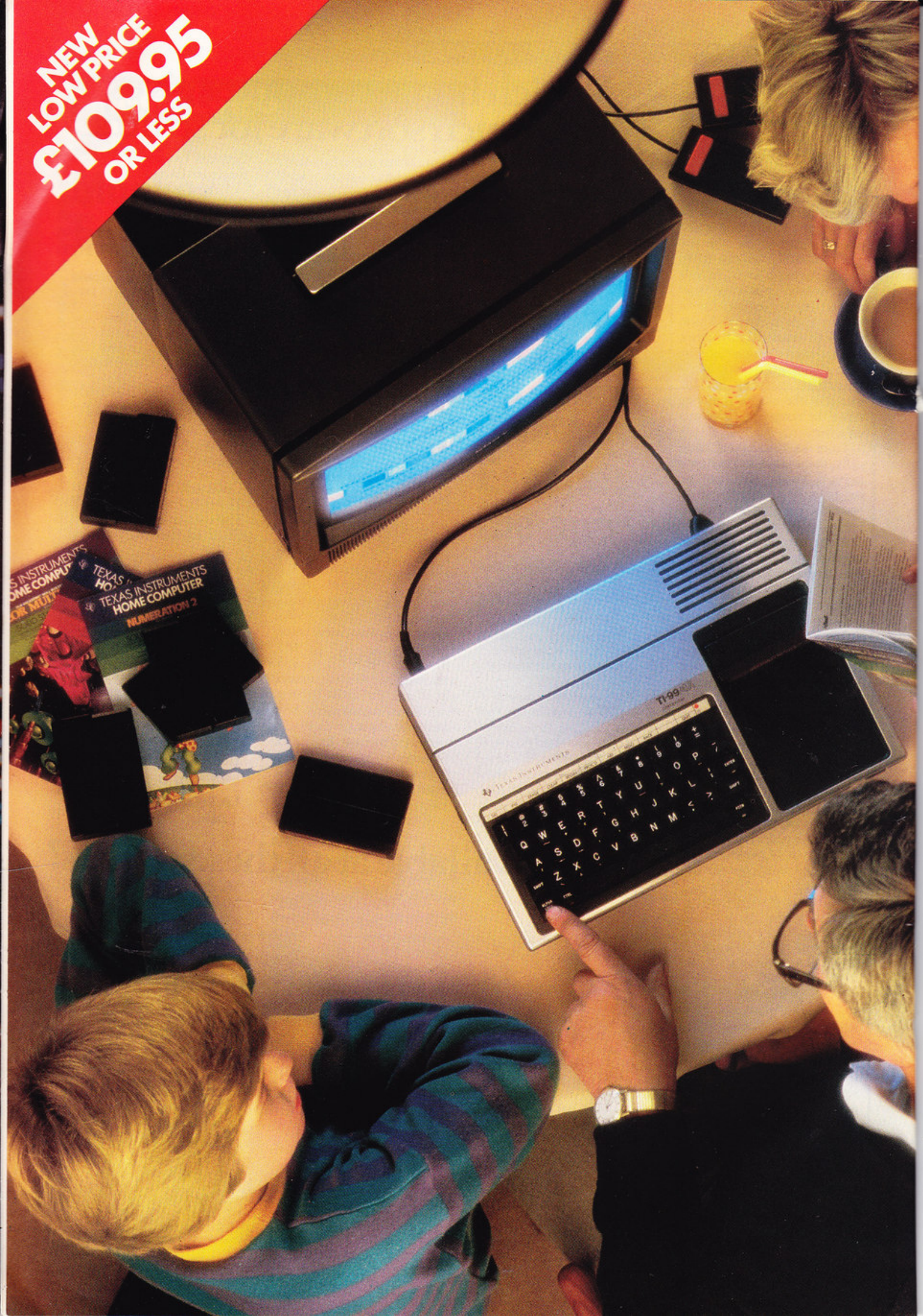
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The TI Home Computer is a real computer system

The TI Home Computer has got the memory power you might expect from more expensive computers, built in. At its heart is a powerful TMS 9900 16-BIT Microprocessor. Most other home computers have only an 8-BIT. And you can expand the memory from 16K of RAM up to 52K.

The total memory capacity is 114K Bytes.

A wide range of software for everyone

Another feature that makes the TI system so powerful, yet so easy to use is Solid State Software.™ These plug-in cartridges cover everything from space games like Parsec™ to teaching maths, managing home finances and composing music. And the range is getting wider all the time.

It even has what professionals look for in a home computer

CPU: TMS 9900 16-BIT, plus 256-byte Scratchpad RAM.

Memory: Total 114K bytes; 26K bytes ROM internal; up to 36K ROM cartridges external; 16K built-in RAM expandable to 52K bytes.

Keyboard: 48 Key QWERTY, alphalock, function key auto repeat.

Sound: 5 octaves, 3 simultaneous tones, noise tone.

Colour: 16 foreground and background. High resolution.

Interfaces: Cassette, TV, 2 joysticks, main peripheral port.

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More than one programming language

The standard programming language, TI BASIC, is built into your TI Home Computer so you can begin programming right away. But there's an expanded range of optional languages like Extended BASIC, TI Logo, USCD-Pascal, TIFORTH and Assembler.

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Most computers lose a lot of memory when you add peripherals. The TI Home Computer is different. Every peripheral comes with its own built-in programs to keep the loss of memory to a minimum.

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The peripherals include memory expansion, RS232 Interface, P-Code card and more. There's also a sophisticated matrix printer and Solid State Speech™ synthesizer – which you can use with your own TIBASIC programs.

A lot more for no more

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DRAGON GAMES

DRAGON 32

Stickman lights up

Name Cuthbert Goes Walkabout
System Dragon 32 **Price** £8
Publisher Microdeal, 41 Truro Road, St Austell, Cornwall (0726-3456) **Format** Cassette
Language Machine code **Other versions** None **Outlets** Mail order, most dealers

After a wave of games based on shooting down aliens, and another based on running round mazes, are we now set for one where the general idea is to fill in squares, or the whole screen, by painting?

Objectives

Cuthbert's main aim in life is to clamber round a lunar pad, five squares by seven, with the corner of each square being a switch. When he has passed any two adjoining switches, that side of the square changes colour, and when all four sides change colour the square lights up.

In play

An initial disappointment is that Cuthbert is little more than a matchstick figure, although when he gets skipping around the screen you discover that he is a very agile figure indeed. The program gives you a great deal of subtle control over his movements, though this does take several plays to get to grips with.

A joystick can be used, or

keyboard control via the arrow keys, with a smack at the space bar to make Cuthbert jump. He can only leap when travelling horizontally, but you have to be careful you don't do it too near the edge of the frame or he'll plunge suicidally out. Other keys you'll need are the B key to freeze the action, S to set it going again, and 8 to change the colour of certain screens and make them more suitable for black and white TVs.

The first frame starts with four meanies lolloping after Cuthbert to a catchy boogie-woogie beat.

Despite being called Moronians, the other side gets smarter, and they'll eventually be joined by their chief, who's super-intelligent.

Points are scored for each line that changes colour, each square lit up, and a bonus and an extra life when a whole screen is filled. Subsequent screens naturally mean more Moronians, more speed, more intelligence, and less chance of survival, though if you score over 500 you can enter your name in the Microdeal Hall of Fame.

Verdict

The idea is to set the lunar pad alight, and although Cuthbert is not a game to set the world alight, it is very entertaining, and something I can see myself coming back to. Good but not quite great.

Mike Gerrard

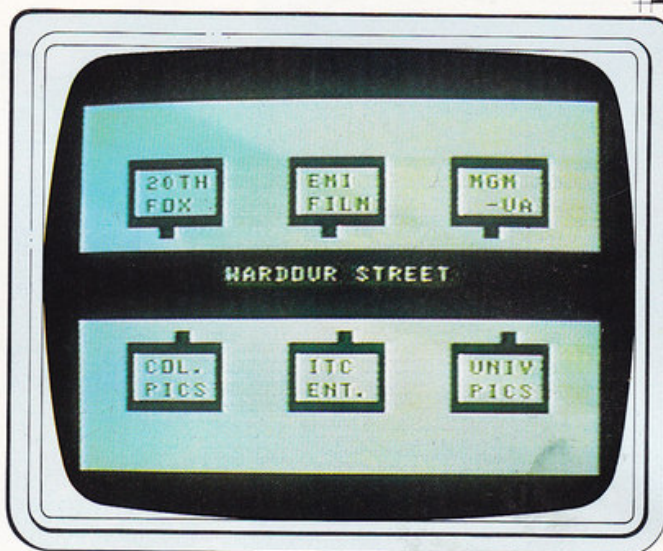
RATING

Lasting appeal

Playability

Use of the machine

Overall value



DRAGON 32

Rushed direction

Name Movie Producer **System** Dragon 32 **Price** £7.95 **Publisher** Silly Software, 61 Thornhill, North Weald, Epping, Essex
Format Cassette **Language** Basic
Other versions None **Outlets** Mail order

An adventure game based on the movie business sounds like a good idea, but unfortunately, like film companies, some software publishers are prone to exaggerating the virtues of their products.

Objectives

Set down in Wardour Street, the heart of London's movie industry, you play the part of entrepreneur Peeko Sputberg, who has a script to turn into a film. The finished film is somehow already lying in one of the rooms of a film company's offices, and you have to find it.

The cassette comes with a pair of 3-D glasses to enable you to look at the specially produced 'cover' for effect.

In play

The optional instructions explain that you'll be given a specially chosen film script and your first job will be to find a backing company. You're shown six names like MGM and ITC, and have a generous ten attempts in which to get one of them to back you. You're not told how to do this, but in fact pressing any key on the keyboard will get you some response from a random

set of messages, mostly refusals, till at last one will say 'Yes, we'll make it.'

Next step is to choose your budget of anything up to \$50 million, and your shooting schedule of up to 50 days, before you begin to move through the various rooms, each move costing you one day and half a million dollars.

Along with your location at the top of the screen there may also be a helpful or not-so-helpful random message like 'You find a European Distributor who pays you \$2 million.' I proceeded to visit rooms such as the Editing Room and the Preview Theatre, whose brief descriptions make feeble attempts at wit, and then on my 14th move I found the film, and the game was over.

I tried it again, and guess what? Yes, the film was in the same location. The whole so-called adventure had lasted about five minutes. I certainly had no inclination to look round the other rooms, there being no graphics and little prospect of surprises, but my reviewer's duty made me go round again and I discovered such hilarious and ungrammatical treats as 'Whoops! Womens toilets, you better get out fast (if you're male of course).'

Verdict

This piece of silly software should run and run... and preferably as far away from me as possible. Mike Gerrard

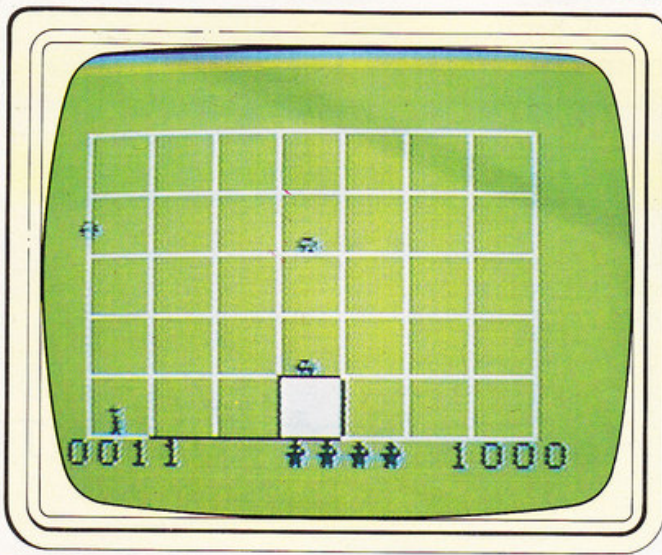
RATING

Lasting appeal

Playability

Use of the machine

Overall value



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PCN Program Cards

For your delectation this week we have two new programs — for the Dragon and the ZX Spectrum.

The Spectrum program, from Keith Briant of Weyhill, Andover, Hants, should be of interest to electronics enthusiasts. It can be used to evaluate the components needed by a 555 timer to obtain a specified output waveform.

The output waveform of the 555 is governed by three components. The program calculates the preferred values of the resistors required for a given waveform. For newcomers to electronics, resistors are generally made in standard sizes. These sizes are the preferred values and are usually the most easily obtained.

The program takes as its starting point the value of the capacitor you wish to use. The capacitor is generally the most expensive component in the circuit, sometimes costing more than the timer. When the value of the capacitor is entered, the program evaluates the exact values of the

resistors and then finds the nearest preferred values. Using the nearest values the new time periods are evaluated, and finally from these the changes from the old time periods (which were entered at the beginning of the program). You are then given options to change the value of the capacitor or resistors or run the program again and alter the time periods.

Using this computer-aided design (CAD) idea, you can tailor the circuit to your requirements without having to lift a soldering iron.

Ever had problems doing anagrams in crosswords — or in any other puzzles for that matter? Mungo Henning of Irvine, Ayrshire, has sent in a program that should be of some help.

Just run the program and enter the anagram. The program will then go through all the possible permutations of the letters. Take note of the number of possible alternatives, because the more there are, the longer the program will take.

If you see the letters approaching a word you know, you can stop the program by pressing the space bar or a number. If you press a number, then the letter pointed to by that number, from the left, will be swapped. This enables you to reach the word more quickly.

The routine can cope with words of up to ten letters, but this can be changed.

If you have a program that you have written and that you think others would like to use, why not send it in to Program Cards? Just send a cassette or disk with your program on. If possible send some notes on how the program works and a listing.

We pay for all the programs we publish according to originality, good programming and length. All cassettes and disks will be returned as soon as possible, after going through our referee system, at our expense. Send them to: Programs Editor, PCN, Evelyn House, 62 Oxford Street, London W1A 2HG.

PCN Program Cards

Composer Card 5 of 11

8331 C05/11

Oric 1(48K)/Oric Basic/R Bower/Cont

```

3000 GOSUB 3500
3001 REM ** PRINT ROUTINE **
3005 FOR OO=1 TO COUNT-1
3007 IF LEN(NT$(OO))>2 THEN 3030
3010 RL$=STR$(RL(OO)):RL$=MID$(RL$,2,LEN(RL$))
3020 NT$(OO)=NT$(OO)+RL$+" ";
3030 B=A+LEN(NT$(OO)):IF B>38 THEN A=2:YBY+1:B=LEN(NT$(OO))+2
3040 IF Y>24 THEN GOSUB 3580 'TURNPAGE
3070 PLOT A,Y,NT$(OO)
3080 A=B
3100 NEXT OO
3104 PLOT3,25,"PRESS ANY KEY TO CONTINUE":GET A#
3105 DOKE 621,48920:POKE 623,4
3110 RETURN
3500 DOKE 621,48160
3510 POKE 623,24
3520 CLS
3530 A=1:Y=4
3540 B=1
3550 RETURN
3580 PLOT3,26,"PRESS ANY KEY TO GO ONTO NEXT PAGE":GET A#:GOTO 3500
5000 REM ** EDIT MODE **
5005 RESTORE:FOR I=1 TO 16:READ DTA$:NEXT I
5010 CLS
5020 PRINT"Which note do you wish to change,          1-";COUNT-1;
5030 INPUT "Number ";ED
5040 IF ED>COUNT THEN PRINT"Not yet typed in !":WAIT 100:GOTO 5010

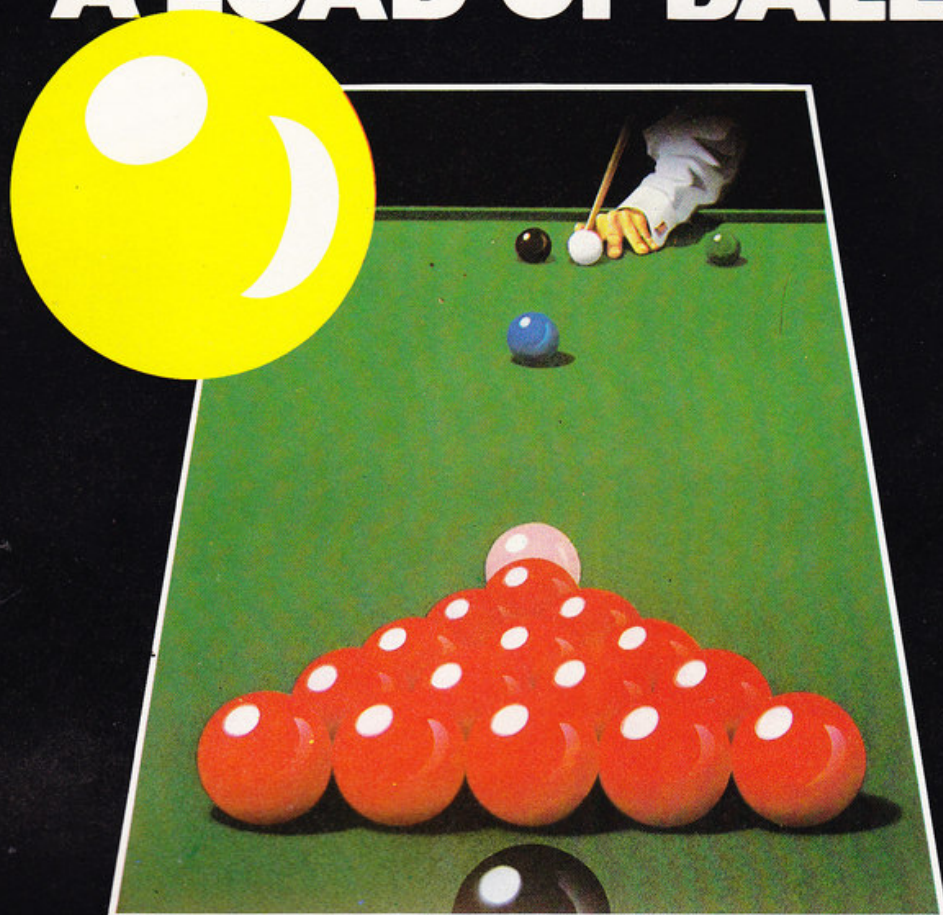
```

3000 GOSUB and reset screen to full.
3005-3100 Print the current notes on the screen, taking into account screen scrolling at 3580.

3104-3110 Reset window after any key prompt.
3500-3550 Reset screen to full.
3580 Next page prompt.

5000-5010 Read the first 16 pieces of data at line 991,992.
5020-5030 Prompt and get note.
5040 Check the note for validity.

MORE THAN A LOAD OF BALLS



The pink's teetering on the edge of the pocket, the red's partially blocked, and now it's make or break.

Do you add a touch of spin or do you play safe?

Do you try for the trick shot or go for the snooker?

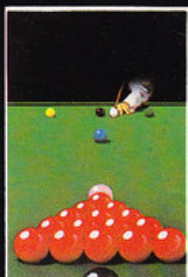
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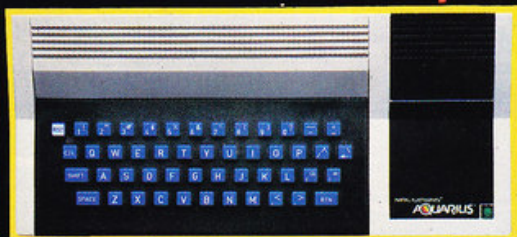
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● This is an entirely new computer system. It was designed with both eyes fixed firmly on the future. So that whatever shape the future takes, we'll be able to fit it into the system. Just as simply as the peripherals and software already available fit into the system. That way, the system will grow with you. And you'll never get left behind.

● Based around the Z80A microprocessor, and utilising Microsoft™ BASIC, Aquarius™ has 8K ROM and 4K RAM resident within its console. It is able to provide up to 16 colours and resolution of 320x192, and generates its sound directly through the television's speakers.

● With twin cartridge ports, the mini-expander allows simultaneous use of additional RAM and software cartridges. Twin disc game hand controls are included and the unit provides two additional sound channels. The 16K RAM cartridge plugs into either the console or the mini-expander, increasing Aquarius™'s RAM capacity to 20K.

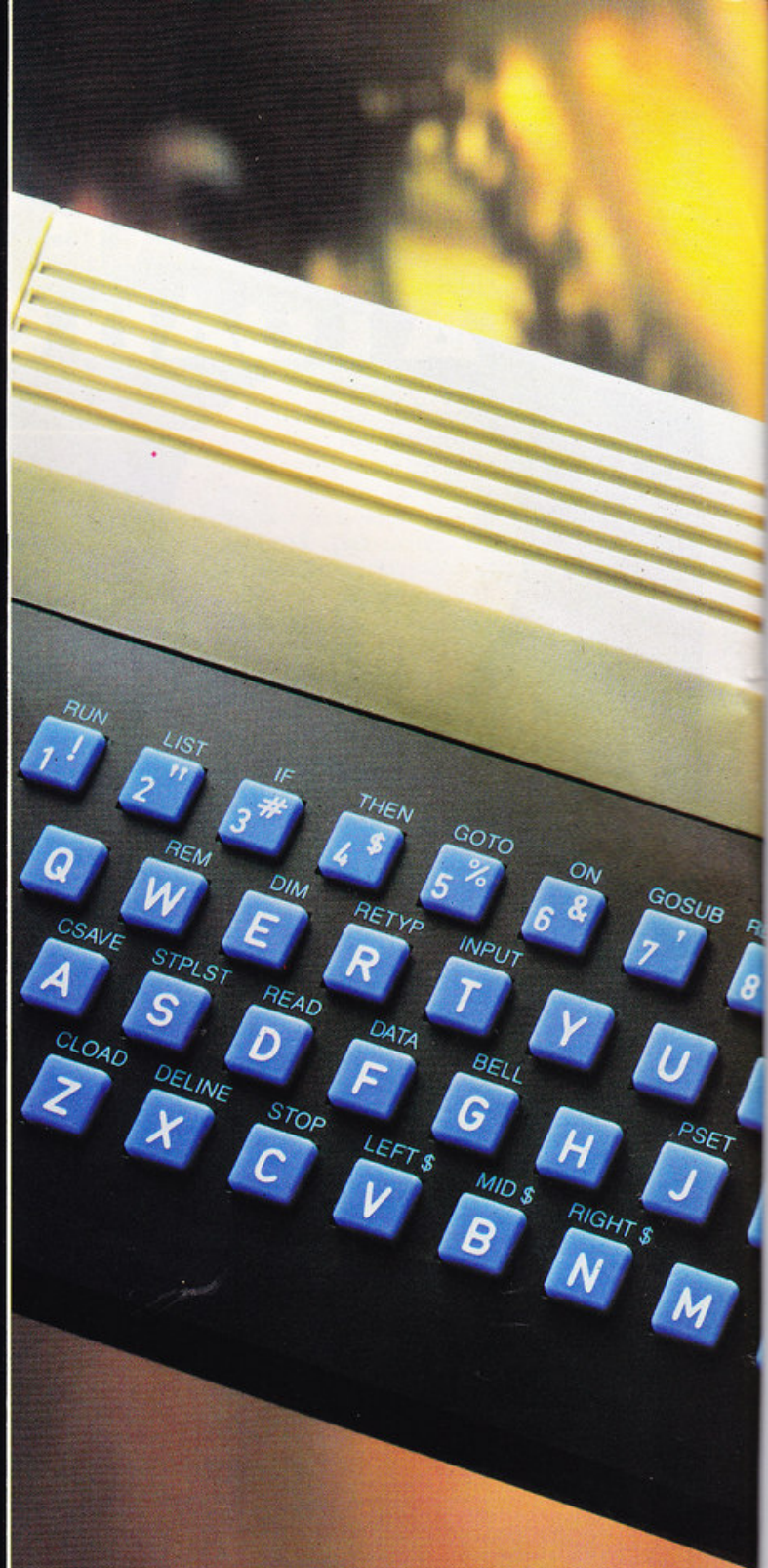
● With the ability to reproduce the entire graphic and character set of Aquarius™ at 80 characters a second, the printer's 40 column output allows transcription of the complete monitor image.



● Using standard audio cassettes, the data recorder provides storage for programs and information, and allows the use of cassette based software. Incorporating a digital tape counter and transmission indicator, it operates sequential searching.

● A large number of games, designed to take advantage of Aquarius™'s sophisticated colour and sound capabilities, are available on cartridges that plug into the console either direct, or through the mini-expander. Cassette based games can be used via the data-recorder.

● A wide range of preprogrammed cartridges is available, including the LOGO teaching program and practical home data systems like FILEFORM™ and the spreadsheet calculator package, FINFORM™.



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PCNProgramCards

Composer

Card 6 of 11

8331C06/11

```

5050 PRINT "Present note number ";ED;" is ";
5060 IF LEN(NT$(ED))>2 THEN 5090
5070 RL$=STR$(RL(ED));RL$=MID$(RL$,2,LEN(RL$))
5080 NT$(ED)=NT$(ED)+RL$+" ";
5090 PRINT NT$(ED)
5095 PRINT "On octave ";OC(ED)
5096 PRINT "New octave";:GETOC$:OC=VAL(OC$):IF OC<0 OR OC>6 THEN 509
5
5097 OC(ED)=OC
5098 PRINT OC$
5100 INPUT "New note";NT$
5110 REPEAT
5120 REA~ DTA$,DTA
5130 IF NT$=DTA$ THEN NT$(ED)=NT$:NT(ED)=DTA
5140 UNTIL DTA$="REST"
5150 IF NT$(ED)<>NT$ THEN PRINT "Note not known":WAIT 100:GOTO 5050
5160 INPUT "Note length (relative)";RL(ED)
5170 IF NT$(ED)="REST" THEN NT$(ED)=" ":GOTO 5190
5175 PLAY 1,0,1,100*RL(ED)
5180 MUSIC 1,OC(ED),NT(ED),12
5190 WAIT RL(ED)*10:PLAY 0,0,0,0
5200 RETURN
6000 REM *** INSTRUCTIONS ***
6010 IF A1$<>" " THEN 6030
6020 PRINT "Do you want instructions (y/n)":GET A$:IF A$="N" OR A$="n"
THEN 9000
6025 CLS
6030 DOKE 621,48160:POKE 623,23:CLS

```

5050-5090	Print and format present note	5110-5140	Check note and install it into	5160-5180	Get the note-length and play
5095	Print the note's octave		the tune		the note
5096-5098	Get new octave	5150	Note not known	5190	Wait, then turn the note off
5100	Get new note			6000-6900	Instructions and help screen

PCNProgramCards

Composer

Card 7 of 11

8331C07/11

```

6040 PRINT "INSTRUCTIONS"
6050 PRINT "=====":PRINT
6060 PRINT "This program allows you to type in ":PRINT
6070 PRINT "music, (your own, or other peoples, ":PRINT
6080 PRINT "compositions), play it back, print it ":PRINT
6090 PRINT "onto the screen etc. ":PRINT
6100 PRINT "You may type in up to ONE THOUSAND ":PRINT
6110 PRINT "notes over a SEVEN octave range, which":PRINT
6120 PRINT "includes over EIGHTY different notes ":PRINT
6130 GOSUB 8900:REM TURN PAGE
6140 PRINT "Firstly, you choose which octave you ":PRINT
6150 PRINT "want to start on. See page 99 of the ":PRINT
6160 PRINT "ORIC manual for a description etc. ":PRINT
6170 PRINT "What you choose can be changed at any":PRINT
6180 PRINT "stage to give the full note range. ":PRINT
6190 PRINT "After typing in the octave, the prompt":PRINT
6200 PRINT "'Which note ?' will appear, To this ":PRINT
6210 PRINT "you may type in one of the notes ":PRINT
6220 PRINT "from the top right of the screen, or a":PRINT
6230 PRINT "command (all described later). ":PRINT
6235 GOSUB 8900
6240 PRINT "Type in the notes in the form : ":PRINT
6250 PRINT "LETTER(sign).e.g. A or D# or REST. ":PRINT
6260 PRINT "After a note has been typed in you ":PRINT
6270 PRINT "will be asked for its 'relative note ":PRINT
6280 PRINT "length ". This is how many beats the ":PRINT
6290 PRINT "note will be in length. (You decide ":PRINT
6300 PRINT "later how long each beat will be) ":PRINT
6310 PRINT "When you have done this, you will hear":PRINT
6320 PRINT "the note, and will then be asked for ":PRINT
6330 PRINT "another note or command. ":PRINT
6335 GOSUB 8900

```

Continued next week

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PCN 6/10

ZX Spectrum ZX BASIC

Application: Electronics
Author: Keith Briant

```

10 RESTORE 40: DIM V(14): FOR
I=1 TO 14: READ V(I): NEXT I
20 DEF FN L()=INT (7*R(2)*C+.5
)/10: DEF FN H()=INT (7*(R(2)+R
(2)*C+.5)/10
30 DEF FN f()=INT (10*t/(.7*c)
+.5)/10: DEF FN s(a,b)={"+" AND
a>b)+STR$(a-b)+$
40 LET ma=1e3: LET mi=1e-2: LE
T s#="#5: DATA 8.2,10,12,15,18
120,27,33,39,47,56,66,80,100
50 PAPER 1: INK 7: CLS: BORDE
R 1: INPUT "":
60 PRINT "*****NE555 SUB COMPON
ENT CALCULATOR": GO SUB 350
70 RESTORE 80: FOR I=USR "a" T
O USR "b"+7: READ J: POKE I,J: N
EXT I: GO TO 140
80 DATA 0,0,0,36,36,36,55,64,0
60,66,66,66,66,102,0: REN A=2,

```

```

90 PRINT "C1: "C1" uF"
100 FOR i=1 TO 2: PRINT "R"i":
: "r(i) "K": NEXT i: RETURN
140 INPUT "Low Output Period (m
S): "L
150 INPUT "High Output Period (
mS): "H
160 IF h-l<=0 THEN DEEP .5,0: P
RINT "Low Period must be LES
S than High Period.": GO TO 140
170 INPUT "Capacitor Value (uF)
: "C
180 DIM r(2): LET t=L: LET R(2)
=FN r()
190 LET t=H: LET R(1)=FN r()-R(
2)
200 IF r(1)>ma OR r(2)>ma THEN
DEEP .5,10: PRINT "Resistors a
re TOO LARGE..." "Please increas
e capacitor value.": GO TO 170

```

10	Set the data pointer to the data in line 40 and read the preferred values into the array v.	50	values (the ones you can buy easily).	100	Print resistor values subroutine.
20	Define the functions L and H to evaluate the low and high time periods.	60	Set border ink and paper colours.	140	Get low time period.
30	Define FN r and FN s\$.	70	Print title and GOSUB to draw graphics.	150	Get high time period.
40	Set the max and min values for the resistors. This line also includes the resistor preferred	80	Set data pointer to data line 80, and define μ and Ω .	160	Check that the low period is less than the high period.
		90	Data for defined characters.	170	Get the capacitor value.
			Print the value of C1.	180	Dimension an array for the resistors and evaluate R2.
				190	Evaluate R1
				200	Check resistor sizes to see if they are too large.

```

210 IF r(1)/c#1 OR r(2)/c#1 THEN
BEEP .5,10: PRINT "Resistors a
r# TOO SMALL...": please decreas
e capacitor value.: GO TO 170
220 PRINT "Exact Values": 0
0 SUB 90
230 FOR i=1 TO 2: LET j=1: LET
a=10*(INT (LN r(i)/LN 10)-1)
240 IF r(i)/v(j) # e THEN LET j=j
+1: GO TO 240
250 LET a=e*v(j-1): LET b=e*v(j)
: LET r=r(i): LET r(i)=a*(r-a+
b-r)+b*(b-r(a)): NEXT i
260 PRINT "Preferred Values":
: GO SUB 100
270 LET f=FN 1(): LET g=FN h():
PRINT "Time Periods (t# Changes
): "High : "gim$,FN s$(g,h)"L
ow : "kmm$,FN s$(k,l)"Total:
":g+kim$
280 PRINT #1: "Press "c" to con
tinue": PAUSE 0: LET q$=INKEY$:
IF q#(<"c" AND q#(<"C" THEN STOP

290 CLS : PRINT "Press: "1
to RUN program again,"2" to a
lter C,"3" to alter R1 or R2":
300 PAUSE 0: LET q=CODE INKEY$:
IF q=CODE "3" OR q=CODE "1" TH

```

```

N BEEP .5,0: GO TO 300
310 RESTORE 320: FOR I=1 TO VAL
CHR# 9: READ J: NEXT I
320 CLS: GO TO J: DATA 140,170
330
330 GO SUB 100: FOR I=1 TO 2: I
NPUT "r(":(i);") = ":r(i): NEXT
I: GO TO 200
350 PLOT 112,132: DRAW 20,0: GO
SUB 400
350 PLOT 132,108: GO SUB 410: G
O SUB 400: PLOT 132,75: GO SUB 4
10: DRAW 0,-14: PLOT 124,54: DRA
W 15,0
370 PLOT 124,48: DRAW 15,0: PLO
T 132,48: DRAW 0,-14: DRAW -20,0
380 LET a=12: PRINT PAPER 3: AT
5,a;"8": AT 9,a;"7": AT 13,10;"2&5
": AT 17,a;"1": AT 10,0;"NEEEE PIN
": "NUMBERS"
390 LET a=18: PRINT AT 7,a;"R1"
AT 11,a;"R2": AT 15,a;"C1": RETU
RN
400 DRAW 0,-8: DRAW 4,0: DRAW 0
,-15: DRAW -8,0: DRAW 0,15: DRA
W 4,0: RETURN
410 DRAW 0,-8: DRAW -20,0: DRA
W 20,0: RETURN

```

210	Check resistor sizes to see if they are too small.	250	Set the correct power of ten and get the nearest preferred value.	300	Get option.
220	GOSUB and print the exact values of the capacitors and resistors.	260	Print the preferred values using the subroutine at line 100.	310	Select the line number to jump to.
230	For both the resistors, evaluate the power of 10 (12 is 1, 123 is 2 etc . . .).	270	Work out the time periods using the preferred values.	320	Jump to line number.
240	. . . and find the nearest preferred value.	280	Prompt to continue.	330	Get and print the values of the resistors and jump to 200.
		290	Print the menu for running the program or altering values.	350-410	Draw resistors and capacitors as they are attached to the 555 timer.

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Anagrams Card 1 of 2

8331AN1/2

```

20 REM ANAGRAM PROGRAM
30 CLEAR 500
40 CLS
50 PRINT @ 8, "ANAGRAM PROGRAM"
60 PRINT @ 193, "TYPE IN ALL ANAGRAM LETTERS"
70 PRINT @ 225, "FOLLOWED BY 'ENTER'."
80 PRINT @ 289, "LETTERS : ";
90 INPUT A$
100 IF A$="" THEN 50
110 PRINT
120 Z$=A$
130 REM SORT ARRAY A$
140 D=LEN(A$)
150 C=0
160 FOR I=1 TO D-1
170 S$=MID$(A$, I, 1)
180 T$=MID$(A$, I+1, 1)
190 IF S$ <= T$ THEN 240
200 B$=LEFT$(A$, I-1)+T$+S$
210 IF LEN(A$)>I+1 THEN B$=B$+RIGHT$(A$, LEN(A$)-I-1)
220 C=C+1
230 A$=B$
240 NEXT I

```

Dragon 32
Dragon BasicApplication: English
Author: Mungo Henning

```

250 D=D-1
260 IF C>0 THEN 150
270 PE=1:FOR I=1 TO LEN(A$):PE=PE*I:NEXT I
280 C=1
290 FOR I=2 TO LEN(A$)
300 IF MID$(A$, I, 1)=MID$(A$, I-1, 1) THEN C=C+1:IF I<>LEN(A$) THEN 340
310 IF C < 2 THEN 340
320 PR=1:FOR J=1 TO C:PR=PR*J:NEXT J
330 PE=INT(PE/PR):C=1
340 NEXT I
350 PRINT "THERE ARE ";PE;" ANAGRAMS"
360 PRINT "OF '";Z$;"' : "
370 REM FIND THE ANAGRAMS
380 PRINT:PRINT
390 SS = 30
400 SP=SS: DIM ST$(SS), SN(SS)
410 I=1: P$=""
420 IF LEN(A$)=1 THEN PRINT STRING$(INT((32-LEN(P$+A$))/2), " ");P$;A$
430 I$=INKEY$
440 IF I$="" THEN 560
450 IF I$<"0" OR I$>"9" THEN 520
460 J=VAL(I$)

```

30	Reserve 500 bytes	210	Rearrange the strings	390	Set the stacks to have 30 levels
50	Print title	220	Increment the count	400	Set stack pointer to the stack level and dimension the stacks
60-80	And prompt	250	Move down the string	410	Set up variables
90	Get string	260	If C isn't zero then continue sort	430	Get a key from the keyboard
140	Get length of string	270	Evaluate the number of permutations	440	If no key pressed then jump to anagram continuation
160	Start alpha sort			450	Check if the key is between 0 and 9
170-180	Get consecutive characters from string	290-340	Work out the number of anagrams	460	Get the number pressed
190	If they are in order then next	350-360	Print the number of anagrams of the string		
200	Put T\$ and S\$ at end of string				

Anagrams Card 2 of 2

8331AN2/2

```

470 IF J<=0 OR J>=LEN(ST$(SS)) THEN 560
480 SP=SS-J
490 PRINT "CHANGING CHARACTER ";J
500 P$=LEFT$(P$, J)
510 GOTO 690
520 T=TIMER
530 PRINT "TO CONTINUE, PRESS THE SPACE BAR"
540 IF TIMER < T+30 THEN 540
550 IF INKEY$="" THEN 550
560 I=1
570 IF I>LEN(A$) THEN 690
580 IF I>1 THEN IF MID$(A$, I, 1)=MID$(A$, I-1, 1) THEN 750
590 B$=LEFT$(A$, I-1)
600 IF LEN(A$)>I THEN B$=B$+RIGHT$(A$, LEN(A$)-I)
610 P$=P$+MID$(A$, I, 1)
620 REM PUSH A$ AND I ONTO THE STACK

```

```

630 IF SP=0 THEN PRINT "OVERFLOW" : STOP
640 ST$(SP)=A$
650 SN(SP)=I
660 SP=SP-1
670 A$=B$
680 GOTO 420
690 REM PULL A$ AND I OFF THE STACK
700 IF SP>=SS THEN 770
710 SP=SP+1
720 A$=ST$(SP)
730 I=SN(SP)
740 IF LEN(P$)>0 THEN P$=LEFT$(P$, LEN(P$)-1) ELSE P$=""
750 I=I+1
760 GOTO 570
770 SOUND 89, 1
780 PRINT
790 PRINT @ 487, "ANAGRAMS FINISHED"
800 END

```

470	Check that the number is valid	580	greater than I	660	Decrement the stack pointer
480	Move the stack pointer to the appropriate character	590	If I is greater than 1 then swap the appropriate letters	670	Set A\$ to B\$
490	Inform the user of the current status	600	Put the remainder of the letters into B\$	680	Continue routine
500	Put chars into P\$	610	If I is the other way around then get the right half of the string into B\$	700	Check for terminator
510	Goto stack operation to pull something off the stack	630	Get next letter to P\$	710	Increment the stack pointer
520	Get the timer value	640	Check whether the stack has overflowed	720	Pull A\$ off the string stack
530	Print a prompt	650	Put A\$ onto the string stack	730	Pull I off the number stack
540	Wait a while	660	Put I onto the number stack	740	If P\$ isn't empty remove the leftmost letter
550	Get key from keyboard	670		750	Increment I
560-570	Check if the length of A\$ is	680		760	Continue the routine
		690		770-800	Routine finished: End

CHOOSING A HOME MICRO

WARNING

Choosing a home micro can be a daunting task to the newcomer, and with an ever increasing number of micros emerging on the market, even up-grading, say, from a ZX81 can be a risky and expensive exercise if the wrong decision is made. It is important to look at the real facts and specifications, and check exactly what you get for your money before choosing your micro-computer system.

THE PITFALLS

"DON'T LET THE ADD ONS ADD UP"

A number of large companies are offering packages that seem to be good value and low cost. These offers usually have a hidden sting inasmuch as the essential accessories such as connection leads, peripherals and software often carry very high cost premiums. e.g. software for low cost hardware usually costs between £29 and £49 for a ROM cartridge!!

CHECK THE QUALITY OF THE PRODUCT.

Raw materials are now an area where corners can be cut, and shoddy workmanship during 'building' can effect the 'up-time' of your unit. Areas to watch out for are unreliable edge connectors, corrosion and poor quality P.C.B.s. Low quality components and bad design will seriously effect the reliability of the end product, and can lead to false economy.

DON'T BUY A GAMES MACHINE

Unless you want just games and nothing else! With a games computer you are limited. Some computers, however, have the advantage of both games facility plus the whole world of computing to explore, as your interest and skills develop. A real computer system will allow you to expand your knowledge of the Hi-Technology world, and help earn its keep with its added uses in the field of education, communication and home business use.

SOFTWARE

Make sure the system you choose has a growing library of support software, to enable you to realize the full potential of your machine.

KEY POINTS TO LOOK FOR

● High Resolution Colour

In general most home computers have a poor graphics resolution (or detail). Check on the vertical and horizontal resolution in graphic mode and multiply the two numbers together. If the result is less than 35,000, then the graphics can hardly be considered high resolution. Without high resolution graphics displays such as those used in games tend to be "Chunky" in appearance.

● High Quality Sound

Some computers claim to provide a sound channel when in reality all that can be found inside the computer is a small buzzer controlled by electronic pulses. At the very least a sound facility should provide more than one channel and a raise channel as well (for gun shot effects in games for example). The best systems also provide envelope control of the sound channels to produce very sophisticated effects; very important for generating music. Also look for the ability to connect to external amplifiers.

● Keyboard

For accurate entry of programs and data into a computer it is important that the keyboard has a good tactile feel in operation. Coupled with acoustic feedback the user is fully aware when the computer has accepted his/her actions. Also of importance in a keyboard is layout. A standard computer keyboard layout will familiarise the user with the vast majority of computers used in the world of business and professional applications; very important if the purpose of purchasing a computer is educational.

● RAM

One of the most important features of a computer is the amount of RAM, or memory, included. In general the more powerful and exciting a computer program is the more RAM it requires. But take care, all computers are advertised quoting the total RAM used in the system. Computers use up a great deal of their own RAM for storing essential data and particularly in supporting the graphics display and the CPU. If it is less than 32K think again, is it enough?

● Computer Language

It is too difficult to program a computer in its own binary language so high level languages are used, the most popular being BASIC. However, there are a number of BASICs, some being very different from the rest. A de facto standard in the computer industry is Microsoft BASIC. Learn this one and you will be able to program in the majority of computer BASICs; such an important point if a home computer is to be used to educate your children to face the technology of the future.

● Expansion

As your interest and knowledge of computing grows, you will need a



Choosing the right system carefully will save you from throwing your money away. Check full specification, plus peripherals and software prices, before you buy. Preferably choose a Real computer system that can expand to meet your needs.

computer system that will grow with you; able to accommodate Printers, Disk-drives, Joysticks, Communications Modem, and Colour Monitor, as well as produce HI-FI sound effects.

● Software

The computer you choose should have a growing selection of utility

software to make the most of its capability.

Remember, computing is here to stay. You can't learn to compute on a toy, or a device which does not behave like a real computer. In short, look out for a computer which offers all the points above, and you will be sure of getting the best value for money.

To find out which company offers you the right choice, with:-

- Good value, high specification, quality micros.
- A quality, 4 colour, plain paper printer/plotter.
- Communications Modem.
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TURNOVER...



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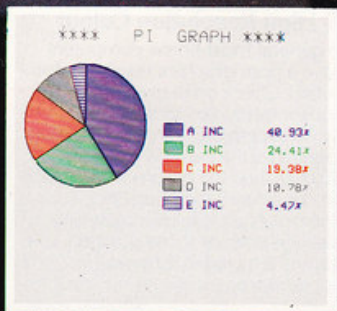


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**NEWS FLASH
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THE HOBBIT**



Clubnet keeps you in touch with micro enthusiasts throughout the UK. It is divided into clubs and user groups and a list of each is published on alternate weeks.

This week it is the turn of user groups, which are listed alphabetically by machine and special interest.

If your association has something special on the agenda or if

you're starting a new one, contact us at *Clubnet, Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HG.

The listings are based on that of the Association of Computer Clubs.

Our Clubnet Report this week focuses on the Scottish TRS-80 User Group.

Tandy first-footing

For the first time in the 2½ years since it began, the Scottish TRS-80 Users Group was visited by Edinburgh's Tandy Centre manager, Donnie Morrison.

It seems that Tandy is changing its policy on UK user groups, according to Mr Morrison, Tandy's top-selling manager in the UK. From now on he can mention the group to customers, display its notices and visit its meetings.

He arrived with a Model 100 under each arm, announced forthcoming Tandy products and gave the 30-odd members first pick of various sale items he had brought from the centre.

Having a salesman along could have drawbacks, but at the end of the meeting everyone seemed pleased. Mr Morrison and his assistant were cross-examined thoroughly, not to say relentlessly, and the

bargains included a Model III which went for £150.

Meanwhile, group member Chas Brown demonstrated how he'd made use of the 2K capacity in his Tandy's memory map with an Eeprom programmer. His plan, he explained, was 'to put into it some obscure commands I want to use, but which aren't in any disk operating systems I've got'. He reckons it cost him £35 to change the Tandy monitor program.

Impressed, but not tempted to try it, other members felt more of a yen for straightforward software projects. For instance, Neil Arnott is a small farmer attempting to write a program for his farm — not just accounts and fuel control, but getting to the bottom of such mysteries as why livestock dies.

Harriet Arnold



Name Scottish TRS-80 and Genie Users Group Venue Mansion House Hotel, Milton Road, Edinburgh Meetings Second Thursday every month Contact Dick Mackie, 031-447 6651.

USER GROUPS

Acorn

Coventry Acorn Atom User Group. Peter Frost, 18 Frankwell Drive, Coventry, 0203 613156.

Kent Medway Acorn User Group. Meets at St John Fisher School on last Monday of month at 7pm. Sessions at 9pm Thursday at the Fox and Hound, Chatham. Clem Rutler, c/o St John's Fisher School, Ordance Street, Chatham, Kent, 0634 42811 (day), 0634 373459 (evenings).

Manchester Acorn User Group. Meets at AMC, Crescent Road, Crupsall, Manchester 8 on Tuesday except school holidays. John Ashurst, 192 Venture Close, Failsworth, Manchester, 061-681 4962.

Apple

Ashted Apple User Group. Meets first Monday of every month. Contact M Lawrence, 15 Petters Road, Ashted, Surrey.

British Apple Systems User Group. PO Box 174, Watford WD2 6NF.

British Apple Systems User Group. Meets first Tuesday evening and third Sunday afternoon every month at Old School, Branch Road, Park Street, St Albans. Subs: £12.50+£2.50 joining. Contact D Bolton, 0727 72917.

Birmingham & Region Apple Group. Contact Mel Golder, 021-426 2275.

Bristol Apple Users and Dabblers. Meets at 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, once a month. Ewa Dabkowski, c/o Datalink, 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, 0272 213427.

Buckinghamshire Apple User Group. Steve Proffitt, The Granary, Hill Farm Road, Marlow Bottom, Buckinghamshire, 062 84 73074.

Chelmsford Apple Users Club. Proposed new club. Contact D Beckingham, 571 Galleywood Road, Chelmsford, tel: Chelmsford 66948.

Croydon Apple User Group. Meets at Sidda House, 350 Lower Addiscombe Road, Croydon, on second Monday of month.

Paul Vernon, 60 Flawkhurst Way, West Wickham, Kent, 01-777 5478.

London Apple Music Synthesis Group. Dr Davis Ellis, 22 Lennox Gardens, London SW1.

South-East London Apple User Group (Appletree). Contact John Grieve at 106 Maran Way, Erith, Kent or phone 01-311 7681.

Milton Keynes Microcomputer User Group. Meets every Tuesday, 7.30pm. Brian Pain, Sir Frank Markham School, Woughton Centre, Chaffron Way, Milton Keynes.

Atari

Birmingham User Group. Meets at the Malaga Grill, Matador Public House, Bull Ring shopping centre, Birmingham, on second and fourth Thursday every month at 7.30pm. Mike Aston, 42 Short Street, Wednesbury, West Midlands.

Carshalton Atari User Club. Paul Deegan, 01-642 5232.

Lea Valley Atari User Group. Meets every month. Details from Matthew Tydemann, 125 Cadmore Lane, Cheshunt, Herts.

South Cheshire Atari User Group. Meets at the Earl of Crewe, Nantwich Road, Crewe, on first Thursday of each month at 7.30pm. Contact A Davies, 48 Blagg Lane, Nantwich, Cheshire, 0270 626969.

Essex. Contact John Sarrar, 138 Frederick Road, Rainham, Essex, tel (76) 22077. Meets at Rainham Town Football Club, 7.30pm, second and fourth Friday of each month.

Hull Atari Users Local Group. Harvey Kong Til, 546 Holderness Road, Hull HU9 3ES. Hull 7911094.

London Silica Atari 400/800 User Club. Richard Hawes, 01-301 1111.

Manchester Atari Computer Enthusiasts. Meets at The Ellesmere, Worsley Road, Worsley, on the second and last Thursday of every month. Contact Martin Davies, Bolton 700757.

South Middlesex Atari Club. Meets fortnightly, Tuesdays, at Staines Methodist Church Hall, Kingston Road, Staines. Contact Brian Milligan, 50 Linkscroft Avenue, Middlesex. Tel: Ashford (69) 45387.

Norwich Atari User Group. Ken Ward, Norwich 661149.

Preston Atari Computer Enthusiasts. Meets at KSC Club, Merriam House, Beach Grove, Ashton, Preston, on third Thursday of month at 7.30pm. Roger Taylor, 0253 738192.

UK Atari Computer Owners Club. Contact PO Box 3, Raleigh, Essex.

Atom

Liverpool BBC and Atom User Group. Meets at Old Swan Technical College, Room C33 on first Wednesday of month at 7.30pm and at Birkenhead Technical College on third Thursday of month at 7.30pm. Nick Kelly, 051-525 2934 (evenings).

BBC

Inverclyde BBC Micro User Group. Meets on third Monday of each month at 9 St John's Road, Gourock, Renfrewshire. Contact Robert Watt on Gourock 39967. **Laserbug** is an international user group for the BBC micro. Paul Barbour, 10 Dawley Ride, Colnbrook, Slough, Berks, 02812 30614.

Beebug. Sheridan Williams or David Graham at PO Box 50, St Albans, Hertfordshire AL1 2AR.

Bournemouth BBC User Group. Meets at Lansdowne Computer Centre, 5 Holdenhurst Road, Bournemouth on first and fourth Wednesday of month at 7.30pm. Norman Carey, 0202 749612. **Brent/Barnet User Group.** Meets on last Sunday of month. Joseph Fox, 4 Harman Close, London NW2 2EA.

Charlton & District (South Manchester) BBC Micro User Group. Contact Philip Harrison, 34 Holwood Drive, Manchester M16 8WS.

Chelmsbug. Contact Ian on Chelmsford 69174.

Cardiff BBC Microcomputer Club. Meets alternate Wednesdays at Applied Science Lecture Theatre, University College, Newport Road, Cardiff.

Format 40/80 Club (BBC Disk User Group). Send SAE to Peter Hughes, Five Marsh Street, Bristol BS1 4AA.

Liverpool BBC & Atom Group. Meets on the first Wednesday of every month at Old Swan Technical College, Room C33, 7.30-9.30pm, and on the third Thursday at Birkenhead Tech. College, 7.30-9.30pm. Contact Nik Kelly, 56 Queens Drive, Walton, Liverpool L4 6SH.

North London BBC Micro Users Group. Meets at The Prince of Wales, 37 Fortune Green Road, on Tuesdays at 7pm. Dr Leo McLaughlin, Westfield College, University of London, Kidderpore Avenue, London NW3 7ST, 01-435 0109.

Northern North Sea User Group. Potential members with helicopters welcome. Contact Ian Wilkins on board MSV Stadvie, Brent Field, East Shetland Basin, Northern North Sea (100 miles off Shetland Islands).

Norwich & District BBC Microcomputer User Group. Meets at Norwich City College on the first and third Tuesday of every month at 7pm. Subs: £3; students and OAPs £1.50. Contact Paul Beverley, Department of Electronics, Norwich City College, Ipswich Road, Norwich NR2 2LJ.

Preston area BBC Micro User Group. Meets at Plough Hotel, Lea, Preston, on last Tuesday of month. Duncan Coulter, 8 Briar Grove, Ingol, Preston, Lancashire, 0772 725793.

Tyne & Wear BBC User Club. Contact Ian Waugh, 13 Briardene Drive, Wardley, Tyne & Wear NE10 8AN.

Wakefield BBC Micro User Group. Meets at Holmfild House, Clarence Park, Wakefield, on first Wednesday of each month at 7.30pm. Contact R Bilton tel: Wakefield 382274.

Wellingborough BBC Owners User Group. Contact R Houghton, 49 Addington Road, Irthlingborough.

Witham (NAMEBUG) BBC Micro User Group. Meets at comprehensive school, Witham on second Thursday each month at 7.30pm. Dave Watts 0245 358127 after 7pm.

Basic

Welwyn Basic User Group meets at Campus West Library, Welwyn Garden City, Herts, on last Friday of each month at 7pm. Contact Debi Colthorpe, 36 Birds

Close, Welwyn Garden City, Herts, 96 30082.

Comal

London Comal User Group. Meets at Polytechnic of North London, Holloway, second Wednesday of month, term time. John Collins, 75 74111.

CUA

CUA User Group. Adrian Waters, 9 Moss Lane, Romford, Essex.

Commodore ICPUG

Basildon. Contact Walter Green, 151 The Hatherley, Basildon, Essex.

Bloxham. Contact John Temple, Kirabanda, Rose Bank, Bloxham, Oxon.

Barnsley. Bob Wool, 13 Ward Green, Barnsley, South Yorkshire, 0226 85084.

Blackpool. Meets at Arnold School, Blackpool, on third Thursday of month.

David Jarrett, 197 Victoria Road, Thornton Cleveleys, Blackpool FY5 3ST.

Birmingham. Contact J A McKain, PPI Ltd, 177 Lozells Road, Birmingham, tel: 021-544 0202.

Bournemouth & Poole. Contact Douglas Shave, 97 Canford Cliffs Road, Poole, Dorset BH13 7EP.

Bury St Edmunds. Contact Alan Morris, 30 Kelso Road, Bury St Edmunds, Suffolk.

Burnley. Contact John Ingham, 72 Ardwick Street, Burnley, Lancashire.

Canterbury SE. Meets at The Physics Lab, Canterbury University, on first Tuesday and Wednesday of month. R Moseley, Rosemount, Romney Hill, Maidstone, 0622 37643.

Carrickfergus. David Bolton, 19 Carrickburn Road, Carrickfergus, Antrim BT38 7ND, 09603 63788.

Chelmsford. Contact A G Surridge, 97 Shelley Road, Chelmsford, Essex.

Cheltenham. Meets at the Cheltenham Ladies College on last Thursday of month at 7.30pm. Alison Schofield, 78 Hesters Way Road, Cheltenham, Gloucester, 0242 580789.

Clwyd. John Poole, 6 Ridgway Close, Connah's Quay, Clwyd CH5 4LZ.

Corby. Peter Ashby, 215 Wincohn Way, Corby, Northamptonshire, 05363 4442.

Coventry. Meets at Stoke Park School and County College at 7pm on fourth Wednesday of month except July, August, December. Will Light, 22 Ivybridge Road, Styvechale, Coventry, Warwickshire.

Derby. Meets at Derby Professional Colour every other Tuesday at 7pm. Robert Watts, 03322 72569.

Derbyshire & District. Meets every other Monday 7-9pm at Davidson Richards Ltd, 14 Duffield Road, Derby. Contact Raymond Davies, 105 Normanton Road, Derby DE1 2GG.

Devon. Contact Matthew Stibbe, The Lawn, Lower Woodfield Road, Torquay, Devon.

Durham. North-East Pet and ICPUG. Meets at Lawson School, Burnley at 7pm second and third Mondays. Jim Cocalis, 20 Worcester Road, Newton Hall Estate, Durham, 0385 67045.

Dyfed. Simon Kniveton, 097 086 303.

Gosport. Meets at Bury House, Bury Road, Gosport, Hants at 7pm. Contact Tony Cox, 10 Staplers Reach, Rowner, Gosport, Hants.

Hainault. Meets at Grange Remedial Centre, Woodman Path, Hainault. Carol Taylor, 101 Courtlands Avenue, Cranbrook, Ilford, Essex.

Glasgow. Dr Jim MacBrayne, 27 Daidmyre Crescent, Newton Mearns, Glasgow, 041-639 5696.

Gloucester and Bristol Area. Meets last Friday of each month. Contact Janet Rich, 20 Old Court, Spring Hill, Cam, Gloucester.

Hampshire. Meets at 70 Reading Road, Farnborough, on third Wednesday of month. Ron Geere, 109 York Road, Farnborough, Hants, 0252 542921.

Hants. Contact Tony Cooke, 7 Russell

Way, Petersfield, Hampshire GU31 4LD.

Hertfordshire North. Meets at Provident Mutual Assurance, Purwell Lane, Hitchin, on last Wednesday of month. B Grainger, 73 Minehead Way, Stevenage, Herts SG1 2HS, 0438 727925.

Kilmarnock. Meets at Symington Primary School on first and third Thursday of month at 7pm. John Smith, 19 Brewlands Road, Symington, Kilmarnock KA1 5RW, 0563 830407.

Liverpool. Meets at The Merchant Taylor School for Boys, Crosby, on second Thursday of month at 7pm. Tony Bond, 27 Ince Road, Liverpool L23 4UE, 051-924 1505.

Llandyssul. Contact F Townsend, The Hill, Rhydownen, Llandyssul, 05455 5291.

London. Alan Birks, 135 Queen Alexandra Mansions, Judd Street, London WC1, 01-430 8025.

London North. Barry Miles, Department of Business Studies, North London Polytechnic, Holloway Road, London N7, 01-607 2789.

Maidstone. Meets on the first Wednesday of every month contact Ron Moseley, Lord Romney Hill, Weaving Maidstone, Kent, 0622 37643.

Manchester. Contact Clive Embrey, 17 Santon Avenue, Fallow Field, Manchester.

Mapperley. Meets at Arnold & Carlton College, Digby Avenue, Mapperley every Friday. Contact Mark Graves, 8 Digby Hall Drive, Gunthorpe Road, Gedling, Notts NG4 4JT.

Merseyside. Meets fortnightly. Contact P Leather, 27 St Luke's Drive, Formby, Merseyside, tel: 36 74694.

National. Contact Membership Secretary, 30 Brancates Road, Newbury Park, Ilford, Essex IG23 7EP.

Norfolk. Proposed new club. Contact J Blair, 7 Beach Road, Cromer, Norfolk.

Norfolk. Peter Petts, Bramley Hale, Wretton, King's Lynn, Norfolk PE33 9QS, 0366 500692.

Northampton. Contact Peter Ashby, 215 Lincoln Way, Corby, Northants.

Northern Ireland. Meets last Wednesday of each month. Contact David Weddell, 9 Upper Cavehill Road, Belfast BT15 5EZ, 0232-711580.

Northumberland. Graham Saunders, 22 Front Street, Guide Post, Northumberland.

Rhyl. Contact Frank Jones, 77 Millbank Road, Rhyl, Clwyd, 0745 54820.

Slough. Meets at Slough College on second Thursday of month at 7.30pm. Brian Jones, 53 Beechwood Avenue, Woodley, Reading RG5 3DF, 0734 661494.

South-East. Regional Group. Meets at Charles Darwin School, Jail Lane, Biggin Hill, Kent, on third and fourth Thursday of month at 7.30pm. Jack Cohen, 30 Brancaster Road, Newbury Park, Ilford, Essex, 01-597 1229.

South Midlands. Meets at 12 York Street, Stourport-on-Severn on last Thursday of month. M J Merriman at above address.

Staffordshire. 57 Clough Hall Road, Kidsgrove, Stoke-on-Trent.

Stourport-on-Severn. Meets last Thursday of each month. Contact M Merriman, 12 York Street, Stourport.

Teddington. G Squibb, 108 Teddington Park Road, Teddington, Middlesex, 01-977 2346.

Watford. Meets on second Monday of month. Stephen Rabagiat, c/o Institute of Grocery Dist. Grange Lane, Letchmore Heath, Watford, Herts, 01-779 7141.

Witney. Contact Ian Blyth, 40 Wilmot Close, Witney 5171.

Wolverhampton. Meets on first and third Thursday of each month. Contact J Bowman, 6 The Oval, Albrighton, Wolverhampton, W Midlands.

Commodore Pet

Blackpool. West Lancashire Pet Users Club. Meets at Arnold School, Blackpool on

the third Thursday of month. D Jowett, 197 Victoria Road, East Thornton, Blackpool FY5 3ST.

Southern Users of Pets Association. Howard Pilgrim, 42 Compton Road, Brighton BN1 5AN.

Pet User Group Crawley. Richard Dyer, 33 Parham Road, Ilfield, Crawley.

Pet Users Education Group. Dr Chris Smith, Department of Physiology, Queen Elizabeth College, Camden Hill Road, London W8 7AH.

UK Pet Users Club. 360 Euston Road, London NW1 3BL.

Pet Users Group. Meets at Polytechnic of North London, Eden Grove, Room 320. On alternate Tuesdays, 6pm. Barry Miles 01-607 2789.

Pet User Club. Margaret Gulliford, 818 Leigh Road, Slough Industrial Estate, 0753 74111.

Independent Pet Users Group. 57 Clough Hall Road, Kilsgrange, Stoke-on-Trent, Staffordshire.

Commodore Vic

National Association of Vic-20 Owners. Contact S Tomananek, 20 Milner Road, Sherwood, Nottingham.

Burnley. John Ingham, 72 Ardwick Street, Burnley, Lancashire.

Clwyd. Contact A Stanners, 192A Willow Park, Queensferry, Deeside, Clwyd, Wales, 816603.

London. Vic Users Group. Meets on alternate Tuesdays at 6.30pm at Polytechnic of North London, Community Centre, Robin Bradbeer.

London. Contact Jim Chambers, Department of Psychology, University College London, Gower Street, London, WC1, 01-387 7050 x 413. Meets at University College, 26 Bedford Way, London WC1, third Tuesday of each month at 8pm.

Norfolk. J Blair, 7 Beach Road, Cromer, Norfolk, 0263 512849.

Compucolour

Caversham. Compucolour Users Group UK. Meets at Community Centre, Caversham Park Village twice a year. Peter Hiner, 11 Penny Croft, Harpenden, Hertfordshire, 05827 64872.

CP/M

Irish CP/M Users Group. Meets monthly in Dublin area. Doug Nottley, Gardner House, Ballsbridge, Dublin 4, Dublin 686411.

London. CP/M User Group (UK). Subs £7.50. Produces newsletter. Contact David Powys-Lybbe, 01-247 0691.

UK CP/M Users Group. Lesley Spicer, 11 Sun Street, London EC2M 2QD, 01-247 0691.

COSMAC

COSMAC Users Group. James Cunningham, 7 Harrowden Court, Harrowden Road, Luton, Bedfordshire, 0582 423934.

Decus

Decus UK & Ireland. Contact Tracey Pardoe, DECUS, PO Box 53. Reading, Berks RG2 0TW.

Digital Equipment

Digital Equipment Users Society. The Secretary, PO Box 53, Reading, Berkshire, 0734 387725.

Dragon

Slough. Contact J Griffin, 1 Garrard Road, Britwell Estate, Slough. Tel: 75 35268.

Brixham Dragon Owners Club. Meets at Computer Systems (Torbay), Pump Street, Brixham, every Saturday at 2.30pm. Ian Chipperfield, 22 Brookdale Court, Brixham, Devon, Brixham 59224.

Greater Manchester. Contact Melvin Franklin, 40 Cowlees, Westhoughton,

Bolton, Lancs.

Epson HX20

London. Contact Terence Ronson, 25 Sawyers Lawn, Drayton Bridge Road, Ealing, W13, 01-998 1494.

Luton. The Dragon's Den. Contact D Buckingham, 83 Neville Road, Limbury, Luton, Beds.

Education

Birmingham. Education ZX80/81 User Group. Eric Deeson, Highgate School, Balsall Heath Road, Highgate, Birmingham B12 9DS.

Birmingham. MUSE. National body for co-ordinating activity in schools, colleges. Lorraine Boyce, MUSE Information Office, Westhill College, Weoley Park Road, Birmingham, 021-471 3723.

Dublin. Computer Education Society of Ireland. Dairmaid McCarthy, 7 St Kevins Park, Kilmacud, Blackrock, Co. Dublin.

Middlesex. Educational Users Group. Offshoot of National TRS-80 Users Group. Dave Fletcher, Head Teacher, Beaconsfield First and Middle School, Beaconsfield Road, Southall, Middlesex.

Worcestershire. Mini and Microcomputer Users in Education. National organisation. R Trigger, 48 Chadcot Way, Catshill, Bromsgrove, Worcestershire B61 0JT.

Forth

Forth Users Group. David Husband, 2 Gorleston Road, Branksome, Poole, Dorset BH12 1NW, 0202 764724.

Forth Interest Group UK. Meets at Room 408, South Bank Polytechnic London SE1 on the first Thursday of the month. Contact K Goldie-Morrison, Braden Old Rectory, Towcester, Northants.

Forum

Forum 80 Users Group. Frederick Brown, 421 Endike Lane, Hull HU6 8AG.

FX-500P

FX-500-P Users Association. Max Francis, 38 Grymsdyke, Great Missenden, Buckinghamshire HP16 0LP.

Genealogists

Society of Genealogists Computer Interest Group. Anthony Camp, 01-373 7054.

Genie

Colour Genie User Group. Details of meetings/membership from Pat Doohan, secretary, Nottingham (0602) 278791.

Intel MDS

UK Intel MDS Users Group. Lewis Hard, c/o S.P.A.C.E., The Old Coach House, Court Row, Upton-on-Severn, Worcester WR8 0NS.

Ithaca Audio S100

Ithaca Audio S100 Users Group. Dave Weaver, 41 Dore Avenue, North Hykeham, Lincoln LN6 8LN.

Jupiter Ace

Jupiter Ace Users Group. John Noyce, Remsoft, 18 George Street, Brighton BN2 1RH.

Lynx

National Independent User-Group. Subs £9. Contact Robert Poat, 53 Kingswood Avenue, Sanderstead, South Croydon CR2 9DQ.

Mattel

Mattel Intellivision TV Game Group. Warrington 62215 after 4pm.

Medical

Durham. Primary Health Care Group. Dr Alastair Malcolm, British Computer Society, Chevelay Park Medical Centre, Belmont, Durham, 0385 64282.

London. Medical Micro Users Group.

Medicom. 1-2 Hanover Street, London W1. **Middlesex.** TRS-80 Medical and Laboratory Users. Dr Robinson, The Residency, Northwick Park Hospital, Harrow, Middlesex.

Micronet

Micronet Independent User Group. Contact George Foot, Prestel Mailbox No. 892852867.

Nascom

Berkshire. Nascom Thames Valley User Group. Meets at Frogmore Hotel, Windsor, on Thursday fortnightly, 8pm. Mike Rothery, 37 Eaton Wick Road, Eton Wick, Windsor, Berkshire, Windsor 56106.

Birmingham Nascom User Group. Meets at Davenports Social Club, Granville Street, Birmingham on the last Thursday of month, 8pm. Martin Sidebotham, 021-744 3093.

International Nascom Microcomputer Club. 80 Oakfield Corner, Sycamore Road, Amersham, Buckinghamshire HP6 5EQ.

Merseyside Nascom User Group. Meets at Mona Hotel, St James Street, Liverpool, on the first Wednesday of month, 7.30pm. Mr T Searle, 051-526 5256.

Newbrain

Wakefield Independent Newbrain User Group. Anthony Hodge, 15 St John's Court, Wakefield WF1 2RY.

Welwyn. Contact Angela Watkiss, 4 Ninnings Lane, Rabley Heath, Welwyn, Herts AL6 9TD.

Ohio

Ohio Scientific User Group. Tom Graves, 19a West End, Street, Somerset, 0458 45359.

Oric

Avon. Contact Bob Green, 1 Marlborough Drive, Worle, Avon, tel: 0934 21315.

Oric Owners Group. Paul Kaufman, 3 Club Mews, Ely, Cambridgeshire.

Kent. Contact Roger Pyatt, 23 Arundel Drive, Orpington, Kent with SAE or call 66 20281.

Strathkelvin Oric 1 User Group. Contact Colin Failes on 041-776 3654, or SAE to him at 24 Muirside Ave, Kirkintilloch, Glasgow G66 3PR.

Cardiff. 12 Tregarth Court, Creigiau, Cardiff.

Osborne

British Osborne Owners Group. J Anglesea, Flat 19, Rowan House, Mitton Road, Handsworth, Birmingham B20 2JR.

OSI

OSI UK User Group. Richard Elen, 12 Bennerley Road, London SW11 6DS.

Pascal

Pascal User Group. Nick Hughes, PO Box 52, Pinner, Middlesex HA5 3FE.

PDP

Buckinghamshire. PDP8 User Group. Nigel Dunn, 21 Campion Road, Widmer End, High Wycombe, Buckinghamshire, 0494 714483.

Hertfordshire. PDP11 User Group. Pete Harris, 119 Carpenter Way, Potters Bar, Hertfordshire EN6 5QB, 0707 52091.

Pilot

UK Pilot User Group. Alec Wood, Wirral Grammar School for Boys, Cross Lane, Bebington, Wirral, Merseyside LG3 3AQ.

Prestel

ACC National Prestel Committee. Administrates Club Spot 800 (hobbyists on Prestel). Rupert Steele, St John's College, Oxford OX1 3JP.

Research Machines

Birmingham. Research Machines 380Z Peter Smith, Birmingham Educational Computing Centre, Camp Hill Teachers

Centre, Stratford Road, Birmingham B11 1AR.

Leamington Spa. West Midland RML User Group. Spencer Instone, c/o 59 Avenue Road, Leamington Spa.

Newcastle. NERML 380Z User Group. Meets monthly at Micro-Electronics Education Centre of the Polytechnic Coach Lane Campus. Mr Hatfield or Mr Reed, Computer Unit, Northumberland Building, Newcastle Polytechnic, 0632 326002.

Oxford. Research Machines Ltd National User Group. Barry Mawer, 0704 24457.

West Midlands RML User Group. Contact 0926 38751.

Sharp MZ80

Aberdeen. International Sharp Users Group. Graham Knight, c/o Knights Computers, 108 Rossmount Place, Aberdeen, 0224 630526.

Essex. Sharp MZ80K User Group. Joe Street, 16 Elmhurst Drive, Hornchurch, Essex RM11 1PE.

Leeds. Sharp PC1211 Users Club. Jonathan Dakeyne, 281 Lidgett Lane, Leeds LS17 3AQ.

Somerset. Sharp MZ80 Users Club. Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset BA21 4AE.

Sinclair

Aylesbury. Sinclair ZX Computer Club. Ken Knight, 0296 5181.

Brighton. ZX Users Group. J Ireland-Hill Jnr, 145 Godwin Road, Hove, Brighton.

Colchester Sinclair User Group. Meets fortnightly. Richard Lawn, 102 Prettygate Road, Colchester, Essex.

Cardiff. ZX Club. Meets on last Sunday of month, 2pm. Mike Hayes, 54 Oakley Place, Grange Town, Cardiff, 0222 371732.

Doncaster & District Sinclair User Group meets at St Andrews Hall, Morley Road, Wheatley, Doncaster, every Wednesday except the first in each month. Contact John Woods, Doncaster 29357.

Edinburgh. ZX. Meets at Claremont Hotel, Claremont Crescent, Edinburgh, on second and fourth Wednesdays every month, 7.30pm. John Palmer, 56 Meadowfield Drive, Edinburgh, 031-661 3183.

Essex. Contact M Burnett, 24 Inverness Drive, Hainault, Ilford, Essex.

Glasgow. ZX80/81 User Group. Ian Watt, 10 Greenwood Road, Clarkston, Glasgow, 041-638 1241.

Liverpool. ZX Computer Club. Meets at ZX Computer Centre, 17 Sweeting Street, Liverpool, on Wednesday, 6.30pm. Keith Archer, 051-260 4950.

London. National ZX User Club. Tim Hartnell, Interface, 44-48 Earls Court, London W8.

London. Sinclair User Group. Meets at Polytechnic of North London, Room 2-5 Tower Block. Monday, 6.30pm. Irving Brand, Polytechnic of North London, Holloway Road, London.

Manchester Sinclair Users Club. Meets at Longsight Library, 519 Stockport Road, Longsight, Manchester, every Wednesday at 7.30pm. Call 061-225 6997 or 061-445 6316.

Nottingham ZX Spectrum Club. D. Beattie, 63 Kingsley Crescent, Sawley, Long Eaton, Nottingham MG10 3DA.

Scunthorpe. Grange Farm ZX Computer Club, Scunthorpe, South Humberside. Meets first and third Tuesday of month. Contact Sheila & Fred Wilkinson, 0724 842970.

Staffordshire. ZX80 National Software Association. 15 Woodlands Road, Wombourne, Staffordshire WV5 0JZ.

Suffolk. ZX Amateur Radio User Group. Paul Newsman, 3 Red House Lane, Leiston, Suffolk, SAE essential. No telephone inquiries.

Surrey. Guildford ZX80/81 Users Group. Meets Fridays. A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0483 62035.

Surrey. ZX80/81 User Club. David Bigden, PO Box 159, Kingston-upon-Thames,

Surrey KT2 5UQ.

West Sussex. Hassocks ZX Micro User Club. Paul King, 25 Fir Tree Way, Hassocks, West Sussex.

Sirius

Sirius User Group. Ray D'Arcy, Sirius User Club, The Microsystems Centre, Enterprise House, 7-71 Gordon Street, Luton, 0582 412215.

68XX

68XX Special Interest Group. meets third Tuesday of each month. Contact Jim Anderson, 01-422 4724.

6809 User Group

6809 User Group. Produce bi-monthly newsletter. Contact Mr Gibbons, Clarence Lodge, Hurdon Road, Launceston, Cornwall PL15 9DB.

Software

London. Software Group. Meets at Polytechnic of North London, Room 2-3 Tower block Thursday, 6pm. Mike Duck at Polytechnic of North London, Holloway, London N7.

Oxford. Program of the Month Club. Mr Durrant, 55 St Thomas Street, Oxford OX1 1JG, 0855 250333.

Sorcerer

Liverpool European Sorcerer Club. Monthly meetings. Colin Marle, 32 Watchyard Avenue, Formby, near Liverpool L37 3JU, 07048 72137.

Surrey. Exidy Sorcerer User Group. Andy Marshall, 44 Arthurs Bridge Road, Woking, Surrey GU21 4NT.

Spreadsheets

International Electronic Spreadsheet Users Group. UK Alpha House, 7th Floor, Rowlandsway, Manchester M22 5RG.

Tandy

Tandy Model 100 User Group. SAE to Remsoft, 18 George Street, Brighton, tel: 0273 602354.

Tangerine

Avon. Tangerine Users Group. Bob Green, 1 Marlborough Drive, Worle, Avon, 0934 21315.

Bristol. Tangerine Homebrew. A Coales, 35 Mogg Street, St Werburghs, Bristol BS2 9UB.

Texas Instruments

Brighton. Contact Clive & Audrey Scally, 40 Barrhill, Patcham, Brighton, Sussex.

Ireland. Proposed new club. Contact Mrs Ann Flynn, 53 Georgian Close, North Road, Drogheda, Co. Louth, Eire.

Leeds. TI99/4A User Group. Meets at 30 Gipton Wood Road, Leeds 8, Mondays 7pm. I Youlden, 0532 401408.

Manchester. TI User Group. T Grimshaw, 21 Allingham Street, Longsight, Manchester.

Manchester. TI9900 User Group. Chris Cadogan, Department of Computer Science, University of Manchester M13 9PL.

Nationwide TI Users Group. Contact TI99/4A Exchange, Independent TI Users, 40 Barrhill, Patcham, Brighton BN1 8UF.

Triton

Triton User Group. Nigel Stride, Transam Ltd, 12 Chapel Street, London NW1, 01-402 8137.

TRS-80

Birmingham. National TRS-80 User Group. Meets at Adam & Eve Pub, 1st Floor, Bradford Street, Birmingham on last Friday of month. Michael Gibbons, 1 New Street, Castle Bromwich, Birmingham B38 9AP, 021-747 2260.

Chelmsford. TRS-80 User Group. Michael Dean, 22 Roughtons, Galleywood, Chelmsford, Essex.

Durham. North East TRS-80 User Group. Meets at Information Technology Centre, Gateshead on the third Wednesday of month, 7pm. J Dunn, 8 Ettrich Terrace, North Gateshead, County Durham.

Edinburgh. Scottish TRS-80 and Genie User Group. Meets at Mansion House Hotel, Milton Road, second Thursdays of month. Dick Mackie, 72 Morningside Drive, Edinburgh EH9 1DX, 031-447 6651.

Herts. Contact Reg Smith, 24 Sempill Road, Hemel Hempstead, Herts, 0442 60085.

Hull & District TRS-80/Beeb Users Group. Meets second Tuesday of month and Thursday 16 days later at Psychology Dpt, Hull University. Contact J Lawrence, 2a Hall Road, Hull HU6 8SA.

Isle of Wight. TRS-80 User Club. Meets at London Hotel, Ryde on last Friday of month. 7.30pm. Sean Coulson, 0903 614589.

Kent. TRS-80 User Group. Alan Reid, 22 Woodeys Road, Rainham, Kent, 0634 367012.

Greater Manchester. Northwest TRS-80 User Group. Meets at Barton Aero Club, Barton Aerodrome, Irlam, near Manchester on last Wednesday of month, 8pm. Melvin Franklin, 40 Cowlees, Westhoughton, Bolton, Lancs.

Lancs. TRS-80 Colour Computer Group. Subs: £3. Contact Ian Wild, 53 Darnton Road, Ashton-U-Lyne, Lancs OL6 6RL.

Liverpool. Merseyside TRS-80/Video Genie User Group. Meets second Thursday of month. 7.15pm. Peter Toothill, 101 Swanside Road, Liverpool L14 7NL, 051-220 9733.

London, SW. TRS-80 User Group. Ron Everitt on 01-394 2123.

Merseyside. TRS-80 User Group. N Rushton, 123 Roughwood Drive, Northwood, Kirby, Merseyside.

Milton Keynes. National TRS-80 and Genie User Group. Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes.

Nottingham. TRS-80 Genie Users Group. Meets at Wilford Moderns Rugby Club House on first and third Wednesday every month at 7.30pm. Contact Geoffrey Hillier, 5a Gregory Street, Lenton, Nottingham NG7 2LR, Nottingham 783938.

Nottingham. East Midlands TRS-80 User Group. Mike Costello, 15 Langbank Avenue, Rise Park, Nottingham NG5 5BU, 0602 751753.

London. TRS-80 Genie Group. Meets at Central Common Room, The Residency, Northwick Park Hospital on first Sunday of month. Dr Nick Robinson, Central Room, The Residency, Northwick Park Hospital.

Northants. TRS-80 User Group. Meets at Welwyn Park Community Centre on alternate Thursdays at 7pm. Neil Griffiths, 0858 65718.

Colour Genie

International Colour Genie Users Group. Write with SAE to The Secretary, NCGUG, 46 Highbury Avenue, Bulwell, Nottingham, 0602 278791.

National Colour Genie User Group. Marc Leduc, 46 Highbury Avenue, Nottinghamshire NG6 9DB.

UCSD

Hants. UCSD System Users Society. John Ash, Dicoll Data Systems Ltd, Bond Close, Kingsland Estate, Basingstoke, Hants RG2 0QB.

Oxford. UCSD Pascal UK Users Group. Malcolm Harper, Oxford University Computing Laboratory Programming Research Group, 45 Banbury Road, Oxford OX2 6PE.

Bedfordshire

6502 Bedfordshire. 6502 User Group. Walter Wallenborn, 21 Argyll Avenue, Luton, Bedfordshire LU3 1EG, 0582 26927.

Hants. 6502 User Group (Southern Region). Steve Cole, 70 Sydney Road, Gosport, Hants.

Newbrain Model AD built in display, unused, one week old only, fully guaranteed, would part exchange for BBC A or B, printer disk drive etc or sell £220. Tel: Bracknell (0344) 28540.

Atari 400/800 disk software to swap. Tel: Mr Everett: Ingrebourne 47548.

M20 games from Germany: Pac man, Space Invaders graphics and 15 other games, £22 (cheques) incl P&P + diskette. Rapp, Dauliger Street 18, 7133 Maulbronn, West Germany.

T199/4A plus X Basic, Parsec, Invaders, cassette lead, joystick £170. Tel: (0455) 634074.

BBC disk interface, £70. LVL dual 200K disk drives, £340. Microvitec colour monitor, £260, all new. Acornsoft cassettes, £4. Micropower games, £3.50. Tel: Daventry 3792.

Intellivision with voice module and 12 cartridges, £150. 276 Lower Broughton Road, Salford 7, Lancs. Tel: 061-792 4108 after 6pm. Buyer must collect.

BBC Model B, cassette recorder and lead, 6502 assembler manual and other books, Beebug magazines, some software cassettes, £275 for quick sale. Tel: Farnborough (0252) 549521 evenings.

Oric 1 48K includes £25 tape recorder plus Xenon 1, Frogger Flight, Mushroom Mania, Dinky Kong, Galaxians, Grail, magazines, as new £150 cash. Tel: Pudsey 561760.

Commodore Pet 2001 8K, £160 ono. Tel: 0484 643047 after 6pm.

Oric-1, 48K, as new, Xenon 1, printer cable, (worth £15), also programming book £130. Tel: 3096 (Oxford). Ask for Les.

Exchange car, Fiat 124, 1975, taxed, MoT, superb order, wanted BBC A or B disk drive, interface etc. Cash either way. What have you? Tel: Bracknell 0344 28540.

Seikosha GP100VC for sale, new and boxed, unwanted gift, new £230, will accept £185. Tel: (Hoddesdon) 0992 443627 evenings and weekends.

Acorn Atom 12K RAM, 12K ROM, PSU, manual leads, Magic Book and listings, still boxed. Also invader tape, £90. Tel: (0532) 563575.

TRS-80 Model III 48K plus CTR-80A recorder plus software catalogues games cassettes, full documentation, £550 ono. Powerful home or business computer. Tel: Mansfield 758910.

Lynx 48K, excellent condition, plus book, two games and newsletter, still under guarantee, £185 ovno. Tel: 01-735 4861 Ext. 69 (day), 01-656 2897 (evenings).

Dragon 32 plus CGP 115 printer plus over £70 worth of software, mint condition. Cost £430, will sell for £355 ono. Tel: 01-883 2381 after 6pm.

Apple II Z80 Card, £50, CP/M 2.2 with Microsoft Softcard Manual, £60. Copying Software Locksmith 4.1, nibbles away and back-it-up, £20. John 128A, High Street, Orpington, Kent. Tel: Orpington 23903 (day).

Vic-20 computer, 16K cartridge, C2N cassette, books, 3 cartridge games, 5 cassette games, excellent condition. Cost £396, £180 ono. Tel: 01-808 0096.

Oric 48K, brand new replacement machine, boxed, complete with £19 software: Xenon, Invaders, Mushroom Mania, Moving house. Only £130 incl carriage. Tel: 0255 429984. Bargain.

ZX81 16K computer with 20 games plus 15 magazines, every item with the compu-

PCN Billboard

ter, 9 months old, £65 for quick sale. Will sell separately. Tel: 01-504 7203.

Apple II Europlus 48K, monitor, manuals, books and £200 worth of games on tape and disk, still under guarantee, £575. Tel: Chester 380082.

Tandy PC1 pocket computer, complete system with printer, cassette interface, software, batteries, mains adaptor, charger. Cost £150 new. Now at less than half price — £69. Tel: Bristol (0272) 635419.

Voyager 1 (1 tape only), 3-D Spacestation maze, graphic adventure, 4 levels, 120 rooms robots in pursuit, shuttle craft, nuclear generators etc. Colour and sound runs on Atari (32K), Apple II (32K), Pet CBM (32K), TRS 80MoDi+III (16K), £9.50. Tel: Mike Bolton 593313.

T199/4A modules for sale. Tombstone City, the Attack and Hunt the Wumpus. All immaculate, original packing, £8 each. Tel: Brian on 0501 70347.

Dragon 32 complete, manual, books, magazines, joysticks, cassette recorder, software worth over £200 included. Total value over £500. Asking £200 ono. Contact Harry on 01-727 6956 for further details.

Wanted Sharp MZ80B secondhand software, especially any business. Offers. Tel: Richard on Camberly (0276) 61948 after 8pm.

Acorn Atom 12K + 8K + PSU, in very good condition, £100. Tel: John on Cambridge 841226 after 5pm.

Vic-20 + 16K, 3K, speech synth, Gorf cartridge with over 150 games, £250. Tel: Martin on New Milton 618216.

Spectrum 48K printer, programmable joystick plus interface, Sony recorder plus software worth £100. Cost £325 new. Accept £225 the lot. Tel: 041-637 0808.

Lynx 48K, excellent condition, includes reset button, still boxed with all leads and cassettes, £195. Tel: Andrew on Newark (0636) 79786.

Centronics 761 teleprinter RS232 300 baud interface, 80/132 column, full documentation, excellent condition, £250. Modem 2A in good order, £40. Both collect. Tel: (0242) 27588.

Mattel Intellivision plus 23 cartridges: Pitfall, Star Strike, TRCM, Dungeons and Dragons, Lock'n Chase Space Armada Skiing etc. Worth £560+, £250 ono. Tel: Pudsey 561760.

Sharp 1500 with CE150 printer/interface, CE153 software board, CE155 8K RAM module with all manuals and several business programs. Bargain at £300. Tel: Huntingdon 830505.

Atari Software: Disk cartridge and cassette. Most under half price. Over 30 titles including Donkey Kong, Qisc Skyblazer and SAM Speech Synthesiser. Tel: Quorn 413745 after 4.30pm.

Pair of Memorex 552 8" dual sided disk drives, as new, £320 ono the pair. Will separate. Tel: Mike on Guildford (0483) 38177.

Texas T1994/A, seven weeks old, four modules including Chess, Parsec, seven cassettes, joysticks, £235. 3 Newbury Road, Houghton Regis, Dunstable, Bedfordshire. Tel: 0582 863606.

ZX81 16K, Bipak sound unit, m/c book, £90. Quality software, all for £55 ono. May split. Tel: Richard on (Birmingham) 021-308 5201.

Atari 400 recorder. Basic, two joysticks, Protector II, Submarine Commander, Airstrike, Jumbojet Pilot, Picnic Paranoia, Galactic Chase, Ghost Hunter Zaxxon. Worth £500. Accept £275. Tel: Stourbridge (03843) 75141 evenings.

16K ZX-81 manual and leads, Filesixty keyboard, software including Pimania, Winged, Avenger, Galaxians, M. Orwin cassette (4), etc. £80 ono Tel: Paul on Motherwell 63421 for details.

Vic-20, nearly new, plus C2N, nine tapes, including Gridrunner, Annihilator, Crazy Kong, 16K Rampack, Competition pro joystick. Worth excess £300, will accept £250. Tel: John Tudor on Lyndhurst (Hampshire) 2446.

ITT 2020 48K Applesoft Basic, £300. DS disk drive plus controller, £300. £550 together including lots of software. Tel: Robin on (0323) 639351 (day).

Spectrum software to swap. Don't be bored with your same old games, swap them with mine — 16K or 48K. Tel: Vicki on Potters Bar 53596.

Newbrain Model A virtually unused, £205 includes beginners guide, printer cable and manufacturers warranty. Rob, 41 Woodhouse Lane, Sale, Cheshire M33 4JZ. Tel: 061-969 3223.

Vic-20 + C2N cassette + "Introducing Basic", "Gortek", loads of books, magazines, cassettes, cartridges, nine months guarantee, as new, £130 ono. Tel: 01-958 8789.

Bargain 16K ZX81 plus £90 of best software for only £90 ono. Tel: Simon on 01-202 7798 after 5pm.

BBC Model B, new 1.20S with £300 of only the best and latest software, £370 ono. Can deliver to your door. Tel: 074574 796.

Spectrum 48K complete with tapes and books, still in guarantee until March '84. Worth £192 new, sell for £100. Tel: 01-262 0468 after 6pm.

Atari 800 48K, Basic cartridge, manual and 410 programme recorder, still under guarantee, £240. Software and books negotiable. Tel: 01-555 5559.

Microtan 65 System in mini system rack, includes ASCII keyboard worth over £400. First £195 accepted. Tel: Keith 0482 812416.

T199/4A all manuals, cassette cable, TI Home and 99ER magazines, games tape, £100, also extended Basic cartridge £50 + Space Invaders £12. Tel: Oakham (0572) 57212.

BBC Model B wanted with disk drive(s) colour TV (Monitor) and software. Will buy separately. Tel: Leics (0533) 393146 after 6 or at weekend.

Dragon 32 with joysticks, £100 of software, complete machine-code programming package, plus magazines and more games. Cost £340 new; three months old: £200. Tel: 01-444 6911.

Spectrum original software for sale, £3 each inc Painter, Penetrator, 3D Tunnel, Golf Arcadia, Time-Gate Orbitor, Black Crystal, Labyrinth and more. Phone: 01-834 3487 (Pimlico) after 3.30.

Swap Dragon 32 + joysticks + six cassettes for Sharp MZ80K, any age but good condition. Cash adjustment for newer or expanded models. Tel: (061) 962 5838 after 6pm.

16K Vic20, C2N cassette unit, 70 games, joystick, cartridges, books, magazines, adventures, listings, boxed, seven months old. Cost £350, sell for £200. Tel: Mark (0924) 253251.

Vic20, C2N cassette, Super Expander, joystick, Reference Guide, books and magazines, excellent condition, will accept £150. Tel: Washington (091) 416 5556 4-8pm, buyer collects. Must sell.

Spectrum 48K with Kempston joystick and interface also Honeyfold computer course and loads of software, books, keyboard overlays etc £140 ono. Tel: Leicester 539583.

Mattel Intellivision with voice unit and 12 cartridges including two voice. Total value £450, will sell for £115 ono. Ring Southampton 785699 after 6pm.

Atari 400: Basic, joystick, manuals, Zaxxon, Defender, Choplifter, Miner, Sea Dragon, Baja Buggies, Energy Izar, still guaranteed, only £275. Tel: 031-552 5964 (evenings) — Paul.

BBC system: Model B & disk interface & Wordwise £450. Mitsubishi 800K oval drive 40/80TK £590 ono. View word pro £45. All superb condition with cables & manuals. Canterbury 750600.

Wanted: BBC owners to swap software. Many titles (Phone for list). Snooker particularly wanted. Phone Harpenden 69152. (Disk owner preferred but not essential).

Wanted: CBM 1541 disk drive (as new condition) for my 48K MZ80K (integral cassette + monitor) + software or sell £250. Tel: Cardiff 732955. Can you help?

T199/4A computer, hardly used, £100. Cartridges: Chess, Personal records, £20 each. Also T155-II programmable LCD calculator, £20. F Richardson, 20 Callerton Close, Ashington, Northumberland NE63 9QT.

Acorn Atom 8K + 12K PSU, MANUAL, TAPES, Poundgate teleprinter interface, Magic book — £140 ono. Tel: 0265 848379 N Ireland.

Texas T199/4 computer, Extended Basic, Attack Zenozap and Chess modules plus cassettes plus joysticks, over £300 worth, only £175. Tel: 0454-613831 (Bristol area).

Wanted BBC B preferably within guarantee. Will pay up to £350 depending on condition/extras. Tel: Richard 01-680 9942 after 6pm.

G4 software for sale, or swap. Pakacuda, Grave Robbers, Shadowfax, Motor Mania £3.75 each. Tel: (Bracklesham Bay) 670 171. Jamie (evenings).

Swap my Atari VCS plus six games cartridges for printer, colour monitor, disk drive, BBC disk upgrade or W.H.Y. (cash adjustment possible). Tel: 01-868 3825.

Spectrum, unwanted software. Datafile, Dungeon Master, Automonopolie, Timegate, Inca Curse, Microbridge. Half price inc p&p. Spectrum Console Case £8. York 763875.

Spectrum 48K + joystick, books over £100 of software including Forth, tape recorder magazines £200 or swap + cash BBC B. Tel: Telford (0952) 583712 anytime.

Atari 800 (48K) + tape deck + software and books worth over £900, sell for £350 ono. Phone (0253) 403994.

Billboard Buy & Sell Form

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

Your name:

Address:

Telephone:

DATABASICS

This week PCN Databasics lists a selection of add-ons for your micro. PCN keeps you up to date in three-week cycles, listing peripherals, then software, followed by micros.

Printers are best categorised by print-head type. The two most common methods of transferring type to paper are the **Dot matrix** and **Daisywheel** techniques.

A dot matrix printer uses a row of pins which are programmed to strike the paper through a ribbon and form the character as a pattern of dots.

The daisywheel acts more like a conventional typewriter, the character set being pre-formed on a wheel with each character on a separate spoke. As the interchangeable wheel rotates it is struck by a hammer to form the character impression.

Dot matrix printers tend to be faster than daisywheel but offer lower print quality.

In selecting a printer make sure the **interface** on your computer is compatible with those available as standard or at extra cost on the printer.

The ● sign means the interface is included in the price; ○ means you have a choice of interfaces included in the price; + means the interface will cost extra.

PERIPHERALS

Make & Model	Price inc VAT	Printhead type (M = matrix)	INTERFACES						I-EEE	Centronics	20ma	RS232	Others ●	Others (+)		
			inc in price, ● at extra cost (+)	options	options	options	options	options								
PRINTERS																
Adler TRD 170	£833	Daisywheel							●			●				
Anadex DP 9000A	£1,397	M 7×9, 9×9							●		●					
Anadex DP 9001A	£1,397	M 7×9, 11×9							●		●					
Anadex DP 9500	£1,397	M 9×9							●		●					
Anadex DP 9500A	£1,397	M 7×9, 9×9, 13×9							●		●					
Anadex DP 9500L	£1,295	M 7×9, 9×9							●		●					
Anadex DP 9501	£1,397	M 7×9, 11×9							●		●					
Anadex DP 9501A	£1,397	M 7×9, 11×9							●		●					
Anadex DP 9620A	£1,489	M 7×9, 9×9, 13×9							●		●					
Anadex WP 6000	£2,616	M up to 18×20							●		●					
ASP 3500	£977	M 9×7, 9×9							○		○					
Brother HRI	£747	Daisywheel							○		○					
Canon AP400	£1,140	Daisywheel							●		●					
Centronics 159/4	£962	M 9×7							●		●					
Centronics 150/4	£682	M 9×7							●		●					
Centronics 152/4	£788	M 9×7							●		●					

PRINTERS

Proportional spacing puts the same space between characters whether they are a long 'm' or a short 'i'. **Block graphics** builds up pictures using rectangular blocks, while **High Resolution Graphics** uses smaller dots.

Bidirectional means the printer can save time by printing left to right and then doing the next line backwards right to left. Similarly, **Logic Seeking** enables the machine to save more time by printing the short lines without sweeping over the whole width of the page.

Feed methods comprise **fanfold** which uses continuous stationery sheets folded road-map style drawn into the printer by a tractor mechanism. The tractor cog fits into holes in the fanfold paper and takes the paper past the printer mechanism. **Roll** is a roll of paper that feeds into the printer, usually using **friction feed** where the paper is gripped between two rollers, typewriter-style. **Cut sheet** indicates the printer uses single sheets like a typewriter.

Distributor: to find which company distributes a particular add-on, use the code listed in this column to refer to the distributor table.

The table is at the end of the listings, and gives the distributor's name and telephone number.

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PRINTERS

Systeme System

DISK DRIVES

This section is divided into categories covering 5 1/4 in and 8 in floppy disks. Disk data **capacity** is measured in kilobytes (K): one kilobyte = 1,024 characters. A **no of disks** column is included because some disk units contain two disk drives.

Manufacturers can vary the number of disk data **tracks** and these are divided into sectors. This **sectoring** system allows the information to be stored and retrieved by reference to a timing mark on the disk so the computer can keep track of its rotation. The system can be hard, where reference is kept by a hole in the disk, or soft, where the disk position is monitored by magnetic signals.

Some drives have one read/write head for each side of the disk so the buyer has a choice between **single or double-sided** drives. **BS** means that the drives are both single and double-sided.

As disk technology advanced it became possible to cram more data onto the floppy so drives will feature either **single or double (data) density**. **BD** means that the drives are both single and double density.

The interface acts as an interpreter so the computer and disk can exchange information. Each device must have the same interpreter before a useful cable connection can be made. The **connect to** column allows you to match the disk interfaces to those included in the disk drives or available at extra cost.

Make and Model	Price inc VAT	Capacity	No. of disks	Tracks	Sectoring	Sides and density	Connects to	Distributor
							I-EEE RS232 BBC Apple II St. Shugart Nasbus Gemini 20ma Others	
Apple II	£399	143K	1	35	16	SS,SD		P2
Altari	£299	90K	1	40	Soft	SS,SD		A4
BASF 6106	£195	500K	1	48	Both	SS,BD		B6
BASF 6108	£240	500K	1	48	Both	DS,BD		B6
BASF 6118	£279	1Mb	1	96	Both	DS,BD		B6
Canon X8300	£600	640K	2	80	Soft	DS,DD		C5
CD 40	£679	400K	2	40	Both	SS,BD		C6
CD 50A	£424	500K	2	40	Both	SS,BD		C6
CD 50E	£569	1Mb	2	80	Both	SS,BD		C6
CD 50F	£712	2Mb	2	80	Both	DS,BD		C6
CD 80	£765	800K	2	80	Both	SS,BD		C6
CD 80D	£949	1.6Mb	2	80	Both	DS,BD		C6
Commodore 2031	£454	171K	1	35	Soft	SS,DD		C2
Commodore 4040	£799	343K	2	35	Soft	SS,DD		C2
Commodore 8050	£1,029	1Mb	2	77	Soft	SS,DD		C2
Commodore 8250	£1,489	2Mb	2	154	Soft	DS,DD		C2
Commodore VIC 1541	£229	171K	1	35	Soft	SS,DD		C2
Control Data 9408	£221	250K	1	40	Both	SS,BD		C7
Control Data 9409	£272	500K	1	40	Both	DS,BD		C7
Control Data 9409T	£420	1Mb	1	80	Both	DS,BD		C7
Control Data ZL141	£225	250K	1	40	Both	SS,DD		M5
Control Data ZL141B	£175	250K	1	40	Both	SS,DD		M5
Control Data ZL142	£360	500K	2	40	Both	SS,DD		M5
Control Data ZL241B	£240	500K	1	40	Both	DS,DD		M5
Control Data ZL291	£380	1Mb	1	80	Both	DS,DD		M5
Control Data ZL291*	£405	500/1Mb	1	40/80	Both	DS,DD		M5
Control Data ZL291B	£320	1Mb	1	80	Both	DS,DD		M5
Control Data ZL292	£640	2Mb	2	80	Both	DS,DD		M5
CS 40	£482	200K	1	40	Both	SS,BD		C6
CS 50A	£229	250K	1	40	Both	SS,BD		C6
CS 50E	£305	500K	1	80	Both	SS,BD		C6
CS 50F	£397	1Mb	1	80	Both	DS,BD		C6
CS 80	£523	400K	1	80	Both	SS,BD		C6
CS 80D	£627	800K	1	80	Both	DS,BD		C6
Cumana AS100	£252	200K	1	35	Soft	SS,BD		C6
Cumana DA8035	£857	655K	2	80	Soft	SS,BD		C6

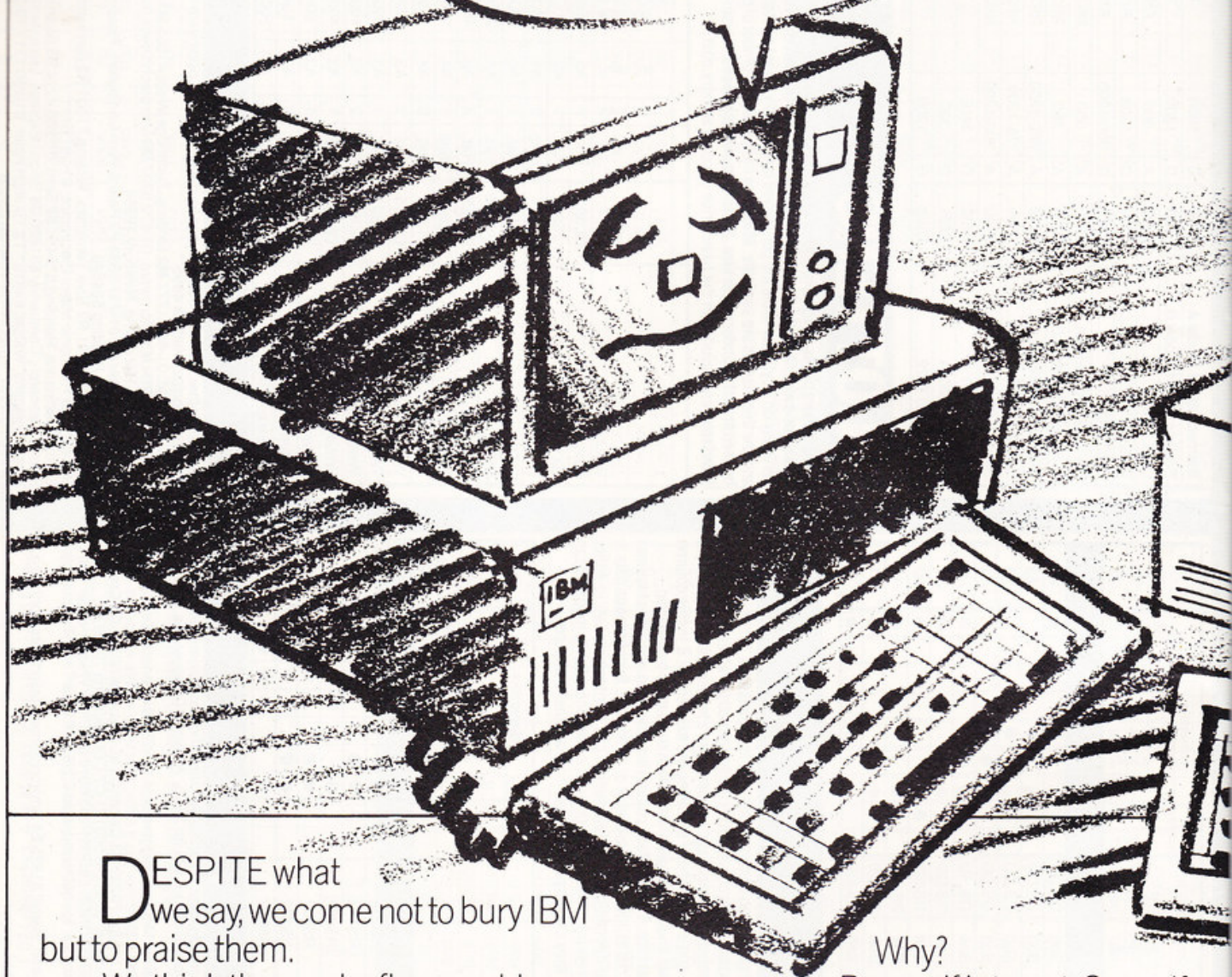
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Lowe EG 400AT	£426	200K	2	40	Soft	SS,BD		L1
Lowe EG 400T	£253	102K	1	40	Soft	SS,BD		L1
M 4853	£311	1Mb	1	80	Soft	DS,DD		A3
M 4854	£368	1.6Mb	1	77	Soft	DS,DD		A3
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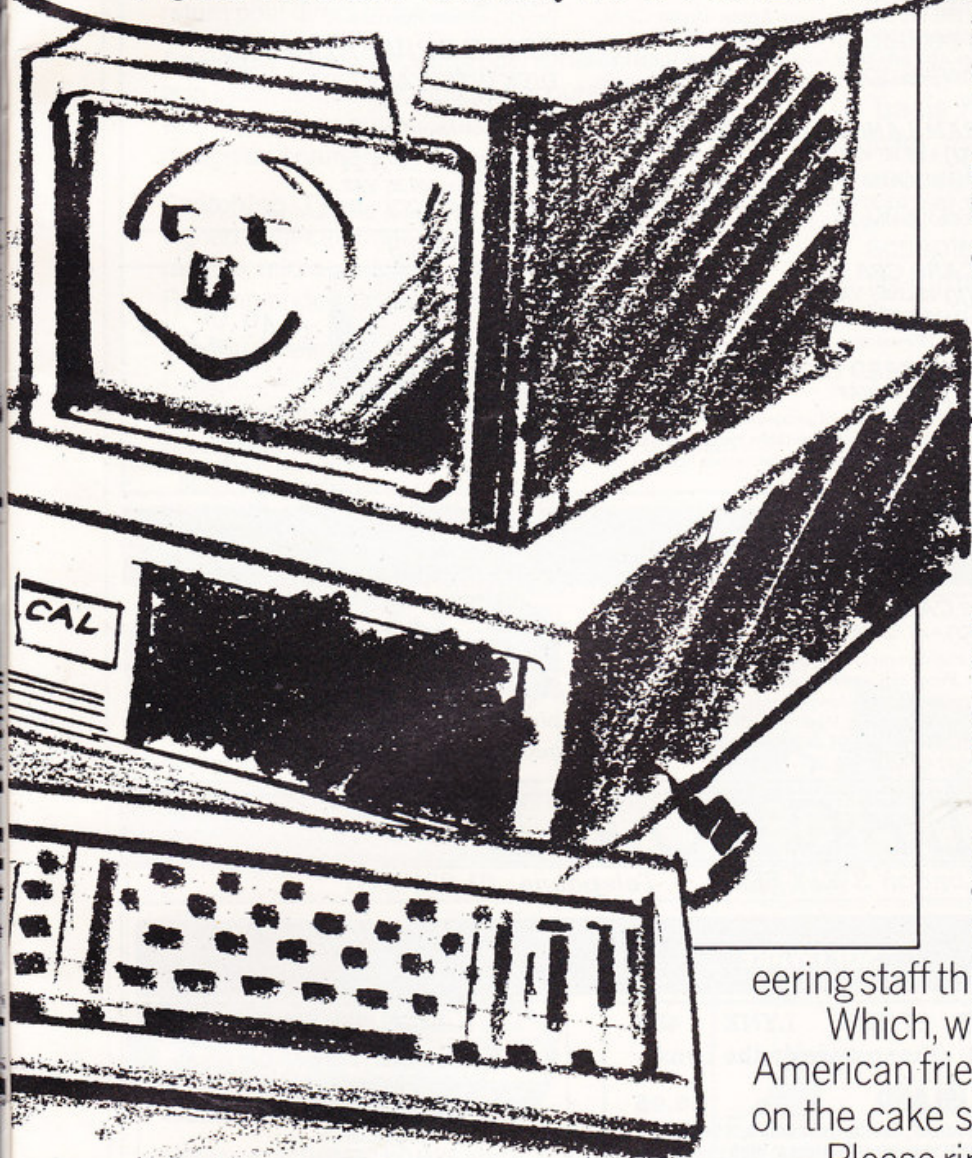
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● **Monopoly for BBC 32K**. Up to six players including the computer. Gamesave facility plus many other features. The computer considers deals and offers exchanges, £6.50. I. A. Skelly, 31a Hillfield Drive, Heswall, Merseyside L61 6UJ.

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Laughline winner

Our picture of Cliff Michelmore and Wendy Craig outside Acorn's Home of the Future drew a rib-tickling response from many of you.

One of our favourites was from Simon Williams down in Devon, who puts Cliff Michelmore into another of his roles: 'Holidaymakers' who've booked a fortnight at Acorn De Cusi for this season have been assured by the operators that a villa like this will be available sometime during

1984.'

Mr J Baker of Peterborough suggested:

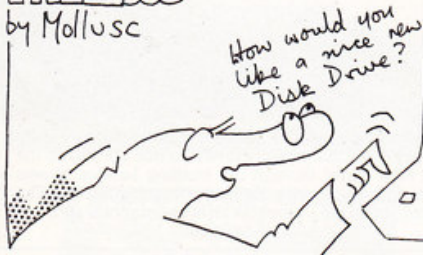
Cliff — 'What is this ROM?'
Wendy — 'Ran Out of Money, dear.'

But the winner of Laughline this time is Richard Porter from Croydon, who wins £20 for putting these words into Cliff Michelmore's mouth: 'Well I'm sorry but the voice operated lock won't take any notice of me. We'll just have to wait until Kenneth Kendall gets here.'



PAL 2000

by Mollusc



what's the catch?
what are you after?

My computer
doesn't understand
me!

Oric wows 'em en Français

Hats off this week to Oric, which has achieved the coveted title of 'Best Home Computer' in France.

This award, the French home computer business's Golden Rose, came Oric's way after 25 French computer journalists assessed it with its competitors. And the Oric-loving French have bought 35,000 of the systems since they were launched in France in February.

Any micro maker with a bit of initiative might see the prospect of valuable publicity in this kind of award. How long will it be before we're hearing that the Nascom 1 is number one in Papua New Guinea, or the Newbrain a smash hit in Upper Volta?

Syntax Errors

Wrong head

On our review of Longman Software's packages for the Spectrum last week, we headlined it as though they ran on the BBC Micro. Apologies to all concerned.

Silent running

We've run into trouble over the Singing Spectrum project in Issue 28. The circuit diagram has caused problems and the components hard to find. We will correct and clarify the projects in Issue 35. It would be best to put the scheme on ice until then — sorry!

NEXT WEEK

- **Intellivision** — A fresh look for a familiar system with typewriter and musical keyboards.
- **Micropaedia** — PCN's pull-out programming course moves into part three.
- **Windfall** — We examine an EPROM blower for the Apple.
- **Colour Coded** — Machine code programming on the Colour Genie.
- **Gameplay** — Reviews of software for the Dragon 32, Atari and Spectrum systems.

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
Leicester Apple Village	October 9-12	Leicester Exhibition Centre	Database Publications, 061-456 8383
The Professional Personal Computer: Markets and Strategies	October 11-12	Intercontinental Hotel, Hamilton Place, London W1	Financial Times Conference Organisation, 01-621 1355
Computer Graphics European Conference & Exhibition	October 18-20	Wembley Conference Centre	Online Services, 09274 28211
International Business Show	October 18-26	NEC, Birmingham	Beta Exhibitions Ltd, 01-405 6233
Microcomputer or Word Processor?	October 20	Piccadilly Hotel, Manchester	IWP Association, 01-242 8699
Computer Open Day Exhibition	October 27	Park Hotel, Cardiff	Tony Kaminiski, Couchmead Communications Ltd, 01-788 1102
Lancaster & Morecambe Computer Club Open Day	October 29	Lower Town Hall, Lancaster	Brian Sheldon, 0524 61831
Software Expo	November 8-10	Wembley Conference Centre, London	Interco, 01-948 3111
Malvern Micro Fair	November 12	Malvern Winter Gardens, Worcestershire	Personal Computer Fairs, Worcester 22659
Manchester Apple Village	November 13-16	Belle Vue, Manchester	Database Publications, 061-456 8383

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Info '83	October 10-13	New York, USA	Cahners Exposition Group, 0483 38085
Computer Systems International Trade Fair & Congress	October 17-21	Munich, West Germany	ECL Exhibition Agencies, 01-486 1951
Computer Technology Exhibition	October 18-21	Kuala Lumpur, Malaysia	Conference & Exhibition Management Services SDN BHD, 9-A Jalan SS24/8, Taman Megah, Petaling Jaya, Selangor.

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If you have a different make of computer, but are interested in the Hobbit system, send us a stamped addressed envelope and details of your computer so that we can send you advance information of new products when they become available.



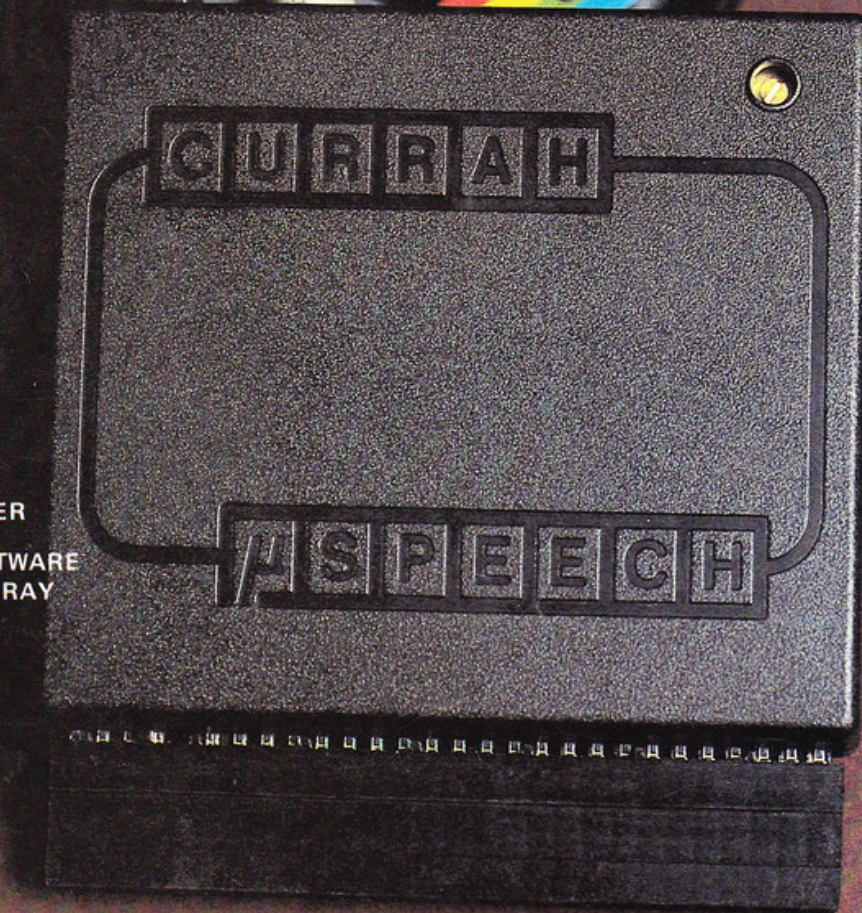
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Tel. 099 421 515. BBC Hobbit £135.00 + £3.00 p&p. BBC Second drive £120.00 + £3.00 p&p. Zero Memory Option £25.00 (£18.00 if ordered with the Hobbit). Power Supply £12.00. Manual (ordered separately) £1.50 (No VAT; refundable on purchase of Hobbit). Nascom Hobbit (unboxed) £120.00. Nascom second drive £94.00. Basic Upgrade Kit £10.00. Box of 6 cassettes £17.50. Cleaning cassette £3.50. Please add VAT at the current rate to the above prices.
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